

MARJO FLYKT

Prenatal Representations Predicting
Parent-Child Relationship in
Transition to Parenthood

Risk and family dynamics considerations

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FIRST LULLABY

Do goldfish sleep?

I asked when I was a child

Watching my shy pet fish with wide-open eyes

Swimming round and round his bowl, and never blinking.

Now, thinking of you

Little fish, little frog, little one

Swimming deep inside me, sight unseen

I wonder, do you sleep?

and do you dream?

I've seen your picture once, through waves of sound

But mostly must imagine who you are.

Do you dream of me, as I dream of you

Little flutter, little infant, little one?

Do you dream of falling

Streams flowing down

Walls and waves that hold you close around?

Do you hear music, raindrops, thunder—

Do you wonder where you are, and where you're going?

Little dormouse, little starfish, little light

Do goldfish dream? How do you spend the night?

-Ellen S. Jaffe/Birth Songs

Nainen tarvitsee elämässään kahta asiaa:
huumoria ja punaiset korkokengät.
Tohtorintutkinto on hyväksi, muttei välttämätön.
(Riikka Pulkkinen: Totta)

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ABSTRACT

The aim of this study was to examine parents' prenatal representations of attachment and caregiving and the effects of these on postnatal parenting, using three different samples and research settings. Representations of the baby, the self-as-parent, the spouse-as-parent and of one's parents as parents to self in childhood were examined. Further, we assessed the stability of these representations into the postnatal period, that is, whether violation of expectations occurred, and the causes and consequences of these violations. Differences between mothers and fathers, as well as characteristics of medical (history of infertility) and psychosocial (maternal depression and substance-abuse) risk groups were examined. The three different samples of parents were followed longitudinally over their transition to parenthood during three time points: pregnancy (second or third trimester), early postpartum (2-4 months) and late postpartum (about one year). The first sample (Studies I and IV) consisted of 745 couples, about half of them ($n=367$) having conceived with assisted reproductive treatment (ART) and half being spontaneously conceiving (SC). The second sample (Study II) consisted of 59 normative mothers screened for depressive symptoms and their infants. The third sample (Study III) included 51 drug-abusing mothers and their infants participating in two different drug-abuse interventions and 50 non-using mother-infant dyads. The results showed that negative, idealized, or incoherent prenatal representations were important predictors of postnatal parent-child relationship problems during the child's first year. In addition, negative violation of expectations (i.e., postnatal representations being more negative than prenatal expectations) predicted postnatal parent-child relationship adversity. The results further showed unique group-specific features: High-risk drug-abusing mothers were the most vulnerable to the effects of non-optimal prenatal representations, whereas infertility history did not exacerbate the risk. According to this study, among mothers the role of mental health symptoms seems to be especially pronounced and intertwined with early parenting and representational processes. Among fathers, on the other hand, the effects of marital relations seem to be more crucial. The results are discussed in the light of the development and implementation of early preventive interventions during the prenatal and early postnatal periods.

TIIVISTELMÄ

Tutkimuksen tarkoituksena oli selvittää kolmen erillisen tutkimusaineiston ja –asetelman avulla vanhempien raskausajan kiintymyssuhde- ja hoivamielikuvien laatua ja sitä, miten ne ennustavat tulevaa vanhemmuutta. Tutkimus kohdistui mielikuviiin vauvasta, itsestä ja puolisosta vanhempina sekä lapsuuden mielikuviin omista vanhemmista. Lisäksi tutkimuksessa selvitettiin näiden mielikuvien pysyvyyttä vauvan syntymän jälkeiselle ajalle: tapahtuiko odotuksissa pettymystä, mitkä tekijät selittivät pettymystä, ja kuinka odotuksissa pettyminen vaikutti vanhemmuuteen. Tutkimme eroja isien ja äitien välillä sekä erityispiirteitä erilaisten riskiryhmien mielikuvissa: mukana oli lääketieteellisen (lapsettomuushoitotausta) ja psykososiaalisen (masennus ja päihteidenkäyttö) riskin vanhempia. Väitöskirjatutkimus koostui kolmesta pitkittäistutkimusaineistosta, joissa vanhemmaksi tuloa seurattiin kolmena eri ajankohtana: raskausaikana (toinen tai viimeinen raskauskolmannes) sekä varhaisessa (2-4kk) ja myöhemmässä vauvaiässä (noin yksivuotiaana). Ensimmäisessä aineistossa (artikkelit I ja IV) mukana oli 745 pariskuntaa, joista noin puolet (n=367) oli tullut raskaaksi lapsettomuushoidoilla ja puolet ilman hoitoja. Toisessa tutkimusaineistossa (artikkeli II) mukana oli 59 normatiivista äitiä, joilta tutkittiin masennusoireita sekä heidän vauvansa. Kolmas aineisto (artikkeli III) koostui 51 päihderiippuvaisesta äidistä vauvoineen, jotka osallistuivat kahteen erilaiseen päihdeinterventioon sekä 50 verrokista, jotka eivät käyttäneet päihteitä. Tulokset osoittivat, että negatiiviset, idealisoidut tai epäkoherentit raskausajan mielikuvat ennustivat ensimmäisen ikävuoden vanhempi-lapsi- suhteen ongelmia. Samanlainen haitallinen vaikutus oli pettymyksellä raskausaikaisissa odotuksissa. Osa ilmiöistä tuli esille vain korkean riskin ryhmässä: Päihderiippuvaiset äidit olivat muita alttiimpia häiriintyneiden raskausajan mielikuvien haitalliselle vaikutuksille. Sen sijaan lapsettomuushoitotausta ei lisännyt riskiä. Äideillä korostui erityisesti mielenterveysongelmien haitallinen vaikutus mielikuvien ja varhaisen vanhemmuuden kehitykseen. Isillä taas parisuhdeongelmat vaikuttivat erityisen negatiivisesti. Väitöskirjassa pohditaan näitä tuloksia myös raskauden ja vauva-ajan interventiodien kehittämisen näkökulmasta.

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ABBREVIATIONS

AAI	Adult Attachment Interview
ANCOVA	Analysis of Covariance
APA	American Psychological Association
ART	assisted reproductive treatment
CFI	Comparative Fit Index
DAS	Dyadic Adjustment Scale
EA(S)	Emotional Availability (Scales)
EM	Expectation-Maximization
EPDS	Edinburgh Postnatal Depression Scale
EVT	Expectancy Violation Theory
FET	frozen embryo transfer
FIML	Full Information Maximum Likelihood
GHQ	General Health Questionnaire
ICSI	intracytoplasmic sperm injection
IRMAG	Interview of Maternal Representations
IUI	intrauterine insemination
IVF	in vitro fertilization
MANCOVA	Multivariate Analysis of Covariance
MLR	Maximum Likelihood with Robust standard errors
NICU	neonatal intensive care unit
PGT	psychodynamic group therapy
PSI	Parenting Stress Index
PSS	psychosocial support
RMSEA	Root Mean Square Error of Approximation
SC	spontaneously conceiving
SDS	Satisfaction with Delivery Scale
SEM	Structural Equation Modeling
SFPT	Subjective Family Picture Test
TLI	Tucker-Lewis Index
VE	Violated expectations

LIST OF ORIGINAL PUBLICATIONS

The thesis is based on the following original publications, referred to in the text as Studies I-IV.

- I. Flykt, M., Lindblom, J., Punamäki R-L., Poikkeus, P., Repokari, L., Unkila-Kallio, L., Vilks, S., Sinkkonen, J., Tiitinen, A., Almqvist, E., & Tulppala, M. (2009). Prenatal expectations in transition to parenthood: Former infertility and family dynamic considerations. *Journal of Family Psychology*, 23, 779-789.
- II. Flykt, M., Kanninen, K., Sinkkonen, J., & Punamäki, R-L. (2010). Maternal depression and dyadic interaction: The role of maternal attachment style. *Infant and Child Development*, 19, 530-550.
- III. Flykt, M., Punamäki, R-L., Belt, R., Pajulo, M., Biringen, Z., Salo, S., & Posa, T. (2012). Maternal representations and dyadic interaction among drug-abusing and non-using mothers and their infants. *Infant Mental Health Journal*, 33, 123-128.
- IV. Flykt, M., Palosaari, E., Lindblom, J., Vänskä, M., Poikkeus, P., Repokari, L., Tiitinen, A., Tulppala, M., & Punamäki, R-L. (2014). What explains violated expectations of parent-child relationship in transition to parenthood? *Journal of Family Psychology*, 28, 148-159.

THEORETICAL AND CLINICAL BACKGROUND

1. Introduction

A child needs his parents for survival during the first years of life, and for love, guidance, and interaction throughout childhood. The early interaction experiences with parents form a basis for a sense of security (Bowlby, 1969), as well as for ways of perceiving and interpreting oneself and others later in life, including in relation to one's own children (Main, Kaplan, & Cassidy, 1985). The parent-child relationship begins already during pregnancy, in parental representations and fantasies that also evoke emotional attachment toward the child-to-be (Cohen & Slade, 2000; Ammaniti et al., 1992; Fava Vizziello, Antonioli, Cocci, & Invernizzi, 1993). Transition to parenthood is a time of fundamental psychological reorganization, simultaneously characterized by development and hope, as well as vulnerability and disorganization (Brodén, 2004; Slade, Cohen, Sadler, & Miller, 2009). It is also a time when earlier close relationship experiences, especially related to parental caregiving in childhood, are activated and worked through (Cohen & Slade, 2000). Parental prenatal representations serve as an important mediating link between a parent's past and current close relationships, predicting the quality of future parenting (Main et al., 1985).

Parents with previous vulnerability such as childhood maltreatment, other trauma, or mental health symptoms, may be at risk of intergenerational transmission of negative experiences to their children (Slade et al., 2009). In addition, problems in current family relations and medical risks associated with the ongoing pregnancy may increase vulnerability in the transition to parenthood. Parental risk factors are known to exert their adverse effects on child development to a great extent via the problems in parent-child relationship (Murray, Fiori-Cowley, Hooper, & Cooper, 1996; Lester, Boukydis, & Twomey, 2000). Although psychological preparation for parenthood

may be more difficult for families at risk, the existing research on parental prenatal representations has primarily focused on normative families. For early preventive purposes, we need more information of prenatal representational processes and early parenting related to the spectrum of different risks, and their dynamic and cumulative interplay in the family. In this dissertation parental prenatal representations and their effects on postnatal parent-child relationship were explored among normative parents and three risk groups: parents with a history of infertility, mothers with symptoms of depression, and mothers who are substance-abusers. These phenomena are discussed from the perspective of attachment, psychodynamic and family system theories, as well as in the light of development and implementation of early clinical intervention in transition to parenthood.

2. Parent-child relationship

The parent-child relationship is the most crucial context for a child's socioemotional and cognitive development (Feldman, 2007; Field & Diego, 2008; Murray, Fiori-Cowley et al., 1996). The quality of caregiving during the child's first year provides the basic foundations for the development of emotion regulation and sense of security, as well as for autonomy and exploration (Bowlby 1988; Feldman, 2007; Field, 2012). The parent-child relationship can be conceptualized using two parallel components: observable interaction patterns in day-to-day situations with the child, as well as one's experience of parenting at a representational level (Stern, 1995). Figure 1 shows these two intertwined dimensions of the parent-infant relationship from the parent's and the child's part, and the associated factors as conceptualized for the purposes of this dissertation.

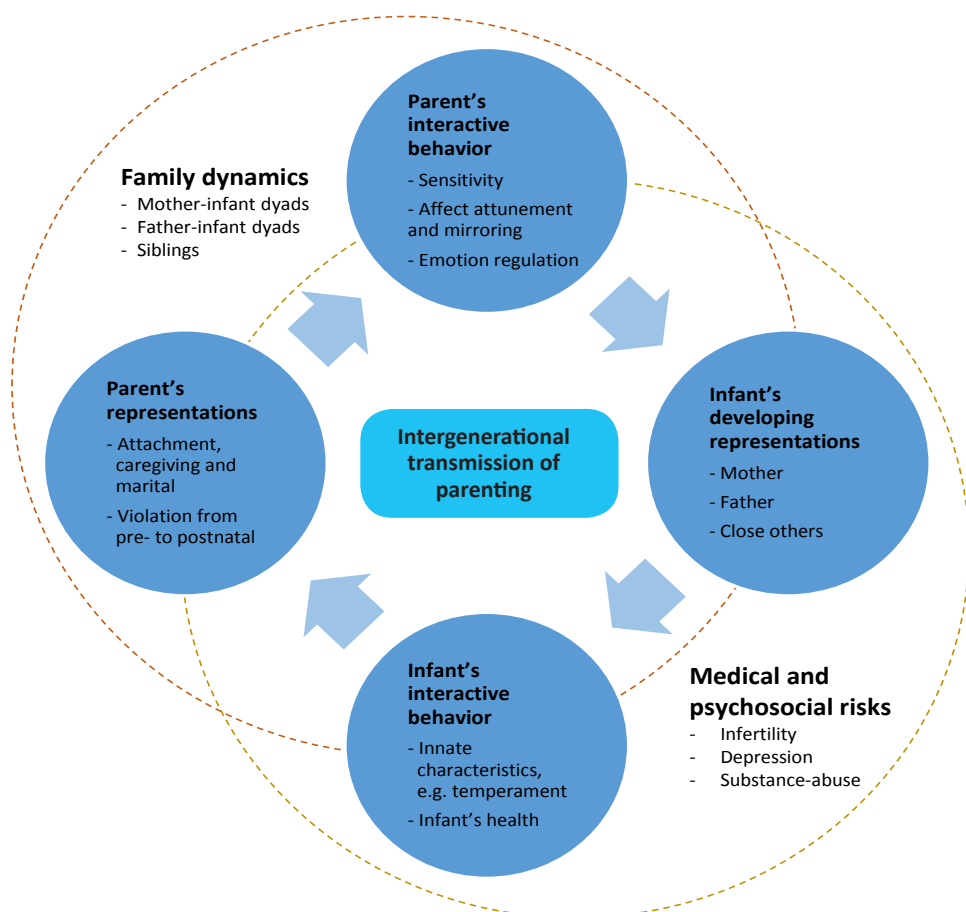


Figure 1. Conceptualization of the parent-infant relationship in transition to parenthood.

2.1 Theoretical perspectives on parent-child relationship in transition to parenthood

The most crucial theoretical perspectives on parent-child relationship in transition to parenthood include psychoanalytic, attachment and family system frameworks.

2.1.1 Psychoanalytic theory

Psychoanalytic theory (e.g., Winnicott, 1960; Bion, 1962) emphasizes the role of maternal fantasy life for the development of her relationship to the infant. During

pregnancy and even before conception, parents-to-be begin to form more or less conscious fantasies of their child and of themselves as parents (Brodén, 2004; Lebovici, 1988). For mothers, pregnancy is the time of intertwined physical and psychological change: a separation-individuation process, where two minds need to be held in one body (Slade et al., 2009; Trad, 1990). The relationship to the child during pregnancy is described as a gradually intensifying reorganizational process proceeding through qualitatively different stages, preparing the mother to meet the real child (Brodén, 2004; Raphael-Leff, 1991; Trad, 1990). Psychoanalytic literature (e.g., Brodén, 2004) describes this reorganization as challenging and thus intrinsically involving ambivalent feelings related to pregnancy, parenthood and the child-to-be. This so-called 'normal ambivalence' is characterized as optimal, and the lack of either positive or negative feelings as riskful.

At the end of pregnancy and during the early postnatal period, psychoanalytic literature describes the mother-to-be as intensely focused on the baby, conceptualized as 'primary maternal preoccupation' by Winnicott (1956) and 'motherhood constellation' by Stern (1995). This new mental organization temporarily takes over former personality organizations, making the mother fully capable of concentrating on her baby for an individually variable time, ranging from a few weeks to even years (Stern, 1995). The task of early postpartum is also to update and match the unconscious fantasies, daydreams and hopes to the reality with the child (Lebovici, 1988; Pines, 1972). Psychoanalytic theory has mostly focused on describing mothers, and it is not clear to which extent fathers experience similar and different phenomena in their transition to parenthood.

2.1.2 Attachment theory

Attachment theory (Bowlby, 1969; 1973; 1980; Ainsworth, Blehar, Waters, & Wall, 1978) views attachment as an innate, evolutionary-based behavioral system intended to ensure the survival of the species. Infant attachment behavior (e.g., crying, clinging, smiling, vocalizing) is aimed to elicit protection or comfort from the attachment figure (most often the mother) in situations of danger (e.g., pain, fear, separation). In non-threatening situations, the infant's attachment system is dormant and the infant uses the mother as a secure base from which to explore the environment.

Parallel to the behavioral systems view, attachment can also be conceptualized as an information-processing system, that is, representations or internal working models of the self in relation to others. These function to maintain the sense of security in close affective relationships (Bowlby, 1969, 1973, 1980; Main et al., 1985).

Representations can be defined as internal features of the external world, but are not simple reflections of it. Instead, they are active mental constructions, based on an individual's perceptions and interpretations of repeated experiences in close relationships (Bowlby, 1980; Lyden & Suchman, 2013; Zeanah & Barton, 1989). They include both conscious and unconscious cognitive and emotional elements (Ammaniti et al., 1992; Bretherton & Munholland, 2008; Larney, Cousens, & Nunn, 1997). There are qualitative differences in infants' attachment representations based on the specific features of the relationship and the availability of the attachment figure (Ainsworth et al., 1978; see also chapter 2.3 in this dissertation). Attachment representations are formed from the second half of the first year of life (Bowlby, 1980; Ainsworth et al., 1978), separately toward mothers and fathers. With age, attachment representations become increasingly stabilized and begin to guide and affect perceptions and interactive behavior also in close relationship later in life, perhaps the most strongly with one's own children (Bowlby, 1980; Bretherton & Munholland, 2008; Main, et al., 1985).

2.1.3 Family systems theory

Family systems theory conceptualizes families as complex and dynamic homeostatic systems that are at the same time continuously changing and maintaining stability (Davies & Cicchetti, 2004; Minuchin, 1985). Families consist of hierarchically ordered parts, from basic dyadic relations to triads and marital, parental and sibling subsystems (Minuchin, 1985). These are at the same time independent and highly intertwined, continuously influencing each other in a reciprocal manner. Functioning of one dyad or subsystem may affect the functioning of another in a process called spill-over: for instance, marital conflict may increase parenting difficulties (Erel & Burman, 1995).

Family systems and relationships reorganize during transitional periods, such as birth of each new child to the family (e.g., Lindblom et al., 2014). This reorganization occurs in both representational and behavioral level. With the birth of the first child, previously dyadic marital relationship is organized into a triad incorporating the child (Stern, 1995), and a parenting subsystem is created (Minuchin, 1985). In multiparous families, even more complex reorganization takes place, as triadic systems are organized into further more complex units (Gameiro, Moura-Ramos, & Canavarro, 2009). In this dissertation, family dynamics view is used to conceptualize the different representational processes among mothers and fathers in their transition to parenthood, including representations of the spouse-child relationship and the existence of siblings.

2.2 Parent-infant interaction quality

Parent-infant interaction can be described as a transactional chain of reactions, whereby both partners reciprocally respond to each other and influence one another's reactions by their response in a mutual "dance" (Stern, 2002; Sameroff & Emde, 1989). This implies that no single aspect of caregiver interactive behavior is intrinsically harmful or beneficial: Rather, its meaning is created dyadically, on the basis of the baby's emotional and behavioral reactions (Biringen, 2008; Crittenden, 1981).

The central element of well-functioning parenting is the caregiver's ability to be emotionally available for the child. This is manifested in a well-timed, sensitive responsiveness to a child's signals of distress, while at the same time being supportive of the child's independence and exploration (Ainsworth, et al., 1978). A sensitive mother is able to both herself express, and become attuned to her child's expressions of a wide range of affects, such that these can be mutually shared (Field, 2012; Stern, 1985; Cohn & Tronick, 1989). This "affect attunement" (Stern, 1985) includes sharing both positive and negative emotions, each of which has different neural mechanisms and distinct meanings for the child's development (e.g., Feldman, 2003; Sroufe, 1995). Young infants are not capable of experiencing highly positive emotional states without the parent (Feldman, 2003), and their capacity to regulate highly negative arousal states without parental regulatory "holding" is also very limited (Winnicott, 1960; Field, 2012). In order to effectively contain the infant's arousal, a mother also must regulate her own negative emotional and behavioral reactions toward the child, such as hostility or intrusive-overcontrolling behavior (Biringen, 2008).

The child's part of the equation is also of great importance, and innate characteristics, such as temperament and health, affect their ability to be emotionally available to the parent and to benefit from the parent's regulatory help (Biringen, 2008; Claussen & Crittenden, 2000). It is easier for a parent to feel and react positively toward a child displaying clear interactive signals, and positive responsiveness and initiative toward the parent (Biringen, 2000; Biringen & Easterbrooks, 2012; Bretherton, 2000). The child's behavior may thus strengthen or impede the parent's experience of their connection and parental sensitive behavior.

A mother's sensitivity is intrinsically linked to her ability to mentalize about her child, that is, to perceive, interpret, and affectively share and mirror her young child's as yet ambiguous and unstructured emotional states (Slade, Grienberger, Bernbach, Levy, & Locker, 2005; Rosenblum, McDonough, Sameroff, & Muzik, 2008). "Marked mirroring" refers to the mother's ability to reflect her child's emotions back to him as a modified expression of that emotion, for example, responding to infant distress with concern (Fonagy, Gergerly, Jurist, & Target, 2002). This communicates to the

child that self and others have separate emotions, but the caregiver can nonetheless provide help in regulating difficult or overwhelming affects. In dyadic interaction, both negative and positive emotion expression and regulation are pivotal. However, of greater importance than the sole amount of positive affect is synchronous, contingent mirroring of the child's emotions (DeWolff & Van IJzendoorn, 1997; Pauli-Pott & Mertesacker, 2009). For example, when the infant's negative affect is mirrored by incongruous parental positive affect (e.g., laughing when the infant cries), this represents deviant mirroring, as described by Fonagy et al. (2002). Conversely, if the mother is not able to "mark" her mirroring but reflects the child's emotion back too directly (e.g., becomes anxious when the child is anxious), this represents another failure in mirroring. Both of these form a potential risk for the child's development (Fonagy et al., 2002).

Most research about parent-child relationships has been conducted with mothers. Father-infant and mother-infant relationships are known to be separate, but intertwined, and to have independent contributions to child development (DeWolff & Van IJzendoorn, 1997; Grossmann et al., 2002). The literature is still controversial with regard to their differences. Classically, fathers have been described as more playful and physical in their interaction with the infant, whereas mothers focus more on face-to-face interaction (Lamb, 1977; Parke, 1996), and may be more emotionally sensitive (Kochanska & Aksan, 2004; Volling, McElwain, Notaro, & Herrera, 2002). On the other hand mother- and father-infant relationships appear to be similarly synchronous and mutually reciprocal (Feldman, 2003; Haapakoski & Silvén, 2009).

2.3 Organization of attachment representations in childhood

Even young infants are capable of perceiving emotional and behavioral contingencies between their own behavior and that of others (Tarabulsy, Tessier, & Kappas, 1996). This makes it possible for them to organize their behavior around the caregiver's and to form mental representations of it, ultimately leading to the development of an attachment style during the second half of the first year (Bowlby, 1980; Ainsworth et al., 1978). When a child receives consistently sensitive and responsive caregiving and can rely on the caregiver's regulatory help under stress, a *secure* attachment style is formed. This is characterized by the infant's open expression of both positive and negative emotions, and a balance in autonomous exploration and closeness-seeking.

However, when the caregiver is not sufficiently available as an aid to emotion regulation and a source of security under stress, the child develops an *insecure* at-

tachment style. The *insecure-avoidant* attachment style is associated with consistently insensitive caregiving. These children display a hypoactivating emotion regulation strategy, failing to seek support from the caregiver under stress, while overly relying on independence and exploration (Cassidy, 1994). Despite the lack of overt displays of distress, avoidantly attached children display physiological stress indicators, such as high cortisol levels (Spangler & Grossmann, 1993). In contrast, the *insecure-ambivalent* attachment style is associated with inconsistent caregiving. These children use a hyperactivating emotion regulation strategy, characterized by the display of strong negative emotions. This facilitates getting a response from an inconsistent caregiver, but leads to problems in emotion regulation and exploration. Children from the most chaotic, traumatic or maltreated backgrounds may develop an *insecure-disorganized* attachment style. This represents a collapse in organized emotion regulation strategies, when the caregiver is at the same time both a haven of safety and a source of fear (Hesse & Main, 2000). Disorganized attachment is a source of great developmental risk (Hazen, Jacobvitz, Higgins, Allen, & Jin, 2011).

Attachment representations, once formed, help guide the individual's experience of the self and others as well as their interactive behavior (Bowlby, 1980; Bretherton & Munholland, 2008; Main, et al., 1985). The continuity of specific attachment patterns is relatively high even into adulthood (Waters, Weinfield, & Hamilton, 2000). Yet, at the same time attachment representations remain susceptible to change based on new close relationships and major life changes and transitions, such as the transition to parenthood.

3. Prenatal parental representations

Pregnancy is one of the most crucial transitional periods in a woman's life. Like other life transitions, it involves complex multi-level reorganization: physical and hormonal shifts are paralleled by emotional, social, and identity changes (Cohen & Slade, 2000; Cowan, 1991). Similarly to mothers, fathers experience their spouse's pregnancy as a major psychological transition, involving higher susceptibility to distress prenatally than postnatally (Condon, Boyce, & Corkindale, 2004; Genesoni & Tallandini, 2009). Interestingly, even physiological reorganization seems to occur also among fathers: Paternal testosterone levels decrease during pregnancy, which is associated with decreased aggression and increased protective behavior (Gray & Campbell, 2009).

Psychological reorganization takes place at the level of representations concerning the child-to-be, one's emerging parenthood, spouse, and other family relationships. Prenatal representations can also be conceptualized as expectations, that

is, representations specifically associated with anticipating and imagining future relationships (Bowlby, 1980; Larney et al., 1997; Zeanah & Barton, 1989). Intrinsic to pregnancy is also the activation of parent's attachment system: earlier attachment experiences, especially childhood experiences with one's own parents, become closer to conscious awareness and susceptible to transformation (Brodén, 2004). Parental representations are described as the most important pathway through which earlier attachment experiences affect a parent's relationship with their child (Bowlby, 1980). The core task of pregnancy is working through childhood attachment experiences and finding a balance between identifying with one's own parents and forming one's own, separate, parental identity. This task can be conceptualized from the viewpoint of two behavioral/motivational systems, as described below.

3.1 Prenatal organization of attachment and caregiving systems

Pregnancy leads to activation of two parallel behavioral/motivational systems. In addition to the parental attachment system, Solomon and George (1996; see also George & Solomon, 2008) described a complementary, but separate, behavioral/motivational system, designed to ensure caretaking of the baby: the parental caregiving system. Both are biologically based, evolutionary adaptive behavioral systems, governed by information-processing systems, that is, representational models. Both are activated by environmental cues of threat or danger, but have different functions: the attachment system functions to maintain one's own sense of security under stress, whereas the caregiving system functions to offer protection to offspring under stress. Both have their roots in early attachment experiences with primary caregivers, but the caregiving system also incorporates elements of the current relationship with the child. The caregiving system starts to develop in adolescence, but undergoes its most major reorganization in the transition to parenthood. Pregnancy represents a shift from the position of a care-receiver to the position of a caregiver (Solomon & George, 1996). Once the caregiving system is established, situations involving danger begin to primarily activate the caregiving, and not the attachment system, that is, giving protection to the infant, instead (or in addition to) of seeking it for oneself.

Assessment and conceptualization of prenatal representations has varied considerably in the previous empirical literature, regarding especially insufficient differentiation between measures of attachment and caregiving systems (see Walsh, 2010). For example term 'prenatal attachment' has commonly been used to describe the prenatal parent-infant bond, even though this represents the functioning of caregiving and not attachment system. Another important measurement issue is the differentiation

between self-report and coherence-based interview measures, latter of which better take into account the unconscious aspects of representations (see chapter ‘Strengths and limitations of the study’ for further details). To maintain theoretical consistency, I have in this dissertation conceptualized parental prenatal representations by combining attachment and caregiving system theories with Stern’s theory of the development of parenting representations (1995). According to Stern (1995; see also Cohen & Slade, 2000; Fava Vizziello et al., 1993), four major representational domains undergo reorganization during pregnancy: representations of the child-to-be, of the self-as-parent, of the spouse, and of one’s own parents. Parental caregiving representations can be conceptualized in terms of representations of the child and of the self-as-parent. Representations of one’s own parents, especially those remembered from childhood, reflect the activation of the attachment system. The reorganization of representations of the spouse may involve both attachment and caregiving systems: the spouse as a marital partner and current attachment figure to the self as well as spouse as the child’s parent. Parents with positive and stable childhood experiences are more likely to form and maintain flexible, coherent attachment and caregiving representations in the transition to parenthood. However, for parents with unresolved trauma or insecurity, this process may be more complex and painful (Cohen & Slade, 2000).

3.2 Adult attachment representations

As first described by Main et al. (1985), adult attachment representations or states of mind are not mere continuations of childhood attachment styles, but represent an active reorganizational process of working through experiences in both earlier and later close relationships. Representations associated with adult attachment styles can be differentiated on the basis of the coherence and integration of a parent’s narrative of their childhood caregiving experiences (Main et al., 1985; Main, Goldwyn & Hesse, 2003; Hesse, 2008). *Secure-autonomous* adults are capable of giving a balanced, coherent and credible narrative of both positive and negative childhood experiences and related emotions. *Insecure-dismissing* adults (equivalent to childhood avoidant attachment) tend to idealize or have little memories of their childhood, and also tend to suppress feelings of vulnerability and a need for support. *Insecure-preoccupied* (equivalent to childhood ambivalent attachment) adults are still largely bound by their early relationships: strong and active feelings of anger or helplessness associated with these make it hard to describe them in a coherent manner. In addition to these organized attachment strategies, an adult can also show *unresolved attachment* regarding trauma or loss. This represents a local disorganization in one’s ordinary attachment

strategy specifically related to a traumatic event that the individual has not been able to psychologically integrate (Hesse & Main, 2000).

3.3 Caregiving representations of the child and the self-as-parent

A parent's ability to mentalize, that is, to reflect on their close relationships and to see the baby as an intentional individual with its own feelings and desires, is an intrinsic part of the caregiving system (George & Solomon, 2008). It is particularly crucial during pregnancy, when especially the mother needs to "hold two minds in her mind", simultaneously imagining the baby and herself as a mother (Arnott & Meins, 2007; Bernier & Dozier, 2003; Slade et al., 2005). A good ability to mentalize makes it easier to imagine the baby and to form a prenatal emotional bond toward it (Cohen & Slade, 2000; Slade et al., 2009; Trad, 1990). Caregiving representations are complementary in nature: If, for example, the mother perceives herself as protective and affectionate, she also views her baby as calm and easygoing (Ammaniti et al., 1992). However, by the end of the pregnancy, representations of the baby and the self-as-mother become increasingly differentiated (Ammaniti et al., 1992).

Parents' representations of the child-to-be involve schemas about the baby as a unique person with certain, stable temperamental features and as a particular son or daughter to these parents (Fava Vizziello et al., 1993; Stern, 1995). The representation is based on the perceptions of the "real" child (e.g., movements, ultrasound), as well as on the previously existing representations of the self and the child's other parent (Brodén, 2004; Cohen & Slade, 2000; Fava Vizziello et al., 1993). Both mothers and fathers are capable of imagining the baby during pregnancy and have a similarly developing emotional bond toward it, starting from the first trimester and intensifying during the course of pregnancy (Arnott & Meins, 2008; Habib & Lancaster, 2006; Wilson et al., 2000). However, some research suggests that fathers' prenatal representations of the baby may be less balanced and vivid during pregnancy than maternal representations (Ahlqvist-Björkroth et al., 2012; Vreeswijk, Maas, Rijk, & van Bakel, 2013). This could be due to the lack of the bodily elements of pregnancy and direct physical contact with the baby (Slade et al., 2009). To a large degree, the prenatal relationship between the father and the baby takes place via the mother ('maternal gatekeeping'; Schoppe-Sullivan, Cannon, Brown, Mangelsdorf, & Sokolowski, 2008).

In a successful transition to parenthood, working through early attachment experiences leads to identification with one's own mother or father (Brodén, 2004; Slade et al., 2009). The representation of the self-as-mother is an integration of former representations of the self-as-woman, formed in lifetime identity development and the

representation of one's own mother-as-mother (Cohen & Slade, 2000; Fava Vizziello et al., 1993). Empirical research also supports the validity of the psychoanalytic concept 'motherhood constellation' (Stern, 1995) or 'primary maternal preoccupation' (Winnicott, 1956): intensive preoccupation with the infant takes place during the late pregnancy and early postpartum period, and it is especially strong among first-time mothers (Kim, Mayes, Feldman, Leckman, & Swain, 2013).

For fathers, representational processes may be even more complex, as they must work through early relationships with both their mother and father and to identify with both (Stern, 1995). Representation of the self-as-father thus integrates the representations of the self-as-man and of one's own mother-as-mother and own father-as-father (Beaton, Doherty, & Rueter, 2003; Raphael-Leff, 1991; Stern, 1995). For fathers, the resulting identity changes may be less pervasive or slower than for mothers, due to more outside activities and other role demands, such as work (Strauss & Goldberg, 1999; Habib & Lancaster, 2006). However, according to research, fathers also show intensive preoccupation with the baby in the beginning, albeit to a lesser extent than mothers (Kim et al., 2013).

3.4 Representations of the marital relationship and the spouse-as-parent

The marital relationship is usually the most crucial current attachment relationship for new parents. The transition to parenthood typically involves a decline in marital satisfaction, especially after the birth of the infant (Doss, Rhoades, Stanley, & Markman, 2009; Lawrence et al., 2007). From the family systems perspective, this may reflect an adaptive change of focus, helping new parents to make psychological space for the infant (Strauss & Goldberg, 1999). Despite its normative nature, a steep decline indicates a problematic transition to parenthood (Belsky, Youngblade, Rovine, Volling, 1991). Marital and parental quality are generally intertwined (Erel & Burman, 1995), and also during pregnancy a more positive marital relationship is associated with more positive prenatal representations of the child-to-be (Hjelmstedt, Widström, Collins, 2006; 2007). Marital quality seems to affect parenting especially strongly among fathers (e.g., Cummings, Merrilees, & George, 2010).

During the first pregnancy, one of the core reorganizational tasks is the transformation of the dyadic marital relationship into a mother-father-child triad (Stern, 1995). As future parents increasingly also begin to view their spouse as the mother or father during pregnancy, they form representations of the spouse-as-parent (Stern, 1995). From a family system perspective, this also means the creation of a new co-parenting subsystem, which is separate, but intertwined, with dyadic marital and parenting sub-

systems (Minuchin, 1985). In multiparous families, the reorganizational processes are even more complex, comprising changes in marital, parental and sibling subsystems (Gameiro, Moura-Ramos, & Canavarro, 2009). The transition to parenthood may thus be more challenging in these families, due to increased demands in balancing the needs of the new baby with those of older siblings (e.g., Gameiro et al., 2009).

3.5 Representations of intimacy and autonomy

Emotional intimacy (relatedness) and individual autonomy are two core dimensions in human relations, and are especially relevant in family interactions and representations (Blatt, Auerbach, & Levy, 1997; Kagitcibasi, 2005). They are also closely linked to the concepts of attachment and exploration in attachment theory (Bowlby, 1969). In parenting, intimacy refers to a parent's emotional attachment toward their child, whereas autonomy indicates the parent's sense of self-assurance and agency. These two dimensions are separate, but intertwined, and well-functioning family relationships are high in both. The balance of high autonomy and intimacy is associated with a child's secure attachment and a more organized family structure (Becker-Stoll, Fremmer-Bombik, Wartner, Zimmermann, & Grossmann, 2008; Niederhofer, Staffen, & Mair, 2002). In contrast, the lack of one or both of these indicates problematic family relationships, even psychopathology (de Albuquerque & Schneider, 2012; Kagitcibasi, 2005).

These two dimensions exist in parental prenatal representations and may be especially relevant during pregnancy, due to its separation-individuation nature, as described by psychoanalytic theories. During pregnancy, the mother must simultaneously expand her sense of self to incorporate the child and to recognize the child as separate from her (Larney et al., 1997; Slade et al., 2009; Trad, 1990). The ability to simultaneously experience intimacy and autonomy in relation to the child also requires an effective ability to mentalize (e.g., Slade et al., 2009). In this dissertation, intimacy and autonomy were examined as one of the core dimensions of parental pre- and postnatal representations.

4. Prenatal representations and parent-child relationship: Intergenerational transmission

Empirical studies show that parental attachment and caregiving representations, even when assessed prenatally, predict the quality of parenting and the child's attachment

security toward the parent (Benoit et al., 1997; Van IJzendoorn & Bakermans-Kranenburg, 1997). The associations are, however, more clear when prenatal representations are measured with coherence-based interview measures that take into account the possible defensive processes and not only the valence of representations (see chapter 'Strengths and limitations of the study' in this dissertation for further details). This study aims to gain more information about the predictive effects of self-reported prenatal representations on parenting, when various areas of representations are conceptualized comprehensively with regard to the theory of attachment and caregiving representations.

Previous literature shows that a mother's prenatal secure-autonomous attachment style predicts her child's secure attachment style at one year of age in 75% of cases (Fonagy, Steele, & Steele, 1991; van IJzendoorn, 1995). Security of maternal attachment also predicts higher quality of mother-infant interaction, for example, higher sensitivity, structuring and child responsiveness (Biringen et al., 2000; Cohn, Cowan, Cowan, & Pearson, 1992; Pederson, Gleason, Moran, & Bento, 1998). Paternal autonomous attachment style is also linked to infant-father attachment security and more positive father-infant interaction, but the associations are weaker than for mothers (Kouvo, Virtanen, & Silvén, 2003; Steele, Steele, & Fonagy, 1996; van IJzendoorn, 1995). With regard to insecure attachment styles, dismissing mothers typically show over-regulation of emotions: their interaction problems with the infant may concentrate more on lack of positive affection, withdrawal, and passivity (Crowell & Feldman, 1988). Insecure-preoccupied mothers show under-regulation of emotions: Intrusiveness and unpredictable emotional responses that oscillate between negative and positive affect are typical (Adam, Gunnar, & Tanaka, 2004; Cohn et al., 1992; Crowell & Feldman, 1988). Parental sensitivity (van IJzendoorn, 1995) and, more importantly, parental ability to mentalize (Arnott & Meins, 2007; Bernier & Dozier, 2003; Slade et al., 2005) seem to be crucial mediating mechanisms in the intergenerational transmission of parental attachment style.

The security of maternal attachment also affects the representations associated with the caregiving system. Secure-autonomous attachment is associated with more positive or coherent representations of the infant and the self-as-mother as well as stronger prenatal emotional bond toward the baby (Benoit et al., 1997; Mikulincer & Florian, 1999; Siddiqui, Hägglöf, & Eiseman, 2000). The same appears to be true of fathers, although research is very limited (Beaton et al., 2003; Vreeswijk et al., 2013). There is also evidence to suggest that more positive or coherent prenatal representations of the child-to-be and the self-as-mother predict more positive mother-infant relationship (Coleman, Nelson, & Sundre, 1999; Dayton, Levondosky, Davidson, & Bogat, 2010; Thun-Hohenstein, Wienerroither, Schreuer, Seim, & Wienerroither, 2008).

Despite the clearly harmful effects of negative or incoherent prenatal representations, we know little of the effects of overly high/idealized prenatal expectations on the parent-child relationship. The results of the few existing studies are controversial: High parental expectations have been associated with both a higher (Kalmuss, Davidson, & Cushman, 1992; Lawrence et al., 2007) and a lower amount of parental and marital problems (Coleman et al., 1999; Harwood, McLean & Durkin, 2007; Pearce & Ayers, 2005). In this dissertation we examined whether a “U-shaped curve” exists, that is, are moderately high prenatal representations optimal for parent-child relationship.

With regard to representations of the spouse-child-relationship that represent more complex family dynamics, most previous studies have focused on the role of triadic representations. More positive triadic representations during pregnancy predict more positive parenting and family functioning, and their predictive value may be even higher for fathers (Favez et al., 2006; von Klitzing et al., 1999; von Klitzing & Burgin, 2005). Representations of the spouse and spouse’s relationship to the child may also contribute to one’s own parenting, due to spill-over processes, that is, affect or behavior in one family subsystem directly transferring to the other subsystem. One of the aims of this dissertation was to examine the family dynamic effects of prenatal representations of the spouse-child- relationship on one’s own parenting. As previous research has been almost exclusively conducted among mothers, we focused on both parents.

5. Stability and violation of prenatal expectations

One of the postnatal tasks for new parents is to revise the prenatal representations of the child and parenting to match the reality with the child (Trad, 1990). According to Expectancy Violation Theory (EVT), this change or stability in pre- to postnatal representations can be conceptualized as violation of expectations (VE). Positive VE occurs when postnatal representations are more positive than prenatal expectations (Fava Vizziello et al., 1993; Larney et al., 1997). In contrast, negative VE occurs when postnatal representations are more negative than prenatal expectations. According to EVT, negative VE is especially harmful, and tends to cause arousal and the need for coping mechanisms (Floyd & Voloudakis, 1999).

Maternal prenatal representations of the child and the self-as-mother are known to remain fairly stable into the postnatal period, and, if VE occurs, it is usually positive (Benoit et al., 1997; Fava Vizziello et al., 1993; Larney et al., 1997). Little is known of the stability of the father’s representations, but a recent study showed that more positive prenatal father-infant bond predicted more positive postnatal bond

at 6 and 12 months (Condon, Corkindale, Boyce, & Gamble, 2013). With regard to representations of the spouse-as-parent, research is scarce, but suggests that these may be less stable, at least concerning the division of childcare and household labor. Mothers generally do more housework and play more with their baby than fathers prenatally expected (positive VE), whereas fathers do less than mothers had expected (negative VE) (Biehle & Mickelsson, 2012; Hackel & Ruble, 1992; Ruble, Hackel, Fleming, & Stangor, 1988). Due to its non-normative nature, negative VE may be an indicator of disappointment and postnatal family relationship adversity: Several studies show it to be associated with postnatal parental, marital and mental health problems (Biehle & Mickelson, 2012; Harwood et al., 2007; Lawrence et al., 2007; Levy-Shiff et al., 1991). In this study, we examined the occurrence of VE among both parents, as related to representations of both self-as-parent and spouse-as-parent.

5.1 Predictors of violated expectations

Despite the potential significance of VE, its underlying psychological and medical mechanisms are as yet unknown. In this dissertation, some of the medical, parental and infant-related factors are analyzed that are known to underlie the parent-child relationship and are thus hypothesized to also affect the occurrence of VE in the transition to parenthood. These and their hypothesized association to VE are presented in Figure 2 (Figure modified from article IV).

