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A large, stylized graphic of a tree with a thick trunk and many rounded, fan-like branches, rendered in a lighter shade of purple, positioned on the left side of the cover.

**PRENATAL REPRESENTATIONS,
EARLY FAMILY RELATIONSHIPS,
AND CHILD SOCIAL-EMOTIONAL
DEVELOPMENT: THE FATHER'S
CONTRIBUTION**

Johanna Lindstedt



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PRENATAL REPRESENTATIONS, EARLY FAMILY RELATIONSHIPS, AND CHILD SOCIAL-EMOTIONAL DEVELOPMENT: THE FATHER'S CONTRIBUTION

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The originality of this publication has been checked in accordance with the University of Turku quality assurance system using the Turnitin OriginalityCheck service.

ISBN 978-951-29-9943-9 (PRINT)
ISBN 978-951-29-9944-6 (PDF)
ISSN 0082-6987 (Print)
ISSN 2343-3191 (Online)
Painosalama, Turku, Finland 2024

To all my dear family and friends

UNIVERSITY OF TURKU

Faculty of Social Sciences

Department of Psychology and Speech-Language Pathology

Psychology

JOHANNA LINDSTEDT: Prenatal Representations, Early Family

Relationships and Child Social-Emotional Development: The Father's

Contribution

Doctoral Dissertation, 131 pp.

Doctoral Program of Social and Behavioral Sciences

November 2024

ABSTRACT

Family relationships begin to develop during pregnancy and provide the context for a child's early social-emotional development. However, the contribution of parental prenatal representations and early parent-child relationships, particularly those of fathers, are less studied. This thesis examined the associations between fathers' and mothers' prenatal representations, early parent-child interaction, triadic family interaction, and the early social-emotional development of children in two-parent families, with particular emphasis on early father-child relationships. The data were collected as part of the multidisciplinary Steps to the Healthy Development and Well-being of Children cohort study. Families ($n = 153$) were followed from pregnancy until the child was 18 months old.

The aims of this thesis were to examine 1) associations between fathers' prenatal representations and postnatal father-child interaction (Study I), 2) the change and stability in father-child interaction from infancy to toddlerhood (Study I), 3) associations between dyadic parent-child interaction and triadic family interaction (Study II), and 4) fathers' and mothers' prenatal representations and their associations with a child's social-emotional development (Study III).

The results showed that fathers' balanced prenatal representations were associated with higher quality in early father-child interaction. Both positive changes and moderate stability in dyadic father-child interaction were observed from infancy to toddlerhood. Well-functioning parent-child interaction, particularly between fathers and children, was associated with higher family coordination and cooperative family alliance in toddlerhood. In addition, both parents' balanced prenatal representations were associated with higher social-emotional competence in children.

The findings of this thesis highlight the importance of balanced prenatal representations and well-functioning early parent-child relationships. Both father-child and mother-child relationships play essential roles in shaping triadic family interaction and enhancing a child's early social-emotional competence.

KEYWORDS: prenatal representations, fathers, transition to parenthood, dyadic parent-child interaction, triadic family interaction, social-emotional development, Steps to the Healthy Development and Well-being of Children

TURUN YLIOPISTO

Yhteiskuntatieteellinen tiedekunta

Psykologian ja logopedian laitos

Psykologia

JOHANNA LINDSTEDT: Raskausajan mielikuvat, varhaiset perhesuhteet ja lapsen sosioemotionaalinen kehitys: Isän merkitys

Väitöskirja, 131 s.

Yhteiskunta- ja käyttäytymistieteiden tohtoriohjelma

Marraskuu 2024

TIIVISTELMÄ

Perhesuhteet alkavat kehittyä jo raskausaikana luoden puitteet lapsen varhaiselle sosioemotionaaliselle kehitykselle. Vanhempien raskaudenaikaisten mielikuvien ja varhaisten vanhempi-lapsisuhteiden merkitystä on tutkittu kuitenkin vasta vähän, erityisesti isien osalta. Tässä väitöskirjassa tutkittiin isien ja äitien raskaudenaikaisten mielikuvien, varhaisen vanhemman ja lapsen välisen vuorovaikutuksen, perheen triadisen vuorovaikutuksen ja lapsen sosioemotionaalisen kehityksen välisiä yhteyksiä kahden vanhemman perheissä painottaen erityisesti varhaisia isä-lapsisuhteita. Aineisto kerättiin osana monitieteistä Hyvän kasvun avaimet -kohorttitutkimusta. Perheitä ($n = 153$) seurattiin raskaudesta alkaen siihen asti, kunnes lapsi oli 18 kuukauden ikäinen.

Tämän väitöskirjan tavoitteena oli tutkia 1) isän raskaudenaikaisten mielikuvien yhteyksiä isän ja lapsen väliseen vuorovaikutukseen (tutkimus I), 2) isän ja lapsen välisessä vuorovaikutuksessa tapahtuvia muutoksia ja pysyvyyttä vauvaiästä taaperoiikään (tutkimus I), 3) vanhemman ja lapsen dyadisen vuorovaikutuksen ja perheen triadisen vuorovaikutuksen välisiä yhteyksiä (tutkimus II) ja 4) isien ja äitien raskaudenaikaisten mielikuvien yhteyksiä lapsen sosioemotionaaliseen kehitykseen (tutkimus III).