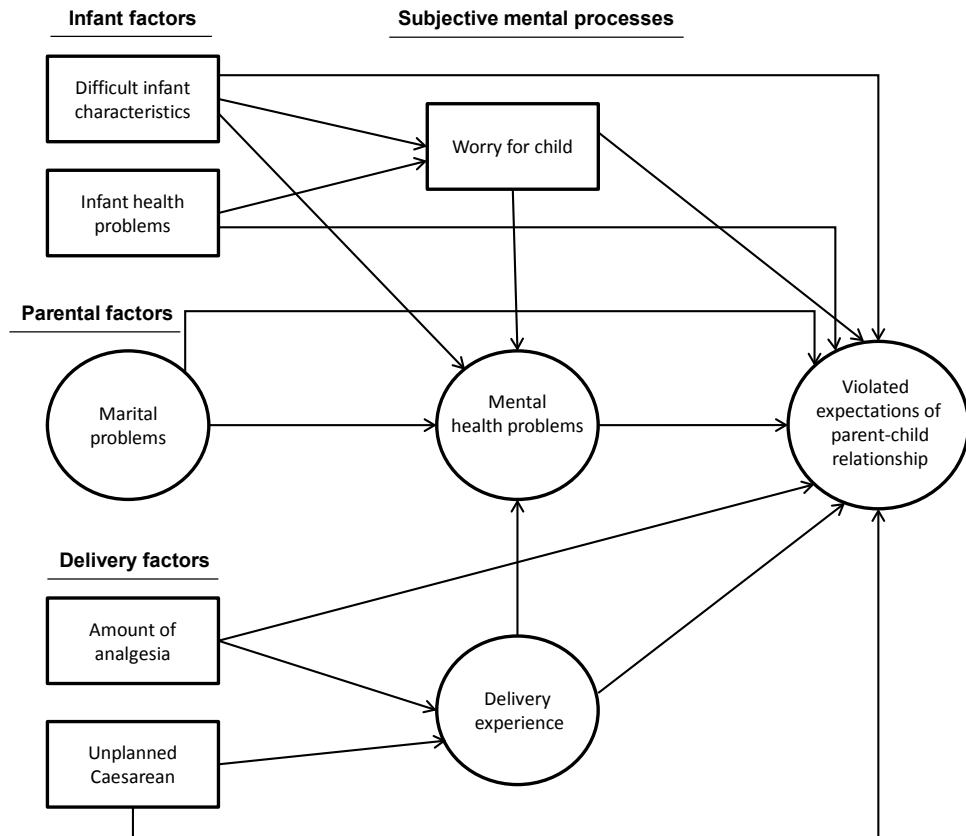


Figure 2. Hypothesized predictors of violated expectations in parent-infant relationship.

With regard to *parent-related* factors, mental health and marital problems are known to be highly intertwined with the quality of parenting (Erel & Burman, 1995; Kane & Garber, 2002). Considering medical risks that are especially relevant to VE, *delivery-related* factors may be important, as delivery is a “bridge” between prenatal fantasies and actual parenthood. Difficult delivery experiences may be harmful, for example, they may delay the formation of the parent-infant bond through prolonged preoccupation with the delivery (Ferber & Feldman, 2005). In addition to subjective experience, some objective delivery-related factors may be important. There is consistent evidence to suggest a harmful effect of an unplanned Caesarean on delivery experience, which also possibly extends to problems in parenting (Lobel & DeLuca, 2007). In addition, use of analgesia during delivery may be important for the maternal delivery experience, but evidence is inconsistent: analgesia use itself appears to predict

a negative delivery experience, but inadequate analgesia has similarly harmful effects (Fawcett, Pollio, & Tully, 1992; Ferber & Feldman, 2005).

The risks associated with VE may also be related to the *infant*, who is an active contributor to the early relationship with parents. Infant features, such as health and regulatory characteristics, affect the ways in which the early parent-child relationship develops. Infant health problems have been linked to both problematic (e.g., Singer et al., 2003), as well as compensatory, especially sensitive, parenting (e.g., Goldberg, 1988). There is also an increased risk of parenting problems in families with infants who are difficult to soothe or have irregular rhythms (Feldman, 2006; Ghera, Hane, Malesa, & Fox, 2006). In contrast, an infant's display of positive emotions, such as smiling, has a distinct, rewarding effect on the caregiver (Strathearn, Li, Fonagy, & Montague, 2008). Some research also suggests that infant-related risks may not automatically affect parenting, but only indirectly, via the worry the parent feels with regard to their child's problems (Miles, Holditsch-Davis, Schwartz, & Scher, 2007). Finally, there is evidence to suggest that all marital, medical and infant-related risk factors may exert part of their influence on the parent-child relationship via parental mental health (e.g., Proulx, Helms, & Buehler, 2007; Davies, Slade, Wright, & Stewart, 2008; Miles et al., 2007). Accordingly, we hypothesized that parental mental health problems may be an important mediating mechanisms for VE.

6. Risk group considerations

Previous research concerning parental prenatal expectations and their violations has focused almost exclusively on normative samples (but see Wendland & Miljkovitch, 2003; Pajulo et al., 2004). This is surprising, as the role of negative, idealized, or violated expectations may be especially crucial in at-risk groups where change and disruption in relationships is more typical (Coleman et al., 1999; Delmore-Ko, Pancer, Husberger, & Pratt, 2000). In addition, attachment and caregiving representations generally show higher continuity under stable, low-stress, conditions (Benoit et al., 1997; Waters, Weinfield & Hamilton, 2000). It is possible that idealized or negatively violated expectations of the child and parenthood are more typical or more harmful for risk-group parents. As a result of the dual medical and psychological changes inherent in pregnancy, these phenomena were examined in this dissertation in different medical and psychosocial risk groups. The medical risk group consisted of parents who have conceived with the aid of infertility treatments and the psychosocial risk groups included depressed and substance-abusing mothers.

6.1 Infertility

Infertility is defined as not achieving pregnancy within one year, despite regular intercourse (Barbieri, 1999). It affects approximately 3.5-16.7% of couples in the western world (Boivin, Bunting, Collins, & Nygren, 2007). In Finland, 4.2% of children are born after assisted reproductive treatment (ART) (THL, 2012). Such treatment includes intrauterine insemination (IUI), *in vitro* fertilization (IVF), intracytoplasmic sperm injection (ICSI) and frozen embryo transfer (FET). In Finland, 84.4% of all infertility treatments were conducted with couples' own gametes during 2011, the incidences being 9300 for IVF and ICSI (including FET) and slightly under 5000 for IUI (THL, 2012). Of IVF/ICSI-treatments, 21.9% lead to the birth of a living child, while for IUI the figure is 9.2%. In recent years in Finland, the number of single embryo transfers has increased, due to the increased medical risks of multiple pregnancies and the improved results shown for single embryo transfer. The incidence of single embryo transfers during 2011 was 74.8% in IVF, 70.1% in ICSI, and 70.3% in FET (THL, 2012). In IUI treatments, 96% of treatments ended in a singleton pregnancy. In this dissertation, we examined only singleton pregnancies.

Pregnancies after ART involve a greater number of medical risks than after spontaneous conception (SC). For example, pregnancy complications, preterm birth, and low birth weight are more common, to some extent also in singleton pregnancies (Helmerhorst et al., 2004; Poikkeus et al., 2006). In addition, delivery complications, such as increased risk of Caesarean section, are more common in ART than SC pregnancies (Poikkeus et al., 2006).

6.1.1 The psychological consequences of infertility history

Parents conceiving with ART have often made considerable emotional and other investments to fulfill their long-awaited dream of parenthood. Treatments, especially unsuccessful ones, are often experienced as stressful, and may increase anxiety and depression (Lykeridou, Gourounti, Delsidou, Loutradis, & Vaslamtzis, 2009; Schmidt, 2006). However, a systematic review shows that after achieving pregnancy, ART parents do not show an increased incidence of symptoms of general anxiety or depression (Hammarberg, Fisher, & Wynter, 2008). This notwithstanding, ART mothers are more prone to pregnancy- and fetal health-specific anxieties (McMahon, Ungerer, Beaurepaire, Tennant, & Saunders, 1997). In general, prenatal distress is known to have direct physiological effects on the developing fetus, affecting the baby's

interactive and regulatory abilities (Field, 2011; Räikkönen, Seckl, Pesonen, Simons, & van den Bergh, 2011).

However, a history of infertility appears to exert no specific harmful effects on the quality of postnatal marital or parent-child relationship (Hahn, 2001; Hammarberg et al., 2008). Nonetheless, some studies suggest that it may persistently diminish self-esteem and parenting self-efficacy among both parents (Gibson, Ungerer, Tennant, & Saunders, 2000; Hammarberg et al., 2008). One study also found that parents with a history of infertility may show interaction problems with the infant in triadic, but not dyadic, relationships, thereby being overly child-centered at the expense of the marital relationship (Cairo et al., 2012).

6.1.2 Infertility and parental representations

A history of infertility may affect the development of parental prenatal representations, although previous research is relatively scarce and contradictory. ART parents have been described as viewing their babies as both “precious” and “vulnerable” due to their great value and the increased risks and fears inherent in ART conception (Gibson et al., 2000; Golombok, Jada, Lycett, Murray, & McCallum, 2005; Minkoff & Berkowitz, 2005). In support of the “precious child” view, some studies have found that ART mothers show more positive prenatal bond toward their infants than SC mothers (Chen, Chen, Sung, Kuo, & Wang, 2011; Fisher, Hammarberg, & Baker, 2008). However, others, in favor of the “vulnerable child”- hypothesis, have found them to be slower in forming emotional bond to their unborn infant, due to the fear of losing the baby (Hjelmstedt, Widström, Wramsby, & Collins, 2003; McMahon, Tennant, Ungerer, & Saunders, 1999). McMahon et al. also showed that these mothers talked less to their unborn infants and had more negative prenatal expectations of infant temperament. The meaning of these findings is also not clear: We do not know if exceptionally positive prenatal bond represents harmful idealization, or a genuinely higher investment in parenting. Similarly, a slower and more cautious prenatal bond may equally as well indicate an adaptive protective mechanism to regulate the parent’s increased worry and anxiety in a medical risk pregnancy as reveal difficulties in preparing for parenthood.

One method of shedding more light on the meaning of these contradictory findings is to identify the ways in which these possibly idealized, or cautious, prenatal representations affect future parenting. To my knowledge, no previous studies exist among ART parents with regard to the effect of prenatal representations on later parenting. Similarly, we do not know if ART parents are more susceptible to pre- to

postnatal VE. Conceiving with the aid of ART may involve stress and environmental change, a factor that attachment research has shown to make representational change more likely (Waters et al., 2000). If ART parents hold overly idealized prenatal expectations, negative VE could be more typical. However, if they are overly cautious in their prenatal expectations, this could lead to positive VE after the child is born.

In addition, previous research on fathers' prenatal representations after ART is lacking. Father-infant-interactions are considered even more sensitive to contextual factors than mother-infant interactions (NICHD Early Child Care Research Network, 2000): for example, they are more vulnerable to prenatal expectations of parenting stress (Noppe, Noppe, & Hughes, 1991) and more dependent on the general marital quality (Belsky et al., 1991). One of the aims of this dissertation was thus to learn whether, and how, ART mothers and fathers differ in the effects of prenatal representations on parenting as well as in the occurrence, direction and preconditions of pre- to postnatal VE.

6.2 Pre-and postnatal depression

The transition to parenthood involves profound life style changes and adaptation to new responsibilities, which can evoke mental health problems, both in previously vulnerable individuals and for the first time (Campbell, Cohn, & Meyers, 1995; Slade et al., 2009). According to the most recent systematic review (Gavin et al., 2005) 7.1% of new mothers experience serious postnatal depressive symptoms, and, if minor depression is included, the percentage is as high as 19.2. The prevalence of prenatal symptoms is 18.4%, with as many as 12.7% having major depression. Even milder symptoms are known to have potentially harmful effects on parenting and child development (Herrera et al., 2004; Hoffman & Drotar, 1991; West & Newman, 2003). Depression also affects approximately 10% of new fathers (Paulson & Bazemore, 2010).

6.2.1 Depression and parent-child relationship

Pre- and postnatal depression may pose a risk for the parent-child relationship and child development via three pathways. First, children of depressed parents may be genetically predisposed to stronger physiological stress responses (Field, Diego, & Hernandez-Reif, 2006; Goodman & Gotlib, 1999). Second, maternal prenatal depression may be a dual risk, affecting both maternal prenatal psychological reorgan-

ization and the development of fetal stress regulation. Maternal prenatal depression is associated with increased infant physiological stress reactivity, delayed growth, prematurity, biochemical abnormalities, and suboptimal newborn, and later child, development (Diego, Field, & Hernandez-Reif, 2005; Diego et al., 2009; Field et al., 2004; 2006). Infant regulatory vulnerabilities may cause infant-related interaction problems and decrease resilience to deficiencies in parenting often associated with parental depression. Some studies suggest that maternal prenatal depression may cause a deterioration in the quality of postnatal mother-infant interaction to an even greater extent than postnatal depression (Field, Diego, Hernandez-Reif, & Ascencio, 2009; Pearson et al., 2012). In our study, we compared the effects of maternal pre- and postnatal depressive symptoms on mother-infant interaction quality.

Third, maternal postnatal depression may negatively affect the mother-infant interactive relationship in several ways (meta-analysis: Beck, 1995; Edhborg, Lundh, Seimyr, & Widström, 2001). It may decrease the mother's ability to sensitively perceive and respond to the infant's needs (review: Field, 2010). Depressed mothers may display interactive problems related to both over- and under-regulation of affect, including flat affect and withdrawal, as well as intrusiveness and high negative affect (Field, 2010; see also meta-analysis: Lovejoy, Graczyk, O'Hare & Neuman, 2000). The infants of postnatally depressed mothers show lower responsiveness and more ambiguous interactive signals (Field et al., 1985; Hoffman & Drotar, 1991), and fewer positive and more negative emotions (Campbell et al., 1995; Cohn, Campbell, Matias, & Hopkins, 1990; Field et al., 1985). They are also more likely to be insecurely attached (meta-analysis: Atkinson, Paglia, Coolbear, Niccols, & Parker, 2000). Their compromised interactive behavior may form a vicious circle of mutual rejection that further exacerbates maternal interaction problems and depression (Hammen, Burge, & Stansbury, 1990; Murray, Stanley, Hooper, King, & Fiori-Cowley, 1996).

Fathers' pre- and postnatal depression has similarly harmful effects on child development and father-infant interaction (Sethna, Murray, & Ramchandani, 2012; Ramchandani, O'Connor, Evans, Heron, & Murray, 2008). The combination of both pre- and postnatal depressive symptoms appears to be the most harmful for infant development among both mothers and fathers (Diego et al., 2005; Ramchandani et al., 2008). In our study, we aimed to ascertain whether the combination of both pre- and postnatal symptoms is also the most harmful for the quality of mother-infant interaction.

6.2.2 Depression and parental representations

Depression is generally associated with more negative representations of the self and significant others (A.T. Beck, 1967; Scharfe, 2007). Depressed mothers tend to more often have insecure adult attachment representations (Scharfe, 2007) and less coherent or more negative representations of their child and parenting during pregnancy (Amaniti, Tambelli, & Odorisio, 2013; Condon & Corkindale, 1997; Hart & McMahon, 2006). They also perceive their marital relationship more negatively (Rehman, Gollan, & Mortimer, 2008). Maternal prenatal anxiety has similar negative effects on prenatal maternal bond toward the child-to-be (Condon & Corkindale, 1997).

There is some evidence to suggest that parallel phenomena may take place among fathers (Paulson, Dauber, & Leiferman, 2010; Zelkowitz, Bardin, & Papageorgiou, 2007). For example, fewer prenatal depressive and anxiety symptoms were associated with more positive prenatal father-infant bond (Vreeswijk et al., 2013). With regard to violated expectations, previous findings also showed that negative representational change and maternal depressive symptoms are connected (Huth-Bocks, Theran, Levondosky, & Bogat, 2011; Pajulo et al., 2004), although the role played by prenatal depression was not included in the studies.

Despite the generally harmful effects of maternal depression, mother-infant interaction is not similarly compromised in all dyads with depressed mothers (Field, Healy, Goldstein, & Guthertz, 1990; Hoffman & Drotar, 1991; Rosenblum, Mazet, & Benovy, 1997). Maternal attachment representations may be one factor explaining these differences, although previous studies are scarce and inconsistent. McMahon, Barnett, Kowalenko and Tennant (2006) found that maternal secure-autonomous attachment style buffers infant attachment security from the negative effects of chronic maternal depression. Adam et al. (2004) found that mothers with a dismissing attachment style are especially vulnerable to low warmth in the parent-child relationship when depressed. In contrast, Bosquet and Egeland (2001) found that maternal attachment style had no effect on the association between maternal postnatal depression and the mother-infant interactive relationship. However, previous studies have not considered the role of prenatal depression, which may partly explain contradictory findings. In this dissertation, we examined whether maternal attachment style buffers the quality of mother-infant interaction from the negative effects of maternal pre- and postnatal depressive symptoms.

6.3 Parental substance-abuse

The prevalence of antenatal substance-abuse (including alcohol and illegal substances) in Finnish pregnant mothers is reported to be 6% (Pajulo, Savonlahti, Sourander, Helenius, & Piha, 2001). Maternal substance-abuse is an indicator of multilevel cumulative psychosocial risks related to both the mother, the child and the surrounding environment (Hans, Bernstein, & Henson, 1999). The infants of substance-abusing mothers are at high risk of disruptions in primary caregiving, including abuse, neglect and foster care placements (Ammermann et al., 1999; Nair et al., 1997). They are also vulnerable to problems in cognitive, motor and socioemotional development (Beeghly & Tronick, 1994; Conners et al., 2004; Hans & Jeremy, 2001).

Common environmental risks include low socioeconomic status and educational level, single parenthood or a relationship with a substance-abusing partner, unplanned pregnancy and problems with the law (Bays, 1990; Hans, 1999). From the mother's part, parenting problems are partly due to the direct effects of drugs (Bays, 1990; Brooks, Zuckerman, Bamforth, Cole, & Kaplan-Sanoff, 1994; Zuckerman & Brown, 1993). In addition to the obvious effects of intoxication or withdrawal symptoms on maternal behavior, substance dependence is known to weaken the brain functions that are needed in parenting, such as motivation, reward, self-awareness, capacity to reflect on behavior, and emotional regulation (Goldstein et al., 2009; Koob & Volkow, 2010; Pajulo et al., 2012). Substance-abusing mothers may thus be less capable of both regulating negative behavior and of deriving pleasure from the close interactive relationship with their infants.

The majority of substance-abusing mothers also suffer from comorbid psychopathology, most commonly depression, anxiety, posttraumatic stress disorder (PTSD) and personality disorders (Brooks et al., 1994; Haller & Miles, 2004; Hans, 1999). In Finland, for example 40% of substance-abusing mothers in residential treatment are clinically depressed (Pajulo, 2001). A majority also have traumatic experiences related to childhood maltreatment and/or violence in later life (e.g., from current or previous partners) (Conners et al., 2004; Kaltenbach, 2013). Maternal psychopathology and trauma history may further exacerbate the risks of mother-infant interactive problems and the child's developmental problems (Beckwith, Howard, Espinosa, & Tyler, 1999; Van der Kolk, 1994).

From the child's side, the teratological effects of prenatal substance-exposure may lead to various infant-related problems, but the effects vary according to the mixture of substances used, and their doses and timings during pregnancy. Most drug-abusers are polysubstance-users who also use alcohol, smoke cigarettes and may have suboptimal nutrition and health care attendance during pregnancy, all of

which have independent effects on child outcome (Bays, 1990; Brooks et al., 1994; Zuckerman & Brown, 1993). Alcohol exposure may cause organic and central nervous system damage, resulting in Fetal Alcohol Syndrome (FAS) or its milder forms Alcohol-Related Neurodevelopmental Disorder (ARND) or Alcohol-Related Birth Defects (ARBD). Almost all illegal drugs may also decrease fetal growth and gestational age (Shankaran et al., 2004; Zuckerman & Brown 1993), both of which are well-known risk factors for mother-infant interaction (see Beeghly & Tronick, 1994). Opiates may also cause transient withdrawal symptoms, such as tremors, irritability, mood swings and vomiting (Finnegan, 1984). The contemporary view is that rather than leading to global developmental delays such as low IQ, prenatal drug exposure more typically causes subtle neurobehavioral deficits in the infant, which may lead to a deterioration in their regulatory abilities such as attention, arousal, and emotion regulation (Beeghly & Tronick, 1994; Lester & Tronick, 1994; Mayes et al., 1995). This may lead to both hypo- and hyperactive arousal states, making the infant more difficult to soothe and activate. This kind of “neurological wound” also makes the child more vulnerable to the effects of suboptimal caregiving environments that are often typical of families with parental addiction.

6.3.1 Substance-abuse and parent-child relationship

In accordance with the transactional model of the constant and complex interplay between multilevel risk and protective factors (Sameroff & Fiese, 1990), longitudinal studies show that parenting and child development are not similarly compromised in all dyads with maternal drug-addiction (e.g., Johnson et al., 1990). There is a consensus that many of the harmful effects of maternal drug-abuse on child development are actually transmitted via disturbed parent-child interaction rather than being the sole result of prenatal drug-exposure (Beeghly & Tronick, 1994; Lester et al., 2000). Substance-abusing mothers are known to be less sensitive to their infants’ signals (Fraser et al., 2010; Mayes et al., 1995; Salo et al., 2010) and to show fewer positive emotions (Burns, Chetnik, Burns, & Clarke, 1997; Pajulo, Savonlahti, Sourander, Ahlqvist et al., 2001). They have more difficulties in structuring and guiding the child in a positive way (Blackwell, Lockman, & Kaiser, 1999; Pajulo, Savonlahti, Sourander, Ahlqvist et al., 2001; Salo et al., 2010), but are instead more intrusive and hostile (A.L. Johnson et al., 2002; Salo et al., 2009; 2010). Hostile-intrusive interactions are especially harmful, as they may indicate a heightened risk of child abuse, as well as disrupt the development of infant affect regulation and attachment organization (Lyons-Ruth, Connell, Zoll, & Stahl, 1987; Miller, Smyth, & Mudar, 1999; Swanson, Beckwith, & Howard, 2000).

Several studies have shown that infants of drug-abusing mothers show similar deficits as interaction partners as their mothers (Tronick et al., 2005). They seem to have problems in responding reciprocally to their mother, as well as in initiating interactions with her: they may be withdrawn and show high negative and low positive affect (Bendersky & Lewis, 1998; Salo et al., 2009; Tronick et al., 2005). The majority of substance-exposed children also show insecure, even disorganized attachment to their primary caregivers (O'Connor et al., 1987; Rodning, Beckwith, & Howard, 1991). However, other studies have found apparently normal interactive behavior among these infants (A.L. Johnson et al., 2002; Mayes et al., 1995; Savonlahti et al., 2005). It is not clear whether this reflects genuine resilience or false adaptation to the grave distortions in parenting at the expense of a healthy emotional development, as some authors suggest (e.g., Biringen, 2000; Crittenden & DiLalla, 1988; Savonlahti et al., 2005).

Research into the father-infant relationship among drug-abusing fathers is scarce, possibly in part due to the high incidence of father absence or couple conflict in these families (T. McMahon, 2013). Substance-abusing fathers are known to be less sensitive to their infants and have poorer parenting practices with their 1-10 years old children than non-users (Eiden, Edwards, & Peterson, 2002; Johnson, Cohen, Kasen, & Brook, 2004). Their children are also more often insecurely attached (Eiden et al., 2002). Possible biological effects of a father's substance-abuse on sperm DNA damage have also been suggested in partial explanation of the developmental risk of these children (e.g., Frank, Brown, Johnson, & Cabral, 2002). The father's substance-abuse may also have effects on family dynamics: Substance-abusing fathers are less supportive and more emotionally and physically abusive toward the mother than non-using fathers (Frank et al., 2002; Johnson et al., 2004).

6.3.2 Substance-abuse and parental representations

Relatively little is known regarding prenatal representations of drug-abusing mothers, and practically no research exists among fathers. According to qualitative research, prenatal representations of substance-abusing mothers are characterized by feelings of guilt, uncertainty and worry (Shieh & Kravitz, 2002; 2006). Substance-abusers are also described as having difficulties in representing affects, especially those related to emotion regulation (Lyden & Suchman, 2013). An unresolved adult attachment style with respect to trauma is especially typical of expectant mothers and fathers with substance-abuse problems (Riggs & Jacobvitz, 2002). With regard to prenatal representations related to mentalization about the child-to-be and one's own parenting,

the ability to mentalize is very low on average in drug-abusing mothers, but there is a fair amount of variability (Pajulo et al., 2012).

Only two previous studies (Pajulo, Savonlahti, Sourander, Piha, & Helenius, 2001; Wendland & Miljkovitch, 2003) have specifically explored the content of prenatal representations among mothers at high psychosocial risk. The mothers had multiple and heterogeneous risks, such as socioeconomic difficulties and mental health or substance-addiction problems. Both studies revealed that high-risk mothers had more negative prenatal representations of the child's father and their own mother, and somewhat more negative representations of their child, than did non-risk mothers. In addition, Pajulo et al. found that high-risk mothers had more negative representations of the self-as-mother and the self-as-woman whereas Wendland and Miljkovitch found these representations similar to those of normative mothers. However, we do not know whether the results specifically apply to substance-abusing mothers.

High-risk mothers may also be more prone to holding extremely idealized or unrealistic prenatal representations. Drug-abusing mothers have been described as often viewing their baby as a "savior" that could repair earlier hurts and losses (e.g., Cohen & Slade, 2000). From the perspective of caregiving and attachment systems, this may indicate role-reversal, an unconscious wish to receive mothering (activation of the attachment system) rather than give it (activation of the caregiving system). High-risk mothers may also be less flexible in updating their unrealistically high expectations to match reality, which could lead to increased likelihood of negative VE, but there is no previous research to show the incidence of VE in this group.

Only two studies have analyzed the association between prenatal representations and mother-child relationships among substance-abusing mothers, one showing a significant and the other a non-significant effect of maternal representations. In a study of methadone-using mothers, Conte, Mazzoni, Serreti, Fundaro and Tempesta (1994) found that negative prenatal representations of one's own mother increased the probability of child foster care placement by two years of age. However, Pajulo et al. (2004) found no direct association between maternal prenatal representations and quality of mother-infant interaction at 6 months among drug-abusing mothers. This notwithstanding, in the same study, more negative VE concerning the child and the child's father was associated with increased problems in mother-infant interaction. One of the aims of this dissertation was to gain more information about prenatal representations and their violations, as well as their effects on the parent-child relationship among substance-abusing mothers and their infants.

AIMS OF THE STUDY

With regard to mothers' and fathers' prenatal representations in the transition to parenthood, this study focuses on their stability, function and preconditions in normative and medical/psychosocial risk conditions. Our research questions and hypothesis are as follows:

First, we focus on risk and normative group differences in parental prenatal representations and pre- to postnatal violations of expectations.

Our aims are:

- 1) To study whether prenatal representations differ a) between couples conceiving with assisted reproductive treatment (ART) and those conceiving spontaneously (SC) (Article I), and b) between drug-abusing and non-using mothers (Article III). We hypothesize that risk group parents have alternatively more negative, or highly positive (idealized), prenatal representations than normative parents.
- 2) To study a) how maternal and paternal prenatal representations are violated into the postnatal period (Article I), and b) whether this violation differs between ART and SC couples (Article I), and c) between drug-abusing and non-using mothers (Article III). We hypothesize that no violation/positive violation of expectations would be typical for both mothers and fathers, but there would be more positive or negative violation among the risk group than in normative parents.

Second, we examine the impact of prenatal representations and their violations on parent-child relationship. Our aims are:

- 1) To study a) the impact of maternal and paternal prenatal representations on early parent-infant relationship (Article I), and b) whether there are group differences between ART and SC couples (Article I), and c) between drug-abusing and non-using mothers (Article III). We hypothesize a U-shaped curve of both negative and highly positive (idealized) prenatal expectations predicting more negative parent-infant relationship than moderate levels of expectations. We also expect that the harmful effect of idealized expectations would be most evident in the high-risk drug-abusing group.
- 2) To study how violation of expectations affects quality of mother-infant interaction among drug-abusing and non-using mothers (Article III). We hypothesize that negative violation of expectation would predict a lower quality of parent-infant interaction in both groups.

Third, we examine the preconditions for the occurrence of violated expectations. Our aims are:

- 1) To study the underlying parent-, infant- and delivery-related mechanisms associated with pre- to postnatal VE among mothers and fathers (Article IV). We hypothesize that all of these would be associated with VE, but that the effects are partially mediated via parental mental health symptoms.
- 2) To study whether there are group differences in these underlying mechanisms between a) ART and SC couples and b) primi- and multiparous couples (Article IV).

Fourth, we examine how maternal pre- and postnatal symptoms of depression, together with maternal prenatal attachment representations, affect the quality of mother-infant interaction. Our aims are:

- 1) To study whether maternal prenatal and postnatal symptoms of depression predict the quality of early mother-infant interaction differently (Article II). We hypothesize that prenatal symptoms, and especially the combination of pre- and postnatal symptoms, would have more harmful effects on the quality of mother-infant interaction than would only postnatal symptoms.
- 2) To study whether maternal autonomous attachment style buffers quality of mother-infant interaction from the harmful effects of maternal symptoms of depression (Article III). We hypothesize that this buffering effect exists.

MATERIALS AND METHODS

1. Participants and procedure

A summary of main research questions, participants, procedures and measures used in different study samples of this dissertation is presented in Table 1.

ARTICLE	I & IV	II	III
Main research question	How do prenatal representations predict parenting among ART and SC parents? (I) What explains violated expectations? (IV)	How do maternal depressive symptoms and attachment representations predict mother-infant interaction?	How do prenatal representations and their violations predict mother-infant interaction among drug-abusing and non-using mothers?
Sample size	Couples: N = 745	Mothers: N = 59	Mothers: N = 101
Subgroups	ART: n = 367 SC: n = 378	(normative sample)	Drug-abuse: n = 51 Normative: n = 50
Timing of assessments	T1: Pregnancy T2: Child 2 months T3: Child 12 months	T1: Pregnancy T2: 4-6 months (appr.) T3: 14 months (appr.)	T1: Pregnancy T2: 4 months T3: 12 months
Measures for representations	Subjective Family Picture Test ¹ (SFPT; T1, T2, T3)	a paper-and-pencil Adult Attachment Interview ¹ (AAI; T1)	a paper-and-pencil Interview of Maternal Representations ¹ (IRMAG; T1, T2, T3)
Measures for parent-child relationship	Parenting Stress Index ¹ (PSI; T2, T3)	Care Index ² (T3)	Emotional Availability Scales ² (EAS; T2, T3)
Measures for mental health	General Health Questionnaire ¹ (GHQ; T1, T2, T3)	Edinburgh Postnatal Depression Scale ¹ (EPDS; T1, T2)	Edinburgh Postnatal Depression Scale ¹ (EPDS; T1, T2, T3)
Other measures	Dyadic Adjustment Scale (DAS), infant- and delivery-related questions (T2) ¹		AUDIT, questions related to substance-abuse characteristics (T1, T2, T3) ¹

Note. ART = assisted reproductive treatment, SC = spontaneously conceiving, appr. = approximately.

¹self-report, ²observational

Table 1. Summary of the research questions, settings and measures.

1.1 Articles I and IV

Participants were 745 married or co-habiting couples and their singleton infants. The spontaneously conceiving (SC) couples with no history of infertility ($n = 378$) were recruited at Helsinki University Central Hospital while they were participating in a routine ultrasonographic examination. The ART group ($n = 367$) consisted of couples with pregnancies that had started after ART with their own gametes (fresh or frozen embryo transfer following IVF or ICSI) in five infertility clinics in Finland. Women and men separately completed a questionnaire at three time points. During the second trimester of pregnancy (T1) they filled out questionnaires regarding, for example, their prenatal representations and mental health symptoms. When their child was two months old (T2), they completed questionnaires concerning postnatal representations, mental health problems, marital quality, delivery- and early infant characteristics, and their parenting stress. The same questionnaires (except for delivery and early infant characteristics) were again completed when their child was 12 months of age (T3). The total participation rate for couples was 69.8%. The rate was higher in the ART group (ART 73.6% of mothers and 69.7% of fathers; SC 66.2% of mothers and 58.3% of fathers). The mean age of mothers was similar in both groups (ART: 33.0 ± 4.2 ; SC: 33.3 ± 3.0), but ART fathers were older (35.0 ± 5.8) than SC fathers (34.2 ± 5.4). Paternal occupational status was similar in both groups, but ART mothers had lower occupational status than SC mothers (unskilled worker: ART 5.7%, SC 7.5%, skilled worker: ART 22.3%, SC 13.2%, low professional: ART 42.5%, SC 40.9%, high professional: ART 29.5%, SC 38.4%). ART couples were more often primiparous (69.9%) than SC couples (36%). Approximately half of the children in both groups were girls.

1.2 Article II

The participants were 59 mothers (age 29 ± 5 years) and their children (approximately half were girls). The basic sample consisted of 150 women in their third trimester of pregnancy, who visited maternity health care centers in southern Finland. The data collection proceeded in three stages: The public health nurses described the purpose of the study to their clients and asked for voluntary participation. If they agreed, the women provided written informed consent and received a questionnaire regarding their attachment style and symptoms of depression for completion at home. A total of 61% ($n = 91$) returned the questionnaire to the nurse in a closed envelope (T1). Of these women, 64 expressed a willingness to continue in the later phases of the study, and they received a second questionnaire when their child was 4-6 months old

(T2), inquiring about their symptoms of depression. They were later contacted by telephone and asked to participate in the third phase, which involved a home visit and videotaping of a free-play interaction of the dyad (T3). At this stage, the children were 7 to 18 months old. All the mothers with complete data from baseline and at least one later phase were kept in the study, and the missing values were imputed using expectation-maximization (EM) algorithm. Of the participating mothers, 64.4% were primiparous, and 35.6% had between one and three older children. Over half (52.5%) were married, around a third (35.6%) were cohabiting, and 11.9% were single. A third (34.7%) had a university degree, half (46.9%) had polytechnic school education, and around a fifth (18.4%) had vocational schooling or had received high school education.

1.3 Article III

The participants were 101 Finnish mothers and their infants. The comparison group comprised 50 dyads, and was recruited from a hospital maternity outpatient clinic in Southern Finland, which they attended for the monitoring of medical risks, such as gestational diabetes or symptoms of premature labor. Exclusion criteria were lifetime use of illegal drugs (drug screening and self-report), and more than light consumption of alcohol. The drug-abusing group comprised 51 mother-infant dyads in outpatient care, receiving either time-limited psychodynamic mother-infant group therapy (PGT group: $n = 26$) or individually tailored psychosocial support (PSS group: $n = 25$). The interventions are described in detail in Belt & Punamäki (2007) and Belt et al. (2012). In short, the aim of the PGT intervention was to offer the mother the experience of care that they, in turn, could return to their infants. Substance-abuse and mental health treatment, as well as parenting interventions, were integrated, with the aim of both addressing the mother's psychological needs, as well as preventing attachment disorders in the child. The PGT intervention started during pregnancy and comprised 20 to 24 weekly, 3-hr sessions. In addition, one of the two therapists was available by telephone between the sessions. After the therapy, the mothers had individual follow-up. The PSS was an individually tailored intervention that comprised different possible elements, such as support for abstinence and for the mother-infant dyad, home visits, help with organizing daily life, and marital counseling, but not psychotherapy. The PSS mothers did not have a systematic weekly participation schedule. All mothers in the drug-abusing groups had a history of severe illegal drug or poly-substance abuse lasting for several years, as verified by a positive drug screen or self-report.

The study procedure was identical for both groups. The staff informed consecutive clients of the study and its purpose, its voluntary nature, and the procedure, during their second or third trimester of pregnancy (T1). The mothers willing to participate signed an informed consent form and were given the baseline questionnaire to complete at home and then return at the following appointment. They answered questions concerning their prenatal representations, mental health problems, and substance-abuse characteristics. At 4 months (T2) and 12 months (T3), the research psychologists visited the mother-infant pair at their home or program residence, and the mothers completed the questionnaires concerning their postnatal representations, mental health symptoms, and substance-abuse characteristics. In addition, free-play interaction of the dyad was videotaped on both occasions. The dropout rates were 8% ($n = 4$) in the drug-abusing and 14% ($n = 7$) in the control group from T1 to T2, and 19% ($n = 9$) and 9% ($n = 4$) from T2 to T3, respectively. Half of mothers in both groups were primiparous and approximately half of the children in each group were girls. The drug-abusing women were more often single (17–19%) than comparison mothers (4%). They also had lower educational levels than comparison mothers: for example 88% of drug-abusing mothers had basic or vocational training whereas only 40% of comparison mothers had this low level of education. The drug-abusing mothers were also younger ($M = 25.53 \pm 4.16$ years) than comparison group mothers ($M = 29.24 \pm 5.02$ years). The two drug-abusing groups were similar in all these variables.

2. Measures

2.1 Representations

Maternal attachment style (Article II) was measured with an adapted paper- and pencil version of the Adult Attachment Interview (AAI, George, Kaplan, & Main, 1985), developed by Kanninen, Salo and Punamäki (2000; see also Kanninen, Punamäki, & Quota, 2003 for validation in a previous study). The participants received a five-page booklet with instructions: first, to describe their childhood relationships with their mother and father separately, by giving five adjectives and five illustrative examples of each. Second, they were asked to describe what had happened when they were upset, ill, felt rejected, or had experienced loss as children, and what they did when they experienced distress in both childhood and adulthood. Finally, they were asked how they thought their upbringing had affected their adult personality, and why they thought their parents had behaved as they had. The Main and Goldwyn (1991) scoring system was applied to code and quantify the written reports. This provides

continuous estimates of the main domains of adult information processing of attachment experiences, that is, what the participants remember (Childhood memories and Dealing with Stress) and how they process their memories (Coherence of Answers and Memory Modalities). The scoring system results in 30 continuous variables with the following contents: (1) Childhood memories, (2) Dealing with Distress in Childhood, (3) Coherence of the Answers involving (a) An overall incoherence score, (b) Current anger, (c) Idealization, and (d) Derogation, and (4) Memory modalities. The inter-rater reliability of the attachment variables was based on a sample of 30 reports using Kappa and Pearson's correlation statistics. The results show that coefficients were acceptable (0.70–1.00) for the variables of Childhood Memories, Dealing with Distress and Memory Modalities, whereas coherence variables were less reliable in the preliminary scoring. In the case of discrepancies between the two coders trained in the Main and Goldwyn (1991) system, a third trained coder in AAI was consulted in order to resolve the differences and establish practical scoring criteria. The classification of attachment styles was based on cluster analysis (Ward's method and Euclidian distance; for details, see Kanninen et al., 2000). The final clustering solution was based on 27 standardized sum scores of these attachment variables, which adequately discriminated the three clusters of attachment styles: secure-autonomous, insecure-dismissing and insecure-preoccupied. The three clusters of secure-autonomous, insecure-dismissing and insecure-preoccupied attachment styles differed from each other in accordance with the theoretical characteristics (e.g., quality of childhood relationships, balance versus imbalance between semantic and episodic memories, current anger, derogation, withdrawal and integrative capacity) (Crittenden, Claussen, & Partridge, 2000; Main & Goldwyn, 1991).

Prenatal expectations and postnatal representations of the parent-child relationship intimacy and autonomy (Articles I and IV) were assessed by eight semantic differentials from the Subjective Family Picture Test (SFPT, Mattejat & Scholz, 1994). Both parents rated prenatal expectations and postnatal representations of their own and their spouse's relationship to the child (intimacy: four pairs of items, e.g., *loving - rejecting*, *warm - distant*; autonomy: four pairs of items, e.g. *determined - indecisive*, *self-confident - uncertain*) using a seven-point scale (range: -3 – 3). High scores on autonomy indicate relational self-assurance, agency and independence, whereas high scores on intimacy indicate emotional attachment, interest and acceptance. Well-functioning families have representations that are high and balanced in both dimensions. Cronbach's α values for summary scales ranged from .56 to .75 at T1 and from .68 to .81 at T2.

Maternal pre- and postnatal representations of their child, child's father, self-as-mother, self-as-woman and own-mother-as mother (Article III) were measured by semantic dif-

ferentials from the questionnaire form of the Interview of Maternal Representations (IRMAG; Ammaniti et al., 1992; Ammaniti, Tambelli, & Perucchini, 1998). This method was developed for pregnant women through the collaboration of an international research group that included Charles Zeanah, Daniel Stern, and Graziella Fava Vizziello, and was further adapted by Massimo Ammaniti and colleagues. Each list contains 17 mixed pairs of opposite adjectives placed at opposite ends of a horizontal line; participants are asked to mark the point from 1 to 7 that best indicates their rating. In our study, global summary scales for each representation type were used. Cronbach's α values ranged from .84 to .91 at T1, from .78 to .90 at T2, and from .81 to .92 at T3.

2.2 Parent-child relationship quality

In **articles II and III**, *mother-child interaction quality* was measured with a video-taped 5-10 minutes free-play interaction, whereby the mother was asked to play as she usually would with her child. In **Article II**, it was coded with the Care Index (Crittenden, 1999). This attachment-based measure is suitable for infants up to 24 months of age, and can be used to compare children of varying ages, as the age and developmental level of the child are inherently accounted for in scoring. Mothers and infants were rated on seven aspects of interactive behavior: facial expression, verbal expression, position and body contact, affection, turn-taking, control and choice of activity. These ratings contributed to three adult scales (Sensitive, Controlling and Unresponsive), and four infant scales (Cooperative, Difficult, Compulsive and Passive). Separate summary scales ranging from 0 to 14 were formed for all the dimensions. The videos were scored by two reliable coders trained by Patricia Crittenden, who were blind to background information. The inter-rater reliabilities (Pearson's R) were satisfactory: .85 for maternal sensitivity, .87 for maternal control, .65 for maternal unresponsiveness, .79 for child co-operation, .98 for child compulsiveness, .69 for child difficulty, and .97 for child passivity. Differences were negotiated. The scale has been found to reliably differentiate normative mother-infant dyads from dyads at risk, on the basis of risk factors such as maltreatment, maternal mental illness and infant prematurity (Crittenden, 1981; Muller-Nix et al., 2004; Steadman et al., 2007).

In **article III**, *mother-infant interaction quality* was coded with Emotional Availability Scales (EAS, 4th Edition, Biringen, 2008). The interaction was evaluated by four maternal scales (Sensitivity, Structuring, Nonintrusiveness and Nonhostility) and two child scales (Responsiveness to Mother and Involvement of Mother). The scales ranged from 1 to 7. The interaction quality was coded by the author of this thesis,

and 10% of the videos were also coded by another coder: both are reliable coders trained by Zeynep Biringen. Both were blind to maternal drug-abuse status and other background information. The inter-rater reliabilities (Pearson's R) ranged from .82 to .97. Differences were negotiated. Another 5% of the videos were jointly coded with the method trainer (Z. Biringen). The scale is known to be correlated with maternal and child attachment status and various aspects of child development (see e.g., Salo & Flykt, 2013, for a review).