Tulokset osoittivat, että isän tasapainoiset raskaudenaikaiset mielikuvat olivat yhteydessä laadukkaampaan isän ja vauvan väliseen vuorovaikutukseen. Isän ja lapsen välisessä vuorovaikutuksessa havaittiin sekä myönteisiä muutoksia että pysyvyyttä vauvaiästä taaperoiikään. Hyvin toimiva vanhemman ja lapsen välinen vuorovaikutus, erityisesti isän ja lapsen välillä, oli yhteydessä perheen triadisen vuorovaikutuksen parempaan koordinaatioon ja kooperatiiviseen allianssiin taaperovaiheessa. Kummankin vanhemman tasapainoiset raskaudenaikaiset mielikuvat olivat lisäksi yhteydessä lapsen parempaan sosiaaliseen kompetenssiin. Tulokset korostavat tasapainoisten raskaudenaikaisten mielikuvien ja hyvin toimivien varhaisten vanhemman ja lapsen välisten suhteiden merkitystä. Sekä isä-lapsi- että äiti-lapsisuhteella on merkitystä perheen triadisen vuorovaikutuksen ja lapsen sosioemotionaalisen kehityksen näkökulmasta.

ASIASANAT: raskaudenaikaiset mielikuvat, isät, siirtymä vanhemmuuteen, vanhemman ja lapsen dyadinen vuorovaikutus, perheen triadinen vuorovaikutus, lapsen sosioemotionaalinen kehitys, Hyvän kasvun avaimet

Acknowledgements

First of all, I would like to thank my supervisors, Docent Sari Ahlqvist-Björkroth and Professor Riikka Korja, who have supported and encouraged me to follow my own path as a doctoral researcher. I would especially like to thank Sari for providing me with several opportunities to expand my knowledge and develop as a researcher over the years. I am grateful to have had the opportunity to have a mentor like you in my life. I would also like to thank Riikka for giving me insight into family research and the scientific world and for strengthening my self-confidence during this process.

I sincerely thank my esteemed opponent, Professor Anna Rönkä, for the time she devoted to my dissertation. I am grateful to her and Professor Hedwig van Bakel for reviewing my thesis and providing valuable and insightful comments.

I am grateful to all the families who took part in the STEPS study, engaged in timely assessments, and shared their experiences of parenthood and family life in a very special and valuable way. You are the stars of this thesis.

I would like to thank the STEPS study team and all my co-authors for their collaboration, especially Professor Niina Junttila for statistical guidance and support in the persistent and demanding process of publication. I would also like to express my gratitude to my colleagues and fellow researchers for the inspiring discussions during the process.

I would like to thank the University of Turku Graduate School, the Signe and Ane Gyllenberg Foundation, and the Turku University Foundation for their financial support for this thesis. I am also grateful for all the financial and social support I have received from the Department of Psychology and Speech-Language Pathology.

My warmest thanks go to my dear family and friends for their endless support and encouragement over the years. In particular, I would like to thank my husband and children for their understanding and patience during these busy years.

Finally, writing this thesis has been a long and fulfilling journey, an adventure I will look back on with gratitude.

Paattinen, November 2024
Johanna Lindstedt

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List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

- I Lindstedt, J., Korja, R., Vilja, S., & Ahlqvist-Björkroth, S. Fathers' prenatal attachment representations and the quality of father-child interaction in infancy and toddlerhood. *Journal of Family Psychology*, 2021; 35(4), 478–488.
- II Lindstedt, J., Ahlqvist-Björkroth, S., Junttila, N., & Korja, R. Latent profiles of dyadic parent-child interaction and associations with triadic family interaction in early childhood. *Family Relations*, 2024; 73(4), 2564–2581.
- III Lindstedt, J., Korja, R., Carter, A., Pihlaja, P., & Ahlqvist-Björkroth, S. Parental prenatal representations of the child are related to 18-month-old children's social-emotional competence. *Attachment & Human Development*, 2024; 26(4), 383–401.

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1 Introduction

Family relationships are the context for a child's cognitive and social-emotional development (Cabrera et al., 2014). Family life, particularly in Western countries, has undergone extensive reorganization, driven by societal changes that are still ongoing (Abraham & Feldman, 2022; Bakermans-Kranenburg et al., 2019). Contemporary fathers are more involved compared to previous generations, and both parents provide exploration and psychological security for the infant (Grossmann et al., 2008; Schoppe-Sullivan & Fagan, 2020). Although the father's crucial role in child development and well-being has been acknowledged for several decades, and substantial progress has been made in father research during the 21st century, most parenting research still focuses on mothers (Cabrera et al., 2018; Schoppe-Sullivan & Fagan, 2020). Even less is known about the development of the early father-child relationship from the prenatal to postnatal period and the effects on later child outcomes. Therefore, this thesis aims to address these questions by focusing on the transition to fatherhood and early father-child relationships in the context of two-parent heteronormative families.

Family relationships and roles change during significant life transitions, such as the birth of a child. Therefore, pregnancy provides an opportunity to examine family relationships from a special viewpoint. For women, pregnancy provides intense physical experiences that coincide with a deepening of the maternal emotional bond toward the fetus (Slade et al., 2009; Yarcheski et al., 2009). It has been shown that father-infant relationships also begin to form during pregnancy when the father's thoughts and feelings about his infant first evolve and fathers form a prenatal emotional bond with their infant (Diamond, 2017; Habib & Lancaster, 2010; Leckman et al., 2004; Vreeswijk, Maas, Rijk, & van Bakel, 2014). A successful transition to fatherhood is important as it predicts more optimal involvement of the father in a child's life in subsequent years and positive child outcomes, such as lower frequency of behavioral and psychological problems and better cognitive development (Abraham & Feldman, 2022; Bakermans-Kranenburg et al., 2019; Sarkadi et al., 2008; Sethna et al., 2017).

For children, early experiences with parents build a basis for a sense of security in the attachment relationship. The attachment relationships are based on

bidirectional processes and aim to provide security and protection for the infant. Through repeated interactions and experiences with caregivers, children construct mental templates, internal working models or representations, of their interpersonal environment (Bowlby, 1982). In this sense, feelings of attachment are mutually created experiences, and the quality of the parent–infant relationship is reflected in these working models (Bowlby, 1969; Peluso et al., 2004; Stern, 1985). Sensitive and responsive interaction promotes the development of secure attachment, which represents children’s confidence and trust in the caregiver to meet their needs (Ainsworth et al., 1978; De Wolff & Van Ijzendoorn, 1997). The benefits of secure attachment have been widely recognized, including positive social-emotional development in many domains and an ability to form close relationships with others (Bretherton, 2010; Groh et al., 2017).

The attachment system of the infant is complemented by a reciprocal caregiving system in the parent, which aims to offer care and protection for the infant (Bowlby, 1982; Solomon & George, 1996). The caregiving system is derived from the parent’s own working models of attachment (Bowlby, 1982; Slade & Aber, 1992). When an individual becomes a parent, previous attachment experiences are expected to be transformed and integrated into a system that is organized to provide protection for the infant. This transition typically begins during pregnancy, as expectant parents form representations of the infant by imagining who the infant will turn out to be (de Cock et al., 2016). Once the baby is born, representations are complemented with concrete experiences with the infant (Solomon & George, 1996).

Current models suggest that parent–child relationships are examined using family-level approaches that focus on the individual and interrelated effects of each relationship on child outcomes (e.g., Adamsons & Johnson, 2013; Cabrera, 2020; Dagan & Sagi-Schwartz, 2018). Family systems theory provides a framework for understanding associations between family relationships at multiple levels (Fagan, 2020; Minuchin, 1985). According to this theory, a child’s early relational context includes several interrelated relationships, such as parent–child, coparenting, couple, and triadic relationships (Cox & Paley, 2003; Cummings & Davies, 2002; McHale & Lindahl, 2011; Minuchin, 1985). The quality and functioning of these relationships provide the basis for a child to learn social skills, emotion regulation, and a sense of attachment security (e.g., De Wolff & Van Ijzendoorn, 1997; Favez, Frascarolo, Carneiro et al., 2006; Favez et al., 2012; Feldman & Masalha, 2010; McHale & Rasmussen, 1998).

This thesis combines various theoretical frameworks and concepts and that are crucial to understanding the transition to parenthood, early family relationships, and child development. It aims to contribute to the family literature by examining the associations between parental prenatal representations, early parent–child relationships, triadic family interaction, and a child’s early social-emotional

development in a prospective nonclinical study. Particular emphasis is given to the father–child relationship in the context of heteronormative two-parent families.

1.1 Transition to Parenthood

Pregnancy and childbirth are crucial transitions for individuals but also for entire families requiring psychological adjustment. Expectant parents build their relationship with the fetus and prepare psychologically for the postnatal caregiving of their infant (Raphael-Leff, 2005; Slade & Sadler, 2019; Trombetta et al., 2021; Vreeswijk, Maas, Rijk, & van Bakel, 2014). Psychological changes occur simultaneously with neurobiological and hormonal changes in both parents, which are activated during pregnancy and continue after birth (Abraham et al., 2014; Bakermans-Kranenburg et al., 2019; Edelstein et al., 2017; Giannotti et al., 2022). These changes prepare expectant parents for parenting their newborn (Dayton et al., 2019).

Due to the interrelatedness of family relationships, the transition to parenthood affects several subsystems in the family (Cox & Paley, 1997; Minuchin, 1985). The pregnant couple expecting their first child undergoes a transition from the dyad into the family triad which includes the processing of future triadic relationships with the baby (von Klitzing et al., 1999). Moreover, the coparental relationship, which refers to parental coordination of caregiving responsibilities and roles, becomes active within the parental subsystem (Feinberg, 2002; Kuersten-Hogan, 2017; McHale, 1997; Shannon et al., 2013). Changes in couple relationships are also inevitable during the transition to parenthood, often reported as experiences of decline in couple relationship satisfaction (Knappe et al., 2021; Lawrence et al., 2008). On the other hand, partners may provide support for each other and contribute positively to each parent's relationship with the child (Cuijilts et al., 2019; Da Rosa et al., 2021; de Cock et al., 2016). The arrival of a new family member also requires an adjustment of existing relationships in families already having children, as parental roles accommodate increased childcare needs and siblings also need to adjust to changing family dynamics (Kuo et al., 2018; Volling, 2005).