In **article I**, *parent's experience of the parent-child relationship* was assessed by a 35-item self-report measure, the Parenting Stress Index, short form (PSI-SF, Abidin, 1995). This instrument comprises three adult-related scales (parenting competence, social isolation and attachment) and three child-related scales (hyperactivity, acceptability and adaptability). The questions are rated on a 5-point scale (1-5), with higher scores indicating higher stress. The scale has shown good validity, for example, predicting quality of parent-child interaction and child adjustment (see Doll, 1989). Cronbach's α values were above .90 at all time points.

2.3 Mental health symptoms

In **articles II and III**, *maternal pre- and postnatal depressive symptoms* were measured with Edinburgh Postnatal Depression Scale (EPDS, Cox, Holden, & Sagovsky, 1987), a 10-item instrument comprising descriptions of depression-related feelings, thoughts and behaviors. The respondents answer on a 4-point scale (0–3) as to how well the description matches the severity and persistency of the symptoms they experienced during the previous week. Separate summary variables were constructed for pre- and postnatal symptoms of depression, and these were used as continuous variables in the studies (although clinical cut-off criteria were also calculated for descriptive purposes). Cronbach's α values were .85 and .80 (**Article II**) and .85, .79, and .87 (**Article III**).

In **article IV** *parental pre- and postnatal mental health* was measured with a 36-item version of the General Health Questionnaire (GHQ-36, Goldberg & Hiller, 1979). Spouses estimated their symptoms of depression, anxiety, sleeping difficulties, and social dysfunction on the basis of their present state over the past few weeks on a four-point scale (1 = *not at all*, 4 = *much more than usually*). The α -values ranged from .80 to .93. (Clinical cut-off criteria were also calculated.)

2.4 Other measures

Marital quality (**Article IV**) was measured with a 32-item Dyadic Adjustment Scale (DAS, Spanier, 1976). Both spouses estimated their marital relationship on a six-point scale (range: 0-5). The dimensions were dyadic consensus, dyadic cohesion, marital satisfaction and sexual affection. The Cronbach's α -values ranged from .72 to .86 for mothers and from .73 to .88 for fathers.

Delivery experience (**Article IV**) was measured with an eight-item Satisfaction with Delivery Scale (SDS, Saisto, Salmela-Aro, Nurmi, & Halmesmäki, 2001) for mothers and one question measuring the positivity/negativity of the experience for fathers. Questions regarding *method of delivery* (unplanned Caesarean, planned Caesarean, assisted vaginal delivery, normal vaginal delivery) and *analgesia use* (number of analgesia methods) were also included. Method of delivery was used as a dichotomous variable (unplanned Caesarean vs. other methods).

Infant-related factors (**Article IV**) were measured with questions concerning *infant health problems* (whether the child was healthy at birth and at 2 months, birth weight, apgar score and NICU treatment), *early infant characteristics* (infant soothability, rhythmicity and early contact smile), and *the number of parental worries for the infant*. These scales were especially built for the purposes of this study.

Substance abuse characteristics (**Article III**) were assessed by presenting a list of eight drugs and asking the mothers in the drug-abusing group to indicate the ones that they had used regularly or had experimented with (1 = *no*, 2 = *yes*: cannabis, LSD, amphetamine, ecstasy, heroin, sniffing medicaments, medicines, and other (e.g., buprenorphine). Further, by an open question, they indicated, how often they had used each drug. The women reported their drug-abuse before pregnancy, whether it had changed during pregnancy or postnatally (1 = *no change*, 2 = *decreased*, 3 = *stopped*, 4 = *increased*). Furthermore, they were asked about the use of substitute medication and intravenous drug use. Alcohol consumption was assessed using seven items from the Alcohol Use Disorders Identification Test (AUDIT, Saunders, Aasland, Babor, de la Fuente, & Grant, 1993).

3. Statistical analyses

3.1 Articles I and IV

To answer our research questions, we built structural equation models with Mplus version 5.2 (Múthen & Múthen, 1998–2007) using the maximum likelihood esti-

mation method with robust standard errors (MLR). Missing values were handled by the missing data method implemented in Mplus corresponding to full information maximum likelihood (FIML). The overall fit of models was considered to be acceptable with CFIs (Comparative fit index) of .90 or higher, TLI (Tucker-Lewis index) of .90 or higher, and RMSEA (Root Mean Square Error of Approximation) values of less than .05 (Kline, 2005).

In Article I, to examine the effect of prenatal expectations on parenting stress, latent constructs of parenting stress as well as of self- and spouse-related representations of autonomy and intimacy with the child were built. When using corresponding constructs repeatedly in the same analysis, longitudinal factorial invariance was assumed, and correlations between corresponding error terms were allowed. Mothers and fathers were included in the same model. The familial dependency between fathers and mothers was controlled for by allowing error terms and latent variables to correlate between parents. A quadratic term of prenatal representations was added to the models. The significant quadratic terms indicate the hypothesized U-shaped curve of both extremely negative and extremely positive representations predicting higher parenting stress.

To examine the occurrence and direction of violations (positive or negative) between the prenatal expectations at T1 and postnatal representations at T2 and T3, we modeled common-factor latent change scores (McArdle, 2009). In the model, later representations (T2 or T3) were defined as the exact sum of earlier expectations (T1) and change score (T2 minus T1 or T3 minus T1). Technically, the latent score variable was created by restricting the residuals of later representations (T2 and T3) to be zero. This restriction causes the residual variance to represent the variance that is not explained by earlier expectations; that is, it represents change. In the model, this residual variance is inherited by latent change score as its own variance. Finally, including mean structure in this model allows average changes to be estimated as properties of change score variables. For a more detailed description of latent change score models, see McArdle (2009). Differences in the parameter estimates between mothers and fathers were assessed with Wald's tests, and differences between ART and SC families and between primi- and multiparous families were examined with multiple group models using Satorra Bentler scaled chi-square tests.

In Article IV latent constructs were built separately for parental representations of one's own autonomy and intimacy with the child, of mental health problems, marital quality and maternal birth experience. Other variables were used as observed summary variables. Common-factor latent change score from T1 to T2 was used to model violated expectations, as described in Article I (McArdle, 2009).

We examined, first, the *direct* effects of the underlying predictors (mental health, marital problems, delivery experience, unplanned Caesarean, amount of analgesia, worry about the child, infant health problems, and difficult infant characteristics) on VE. In the same model, we tested the *indirect* paths to VE: (a) marital-, delivery- and infant-related predictors via mental health, (b) objective delivery-related predictors via subjective delivery experience or subjective delivery experience and mental health, and (c) infant-related predictors via worry about the child or worry about the child and mental health. T1 expectations and T1 mental health were used as covariates for violated expectations, if significant, and T1 mental health also for T2 mental health.

Four SEM-models were constructed, using the T2-T1 latent change scores of autonomy or intimacy as outcome variables, separately for mothers and fathers. Mothers and fathers were not compared to each other in the same model, because the metric invariance assumptions did not hold between maternal and paternal representations of autonomy and intimacy. Group comparisons between ART and SC parents and primi- and multiparous parents were conducted by using Satorra-Bentler scaled chi-square tests. If groups differed, each individual path was examined separately.

3.2 Article II

The classification of adult attachment styles was based on cluster analysis, conducted with the summary scales of the modified AAI procedure. The impact of maternal attachment style on quality of mother-infant interaction was examined with Multivariate Analysis of Covariance (MANCOVA), followed by univariate analyses. Hierarchical regression analyses were conducted to study the impact of separate and combined effects of maternal pre- and postnatal symptoms of depression on quality of mother-infant interaction. The interactive effects of Attachment style \times Prenatal symptoms of depression and Attachment style \times Postnatal symptoms of depression on quality of mother-infant interaction were examined in separate MANCOVAs. Child age, gender, and maternal educational level were used as covariates in all analyses. Missing values were imputed using EM.

3.3 Article III

Group differences in prenatal representations were tested by univariate Analyses of Covariance (ANCOVAs), followed by Bonferroni *post hoc* tests. The group status (PGT and PSS drug-abusing and comparison groups) was the independent variable,

and representations of the child, the self-as-woman, the child's father, the self-as-mother, and own mother-as-mother were the dependent variables. Pre- to postnatal representational change (i.e., violated expectations) was examined with repeated measure MANCOVAs, followed by univariate analyses. The effect of prenatal representations on mother-infant interaction quality was tested by Group Status (PGT and PSS drug-abusing and comparison) \times Prenatal Representations MANCOVAs on EA variables separately at T2 and T3. In subsequent analyses, a quadratic term of prenatal representations was added to the models. The significant quadratic terms would indicate the hypothesized U-shaped curve of both extremely negative and extremely positive representations predicting less emotionally available interaction. The results were further specified by ANCOVAs conducted separately for the three groups by looking at B-coefficients from parameter estimates and graphic illustrations. Finally, to test for the effect of violated expectations on EA, representational change (i.e., VE) variables were constructed by calculating standardized residual scores through a regression analysis, with T1 prenatal representations as independent variables and T2 postnatal representations as dependent variables. The residual scores represent the discrepancy between pre- and postnatal representations, with high scores indicating more positive VE. The residual scores are the result of partialing out the variance associated with the pre-scores from the post-scores and accounting for regression to the mean (e.g., MacKinnon, 2008). Group \times Representational Change MANCOVAs, followed by univariate analyses, and graphic illustrations were then separately conducted at T2 and T3. The dependent variables were the mother-child EA interaction variables. Maternal depressive symptoms, marital status, educational level, and financial difficulties were used as covariates in all analyses.

4. Ethical considerations

The fieldwork was conducted according to the APA ethical recommendations. The Ethics Committees of the participating clinics approved the study purpose, methods and data collection procedure of each study.

RESULTS

1. Prenatal expectations and their violations

Our first task was to examine risk and normative group differences in parental prenatal representations and in the occurrence of pre- to postnatal violations of expectations. We further examined the differences between mothers and fathers in the occurrence of violated expectations.

1.1 Risk group differences in prenatal representations

We had hypothesized risk group parents to have more negative or idealized prenatal representations than normative parents, but this hypothesis received partial support only in the psychosocial but not in the medical risk group. Contrary to our hypothesis, there were no differences in maternal and paternal prenatal representations of parent-infant intimacy and autonomy between ART and SC parents. The results were similar with regard to self- and spouse-related representations (**Article I**). However, drug-abusing mothers showed more negative prenatal representations of the child's father and the self-as-woman than non-using mothers, but this was only true of the mothers in the PGT intervention group. PSS intervention group mothers reported similar prenatal representations than non-using mothers. In addition, mothers with higher prenatal symptoms of depression, irrespective of drug-abuse status, reported more negative representations of the self-as-woman, the self-as-mother, the child's father, and one's own mother (**Article III**).

1.2 Pre- to postnatal violation of expectations

We had hypothesized that among all parents, no violation or positive violation of expectations would be most typical. In accordance with this, the results revealed that maternal and paternal postnatal representations were most often more positive or equal to prenatal expectations, that is, typically there was a positive VE or no VE. Maternal expectations of her own relationship with the child changed in a more positive direction over the transition to parenthood, with regard to both emotional intimacy and autonomy. The positive change for intimacy took place already at 2 months of infant age, but for autonomy it occurred later, at 12 months. However, contrary to the hypothesis, maternal expectations of the father-child relationship intimacy and autonomy were negatively violated. For fathers, no violation occurred in the postnatal representations of their own intimacy and autonomy with the child. With regard to the spouse's relationship to the child, fathers showed positive VE in mother-infant autonomy at 12 months, but otherwise no violation occurred in their spouse-child representations (**Article I**).

We had further hypothesized that more positive or negative VE would be typical among risk group than normative parents. This received partial support in both medical and psychosocial risk groups, but in the different direction. ART mothers experienced less negative VE in father-child relationship autonomy than SC mothers, suggesting more stability in their prenatal representations than among SC mothers. ART fathers, however, did not differ from SC fathers in their VE (**Article I**). Concerning psychosocial risk mothers, instability of representational processes seemed to be characteristic, but there were some potentially unique and treatment-specific features. Regarding VE of the child, among PSS mothers alone, there was a quadratic representational change. Representations of the child first changed in a more positive direction from pregnancy to 4 months and then back in a more negative direction at 12 months. No such change occurred among PGT or non-using mothers. In other representational dimensions, our results suggest that high-risk, drug-abusing mothers and normative mothers show largely similar VE over the transition to parenthood: There was no violation in representations of the self-as-mother, one's own mother, and the child's father, and positive violation in representations of the self-as-woman. Maternal prenatal depression was, however, also associated with increased instability of representations as evidenced by a quadratic change concerning the representations of the self-as-mother: Despite drug-abuse status, a higher number of symptoms of depression were associated with positive VE from pregnancy to 4 months, but with negative VE at 12 months (**Article III**).

2. The impact of prenatal expectations and their violations on parenting

Our second task was to examine the impact of prenatal representations and their violations on parent-child relationship, and whether there are differences between mothers and fathers and between normative and risk group parents.

2.1 The effect of prenatal representations on parenting

We had hypothesized to find a U-shaped curve where both negative and highly positive prenatal representations would predict more negative parenting than moderately high level of prenatal representations. The “U-shaped curve hypothesis” was, however, substantiated only with regard to paternal expectations of own autonomy with the child in predicting parenting stress at the child age of 2 months. Instead, in general, the association between prenatal representations and parenting seemed to be linear: negative expectations of one’s own and the spouse’s relationship with the child were linearly associated with higher parenting stress for both parents, both at the child age of 2 months and 12 months. In addition, there was an inverse curvilinear effect opposite to our hypothesis, namely, among both parents, moderate prenatal expectations of spouse’s intimacy with the child predicted higher parenting stress at 2 months than high or low expectations. There were few differences between parents, but among mothers, high expectations of own intimacy with the child was a stronger predictor of low parenting stress than among fathers (**Article I**).

Medical risk parents showed dynamics largely similar to normative parents. Among both ART and SC parents, negative prenatal expectations linearly predicted higher parenting stress at both 2 and 12 months. Contrary to our hypothesis of the beneficial role of moderate prenatal expectations, curvilinear effects revealed that among ART fathers, moderate expectations of spouse’s intimacy with the child were associated with higher parenting stress at 2 months than either highly positive or highly negative expectations. Among SC fathers, there was a trend to a similar curvilinear effect, but it occurred at 12 months (**Article I**).

However, the U-shaped curve hypothesis of the beneficial role of moderate prenatal expectations was more valid in the psychosocial risk group. As we had hypothesized, highly idealized prenatal representations were the most harmful among psychosocial risk mothers, but this was true only in the PGT group concerning the representations of the self-as-mother. In the PGT group, maternal sensitivity, structuring, and child responsiveness were higher and hostility lower at 4 months when maternal prenatal

representations were at a moderate level, compared to when they had been very negative or very positive. In the non-using and PSS groups, maternal prenatal expectations did not predict quality of mother-infant interaction (**Article III**).

2.2 The effect of violated expectations on parenting

We hypothesized negative violation of expectations to be a risk factor for parent-infant relationship among all mothers. In accordance with this, the results showed that negative VE concerning one's own mother-as-mother were associated with higher maternal intrusiveness and lower structuring at 4 months, among both drug-abusing and non-using mothers. Negative VE concerning the child was associated with lower maternal sensitivity and higher hostility at 4 months, and, with regard to the child's father, it was associated with higher maternal hostility at 4 months.

Contrary to the hypothesis, normative and psychosocial risk mothers also showed unique features. Among drug-abusing mothers, especially in the PGT group, negative VE concerning the self-as-mother was, unexpectedly, associated with lower maternal hostility at 4 months. However, among non-using mothers, negative VE of the self-as-mother was associated with higher maternal hostility, as hypothesized. Similarly, positive VE concerning one's own mother was, unexpectedly, associated with lower child responsiveness at 4 months only in the drug-abusing groups, whereas in the non-using group, it was associated with higher child responsiveness, as hypothesized. Further, positive VE concerning one's own mother predicted higher maternal structuring at 12 months among the PGT mothers only, suggesting possible treatment-specific effects (**Article III**).

3. The preconditions for the occurrence of violated expectations

Our third task was to examine the possible parent-, infant- and delivery-related mechanisms that could explain the occurrence of violated expectations from prenatal to 2 months postpartum. The results supported our hypothesis that all of these were significant direct or indirect predictors of VE. However, our hypothesis of mental health symptoms as mediators of other factors was supported only among mothers.

The results among mothers revealed that, with regard to violated expectations in both mother-infant intimacy and autonomy, maternal mental health problems were negatively associated with VE. Here, negative association means

that the more mental health problems the mothers had, the less positive or more negative were the violated expectations of mother-infant intimacy and autonomy. Of delivery-related factors, lower number of analgesia methods was negatively associated with VE in mother-infant intimacy and negative birth experience was associated with more negative VE in mother-infant autonomy. Marital problems were indirectly associated with VE in both mother-infant intimacy and autonomy, via mental health problems. Of the infant-related factors, infant health problems and difficult infant characteristics were indirectly associated with VE in both mother-infant intimacy and autonomy, via a sequential mediation path of higher levels of worry about the child and maternal mental health problems. Of the delivery-related factors, unplanned Caesarean was indirectly associated with VE in mother-infant intimacy and autonomy via a sequential mediation path of negative birth experience and maternal mental health problems. With regard to VE in mother-infant autonomy, unplanned Caesarean was also indirectly associated with VE via negative birth experience.

With regard to father-infant intimacy, marital problems and lower number of analgesia methods used by the mother were negatively associated with VE. Regarding father-infant autonomy, the results showed that marital problems, father's more negative birth experience, and difficult infant characteristics were negatively associated with VE. Different from mothers and contrary to our hypothesis, there were no significant indirect associations in either paternal model (**Article IV**).

3.1 Group differences in the underlying mechanisms for violated expectations

The ART and SC groups differed in the underlying mechanisms for VE in father-infant intimacy only. Difficult infant characteristics were negatively associated with VE among SC, but not ART fathers, that is, the more difficult the infant was to take care of, the more negative or less positive VE took place among SC fathers. When analyses were re-run with mental health symptoms as a dichotomous clinical cut-off score, additional group differences emerged: lower number of analgesia methods and, curiously, less worry for the child were negatively associated with VE among ART, but not SC fathers. The results thus suggest that among ART fathers, spouse's low analgesia use increased risk for negative VE, but higher worry for the child actually seemed to decrease the risk.

Primi- and multiparous parents differed in the underlying mechanisms for VE concerning mother-infant autonomy only. Multiparous mothers were more vulnerable

to VE than primiparous mothers when they experienced a negative birth experience, an unplanned Caesarean, a lower number of analgesia methods, or infant health problems. Primiparous mothers, in turn, were more vulnerable to VE than multiparous mothers when they experienced difficult infant characteristics. When analyses were re-run with mental health symptoms as a dichotomous clinical cut-off score, additional group differences emerged: clinical mental health symptoms were negatively associated with VE among primiparous, but not multiparous mothers (**Article IV**).

4. Maternal depression, attachment style and mother-infant interaction

Our fourth task was to examine how maternal pre- and postnatal symptoms of depression, together with maternal prenatal attachment representations, affect the quality of mother-infant interaction. The results supported our hypotheses that maternal prenatal depressive symptoms, and especially the combination of both pre- and postnatal symptoms, are harmful for the quality of later mother-infant interaction. Mother's prenatal, but not postnatal, depressive symptoms predicted unresponsive interactive behavior toward the infant. In addition, the combination of both pre- and postnatal symptoms of depression predicted the highest levels of maternal unresponsive interactive behavior (**Article II**).

Maternal attachment representations also predicted the quality of later mother-child interaction. Mothers with secure-autonomous attachment style were more sensitive and responsive and their children more co-operative than mothers with dismissing attachment style and their children. Further, we had hypothesized maternal secure-autonomous attachment style to buffer the quality of early mother-child interaction from the negative effects of maternal depressive symptoms. This was supported concerning maternal postnatal depressive symptoms. Among dyads with secure-autonomous mothers, maternal sensitivity and child co-operation were in the normative range (≥ 7), regardless of maternal postnatal symptom level. The results also revealed a specific vulnerability effect for preoccupied mothers, among whom maternal sensitivity and child co-operation were in the normative range when they were not depressed, but less than adequate when they had symptoms of depression. Curiously, although insecure-dismissing mothers were generally lower than others in sensitivity and child co-operation, these increased to some extent when mothers reported a greater number of symptoms of depression. Maternal attachment style showed no buffering effect from prenatal symptoms of depression (**Article II**).

5. Summary of the main results

- 1) We first examined whether normative and risk group parents differed in their prenatal representations and in the stability of these representations into the postnatal period (i.e., in the occurrence of violated expectations). According to the current study:
 - a) Normative mothers and fathers typically show positive and stable prenatal representations of their own and their spouse's relationship to the child
 - b) Infertility history is not a risk factor for more negative, idealized or unstable prenatal representations.
 - c) Psychosocial risk, as indicated by maternal substance-abuse and mental health problems, increases the risk for more negative and unstable prenatal representations.
- 2) Second, we examined the effects of parental prenatal representations and violated expectations on later parent-child relationship. According to the current study:
 - a) Among both normative and formerly infertile parents, negative prenatal representations of one's own and the spouse's relationship to the child predict postnatal parenting problems.
 - b) Overly high/idealized prenatal representations appear to be a risk factor for the parent-child relationship only among high psychosocial risk parents.
 - c) Instability of representations, especially negative violation of expectations, from pre- to postpartum indicates risk for parent-child relationship.
- 3) Third, we examined possible parent-, infant- and delivery-related underlying mechanisms explaining the occurrence of violated expectations. According to the current study:
 - a) Among mothers, mental health problems increase vulnerability for negative violation of expectations, and also mediate the effects of other delivery-, infant- and marital risk factors on violated expectations.

- b) Among fathers, mental health problems are not a risk factor for violated expectations, but marital, infant- and delivery problems directly increase risk for violated expectations.
 - c) Parents with a history of infertility may be less vulnerable to psychological risks and more vulnerable to medical delivery risks.
- 4) Fourth, we examined how pre- and postnatal depressive symptoms, together with maternal attachment representations, affect postnatal mother-infant relationship. According to the current study:
- a) Prenatal symptoms and particularly the combination of pre- and postnatal depressive symptoms are especially harmful for the mother-infant interaction.
 - b) Coherent maternal attachment representations (i.e., secure-autonomous attachment style) predict more positive parenting and buffer the quality of mother-infant interaction from the negative effects of maternal postnatal depressive symptoms.

DISCUSSION

According to psychoanalytic theory (e.g., Raphael-Leff, 1991; Stern, 1995), new parents undergo major reorganizations in their identity and representational world during their transition to parenthood. The parent-child relationship begins early on during pregnancy, or even before it, in the representations the parent holds and gradually develops of the child, parenthood, and close family relationships. Also parents' own childhood attachment representations are activated and reorganized during pregnancy and, according to attachment theory, they affect future parenting (e.g., Main et al., 1985). After birth, prenatal fantasies and representations need to be updated to meet the real baby (Lebovici, 1988; Trad, 1990). This study aimed to examine parental prenatal representations and their stability into the postnatal period (i.e., the violation of expectations), and how these influence postnatal parenting quality.

As previous knowledge is limited related to fathers' representations in the transition to parenthood, one aim of this dissertation was to bring new information about similarities and differences between maternal and paternal representational processes. As family systems theory (e.g. Minuchin, 1985) states that different family units and subsystems affect each other's functioning, we also included a novel research topic of how representations of the spouse-child relationship affect one's own parenting. The results show that both maternal and paternal representations are relatively stable from pre- to postpartum, and that prenatal representations and their stability are important predictors of future parenting. This is in line with psychoanalytic and attachment theory views of pregnancy as a reorganizational process that concludes in the formation of parental identity and the relationship to the child.

Clinical experience as well as psychoanalytic and attachment theories suggest that the reorganizational processes reflected in parental prenatal representations may be more challenging for parents with additional burdens, such as mental health or other psychosocial problems or medical pregnancy risks. Nonetheless, previous research on

the role and nature of these early representational processes has almost exclusively focused on normative parents. The aim of this dissertation was to broaden this scope by including medical (history of infertility) and psychosocial (maternal depression and substance-abuse) risk parents. Our results revealed that especially the psychosocial risk group showed unique and pronounced risks in their representational processes. The results increase empirical knowledge of risk-group parenting and can potentially inform clinicians working with parents-to-be during the period of transition to parenthood.

1. Family dynamic considerations

Family dynamics include family relationships, representations related to them and all their mutual interconnections. In this study, we first examined the occurrence of pre- to postnatal violations of expectations among mothers and fathers, that is, whether parental postnatal representations are more positive or negative than prenatal expectations. Negative violation of expectations may indicate disappointment and adjustment difficulties in the transition to parenthood, and be harmful for future parenting and family relationships (e.g., Biehle & Mickelsson, 2008). The results primarily supported the hypothesis that no violation or positive violation of expectations generally takes place among new parents. Nonetheless, some gender differences emerged. This was most clearly evident concerning expectations of spouse-child relationship, which were negatively violated among mothers, whereas fathers showed alternatively no violation or positive violation. The results thus suggest that early transition to motherhood may often require adaptation to the primary caregiving role, including disappointment toward the spouse. This is also supported by earlier findings of mothers' negatively violated prenatal expectations in the division of household labor and child care (Biehle & Mickelsson, 2008; Hackel & Ruble, 1992). On the other hand, mothers also appeared to experience early motherhood even more positively than fathers did, as indicated by positively violated expectations of own intimacy with the child, whereas fathers showed no violation.

We further examined the effects of maternal and paternal prenatal expectations on parenting. We had hypothesized a U-shaped curvilinear relationship between prenatal expectations and later parenting, with moderate expectations predicting higher quality of parenting (i.e., lower parenting stress) than either very low or high expectations. The hypothesis was supported only with regard to the effect of fathers' expectations of self-child autonomy on parenting stress at two months. This may reflect gender differences in early parenting: Fathers as non-primary caregivers may gain higher degrees of parenting efficacy (autonomy) more gradually than mothers.

Moderate expectations in that domain may thus suggest a more realistic orientation toward early fatherhood. Otherwise, more positive maternal and paternal prenatal expectations linearly predicted lower parenting stress, thus supporting earlier findings (e.g., Coleman et al., 1999; Thun-Hohenstein et al., 2008). This is somewhat contradictory to the psychoanalytic concept of mother's 'normal ambivalence' during pregnancy, which would suggest that either extreme of overly negative or overly positive expectations are harmful. Our results instead suggest that among normative, well-functioning parents even highly positive expectations do not adversely affect parenting. On the other hand, extremely difficult feelings during pregnancy, as indicated by negative representations, may be more of a warning sign than part of a normative pregnancy process.

Also concerning expectations of the spouse-child relationship, more positive parental prenatal expectations linearly predicted lower parenting stress. This concurs with family systems theory in terms of spill-over: negative representations not only within one's own parent-child subsystem but also within the spouse-child subsystem predict the functioning of one's own parent-child subsystem later in family history. Curiously, concerning spouse-child relationship, there was also an inverse curvilinear relationship between prenatal expectations of spouse's intimacy with the child and parenting among both mothers and fathers: Moderate expectations predicted higher parenting stress, rather than low or high expectations. It may be that moderate expectations reflect an unresolved conflict in co-parenting, for example, hopes of a more equal share of work. Conversely, high expectations may indicate generally harmonious family relationships, whereas low expectations could represent compensatory dynamics, for example, a triangulated relationship with the child and distance from the spouse.

Thirdly, we examined a model of several parent-, infant- and delivery-related underlying mechanisms that potentially explain the occurrence of violated expectations. The results showed that all these domains were meaningful and the mechanisms also varied according to parent gender. Among mothers, the occurrence of violated expectations was best explained by mediating dynamics associated with maternal psychological well-being. Mental health problems not only directly explained the occurrence of violated expectations, but also mediated the harmful effects of marital-, delivery- and infant-related problems on violated expectations. For fathers, no mediating dynamics occurred, but violated expectations were directly explained by marital, delivery- and infant problems. These differences may be related to the share of work in early parenting: As mothers are usually the primary caregivers, their psychological vulnerabilities and distresses may be more closely linked with early mothering. Challenges such as negative birth experience or difficult infant characteristics may thus more easily turn into mental health and mother-infant interaction problems

than among fathers, who are also more oriented to responsibilities outside the home (Davies et al., 2008; Lobel & DeLuca, 2007).

However, the finding of the direct negative effects of marital difficulties on violated expectations solely among fathers suggests that fathers' parenting may be more vulnerable to marital difficulties than mothers'; a finding also supported by earlier studies (e.g., Cummings et al., 2010). From the family dynamic perspective, fathers may have more difficulties in containing emotions and insecurities arising from the marital subsystem, leading to a spill-over into the parenting subsystem. Among mothers, it may be that mental health problems specifically decrease the ability to contain marital problems, as suggested by marital problems being negatively associated with violated expectations only via mental health problems in the present study.

Concerning delivery-related factors, negative delivery experiences and mother's low analgesia use were important contributors to violated expectations among both mothers and fathers. This suggests that preoccupation with a painful delivery may delay the formation of attachment to the infant. Conversely, unplanned Caesarean explained violated expectations only among mothers. Although stressful for both parents, its consequences differ between parents, leading to early mother-infant separation, but often increasing early father-infant involvement. However, the harmful effects of unplanned Caesarean on violated expectations were not direct among mothers, but were mediated via negative subjective birth experience and mental health problems. Although medical difficulties do not automatically lead to negative violation of expectations, it is important for mothers to have a chance to go through a difficult delivery, such as unplanned Caesarean, with the delivery hospital staff.

Mothers and fathers also showed different underlying dynamics concerning infant-related factors. The results reveal that fathers may be more vulnerable to infant-related difficulties than mothers, suggested by direct negative effects of difficult infant characteristics on their violated expectations. Well-functioning mothers of medically vulnerable infants have in some studies been found as skillful in using compensatory sensitive parenting strategies (e.g., Goldberg, 1988). Our results were along these lines, showing only an indirect association among mothers, where the harmful effect of difficult infant characteristics and infant health problems was mediated by worry about the infant and maternal mental health problems. Mothers who experience worry about their infant may be a group at specific risk of postnatal mental health problems, and interventions should be targeted to relieve their burden. When infant-related challenges occur, fathers should also receive more attention, as they may be less able to use compensatory skills in parenting than mothers.

The results of this thesis also raise family dynamic considerations regarding the different experiences of primi- and multiparous families. The birth of each new

child represents a reorganization in the former family system, and this reorganization involves even more complex hierarchical levels in multiparous families. It may also be more challenging in terms of parental share of resources. Our results were along these lines in showing that multiparous mothers were more prone to violated expectations of mother-infant autonomy than primiparous mothers, when dealing with problems related to the delivery or infant health. This is in accordance with the previous literature describing lower well-being and less positive feelings toward the baby among multiparous, rather than primiparous, mothers (e.g., Gameiro et al., 2009). Conversely, primiparous mothers were more susceptible to negative violation of expectations due to difficult infant characteristics and mental health problems. First-time mothers may be more unprepared and stressed over their babies at the beginning (e.g., Gameiro et al., 2009), and this may become more pronounced with challenges related to postnatal mood or infant regulatory difficulties.

2. Medical risk considerations: The role of infertility history

Due to the highly intertwined psychological and physiological reorganization intrinsic in pregnancy, medical risks occurring before or during pregnancy may be especially relevant for parental adaptation. In this study, we examined prenatal expectations and their violations among parents conceiving with assisted reproductive treatment (ART). Infertility and its treatments are often highly stressful, and pregnancies after ART have increased medical risks. Conversely, achievement of pregnancy after infertility represents a fulfillment of long-time hopes. We expected ART parents to hold alternatively more cautious and negative, or more idealizing and positive, expectations of their relationship with the child during pregnancy than spontaneously conceiving parents. In the same vein, we hypothesized that positive or negative violation of expectations would be more typical of ART than spontaneously conceiving parents. In addition, we examined whether prenatal representations affect quality of later parenting similarly among formerly infertile and spontaneously conceiving parents and whether underlying mechanisms explaining the occurrence of violated expectations differ according to the history of infertility. The results offer little support for viewing history of infertility as a risk factor for parental representational processes.

Contrary to the hypothesis, ART mothers and fathers showed similar prenatal expectations of their own and their spouse's relationship to the child as did spontaneously conceiving parents. Prenatal representations also similarly affected future parenting in both groups, with more positive prenatal expectations linearly predicting more positive parenting. The only difference was in that among ART fathers there

was, at the child age of two months, an inverse curvilinear association concerning spouse-child intimacy, i.e., high or low expectations predicted lower parenting stress than moderate expectations. In the spontaneously conceiving group this association occurred more clearly in later parenting at child age of twelve months. The result that representational processes change earlier among ART than spontaneously conceiving fathers may suggest that ART fathers are capable of balancing their paternal roles earlier, possibly due to the long preparation for parenthood.

There was also no support for the idea that history of infertility would be a risk factor for the occurrence of negative violation of expectations, that is, disappointment, in transition to parenthood. However, some support was found for the alternative hypothesis that ART parents experience more positive violation of expectations. For ART mothers, negative violation of expectations concerning husband's autonomy with the child was less pronounced than for spontaneously conceiving mothers. As ART children are often described as especially "precious" (e.g., Minkoff & Berkowitz, 2005), it is possible that their fathers actually participate more in early parenting (see Holditch-Davis, Sandelowski, & Harris, 1999). Alternatively, resolving the joint crisis of infertility increases marital satisfaction (e.g., Repokari et al., 2007), which may spill-over into positive representations of spouse-child relationship.

With regard to underlying mechanisms for violated expectations, the results support the view that formerly infertile and spontaneously conceiving parents may be susceptible to different risk factors, although this concerned only fathers. ART fathers were less vulnerable to negatively violated expectations of father-infant intimacy than spontaneously conceiving fathers due to infant-related risks (difficult infant characteristics and infant-related worry). This resilience may be due to ART fathers' long preparation for parenthood, high degree of involvement in the treatment process and specific support tailored to them in Finnish infertility clinics. On the contrary, ART fathers were more vulnerable to violated expectations than spontaneously conceiving fathers due to medical risk (mother's low analgesia use). Adequate control of pain and medical processes in delivery may be especially important for parents with past medical difficulties of infertility. The result that ART parents are more susceptible to medical risk and less susceptible to psychological risk than spontaneously conceiving parents also concurs with earlier findings in the same sample (Punamäki et al., 2006; Repokari et al., 2005).

3. Psychosocial risk considerations: The role of maternal substance-abuse

Mother's substance-addiction problem is an indicator of multilevel cumulative psychosocial risks related to the mother (e.g., mental health problems, trauma history), the child (e.g., effects of prenatal drug-exposure) and the environment (e.g., low socioeconomic status and social support). In this study, we examined whether substance-abusing mothers differ from non-users in their prenatal expectations and violations of these expectations and in how these two affect their parenting. The results supported our hypothesis that more negative, idealized or unstable representations are more typical for high-risk mothers and their parenting may be especially vulnerable to the effects of difficulties in representational processes. The substance-abusing mothers in this study alternatively received psychodynamic group therapy or individually tailored psychosocial support (described in the Measures-section of this thesis and in more detail in Belt & Punamäki, 2007), and the results also revealed intervention-specific dynamics.

Both the hypotheses of more negative and unstable prenatal representations among psychosocial risk mothers received partial support, but the results were intervention-specific. Only the mothers receiving psychodynamic group therapy reported more negative prenatal representations of the child's father and of themselves as women than non-using mothers. On the other hand, only the drug-abusing mothers receiving psychosocial support showed more unstable representations of the child than non-using mothers, i.e., first more positive and then more negative violation of expectations. There was a course of idealization at four months postpartum, and a subsequent disillusionment at 12 months, whereas in other groups representations of the child remained stable from pregnancy to postpartum.

Importantly, drug-abusing mothers did not differ from non-users in their caregiving representations, that is, representations related to the child or the self-as-mother, a finding similar to those of a previous study by Wendland and Miljkovitch (2003). It is possible that these new representational domains developing during pregnancy are especially susceptible to the effects of prenatally starting interventions also among high-risk mothers. In particular, more insight-oriented intervention may also help form and sustain a positive view of the child, as suggested by the result that only the drug-abusing mothers receiving psychodynamic group therapy showed stable positive representations of the child over the first year.

In contrast with earlier high-risk studies (Pajulo et al., 2001; Wendland & Miljkovitch, 2003), drug-abusing mothers in the present study did not report more negative prenatal representations related to the attachment system, that is, of their own

mother. The result is unexpected, considering that drug-abusing mothers very often have childhood family histories involving loss, maltreatment and substance abuse by family members, especially by their own mother (e.g., Hans, 1999). In the normal course of pregnancy, memories of one's own childhood become activated (Ammaniti et al., 1992; Broden, 2004; Fava Vizziello et al., 1993), which can reactivate painful emotional conflicts among mothers with early attachment trauma or adversity. The absence of this activation may be explained by the use of strong defenses of denial and idealization to protect oneself and one's positive stance to motherhood, a phenomenon often described among drug-abusers (Gottdiener, 2013; Pajulo, 2001). However, strong defensiveness and the resulting failure to reconcile with one's attachment adversity and current addiction problems may impede the formation of a maternal identity separate from one's own mother. Our results of positive attachment and caregiving representations among these mothers may thus alternatively indicate harmful defensive processes or an intervention-induced new possibility and a motivating force for change. Due to this complex interplay of defensive and developmentally constructive processes in the transition to parenthood, drug-abusing mothers require extensive support to achieve integration between their own childhood hardships and their current, emerging motherhood.

It is also possible that risk factors other than maternal drug-abuse have a more substantial impact on maternal representational processes in the transition to parenthood. Our results show that maternal prenatal symptoms of depression, irrespective of drug-abuse status, formed a risk of more negative representations of the self-as-mother and the self-as-woman, of own mother and of the child's father. With regard to violated expectations of the self-as-mother, our results similarly suggest that maternal depressive symptoms, irrespective of her drug-use, increased the risk for oscillating and instable representations, ultimately leading to negative violation of expectations by the end of the child's first year.

As stated previously, our results among spontaneously conceiving and formerly infertile parents showed little support for the hypothesized U-shaped curve of both idealized and negative prenatal expectations predicting more parenting difficulties than moderate expectations. Instead, the association seemed to be linear, more negative prenatal expectations directly predicting difficulties in future parenting. However, due to the defensive processes and multiple cumulative risks intrinsic to maternal addiction problems, we further hypothesized that these phenomena would be more pronounced among drug-abusing mothers. The results partially supported the U-shaped curve hypothesis, but were again intervention-specific. Only among mothers participating in the psychodynamic group therapy, were moderate prenatal expectations of the self-as-mother more optimal for the quality of mother-infant

interaction at four months than very high or very low expectations. This also raises a question of whether the psychoanalytic concept of 'normal ambivalence' actually better applies to high-risk than normative parents. Although negative representations are harmful for all parents, high-risk parents seem especially vulnerable to idealized prenatal representations. Supporting flexibility in seeing both negative and positive facets of the emerging parenthood may thus be especially crucial among these parents.

Contrary to the findings among ART and spontaneously conceiving mothers, there was no association between the prenatal expectations and parent-child relationship among non-using mothers or drug-abusing mothers in the psychosocial support group, the latter finding paralleling Pajulo et al. (2004). These differences may be due to treatment effects, such as insight-oriented psychodynamic group therapy particularly facilitating the formation of a realistic maternal identity. They may also be due to the research setting. As the intervention group status was not randomized, psychodynamic group therapy mothers might have been motivated for more intensive treatment, due to better self-reflection ability, possibly resulting in more accurate self-reports. They also had more prenatal symptoms of depression (see Belt et al., 2012), which may explain their more negative initial prenatal representations. In addition, the non-using group consisted of mothers with pregnancy complications, and medical high-risk pregnancy may also negatively affect maternal well-being and perceptions of the infant during pregnancy (Levy-Shiff, Lerman, Har-Even & Hod, 2002; Maloni, Park, Anthony & Musil, 2005; Priel, & Kantor, 1988). However, this may be a normative reaction that does not negatively affect future parenting.

Negatively violated expectations may indicate disappointment in the transition to parenthood. In psychoanalytic terms, they may also represent a failure to update the image of the fantasized infant into the real infant after birth (see Lebovici, 1988). According to our hypothesis, mother's negative violation of expectations concerning the child and the child's father predicted lower quality of mother-infant interaction at four months, similarly among drug-abusing and non-using mothers. This is also in accordance with previous studies in both drug-abusing (Pajulo et al., 2004) and normative mothers (e.g., Kalmuss et al., 1992). However, high-risk and normative groups showed opposite dynamics with regard to violated expectations of one's own-mother and the-self-as-mother, with some of the effects also being intervention-specific. Negative violation of expectations regarding the self-as-mother was associated with lower quality of mother-infant interaction in the non-using group, but higher quality of mother-infant interaction among drug-abusers. Similarly, negative violation of expectations regarding one's own mother predicted lower infant-related quality of interaction among non-using mothers, but higher quality among drug-abusing mothers, especially in the psychodynamic group therapy group. At the same time,

positive violation of expectations concerning one's own mother predicted more positive mother-related interaction features in all groups. The results also showed that only in the psychodynamic group therapy group did the beneficial effect of positive violation of expectations concerning one's own mother on quality of mother-infant interaction still remain when the child was one year old. This could possibly suggest more long-term effects of insight-oriented therapy.

These results, seemingly contradictory to the general Expectancy Violation Theory, may imply that due to treatment and especially psychodynamic group therapy, representations of one's motherhood and one's own mother actually become more realistic, when negative violation of expectations occurs. This may actually buffer high-risk mothers against negative or abusive behavior toward their infant and protect their children against emotional withdrawal. For drug-abusers, positive violation of expectations concerning the self-as-mother may reflect a denial of the harmful effects their own addiction problems exert on the child. Positive violation of expectations concerning one's own mother, in turn, may reflect a stronger identification with her style of negative or abusive parenting. Fraiberg, Adelson and Shapiro (1975) described mother's early, unprocessed attachment trauma as "ghosts in the nursery", which may run the risk of intergenerational transmission of negative, even abusive, parenting. To confront these ghosts, one must achieve emotional consciousness of one's childhood hardships: "...it is the parent who cannot remember his childhood feelings of pain and anxiety who will need to inflict his pain upon his child" (Fraiberg et al., 1975). However, it is also vital to find the positive in one's childhood and parents – "the angels in the nursery" (e.g., Lieberman & van Horn, 2008). This may be reflected in our results of higher mother-related interaction quality at four months, when there was positive violation of expectations concerning own mother. In a therapeutic process, clients often first become conscious of their difficult childhood experiences, leading to negative feelings toward their parents. If these conflicts are resolved in the course of therapy, a deeper understanding of one's parents and forgiveness may take place.

4. Maternal depression, attachment style and mother-infant interaction

Maternal prenatal depression is especially detrimental for the early mother-infant relationship, as it combines the dual risks of biology and psychology, impacting both fetal development and mother's psychological reorganizational processes during pregnancy (e.g., Brodén, 2004; Field et al., 2006). Postnatal depression on the other hand may directly affect maternal caregiving and the infant's sense of security. Our

results supported the hypothesis that prenatal depressive symptoms, and especially the combination of pre- and postnatal symptoms, constitute a higher risk for problematic mother-child interaction than postnatal symptoms alone. In this study, symptoms of depression especially decreased maternal responsiveness.

We further examined whether mother's secure-autonomous attachment style buffers quality of mother-infant interaction from the harmful effects of maternal symptoms of depression. With regard to postnatal symptoms, the results were in accordance with the hypothesis: Autonomously attached mothers were sensitive and their infants co-operative, despite maternal symptoms, concurring with McMahon et al. (2006) on the buffering effects of maternal secure-autonomous attachment style on child attachment security. However, it is noteworthy that mother's autonomous attachment style did not reverse the combined biological and psychological harmful effects of prenatal symptoms of depression.

Dyads with preoccupied maternal attachment style emerged as especially vulnerable to the effect of postnatal depression. When not depressed, maternal sensitivity and child's co-operation were in the normative range in the preoccupied group, but as symptoms increased, the quality of interaction declined to risk levels. Due to their tendency toward emotional and behavioral under-regulation, preoccupied mothers may be less able to contain the harmful effects of depressive mood on the interactive relationship. Conversely, mothers with dismissing attachment style were generally the least sensitive and their infants the least co-operative. When these mothers reported a greater number of symptoms of depression, the quality of their interaction with the child actually increased somewhat. We may speculate that this represents some kind of "cracks in the wall" in maternal defensive processes. As we did not use clinical symptom levels of depression in this study, it may be that allowing and acknowledging milder distress may actually be beneficial for decreasing emotional distance between dismissing mothers and their infants.

5. Strengths and limitations of the study

All the three studies described in this dissertation had prospective longitudinal designs, starting from pregnancy and with multiple measurement points during the postpartum period. The use of three different samples also allowed examination of similar phenomena in varying populations, including normative, lower-risk medical, and high psychosocial risk samples. However, the use of different methods to assess the same concepts in different samples may also raise a question of direct comparability of the results. In addition, the concept of violated expectations was measured differently in

the studies. In articles I and IV we used latent change scores, whereas in article III we used standardized residual scores based on regression analysis. Latent change scores in SEM are more reliable as they account for the measurement error. Residualized change scores are usually also superior to simple difference scores, a method most commonly used in the literature. This is because they account for regression to the mean, that is, they control for the statistical tendency of extreme values to move toward the population mean over time (although there is controversy in the literature regarding the use of difference score, see e.g., MacKinnon, 2008). Future studies should also examine the combination of dichotomized and continuous measures of change (i.e., continuous violations in expectations separately in the positive and in the negative domains), as this may give a more comprehensive picture of the phenomena of violated expectations.

Some other important limitations relate to the study methodology. The assessment of parental representations and mental health symptoms was based on self-report, although interview methods are usually considered more reliable. This may be especially relevant concerning parental representations: aspects of coherence intrinsic in the measurement of attachment and caregiving representations cannot reliably be assessed with self-report, due to possible defensive processes (e.g., idealization). In addition, it would have been preferable to use the standardized method for assessing adult attachment, namely the Adult Attachment Interview (AAI; George et al., 1985). The modified, paper-and-pencil version of the AAI procedure used in the study II attempted to account for the same coherence-related issues assessed in the original interview, but it is clear that their full scope cannot be obtained due to, for example, brevity of written answers. For example, it was not possible to discern states of mind related to unresolved attachment, but only the three main attachment patterns were assessed. The choice of a modified AAI procedure instead of the original interview and the use of the older coding system instead of the updated version (Main, Goldwyn, & Hesse, 2002) can in general be criticized. Nonetheless, some validation data of paper-and-pencil measures of AAI exist (Crandell et al., 1997; Kanninen et al., 2000; 2003). In addition, in the present study, the paper-and-pencil measure of attachment was found to predict quality of mother-infant interaction in a similar manner to that described in previous studies. It would also have been preferable to use the interview format of IRMAG in study III. The SFPT measure used in articles I and IV to assess representations can also be criticized for low number of items, resulting in problems with small scale variances and skewed variables (the latter of which was accounted for in the analyses).

In the same vein, parent-child relationship was measured with self-report in Studies I and IV, due to the large sample size. Observational methods were used for studies

II and III, but they can be criticized for the use of relatively short observational times and the exclusive use of non-stress free-play context. Longer observational times and/or high-stress contexts (e.g., separation or still-face paradigms) may more effectively discern distortions in early interaction (see e.g., Biringen et al., 2005). The use of two different observational measures, instead of the same measure, can also be criticized: This was due to practical arrangements (i.e., availability of trained coders at the time).

With regard to some of the specific limitations of the individual studies, randomization of drug-abusing mothers into the two substance-abuse treatments would have been ideal (Article III). Self-selection to groups could cause bias, such as mothers who were more reflective or those of lower well-being choosing a more intensive, psychodynamic group treatment intervention. However, due to ethical and practical reasons this was not possible. In addition, documentation of maternal drug-abuse characteristics could have been more comprehensive. For example, information regarding maternal smoking during pregnancy was missing, although this may also affect fetal development. Although urinary sampling was used as part of the treatment, this information was not available to the researchers, so the descriptions of drug-abuse rely on maternal self-report. Related to the measurement of depression, information of its chronicity was lacking in article II due to only one postnatal measurement point of depressive symptoms. Some of the measures used in article IV deserve criticism, for example, father's birth experience was measured with only one question, and infant characteristics with three questions, and self-constructed scales were used instead of a wider and more validated measure of early behavior and temperament. Further, in study I, the potential confounding effect of maternal depressed mood on representations measured with SFPT or on parenting stress was not controlled for.

It would have been ideal to include both mothers and fathers in all studies, but both parents were included only in the study sample for articles I and IV. In addition, due to factorial invariance assumption not holding between mothers and fathers in article IV, SEM model comparisons between them should be treated as preliminary at best. Sample sizes for studies II and III were fairly small and the attrition rate was relatively high, especially in study II. Many of the effect sizes obtained in the studies were quite modest. The generalizability of results into more disadvantageous populations may be limited, as participants in all but the drug-abuse sample primarily represented relatively advantaged middle class.

6. Implications for clinical practice and future research

More attention should be paid to the prenatal expectations the parents hold for the child, themselves as parents, and close family relationships, as these are important predictors of future parenting. The quality of early family atmosphere and communication are in turn crucial for optimal child development and mental health. In antenatal clinical settings, parents with highly negative, idealized or distorted expectations should be recognized and referred to adequate treatment services, as these can be a strong indicator of parent-child relationship risk. Similarly, it is important to identify parents who have worries concerning their spouse's relationship with the expected child, as different family subsystems (such as marital, mother-child, and father-child systems) all affect one another. Negative expectations in this area may reflect marital and future triadic relationship problems, but also directly affect one's own parenting.

The parent's experience of their parental and marital role should also be accounted for after the birth of the infant. The role of violated expectations needs to be considered: Parents disappointed in their prenatal expectations may be a particular risk group for parenting problems. According to this dissertation, pre- to postnatal instability (i.e., violation) of representations is especially typical of high-risk parents. The results also provide preliminary evidence to suggest that this instability may be ameliorated in long and intensive treatments starting during pregnancy, even among very high-risk parents. These parents may especially benefit from prenatal opportunities to gain realistic information about the infant and parenting and to process their own parenthood.

The results further suggest that more comprehensive health care attention should be paid to fathers, who appear to be less able to use compensatory skills and thus be more vulnerable to the effects of marital or infant-related problems than mothers. Among mothers, the role of depression and other mental health problems appears especially pronounced, as depression is closely linked to disappointments in parenting. Targeting maternal prenatal depressive symptoms is pivotal, because they have long-lasting harmful physiological effects on the fetus, and may also impede parental psychological reorganization processes during pregnancy. Our study showed that these effects are not as easily reversed by protective factors as are the effects of postnatal depressive symptoms. The role of mental health symptoms needs to be particularly considered even with high-risk populations, such as drug-abusing mothers in our study. It emerged that for many aspects of the representational world, maternal symptoms of depression were more harmful than maternal addiction, suggesting the role of accumulative risk factors or the pivotal role of maternal perinatal mood. Maternal symptoms of depression must be routinely screened both during pregnancy and the

postnatal period, so that vulnerable parents can be referred for specific treatment or receive additional support in the basic healthcare system.

With regard to medical risk, our results, together with those in previous studies, suggest that former infertility is not a very clear risk factor for dysfunctional aspects of parenting and the representational world. A history of infertility may even produce resilience, due to longer preparation for parenthood. Nonetheless, clinicians working with early parenthood often view ART parents as high-risk parents. This “gap” between the clinical and empirical worlds requires more clarification. It is likely that great differences exist between different families and individual parents. However, research is lacking on the risk factors that, together with a history of infertility, predict dysfunctional or negative representational and parenting processes in the transition to parenthood. In accordance with previous studies, these results suggest that one important vulnerability factor to consider in future studies may be additional medical risk factors, which may affect ART parents more than others.

Early loss, trauma, and difficult experiences with own parents may shatter the development of both parental attachment and caregiving systems, leading to feelings of helplessness, rejection and lack of protection toward the child. However, the transition to parenthood is also a new possibility. The baby is an active agent, who has powerful abilities to evoke caretaking, even when the parent has deficient attachment and caregiving representations, especially when adequate support exists. Our results also showed that representations concerning the baby in particular were more resilient to the effects of distress than representations regarding own parenting or close relationships.

Mother’s attachment and caregiving representations may also provide valuable information to clinicians in the choice and planning of appropriate treatment. Related to maternal attachment representations, the results suggest that dismissing mothers may especially need to be encouraged in emotional responsiveness, reciprocal joy, and enrichment of their interactions. Preoccupied mothers may fare reasonably well in their motherhood at times of low stress, but require additional support when their insecure working models are activated by distress. They can benefit from guidance towards purposeful responses to the infant’s needs and more structured interaction with the infant. Adult psychiatric treatment of their mental health symptoms is very important, as they are less capable of containing the harmful effects of these symptoms in the interaction with their infant.

Interventions focusing on the parent-infant relationship should begin early, as our results show that negative, idealized, or incoherent representations measured as early as the second trimester of pregnancy were predictive of problematic relationships during the first year of the child’s life. In high-risk populations in particular, it would

be especially important to trace the risk and protective factors and tailor the appropriate treatments as early as possible (see Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003). Due to the activation of the attachment system and the trauma related to it during pregnancy, the prenatal period is an especially open and sensitive time for change (Slade et al., 2009). High-risk, traumatized parents require longer treatments, and may be more motivated especially during pregnancy. Prenatal interventions may prevent disorders in prenatal representational processes and reduce the negative effects of maternal prenatal stress on the fetus (Brodén, 2004; Field, 1992), as well as prevent postnatal depression and mother-infant interactive problems (Clatworthy, 2012; Milgrom et al., 2011), including child abuse (Honig & Morin, 2001). Among higher-risk populations, interventions must also extend sufficiently long into the postnatal period (Bakermans-Kranenburg et al., 2003; Belt, 2013; Honig & Morin, 2001). During recent years, especially promising results have been obtained among high-risk families using interventions started prenatally that strengthen the ability to mentalize the baby and one's own parenthood (e.g., Suchman, Pajulo, Kalland, DeCoste & Mayes, 2012). Both parents should be included in the treatment and the perspective of marital and triadic relations kept in mind already during pregnancy.

This study focused primarily on the dyadic parenting relationship, and the effects of marital relations received little attention. Future studies should also extend beyond dyadic relations, and pay more attention to triadic or family system level phenomena. In addition, further research into sibling relationships and differences between primi- and multiparous parents in the transition to parenthood is required, as is additional research regarding fathers, especially in high-risk groups, such as substance-abusers. Future research should also consider the effect of timing in assessing prenatal representations in predicting future parenting. Development of prenatal representations is a continuous, dynamic process, but multiple measurement points during pregnancy are still scarce.

REFERENCES

- Abidin, R. A. (1995). *Parenting Stress Index* (3rd ed.). Professional Manual. Odessa, FL: Psychological Assessment Resources.
- Adam, E. K., Gunnar, M. R., & Tanaka, A. (2004). Adult attachment, parent emotion and observed parenting behavior: Mediator and moderator models. *Child Development*, 75, 110-122.
- Ahlqvist-Björkroth, S., Junttila, N., Korja, R., Pajulo, M., Aromaa, M., & Räihä, H. (2012). Marital satisfaction and parent's prenatal attachment representations – individual and family level. *Infant Mental Health Journal, Suppl. 33*.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the Strange Situation*. Hillsdale, NJ: Erlbaum.
- Ammaniti, M., Baumgartner, E., Candelori, C., Perucchini, P., Pola, M., Tambelli, R., & Zampino, F. (1992). Representations and narratives during pregnancy. *Infant Mental Health Journal*, 13, 167-182.
- Ammaniti, M., Tambelli, R., & Odorisio, F. (2013). Exploring maternal representations during pregnancy in normal and at-risk samples: The use of the Interview of maternal representations during pregnancy. *Infant Mental Health Journal*, 34, 1-10.
- Ammaniti, M., Tambelli, R., & Perucchini, P. (1998). *From pregnancy to the postnatal period: Stability and change of the factorial structure of maternal representations*. Manuscript.
- Ammerman, R. T., Kolko, D. J., Kirisci, L., Blackson, T. C., & Dawes, M. A. (1999). Child abuse potential in parents with histories of substance use disorder. *Child Abuse & Neglect*, 23, 1225-1238.
- Arnott, B., & Meins, E. (2007). Links among antenatal attachment representations, postnatal mind-mindedness, and infant attachment security: A preliminary study of mothers and fathers. *Bulletin of the Menninger Clinic*, 71, 132-149.
- Arnott, B., & Meins, E. (2008). Continuity in mind-mindedness from pregnancy to the first year of life. *Infant Behavior and Development*, 31, 647-654.
- Atkinson, L., Paglia, A., Coolbear, J., Niccols, A., & Parker, K. C. H., & Guger, S. (2000). Attachment security: A meta-analysis of maternal mental health correlates. *Clinical Psychology Review*, 20, 1019-1040.
- Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analysis of sensitivity and attachment interventions in early childhood. *Psychological Bulletin*, 129, 195-215.
- Barbieri, R.L. (1999). Infertility. In S. S. C. Yen, R. B., Jaffe, & R. L. Barbieri (Eds.), *Reproductive Endocrinology. Physiology, Pathophysiology and Clinical Management* (4th ed., pp. 562-593). Philadelphia: WB Saunders, Inc.
- Bays, J. (1990). Substance abuse and child abuse. *Pediatrics Clinics of North America*, 37, 881-904.
- Beaton, J.M., Doherty, W.J., & Rueter, M.A. (2003). Family of origin processes and attitudes of expectant fathers. *Fathering*, 1, 149-168.
- Beck, A. T. (1967). *Depression: Clinical, experimental and theoretical aspects*. London: Staples Press
- Beck, C. T. (1995). The effects of postpartum depression on maternal-infant interaction: A meta-analysis. *Nursing Research*, 44, 298-304.
- Becker-Stoll, F., Fremmer-Bombik, E., Wartner, U., Zimmermann, P., & Grossmann, K. E. (2008). Is attachment at ages 1, 6 and 16 related to autonomy and relatedness

- behavior of adolescents in interaction towards their mothers? *International Journal of Behavioral Development*, 32, 372-380.
- Beckwith, L., Howard, J., Espinosa, M., & Tyler, R. (1999). Psychopathology, mother-child interaction and infant development: Substance-abusing mothers and their offspring. *Development and Psychopathology*, 11, 715-725.
- Beeghly, M., & Tronick, E.Z. (1994). Effects of prenatal exposure to cocaine in early infancy: Toxic effects on the process of mutual regulation. *Infant Mental Health Journal*, 15, 158-175.
- Belsky, J., Youngblade, L., Rovine, M., & Volling, B. (1991). Patterns of marital change and parent-child interaction. *Journal of Marriage and Family*, 53, 487-498.
- Belt, R. (2013). *Mother-infant psychotherapy groups among drug-abusing mothers: Preventing intergenerational negative transmission*. Doctoral Dissertation. The University of Tampere, Finland.
- Belt, R., Flykt, M., Punamäki, R-L, Pajulo, M. Posa, T. Biringen, Z., & Tamminen, T. (2012). Effectiveness of psychodynamic group therapy and psychosocial support in improving maternal mental health and dyadic interaction among drug-abusing mothers. *Infant Mental Health Journal*, 33, 520-534.
- Belt, R., & Punamäki, R-L. (2007). Mother-infant group psychotherapy as an intensive treatment in early interaction among mothers with substance-abuse problems. *Journal of Child Psychotherapy*, 33, 202-220.
- Bendersky, M., & Lewis, M. (1998). Arousal modulation in cocaine-exposed infants. *Developmental Psychology*, 34, 555-564.
- Benoit, D., Parker, K., & Zeanah, C.H. (1997). Mothers' representations of their infants assessed prenatally: Stability and association with infants' attachment classifications. *Journal of Child Psychology and Psychiatry*, 38, 307-313.
- Bernier, A., & Dozier, M. (2003). Bridging the attachment transmission gap: The role of maternal mind-mindedness. *International Journal of Behavioral Development*, 27, 355-365.
- Biehle, S. N., & Mickelson, K. D. (2012). First-time parents' expectations about the division of childcare and play. *Journal of Family Psychology*, 26, 36-45.
- Bion, W. R. (1962). *Learning from experience*. London: Karnac.
- Biringen, Z. (2000). Emotional Availability. Conceptualization and research findings. *American Journal of Orthopsychiatry*, 70, 104-114.
- Biringen, Z. (2008). *Emotional Availability (EA) Scales Manual. Part 1: Infancy/Early Childhood version* (4th ed.) Unpublished manuscript.
- Biringen, Z., Brown, D., Donaldson, L., Green, S., Krcmarik, S., & Lovas, G. (2000). Adult attachment interview: Linkages with dimensions of emotional availability for mothers and their pre-kindergarteners. *Attachment and Human Development*, 2, 188-202.
- Biringen, Z., Damon, J., Grigg, W., Mone, J., Pipp-Siegel, S., Skillern, S., & Stratton, J. (2005). Emotional availability: Differential predictions to infant attachment and kindergarten adjustment based on observation time and context. *Infant Mental Health Journal*, 26, 295-308.
- Biringen, Z., & Easterbrooks, A. N. (2012). The integration of emotional availability into a developmental psychopathology framework: reflections of the special section and future directions. *Development and Psychopathology*, 24, 1-8.
- Blackwell, P. L., Lockman, J., & Kaiser, M. (1999). Mother-infant interaction in drug-affected dyads over the first 9 months of life. *Applied Developmental Science*, 3, 168-177.
- Blatt, S. J., Auerbach, J. S., & Levy, K. N. (1997). Mental representations in personality development, psychopathology and the therapeutic process. *Review of General Psychology*, 1, 351-374.

- Boivin, J., Bunting, L., Collins, J. A., & Nygren, K. G. (2007). International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. *Human Reproduction*, 22, 1506-1512.
- Bosquet, M., & Egeland, B. (2001). Associations among maternal depressive symptomatology, state of mind and parent and child behaviours: Implications for attachment-based interventions. *Attachment and Human Development*, 3, 173-199
- Bowlby, J. (1969). *Attachment and Loss, Vol. 1: Attachment*. Harmondsworth: Penguin Books.
- Bowlby, J. (1973). *Attachment and Loss, Vol 2: Separation*. Harmondsworth: Penguin books.
- Bowlby, J. (1980). *Attachment and Loss, Vol 3: Loss, sadness and depression*. Harmondsworth: Penguin Books.
- Bowlby, J. (1988). *A Secure Base: Parent-Child Attachment and Healthy Human Development*. Tavistock professional book. London: Routledge
- Bretherton, I. (2000). Emotional availability: An attachment perspective. *Attachment and Human Development*, 2, 233-241.
- Bretherton, I. & Munholland, K. A. (2008) Internal working models in attachment relationships: Elaborating a central construct in attachment theory. In: J. Cassidy, & P. R. Shaver (Eds.), *Handbook of Attachment: theory, research, and clinical applications* (pp. 102-130). New York: Guilford.
- Broden, M. (2004). *Graviditetens möjligheter: en tid då relationer skapas och utvecklas*. [The possibilities of pregnancy: The time when relationships are created and developed]. Natur och Kultur: Stockholm.
- Brooks, C. S., Zuckerman, B., Bamforth, A., Cole, J., & Kaplan-Sanoff, M. (1994). Clinical issues related to substance-involved mothers and their infants. *Infant Mental Health Journal*, 15, 202-217.
- Burns, K. A., Chetnik, L., Burns, W. J., & Clark, R. (1997). The early relationships of drug-abusing mothers and their infants: an assessment at eight to twelve months of age. *Journal of Clinical Psychology*, 53, 279-287.
- Cairo, S., Darwiche, J., Tissot, H., Favez, N., Germond, M., Guex, P., . . . Despland, J.-N. (2012). Family interactions in IVF families: Change over the transition to parenthood. *Journal of Reproductive and Infant Psychology*, 30, 5-20.
- Campbell, S. B., Cohn, J. F., & Meyers, T. (1995). Depression in the first-time mothers: Mother-infant interaction and depression chronicity. *Developmental Psychology*, 31, 349-357.
- Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. In N. A. Fox (Ed.), *The development of emotion regulation: Biological and behavioral considerations. Monographs of the Society for Research in Child Development*, 59, (pp. 228-249). Chicago: University of Chicago Press.
- Chen, C. J., Chen, Y. C., Sung, H. C., Kuo, P. C., & Wang, C. H. (2011). Perinatal attachment in naturally pregnant and infertility-treated pregnant women in Taiwan. *Journal of Advanced Nursing*, 67, 2200-2208.
- Clatworthy, J. (2012). The effectiveness of antenatal interventions to prevent postnatal depression in high-risk women. *Journal of Affective Disorders*, 137, 25-34.
- Claussen, A. H. & Crittenden, P. M. (2000). Maternal Sensitivity. In P.M. Crittenden & A.H. Claussen (Eds.), *Organization of Attachment Relationships: Maturation, Culture and Context* (pp. 115-122). New York: Cambridge University Press.
- Cohen, L., & Slade, A. (2000). The psychology and psychopathology of pregnancy: reorganization and transformation. In: C. H. Zeanah (Ed.), *Handbook of infant mental health* (2nd ed., pp. 20-36). New York: Guilford Press.

- Cohn, J. F., Campbell, S. B., Matias, R., & Hopkins, J. (1990). Face-to-face interactions of postpartum depressed and nondepressed mother-infant pairs at 2 months. *Developmental Psychology*, 26, 15-23.
- Cohn, D. A., Cowan, P. A., Cowan, C. P., & Pearson, J. (1992). Mothers' and fathers' working models of childhood attachment relationships, parenting styles and child behaviour. *Development and Psychopathology*, 4, 417-431.
- Cohn, J. F., & Tronick, E. (1989). Specificity of infant response to mothers' affective behavior. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28, 242-248.
- Coleman, P., Nelson, E. S., & Sundre, D. L. (1999). The relationship between prenatal expectations and postnatal attitudes among first-time mothers. *Journal of Reproductive and Infant Psychology*, 17, 27-39.
- Condon, J., Boyce, P., & Corkindale, C. (2004). The first-time fathers study: A prospective study of the mental health and wellbeing of men during the transition to parenthood. *Australian and New Zealand Journal of Psychiatry*, 38, 56-64.
- Condon, J. T., & Corkindale, C. (1997). The correlates of antenatal attachment in pregnant women. *British Journal of Medical Psychology*, 70, 359-372.
- Condon, J., Corkindale, C. J., Boyce, P., & Gamble, E. (2013). A longitudinal study of father-to-infant attachment: Antecedents and correlates. *Journal of Reproductive and Infant Psychology*, 31, 15-30.
- Connors, N. A., Bradley, R. H., Whiteside Mansell, L., Liu, J. Y., Roberts, T. J., Burgdorf, K., & Herrell, J. M. (2004). Children of mothers with serious substance abuse problems: An accumulation of risks. *The American Journal of Drug and Alcohol Abuse*, 30, 85-100.
- Conte, G. L., Mazzoni, S., Serretti, A., Fundaro, C., & Tempesta, E. (1994). "Separation" of the mother-child couple: pregnancy and maternity of drug-dependent women. *Acta Paediatr Suppl* 404: 47-53.
- Cowan, P. A. (1991). Individual and family life transitions: A proposal for a new definition. In P. A. Cowan, & E. M. Hetherington (Eds.), *Family transitions* (pp.3-30). Hillsdale: Lawrence Erlbaum.
- Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, 150, 782-786.
- Crandell, L. E., Fitzgerald, H. E., & Whipple, E. E. (1997). Dyadic synchrony in parent-child interactions: A link with maternal representations of attachment relationships. *Infant Mental Health Journal*, 18, 247-264.
- Crittenden, P. M. (1981). Abusing, neglecting and adequate dyads: differentiating by patterns of interaction. *Merrill-Palmer-Quarterly*, 27, 201-218.
- Crittenden, P. M. (1999). *Care-Index*. Unpublished manuscript. Family Relations Institute, Miami.
- Crittenden, P. M., Lang C., Claussen, A. H., & Partridge, M. F. (2000). Relations among mother's dispositional representations of parenting. In P. M. Crittenden, & A. H. Claussen (Eds.), *The organization of attachment relationships: Maturation, culture, and context* (pp. 214-233). New York: Cambridge University Press.
- Crittenden, P. M., & DiLalla, D. L. (1988). Compulsive compliance: the development of an inhibitory coping strategy in infancy. *Journal of Abnormal Child Psychology*, 16, 585-599.
- Crowell, J. A., & Feldman, S. S. (1988). Mothers' internal models of relationships and children's behavioural and developmental status: A study of mother-child interaction. *Child development*, 59, 1273-1285.

- Cummings, E. M., Merrilees, C. E., & George, M. W. (2010). Fathers, marriages, and families: Revisiting and updating the framework for fathering in family context. In M. E. Lamb (Ed.), *The role of the father in child development* (pp. 154–176). NY: Wiley.
- Davies, P. T., & Cicchetti, D. (2004). Toward an integration of family systems and developmental psychopathology approaches. *Development and Psychopathology*, 16, 477–481.
- Davies, J., Slade, P., Wright, I., & Stewart, P. (2008). Posttraumatic stress symptoms following childbirth and mothers' perceptions of their infants. *Infant Mental Health Journal*, 29, 537–554.
- Dayton, C. J., Levendosky, A. A., Davidson, W. S., & Bogat, G. A. (2010). The child in the mind of the mother: The influence of prenatal maternal representations on parenting behaviors. *Infant Mental Health Journal*, 31, 220–241.
- de Albuquerque, J. E. G., & Schneider, S. (2012). Perceived intrafamilial connectedness and autonomy in families with and without an anxious family member: A multiple informant approach. *Child & Family Behavior Therapy*, 34, 324–341.
- Delmore-Ko, P., Pancer, S. M., Husberger, B., & Pratt, M. (2000). Becoming a parent: The relation between prenatal expectations and postnatal experience. *Journal of Family Psychology*, 14, 625–640.
- De Wolff, M. S., & van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development*, 68, 571–591.
- Diego, M.A., Field, T., & Hernandez-Reif, M. (2005). Prepartum, postpartum and chronic depression effects on neonatal behavior. *Infant Behavior and Development*, 28, 155–164.
- Diego, M.A., Field, T., Hernandez-Reif, M., Schanberg, S., Kuhn, C., & Gonzalez-Quintero, V.H. (2009). Prenatal depression restricts fetal growth. *Early Human Development*, 85, 65–70.
- Doll, E. (1989). Parenting stress index, 2nd ed. *Professional School Psychology*, 4, 307–312.
- Doss, B. D., Rhoades, G. K., Stanley, S. M., & Markman, H. J. (2009). The effect of the transition to parenthood on relationship quality: An 8-year prospective study. *Journal of Personality and Social Psychology*, 96, 601–619.
- Edhborg, M., Lundh, W., Seimyr, L., & Widström, A-M. (2001). The long-term impact of postnatal depressed mood on mother-child interaction: A preliminary study. *Journal of Reproductive and Infant Psychology*, 19, 61–71.
- Eiden, R. D., Edwards, E. P., & Leonard, K. E. (2002). Mother-infant and father-infant attachment among alcoholic families. *Development and Psychopathology*, 14, 253–278.
- Erel, O., & Burman, B. (1995). Interrelatedness of marital relations and parent-child relations: A meta-analytic review. *Psychological Bulletin*, 118, 108–132.
- Fava Vizziello, G., Antonioli, M. E., Cocci, V., & Invernezzi, R. (1993). From pregnancy to motherhood: the structure of representative and narrative change. *Infant Mental Health Journal*, 14, 4–16.
- Favez, N., Frascarolo, F., Carneiro, C., Montfort, V., Corboz-Warnery, A., & Fivaz-Depeursinge, E. (2006). The development of the family alliance from pregnancy to toddlerhood and children outcomes at 18 months. *Infant and Child Development*, 15, 59–73.
- Fawcett, J., Pollio, N., & Tully, A. (1992). Women's perceptions of cesarean and vaginal delivery: Another look. *Research in Nursing and Health*, 15, 439–446.
- Feldman, R. (2003). Infant-mother and infant-father synchrony: The coregulation of positive arousal. *Infant Mental Health Journal*, 24, 1–23.
- Feldman, R. (2006). From biological rhythms to social rhythms: Physiological precursors of mother-infant synchrony. *Developmental Psychology*, 42, 175–188.

- Feldman, R. (2007). Parent-infant synchrony and the construction of shared timing; physiological precursors, developmental outcomes, and risk conditions. *Journal of Child Psychology and Psychiatry*, 48, 329-354.
- Ferber, S. G., & Feldman, R. (2005). Delivery pain and the development of mother-infant interaction. *Infancy*, 1, 43-62.
- Field, T. (1992). Interventions in early infancy. *Infant Mental Health Journal*, 13, 329-336.
- Field, T. (2010). Postpartum depression effects on early interaction, parenting and safety practices: A review. *Infant Behavior and Development*, 33, 1-6.
- Field, T. (2011). Prenatal depression effects on early development: A review. *Infant Behavior and Development*, 34, 1-14.
- Field, T. (2012). Relationships as regulators. *Psychology*, 3, 467-479.
- Field, T., Diego, M., Dieter, J., Hernandez-Reif, M., Schanberg, S., Kuhn, C., Yando, R., & Bendell, D. (2004) Prenatal depression effects on the fetus and the newborn. *Infant Behavior and Development*, 27, 216-229.
- Field, T., & Diego, M. (2008). Vagal activity, early growth and emotional development. *Infant Behavior and Development*, 31, 361-373.
- Field, T., Diego, M., & Hernandez-Reif, M. (2006). Prenatal depression effects on the fetus and newborn: a review. *Infant Behavior and Development*, 29, 445-455.
- Field, T., Diego, M., Hernandez-Reif, M., & Ascencio, A. (2009). Prenatal dysthymia versus major depression effects on early mother-infant interactions: A brief report. *Infant Behavior and Development*, 32, 129-131.
- Field, T., Healy, B., Goldstein, S., & Guthertz, M. (1990). Behavior-state matching and synchrony in mother-infant interactions of nondepressed versus depressed dyads. *Developmental Psychology*, 26, 7-14.
- Field, T., Sandberg, D., Garcia, R., Vega-Lahr, N., Goldstein, S., & Guy, L. (1985). Pregnancy problems, postpartum depression and early mother-infant interactions. *Developmental Psychology*, 21, 1152-1156.
- Finnegan, L.P. (1984). Neonatal abstinence. In M. N. (Ed.), *Current therapy in neonatal and perinatal medicine* (pp. 314-320). Ontario: BC Decker Inc.
- Fisher J., Hammarberg K., & Baker G. (2008). Antenatal mood and foetal attachment after assisted conception. *Fertility and Sterility*, 89, 1103-1112
- Floyd, K., & Voloudakis, M. (1999). Affectionate behavior in adult platonic friendships: Interpreting and evaluating expectancy violations. *Human Communication Research*, 25, 341-369.
- Fonagy, P., Gergely, G., Jurist, E.L., & Target, M. (2002). *Affect regulation, mentalization, and the development of the self*. New York: Other Press.
- Fonagy, P., Steele, H., & Steele, M. (1991). Maternal representations of attachment during pregnancy predict the organization of infant-mother attachment at one year of age. *Child Development*, 62, 891-905.
- Fraiberg, S., Adelson, E., & Shapiro, V. (1975). Ghosts in the Nursery: A Psychoanalytic Approach to the Problems of Impaired Infant-Mother Relationships. *American Academy of Child Psychiatry*, 14, 387-422.
- Frank, D.A., Brown, J., Johnson, S., & Cabral, H. (2002). Forgotten fathers: An exploratory study of mothers' report of drug and alcohol problems among fathers of urban newborns. *Neurotoxicology and Teratology*, 24, 339-347.
- Fraser, J. G., Harris-Britt, A., Thakkallapalli, E.L., Kurtz-Costes, B., & Martin, S. (2010). Emotional availability and psychosocial correlates among mothers in substance-abuse treatment and their young infants. *Infant Mental Health Journal*, 31, 1-15.

- Gameiro, S., Moura-Ramos, M., & Canavarro, C. (2009). Maternal adjustment to the birth of a child: primiparity versus multiparity. *Journal of Reproductive and Infant Psychology*, 27, 269-286.
- Gavin, N. I., Gaynes, B. N., Lohr, K. N., Meltzer-Brody, S., Gartlehner, G., & Swinson, T. (2005). Perinatal depression. A systematic review of prevalence and incidence. *Obstetrics and Gynecology*, 106, 1071-1083.
- Genesoni, L. & Tallandini, M.A. (2009). Men's psychological transition to fatherhood: An analysis of the literature 1989-2008. *Birth: Issues in Perinatal Care*, 36, 305-318.
- George, C., Kaplan, N., & Main, M. (1985). *Attachment interview for adult*. Unpublished manuscript. University of California, Berkeley.
- George, C., & Solomon, J. (2008). Attachment and caregiving: The caregiving behavioral system. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of Attachment: theory, research, and clinical applications* (pp. 649-670). New York: Guilford.
- Ghera, M. M., Hane, A. A., Malesa, E. E., & Fox, N. A. (2006). The role of infant soothability in the relation between infant negativity and maternal sensitivity. *Infant Behavior and Development*, 29, 289-293.
- Gibson, F. L., Ungerer, J. A., Tennant, C. C., & Saunders, D. M. (2000). Parental adjustment and attitudes to parenting after in vitro fertilization. *Fertility and Sterility*, 73, 565-574.
- Goldberg, D. P., & Hiller, V. F. (1979). A scaled version of the general health questionnaire. *Psychological Medicine*, 9, 139-145.
- Goldberg, S. (1988). Risk factors in infant-mother attachment. *Canadian Journal of Psychology*, 42, 173-188.
- Goldstein, R. Z., Craig, A. D., Bechara, A., Garavan, H., Childress, A. R., Paulus, M. P., Volkow, N. D. (2009). The neurocircuitry of impaired insight in drug addiction. *Trends in Cognitive Sciences*, 13, 372-380.
- Golombok, S., Jadv, V., Lycett, E., Murray, C., & McCallum, F. (2005). Families created by gamete donation: Follow-up at age 2. *Human Reproduction*, 20, 286-293.
- Goodman, S.H., & Gotlib, I.H. (1999). Risk for psychopathology in the children of depressed mothers: A developmental model for understanding mechanisms of transmission. *Psychological Review*, 106, 458-490.
- Gottdiener, W.H. (2013). Understanding, treating and preventing the development of substance use disorders: A psychodynamic perspective. In N.E. Suchman, M. Pajulo, & L.C. Mayes (Eds.), *Parenting and substance-abuse: Developmental approaches to intervention* (pp. 87-99). New York: Oxford University Press.
- Gray, P. B., & Campbell, B. C. (2009). Human male testosterone, pair-bonding and fatherhood. In Gray, P.B., Ellison, P.T. (Eds.), *Endocrinology of Social Relationships* (pp. 270-293). Harvard University Press, Cambridge, MA.,
- Grossmann, K., Grossmann, K. E., Fremmer-Bombik, E., Kindler, H., Scheuerer-Engelisch, H., & Zimmerman, P. (2002). The uniqueness of the child-father attachment relationship: Fathers' sensitive and challenging play as a pivotal variable in a 16-year longitudinal study. *Social Development*, 11, 307-331.
- Haapakoski, M. & Silvén, M. (2009). Families, not parents differ: Development of communication in Finnish infants. *Infancy*, 14, 195-221.
- Habib, C. & Lancaster, S. (2006). The transition to fatherhood: Identity and bonding in early pregnancy. *Fathering*, 4, 235-253.
- Hackel, L. S. & Ruble, D. N. (1992). Changes in marital relationship after the first baby is born: Predicting the impact of expectancy disconfirmation. *Journal of Personality and Social Psychology*, 62, 944-957.

- Hahn, C-S. (2001). Review: Psychosocial well-being of parents and their children born after assisted reproduction. *Journal of Pediatric Psychology*, 26, 525-538.
- Haller, D. L. & Miles, D. R. (2004). Personality disturbances in drug-dependent women: Relationship to childhood abuse. *The American Journal of Drug and Alcohol Abuse*, 30, 269-286.
- Hammarberg, K., Fisher, J. R. W., & Wynter, K. H. (2008). Psychological and social aspects of pregnancy, childbirth and early parenting after assisted conception: A systematic review. *Human Reproduction Update*, 14, 395-414.
- Hammen, C., Burge, D. & Stansbury, K. (1990). Relationship of mother and child variables to child outcome in a high-risk sample: A causal modeling analysis. *Developmental Psychology*, 26, 24-30.
- Hans, S. L. (1999). Demographic and psychosocial characteristics of substance-abusing pregnant women. *Clinics in Perinatology*, 26, 55-74.
- Hans, S. L., Bernstein, V. J., & Henson, L. G. (1999). The role of psychopathology in the parenting of drug-dependent women. *Development and Psychopathology*, 11, 957-977.
- Hans, S. L., & Jeremy, R. J. (2001). Postneonatal mental and motor development of infants exposed in utero to opioid drugs. *Infant Mental Health Journal*, 22, 300-315.
- Hart, R., & McMahon, C. (2006). Mood state and psychological adjustment to pregnancy. *Archives of Women's Mental Health*, 9, 329-337.
- Harwood, K., McLean, N., & Durkin, K. (2007). First-time mothers' expectations of parenthood: What happens when optimistic expectations are not matched by later experience? *Developmental Psychology*, 43, 1-12.
- Hazen, N. L., Jacobvitz, D., Higgins, K. N., Allen, S., & Jin, M. K. (2011). Pathways from disorganized attachment to later social-emotional problems: The role of gender and parent-child interaction patterns. In Solomon, J. & George, C. (Eds.), *Disorganized attachment and caregiving* (pp. 167-206). New York: Guilford Press.
- Helmerhorst, F. M., Perquin, D. A. M., Donker, D., & Keirse, M. J. (2004). Perinatal outcome of singletons and twins after assisted conception: A systematic review of controlled studies. *British Medical Journal*, 328, 261.
- Herrera, E., Reissland, N., & Shepherd, J. (2004). Maternal touch and maternal child-directed speech: effects of depressed mood in the postnatal period. *Journal of Affective Disorders*, 81, 29-39.
- Hesse, E. (2008). The adult attachment interview: Protocol, method of analysis and empirical studies. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of Attachment: theory, research, and clinical applications* (pp. 552-598). New York: Guilford.
- Hesse, E., & Main, M. (2000). Disorganized infant, child and adult attachment: Collapse in behavioral and attentional strategies. *Journal of American Psychoanalytic Association*, 48, 1097-1127.
- Hjelmstedt, A., Widstrom, A-M., Wramsby, H., & Collins, A. (2003). Patterns of emotional responses to pregnancy, experience of pregnancy and attitudes to parenthood among IVF couples: A longitudinal study. *Journal of Psychosomatic Obstetrics and Gynecology*, 24, 153-162.
- Hjelmstedt, A., Widström, A-M., & Collins, A. (2006). Psychological correlates of prenatal attachment in women who conceived after in vitro fertilization and women who conceived naturally. *Birth: Issues in Perinatal Care*, 33, 303-310.
- Hjelmstedt, A., Widström, A-M., & Collins, A. (2007). Prenatal attachment in Swedish IVF fathers and controls. *Journal of Reproductive and Infant Psychology*, 25, 296-307.
- Hoffman, Y., & Drotar, D. (1991). The impact of postpartum depressed mood on mother-infant interaction: Like mother like baby? *Infant Mental Health Journal*, 12, 65-80.

- Holditch-Davis, D., Sandelowski, M., & Harris, B.G. (1999). Effects of infertility on mothers' and fathers' interactions with young children. *Journal of Reproductive and Infant Psychology*, 17, 159-173.
- Honig, A.S., & Morin, C. (2001). When should programs for teen parents and babies begin? Longitudinal evaluation of a teen parents and babies program. *The Journal of Primary Prevention*, 21, 447-454.
- Huth-Bocks, A.C., Levendosky, A.A., Bogat, A., & von Eye, A. (2004). The impact of maternal characteristics and contextual variables in infant-mother attachment. *Child Development*, 75, 480-496.
- Huth-Bocks, A. C., Theran, S. A., Levendosky, A. A., & Bogat, G. A. (2011). A social-contextual understanding of concordance and discordance between maternal prenatal representations of the infant and infant-mother attachment. *Infant Mental Health Journal*, 32, 405-426.
- Johnson, A. L., Morrow, C. E., Accornero, V. H., Xue, L., Anthony, J. C., & Banstra, E. S. (2002). Maternal cocaine use: estimated effects on mother-child play interactions in the preschool period. *Developmental and Behavioral Pediatrics*, 23, 191-202.
- Johnson, H. L., Glassman, M. B., Fiks, K. B., & Rosen, T. S. (1990). Resilient children: individual differences in developmental outcome of children born to drug abusers. *Journal of Genetic Psychology*, 151, 523-539.
- Johnson, J. G., Kohen, P., Kasen, S., & Brook, J.S. (2004). Paternal psychiatric symptoms and maladaptive paternal behavior in the home during the child rearing years. *Journal of Child and Family Studies*, 13, 421-437.
- Kagitcibasi, C. (2005). Autonomy and relatedness in cultural context: Implications for self and family. *Journal of Cross-cultural Psychology*, 36, 403-422.
- Kalmuss, D., Davidson, A., & Cushman, L. (1992). Parenting expectations, experiences and adjustment to parenthood: A test of violated expectations framework. *Journal of Marriage and the Family*, 54, 516-526.
- Kaltenbach, K. (2013). Bio-psychosocial characteristics of parenting women with substance use disorders. In N. Suchman, M. Pajulo, & L.C. Mayes (Eds.), *Parenting and Substance Abuse* (pp. 185-194). New York: Oxford University Press.
- Kane, P., & Garber, J. (2004). The relations among depression in fathers, children's psychopathology, and father-child conflict: a meta-analysis. *Clinical Psychology Review*, 24, 339-360.
- Kanninen, K., Salo, J., & Punamäki, R. (2000). Attachment patterns and working alliance in trauma therapy for victims of political violence. *Psychotherapy Research*, 10, 435-449.
- Kim, P., Mayes, L., Feldman, R., Leckman, J. F., & Swain, J. E. (2013). Early postpartum parental preoccupation and positive parenting thoughts: Relationship with parent-infant interaction. *Infant Mental Health Journal*, 34, 104-116.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.) New York: The Guilford Press.
- Kochanska, G., & Aksan, N. (2004). Development of mutual responsiveness between parents and their young children. *Child Development*, 75, 1657-1676.
- Koob, G. F., & Volkow, N. D. (2010). Neurocircuitry of addiction. *Neuropsychopharmacology*, 35, 217-238.
- Kouvo, A., Virtanen, E., & Silvén, M. (2003). Kiintymys suomalaisissa perheissä. Äidin, isän ja lapsen kiintymyssuhteiden vastaavuus. [Attachment in Finnish families. The match between maternal, paternal and child attachments]. *Psykologia*, 1, 34-40.
- Lamb, M. (1977). Father-infant and mother-infant interaction in the first year of life. *Child Development*, 48, 167-181.