The experiences of men in transition to parenthood have been less studied compared to those of women. However, a successful transition provides an optimal basis for subsequent fatherhood (Bakermans-Kranenburg et al., 2019). In addition, the active involvement of men during pregnancy benefits not only maternal health behaviors and fetal outcomes, but also paternal engagement in postnatal caregiving (Alio et al., 2010; Cabrera et al., 2008; Zvara et al., 2013). As has been demonstrated, both parents develop an emotional bond toward the fetus during pregnancy (Condon et al., 2013; de Cock et al., 2016). However, men lack a physical connection with the fetus, and some expectant fathers report experiencing emotional distance from the

infant during pregnancy (Dayton et al., 2019; Draper, 2002; van Bakel et al., 2013; Vreeswijk, Maas, Rijk, & van Bakel, 2014). The expectant father's ability to experience the fetus is limited to a psychological connection, and their pregnant partners play a crucial role in mediating information about the fetus (Condon et al., 2013; Dayton et al., 2019; Vreeswijk, Maas, Rijk, & van Bakel, 2014). This places pregnant women in a gatekeeping role, enabling or inhibiting the expectant father's engagement with the fetus during pregnancy, which may impact the development of the prenatal father–infant relationship (Condon et al., 2013; Schoppe-Sullivan et al., 2008).

During the transition, expectant parents undergo psychological reorganization and process their identities as prospective caregivers (Raphael-Leff, 2005; Slade, et al., 2009; Vreeswijk, Maas, Rijk, & van Bakel, 2014). Simultaneously, parents' attachment systems are activated, provoking them to reflect on their own experiences of early care (Brodén, 2004; Slade et al., 2009). Expectant parents identify with their own parents while simultaneously developing their own parental identities (Solomon & George, 1996; Brodén, 2004). The attachment system activated during pregnancy is biologically based and intended to secure the provision of care and affection toward the infant, who is dependent on parental care (Bowlby, 1969, 1982; Emde, 1991). Through psychological reorganization, parents begin to perceive themselves as providers of care instead of being cared for (Solomon & George, 1996). Prenatal psychological reorganization forms the basis for the caregiving system guiding early parenting practices after the child is born (Dayton et al., 2010; Solomon & George, 1996).

1.2 Parental Prenatal Representations

As pregnancy progresses, parental representational processes of the expected child and themselves as nurturing parents are activated (Brodén, 2004; Raphael-Leff, 2005; Slade et al., 2009). These processes are interrelated and complementary (Ammaniti et al., 1992; Brodén, 2004). Parental representations include expectations, ideas, and experiences related to the expected child and the parent–child relationship, providing insight into the meaning of the child for the expectant parent (Benoit, Parker, et al., 1997). Representations are based on an individual's previous experiences, especially with their own attachment figures and caregivers (Stern, 1995). The circumstances of childbirth, the characteristics of the infant, and aspects of one's social and romantic relationships may also affect the quality of representations (George & Solomon, 2008). However, as the pregnancy progresses and the parent–infant relationship develops, parental representations increasingly reflect the actual relationships with the expected infant and the contributions of the infant's own personality (Maysseless, 2006).

Research has demonstrated that both mothers and fathers develop representations during pregnancy (Ahlqvist-Björkroth et al., 2016; Benoit, Parker, et al., 1997; Vreeswijk, Maas, Rijk, & van Bakel, 2014). Thus, fathers' representations do not require actual interaction experiences with the child but develop from an underlying capacity to create a relationship with the imagined baby (Dayton et al., 2010). Maternal representations become clearer and richer by the third trimester of pregnancy, when the fetus becomes more vital and individual through perceived movements and ultrasound images (Ammaniti et al., 1992; Slade et al., 2009; Brodén, 2004). Feeling fetal movements and seeing the fetus on the ultrasound screen are important experiences also for men, for example by strengthening the paternal–fetal bond, processing the parental role, and offering feelings of becoming a family (Draper, 2002; Ekelin et al., 2004; Freeman, 2000; Tolman et al., 2021; Walsh et al., 2014). As pregnancy progresses, paternal emotional connection and interaction with the fetus seem to increase (Draper, 2002; Habib & Lancaster, 2010; Tambelli et al., 2020). However, knowledge regarding the representational process of fathers and the factors associated with it is still limited.

The quality of parental representations is often assessed using interviews that focus on parental narratives about their fetus and the relationship with it, including various classifications of parental representations. One commonly used method is the Working Model of Child Interview (WMCI; Benoit, Zeanah, et al., 1997; Zeanah et al., 1994), which assesses the qualitative features and coherence of the parental narrative. Higher coherence of parental narrative indicates more organized representations of the parent–child relationship (Benoit, Zeanah, et al., 1997; Hesse, 2008; Zeanah et al., 2000). The WMCI classifies parental representations into three categories: balanced, disengaged, and distorted representations. These classifications have shown high concordance with a child's attachment classification assessed in the Strange Situation Procedure (SSP; Ainsworth et al., 1978) and parents' own attachment experiences measured using the Adult Attachment Inventory (AAI; George, Kaplan, & Main, 1985) (Vreeswijk et al., 2012).

Parental balanced representations are coherent descriptions of the infant's positive and negative characteristics, including high levels of involvement, acceptance, and caregiving sensitivity (Benoit, Zeanah, et al., 1997). Balanced prenatal representations are more often found among first-time parents compared to nonprimiparous parents (Vreeswijk, Maas, Rijk, & van Bakel, 2014; Vreeswijk et al., 2015). Disengaged representations are characterized by emotional distance, detachment, and indifference towards the child (Benoit, Zeanah, et al., 1997). Distorted representations, on the other hand, reflect internal inconsistencies, preoccupation, or overwhelming feelings about the infant, lacking coherence.

Representations of both parents demonstrate substantial stability from pregnancy to the postnatal period, especially regarding balanced representations

(Benoit, Parker, et al., 1997; Theran et al., 2005; Vreeswijk, Maas, Rijk, Braeken, et al., 2014). However, nonbalanced representations are less stable and may develop into balanced representations postnatally, indicating openness to adjustment after the child's birth (Vreeswijk, Maas, Rijk, Braeken, et al., 2014). This may be especially true for fathers whose prenatal representations indicate higher disengagement (Vreeswijk, Maas, Rijk, & van Bakel, 2014). However, maternal distorted representations also show substantial stability (Benoit, Parker, et al., 1997).

Knowledge of the predictive value of parental prenatal representations is limited. However, the benefits of balanced prenatal or postnatal representations have been demonstrated (Benoit, Parker, et al., 1997; Huth-Bocks et al., 2011; Tambelli et al., 2020). Balanced prenatal representations predict higher quality in postnatal parent–infant relationships (Benoit, Parker, et al., 1997; Tambelli et al., 2020; Theran et al., 2005). Additionally, maternal balanced prenatal representations have significant predictive value for a child's attachment security with the mother (Madigan et al., 2015; Mehler et al., 2011). Similarly, postnatal assessments indicate that mothers with balanced representations are more sensitive compared to mothers with nonbalanced representations, and their children demonstrate higher quality play and attention skills (Korja et al., 2010; Sokolowski et al., 2007). Maternal disengaged representations, in turn, are linked with maternal withdrawal, and distorted representations with intrusiveness (Korja et al., 2010; Rosenblum et al., 2002; Sokolowski et al., 2007).

Less is known about the predictive value of paternal representations, both prenatally and postnatally. One of the few studies assessing both parents' prenatal representations found a strong relationship between representations, parental emotional availability, and child attachment security (Tambelli et al., 2020). Children whose fathers had integrated/balanced prenatal representations were more likely to develop secure attachment relationships. This association was completely mediated by the father's level of emotional availability. Postnatal assessments have linked fathers' representations with paternal interaction behaviors and child outcomes. Balanced representations predict more favorable behaviors in both fathers and their two-year-old children (Hall et al., 2014). These fathers exhibit higher sensitivity and lower withdrawal, and the children of these fathers show higher sociability and a larger vocabulary (Hall et al., 2014). In contrast, fathers with disengaged representations are more sensitive and less intrusive compared to fathers with distorted representations (Hall et al., 2014).

Given that the quality of representations shows stability from pregnancy to the postnatal period and contributes to the quality of postnatal parent–child relationships, the organization of prenatal representations may be particularly significant (Benoit, Parker, et al., 1997; Madigan et al., 2015; Vreeswijk, Maas, Rijk, Braeken, et al., 2014).

1.3 Parent–Child Interaction

After the concrete transition to parenthood, childbirth, the parent–child relationship becomes tangible but also more reciprocal. Dyadic parent–child relationships are interactional processes that develop from a chain of reactions of both interaction partners affecting each other’s reactions and behaviors (Sameroff et al., 1989). Each parent–child relationship is uniquely constituted and involves distinct patterns of interaction (Bowlby, 1982; Grossmann et al., 2002; Kochanska & Kim, 2013). Infants construct different types of relationships with different caregivers, and the overall quality of dyadic interaction is not dependent on the parent’s or child’s sex (De Wolff & Van Ijzendoorn, 1997; Siqueland et al., 2022).

Research often focuses on parental behaviors toward children, ignoring the bidirectional, conditional, and transactional nature of parent–child relationships (Palkovitz, 2020). Nevertheless, parents and children bring their own behavioral and affective inputs to the interaction, and children need to be considered as actively contributing to the interaction (e.g., Belsky, 1984; Clark, 1985; Tronick, 2007, 2017). Early experiences and interactions with parents during daily activities are internalized by the infant as working models of attachment (Bowlby, 1969/1982). Therefore, internal working models are an essential part of the parent–child relationship, guiding behaviors of parents and children, and they also contribute to a child’s ability to form close relationships with others (Bretherton, 2010).