- Larney, B., Cousens, P., & Nunn, K. (1997). Maternal representations reassessed. *Clinical Child Psychology and Psychiatry*, 2, 125-144.
- Lawrence, E., Nysten, K., & Cobb, R. J. (2007). Prenatal expectations and marital satisfaction over the transition to parenthood. *Journal of Family Psychology*, 2, 155-164.
- Lebovici, S. (1988). Fantasmatic interactions and intergenerational transmission. *Infant Mental Health Journal*, 9, 10-19.
- Lester, B. M., Boukydis, C. F. Z., & Twomey, J. E. (2000). Maternal substance abuse and child outcome. In C.H. Zeanah (Ed.), *Handbook of infant mental health* (2nd ed., pp. 161-175). New York: Guilford Press.
- Lester, B. M., & Tronick, E. Z. (1994). The effects of prenatal cocaine exposure and child outcome. *Infant Mental Health Journal*, 15, 107- 120.
- Levy-Shiff, R., Goldshmidt, I., & Har-Even, D. (1991). Transition to parenthood in adoptive families. *Developmental Psychology*, 27, 131-140.
- Levy-Shiff, R., Lerman, M., Har-Even, D., & Hod, M. (2002). Maternal adjustment and infant outcome in medically defined high-risk pregnancy. *Developmental Psychology*, 38, 93-103.
- Lieberman, A. F., & van Horn, P. (2008). *Psychotherapy with infants and young children: Repairing the effects of stress and trauma on early attachment*. New York: Guilford Press.
- Lindblom, J., Flykt, M., Tolvanen, A., Vänskä, M., Tiitinen, A., Tulpala, M., & Punamäki, R-L. (2014, in press). Dynamic family system trajectories from pregnancy to child's first year. *Journal of Marriage and the Family*.
- Lobel, M., & DeLuca, R.S. (2007). Psychosocial sequelae of cesarean delivery: Review and analysis of their causes and implications. *Social Science and Medicine*, 64, 2272-2284.
- Lovejoy, M. C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review*, 20, 561-592.
- Lyden, H., & Suchman, N.E. (2013). Transmission of parenting models at the level of representation: Implications for mother-child dyads affected by maternal substance abuse. In N. Suchman, M. Pajulo, & L.C. Mayes (Eds.), *Parenting and Substance Abuse* (pp. 100-125). New York: Oxford University Press.
- Lykeridou, K., Gourounti, K., Delsidou, A., Loutradis, D., & Vaslamtzis, G. (2009). The impact of infertility diagnosis on psychological status of women undergoing fertility treatment. *Journal of Reproductive and Infant Psychology*, 17, 223-237.
- Lyons-Ruth, K., Connell, D. B., Zoll, D. & Stahl, J. (1987). Infants at social risk: Relations among infant maltreatment, maternal behavior, and infant attachment behavior. *Developmental Psychology*, 23, 223-232.
- MacKinnon, D.P. (2008). *Introduction to statistical mediation analysis*. New York: Lawrence Erlbaum.
- Main, M., & Goldwyn, R. (1991). *Adult attachment scoring and classification system*. Unpublished manuscript. University of California at Berkeley.
- Main, M., Goldwyn, R., & Hesse, E. (2002). *Adult attachment scoring and classification system. Version 7.1*. Unpublished manuscript. University of California at Berkeley.
- Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood and adulthood: A move to the level of representation. In I. Bretherton, & E. Waters (Eds.), *Growing points of attachment theory and research*. Monographs of the Society for Research in Child Development, 50, (1-2, Serial No. 209), 66-104.
- Maloni, J. A., Park, S., Anthony, M. K., & Musil, C. M. (2005). Measurement of antepartum depressive symptoms during high-risk pregnancy. *Research in Nursing and Health*, 28, 16-26.

- Mattejat, F., & Scholz, M. (1994). Das subjective Familienbild. [Subjective Family Picture Test]. Manual. Göttingen: Hogrefe.
- Mayes, L., Feldman, R., Granger, R. H., Haynes, O. M., Bornstein, M. H., & Schottenfeld, R. (1995). The effects of polydrug use with and without cocaine on mother-infant interaction at 3 and 6 months. *Infant Behavior and Development*, 20, 489-502.
- McArdle, J. J. (2009). Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology*, 60, 577-605.
- McMahon, C., Barnett, B., Kowalenko, N. M., & Tennant, C. C. (2006). Maternal attachment state of mind moderates the impact of postnatal depression on infant attachment. *Journal of Child Psychology and Child Psychiatry*, 47, 660-669.
- McMahon, C. A., Tennant, C., Ungerer, J., & Saunders, D. (1999). 'Don't count your chickens': A comparative study of the experience of pregnancy after IVF conception. *Journal of Reproductive and Infant Psychology*, 17, 345-356.
- McMahon, C. A., Ungerer, J. A., Beaurepaire, J., Tennant, C., & Saunders, D. (1997). Anxiety during pregnancy and fetal attachment after in-vitro fertilization conception. *Human reproduction*, 12, 176-182.
- McMahon, T. (2013). Substance-abusing fathers: A developmental perspective. In N.E., Suchman, M. Pajulo, & L.C.Mayes (Eds.), *Parenting and substance-abuse: Developmental approaches to intervention* (pp. 156-182). New York: Oxford University Press.
- Mikulincer, M., & Florian, V. (1999). Maternal-fetal bonding, coping strategies and mental health: The contribution of attachment style. *Journal of Social and Clinical Psychology*, 18, 255-276.
- Miles, M. S., Holditsch-Davis, D., Schwartz, T. A., & Scher, M. (2007). Depressive symptoms in mothers of prematurely born infants. *Journal of Developmental and Behavioral Pediatrics*, 28, 36-44.
- Milgrom, J., Schembri, C., Ericksen, J., Ross, J., & Gemmill, A. W. (2011). Towards parenthood: An antenatal intervention to reduce depression, anxiety and parenting difficulties. *Journal of Affective Disorders*, 130, 385-394.
- Miller, B. A., Smyth, N. J., & Mudar, P. J. (1999) Mothers' alcohol and other drug problems and their punitiveness toward their children. *Journal of Studies on Alcohol*, 60, 632-642.
- Minkoff, H. L., & Berkowitz, R. (2005). The myth of the precious baby. *Obstetrics and Gynecology*, 106, 607-609.
- Minuchin, P. (1985). Families and individual development: Provocations from the field of family therapy. *Child Development*, 56, 289-302.
- Muller-Nix, C., Forcada-Guex, M., Pierrehumbert, B., Jaunin, L., Borghini, A., & Ansermet, F. (2004). Prematurity, maternal stress and mother-child interactions. *Early Human Development*, 79, 145-158.
- Murray, L., Fiori-Cowley, A., Hooper, R., & Cooper, P. (1996). The impact of postnatal depression and associated adversity on early mother-infant interactions and later infant outcomes. *Child Development*, 67, 2512-2526.
- Murray, L., Stanley, C., Hooper, R., King, F., & Fiori-Cowley, A. (1996). The role of infant factors in postnatal depression and mother-infant interactions. *Developmental Medicine and Child Neurology*, 38, 109-119.
- Múthen, L. K., & Múthen, B. O. (1998-2007). *Mplus User's Guide* (5th ed.). Los Angeles, CA: Múthen & Múthen.
- Nair, P., Black, M. M., Schuler, M., Keane, V., Snow, L., Rigney, B.A., & Magder, L. (1997). Risk factors for disruption in primary caregiving among infants of substance-abusing women. *Child Abuse and Neglect*, 21, 1039-1051.

- NICHD Early Child Care Research Network (2000). Factors Associated with Fathers' Caregiving Activities and Sensitivity with Young Children. *Journal of Family Psychology*, 14, 200-219.
- Niederhofer, H., Staffen, W., & Mair, A. (2002). Features in families and family relationships. *Psychological Reports*, 90, 1105-1108.
- Noppe, I. C., Noppe, L., & Hughes, F. P. (1991). Stress as a predictor of the quality of parent-infant interaction. *Journal of Genetic Psychology*, 152, 17-28.
- O'Connor, M. J., Sigman, M., & Brill, N. (1987). Disorganization of attachment in relation to maternal alcohol consumption. *Journal of Consulting and Clinical Psychology*, 55, 831-836.
- Pajulo (2001). *Early motherhood at risk: mothers with substance dependency*. Doctoral Dissertation. The University of Turku, Finland.
- Pajulo, M., Savonlahti, E., Sourander, A., Ahlqvist, S., Helenius, H., & Piha, J. (2001). An early report on the mother-baby interactive capacity of substance-abusing mothers. *Journal of Substance Abuse Treatment*, 20, 143-151.
- Pajulo, M., Savonlahti, E., Sourander, A., Helenius, H., & Piha, J. (2001). Antenatal depression, substance dependency and social support. *Journal of Affective Disorders*, 65, 9-17.
- Pajulo, M., Savonlahti, E., Sourander, A., Piha, J., & Helenius, H. (2001). Prenatal maternal representations: mothers at psychosocial risk. *Infant Mental Health Journal*, 22, 529-544.
- Pajulo, M., Savonlahti, E., Sourander, A., Piha, J., & Helenius, H. (2004). Maternal representations, depression and interactive behaviour in the postnatal period: A brief report. *Journal of Reproductive and Infant Psychology*, 22, 91-98.
- Pajulo, M., Pyykkönen, N., Kalland, M., Sinkkonen, J., Helenius, H., Punamäki R-L, & Suchman, N. (2012). Substance-abusing mothers in residential treatment with their babies: Importance of pre- and postnatal maternal reflective functioning. *Infant Mental Health Journal*, 33, 70-81.
- Parke, R. D. (1996). *Fatherhood*. Cambridge: Harvard University Press.
- Pauli-Pott, U., & Mertesacker, B. (2009). Affect expression in mother-infant interaction and subsequent attachment development. *Infant Behavior and Development*, 32, 208-215.
- Paulson, J. F., & Bazemore, S. D. (2010). Prenatal and postpartum depression in fathers and its association with maternal depression: A meta-analysis. *Journal of American Medical Association*, 303, 1961-1969.
- Paulson, J. F., Dauber, S., & Leiferman, J. A. (2006). Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics*, 118, 659-668.
- Pearce, H., & Ayers, S. (2005). The expected child versus the actual child: Implications for the mother-baby bond. *Journal of Reproductive and Infant Psychology*, 23, 89-102.
- Pearson, R. M., Melotti, R., Heron, J., Joinson, C., Stein, A., Ramchandani, P. G., & Evans, J. (2012). Disruption to the development of maternal responsiveness? The impact of prenatal depression on mother-infant interactions. *Infant Behavior and Development*, 35, 613-626.
- Pederson, D. R., Gleason, K. E., Moran, G., & Bento, S. (1998). Maternal attachment representations, maternal sensitivity and the infant-mother attachment relationship. *Developmental Psychology*, 34, 925-933.
- Pines, D. (1972). Pregnancy and motherhood: Interaction between fantasy and reality. *British Medical Journal of Psychology*, 45, 333-343.

- Poikkeus, P., Vilksa, S., Repokari, L., Punamäki, R-L., Aitokallio-Tallberg, A., Sinkkonen, J., Almqvist, F., Tulppala, M., & Tiitinen, A. (2006). Impact of infertility characteristics and treatment modalities on singleton pregnancies after assisted reproduction. *Reproductive BioMedicine Online*, 13, 135-144.
- Priel, B., & Kantor, B. (1988). The influence of high-risk pregnancies and social support systems on maternal perceptions of the infant. *Infant Mental Health Journal*, 9, 235-244.
- Proulx, C.M., Helms, H.M., & Buehler, H. (2007). Marital Quality and Personal Well-being: A Meta-analysis. *Journal of Marriage and Family*, 69, 576-593.
- Punamäki, R-L., Repokari, L., Vilksa, S., Poikkeus, P., Tiitinen, A., Sinkkonen, J., & Tulppala, M. (2006). Maternal mental health and medical predictors of infant developmental and health problems from pregnancy to one year: Does former infertility matter? *Infant Behavior and Development*, 29, 230-242.
- Räikkönen, K., Seckl, J. R., Pesonen, A.-K., Simons, A., & Van den Bergh, B. R. H. (2011). Stress, glucocorticoids and liquorice in human pregnancy: Programmers of the offspring brain. *Stress: The International Journal on the Biology of Stress*, 14, 590-603.
- Ramchandani, P. G., O'Connor, T., Evans, J., Heron, J., Murray, L., & Stein, A. (2008). The effects of pre- and postnatal depression in fathers: a natural experiment comparing the effects of exposure to depression on offspring. *Journal of Child Psychology and Psychiatry*, 49, 1069-1078.
- Raphael-Leff, J. (1991). *Psychological processes of childbearing*. London: The Anna Freud Centre.
- Rehman, U. S., Gollan, J., & Mortimer, A. R. (2008). The marital context of depression: Research, limitations and new directions. *Clinical Psychology Review*, 28, 179-198.
- Repokari, L., Punamäki, R-L., Poikkeus, P., Vilksa, S., Unkila-Kallio, L., Sinkkonen, J., Almqvist, F., Tiitinen, A., & Tulppala, M. (2005). The impact of successful assisted reproduction treatment on female and male mental health during transition to parenthood: a prospective controlled study. *Human Reproduction*, 20, 3238-3247.
- Riggs, S. A., & Jacobvitz, D. (2002). Expectant parents' representations of early attachment relationships: Associations with mental health and family history. *Journal of Consulting and Clinical Psychology*, 70, 195-204.
- Rodning, C., Beckwith, L., & Howard, J. (1991). Quality of attachment and home environments in children prenatally exposed to PCP and cocaine. *Development and Psychopathology*, 3, 351-366.
- Rosenblum, K. L., McDonough, S. C., Sameroff, A. J., & Muzik, M. (2008). Reflection in thought and action: Maternal parenting reflectivity predicts mind-minded comments and interactive behavior. *Infant Mental Health Journal*, 29, 362-376.
- Rosenblum, O., Mazet, P., & Bénovy, H. (1997). Mother and infant affective involvement states and maternal depression. *Infant Mental Health Journal*, 18, 350-363.
- Ruble, D. N., Hackel, L. S., Fleming, A. S., & Stangor, C. (1988). Changes in marital relationship during the transition to first time motherhood: Effects of violated expectations concerning division of household labor. *Journal of Personality and Social Psychology*, 55, 78-87.
- Saisto, T., Salmela-Aro, K., Nurmi, J., & Halmesmäki, E. (2001). Psychosocial predictors of disappointment with delivery and puerperal depression: A longitudinal study. *Acta Obstetrica et Gynecologica Scandinavica*, 80, 39-45.
- Salo, S., & Flykt, M. (2013). Lapsen ja vanhemman välisen emotionaalisen saatavillaolon merkitys lapsen kehityksessä ja hyvinvoinnissa. [The role of parent-child emotional availability for child development and well-being]. *Psykologia*, 48, 402-416.
- Salo, S., Kivistö, K., Korja, R., Biringen, Z., Tupola, S.-M., Kahila, H., & Kivitie-Kallio, S. et al. (2009). Emotional availability, parental self-efficacy beliefs and child de-

- velopment in caregiver-child relationships with buprenorphine-exposed 3-year-olds. *Parenting*, 9, 244-259.
- Salo, S., Politi, J., Tupola, S.-M., Biringen, Z., Kalland, M., Halmesmäki, E., Kahila, H., & Kivittie-Kallio, S. (2010). Early development of opioid-exposed infants born to mothers in buprenorphine-replacement therapy. *Journal of Reproductive and Infant Psychology*, 28, 161-179.
- Sameroff, A. J., & Emde, R. N. (1989). *Relationship disturbances in early childhood: A developmental approach*. New York: Basic Books.
- Sameroff, A. J., & Fiese, B. H. (1990). Transactional regulation and early intervention. In S. J. Meisels, & J. P. Shonkoff (Eds.), *Handbook of early childhood intervention* (pp. 119-149). New York: Cambridge University Press.
- Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption: II. *Addiction*, 88, 791-804.
- Savonlahti, E., Pajulo, M., Ahlqvist, S., Helenius, H., Korvenranta, H., Tamminen, T., & Piha, J. (2005). Interactive skills of infants with their high-risk mothers. *Nordic Journal of Psychiatry*, 59, 139-147.
- Scharfe, E. (2007). Cause or consequence? Exploring causal links between attachment and depression. *Journal of Social and Clinical Psychology*, 26, 1048-1064.
- Schmidt, L. (2006). Psychosocial burden of infertility and assisted reproduction. *Lancet*, 367, 379-380.
- Schoppe-Sullivan, S. J., Brown, G. L., Cannon, E. A., Mangelsdorf, S. C., & Sokolowski, M. S. (2008). Maternal gatekeeping, coparenting quality, and fathering behavior in families with infants. *Journal of Family Psychology*, 22, 389-398.
- Sethna, V., Murray, L., & Ramchandani, P.G. (2012). Depressed fathers' speech to their 3-month-old infants: A study of cognitive and mentalizing features in paternal speech. *Psychological Medicine*, 42, 2361-2371.
- Shankaran, S., Das, A., Bauer, C. R., Bada, H. S., Lester, B., Wright, L. L., & Smeriglio, V. (2004). Association between patterns of maternal substance use and infant birth weight, length and head circumference. *Pediatrics*, 114, 226-234.
- Shieh, C., & Kravitz, M. (2002). Maternal-fetal attachment in pregnant women who use illicit drugs. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 31, 156 - 164.
- Shieh, C., & Kravitz, M. (2006). Severity of drug use, initiation of prenatal care, and maternal-fetal attachment in pregnant marijuana and cocaine/heroin users. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 35, 499 - 508.
- Siddiqui, A., Hägglöf, B., & Eiseman, M. (2000). Own memories of upbringing as a determinant of prenatal attachment in expectant women. *Journal of Reproductive and Infant Psychology*, 18, 67-74.
- Singer, L. T., Fulton, S., Davillier, M., Koshy, D., Salvator, A., & Baley, J. E. (2003). Effects of infant risk status and maternal psychological distress on maternal-infant interactions during the first year of life. *Developmental and Behavioral Pediatrics*, 24, 233-241.
- Slade, A., Cohen, L. J., Sadler, L. S., & Miller, M. (2009). The psychology and psychopathology of pregnancy: Reorganization and transformation. In C.H. Zeanah (Ed.), *Handbook of infant mental health* (pp 22-39). New York: Guilford Press.
- Slade, A., Grienemberger, J., Bernbach, E., Levy, D., & Locker, A. (2005). Maternal reflective functioning and attachment: Considering the transmission gap. *Attachment and Human Development*, 7, 283-298.
- Solomon, J., & George, C. (1996). Defining the caregiving system: Toward a theory of caregiving. *Infant Mental Health Journal*, 17, 183-197.

- Spanier, G. B. (1976). Measuring dyadic adjustment: New scales for assessing the quality of marriage and similar dyads. *Journal of Marriage and the Family*, 38, 15-28.
- Spangler, G., & Grossmann, K. E. (1993). Biobehavioral organization in securely and insecurely attached infants. *Child Development*, 64, 1439-1450.
- Sroufe, L. A. (1995). *Emotional development: The organization of emotional life in the early years*. Cambridge: Cambridge University Press.
- Steadman, J., Pawlby, S., Mayers, A., Bucks, R. S., Gregoire, A., Miele-Norton, M., & Hogan, A. M. (2007). An exploratory study of the relationship between mother-infant interaction and maternal cognitive function in mothers with mental health illness. *Journal of Reproductive and Infant Psychology*, 25, 255-269.
- Steele, H., Steele, M., & Fonagy, P. (1996). Associations among attachment classifications of mothers, fathers and their infants. *Child Development*, 67, 541-555.
- Stern, D. N. (1985). *Interpersonal World of the Infant: A View from Psychoanalysis and Developmental Psychology*. New York: Basic Books.
- Stern, D.N. (1995). *The Motherhood Constellation. A Unified View of Parent-Infant Psychotherapy*. New York: Basic Books.
- Stern, D.N. (2002). *The first relationship: Infant and mother*. Cambridge: Harvard University Press.
- Strathearn, L., Li, J., Fonagy, P., & Montague, P. R. (2008). What's in a smile? Maternal brain responses to infant facial cues. *Pediatrics*, 122, 40-51.
- Strauss, R., & Goldberg, W. A. (1999). Self and possible selves during the transition to fatherhood. *Journal of Family Psychology*, 13, 244-259.
- Suchman, N., Pajulo, M., Kalland, M., DeCoste, C., & Mayes, L. (2012). At-risk mothers of infants and toddlers. In A.W. Bateman, & P. Fonagy (Eds.), *Handbook of mentalizing in mental health practice* (pp. 309-346). Arlington: American Psychiatric Publishing.
- Swanson, K., Beckwith, L., & Howard, J. (2000). Intrusive caregiving and quality of attachment in prenatally drug-exposed toddlers and their primary caregivers. *Attachment and Human Development*, 2, 130-148.
- Tarabulsky, G. M., Tessier, R., & Kappas, A. (1996). Contingency detection and the contingent organization of behavior in interactions: implications for socioemotional development in infancy. *Psychological Bulletin*, 120, 25-41.
- THL (2012). Tilastoraportti: Hedelmöityshoidot 2011-2012 [Statistics: Infertility treatments 2011-2012]. Heino A. & Gissler, M.
- Thun-Hohenstein, L., Wienerroither, C., Schreuer, M. Seim, G., & Wienerroither, H. (2008). Antenatal mental representations about the child and mother-infant interaction at three months post partum. *European Child and Adolescent Psychiatry*, 17, 9-19.
- Trad, P. (1990). On becoming a mother: In the throes of developmental transformation. *Psychoanalytic Psychology*, 7, 341-361.
- Tronick, E. Z., Messinger, D. S., Weinberg, M. K., Lester, B. M., LaGasse, L., Seifer, R., Bauer, C. et al. (2005). Cocaine exposure is associated with subtle compromises of infants' and mothers' social-emotional behavior and dyadic features of their interaction in the face-to-face still-face paradigm. *Developmental Psychology*, 41, 711-722.
- Van der Kolk, B. A., & Fislser, R. E. (1994). Childhood abuse and neglect and loss of self-regulation. *Bulletin of the Menninger Clinic*, 58, 145-168.
- van IJzendoorn, M.H. (1995). Adult attachment representations, parental responsiveness, and infant attachment: A meta-analysis on the predictive validity of the Adult Attachment Interview. *Psychological Bulletin*, 117, 387-403.
- Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (1997). Intergenerational transmission of attachment. State of art in psychometric, psychological and clinical re-

- search. In I. Atkinson, & K.J. Zucker (Eds.), *Attachment and psychopathology* (pp. 135-170). New York: Guilford.
- Volling, B. L., McElwain, N. L., Notaro, P. C., & Herrera, C. (2002). Parents' Emotional Availability and Infant Emotional Competence: Predictors of Parent-Infant Attachment and Emerging Self-Regulation. *Journal of Family Psychology*, 16, 447-465.
- Von Klitzing, K., & Burgin, D. (2005). Parental capacities for triadic relationship during pregnancy: early predictors of children's behavioral and representational functioning at preschool age. *Infant Mental Health Journal*, 26, 19-39.
- Von Klitzing, K., Simoni, H., Amsler, F., & Burgin, D. (1999) The role of the father in early family interaction. *Infant Mental Health Journal*, 20, 222-237.
- Vreeswijk, C., Maas, A., Rijk, C., & van Bakel, H. (2013). Fathers' experiences during pregnancy: Paternal prenatal attachment and representations of the fetus. *Psychology of Men and Masculinity*, 15, 129-137.
- Walsh, J. (2010). Definitions matter: If maternal-fetal relationships are not attachment, what are they? *Archives of Women's Mental Health*, 13, 449-451.
- Waters, E., Weinfield, N. S., & Hamilton, C. E. (2000). The stability of attachment security from infancy to adolescence and early adulthood: General discussion. *Child Development*, 71, 703-706.
- Wendland, J., & Miljkovitch, I. (2003). From late pregnancy to six months postpartum: Content and evolution of high-risk primiparous single mother's conscious representations. *Journal of Social and Clinical psychology*, 22, 745-770.
- West, A. E., & Newman, D. L. (2003). Worried and blue. Mild parental anxiety and depression in relation to the development of young children's temperament and behavior problems. *Parenting: Science and practice*, 3, 133-154.
- Wilson, M., White, M., Cobb, B., Curry, R., Greene, D., & Popovich, D. (2000). Family dynamics, parental-fetal attachment and infant temperament. *Journal of Advanced Nursing*, 31, 204-210.
- Winnicott, D. W. (1956). Primary maternal preoccupation. In *Through Paediatrics to Psychoanalysis*. London: Hogarth
- Winnicott, D. W. (1960). The theory of the parent-infant relationship. *The International Journal of Psychoanalysis*, 41, 585-595.
- Zeanah, C. H., & Barton, M. L. (1989). Introduction: Internal representations and parent-infant relationships. *Infant Mental Health Journal*, 10, 135-141.
- Zelkowitz, P., Bardin, C., & Papageorgiou, A. (2007). Anxiety affects the relationship between parents and their very low birth weight infants. *Infant Mental Health Journal*, 28, 296-313.
- Zuckerman, B., & Brown, E. R. (1993). Maternal substance abuse and infant development. In C.H. Zeanah (Ed.), *Handbook of infant mental health* (pp. 143-158). New York: Guilford Press.

ORIGINAL PUBLICATIONS I–IV

Maternal Depression and Dyadic Interaction: The role of Maternal Attachment Style

Marjo Flykt^{a,*}, Katri Kanninen^b, Jari Sinkkonen^c and Raija-Leena Punamäki^d

^aDepartment of Psychology, University of Tampere, Tampere, Finland

^bCity of Kirkkonummi, Finland

^cSave the Children, Finland

^dCollegium of Advanced Studies, University of Helsinki, Helsinki, Finland

Maternal mental health and the contents of her representational world are important determinants of early parent–child relationship. We examined, first, the role of prenatal and postnatal depressive symptoms and maternal attachment style in predicting the quality of mother–child interaction. Second, we analysed whether the secure-autonomous attachment style can protect the dyadic interaction from the negative effects of maternal depression. The participants were 59 mother–infant pairs examined during pregnancy (T1), 4–5 months postpartum (T2) and when the children were approximately 14 months old (T3). Maternal attachment style was assessed with a modified Adult Attachment Interview -procedure, depressive symptoms with Edinburgh Postnatal Depression Scale, and observed mother–child interaction with Care Index. The results show that autonomous mothers were more sensitive and responsive and their children more co-operative than dyads with dismissing maternal attachment style. As hypothesized, mothers with the combination of both prenatal and postpartum depressive symptoms were highly unresponsive in their dyadic interaction. Further, prenatal depressive symptoms had a stronger impact on maternal unresponsiveness than postnatal symptoms. As hypothesized, mother's autonomous attachment style protected the mother–child interaction from the negative impact of maternal postnatal depressive symptoms, whereas dyads with preoccupied mothers were especially at risk for interaction problems when mothers had postpartum depressive symptoms. Copyright © 2010 John Wiley & Sons, Ltd.

*Correspondence to: Marjo Flykt, Department of Psychology, 33014 University of Tampere, Tampere, Finland. E-mail: Marjo.Flykt@uta.fi

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Attachment behavior may be largely dormant in adulthood, but becomes activated by stress and significant life events (Bowlby, 1980; Crittenden, 1997) such as transition to parenthood (Van IJzendoorn & Bakermans-Kranenburg, 1997). Mother's attachment-related working models are crucial for the early dyadic relationship, as they underlie her perceptions and interpretations of the infant's interactive signals (Fonagy, Gergely, Jurist, & Target, 2002; Stern, 1995). Maternal depression constitutes a risk for healthy child development (Beck, 1998, 2006) and its harmful effects are often mediated by problems in mother–infant interaction. It is possible that maternal autonomous attachment style could protect the early interactive relationship from the negative impact of maternal depression, although research evidence is still scarce and inconclusive. In our study we examine the role of maternal attachment style as a moderator between maternal prenatal and postnatal depressive symptoms and mother–child interactive relationship.

Maternal Depression and Early Interaction

Transition to motherhood involves profound changes in life style and adaptation to new responsibilities, which can evoke mental health problems (Campbell, Cohn, & Meyers, 1995; Stern, 1995). About 8–14% of new mothers experience serious depressive symptoms (Evans, Heron, Francomb, Oke, & Golding, 2001; Matthey, Barnett, Ungerer, & Waters, 2000). Prenatal depression may be at least as common, and has been estimated to affect 10–25% of mothers (Bennett, Einarson, Taddio, Koren, & Einarson, 2004; Evans *et al.*, 2001; Field, Diego, & Hernandez-Reif, 2006). Mild depression or distress is even more common.

Researchers no longer ask whether prenatal and postnatal maternal depression exert a risk upon child development, but rather through which pathways they affect it. Three main routes have been described. First, children of depressed parents may be genetically predisposed to stronger physiological stress responses (Field *et al.*, 2006; Goodman & Gotlib, 1999), and are thus more vulnerable to the environmental adversities often associated with parental depression. Second, maternal prenatal depression is associated with harmful physiological effects on the foetus: elevated heart rate, increased physiological reactivity, delayed growth, prematurity and low birth weight have been reported (Diego *et al.*, 2009; Field *et al.*, 2004, 2006). Newborns of depressed mothers show biochemical and physiological profiles that parallel those of their depressed mothers, including higher cortisol levels and lower dopamine and serotonin levels (Field *et al.*, 2004). Compared with newborns of non-depressed mothers, they also perform less optimally on several Brazelton scales, e.g. habituation, orientation, motor and autonomic stability (Field *et al.*, 2004), and are less responsive to human faces and voices and physical pain (Field, Diego, & Hernandez-Reif, 2009; Warnock, Bakeman, Shearer, Misri, & Oberlander, 2009).

The third, and the most widely studied, is the negative interactional pathway associated with maternal postnatal depression (meta-analysis: Beck, 1995; Edhborg, Lundh, Seimyr, & Widström, 2001). Depressed mothers face difficulties in understanding and responding to their children's needs (Bettes, 1988; Donovan, Leavitt, & Walsh, 1998) and in timing their responses adequately (Hoffman & Drotar, 1991; Leadbeater, Bishop, & Raver, 1996). They have been described to

express more negative feelings and intrusiveness on the one hand (Campbell *et al.*, 1995; Herrera, Reissland, & Shepherd, 2004; Hoffman & Drotar, 1991), and more flat affect and withdrawal on the other (Field, 1984; Herrera *et al.*, 2004; Martinez *et al.*, 1996). Negative influences have been reported even with mild depression (Herrera *et al.*, 2004; Hoffman & Drotar, 1991).

The children of depressed mothers mimic their mother's interactive behaviour: they tend to show lower responsiveness (Field *et al.*, 1985; Hoffman & Drotar, 1991) and less positive and more negative emotions than other children (Campbell *et al.*, 1995; Cohn, Campbell, Matias, & Hopkins, 1990; Field *et al.*, 1985). Their behavioural signals are also more difficult to interpret (Hoffman & Drotar, 1991), which may, together with their more negative interaction style, form a vicious circle of mutual rejection that further increases maternal interaction problems and depression (Hammen, Burge, & Stansbury, 1990; Murray, Stanley, Hooper, King, & Fiori-Cowley, 1996).

To our knowledge, there are no published studies differentiating the effects of maternal prenatal and postnatal depression on the dyadic interactive relationship, but Chazan (1998) found in her unpublished dissertation that it was prenatal rather than postnatal depression that explained dyadic interaction problems. This is also supported by the findings that maternal prenatal depression has a more profound impact on infant's fussiness and stress behaviour (Diego, Field, & Hernandez-Reif, 2005) and later childhood psychopathology than postnatal depression (Luoma *et al.*, 2001). It is possible that maternal depressive symptoms in pregnancy could exert a dual risk on the dyadic relationship: first, by affecting the infant's self-regulatory capacity via the adverse foetal physiological effects, and second, by interfering with maternal psychological preparation to motherhood. We may thus hypothesize that even though both timings of depressive symptoms are detrimental to the interaction quality, prenatal symptoms may have a more severe impact.

Postpartum depressive symptoms could, however, be directly associated with the infant's sense of security. Along these lines, previous research has shown that infants who have experienced the combination of prenatal and postnatal maternal depression exhibit the most pronounced developmental problems (Diego *et al.*, 2005). Thus, not the timing, but the chronicity of maternal depression would be the most crucial for the quality of dyadic interaction. Subsequently, we test the hypothesis that the combination of prenatal and postnatal depressive symptoms is the most harmful for the mother-child interaction.

Maternal Attachment Style and Early Interaction

Maternal attachment style—internal representations of self and significant others in close relationships—guides mother's perceptions, interpretations, emotions and behaviour with her infant (Main, Kaplan, & Cassidy, 1985; Van IJzendoorn & Bakermans-Kranenburg, 1997). Dyads with secure-autonomous mothers tend to show a higher quality of interaction, including higher sensitivity, affectivity, structure, synchrony and child responsiveness (Biringen *et al.*, 2000; Cohn, Cowan, Cowan, & Pearson, 1992; Crandell, Fitzgerald, & Whipple, 1997; Das Eiden, Teti, & Corns, 1995; Pederson, Gleason, Moran, & Bento, 1998). The two insecure attachment styles are known to communicate highly different relational preferences and emotional responses (Main *et al.*, 1985; Bretherton, 1996; Gerhardt, 2005), but the results of their specific impact on early mother-infant interaction are somewhat contradictory. Some studies report the most

pronounced interaction problems among dyads with insecure-preoccupied mothers (Adam, Gunnar, & Tanaka, 2004; Bosquet & Egeland, 2001; Crowell & Feldman, 1988; Das Eiden *et al.*, 1995), and others among dyads with insecure-dismissing mothers (Crowell, O'Connor, Wollmers, Sprafkin, & Rao, 1992; Pederson *et al.*, 1998).

The discrepant findings may be explained by the qualitative difference in the underlying problems among the two insecure groups: Dyads with insecure-dismissing mothers typically show more withdrawal and passivity (Crowell & Feldman, 1988), and their interaction problems may thus concentrate more around the lack of positive affection and over-regulation of emotions. Dyads with insecure-preoccupied mothers, for their part, tend to show intrusiveness and under-regulated, unpredictable emotional responses that oscillate between negative and positive affect (Adam *et al.*, 2004; Cohn *et al.*, 1992; Crowell & Feldman, 1988). Owing to these differences, it is probable that distinct moderating factors affect the dyadic interactions of mothers with these two insecure attachment styles differently (Crittenden, 1997).

Depression, Maternal Attachment Style and Mother–infant Interaction

Quite puzzlingly, depressed mothers tend to show highly heterogeneous interaction patterns with their children (Field, Healy, Goldstein, & Guthertz, 1990; Hoffman & Drotar, 1991; Rosenblum, Mazet, & Bénovy, 1997), ranging from optimally sensitive to either intrusive or withdrawing. Maternal attachment style may be an important factor explaining these differences, as maternal autonomous attachment style may have a buffering effect on the quality of the dyadic relationship when the mother suffers of depression. McMahon, Barnett, Kowalenko, & Tennant (2006) found this buffering effect in their study: 60% of children of autonomously attached, chronically depressed mothers (postnatal depression lasting over 12 months) were securely attached, compared with only 24% of the children of the chronically depressed and insecurely attached mothers. Moreover, Adam *et al.* (2004) found a specific vulnerability effect: Maternal depression was associated with low warmth in parent–child relationship only among mothers with insecure-dismissing attachment style. On the contrary, Bosquet and Egeland (2001) found neither a buffering nor a vulnerability effect of maternal attachment style on the dyadic interaction between depressed mothers and their children. However, previous studies have not considered the role of prenatal depression. We thus do not know if the moderating effect of maternal attachment style on the dyadic interaction is different when maternal depression has its onset already at pregnancy or occurs only during pregnancy.

In this study we examine, first, whether maternal prepartum and postpartum depressive symptoms are differently associated with the quality of the early mother–child interaction, indicated by maternal sensitivity, control (over-structuring or intrusiveness) and unresponsiveness, and child's co-operative, difficult, compulsive and passive behaviour. We hypothesize that both maternal prenatal and postnatal depressive symptoms are predictive of dyadic interactive problems, but prenatal symptoms are even more influential than postnatal symptoms, and the combination of depressive symptoms at both times has the most harmful impact. Second, we hypothesize that maternal secure-autonomous attachment style protects the early dyadic interaction from the negative effects of maternal prenatal and postnatal depressive symptoms, i.e. depressive symptoms are not associated with negative interaction characteristics among autonomously

attached mothers and their children, but only among dyads with insecurely attached mothers.

METHODS

Participants and Procedure

The participants were 59 mothers (age = 29 ± 5 years) and their children (48% girls and 52% boys, child age at the final phase of the study = 14 ± 7.76 months). Of the mothers, 64.4% were primiparous, and 35.6% had 1–3 older children. More than half (52.5%) of the mothers were married, about a third (35.6%) cohabiting and 11.9% single. A third (34.7%) had a university degree, half (46.9%) had polytechnic school education, and about a fifth (18.4%) had vocational schooling or high school. The sample clearly belonged to the Finnish middle class, indicated by relatively high education and monthly income.

The basic sample consisted of 150 women in their third trimester of pregnancy, visiting maternity health-care centres in southern Finland. The data collection proceeded in three stages: The public health nurses presented their clients the purpose of the study (the well-being and experiences of mothers-to-be), and asked for voluntary participation. If they agreed, the women provided written informed consent and received a questionnaire to be completed at home. 61% ($n = 91$) returned the questionnaire to the nurse in a closed envelope (T1), and 64 expressed willingness to continue in the later phases of the study. These mothers received the second questionnaire by mail, when the child was 4–5 months old, and 53 women returned it (T2). All the mothers who had expressed their willingness to continue in the study at postpartum ($n = 64$), were contacted by telephone and asked whether they would like to participate in the third phase, which involved a home visit and videotaping of a dyadic free play situation when the child was in average 14 months old (T3). Forty-nine women agreed, which is 53.3% of the sample at T1.

The mothers who had participated at baseline and in at least one later phase of the study ($n = 59$) were included in the analyses and the missing data were replaced. The decision regarding replacement of missing data is consistent with previous studies with multiple assessment points (e.g. Connors, Grant, Crone, & Whiteside-Mansell, 2006). Ten mothers had participated only at T1 and T2, and six mothers only at T1 and T3, so the missing data were replaced with EM for 16 mothers. The decision to use EM was based on Little's MCAR-test that showed the data were not missing completely at random, $\chi^2 = 45.33$, $p < 0.05$. If the data are not MCAR, listwise deletion may result in biased estimates and is not recommended (Schafer & Graham, 2002; StatNotes: Topics in Multivariate Analysis, North Carolina State University, Public Administration Program 2010). Because repeated measurements on an individual tend to be correlated, Schafer & Graham (2002) recommend procedures that use all available data for each participant such as EM, because missing information can then be partially recovered from earlier or later waves of the longitudinal study. A number of authors have recently argued that missing data on dependent variables should also be replaced (Enders, 2008; Little, Card, Preacher, & McConnell, 2009; Schafer & Graham, 2002). To follow their line, the missing data were replaced with EM on dependent variables for 10 cases. This was also justified because we detected a systematic pattern of missingness: When the mothers with complete and non-complete data in the original sample ($n = 91$) were compared, there was marginally more attrition among mothers with lower education, $\chi^2(2) = 5.10$,

$p < 0.10$. There was also a similar pattern, when the mothers who had and had not participated at T3 were compared, $\chi^2(2) = 4.68$, $p < 0.10$, but not when the mothers who had and had not participated at T2 were compared, $\chi^2(2) = 2.41$, $p = ns$, suggesting that the educational level did not yet differ from the original sample at T2, but did so at T3. After the EM, there were no longer differences in the educational level. Maternal attachment style, prenatal depression, age, number of children, marital status or monthly income did not differ between mothers with complete and non-complete data. Nor was participation at T3 dependent on the level of postpartum depression at T2.

Measures

Mother-child interaction quality was assessed with a free mother-child play interaction, lasting 5–10 min, that was videotaped and coded according to *Care Index* (Crittenden 1988, 2003). This is an assessment of playful adult-child interaction under non-stressful conditions. It is specifically designed for infants up to 24 months of age and is commonly used in Finnish clinical settings. The age and developmental level of the child are inherently taken into account in scoring, so the method can be used to compare children of varying ages. The scale has been found to differentiate risk group mothers and their children (e.g. abused or neglected) from normative dyads (Crittenden, 1981; Crittenden & Bonvillian, 1984) and preterm infant-mothers dyads from their full-term controls (Muller-Nix *et al.*, 2004).

The videotaping took place at home to make the interactions as natural as possible. The mother was instructed to play or interact with her child as they normally would. The scale assesses maternal interactive behaviour in seven aspects (facial expressions, voice, position/body contact, affection, turn-taking contingencies within an activity, control between activities and the appropriate choice of activity) according to three qualifications (sensitive, controlling and unresponsive). The child's interactive behaviour is coded in the same aspects according to four qualifications (co-operative, compulsive, difficult and passive). Although maternal and child behaviour are coded separately, the interaction is assessed dyadically, for instance maternal interactive quality is based on its concordance with child's temperament, developmental level and expressed satisfaction. Separate summary scales ranging from 0 to 14 were formed for all the dimensions. Based on Crittenden (2003), mothers were classified into highly sensitive (scores 11–14), adequately sensitive (scores 7–10), ineptly sensitive (scores 5–6) and high-risk group (scores 0–4). Scores under 7 indicate intervention range. The videos were scored by the second author (K. K.), and 18% ($n = 9$) were also analysed by the third author (J. S.), who both are reliable coders trained by Patricia Crittenden. The inter-rater reliabilities indicated by Pearson's correlation coefficients were satisfactory: 0.85 for maternal sensitivity, 0.87 for maternal control, 0.65 for maternal unresponsiveness, 0.79 for child co-operation, 0.98 for child compulsiveness, 0.69 for child difficulty and 0.97 for child passivity. Differences were negotiated. The coders were blind to maternal background data.