Infants have biologically based, innate abilities to engage in interaction, and they have characteristics that elicit caregiving behaviors from the parents (Sameroff, & Emde, 1989). However, they are born with limited capacity to regulate their physiological and emotional states, which highlights parents’ crucial roles as interaction partners (Bretherton, 2010; Eisenberg et al., 2010; Mesman et al., 2009). During the first weeks and months after the birth, interaction concentrates on regulatory and stabilizing functions, such as the infant’s feeding, sleep/wake, and activity cycles (Stern, 1995). Repeated engagement in these interactions forms the basis for the parent–infant relationship (Dayton et al., 2019). During this time, infants develop skills to make direct eye contact and smile more frequently and responsively. Over time, a parent’s capacity to effectively sooth the infant in distress contributes to self-regulatory capacities within the infant and is associated with feelings of parenting competence (Dayton et al., 2015; Doi et al., 2011).

The period from two to six months is a time of intense sociality. Sharing pleasure through facial expressions and vocalizations is a fundamental aspect of parent–child interaction at two to three months of age, when a child is particularly interested in human faces and is able to control gaze and smile responsively (Fivaz-Depeursinge, 1991). A four-month-old infant has achieved multiple interactive capacities and cumulative caregiving experiences result in the child expecting interaction to be mutual and continuous (Rochat et al., 2002). Parent–child interaction at this age

concentrates on face-to-face play situations (Stern, 1995). At the same time, the infant has gained more abilities to organize subjective experiences (Stern, 1985). The infant also regulates the intensity of interaction using gaze aversion to cut out stimulation that is above the optimal range. Reciprocity appears, and parent and child begin to regulate interaction mutually (Stern, 1995).

As the child develops and gains new interactive capacities, the content and observable parent–child interaction changes, and parents need to adjust their responses and parenting practices (Bornstein et al., 2008; Holden & Miller, 1999). Developmental changes at the age of 18 months concern the learning of language (speaking) and improved physical and motor skills (Stern, 1995). These achievements require limit-setting from parents to maintain physical and psychological security (Stern, 1995). While specific parental responses change as children develop, some aspects of parenting, such as parental sensitivity, intrusiveness, and withdrawal, demonstrate moderate stability over time (Else-Quest et al., 2011; Hall et al., 2015; Holden & Miller, 1999). However, an infant’s interactive behaviors do not show similar stability (Else-Quest et al., 2011; Hall et al., 2015). Research on stability and change in parent–child interaction is limited, particularly regarding father–child interaction. However, it has been suggested that the stability of high-quality parenting supports infant development (Belsky & Fearon, 2002). Accordingly, if certain characteristics of parenting remain relatively stable over time (within an individual), parents at risk of implementing continuously negative parenting can be identified earlier (Hall et al., 2015).

When children receive appropriate and contingent care and responses to their needs, they gradually learn self-regulation over time (McElwain & Booth-LaForce, 2006). In general, secure, supportive, and sensitive parent–child relationships contribute to attachment security and support better psychological adjustment in children (e.g., Grossmann et al., 2002; Ramchandani et al., 2013; Sroufe, 2005). In contrast, disengaged, intrusive, and remote interactions between parents and infants are associated with insecure attachment and more externalizing behaviors in young children (Fearon et al., 2010; Ramchandani et al., 2013). Thus, high-quality parent–child interaction provides an environment that is stimulating and emotionally supportive, which supports children in developing emotion regulation and engagement in social interaction (Cabrera, 2020; Sroufe et al., 2005).

One aspect of parent–child relationships, the role of parental sensitivity, has been emphasized, although the predictive value of sensitivity is only moderate for mother–child attachment security and weak for father–child attachment security (van Bakel & Hall, 2019; De Wolff & Van Ijzendoorn, 1997; Lucassen et al., 2011). This suggests that other variables also impact the development of the infant–parent attachment relationship (Belsky, 1996; Brown et al., 2010; Grossmann et al., 2002; Olsavsky et al., 2020). Although fathers and mothers have similar abilities to be

sensitive, they may express sensitivity differently (Abraham & Feldman, 2022; van Bakel & Hall, 2019; Hazen et al., 2010; Mills-Koonce et al., 2015; Paquette, 2004). Maternal sensitivity is often described as emotional warmth and support, providing the “secure base” for the child to return to when experiencing stress (Feldman, 2003; Volling et al., 2002). Instead, paternal sensitivity may be expressed through physical stimulation and play, with fathers exciting and destabilizing their infant emotionally while simultaneously providing safety, warmth, and security (Feldman, 2003; Hazen et al., 2010; Paquette, 2004; Volling et al., 2002). However, fathering and mothering as unique constructs have not been substantiated (Fagan et al., 2014). Instead, parents may have complementary roles that provide different experiences for children, highlighting the independent and joint effects of multiple caregivers (Abraham & Feldman, 2022; Bretherton, 1985; Dagan & Sagi-Schwartz, 2018; Grossmann et al., 2002).

1.4 Triadic Family Interaction

To gain a deeper understanding of the determinants of a child’s developmental outcomes, it is essential to examine the contexts of children’s lives beyond dyadic relationships, adopting systemic approaches (Volling & Cabrera, 2019). Family systems theory suggests that each individual in the family belongs to various family subsystems, such as dyadic parent–child, marital, and coparental subsystems, as well as higher-order triadic parent–parent–child relationships (Cox & Paley, 1997, 2003; Minuchin, 1985). During daily interactions in two-parent families, children experience not only dyadic parent–child interactions but also triadic interaction situations. Each interaction within the family triad influences and is influenced by other relationships, creating a dynamic yet complex system that shapes family functioning (Cox & Paley, 1997; McHale & Rasmussen, 1998).

Thus, triadic interaction is a unique constitution that is not inferred from the properties of dyadic relationships (Cox & Paley, 2003; Frascarolo et al., 2004; Venturelli et al., 2016). Moreover, behaviors, affects, and emotional exchanges among family members may vary depending on the relational context (Bureau et al., 2021; Clarke-Stewart, 1978; Kwon et al., 2012; de Mendonça et al., 2011). For example, although both mothers and fathers show close contact with their child during dyadic interaction, fathers are more distant and less involved during triadic interaction, suggesting that father–child interaction may be more influenced by the context than mother–child interaction (de Mendonça et al., 2011). However, fathers are crucial participants in family interactions in both dyadic and triadic relationships, and their contribution, as well as those of mothers and children, need to be studied in both contexts.

In a triadic family context, children engage in different interactive configurations and roles, which allows them to learn how to interact with one or more interaction partners at the same time, also providing experiences of the third-party position (Fivaz-Depeursinge & Corboz-Warnery, 1999; Frascarolo et al., 2004). Triadic interaction situations also provide experiences of turn-taking, co-operation, conflict management, and competitiveness (McHale & Rasmussen, 1998). After birth, between three and six months, infants also start to form schemas of their triadic configurations and indicate a capacity to engage in triadic interaction even at the age of four months (Fivaz-Depeursinge et al., 2005; McHale et al., 2008; Striano & Stahl, 2005). Triadic interaction also includes non-verbal components, such as distances and bodily orientation, gazes, vocalizations, and facial and gestural expressions. The complexity of early relational contexts poses methodological challenges, leading to the development of methods that capture this complexity and represent the ecological validity of children's lives, such as Lausanne Trilogue Play (LTP; Fivaz-Depeursinge & Corboz-Warnery, 1999), which has significantly contributed to research in this area (Hollenstein et al., 2016; Venturelli et al., 2016). The benefit of observational measures is that they allow examination of aspects that are beyond family members awareness (Margolin et al., 1998).

The family alliance model suggests that triadic family interaction is composed of the family alliance and the level of coordination (Favez et al., 2017; Fivaz-Depeursinge & Corboz-Warnery, 1999). The family alliance can be categorized as cooperative, conflicted, or disordered, depending on how well family members organize and coordinate their triadic interaction (Favez et al., 2017; Fivaz-Depeursinge & Corboz-Warnery, 1999; Frascarolo et al., 2004; Tissot et al., 2014). When all participants are actively involved and available during interaction, have clearly defined and maintained roles, and express and share positive affect and joint attention, the triadic interaction demonstrates high levels of family coordination and cooperative alliance (Favez et al., 2017). When children develop in a cooperative family alliance, which is characterized by high cohesion and mutual support between family members during triadic interactions, they are likely to experience more affect sharing and empathy during their early lives (Tissot et al., 2022). These experiences further contribute to positive development of social cognition, theory of mind, and understanding of inner states (Favez, Frascarolo, Carneiro, et al., 2006; Favez et al., 2012). In conflicted families, triadic interaction is characterized by competence and interference, whereas in disordered family triads, one family member is systematically excluded from the interaction (Favez et al., 2017).

In line with the family systems perspective, other subsystems, such as couple relationships and dyadic parent-child relationships, can affect triadic family interaction. Most studies have focused on marital and coparental subsystems and their associations with other family systems. For example, higher satisfaction in the

couple relationship is associated with a cooperative family alliance (Korja et al., 2016). Associations between dyadic parent–child subsystems and triadic family interaction have been less studied. In one such study, triadic interaction was more strongly influenced by the dyadic father–child interaction than dyadic mother–child interaction when assessing levels of interactional synchrony in a small sample of families (de Mendonça et al., 2019). Furthermore, parental sensitivity has been associated with higher levels of functioning in triadic family interaction, such as early family cohesion and the cooperative family alliance (Feldman, 2007; Tissot et al., 2015). The impact of both parents’ sensitivity on the triadic family alliance seems to be particularly important in early infancy but declines after infancy (Tissot et al., 2015). However, in addition to parental sensitivity, other aspects of dyadic parent–child interaction need to be studied in relation to triadic family interaction.