Adult attachment style was measured during pregnancy with a paper-and-pencil questionnaire (see for details: Kanninen, Salo, & Punamäki, 2000), derived from Adult Attachment Interview (George, Kaplan, & Main, 1985). The participants were given a five-page booklet with instructions: first, to describe their childhood relationship separately with their mother and father, by giving five adjectives and five illustrative examples for each adjective. Second, they were

asked to describe what had happened when they were upset, ill, felt rejected or had experienced loss as children and what they did when they experienced distress in both childhood and adulthood. Finally, they were inquired how they thought their upbringing had affected their adult personality and why they thought their parents had behaved as they had.

The Main and Goldwyn (1991) scoring system was applied to code and quantify the written reports. It provides continuous estimates of the main domains of adult information processing of attachment experiences, i.e. what the subjects remember (Childhood memories and Dealing with Stress) and how they process their memories (Coherence of Answers and Memory Modalities). The scoring system results in 30 continuous variables with the following contents: (1) *Childhood memories*, (2) *Dealing with Distress in Childhood*, (3) *Coherence of the Answers involving* (a) *An overall incoherence score* (b) *Current anger* (c) *Idealization* and (d) *Derogation* and (4) *Memory modalities*.

The inter-rater reliability of the attachment variables is based on a sample of 30 reports using Kappa and Pearson's correlation statistics. The second author K. K. and a clinical expert scorer were reliable coders of the Main and Goldwyn (1991) system. The results show that coefficients were acceptable (0.70–1.00) for the variables of Childhood Memories, Dealing with Distress and Memory Modalities, whereas coherence variables were less reliable in the preliminary scoring. In case of discrepancies between the two coders, a third trained coder in AAI was consulted in order to resolve the differences and establish practical scoring criteria.

The classification of attachment styles was based on cluster analysis (Ward's method and Euclidian distance; for details, see Kanninen *et al.*, 2000). The final clustering solution is based on 27 standardized sum scores of these attachment variables, which adequately discriminated the styles. The three clusters of *secure-autonomous*, *insecure-dismissing* and *insecure-preoccupied* attachment styles differed from each other in accordance with the theoretical characteristics (e.g. quality of childhood relationships, balance versus imbalance between semantic and episodic memories, current anger, derogation, withdrawal and integrative capacity). (Crittenden, Claussen, & Partridge, 2000; Main & Hesse, 1990).

Prenatal and postnatal depressive symptoms were measured in pregnancy and at 4–5 months postpartum by Edinburgh Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987), which involves descriptions of depression-related feelings, thoughts and behaviours, and respondents answer on a 4-point scale (0–3) how well the description matches the severity and persistency of their symptoms. The time reference is the previous week. We used the depressive symptoms measure as a continuous variable in our analyses, because the number of diagnosed postpartum depressions is small in a normative sample like ours. Separate summary variables were constructed for prepartum and postpartum depressive symptoms. Their reliabilities (Cronbach's α) were 0.85 and 0.80, respectively.

RESULTS

Descriptive Statistics

Of the 59 mothers, 39% ($n = 23$) were classified as autonomously attached, 28.8% ($n = 17$) as insecure-dismissing, and 32.2% ($n = 19$) as insecure-preoccupied. Concerning maternal interaction with the child, almost a half (44.1%; $n = 26$) of the mothers were adequately sensitive, 13.6% ($n = 8$) were highly sensitive and

almost a fourth (23.7%, $n = 14$) ineptly sensitive. 18.6% ($n = 10$) of the mother–child dyads were classified as belonging to interactional risk group. Using the recommended cut-off criteria of 14 for prenatal depression and 12 for postnatal depression (Gibson, McKenzie-McHarg, Shakespeare, Price, & Gray, 2009), 10.2% ($n = 6$) of mothers were considered clinically depressed prenatally and 8.5% ($n = 5$) postnatally. Owing to the small amount of clinical depression in a normative sample like ours, depressive symptoms were used as a continuous variable in further analyses. Maternal attachment style was not associated with maternal depressive symptoms prenatally, $F(2, 56) = 0.57$, $p = \text{ns}$, or postnatally, $F(2, 56) = 1.82$, $p = \text{ns}$.

Table 1 shows the means and standard deviations of mother–child interaction scores and maternal prenatal and postnatal depressive symptoms according to maternal educational level and child gender, and the correlations between child age and mother–child interaction and maternal depression variables. Child compulsiveness was dropped from the analyses due to its extremely low incidence. Educational level was associated with the quality of mother–child interaction. Post-hoc tests (Bonferroni) specified that mothers having a middle level of education were more responsive than mothers having a low education. Mothers with high education were between the two other groups, but did not differ significantly from either. Similarly, children of mothers with middle level of education were less passive than children of mothers with low education. Children of highly educated mothers were between the other two groups in their passivity, but they did not differ significantly from either. Child gender was not associated with maternal or child interactive behaviour in multivariate analyses, but in univariate analyses boys were marginally more difficult than girls. Older child age was associated with higher maternal sensitivity and child co-operation and with lower maternal control. Child age, gender and maternal education were not associated with the level of maternal prenatal and postnatal depressive symptoms.

Table 2 shows the means and standard deviations for maternal and child interaction variables according to maternal attachment status and analysis of variance statistics. Maternal autonomous attachment style was associated with more positive features of maternal ($F_{\text{Roy's Largest Root}}(3, 55) = 3.45$, $p < 0.05$) and child ($F_{\text{Roy's Largest Root}}(3, 55) = 3.15$, $p < 0.05$) interaction. Autonomous mothers were more responsive and marginally more sensitive than dismissing mothers, and their children were more co-operative than the children of dismissing mothers. Preoccupied mothers and their children were between the autonomous and the dismissing groups in their sensitivity, unresponsiveness and child co-operation scores, but did not differ significantly from either group. The results remained after controlling for maternal educational level and child gender, but maternal sensitivity was no longer significant after controlling for child age. Older child age was associated with higher maternal sensitivity ($F(1, 43) = 23.94$, $p < 0.001$), lower maternal control ($F(1, 43) = 6.98$, $p < 0.05$) and higher child co-operation ($F(1, 43) = 28.02$, $p < 0.001$). Child gender was also significant as a covariate, indicating that boys were more difficult than girls ($F(1, 43) = 6.44$, $p < 0.05$).

Depressive Symptoms and Dyadic Interaction

Hierarchical regression analyses were conducted to test the impact of maternal prenatal and postnatal depressive symptoms and their combination

Table 1. Means, standard deviations and correlations of mother-child interaction variables and maternal antenatal and postpartum depressive symptoms according to mother's education, child age and child gender

	Mother's educational level						Child gender				Child age (T3)		
	Vocational/high school		Polytechnic school		University		Girl		Boy				
	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	F		
<i>Dyadic interaction</i>													
<i>Mother</i>													
Sensitivity	6.21	0.76	7.42	0.58	7.45	0.63	0.98	7.21	0.55	7.03	0.54	0.06	0.60***
Control	3.21	0.75	4.17	0.58	2.95	0.63	1.12	3.75	0.54	3.28	0.53	0.39	-0.37***
Unresponsiveness	4.57 ^a	0.66	2.42 ^b	0.50	3.65 ^{ab}	0.55	3.61 [*]	3.07	0.50	3.69	0.49	0.79	-0.25
<i>Child</i>													
Co-operation	5.93	0.86	6.92	0.65	7.25	0.72	0.73	6.89	0.62	6.62	0.61	0.10	0.63***
Difficulty	2.64	0.63	3.17	0.48	2.25	0.53	0.83	2.18 ^a	0.44	3.31 ^b	0.43	3.36 [†]	-0.14
Passivity	4.50 ^a	0.70	1.88 ^b	0.53	3.30 ^{ab}	0.59	4.65 [*]	3.36	0.54	2.72	0.53	0.70	-0.24
<i>Maternal depression</i>													
Antenatal (n = 91)	8.22	0.94	6.72	0.76	5.96	0.93	1.53	7.29	0.91	6.83	0.94	0.13	-0.08
Postpartum (n = 59)	7.64	1.10	5.54	0.84	5.75	0.92	1.29	5.50	0.76	6.41	0.75	0.68	-0.09

Note: [†]p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001. F-values are for Univariate Analyses. Values with different letters (a,b) differ from each other significantly (p < 0.05) according to Bonferroni post-hoc tests.

Table 2. Means and standard deviations of mother–child interaction variables according to maternal attachment style and ANOVA statistics

	Maternal attachment style						
	Secure-autonomous		Insecure-dismissing		Insecure-preoccupied		ANOVA
	M	S.D.	M	S.D.	M	S.D.	F(2, 56)
Dyadic interaction							
<i>Mother</i>							
Sensitivity	7.96 ^a	0.57	5.82 ^b	0.67	7.16 ^{ab}	0.63	2.96 [†]
Control	3.44	0.59	3.47	0.69	3.63	0.65	0.03
Unresponsiveness	2.65 ^a	0.52	4.71 ^b	0.66	3.21 ^{ab}	0.57	3.44 [*]
<i>Child</i>							
Co-operation	7.73 ^a	0.64	5.12 ^b	0.74	6.95 ^{ab}	0.70	3.67 [*]
Difficulty	2.91	0.49	2.35	0.57	2.90	0.54	0.33
Passivity	2.61	0.59	3.82	0.68	2.95	0.64	0.94

Note: [†] $p < 0.10$; ^{*} $p < 0.05$. F-values are for Univariate Analyses. Values with different letters (a,b) differ from each other significantly ($p < 0.05$) according to Bonferroni post-hoc tests.

on mother–child interaction variables. Child age, gender and maternal education were entered at Step 1, maternal prenatal depressive symptoms at Step 2 and postnatal depressive symptoms at Step 3. Finally, at Step 4 the centered Prenatal \times Postnatal Depressive Symptoms—interaction term was added. The results are presented in Tables 3 and 4.

Regression models significantly explained the variations of mother–child interaction in maternal sensitivity (37.7%), control (26.2%) and unresponsiveness (31.7%), and child co-operation (40%). Our hypothesis that the combination of both prenatal and postpartum depressive symptoms is the most harmful for the dyadic relation was substantiated only concerning maternal unresponsiveness (interaction effect $\beta = 0.31$, $t = 2.06$, $p < 0.05$; $\Delta R^2 F(41, 1) = 4.25$, $p < 0.05$). The model for maternal unresponsiveness further showed that, as hypothesized, prenatal depressive symptoms were more harmful for dyadic interaction quality than postpartum depressive symptoms, as R^2 change was significant at Step 2, when prenatal depressive symptoms were added into the model ($\Delta R^2 = 0.13$, $F(1, 43) = 7.32$, $p = 0.01$), but not when postnatal depressive symptoms were added at Step 3 ($\Delta R^2 = 0.02$, $F(1, 42) = 1.35$, $p = \text{ns}$). The β -weight for prenatal depressive symptoms was also significant at Step 2 ($\beta = 0.38$, $t = 2.71$, $p = 0.01$), but its significance disappeared after the addition of the interaction term for Prenatal \times Postnatal Depressive Symptoms into the model at Step 4.

Figure 1 graphically illustrates that when mothers had a high level (2 S.D. above mean) of depressive symptoms both at prenatal and postnatal period, they showed high unresponsiveness to their child. It further shows that having high prenatal but low postnatal (2 S.D. below the mean) depressive symptoms was also associated with relatively higher maternal unresponsiveness than having high postnatal but low prenatal depressive symptoms.

Curiously, and contrary to our hypothesis, at Step 2 maternal prenatal depressive symptoms predicted low maternal control in the dyadic interaction, indicated by a significant R^2 change, when prenatal depressive symptoms were added into the model ($\Delta R^2 = 0.08$, $F(1, 43) = 4.62$, $p < 0.05$), but not at Step 3, when postnatal depressive symptoms were added ($\Delta R^2 = 0.00$, $F(1, 42) = 0.006$, $p = \text{ns}$).

Table 3. Hierarchical regression models of maternal pre- and postnatal depressive symptoms on maternal interaction variables

	Maternal sensitivity					Maternal control					Maternal unresponsiveness				
	R ²	FΔR ²	B	β	S.E.	R ²	FΔR ²	B	β	S.E.	R ²	FΔR ²	B	β	S.E.
Step 1	0.35	7.90***				0.16	2.85*				0.09	1.44			
Child gender			-0.23	-0.04	0.76			-0.47	-0.08	0.85			0.71	0.14	0.71
Mother's education			-0.23	-0.06	0.56			-0.54	-0.13	0.63			0.77	0.21	0.52
Child age			0.23	0.58***	0.05			-0.17	-0.42**	0.06			-0.06	-0.17	0.05
Step 2	0.35	0.06				0.24	4.62*				0.22	7.32*			
Prenatal depression			0.06	0.10	0.10			-0.14	-0.23	0.11			0.08	0.15	0.09
Step 3	0.37	1.07				0.24	0.01				0.25	1.35			
Postnatal depression			-0.11	-0.16	0.11			-0.01	-0.02	0.12			0.13	0.19	0.10
Step 4	0.38	0.64				0.26	0.99				0.32	4.25*			
Prenatal × Postnatal depression			-0.02	-0.12	0.02			-0.03	-0.16	0.03			0.05	0.31*	0.02
	F(41, 6) = 4.14, <i>p</i> < 0.01 37.7% of variance explained					F(6, 41) = 2.42, <i>p</i> < 0.05 26.2% of variance explained					F(6, 41) = 3.17, <i>p</i> < 0.05 31.7% of variance explained				

p* < 0.05, *p* < 0.01; ****p* < 0.001. β-values are from the final 4th step of the regression models.

Table 4. Hierarchical regression models of maternal pre- and postnatal depressive symptoms on child's interaction variables

	Child co-operation					Child difficulty					Child passivity				
	R ²	FΔR ²	B	β	S.E.	R ²	FΔR ²	B	β	S.E.	R ²	FΔR ²	B	β	S.E.
Step 1	0.38	9.03***				0.13	2.11				0.05	0.75			
Child gender			-0.40	-0.06	0.83			1.71	-0.35*	0.72			-0.68	-0.11	0.93
Mother's education			-0.23	-0.05	0.62			-0.89	-0.26	0.54			0.23	0.06	0.69
Child age			0.26	0.60***	0.05			-0.03	-0.10	0.05			-0.08	-0.19	0.06
Step 2	0.38	0.11				0.21	4.34*				0.08	1.33			
Prenatal depression			0.05	0.07	0.11			-0.14	-0.27	0.10			0.04	0.07	0.12
Step 3	0.39	0.76				0.21	0.01				0.09	0.59			
Postnatal depression			-0.10	-0.13	0.12			0.01	0.01	0.10			0.10	0.14	0.13
Step 4	0.40	0.44				0.21	0.18				0.10	0.24			
Prenatal × postnatal depression			-0.02	-0.09	0.03			-0.01	-0.07	0.02			0.01	0.09	0.03
F(6, 41) = 4.55, $p < 0.01$					40% of variance explained	F(6, 41) = 1.81, $p = \text{ns}$					F(6, 41) = 0.72, $p = \text{ns}$				
					20.9% of variance explained										
					9.5% of variance explained										

* $p < 0.05$, *** $p < 0.001$. β -values are from the final fourth step of the regression models.

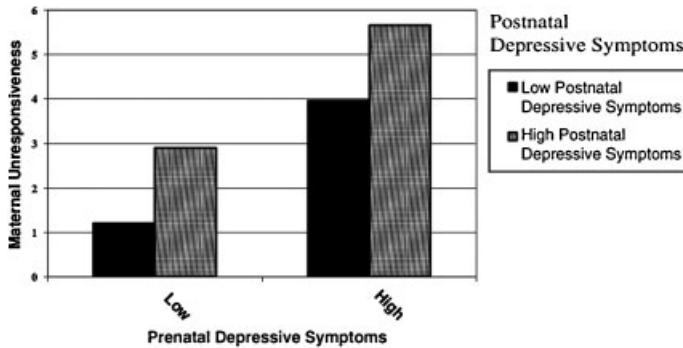


Figure 1. The effect of the combination of maternal pre- and postnatal depressive symptoms on maternal unresponsiveness. *Note:* High values represent values 2 S.D. above the mean, and low values represent values 2 S.D. below the mean for depression variables.

Also the β -weight for prenatal depressive symptoms was significant at Step 2 ($\beta = -0.30$, $t = -2.15$, $p < 0.05$), but its significance disappeared after the addition of the postnatal depressive symptoms into the model.

The background variables (Step 1) significantly contributed to the models of maternal sensitivity and control and child co-operation, confirming the correlation result that the dyadic interaction quality was higher when children were older.

Maternal Attachment, Depressive Symptoms and Dyadic Interaction

We hypothesized that maternal secure-autonomous attachment style would protect the early dyadic interaction from the negative impact of maternal depressive symptoms. Maternal attachment style was used as a categorical variable and prenatal and postnatal depressive symptoms as continuous variables, as the SPSS General Linear Model allows the customization of the model so that continuous variables may be used as predictors.

The results supported our hypothesis as regards maternal postnatal depressive symptoms, revealing marginally significant Maternal Attachment \times Postnatal Depressive Symptoms—interaction effects on maternal ($F_{\text{Roy's Largest Root}}(3, 48) = 2.45$, $p < 0.10$) and child ($F_{\text{Roy's Largest Root}}(3, 48) = 2.76$, $p = 0.053$) interactive behaviour. Univariate tests were significant, revealing that the moderation concerned maternal sensitivity ($F(2, 49) = 3.67$, $p < 0.05$) and child co-operation ($F(2, 49) = 3.89$, $p < .05$). In dyads with secure-autonomous mothers, the levels of maternal sensitivity (Figure 2) and child co-operation (Figure 3) remained adequate (≥ 7) despite an increase in maternal depressive symptoms. Preoccupied mothers were adequately sensitive and their children adequately co-operative (≥ 7), when mothers had low depressive symptoms. However, when depressive symptoms increased, the dyads with preoccupied mothers began to show less than adequate levels of maternal sensitivity and child co-operation (< 7). Curiously, among dismissing mothers, the levels of maternal sensitivity and child co-operation, which were initially lower than in other attachment groups, even somewhat increased when mothers reported increasing depressive symptoms. The interaction effect of Maternal Attachment \times Prenatal Depressive Symptoms was not significant on either maternal or child's interactive behaviour, $F_{\text{Wilk's } \lambda}(6, 94) = 0.82$, $p = \text{ns}$, and $F_{\text{Wilk's } \lambda}(6, 94) = 0.77$, $p = \text{ns}$, respectively.

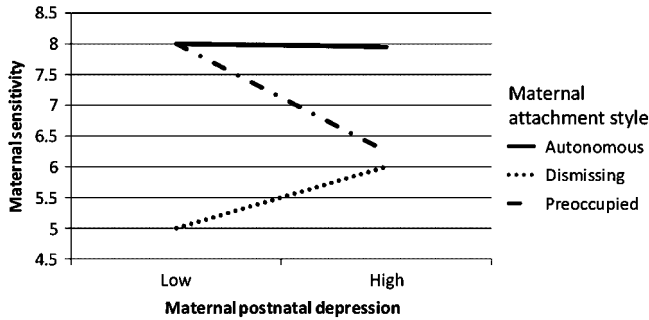


Figure 2. The effect of maternal attachment style and maternal postnatal depression on maternal sensitivity in dyadic interaction. (Adequate sensitivity ≥ 7). Note: High values represent values 2 S.D. above the mean, and low values represent values 2 S.D. below the mean for postnatal depression.

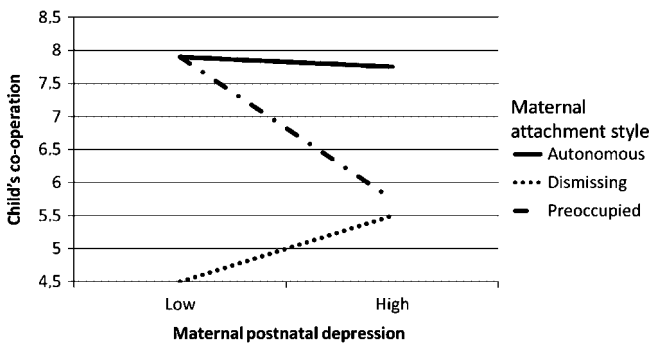


Figure 3. The effect of maternal attachment style and maternal postnatal depression on child's co-operation in dyadic interaction. (Adequate co-operation ≥ 7). Note: High values represent values 2 S.D. above the mean, and low values represent values 2 S.D. below the mean for postnatal depression.

The results remained after controlling for child age, gender and maternal educational level.

DISCUSSION

Despite abundant evidence that maternal depression may compromise the delicate early interaction (Beck, 1995; Paulson, Dauber, & Leiferman, 2006), a fair number of depressed mothers are able to remain adequately sensitive in their dyadic interaction with their children. We examined the role of the specific timing of depressive symptoms (prenatal and postnatal) and maternal attachment style as possible explanations for this individual diversity in the association between depression and dyadic interaction quality.

The results supported our hypothesis that the combination of relatively high depressive symptoms both prenatally and postnatally constitutes the highest risk for problematic mother-child interaction. The impact of prenatal depressive symptoms seems, however, more severe than the impact of postnatal symptoms: mothers with relatively high depressive symptoms only prenatally were less

responsive with their children than mothers who had depressive symptoms only at postpartum. Prenatal depression is especially harmful for the early relationship as it combines the dual risks of biology and psychology. There is evidence that depression during pregnancy affects, through hormonal changes, the child's regulatory capacity and increases several developmental risks, which may negatively influence the mother-child interaction (Field *et al.*, 2006). Pregnancy is a crucial time for preparation to motherhood, and prenatally depressed mothers may be lacking in their ability for intrapsychic re-organization necessary for the development of maternal identity and formation of a prenatal emotional bond with their baby (Broden, 2004). It has also been suggested that prenatal depression would be more related to a person's general depressive tendencies, whereas postnatal depression would be activated by life-span transitions (Tamminen, 2001).

Our result about the most harmful effect of the combination of both prenatal and postnatal depressive symptoms on maternal responsiveness concurs with Diego *et al.* (2005) who found that it was the combination of maternal prenatal and postnatal depression that was most harmful for the infant development. It is probable that the compromised dyadic interaction quality, together with the foetal effects of prenatal depression, is the pathway for maladaptive development. Earlier research has also shown that the chronicity of maternal postnatal depression is an important predictor of compromised dyadic interaction quality (Campbell *et al.*, 1995), and our results further suggest that the continuation of prenatal depressive symptoms to the postpartum period may have the same effect.

Researchers agree that depression compromises maternal sensitivity (Beck, 1995; Hoffman & Drotar, 1991; Murray, Fiori-Cowley, Hooper, & Cooper, 1996) which is a central characteristic of early parenting. We could not, however, find associations between either prepartum or postpartum depressive symptoms on global maternal sensitivity or any child interaction characteristics. Some recent studies have failed to find the association between maternal postpartum depression and parenting quality in mildly depressed mothers without comorbid risk factors (Cornish, McMahon, & Ungerer, 2008; Van Doesum, Hosman, Riksen-Walraven, & Hoetnagels, 2007). This can also explain our results of a minor impact of maternal depressive symptoms on some dimensions of mother-infant interaction, as the data did not consist of high-risk mothers and few were clinically depressed. Curiously, higher prenatal, but not postnatal depressive symptoms actually predicted lower maternal control in our study. It may be that for some reason, prenatal depressive symptoms are more predictive of under- than over-regulating problems in later dyadic interaction, at least in our sample. However, as most mothers in our sample were not clinically depressed, it is probable that among severely depressed mothers, also controlling or intrusive interactive behaviour is typical.

Our second aim was to study the role of maternal attachment style in mitigating the impact of prenatal and postnatal depressive symptoms on mother-child interaction. The results supported our hypothesis that secure-autonomous mothers and their infants are capable of adequately sensitive and co-operative interaction despite maternal postnatal depressive symptoms. The results concur with McMahon *et al.* (2006), who found that maternal postpartum depression, even when persisting over a long postnatal period, did not increase the risk for child's insecure attachment style when the mother was autonomously attached.

Concerning the two insecure attachment styles, we found a mirror-like opposite impacts of postnatal depressive symptoms on maternal sensitivity. Dyads

with preoccupied mothers were as sensitive and their children as co-operative as dyads with secure-autonomous mothers, if the mother had low postnatal depressive symptoms. However, when depressive symptoms increased, dyads with preoccupied mothers were highly susceptible to interactional problems both in maternal and child domains: maternal sensitivity and child co-operation. The parenting of preoccupied mothers may be more vulnerable to stress and depression due to their tendency to emotional and behavioural under-regulation. Their dormant shattered insecure attachment models may become activated when under distress (Bowlby, 1980; Mikulincer & Orbach, 1995; Kanninen, Punamäki, & Quota, 2003), leading to overwhelming, under-regulated emotions that distract them from adequately perceiving and interpreting the child's cues. The activation of attachment-related models seemed to be especially intensive under the stress caused by postpartum depression, making dyads with preoccupied mothers more vulnerable and dyads with secure-autonomous mothers more resilient.

Quite puzzlingly, dyads with dismissing mothers displayed less than adequate maternal sensitivity and child's co-operation when they had low depressive symptoms, whereas when depressive symptoms increased, their dyadic interaction actually improved. The explanation may lie in that for dismissing mothers, experiencing and reporting more depressive symptoms might indicate that their defensive facade of independence and distancing is broken and their internal conflicts are being processed and solved, instead of denied. It is possible that those dismissing mothers who were able to admit and recognize some negative moods were more in touch with their own emotions, and thus more responsive towards their children's needs. This explanation may, however, be valid only among mothers with sub-clinical levels of depression, but the situation is different, in case of more severe depression (Adam *et al.*, 2004).

It is noteworthy that maternal secure-autonomous attachment style did have a protective role in postnatal depression, but could not prevent the harmful impact of maternal prenatal depression on the mother-child relationship. This is probably due to the dual psychological and biological vulnerability associated with maternal prenatal depression that affects both physiological and hormonal development of the foetus and maternal psychological preparation for motherhood. Even though autonomously attached mothers were able to compensate for their depression in creating and maintaining adequate dyadic interactive behaviour after the birth of the child, they could not fully compensate for the high vulnerabilities of the foetal period. Postpartum depressive symptoms may be more directly or visibly associated with the infant's sense of security, and the autonomously attached mothers may be better able to recognize their infants' needs for security and comfort and to act accordingly, despite their own mood.

There are several limitations to this study. First, it would have been ideal to use more than one-time postnatal assessment of depressive symptoms, as mild depression has been suggested to compromise the mother-child interaction only when it lasts for over 6 months (Campbell *et al.*, 1995). The duration of postnatal depressive symptoms was not controlled for in our study. If the maternal depressive symptoms were only transient, this could further explain the minor effect of maternal depressive symptoms on some maternal and child dyadic interaction qualities.

The second limitation is the small sample size, and our results thus have to be considered only preliminary in nature. The loss of participants was fairly high from pregnancy ($n = 91$) to postpartum ($n = 59$), but the attrition was not associated with demographic factors, attachment style or maternal prenatal- and

postnatal depression. Our sample also represents middle class mothers who are quite well-being, and thus the results can only be generalized to relatively low-risk and advantaged populations.

Third, our measurement tool of attachment style deserves criticism. The paper-and-pencil method of discerning adult attachment style was able to identify only the three main patterns, but not the sub-patterns. Moreover, unresolved attachment style could not be classified. Naturally, the application of the original AAI and its updated scoring procedure (Main, Goldwyn, & Hesse, 2002) would have provided more dynamic information, as the full extent of attachment-related information cannot be obtained from self-reports. However, our measure of AAI was predictive of mother–child interaction in similar ways to those described in the previous literature, supporting its validity. Also, earlier studies have received valid results using paper-and-pencil versions of AAI (e.g. Crandell *et al.*, 1997; Kanninen *et al.*, 2000, 2003).

Fourth, child age at the interaction assessment varied. Even though our Care-Index interactive measure implicitly takes account different kinds of developmental tasks for each age group, and children of different ages can thus be compared, it would have been preferable to have all the children videotaped at the same age. The effect of child age was, however, used as a covariate in all analyses, and did not change the results for the analyses of research questions.

Clinical Implications

Clinically, our results increase the understanding of specific and cumulative risk factors for mother–child relationship, and help explain why depressed mothers may show highly variable interaction profiles with their children (Field *et al.*, 1985; Hoffman & Drotar, 1991; Rosenblum *et al.*, 1997). It is important to consider both the effects of maternal attachment style and the duration, severity and onset (pre/postnatal) of her depressive symptoms. Our findings suggest that mothers with insecure-preoccupied attachment style suffering from postnatal depressive symptoms were the most susceptible for dyadic adversity. Insecure-dismissing mothers, for their part, in general showed the most pronounced interactive problems with the child, but seemed less vulnerable to the specific effects of maternal depressive symptoms, at least when the depression is mild.

Transition to parenthood is a period with strong potential for reorganizational change in the attachment models, and mother–child relationship interventions should therefore be tailored according to the attachment style. Dismissing mothers apparently need to be encouraged for emotional responsiveness, reciprocal joy and enrichment of their interactions. Occurrence of distress, here maternal depressive symptoms, can provide an opportunity to confront and process one's internal conflicts and, according to our results, even improve the parent–child relationship among dismissing mothers. Preoccupied mothers, instead, may fare reasonably well in their motherhood at times of low stress, but need additional support when their insecure working models are activated by depression or distress. They can benefit from guidance towards purposeful responses to the infant's needs and towards more structured interaction with the infant.

To promote healthy mother–child relationship and child development, maternal mental health problems should be routinely screened in both prenatal and postnatal health care, and interventions aimed at enhancing the mother–infant relationship should start during pregnancy, continuing over a sufficiently long

period postpartum, as both periods seem to have unique meanings for the development of mother–child relationship.

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REFERENCES

- Adam, E. K., Gunnar, M. R., & Tanaka, A. (2004). Adult attachment, parent emotion and observed parenting behavior: Mediator and moderator models. *Child Development*, 75, 110–122.
- Beck, C. T. (1995). The effects of postpartum depression on maternal-infant interaction: A meta-analysis. *Nursing Research*, 44, 298–304.
- Beck, C. T. (1998). The effects of postpartum depression on child development: A meta-analysis. *Archives of Psychiatric Nursing*, 12, 12–20.
- Beck, C. T. (2006). Postpartum depression. It isn't just the blues. *American Journal of Nursing*, 106, 40–50.
- Bennett, H. A., Einarson, A., Taddio, A., Koren, G., & Einarson, T. (2004). Depression during pregnancy. Overview of clinical factors. *Clinical Drug Investigation*, 24, 157–179.
- Bettes, B. A. (1988). Maternal depression and motherese: Temporal and intonational features. *Child Development*, 59, 1089–1096.
- Biringen, Z., Brown, D., Donaldson, L., Green, S., Krcmarik, S., & Lovas, G. (2000). Adult Attachment Interview: Linkages with dimensions of emotional availability for mothers and their pre-kindergarteners. *Attachment and Human Development*, 2, 188–202.
- Bretherton, I. (1996). Internal working models of attachment relationships as related to resilient coping. In G. G. Noam, & K. W. Fisher (Eds.), *Development and vulnerability in close relationships* (pp. 3–27). New Jersey: Lawrence Erlbaum Associates.
- Bosquet, M., & Egeland, B. (2001). Associations among maternal depressive symptomatology, state of mind and parent and child behaviours: Implications for attachment-based interventions. *Attachment and Human Development*, 3, 173–199.
- Bowlby, J. (1980). *Attachment and Loss, Vol 3: Loss, sadness and depression*. Harmondsworth: Penguin Books.
- Broden, M. (2004). *Graviditetens möjligheter: En tid då relationer skapas och utvecklas (The possibilities of pregnancy: The time when relationships are created and developed)*. Stockholm: Natur och kultur.
- Campbell, S. B., Cohn, J. F., & Meyers, T. (1995). Depression in the first-time mothers: Mother–infant interaction and depression chronicity. *Developmental Psychology*, 31, 349–357.
- Chazan, R. Z. (1998). *Great expectations: Mothers' prenatal beliefs and the mother–infant relationship*. Unpublished dissertation, University of Yale.
- Cohn, D. A., Cowan, P. A., Cowan, C. P., & Pearson, J. (1992). Mothers' and fathers' working models of childhood attachment relationships, parenting styles and child behaviour. *Development and Psychopathology*, 4, 417–431.
- Cohn, J. F., Campbell, S. B., Matias, R., & Hopkins, J. (1990). Face-to-face interactions of postpartum depressed and nondepressed mother–infant pairs at 2 months. *Developmental Psychology*, 26, 15–23.
- Connors, N. A., Grant, A. G., Crone, C. C., & Whiteside-Mansell, L. (2006). Substance-abuse treatment for mothers: Treatment outcomes and the impact of length of stay. *Journal of Substance Abuse Treatment*, 31, 447–456.
- Cornish, A. M., McMahon, C., & Ungerer, J. A. (2008). Postnatal depression and the quality of mother–infant interactions during the second year of life. *Australian Journal of Psychology*, 60, 142–151.

- Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of Postnatal Depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, 150, 782–786.
- Crandell, L. E., Fitzgerald, H. E., & Whipple, E. E. (1997). Dyadic synchrony in parent-child interactions: A link with maternal representations of attachment relationships. *Infant Mental Health Journal*, 18, 247–264.
- Crittenden, P. M. (1981). Abusing, neglecting and adequate dyads: Differentiating by patterns of interaction. *Merrill-Palmer-Quarterly*, 27, 201–218.
- Crittenden, P. M. (1988). Relationships at risk. In J. Belsky, & T. Nezworski (Eds.), *Clinical implications of attachment* (pp. 136–174). Hillsdale: Lawrence Erlbaum associates.
- Crittenden, P. M. (1997). Toward an integrative theory of trauma: A dynamic-maturational approach. In D. Cicchetti, & S. Toth (Eds.), *The Rochester Symposium on Developmental Psychopathology*, Vol. 10. *Risk, Trauma, and Mental Processes* (pp. 34–84). Rochester, NY: University of Rochester Press.
- Crittenden, P. M. (2003). *Care-Index*. Unpublished manuscript. Family Relations Institute, Miami.
- Crittenden, P. M., & Bonvillian, J. D. (1984). The relationship between maternal risk status and maternal sensitivity. *American Journal of Orthopsychiatry*, 54, 250–262.
- Crittenden, P. M., Lang C., Claussen, A. H., & Partridge, M. F. (2000). Relations among mother's dispositional representations of parenting. In P. M. Crittenden, & A. H. Claussen (Eds.), *The organization of attachment relationships: Maturation, culture, and context* (pp. 214–233). New York: Cambridge University Press.
- Crowell, J. A., & Feldman, S. S. (1988). Mothers' internal models of relationships and children's behavioural and developmental status: A study of mother-child interaction. *Child development*, 59, 1273–1285.
- Crowell, J. A., O'Connor, E., Wollmers, G., Sprafkin, J., & Rao, U. (1992). Mothers' conceptualizations of parent-child relationships: Relation to mother-child interaction and child behaviour problems. *Development and psychopathology*, 3, 431–444.
- Das Eiden, R., Teti, D. M., & Corns, K. M. (1995). Maternal working models of attachment, marital adjustment and parent-child relationship. *Child Development*, 66, 1504–1518.
- Diego, M. A., Field, T., & Hernandez-Reif, M. (2005). Prepartum, postpartum and chronic depression effects on neonatal behavior. *Infant Behavior & Development*, 28, 155–164.
- Diego, M. A., Field, T., Hernandez-Reif, M., Schanberg, S., Kuhn, C., & Gonzalez-Quintero, V. H. (2009). Prenatal depression restricts fetal growth. *Early Human Development*, 85, 65–70.
- Donovan, W. L., Leavitt, L. A., & Walsh, R. O. (1998). Conflict and depression predict maternal sensitivity to infant cries. *Infant Behavior and Development*, 21, 505–517.
- Edhborg, M., Lundh, W., Seimyr, L., & Widström, A-M. (2001). The long-term impact of postnatal depressed mood on mother-child interaction: A preliminary study. *Journal of Reproductive and Infant Psychology*, 19, 61–71.
- Enders, C. K. (2008). *Applied missing data analysis*. New York: Guilford.
- Evans, J., Heron, J., Francomb, H., Oke, S., & Golding, J. (2001). Cohort study of depressed mood during pregnancy and after childbirth. *British Medical Journal*, 323, 257–260.
- Field, T. (1984). Early interactions between infants and their postpartum depressed mothers. *Infant Behavior and Development*, 7, 517–522.
- Field, T., Diego, M., Dieter, J., Hernandez-Reif, M., Schanberg, S., Kuhn, C., et al. (2004). Prenatal depression effects on the fetus and the newborn. *Infant Behavior & Development*, 27, 216–229.
- Field, T., Diego, M., & Hernandez-Reif, M. (2006). Prenatal depression effects on the fetus and newborn: A review. *Infant Behavior and Development*, 29, 445–455.
- Field, T., Diego, M., & Hernandez-Reif, M. (2009). Depressed mothers' infants are less responsive to faces and voices. *Infant Behavior and Development*, 32, 239–244.
- Field, T., Healy, B., Goldstein, S., & Guthertz, M. (1990). Behavior-state matching and synchrony in mother-infant interactions of nondepressed versus depressed dyads. *Developmental psychology*, 26, 7–14.
- Field, T., Sandberg, D., Garcia, R., Vega-Lahr, N., Goldstein, S., & Guy, L. (1985). Pregnancy problems, postpartum depression and early mother-infant interactions. *Developmental Psychology*, 21, 1152–1156.
- Fonagy, P., Gergely, G., Jurist, E. L., & Target, M. (2002). *Affect regulation, mentalization, and the development of the self*. New York: Other Press.

- George, C., Kaplan, N., & Main, M. (1985). *Attachment interview for adult*. Unpublished manuscript. University of California, Berkeley.
- Gerhardt, S. (2005). *Why love matters. How affection shapes a baby's brain*. London: Brunner-Routledge.
- Gibson, J., McKenzie-McHarg, K., Shakespeare, J., Price, J., & Gray, R. (2009). A systematic review of studies validating the Edinburgh Postnatal Depression Scale in antepartum and postpartum women. *Acta Psychiatrica Scandinavica*, 119, 350–364.
- Goodman, S. H., & Gotlib, I. H. (1999). Risk for psychopathology in the children of depressed mothers: A developmental model for understanding mechanisms of transmission. *Psychological Review*, 106, 458–490.
- Hammen, C., Burge, D., & Stansbury, K. (1990). Relationship of mother and child variables to child outcome in a high-risk sample: A causal modeling analysis. *Developmental Psychology*, 26, 24–30.
- Herrera, E., Reissland, N., & Shepherd, J. (2004). Maternal touch and maternal child-directed speech: Effects of depressed mood in the postnatal period. *Journal of Affective Disorders*, 81, 29–39.
- Hoffman, Y., & Drotar, D. (1991). The impact of postpartum depressed mood on mother–infant interaction: Like mother like baby? *Infant Mental Health Journal*, 12, 65–80.
- Kanninen, K., Punamäki, R., & Quota, S. (2003). Personality and trauma: Adult attachment and posttraumatic distress among former political prisoners. *Peace and conflict: Journal of peace psychology*, 9, 97–126.
- Kanninen, K., Salo, J., & Punamäki, R. (2000). Attachment patterns and working alliance in trauma therapy for victims of political violence. *Psychotherapy Research*, 10, 435–449.
- Leadbeater, B., Bishop, S. J., & Raver, C. C. (1996). Quality of mother–toddler interaction, maternal depressive symptoms and behavior problems in preschoolers of adolescent mothers. *Developmental Psychology*, 32, 280–288.
- Little, T. D., Card, N. A., Preacher, K. J., & McConnell, E. (2009). Modeling Longitudinal Data from Research in Adolescence. In R. M. Lerner, & L. Steinberg (Eds.), *Handbook of adolescent psychology, individual bases of adolescent development* (pp. 15–54). New Jersey: Wiley.
- Luoma, I., Tamminen, T., Kaukonen, P., Laippala, P., Puura, K., Salmelin, R., & Almqvist, F. (2001). Longitudinal study of maternal depressive symptoms and child well-being. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40, 1367–1374.
- Main, M., & Goldwyn, R. (1991). *Adult attachment scoring and classification system*. Unpublished manuscript. University of California at Berkeley.
- Main, M., Goldwyn, R., & Hesse, E. (2002). *Adult attachment scoring and classification system*. Unpublished manuscript. University of California at Berkeley.
- Main, M., & Hesse, E. (1990). Parents' unresolved traumatic experiences are related to infant attachment status: Is frightened and/or frightening parental behavior the linking mechanism? In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the preschool years: Theory, research and intervention* (pp. 161–182). Chicago: The University of Chicago Press.
- Main, M., Kaplan, N. & Cassidy, J. (1985). Security in infancy, childhood and adulthood: A move to the level of representations. *Monographs of the Society for Research in Child Development*, 50, 66–104.
- Martinez, A., Malphurs, J., Field, T., Pickens, J., Yando, R., Bendell, D., et al. (1996). Depressed mothers' and their infants' interactions with nondepressed partners. *Infant Mental Health Journal*, 17, 74–80.
- Matthey, S., Barnett, B., Ungerer, J., & Waters, B. (2000). Paternal and maternal depressed mood during the transition to parenthood. *Journal of Affective Disorders*, 60, 75–85.
- McMahon, C., Barnett, B., Kowalenko, N. M., & Tennant, C. C. (2006). Maternal attachment state of mind moderates the impact of postnatal depression on infant attachment. *Journal of Child Psychology and Child Psychiatry*, 47, 660–669.
- Mikulincer, M., & Orbach, I. (1995). Attachment styles and repressive defensiveness: The accessibility and architecture of affective memories. *Journal of Personality and Social Psychology*, 68, 917–925.
- Muller-Nix, C., Forcada-Guex, M., Pierrehumbert, B., Jaunin, L., Borghini, A., & Ansermet, F. (2004). Prematurity, maternal stress and mother–child interactions. *Early Human Development*, 79, 145–158.

- Murray, L., Fiori-Cowley, A., Hooper, R., & Cooper, P. (1996). The impact of postnatal depression and associated adversity on early mother–infant interactions and later infant outcomes. *Child Development*, 67, 2512–2526.
- Murray, L., Stanley, C., Hooper, R., King, F., & Fiori-Cowley, A. (1996). The role of infant factors in postnatal depression and mother–infant interactions. *Developmental Medicine and Child Neurology*, 38, 109–119.
- Paulson, J. F., Dauber, S., & Leiferman, J. A. (2006). Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics*, 118, 659–668.
- Pederson, D. R., Gleason, K. E., Moran, G., & Bento, S. (1998). Maternal attachment representations, maternal sensitivity and the infant–mother attachment relationship. *Developmental Psychology*, 34, 925–933.
- Rosenblum, O., Mazet, P., & Bénovy, H. (1997). Mother and infant affective involvement states and maternal depression. *Infant Mental Health Journal*, 18, 350–363.
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of art. *Psychological Methods*, 7, 147–177.
- StatNotes: Topics in Multivariate Analysis: From North Carolina State University Public Administration Program. Available at: <http://faculty.chass.ncsu.edu/garson/PA765/missing.htm>. Accessed 1st February, 2010.
- Stern, D. N. (1995). *The motherhood constellation. A unified view of parent–infant psychotherapy*. New York: Basic Books.
- Tamminen, T. (2001). Poikkeavat kiintymyssuhteet (Abnormal attachments). In J. Sinkkonen, & M. Kalland, (Eds.), *Varhaiset ihmissuhteet ja niiden häiriintyminen (Early relationships and their disturbances)* (pp. 234–249). Helsinki: WSOY.
- van Doesum, K. T. M., Hosman, C. M. H., Riksen-Walraven, J. M., & Hoefnagels, C. (2007). Correlates of depressed mothers' sensitivity towards their infants: The role of maternal, child and contextual factors. *Journal of the American Academy of Child and Adolescent Psychiatry*, 46, 747–756.
- Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (1997). Intergenerational transmission of attachment. State of art in psychometric, psychological and clinical research. In I. Atkinson, & K. J. Zucker (Eds.), *Attachment and psychopathology* (pp. 135–170). New York: Guilford.
- Warnock, F., Bakeman, R., Shearer, K., Misri, S., & Oberlander, T. (2009). Caregiving behaviour and interactions of prenatally depressed mothers (antidepressant treated and non-antidepressant treated) during newborn acute pain. *Infant Mental Health Journal*, 30, 384–406.

MATERNAL REPRESENTATIONS AND EMOTIONAL AVAILABILITY AMONG DRUG-ABUSING AND NONUSING MOTHERS AND THEIR INFANTS

MARJO FLYKT, RAIJA-LEENA PUNAMÄKI, AND RITVA BELT

University of Tampere

ZEYNEP BIRINGEN

Colorado State University

SAARA SALO

Helsinki University Central Hospital

TIINA POSA

City of Hollola, Finland

MARJUKKA PAJULO

University of Turku

ABSTRACT: Both negative and idealized maternal prenatal representations may constitute a risk for mother–infant interaction. This study analyzed the role of maternal prenatal representations and pre- to postnatal representational change in predicting mother–infant emotional availability (EA) among 51 drug-abusing mothers and their infants who participated in either psychodynamic group therapy (PGT) or received psychosocial support (PSS) and among 50 nonusing comparison dyads. Maternal representations of her child, the child's father, her own mother, self-as-mother, and self-as-woman were measured during pregnancy and at 4 and 12 months' postpartum with the Interview of Maternal Representations (M. Ammaniti et al., 1992; M. Ammaniti, R. Tambelli, & P. Perucchini, 1998). EA was measured with the Emotional Availability Scales, fourth edition (Z. Biringen, 2008) at 4 and 12 months. The results showed that drug-abusing mothers had more negative prenatal representations of the self-as-woman and of the child's father. Postnatally, PSS mothers tended to first idealize their child, but later to experience disillusionment of idealization. Both negative and idealized prenatal representations of the self-as-mother predicted mother–infant EA problems, but only among the PGT mothers. For all mothers, negative representational change was detrimental for the mother–infant EA whereas for drug-abusing mothers, also increasing idealization from the prenatal period to the postnatal period was harmful. Clinicians working with drug-abusing mothers should aim at supporting the development of a realistically positive view of motherhood.

Abstracts translated in Spanish, French, German, and Japanese can be found on the abstract page of each article on Wiley Online Library at <http://wileyonlinelibrary.com/journal/imhj>.

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Maternal drug abuse constitutes a severe risk for the infant's well-being and development (Hans & Jeremy, 2001; H.L. Johnson, Glassman, Fiks, & Rosen, 1990) and one crucial pathway to these harmful effects is disturbed early dyadic interaction (Beeghly & Tronick, 1994; Lester, Boukydis, & Twomey, 2000). Maternal prenatal representations are considered important predictors of the future relationship with the child, and may play either buffering or vulnerability roles. In the course of pregnancy, representations of the woman's own childhood and prior close relationships become reactivated, and representations of the child and

the self-as-mother are constructed (Brodén, 2004; Stern, 1995). For drug-abusing mothers, the transition to parenthood is a period with a special potential for positive change, but also with high risk for intergenerational transmission of trauma and maltreatment. Here, we examine how maternal prenatal representations and representational changes predict the dyadic emotional availability (EA) among drug-abusing and nonusing mother–baby pairs.

MATERNAL DRUG ABUSE AND EA

EA is a relational construct reflecting the overall quality of dyadic parent–infant interaction and emotional communication (Biringen, 2000; Bretherton, 2000; Emde, 1980). On the parent's side, the key elements of EA are parental emotional expressiveness and

Tiina Posa is now at Terveystalo Lahti, Finland. Direct correspondence to: Marjo Flykt, School of Social Sciences and Humanities/Psychology, University of Tampere, 33014 Tampere, Finland; e-mail: Marjo.Flykt@uta.fi.

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awareness of child's emotions, manifested as parental sensitivity, and the control-related aspects of the interaction, manifested as parental structuring, nonhostility, and nonintrusiveness. On the child's side, the key elements are the readability of the child's emotional signals and positive emotional presence, displayed in child's responsiveness to the parent, and the child's initiative and involvement of the parent.

Drug-abusing mothers have been found to show lower general EA with their 2- to 5-month-old infants than do demographically matched nonabusers (Fraser, Harris-Britt, Thakkallapalli, Kurtz-Costes, & Martin, 2010). They also are less sensitive in perceiving and responding to their infants' interactive signals (Fraser et al., 2010; Mayes et al., 1995; Rodning, Beckwith, & Howard, 1991; Salo et al., 2010) and in showing positive emotional expressiveness (Burns, Chetnik, Burns, & Clarke, 1991, 1997; Pajulo, Savonlahti, Sourander, Ahlqvist et al., 2001). Difficulties in structuring and guiding the child also are common (Blackwell, Lockman & Kaiser, 1999; Pajulo, Savonlahti, Sourander, Ahlqvist et al., 2001; Salo et al., 2010). High intrusiveness and hostility are suggested to be especially characteristic for the mother–infant interaction among drug-abusing mothers (A.L. Johnson et al., 2002; Rodning et al., 1991; Salo et al., 2009; Salo et al., 2010), and they also are the features considered the most detrimental to the child development (Lyons-Ruth, Connell, Zoll, & Stahl, 1987; Miller, Smyth, & Mudar, 1999; Swanson, Beckwith, & Howard, 2000).

According to many studies, the infants of drug-abusing mothers also show problematic interaction patterns, due to both the effects of prenatal drug exposure and deficits in maternal interactive behavior (Tronick et al., 2005). These infants have problems in both reciprocally responding to their mother's interactive signals and in initiating new interactions with the mother; they may be withdrawn and express little positive and much negative affect (Bendersky & Lewis, 1998; Burns et al., 1991; Salo et al., 2009; Tronick et al., 2005). Nonetheless, according to some studies, infants of drug-abusing mothers display only mildly problematic or even apparently normal interactive behavior (A.L. Johnson et al., 2002; Mayes et al., 1995; Savonlahti et al., 2005). This apparently normal behavior also may be interpreted as children's nongenuine attempt to compensate for grave distortions in dyadic interaction, which may, however, imperil their emotional and identity development (Biringer, 2000; Crittenden & DiLalla, 1988; Savonlahti et al., 2005).

ROLE OF MATERNAL REPRESENTATIONS

Maternal representations are one important mediating pathway between a mother's personal history, especially of her childhood experiences, and her interactive behavior with the infant. Representations are mental constructions of reality based upon memories, expectations, and perceptions that guide both one's sense of self and interpersonal behavior (Larney, Cousens, & Nunn, 1997; Main, Kaplan, & Cassidy, 1985). During the transition to parenthood, the major representational domains involve the child, the self-as-mother, the self-as-woman, one's own mother-as-mother and the child's father (L. Cohen & Slade, 2000; Fava Vizziello,

Antonioli, Cocci, & Invernizzi, 1993; Stern, 1995). These representations are based on real and fantasized interactive experiences with a specific person (Stern, 1995) and include highly salient emotional elements (Ammaniti et al., 1992; Broden, 2004).

The representation of the child involves schemas about the baby as a unique person with certain, stable temperamental features and as the particular son or daughter to these parents (Fava Vizziello et al., 1993; Stern, 1995). The representation of the child has its foundation in the previously existing representations of the self-as-woman and of the child's father as well as in actual perceptions of the fetus via the child's movements and ultrasound (Broden, 2004; L. Cohen & Slade, 2000; Fava Vizziello et al., 1993). The representation of the self-as-mother integrates the representation of the self-as-woman formed in the lifetime identity development and the representation of one's own mother-as-mother, in the process of working through one's childhood experiences (L. Cohen & Slade, 2000; Fava Vizziello et al., 1993). Representations of the child and the self-as-mother are often complementary in nature: If, for example, the mother perceives herself as protective and affectionate, she also views her baby as calm and easygoing (Ammaniti et al., 1992).

In transition to parenthood, the previously existing representations undergo substantial, dynamic changes. The dyadic representations of the self-with-partner and the self-with-own-mother become transformed into triads that also include the baby (Stern, 1995; Stern & Bruschweiler-Stern, 1998). The representation of the partner includes the mother's changing schemas of her partner as a man and a mate as well as of his emerging fatherhood. The representation of one's own mother includes schemas of own mother as a mother to the self in childhood, own mother as a wife, as a woman, and as the grandmother to the child-to-be (Stern, 1995). The shift from being the daughter-of-own-mother into being the mother-of-own-child characterizes the transition (Stern, 1995).

Two studies (Pajulo, Savonlahti, Sourander, Piha, & Helenius, 2001; Wendland & Miljkovitch, 2003) have explored the content of prenatal representations among mothers at high psychosocial risk. The mothers had multiple and heterogeneous risks such as socioeconomic difficulties and mental health or substance-addiction problems. Both studies have revealed that high-risk mothers had more negative prenatal representations of the child's father and their own mother, and somewhat more negative representations of their child, than did nonrisk mothers. In addition, Pajulo, Savonlahti, Sourander, Piha, and Helenius (2001) found that high-risk mothers had more negative representations of the self-as-mother and the self-as-woman whereas in Wendland and Miljkovitch's (2003) study, these representations were similar to those of normative mothers. However, we do not know whether the results apply specifically to drug-abusing mothers.

There is evidence that more positive or balanced prenatal representations of one's own mother (Ward & Carlson, 1995), the child-to-be (Dayton, Levondosky, Davidson, & Bogat, 2010; Flykt et al., 2009; Pearce & Ayers, 2005; Thun-Hohenstein, Wienerroither, Schreuer, Seim, & Wienerroither, 2008), the self-as-mother, and the child's father (Coleman, Nelson, & Sundre,

1999) are important predictors of a more positive mother–infant relationship. The previous studies have not included the representations of the self-as-woman, and it thus is not possible to judge whether it would be a less salient predictor of mother–infant interaction quality than would other representational dimensions. There is, however, indirect evidence, as the women’s self-esteem predicts the quality of mother–infant interactive relationship (Drake, Humenick, Amankwaa, Younger, & Roux, 2007).

Clinicians regard both negative and idealized prenatal representations as potentially interfering with later mother–infant interaction quality, but empirical studies have failed to detect the harmful impact of extremely positive prenatal expectations on future parenthood (Coleman et al., 1999; Flykt et al., 2009; Pearce & Ayers, 2005). These studies, however, were conducted with low-risk parents whereas the impact of prenatal representations may be different for high-risk mothers. Even though it seems reasonable that idealized prenatal representations are harmful for everyone, normative mothers have many protective factors that high-risk mothers lack. Subsequently, normative mothers may be more flexible in “updating” even unrealistically high expectations to match the reality, which prevents the harmful impact of idealization on the child. Considering high-risk mothers, we can speculate in turn that overly positive representations may indicate inflexible and distorted views of the child which are difficult to change, and therefore signify a more permanent risk. Further, earlier research might not have found a harmful impact of idealization among normative mothers due to a possibly less extreme range of idealization.

Only two studies have analyzed the association between prenatal representations and mother–child relations among drug-abusing mothers, one showing a significant role and the other a nonsignificant role for maternal representations. Conte, Mazzoni, Serreti, Fundaro, and Tempesta (1994) found that among methadone-using mothers, negative prenatal representations of one’s own mother predicted increased probability that the child would be removed from the home and placed into foster care by 2 years of age. On the other hand, Pajulo, Savonlahti, Sourander, Piha, and Helenius (2004) found no direct association between the content of maternal prenatal representations and the quality of mother–infant interaction at 6 months’ postnatally among drug-abusing mothers.

Representations of the self, the child, the child’s father, and one’s own mother tend to remain quite stable from the prenatal to the postnatal period, and such stability has been found both among normative (Flykt et al., 2009; Larney et al., 1997; Stern, 1995) and psychosocial-risk mothers (Theran, Levondosky, Bogat, & Huth-Bocks, 2005; Wendland & Miljkovitch, 2003). If representational change occurs (i.e., prenatal representations do not match postnatal reality), the change appears to be in a positive direction (Flykt et al., 2009; Larney et al., 1997); however, we do not know whether these results apply specifically to drug-abusing mothers.

Due to its nonnormative nature, negative representational change may be an even more important predictor of dyadic interaction problems than the sole negativity of prenatal representations. Expectation Violation Theory (EVT; e.g., Negy, Schwartz, & Reig-Ferrer, 2009) states that in many interpersonal areas such

as the marital relationship after the transition to parenthood, negatively violated expectations (i.e., negative representational change) are associated with a more negative relational outcome (Hackel & Ruble, 1992; Ruble, Hackel, Fleming, & Stangor, 1988). The EVT was also confirmed among drug-abusing mothers, with results showing that negative changes in maternal representations regarding the child, one’s own mother, and the child’s father from the prenatal to the postnatal period predicted problems in dyadic interaction (Pajulo et al., 2004). Similarly among normative mothers, more negative representational change has generally been associated with poorer maternal adjustment (Kach & McGhee, 1982; Kalmuss, Davidson, & Cushman, 1992; Levy-Shiff, Goldshmidt, & Har-Even, 1991). However, Pearce and Ayers (2005) did not find any effect of negative representational change on mother–child relationship quality among normative mothers. Our study is the first to compare the impact of representational changes between normative and high-risk mothers.

MECHANISMS OF RISK

Maternal drug abuse can be considered as an indicator of multiple mother-, infant-, and environment-related risks that may compromise both the quality of the early interaction (Hans, Bernstein, & Henson, 1999) and maternal representations sometimes even more than maternal drug use, *per se*. These risks can be conceptualized with Sameroff and Fiese’s (1990) transactional model, which emphasizes the constant and complex interplay between both negative and positive mother-, child-, and community-related influences in child development. They can function as potential multilevel mechanisms through which maternal drug abuse predicts the more negative maternal representations and subsequent deficiencies in EA.

From the mother’s side, the interactive problems are partly due to the direct effects of drugs (Bays, 1990; Brooks, Zuckerman, Bamforth, Cole, & Kaplan-Sanoff, 1994; Zuckerman & Brown, 1993). Besides the obvious effects of intoxication or withdrawal symptoms on maternal behavior, animal studies also have suggested that at least cocaine increases maternal aggressive and neglecting behavior and diminishes child-directed, protective behavior (Johns et al., 2005; Johns, Noonan, Zimmerman, Li, & Pedersen, 1994) via decreased oxytocin levels (Elliott, Lubin, Walker, & Johns, 2001; Lubin, Elliott, Black, & Johns, 2003).

The majority of drug-abusing mothers also suffer from comorbid psychopathology such as depression (Brooks et al., 1994; Hans, 1999; Pajulo, Savonlahti, Sourander, Ahlqvist et al., 2001). In Finland, 40% of substance-abusing mothers at least in residential treatment are clinically depressed (Pajulo, 2001). Maternal depression is by itself associated with an increased risk for mother–infant interaction problems (for a review, see C.T. Beck, 1995), even though maternal drug abuse seems to have an even more devastating effect than does maternal depression alone (Salo et al., 2010). Depression also is generally associated with more negative representations of the self and significant others (A.T. Beck, 1967), even though research evidence on drug-abusing mothers is still lacking

on this issue. Substance-abusing mothers also often come from very disadvantaged backgrounds with low socioeconomic status and educational level and are more often single parents (Bays, 1990; Hans, 1999), which may moderate the negative impact of drug abuse on dyadic interaction and maternal representations.

From the child's side, the teratological effects of prenatal drug-exposure are known to decrease fetal growth and gestational age (Shankaran et al., 2004; Zuckerman & Brown 1993), both of which are well-known risk factors for mother–infant interaction (see Beeghly & Tronick, 1994). Both human and animal studies also have suggested that prenatally drug-exposed infants may be more difficult to take care of and have deficiencies in their ability to elicit maternal caregiving (Johns et al., 2005; Zuckerman & Brown, 1993). These problems are not solely due to transient withdrawal symptoms but also to long-term difficulties in neuroregulatory mechanisms such as regulation of arousal, attention, and affect, which are common among the infants of drug-abusing mothers (Beeghly & Tronick, 1994; Lester & Tronick, 1994).

RESEARCH QUESTIONS

We first examined whether drug-abusing mothers differ from comparison-group mothers in the content of their prenatal representations about themselves as mothers and as women, of their baby, the child's father, and own mother. We hypothesized that drug-abusing mothers would have more negative prenatal representations than would comparison mothers. Second, we examined how maternal prenatal representations changed from pregnancy to the postnatal period. According to existing studies, we hypothesized that the representations of both drug-abusing and comparison mothers would remain unchanged over the transition to parenthood, or if a change does occur, it is in a positive direction. Third, we examined whether the content of maternal prenatal representations differentially predicts the EA in mother–infant interaction among drug-abusing and comparison mothers. We hypothesized that among drug-abusing mothers, there is a U-shaped curve, both negative and highly positive representations predicting lower EA. For comparison mothers, we hypothesized that negative, but not highly positive, prenatal expectations would predict lower EA, as existing empirical research has suggested. Fourth, we examined how the representational change from the prenatal to the postnatal period is associated with EA among drug-abusing and comparison mothers. In line with EVT, we hypothesized that negative representational changes would predict lower EA among all mothers.

The questions and hypotheses were examined among polydrug users receiving either time-limited psychodynamic group therapy (PGT group) or psychosocial support (PSS group), and among nonabusing comparison mothers. Theoretically, interventions such as PGT that are aimed at both changing the mother's internal representations and directly enhancing her sensitivity to infant's cues are suggested to be most effective for substance-abusing mothers (Molitor & Mayes, 2010; Pajulo, Suchman, Kalland, & Mayes, 2006; Suchman, De Coste, Castiglioni, Legow, & Mayes, 2008;

Suchman, McMahon, & Luthar, 2004). Therefore, we expect more profound and positive representational changes in the PGT group than in the PSS group. Due to the lack of previous literature, however, no specific hypotheses were stated concerning the possible differences in the representations predicting EA between the PGT and PSS groups.

METHODS

Participants and Procedure

The sample was 101 Finnish mothers and their children (43.4% girls, 56.6% boys). The drug-abusing group comprised 51 mother–infant dyads in outpatient care, receiving either time-limited psychodynamic mother–infant group therapy (PGT group: $n = 26$) or individually tailored psychosocial support (PSS group: $n = 25$), and the comparison group comprised 50 dyads. The aim of the PGT intervention was to offer the mother the experience of care that they in turn could return to their infants. Substance-abuse and mental health treatment as well as parenting interventions were integrated, with the aim of both addressing the mother's psychological needs as well as preventing the child's attachment disorders. The PGT intervention started during pregnancy and comprised 20 to 24 weekly, 3-hr sessions. In addition, one of the two therapists was available by telephone between the sessions. On the whole, therapy engagement was high; only one to three sessions were missed by the mothers. After the therapy, the mothers had individual follow-up. The PSS was an individually tailored intervention which comprised different possible elements such as support for abstinence and for the mother–infant dyad, home visits, help with organizing daily life, and marital counseling, but not psychotherapy. The PSS mothers did not have a systematic weekly participation schedule. The interventions are described in more detail elsewhere (Belt & Punamäki, 2007; Belt et al., 2011).

Among both drug abusers and nonusers, half of the mothers were primiparous, and half already had one to three children. Mothers were recruited in pregnancy, with assessments scheduled during the second or third trimester of pregnancy (T1), at 4 months (T2), and at 12 months (T3) of child age. All mothers in the drug-abusing group had a history of severe illegal drug or polysubstance abuse lasting for several years and verified by a positive drug screen or self-report. The staff in two addiction psychiatry outpatient clinics referred pregnant mothers to interventions carried out in outpatient family centers. Concerning the choice of treatment, the principle was to respect every mother's individual preferences as much as possible. The inclusion criteria for PGT group were (a) motivation to examine one's own internal world and to process the causes of the drug addiction, and (b) participation was practically feasible concerning the formation of the therapy group (Groups were formed every 6th or 12th month.) Other mothers were included in the PSS group.

The comparison-group mothers were recruited from a maternity outpatient clinic in Southern Finland. They visited the clinic for medical risks such as gestational diabetes, twin pregnancy, or premature labor symptoms. Exclusion criteria were lifetime use of

illegal drugs (drug screening and self-report) and more than light consumption of alcohol. Smoking was not a criterion for exclusion in either group. We used medical-risk mothers as a comparison group because maternal drug abuse also is associated with increased medical pregnancy risks such as low birth weight of the child (Zuckerman & Brown 1993), which by itself is a vulnerability factor for child development (Beeghly & Tronick, 1994).

The study procedure was identical for both drug-abusing and comparison groups. The staff informed consecutive clients during their second or third trimester of pregnancy (T1) about the study and its purpose (i.e., learning about the experiences in pregnancy and early motherhood), its voluntary nature, and the procedure. The mothers willing to participate signed an informed consent form and were given the baseline questionnaire to be completed and returned at the following appointment. At T2 and T3, the research psychologists visited the mother–infant pair at their home or program residence, and the mothers again completed the questionnaires. At both times, the dyadic free-play interaction was videotaped. The study was approved by the Ethical Committees of Päijät-Häme Central Hospital and the City of Tampere, Finland, and the whole study was carried out according to the provisions of the Declaration of Helsinki.

Originally, 108 mothers were approached for the study. All comparison mothers who were approached agreed to participate. Two drug-abusing mothers declined, and 2 had almost completely missing data. Three participated in the treatment, but were excluded from the study due to being abstinent for a long time before pregnancy. In addition, 1 mother declined to participate in the PGT, but was included in the PSS. For the 5 twin families in the comparison group, only data from 1 twin (randomly selected) was used in the analyses. The final number of participants was thus 101. The dropout rates were 8% ($n = 4$) in the drug-abusing and 14% ($n = 7$) in the control group from T1 to T2, and 19% ($n = 9$) and 9% ($n = 4$) from T2 to T3, respectively. Three children (2 PGT, 1 PSS) were removed from the home and placed in foster care during the first year, and are included in the dropout rate. For mothers who had participated in at least two phases of the study, the missing values were replaced with Expectation Maximization (EM). Attrition analyses showed no differences with respect to group status (PGT, PSS, or comparison), mother's employment status, or financial problems. However, there was more attrition among mothers with a lower educational level, $\chi^2 = 14.66$, $p < .01$, and with single marital status, $\chi^2 = 16.04$, $p < .01$ (for a participation flow chart, see Belt et al., 2011 for review; for further details of the attrition, see Belt, Punamäki, Pajulo, Posa, & Tamminen, 2009).

Measures

Both drug-abusing and comparison-group mothers completed the same questionnaires at T1, T2, and T3. Questions concerning illegal drug abuse were not relevant for the comparison mothers, but served as a double check of the exclusion criterion.

Demographic and obstetric characteristics were indicated by a questionnaire. Demographic information included length of current partnership, level of education, maternal employment status,

marital status, number of children, and financial difficulties. In pregnancy, mothers reported pregnancy-related medical problems (high blood pressure, high blood sugar level, bleeding, early contractions, the threat of miscarriage, and abnormalities in ultrasound). After birth, they reported the length and the type of the delivery (e.g., normal, cesarean, emergency) and the perceived difficulty of the delivery.

Substance abuse characteristics were assessed by presenting a list of eight drugs and asking the mothers in the drug-abusing group to indicate the ones that they had used regularly or experimented with (1 = *no*, 2 = *yes*: cannabis, LSD, amphetamine, ecstasy, heroin, sniffing medicaments, medicines, and other (e.g., buprenorphine). Further, they indicated, by an open question, how often they had used each drug. At T1, the women reported their drug abuse before pregnancy, and whether it had changed during pregnancy (1 = *no change*, 2 = *decreased*, 3 = *stopped*, 4 = *increased*). At T2 and T3, the women reported drug use after the birth of the child, and whether there had been changes in it after delivery (rated on the aforementioned 1–4 scale). Furthermore, they were asked about the use of substitute medication and intravenous drug use. Alcohol consumption was assessed using seven items from the Alcohol Use Disorders Identification Test (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Among comparison mothers, alcohol consumption during pregnancy was assessed in an interview by a public health nurse, and more than very light use was a criterion for exclusion.

Maternal pre- and postnatal depression were measured in pregnancy (T1) and at 4 (T2) and 12 months' (T3) postpartum using the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987). The EPDS involves descriptions of depression-related feelings, thoughts, and behaviors, and respondents answer on a scale of 0 to 3 (e.g., 0 = *no*, not at all; 1 = *hardly ever*; 2 = *yes*, sometimes; 3 = *yes*, very often) about how well the description matches the severity and persistency of their symptoms. The time reference is the previous week. Separate sum variables were constructed for each time point. Their reliabilities (Cronbach's α) were .85, .79, and .87, respectively.

Maternal representations were measured at T1 (second or third trimester of pregnancy), T2 (child age 4 months), and T3 (child age 12 months) using an adjective scale questionnaire form from the Interview of Maternal Representations (IRMAG; Ammaniti et al., 1992; Ammaniti, Tambelli, & Perucchini, 1998). This is an adaptation of Osgood and Suci's (1952) semantic differentials, developed for pregnant women through the collaboration of an international research group including Charles Zeanah, Daniel Stern, and Graziella Fava Vizziello, and further adapted by Massimo Ammaniti and colleagues. The questionnaires are included in the IRMAG method specifically for research purposes. Mothers are given five lists of adjectives concerning their representations of the infant, the self-as-woman, the partner (child's father), the self-as-mother, and one's own mother-as-mother. Each list contains 17 mixed pairs of opposite adjectives placed at opposite ends of a horizontal line; participants are asked to mark the point from 1 to 7 that best indicates their rating. On the basis of

the factorial structure of the method (Ammaniti et al., 1998), the adjectives are divided into four representational areas. Conceptually, the dimensions of the child-to-be, the self-as-woman, and the child's father are (a) personal functioning (e.g., active-passive), (b) interpersonal style (e.g., accepting-rejecting), (c) emotional tendencies (e.g., calm-anxious), and (d) content of impulses (e.g., determined-submissive). The conceptual dimensions of the self-as-mother and one's own mother-as-mother are (a) emotional tendencies (e.g., affectionate-not affectionate), (b) personal role (e.g., authoritarian-permissive), (c) maternal role (e.g., satisfied with being a mother-unsatisfied with being a mother), and (d) sensitivity and maternal interaction (e.g., protective-indifferent). A higher summary score indicates a more positive view. In our study, we combined the subscales into five broader sum-score variables, describing positivity/negativity in the global representations of the infant, the self-as-woman, the child's father, the self-as-mother, and one's own mother-as-mother. The new sum-score index (mean of scores) was calculated for each, and its range was also from 1 to 7. The reliabilities (Cronbach's α) for the scales at T1 ranged from .84 to .91, at T2 from .78 to .90, and at T3 from .81 to .92.

EA. A mother-infant free-play interaction, lasting 7 to 10 min, was videotaped and coded according to EA Scales, fourth edition (with subscales) (Biringen, 2008). The mother was asked to play as she usually would with the baby. The interaction was evaluated by four maternal scales (Sensitivity, Structuring, Nonintrusiveness, and Nonhostility) and two child scales (Responsiveness to Mother and Involvement of Mother). All scales range from 1 to 7 (e.g., 1 = highly insensitive; 2.5/3 = somewhat insensitive; 4 = inconsistently sensitive/"apparently sensitive"; 5.5/6 = bland sensitivity; 7 = highly sensitive). Sensitivity refers to mother's balanced and genuinely positive affect, awareness of her infant's cues, and appropriate, well-timed responsiveness to them, acceptance of the infant, and negotiation skills in conflict situations. Structuring refers to mother's ability to scaffold the infant's environment and play. Nonintrusiveness involves the degree to which the mother can be available without interfering with the infant's autonomy and space. Nonhostility refers to maternal behavior that is free of impatience, harshness, or malice. Child Responsiveness indicates how well the infant responds to maternal bids and expressions. Child Involvement refers to the degree to which the infant invites the mother to interact with him or her. The interaction quality was coded by the first author, and 10% of the videos also were coded by the fifth author, who are both reliable coders trained by Zeynep Biringen. Both were blind to maternal drug-abuse status and other background information. The interrater reliabilities (Pearson's R) at T2 ranged from .82 to .97, and at T3, from .85 to .97. Any differences were negotiated. Another 5% of the videos were jointly coded with the method trainer (Z. Biringen).

Statistical Methods

The group comparisons between categorical demographic variables were conducted by χ^2 statistics and t test or univariate analyses of variance (ANOVA) was used for the continuous background

variables. The first hypothesis of group differences in prenatal representations was tested by univariate ANCOVAs with Bonferroni post hoc tests. The group status (PGT and PSS drug-abusing and comparison groups) was the independent variable, and representations of the child, the self-as-woman, the child's father, the self-as-mother, and own mother-as-mother were the dependent variables. Maternal prenatal depressive symptoms, marital status, educational level, and financial difficulties were used as covariates. The second hypothesis of the pre- to postnatal representational change was examined with repeated measure multivariate ANCOVAs (MANCOVAs) with univariate statistics and within-subject contrasts. Maternal depressive symptoms at T1, T2, and T3, marital status, educational level, and financial difficulties were used as covariates. The third hypothesis was tested by Group Status (PGT and PSS drug-abusing and comparison) \times Prenatal Representations MANCOVAs on EA variables separately at T2 and T3. Maternal prenatal depressive symptoms, marital status, educational level, and financial difficulties were used as covariates. In subsequent analyses, a quadratic term of prenatal representations was added to the MANCOVA models. The significant quadratic terms would indicate the hypothesized U-shaped curve of both extremely negative and extremely positive representations predicting less emotionally available interaction. The results were further specified by ANCOVAs conducted separately for the three groups by looking at B-coefficients from parameter estimates and graphic illustrations. Finally, to test the fourth hypothesis, pre- to postnatal representational change variables were first constructed by calculating standardized residual scores through a regression analysis, with T1 prenatal representations as independent variables and T2 postnatal representations as dependent variables. The residual scores represent the discrepancy between pre- and postnatal representations, with high scores indicating more positive representational change and low scores more negative change. The residualized scores were used to partial out the variance associated with the prescores from the postscores (e.g., J. Cohen & Cohen, 1983). The hypothesis was tested by Group & Representational Change MANCOVAs with univariate tests and graphic illustrations, separately at T2 and T3. The dependent variables were the mother-child EA interaction variables. Maternal depressive symptoms at T1 and T2, marital status, educational level, and financial difficulties were used as covariates.

RESULTS

Descriptive Statistics

Table 1 shows the demographic information of the sample. Drug-abusing mothers differed significantly from comparison-group mothers in their marital status, being less often married and cohabiting and more often single, divorced, or other (e.g., widowed). They also were less often employed, had lower educational levels, and more financial difficulties. The socioeconomic status of these women thus closely corresponds to that in other Western countries (Hans, 1999). Comparison group mothers also had longer partnerships than did drug-abusing mothers, $t(91) = 7.56$, $p < .001$.

TABLE 1. Percentages and Frequencies of Demographic Variables

	Substance Abuse		Control		χ^2
	%	<i>n</i>	%	<i>n</i>	
Educational Level					35.25***
Basic	59	30	12	6	
Vocational	29	15	28	14	
Polytechnic	4	2	32	16	
University	2	1	22	11	
Other	6	3	6	3	
Marital Status					21.95***
Married	20	10	50	25	
Cohabiting	36	18	44	22	
Single	18	9	4	2	
Divorced	10	5	2	1	
Other (e.g., widow)	16	8	0	0	
Parity					1.00
Primipara	46	23	46	23	
Multipara	54	27	54	27	
Financial Difficulties					22.13***
Very Much	10	5	4	2	
Some	64	32	24	12	
Not At All	26	13	72	36	
Employment					32.79***
Employed	12.8	6	66	33	
Unemployed	34	16	6	3	
Housewife	36.2	17	12	6	
Other (e.g., student)	17	8	16	8	

The demographic background information of the sample also is described in Belt et al. (2011) and in Belt et al. (2009). The differences in numbers are due to different amounts of missing values in each variable.

*** $p < .001$.

The two drug-abusing groups were similar in all background variables. However, during pregnancy, PGT mothers reported more prenatal (T1) depressive symptoms than did comparison mothers, $F(2, 93) = 5.71$, $p < .01$, whereas the PSS mothers did not differ significantly from either group. Postnatally, both groups of drug-abusing mothers were more depressed than were comparison mothers (Belt et al., 2009; Belt et al., 2011). The comparison group mothers, who were a medical-risk group, more often had high blood pressure, $\chi^2 = 5.57$, $p < .05$, and high blood sugar level, $\chi^2 = 11.59$, $p < .01$, than did the drug-abusing mothers. No differences were found in child's birth weight, $t(94) = 0.39$, $p = \text{n.s.}$, number of premature births, $\chi^2 = .60$, $p = \text{n.s.}$, or child health problems at birth, $\chi^2 = 2.22$, $p = \text{n.s.}$ Drug-abusing mothers more often had normal vaginal deliveries than control group mothers, $\chi^2 = 9.59$, $p < .01$. However, there was no difference in their birth experience, $\chi^2 = 1.42$, $p = \text{n.s.}$ The two drug-abusing groups were similar in these variables.

All mothers in both drug-abusing groups had severe and regular abuse of illicit drugs, and had a psychiatric drug-dependency diagnosis from the doctor who referred them into treatment. All had regularly used cannabis before pregnancy recognition, nearly all

(95.2%) had regularly used amphetamine, and 85% reported regular misuse of medications (including tranquilizers). About half had regularly used opiates (47.5%). Intravenous use was present among 80.9% of women. These figures do not include substitute medication, which was used by 25% of mothers. However, all the mothers reported either decreasing (12%) or stopping illegal use (88%) during pregnancy. At T2, none reported regular use, but 15% reported relapses of illegal drug use, 7.5% of which was intravenous use. At T3, none reported regular use, but 22% reported relapses of illegal drug use, of which 9% was intravenous use. The two groups were similar in their drug-abuse characteristics (Belt et al., 2011; Belt et al., 2009).

At T1, 75% of drug-abusing mothers reported having consumed alcohol. More than one third (38.6%) reported consuming alcohol at least two to four times a month. For 35.2%, the typical portions of alcohol per session were seven or higher, and for 26.4%, the typical portions were three to six. However, all the mothers reporting these large amounts also reported decreasing their alcohol consumption during pregnancy, and the typical portion per time reported during pregnancy was only one to two. In the comparison group, alcohol consumption during pregnancy was a criterion for exclusion. Again, we did not control for maternal smoking.

The intercorrelations of representation variables were significant within T1 (range = .34–.72), T2 (range = .25–.66), and T3 (range = .35–.72), except for the correlation between representations of the child and representations of one's own mother at all time points and between the representation of one's own mother and the representation of the self-as-woman at T2. The correlations between the different assessment times also were mostly significant (T1–T2: range = .24–.80, T1–T3: range = .26–.79, and T2–T3: range = .31–.87), except for the representations between the child and one's own mother at all time points. In addition, earlier representations of the child had little correlation with most of the other T3 representations. The intercorrelations of EA variables were significant both within (range = .51–.94 at both T2 and T3) and between (range = .23–.47) the T2 and T3 periods. However, T2 maternal hostility was uncorrelated with most of the other T3 EA dimensions, and T2 maternal structuring was uncorrelated with T3 intrusiveness.

The results concerning the group differences in EA between PGT, PSS, and comparison mothers have been reported in a separate article concerning the effectiveness of the two interventions (Belt et al., 2011 for review). That study showed that EA was lower among both drug-abusing groups than it was among comparison mothers at T2 and T3. When the baby was 4 months old (T2), mothers in PGT and PSS were less sensitive and structuring and more intrusive and hostile than were the comparison mothers. The infants of drug-abusing mothers were less responsive, and the infants in the PSS group also less involving than were the comparison group infants. When the baby was 12 months old (T3), mothers in both drug-abusing groups were less sensitive and structuring than were the comparison mothers. The children of drug-abusing mothers were less responsive and the children in the PGT group also less involving than were comparison group infants.

TABLE 2. Prenatal Representations Among the Drug-Abusing (PGT and PSS) and Comparison-Group Mothers

Prenatal Representations (T1)	PGT		PSS		Comparison Group			η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> (2, 88)	
Child	5.44	.14	5.25	.15	5.51	.10	0.88	.02
Self-as-woman	4.85 ^a	.13	5.02 ^{a,b}	.14	5.29 ^b	.09	3.59*	.08
Child's father	4.59 ^a	.17	5.15 ^b	.18	5.40 ^b	.12	6.94**	.14
Self-as-mother	5.41	.11	5.39	.12	5.49	.08	0.23	.01
Own mother	5.17	.21	5.38	.22	5.18	.15	0.33	.01

The covariates were marital status, educational level, financial difficulties, and maternal prenatal (T1) depression. PGT = Psychodynamic group treatment, PSS = Psychosocial support.

^{a,b}Mean values with different superscript letters differ significantly from each other (Bonferroni post hoc test at $p < .05$).

* $p < .05$. ** $p < .01$.

Maternal Drug Abuse and Prenatal Representations

Our first research question was whether the content of maternal prenatal representations differs between drug-abusing mothers (participating in the two different interventions) and the comparison group. Table 2 shows means and standard deviations for the three groups, the F values indicating group differences, and the effect sizes. Our hypothesis of drug-abusing mothers showing more negative prenatal representations was substantiated only among the PGT mothers, who had more negative representations of the child's father than did either the comparison or the PSS group mothers. They also had more negative representations of the self-as-woman than did the comparison mothers whereas the PSS mothers were between the other two groups and did not differ significantly from either group. Only prenatal depressive symptoms were a significant covariate. Mothers with higher prenatal depression had more negative representations of themselves as women, $F(1, 88) = 21.80$, $p < .001$, $\eta^2 = .20$, and of the child's father, $F(1, 88) = 15.29$, $p < .001$, $\eta^2 = .15$.

Contrary to our hypothesis, no group differences emerged concerning the prenatal representations of the child, the self-as-mother, or one's own-mother. However, prenatal depressive symptoms were a significant covariate for representations of the self-as-mother, $F(1, 88) = 17.51$, $p < .001$, $\eta^2 = .17$, and of one's own mother, $F(1, 88) = 5.97$, $p < .05$, $\eta^2 = .06$, indicating that maternal prenatal depressive symptoms were associated with negative representations on these domains, even if drug abuse was not. Concerning the representations of the child, drug abuse, depressive symptoms, and any other covariate were not significant.

Maternal Drug Abuse and Representational Change

Our second research question was how maternal representations changed from the pre- to the postnatal period among the drug-abusing mothers (in the two different interventions) and the comparison-group mothers. The results are presented in Table 3. Our hypothesis of no changes or, alternatively, more positive representational change during the transition to parenthood was sup-

ported among both drug-abusing and comparison mothers concerning the representations of the self-as-woman, the child's father, the self-as-mother, and one's own mother. There was no change from the pre- to the postnatal period in maternal representations of the child's father, the self-as-mother, and one's own mother. The representations of the self-as-woman changed generally from pregnancy to postpartum, and univariate statistics revealed significantly more positive representations at T2 and T3 than at T1 in all three groups.

Concerning the change in maternal representations of the child, drug-abusing mothers showed some potentially unique and treatment-specific features. Marginal group differences were found concerning the change in maternal representations of the child, Group \times Time interaction effect, $F_{\text{Wilks's } \Lambda}(4, 142) = 2.25$, $p < .10$, $\eta^2 = .06$. However, Roy's Largest Root for the same effect was significant, $F_{\text{Roy's Largest Root}}(2, 72) = 4.10$, $p < .05$, $\eta^2 = .10$. The univariate test also was significant, $F(4, 144) = 2.49$, $p < .05$, $\eta^2 = .07$, and within-subject contrasts showed a significant quadratic change. Figure 1 illustrates that among PSS mothers, representations first changed in a more positive direction from T1 to T2 and then back in a more negative direction from T2 to T3 whereas there was no change among the comparison mothers and a mild, nonsignificant positive change among the PGT mothers.

Even though the groups did not differ in the representational change of the self-as-mother, the Time \times Prenatal Depression interaction turned out to be a significant covariate on maternal representation change, $F_{\text{Wilks's } \Lambda}(2, 71) = 6.19$, $p < .01$, $\eta^2 = .15$. Significant univariate test and within-subject contrasts specified that mothers with more prenatal depressive symptoms experienced a quadratic representational change: Their representations changed in a more positive direction from T1 to T2, but in a more negative direction from T2 to T3 whereas among mothers with less prenatal depressive symptoms, no representational change occurred. Furthermore, although the groups did not differ in the representational change of one's own-mother-as-mother, the Time \times Educational level was a significant covariate on maternal representation change, $F(2, 71) = 3.58$, $p < .05$, $\eta^2 = .14$. More educated mothers had more negative representational change in their representations of own-mother-as-mother whereas among less educated

TABLE 3. Change of Maternal Representations Over the Transition to Parenthood in Drug-Abusing (PGT and PSS) and Comparison Groups

Maternal Representations	PGT						PSS						Control Group						<i>F^a</i>	<i>F^b</i>									
	T1			T2			T3			T1			T2			T3													
	<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>		<i>M</i>	<i>SD</i>												
Child	5.45	.17		5.54	.17		5.86	.15		5.26	.17		5.89	.18		5.55	.15		5.40	.13		5.50	.12		5.57	.10		1.37	0.30
Self-as-woman	4.86	.15		5.15	.18		5.37	.15		5.04	.16		5.55	.18		5.44	.15		5.21	.11		5.40	.12		5.42	.10		7.86**	1.01
Child's father	4.68	.20		5.00	.20		4.75	.22		5.14	.21		5.18	.22		5.01	.24		5.27	.14		5.37	.14		5.24	.15		0.20	2.22
Self-as-mother	5.44	.14		5.67	.13		5.57	.14		5.31	.14		5.77	.13		5.57	.15		5.42	.10		5.49	.09		5.46	.10		1.60	0.27
Own mother	5.24	.23		4.94	.25		4.74	.27		5.43	.23		5.26	.25		5.23	.27		5.21	.16		5.20	.17		5.24	.19		0.64	0.67

Note. The covariates were maternal educational level, financial difficulties, marital status, and maternal depression at T1, T2, and T3. PGT = Psychodynamic group therapy, PSS = Psychosocial support, T1 = pregnancy second or third trimester, T2 = child 4 months, T3 = child 12 months.

^aMultivariate analysis of covariance Wilks's Λ *F* values refer to general changes in representations over the transition to parenthood.

^bAnalysis of covariance *F* values between-subjects effects refer to the level of quality of representations between the PGT, the PSS, and comparison groups. The results with *F* values for the interaction effects between group and representational changes across T1, T2, and T3 are presented in the text.

p* < .05. *p* < .01.

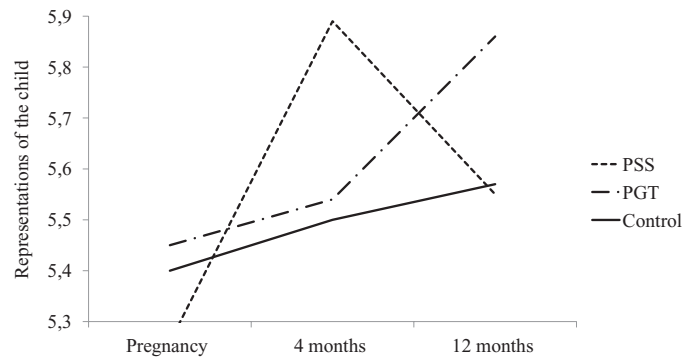


FIGURE 1. Change in representations of the child from the prenatal (T1) to the postnatal (T2) period. PGT = Drug-abusing mothers in psychodynamic group therapy. PSS = Drug-abusing mothers in the psychosocial support group.

mothers, there was no representational change. None of the other covariates were significant.

Maternal Drug Abuse, Prenatal Representations, and Dyadic EA

Our third question was whether maternal prenatal representations are differentially associated with EA in mother–infant interaction among the drug-abusing and comparison groups. Among comparison mothers, we hypothesized a linear association (i.e., more negative prenatal representations predicting lower EA) whereas among drug-abusing mothers, we hypothesized a U-shaped association (i.e., both negative and idealized prenatal representations predicting lower EA). The results were partly supportive of our hypotheses.

Concerning the interaction effect between group status and quadratic term of maternal prenatal representations of the self-as-mother on T2 EA, only the multivariate analyses using Roy's Largest Root were significant, $F_{\text{Roy's Largest Root}}(4, 66) = 2.62, p < .05, \eta^2 = .14$, for maternal EA, $F_{\text{Wilks's } \Lambda}(8, 130) = 1.47, p = \text{n.s.}$; and $F_{\text{Roy's Largest Root}}(2, 68) = 3.94, p < .05, \eta^2 = .10$, for child's EA, $F_{\text{Wilks's } \Lambda}(4, 134) = 1.90, p = \text{n.s.}$ The results should thus be interpreted with caution even though the univariate tests also were significant, $F(2, 68) = 4.11, p < .05, \eta^2 = .11$, for sensitivity; $F(2, 68) = 3.52, p < .05, \eta^2 = .09$, for structuring; $F(2, 68) = 3.16, p < .05, \eta^2 = .09$, for nonhostility; and $F(2, 68) = 3.67, p < .05, \eta^2 = .10$, for child responsiveness. When looking separately at the groups, only among PGT mothers was there an inverse quadratic relationship concerning maternal sensitivity, $B = -3.21, F(1, 13) = 10.83, p < .01$; structuring, $B = -2.57, F(1, 13) = 9.25, p < .01$; nonhostility, $B = -3.82, F(1, 13) = 10.19, p < .05$; and child responsiveness, $B = -2.65, F(1, 13) = 5.21, p < .05$. Figure 2 illustrates the quadratic associations between maternal prenatal representations of the self-as-mother and EA structuring. In line with our hypothesis, sensitivity, structuring, and child responsiveness were highest and hostility was lowest when maternal representations were on the middle level whereas very negative or very positive representations predicted lower



FIGURE 2. Schematic illustration of the interaction between group and maternal prenatal representations of self-as-mother on maternal structuring in dyadic interaction at 4 months' postpartum (T2). PGT = Drug-abusing mothers in psychodynamic group therapy, PSS = Drug-abusing mothers in the psychosocial support group.

sensitivity, structuring, and child responsiveness as well as higher hostility. There were no further interaction effects between quadratic representation variables and EA at T2 or T3.

Maternal prenatal depressive symptoms were a significant covariate in the analysis of quadratic term of maternal prenatal representations of child's father on child's EA at T2, $F_{\text{Wilks's } \Lambda}(2, 67) = 3.58, p < .05, \eta^2 = .10$, and marginally significant on maternal EA at T2, $F_{\text{Wilks's } \Lambda}(4, 65) = 2.29, p < .10, \eta^2 = .10$. Significant univariate tests showed that higher maternal prenatal depressive symptoms predicted lower maternal sensitivity, $\eta^2 = .10$, structuring, $\eta^2 = .12$, child responsiveness, $\eta^2 = .06$, and child involvement, $\eta^2 = .10$.

Against our hypothesis, there were no group differences in the linear association between maternal prenatal representations and EA at T2 or T3, as indicated by nonsignificant interaction effects between group status and linear terms of maternal prenatal representations on both maternal and child EA. In other words, positive representations did not predict linearly more favorable EA among comparison women, as hypothesized. Similarly to the quadratic analysis, only maternal prenatal depressive symptoms were significant as a covariate.

Maternal Drug Abuse, Representational Change, and Dyadic EA

Our fourth question was how maternal pre- to postnatal representational change is associated with mother's and infant's EA. As hypothesized according to EVT (e.g., Negy et al., 2009), more negative pre- to postnatal representational change was associated with problems in EA. Negative representational change concerning one's own mother-as-mother was associated with lower maternal EA at T2 among all groups, $F_{\text{Wilks's } \Lambda}(4, 64) = 4.41, p < .01, \eta^2 = .22$, predicting higher intrusiveness, $\eta^2 = .07$, and marginally,

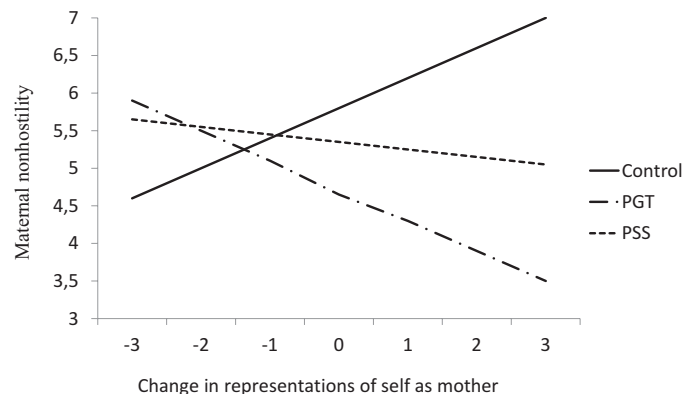


FIGURE 3. Schematic illustration of the interaction between group and change in maternal representations of self-as-mother from pregnancy (T1) to 4 months' postpartum (T2) on maternal nonhostility at T2. PGT = Drug-abusing mothers in psychodynamic group therapy, PSS = Drug-abusing mothers in the psychosocial support group. The y axis represents maternal nonhostility (i.e., higher values indicate lower hostility).

$p = .051$, also lower structuring, $\eta^2 = .06$. There also was marginal support that negative representational changes concerning the child, $F_{\text{Wilks's } \Lambda}(4, 64) = 2.20, p < .10, \eta^2 = .12$, and the child's father, $F_{\text{Wilks's } \Lambda}(4, 64) = 2.39, p < .10, \eta^2 = .13$, were associated with lower EA at T2 among all groups. Significant univariate tests, $F(1, 65) = 5.13, p < .05, \eta^2 = .07$, and $F(1, 65) = 5.75, p < .05, \eta^2 = .08$, revealed that among all groups, more negative representational changes concerning the child and the child's father predicted higher hostility at T2, and more negative representational change concerning the child also predicted lower maternal sensitivity at T2.

Results also show a significant interaction effect between the group and self-as-mother representational change on maternal EA at T2, $F_{\text{Wilks's } \Lambda}(8, 128) = 2.16, p < .05, \eta^2 = .12$, indicating a distinct role of representational change in drug-abusing and nonabusing mothers. Against our hypothesis, Figure 3 shows that among drug-abusing mothers, especially in the PGT group, negative representational change was, unexpectedly, associated with lower hostility (higher nonhostility). However, among comparison mothers, more negative change in representations of the self-as-mother was associated with higher hostility, as hypothesized.

The interaction effect between the group and own mother-as-mother representational change on child's EA at T2 was significant only in terms of Roy's Largest Root, $F_{\text{Roy's Largest Root}}(2, 67) = 3.61, p < .05, \eta^2 = .10$, $F_{\text{Wilks's } \Lambda}(4, 130) = 1.94, p = \text{n.s.}$ The univariate tests were, however, significant for child responsiveness, $F(2, 66) = 3.28, p < .05, \eta^2 = .09$. In the drug-abusing groups, against our hypothesis, more positive representational change concerning one's own mother was associated with lower child responsiveness whereas in the comparison group, it was associated with higher child responsiveness, as hypothesized. In addition, there was marginal support for the effect of a Group \times Own Mother-As-Mother Representational Change interaction on mother's EA

at T3, $F_{\text{Wilks's } \Lambda}(8, 116) = 1.87, p < .10, \eta^2 = .11$, and significant univariate tests, $F(2, 60) = 3.92, p < .05, \eta^2 = .11$, showed that positive representational change predicted higher maternal structuring at T3 only among the PGT mothers, but lower structuring among the PSS and comparison mothers. Maternal depression at T2 was a significant covariate in all analyses concerning the representational change and mother's EA at T3: Mothers with higher depressive symptoms at T2 showed lower structuring at T3.

DISCUSSION

Maternal Drug Abuse and Prenatal Representations

Consistent with our first hypothesis, drug-abusing mothers reported more negative content in prenatal representations of the child's father and of themselves as women than did normative mothers, but the result was valid only among mothers participating in PGT. Instead, drug-abusing mothers receiving PSS showed prenatal representations similar to those of normative mothers. Note that the representations directly associated with future motherhood—those of the self-as-mother and of the child—were not more negative among drug-abusing than among normative mothers. The results are consistent with Wendland and Miljkovitch (2003), who found that psychosocial-risk mothers viewed their maternal identity similarly to that of normative mothers. Earlier research also has found the representation of the future child to be almost similar to that of normative mothers (Pajulo, Savonlahti, Sourander, Piha, & Helenius, 2001; Wendland & Miljkovitch, 2003).

Maternal prenatal depression seemed to be a specific risk factor for the development of negative prenatal representations: Mothers with elevated levels of prenatal depressive symptoms showed more negative prenatal representations of themselves as mothers and as women, of own mother, and of the child's father. This is in accordance with the central thesis of cognitive psychotherapy that depression results in more negative perceptions of the self and other people (A.T. Beck, 1967), and with earlier literature findings that have shown depressed mothers' more negative perceptions of themselves as parents and of their marital relationship (Milgrom & McCloud, 1996; Rehman, Gollan, & Mortimer, 2008). Our important and resilience-indicating result is that prenatal representations of the future child were not more negative among drug abusing mothers even if controlled for depressive symptoms. Pearce and Ayers (2005) similarly found that prenatal representations of the child were not associated with maternal depression.

In contrast to earlier studies, the drug-abusing mothers did not report more negative prenatal representations of their own mother than comparison mothers. The result is unexpected, considering that drug-abusing mothers typically have difficult or even traumatic childhood family histories involving experiences of loss, violence, neglect and substance abuse by family members, especially by their own mother (Bays, 1990; Brooks et al., 1994; Hans, 1999). In the normal course of pregnancy, memories of one's own childhood become activated (Ammaniti et al., 1992; Broden, 2004; Fava Vizziello et al., 1993), which may reactivate painful emotional conflicts among traumatized mothers.

The absence of this activation may be explained by the typical use of strong defenses of denial and idealization among drug-abusing mothers (Hennigan, O'Keefe, Noether, Rinehart, & Russell, 2006; Pajulo, 2001). These defenses may be used as an attempt to protect oneself against intense anxiety threatening the ability to form and maintain a positive stance to one's own motherhood (Broden, 2004; Pajulo, 2001; L. Cohen & Slade, 2000). However, strong defensiveness also may impede the normal process of forming one's own maternal identity separate from one's own mother. Failure to reconcile with one's early history of adversity and the denial of one's own severe problems as indicated by drug addiction may result in the danger of intergenerational transmission of negative, and even abusive, parenting. On the other hand, genuinely positive representations of the self-as-mother and of the child also may indicate a new possibility and a motivating force for change. Due to this complex interplay, drug-abusing mothers need extensive support to achieve integration between representations of their own childhood hardships and their current, emerging motherhood. Our results also suggest that not maternal drug abuse itself but rather maternal depressive symptoms significantly explain the quality of maternal representations of own mother-as-mother.

The more negative representations of PGT mothers than those of PSS mothers may be explained by the fact that they might have more severe problems, which made them more motivated to seek for and participate in intensive therapy. Although the PGT and PSS mothers did have similar adverse social backgrounds, those women preferring PGT might have been more worried about their conflicting relations with the child's father and their original family. It also is possible that drug-abusing mothers in the PSS group actually were more defensive and idealizing, resulting in less objective self-report.

The few differences in the prenatal representations between drug-abusing and normative mothers also may partly reflect our comparison group consisting of mothers with medical risks during pregnancy. We know that pregnancy complications may negatively affect maternal mental health, perceptions of the infant, and later mother-infant interaction (Levy-Shiff, Lerman, Har-Even, & Hod, 2002; Maloni, Park, Anthony, & Musil, 2005; Priel & Kantor, 1988).

Maternal Drug Abuse and Representational Change

Consistent with the second hypothesis, among normative mothers, alternatively, there was a course of positive representational change or no change from pregnancy to the child's first birthday. Characteristic to drug-abusing mothers was the occurrence of oscillation and drastic change concerning their representations of the child, but the representational change seemed to depend on their therapeutic support. Our findings suggest a course of idealization at 4 months' postpartum and a subsequent disillusionment at 12 months in the representations of the child only among PSS mothers. Similarly to normative mothers, the PGT group showed no disillusionment of idealization concerning the baby. This result

suggests that insight-oriented PGT helps drug-abusing mothers to build a sustained, positive view of the infant whereas PSS does not facilitate the stabilization of representations of the child in a similar manner. Instead, the PSS mothers seemed to alternate between idealization and devaluation of the child, possibly due to the increasing demands of mothering as the child grows older. On the other hand, our findings show that in the transition to motherhood, high-risk mothers also start to view their identity as a woman in more positive ways.

Concerning the change in maternal representations of self-as-mother, our results suggest that maternal depression rather than drug abuse is the important predictor. Maternal depression increased the risk for oscillating and instable representations. Even though representations became more positive in the transition from pregnancy into early parenting also among prenatally depressed mothers, it was followed by a disillusionment and drastic negative change below the prenatal level by the end of the first year. Among nonprenatally depressed mothers, the representations of the self-as-mother remained stable. Previous findings by Pajulo et al. (2004) also showed that negative representational change and maternal depressive symptoms are connected, even though that study did not examine the role of prenatal depression.

Drug Abuse, Prenatal Representations, and EA

Our third hypothesis was partially supported among drug-abusing mothers, but not among normative mothers. Our results confirmed the clinically observed U-shaped curve of both idealized and negative prenatal representations as risk factors for the early relationship, but only in the PGT group. Moderate levels for the representations of self-as-mother were optimal for EA in the mother–infant dyads at 4 months whereas, alternatively, having very negative or very positive prenatal representations predicted an interaction style characterized by maternal insensitivity, hostility, and difficulties with scaffolding the child as well as infant’s unresponsiveness toward the mother. Contrary to our hypothesis, among drug-abusing mothers receiving PSS, prenatal representations were not associated with EA. This parallels the findings of Pajulo et al. (2004), who also found no association between prenatal representations and mother–infant interaction among drug-abusing mothers.

Curiously, and in contrast to earlier studies (e.g., Coleman et al., 1999; Flykt et al., 2009), we also found no association between maternal prenatal representations and later mother–infant interaction among comparison-group mothers. It is possible that due to at-risk pregnancies, these mothers experience much prenatal worry and distress, which may, however, be a normative reaction to these difficulties. It could be speculated that if all goes well with the child’s birth, these worries may be easily ameliorated, resulting in no long-lasting adversity due to negative prenatal representations. On the other hand, if at-risk pregnancies end with the birth of a child with health problems, these problems may be more important determinants of later interactive quality than the maternal prenatal representations.

Drug Abuse, Representational Change, and EA

Our results also partially supported the fourth hypothesis. Negative representational change concerning the child and child’s father predicted lower mother–infant EA at 4 months among both drug-abusing and nonusing mothers, thus supporting the principles of EVT. Perceptions of the child may become more negative than expected, for example, due to difficult infant temperament (Campbell, 1979; van den Boom & Hoeksma, 1994) or the experience of parenting as more binding than expected. Concurring with the spillover phenomenon described in family systems theory, a more negative view of the child’s father also affects the mother–child relationship more negatively (Engfer, 1988; Erel & Burman, 1995). Pajulo et al. (2004) found, as did we, that among drug-abusing mothers, negative representational change concerning the child and the child’s father was associated with increased problems in mother–infant interaction. Our result about the negative effect of representational change among normative mothers also concurs with earlier findings (Kach & McGhee, 1982; Kalmuss et al., 1992; Levy-Shiff et al., 1991).

Concerning the one’s own-mother-as-mother representational change, the situation seemed more complex. More positive change was associated with more positive maternal EA among both normative and drug-abusing mothers, supporting the findings of Pajulo et al. (2004). Nonetheless, when considering child EA, the results also revealed substantial differences. In the comparison group, negative maternal representational change concerning one’s own mother also increased the risk of child’s dyadic problems. However, among drug-abusing mothers and especially the PGT mothers, negative representational change actually predicted higher child EA. In addition, similar group differences were evident concerning the self-as-mother representational change. Among normative mothers, negative representational change increased the risk for maternal hostile interactive behavior whereas among both groups of drug-abusing mothers, more negative representational change actually decreased maternal hostility.

These two puzzling results may imply that due to treatment and especially mother–infant PGT, the representations of one’s motherhood and one’s own mother’s ways of mothering become more realistic, which may actually have buffered these mothers against hostile and abusive behavior toward their infant and their children from emotional withdrawal. The association mechanism may differ depending on the source of representations and on the EA domain.

We may assume that more positive change in representations of the self-as-mother reflects denial of one’s own addiction problems and their harmful impact on the child. Positive change in representations of one’s own mother, in turn, reflects a stronger identification with her style of parenting. Among normative mothers, this identification is desirable. But among drug-abusing mothers, who often have experienced negative or even abusive parenting in their own childhood, overly identifying with one’s own mother’s style of parenting also may have detrimental consequences. As Fraiberg, Adelson, and Shapiro (1975) stated in their famous article “Ghosts

in the Nursery: “. . . it is the parent who cannot remember his childhood feelings of pain and anxiety who will need to inflict his pain upon his child” (p. 406). However, it also is vital to find the positive in one’s own mother and to be able to forgive her, which may be reflected in our results of higher maternal structuring and lower intrusiveness at 4 months among all mothers, when there was positive representational change concerning one’s own mother.

In a therapeutic process, clients tend to first become conscious of the difficult past history with their own parents, leading to negative feelings toward them. Yet, later on, if these conflicts are resolved in a successful therapy, the clients may achieve a deeper understanding of their own parents and be able to forgive them. Interestingly, in our study, only in the PGT group did the beneficial effect of positive representational change concerning one’s own mother on maternal EA still remain when the child was 1 year old, possibly suggesting long-term effects of the insight-oriented group therapy. This result concurs with our expectation of more profound changes in PGT due to its focus on maternal psychological insights and sensitivity toward one’s own and the baby’s emotions.

Clinical Implications

Our results provide empirical support for the clinically long-held idea that both negative and idealized prenatal representations constitute a risk to future parenthood among high-risk mothers. Mothers’ negative prenatal expectations of their motherhood may indicate a lack of sufficient maternal attachment and protectiveness toward the baby. On the other hand, excessively high expectations of one’s own motherhood may depict the role assigned to the child as that of a savior of one’s whole life as typically described among drug-abusing mothers (e.g., Belt & Punamäki, 2007). When this idealization is shattered by the reality of a very needy and dependent little baby, the nonintegrated, painful childhood memories may be activated in the mother. Due to these mothers’ poor affect regulation, this may lead to negative, and even enraged, feelings toward the baby and to intrusive interactive behavior (Azar & Rohrbeck, 1986; Twentyman & Plotkin, 1982), which may ultimately result in child abuse (Lyons-Ruth et al., 1987; Miller et al., 1999). Our results also remind us of the vital role of maternal depression, which can be as harmful as maternal drug abuse itself, and thus mental health issues should be especially targeted in maternal drug-abuse interventions.

Clinicians should work to dismantle the unrealistic idealization of motherhood during the prenatal period and to help the mother to replace the idealization concerning her own motherhood with a realistic, but merciful, view of the self-as-mother. Furthermore, it would be imperative to help the mother to sustain positive representations of the child and the child’s father during the transition to motherhood. Simultaneously, clinicians should encourage mothers to reflect and integrate their own negative childhood experiences and to become aware of the deleterious effect of their addiction problems on the child.

Our results add to previous findings (Belt et al., 2011 ; Belt & Punamäki, 2007) of the use of mother–infant PGT among drug-

abusing mothers, and suggest that this treatment may help these high-risk mothers to build and maintain a more positive view of the infant. Our results also show that in the course of successful PGT, the representation of one’s own mother-as-mother also may change more positively and persist after the end of therapy, which would help the mother to more easily relate to her child. It is vital to become conscious of one’s own childhood hardships, but also to reconcile these experiences. Clinical work is crucial in preventing the unprocessed and biased maternal representational contents from being transferred to the mother–infant interaction.

Limitations

There are several limitations to our study. Concerning the sampling of substance-abusing mothers, a randomized setting would have been preferable because self-selection into the intervention type may be affected by both problem severity and capability for self-reflection. Similarly to research in other countries, our drug-abusing mothers had more socioeconomic problems, but matching the comparison mothers on socioeconomic variables unfortunately was not possible. Subsequently, there were many differences between the groups, which were, however, controlled for in the analyses.

The drug-abusing mothers in the present study were motivated for volunteer participation in the interventions and may not be representative of all substance-abusing mothers. In addition, most were able to abstain from drugs after pregnancy recognition (which is, however, often not immediate among drug abusers), so the results cannot be generalized to samples with continuing use, as the infants in our sample apparently suffered fewer teratological fetal effects of drugs. Further, the documentation of licit drugs could have been more comprehensive, and the control for maternal smoking would have been helpful. We were able to control for the effect of maternal depression, but ideally, other well-known risk factors for negative prenatal representations, such as intimate partner violence or negative and traumatic childhood experiences, also could have been controlled. Finally, the sample size was originally quite small, and we lost even more mothers due to dropout. Also note that the effect sizes were small in all analyses.

The choice of research methods deserves criticism. It would have been ideal to use the IRMAG in the interview form to measure for representations. Questionnaires are dependent on the ability for self-reflection, which may be poor among high-risk mothers and especially mothers not motivated for self-reflection in intensive therapy (the PSS group). It also would have been preferable to use a longer period for observation in EAS, as the full range of interaction problems is often not apparent in 10 min in a nonstress context (Biringen et al., 2005).

REFERENCES

- Ammaniti, M., Baumgartner, E., Candelori, C., Perucchini, P., Pola, M., Tambelli, R., & Zampino, F. (1992). Representations and narratives during pregnancy. *Infant Mental Health Journal*, 13, 167–182.

- Ammaniti, M., Tambelli, R., & Perucchini, P. (1998). From pregnancy to the postnatal period: Stability and change of the factorial structure of maternal representations. Unpublished manuscript.
- Azar, S.T., & Rohrbeck, C.A. (1986). Child abuse and unrealistic expectations: Further validation of the Parent Opinion Questionnaire. *Journal of Consulting and Clinical Psychology*, 54, 867–868.
- Bays, J. (1990). Substance abuse and child abuse. *Pediatrics Clinics of North America*, 37, 881–904.
- Beck, A.T. (1967). *Depression: Clinical, experimental and theoretical aspects*. London: Staples Press.
- Beck, C.T. (1995). The effects of postpartum depression on maternal–infant interaction: A meta-analysis. *Nursing Research*, 44, 298–304.
- Beeghly, M., & Tronick, E.Z. (1994). Effects of prenatal exposure to cocaine in early infancy: Toxic effects on the process of mutual regulation. *Infant Mental Health Journal*, 15, 158–175.
- Belt, R., Flykt, M., Punamäki, R.-L., Pajulo, M., Posa, T., Biringen, Z., & Tamminen, T. (2011). Effectiveness of psychodynamic group therapy and psychosocial support in improving maternal mental health and dyadic interaction among drug-abusing mothers. Manuscript submitted for publication.
- Belt, R., & Punamäki, R.-L. (2007). Mother–infant group psychotherapy as an intensive treatment in early interaction among mothers with substance-abuse problems. *Journal of Child Psychotherapy*, 33, 202–220.
- Belt, R., Punamäki, R.-L., Pajulo, M., Posa, T., & Tamminen, T. (2009). Transition to parenthood among substance-abusing mothers: Stressors, supports, coping and mental health. *Journal of Prenatal and Perinatal Psychology and Health*, 20, 27–48.
- Bendersky, M., & Lewis, M. (1998). Arousal modulation in cocaine-exposed infants. *Developmental Psychology*, 34, 555–564.
- Biringen, Z. (2000). Emotional availability: Conceptualization and research findings. *American Journal of Orthopsychiatry*, 70, 104–114.
- Biringen, Z. (2008). *Emotional Availability (EA) Scales Manual (4th ed.): Part 1. Infancy/Early Childhood Version (Child aged 0–5 years)*. Unpublished manuscript.
- Biringen, Z., Damon, J., Grigg, W., Mone, J., Pipp-Siegel, S., Skillern, S., & Stratton, J. (2005). Emotional availability: Differential predictions to infant attachment and kindergarten adjustment based on observation time and context. *Infant Mental Health Journal*, 26, 295–308.
- Blackwell, P.L., Lockman, J., & Kaiser, M. (1999). Mother–infant interaction in drug-affected dyads over the first 9 months of life. *Applied Developmental Science*, 3, 168–177.
- Bretherton, I. (2000). Emotional availability: An attachment perspective. *Attachment and Human Development*, 2, 233–241.
- Brodén, M. (2004). *Graviditetens möjligheter: en tid då relationer skapas och utvecklas [The possibilities of pregnancy: The time when relationships are created and developed]*. Stockholm: Natur och Kultur.
- Brooks, C.S., Zuckerman, B., Bamforth, A., Cole, J., & Kaplan-Sanoff, M. (1994). Clinical issues related to substance-involved mothers and their infants. *Infant Mental Health Journal*, 15, 202–217.
- Burns, K., Chetnik, L., Burns, W.J., & Clark, R. (1991). Dyadic disturbances in cocaine-abusing mother and their infants. *Journal of Clinical Psychology*, 47, 316–319.
- Burns, K.A., Chetnik, L., Burns, W.J., & Clark, R. (1997). The early relationships of drug-abusing mothers and their infants: An assessment at eight to twelve months of age. *Journal of Clinical Psychology*, 53, 279–287.
- Campbell, S.B. (1979). Mother–infant interaction as a function of maternal ratings of temperament. *Child Psychiatry and Human Development*, 10, 67–76.
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Cohen, L., & Slade, A. (2000). The psychology and psychopathology of pregnancy: Reorganization and transformation. In C.H. Zeanah (Ed.), *Handbook of infant mental health* (2nd ed., pp. 20–36). New York: Guilford Press.
- Coleman, P., Nelson, E.S., & Sundre, D.L. (1999). The relationship between prenatal expectations and postnatal attitudes among first-time mothers. *Journal of Reproductive and Infant Psychology*, 17, 27–39.
- Conte, G.L., Mazzoni, S., Serretti, A., Fundaro, C., & Tempesta, E. (1994). “Separation” of the mother–child couple: Pregnancy and maternity of drug-dependent women. *Acta Paediatrica (Suppl.)*, 404, 47–53.
- Cox, J.L., Holden, J.M., & Sagovsky, R. (1987). Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, 150, 782–786.
- Crittenden, P.M., & DiLalla, D.L. (1988). Compulsive compliance: The development of an inhibitory coping strategy in infancy. *Journal of Abnormal Child Psychology*, 16, 585–599.
- Dayton, C.J., Levendosky, A.A., Davidson, W.S., & Bogat, G.A. (2010). The child in the mind of the mother: The influence of prenatal maternal representations on parenting behaviors. *Infant Mental Health Journal*, 31, 220–241.
- Declaration of Helsinki www.wma.net/en/30publications/10policies/b3/
- Drake, E.E., Humenick, S.S., Amankwaa, L., Younger, J., & Roux, G. (2007). Predictors of maternal responsiveness. *Journal of Nursing Scholarship*, 39, 119–125.
- Elliott, J., Lubin, D.A., Walker, C.H., & Johns, J.M. (2001). Acute cocaine alters oxytocin levels in the medial preoptic area and amygdala of lactating rat dams: Implications for cocaine-induced changes in maternal behavior and maternal aggression. *Neuropeptides*, 35, 1–8.
- Emde, R.N. (1980). Emotional availability: A reciprocal system for infants and parents with implications for prevention of psychosocial disorders. In P.M. Taylor (Ed.), *Parent–infant relationships* (pp. 87–115). Orlando, FL: Grune & Stratton.
- Engfer, A. (1988). The inter-relatedness of marriage and the mother–child relationship. In R.A. Hinde & J. Stevenson-Hinde (Eds.), *Relationships within families: Mutual influences* (pp. 104–118). University of Michigan: Clarendon Press.
- Erel, O., & Burman, B. (1995). Interrelatedness of marital relations and parent–child relations: A meta-analytic review. *Psychological Bulletin*, 118, 108–132.

- Fava Vizziello, G., Antonioli, M.E., Cocci, V., & Invernizzi, R. (1993). From pregnancy to motherhood: The structure of representative and narrative change. *Infant Mental Health Journal*, 14, 4–16.
- Flykt, M., Lindblom, J., Punamäki, R.-L., Poikkeus, P., Repokari, L., Unkila-Kallio, L. et al. (2009). Prenatal expectations in transition to parenthood: Former infertility and family dynamic considerations. *Journal of Family Psychology*, 23, 779–789.
- Fraiberg, S., Adelson, E., & Shapiro, V. (1975). Ghosts in the nursery: A psychoanalytic approach to the problems of impaired infant–mother relationships. *American Academy of Child Psychiatry*, 14, 387–422.
- Fraser, J.G., Harris-Britt, A., Thakkallapalli, E.L., Kurtz-Costes, B., & Martin, S. (2010). Emotional availability and psychosocial correlates among mothers in substance-abuse treatment and their young infants. *Infant Mental Health Journal*, 31, 1–15.
- Hackel, L.S., & Ruble, D.N. (1992). Changes in marital relationship after the first baby is born: Predicting the impact of expectancy disconfirmation. *Journal of Personality and Social Psychology*, 62, 944–957.
- Hans, S.L. (1999). Demographic and psychosocial characteristics of substance-abusing pregnant women. *Clinics in Perinatology*, 26, 55–74.
- Hans, S.L., Bernstein, V.J., & Henson, L.G. (1999). The role of psychopathology in the parenting of drug-dependent women. *Development and Psychopathology*, 11, 957–977.
- Hans, S.L., & Jeremy, R.J. (2001). Postneonatal mental and motor development of infants exposed in utero to opioid drugs. *Infant Mental Health Journal*, 22, 300–315.
- Hennigan, K.M., O’Keefe, M., Noether, C.D., Rinehart, D.J., & Russell, L.A. (2006). Through a mother’s eyes: Sources of bias when mothers with co-occurring disorders assess their children. *Journal of Behavioral Health Services & Research*, 33, 87–104.
- Johns, J.M., Elliott, D.L., Hoffer, V.E., Joyner, P.W., McMurray, M.S., Jarrett, T.M. et al. (2005). Cocaine treatment and prenatal environment interact to disrupt intergenerational maternal behavior in rats. *Behavioral Neuroscience*, 119, 1605–1618.
- Johns, J.M., Noonan, L.R., Zimmerman, L.I., Li, L., & Pedersen, C.A. (1994). Effects of chronic and acute cocaine treatment on maternal behavior and aggression in Sprague-Dawley rats. *Behavioral Neuroscience*, 108, 107–112.
- Johnson, A.L., Morrow, C.E., Accornero, V.H., Xue, L., Anthony, J.C., & Banstra, E.S. (2002). Maternal cocaine use: Estimated effects on mother–child play interactions in the preschool period. *Developmental and Behavioral Pediatrics*, 23, 191–202.
- Johnson, H.L., Glassman, M.B., Fiks, K.B., & Rosen, T.S. (1990). Resilient children: Individual differences in developmental outcome of children born to drug abusers. *Journal of Genetic Psychology*, 151, 523–539.
- Kach, J.A., & McGhee, P.E. (1982). Adjustment of early parenthood: The role of accuracy of preparenthood experiences. *Journal of Family Issues*, 3, 375–388.
- Kalmuss, D., Davidson, A., & Cushman, L. (1992). Parenting expectations, experiences and adjustment to parenthood: A test of violated expectations framework. *Journal of Marriage and the Family*, 54, 516–526.
- Larney, B., Cousens, P., & Nunn, K. (1997). Maternal representations reassessed. *Clinical Child Psychology and Psychiatry*, 2, 125–144.
- Lester, B.M., Boukydis, C.F.Z., & Twomey, J.E. (2000). Maternal substance abuse and child outcome. In C.H. Zeanah (Ed.), *Handbook of infant mental health* (2nd ed., pp. 161–175). New York: Guilford Press.
- Lester, B.M., & Tronick, E.Z. (1994). The effects of prenatal cocaine exposure and child outcome. *Infant Mental Health Journal*, 15, 107–120.
- Levy-Shiff, R., Goldshmidt, I., & Har-Even, D. (1991). Transition to parenthood in adoptive families. *Developmental Psychology*, 27, 131–140.
- Levy-Shiff, R., Lerman, M., Har-Even, D., & Hod, M. (2002). Maternal adjustment and infant outcome in medically defined high-risk pregnancy. *Developmental Psychology*, 38, 93–103.
- Lubin, D.A., Elliott, J.C., Black, M.C., & Johns, J.M. (2003). An oxytocin antagonist infused into the central nucleus of the amygdala increases maternal aggressive behavior. *Behavioral Neuroscience*, 117, 195–201.
- Lyons-Ruth, K., Connell, D.B., Zoll, D., & Stahl, J. (1987). Infants at social risk: Relations among infant maltreatment, maternal behavior, and infant attachment behavior. *Developmental Psychology*, 23, 223–232.
- Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood and adulthood: A move to the level of representation. In I. Bretherton & E. Waters (Eds.), *Growing points of attachment theory and research*. Monographs of the Society for Research in Child Development, 50(1–2, Serial No. 209), 66–104.
- Maloni, J.A., Park, S., Anthony, M.K., & Musil, C.M. (2005). Measurement of antepartum depressive symptoms during high-risk pregnancy. *Research in Nursing & Health*, 28, 16–26.
- Mayes, L., Feldman, R., Granger, R.H., Haynes, O.M., Bornstein, M.H., & Schottenfeld, R. (1995). The effects of polydrug use with and without cocaine on mother–infant interaction at 3 and 6 months. *Infant Behavior & Development*, 20, 489–502.
- Milgrom, J., & McCloud, P. (1996). Parenting stress and postnatal depression. *Stress Medicine*, 12, 177–186.
- Miller, B.A., Smyth, N.J., & Mudar, P.J. (1999). Mothers’ alcohol and other drug problems and their punitiveness toward their children. *Journal of Studies on Alcohol*, 60, 632–642.
- Molitor, A., & Mayes, L.C. (2010). Problematic dyadic interaction among toddlers and their polydrug-cocaine-using mothers. *Infant Mental Health Journal*, 31, 121–140.
- Negy, C., Schwartz, S., & Reig-Ferrer, A. (2009). Violated expectations and acculturative stress among U.S. Hispanic immigrants. *Cultural Diversity and Ethnic Minority Psychology*, 15, 255–264.
- Osgood, C.E., & Suci, G.J. (1952). A measure of relation determined by both mean difference and profile information. *Psychological Bulletin*, 49, 251–262.
- Pajulo, M. (2001). Early motherhood at risk: Mothers with substance dependency. Unpublished doctoral dissertation, University of Turku, Finland.

- Pajulo, M., Savonlahti, E., Sourander, A., Ahlqvist, S., Helenius, H., & Piha, J. (2001). An early report on the mother–baby interactive capacity of substance-abusing mothers. *Journal of Substance Abuse Treatment*, 20, 143–151.
- Pajulo, M., Savonlahti, E., Sourander, A., Piha, J., & Helenius, H. (2001). Prenatal maternal representations: Mothers at psychosocial risk. *Infant Mental Health Journal*, 22, 529–544.
- Pajulo, M., Savonlahti, E., Sourander, A., Piha, J., & Helenius, H. (2004). Maternal representations, depression and interactive behaviour in the postnatal period: A brief report. *Journal of Reproductive and Infant Psychology*, 22, 91–98.
- Pajulo, M., Suchman, N., Kalland, M., & Mayes, L. (2006). Enhancing the effectiveness of residential treatment for substance abusing pregnant and parenting women: Focus on maternal reflective functioning and mother–child relationship. *Infant Mental Health Journal*, 27, 448–465.
- Pearce, H., & Ayers, S. (2005). The expected child versus the actual child: Implications for the mother–baby bond. *Journal of Reproductive and Infant Psychology*, 23, 89–102.
- Priel, B., & Kantor, B. (1988). The influence of high-risk pregnancies and social support systems on maternal perceptions of the infant. *Infant Mental Health Journal*, 9, 235–244.
- Rehman, U.S., Gollan, J., & Mortimer, A.R. (2008). The marital context of depression: Research, limitations and new directions. *Clinical Psychology Review*, 28, 179–198.
- Rodning, C., Beckwith, L., & Howard, J. (1991). Quality of attachment and home environments in children prenatally exposed to PCP and cocaine. *Development and Psychopathology*, 3, 351–366.
- Ruble, D.N., Hackel, L.S., Fleming, A.S., & Stangor, C. (1988). Changes in marital relationship during the transition to first time motherhood: Effects of violated expectations concerning division of household labor. *Journal of Personality and Social Psychology*, 55, 78–87.
- Salo, S., Kivistö, K., Korja, R., Biringen, Z., Tupola, S.-M., Kahila, H. et al. (2009). Emotional availability, parental self-efficacy beliefs and child development in caregiver–child relationships with buprenorphine-exposed 3-year-olds. *Parenting*, 9, 244–259.
- Salo, S., Politi, J., Tupola, S.-M., Biringen, Z., Kalland, M., Halmesmüki, E. et al. (2010). Early development of opioid-exposed infants born to mothers in buprenorphine-replacement therapy. *Journal of Reproductive and Infant Psychology*, 28, 161–179.
- Sameroff, A.J., & Fiese, B.H. (1990). Transactional regulation and early intervention. In S.J. Meisels & J.P. Shonkoff (Eds.), *Handbook of early childhood intervention* (pp. 119–149). New York: Cambridge University Press.
- Saunders, J.B., Aasland, O.G., Babor, T.F., de la Fuente, J.R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons With Harmful Alcohol Consumption: II. *Addiction*, 88, 791–804.
- Savonlahti, E., Pajulo, M., Ahlqvist, S., Helenius, H., Korvenranta, H., Tamminen, T., & Piha, J. (2005). Interactive skills of infants with their high-risk mothers. *Nordic Journal of Psychiatry*, 59, 139–147.
- Shankaran, S., Das, A., Bauer, C.R., Bada, H.S., Lester, B., Wright, L.L., & Smeriglio, V. (2004). Association between patterns of maternal substance use and infant birth weight, length and head circumference. *Pediatrics*, 114, 226–234.
- Stern, D.N. (1995). *The motherhood constellation: A unified view of parent–infant psychotherapy*. New York: Basic Books.
- Stern, D.N., & Bruschweiler-Stern, N. (1998). *The birth of a mother*. New York: Basic Books.
- Suchman, N., De Coste, C., Castiglioni, N., Legow, N., & Mayes, L. (2008). The mothers and toddlers program: Preliminary findings from an attachment-based parenting intervention for substance abusing mothers. *Psychoanalytic Psychology*, 25(3), 499–517.
- Suchman, N., McMahon, T., & Luthar, S. (2004). Interpersonal maladjustment as predictor of mothers' response to a relational parenting intervention. *Journal of Substance Abuse Treatment*, 27, 135–143.
- Swanson, K., Beckwith, L., & Howard, J. (2000). Intrusive caregiving and quality of attachment in prenatally drug-exposed toddlers and their primary caregivers. *Attachment and Human Development*, 2, 130–148.
- Theran, S.A., Levondosky, A.A., Bogat, G.A., & Huth-Bocks, A.C. (2005). Stability and change in mothers' internal representations of their infants over time. *Attachment and Human Development*, 7, 253–268.
- Thun-Hohenstein, L., Wienerroither, C., Schreuer, M., Seim, G., & Wienerroither, H. (2008). Antenatal mental representations about the child and mother–infant interaction at three months post partum. *European Child and Adolescent Psychiatry*, 17, 9–19.
- Tronick, E.Z., Messinger, D.S., Weinberg, M.K., Lester, B.M., LaGasse, L., Seifer, R. et al. (2005). Cocaine exposure is associated with subtle compromises of infants' and mothers' social-emotional behavior and dyadic features of their interaction in the face-to-face still-face paradigm. *Developmental Psychology*, 41, 711–722.
- Twentyman, C.T., & Plotkin, R.C. (1982). Unrealistic expectations of parents who maltreat their children: An educational deficit that pertains to child development. *Journal of Clinical Psychology*, 38, 497–503.
- van den Boom, D.C., & Hoeksma, J.B. (1994). The effect of infant irritability on mother–infant interaction: A growth-curve analysis. *Developmental Psychology*, 30, 581–590.
- Ward, M.J., & Carlson, E.A. (1995). Associations among adult attachment representations, maternal sensitivity and infant–mother attachment in a sample of adolescent mothers. *Child Development*, 66, 69–79.
- Wendland, J., & Miljkovitch, I. (2003). From late pregnancy to six months postpartum: Content and evolution of high-risk primiparous single mother's conscious representations. *Journal of Social and Clinical Psychology*, 22, 745–770.
- Zuckerman, B., & Brown, E.R. (1993). Maternal substance abuse and infant development. In C.H. Zeanah (Ed.), *Handbook of infant mental health* (pp. 143–158). New York: Guilford Press.