Family relationships start to evolve and shape before the child has been born, during pregnancy (Benoit, Parker, et al., 1997; Favez, Frascarolo, & Fivaz-Depeursinge, 2006; Kuersten-Hogan, 2017; Tissot et al., 2015; Vreeswijk, Maas, Rijk, & van Bakel, 2014). Expectant parents demonstrate triadic capacity, which indicates their ability to imagine their future relationship with the expected child, simultaneously maintaining themselves and their partners in these representations (von Klitzing et al., 1999). The family alliance also begins to develop during pregnancy, indicating stability until the end of the second year of the child’s life, thereby providing a stable relational context for early child development (Favez, Frascarolo, & Fivaz-Depeursinge, 2006; Tissot et al., 2015).

The quality of triadic family interaction and the family alliance have significant consequences for a child’s cognitive and emotional development, for example social skills and emotion regulation (Favez et al., 2012; Favez, Frascarolo, Carneiro, et al., 2006; Feldman & Masalha, 2010; McHale & Rasmussen, 1998; Tissot et al., 2015). Particularly cooperative family alliances have been linked with more optimal child outcomes among children aged 18 months to 5 years (Favez et al., 2012; Favez, Frascarolo, Carneiro, et al., 2006). In contrast, children who are exposed to conflicted or disordered family alliances or challenges in the parental unit, such as competitive and discordant parental interaction, may experience feelings of insecurity or other challenges, and this has been linked with infants’ psychofunctional symptoms and parental psychopathology (Caldera & Lindsey, 2006; Carone, 2022; Favez et al., 2011; Favez, Frascarolo, Carneiro, et al., 2006; Jacobvitz et al., 2004; McHale, 1997). Therefore, identifying the factors that promote the development of well-functioning triadic interaction is important.

1.5 A Child's Early Social-Emotional Development

Social-emotional development refers to a child's evolving capacity to experience, manage, and express a wide range of positive and negative emotions, form close and satisfying relationships, and engage in active learning and exploration (Bagner et al., 2012; Zero to Three, 2001). Contemporary perspectives emphasize the complex and dynamic interplay between genetic predispositions and environmental factors in shaping this development (Berens & Nelson, 2019). Due to heightened neural plasticity in early childhood, experiences, particularly with caregivers, significantly impact cognitive abilities, social-emotional skills, health, and the organizational structure of the brain (Belsky & van IJzendoorn, 2017; Berens & Nelson, 2019; Knudsen, 2004). This highlights the importance of fostering a positive environment for early parent–child interactions to establish positive developmental trajectories as early as possible, including during pregnancy (e.g., Belsky & Fearon, 2002; Fearon et al., 2010; Ramchandani et al., 2013; Sarkadi et al., 2008; Zeanah & Zeanah, 2019).

In this thesis, a child's early social-emotional development is described in terms of social-emotional and behavioral (SEB) problems and the level of social-emotional competence (Briggs-Gowan, et al., 2004). Social-emotional competence refers to the ability to adapt successfully to differing social and environmental demands (Fabes et al., 2006; Zeanah & Zeanah, 2019). A socially competent child has adequate skills to develop and maintain positive relationships with others, coordinate and communicate actions and feelings, and regulate emotions and actions in social interactions (Campbell et al., 2016; Briggs-Gowan & Carter, 2006). A child's social-emotional competence includes the levels of prosocial behavior, compliance with authority figures, attention regulation, expressions of positive emotion, and empathy (Briggs-Gowan & Carter, 2006; Godoy et al., 2019). The level of competence may vary in different relationships and contexts (Zeanah & Zeanah, 2019).

Infants and toddlers experience rapid growth and change in all developmental domains, which makes it difficult to distinguish between typical and deviant development (Wakschlag & Danis, 2009). In addition, most young children exhibit some challenging behaviors (e.g., tantrums) as part of their normal development (Wakschlag & Danis, 2009). Therefore, problems and delays must be distinguished from the large range of normal variations in behavior (Zeanah & Zeanah, 2019). For some children, these behaviors indicate more serious long-term problems (Campbell et al., 2000; Carter et al., 2003; Shaw et al., 2003). In young infants, it is fundamental to evaluate whether the problem behaviors limit the child's functioning in addition to considering the caregiver's concern in relation to reported symptoms (Carter et al., 2004). Parental reports of symptoms are beneficial because parents have a wide range of information regarding their child's development, temperament, daily routines, and behaviors in different settings, as well as knowledge regarding contextual and historical experiences (Godoy et al., 2019).

Social-emotional problems and delays in social-emotional competence are often interrelated, particularly during early childhood (Briggs-Gowan et al., 2004). A developmental delay in some social-emotional area is often defined as one or more standard deviations below the mean of a reference population (Cromwell et al., 2014; Johnson et al., 2014). Approximately 10% to 15% of one- and two-year-old children have significant SEB problems (Briggs-Gowan et al., 2001, 2006; Roberts, 1998). During toddlerhood, social-emotional problems can be divided into externalizing, internalizing, and regulatory challenges. Children with externalizing problems may demonstrate impulsivity, aggression, or hyperactivity (Briggs-Gowan & Carter, 2006). Internalizing problems include symptoms such as fearfulness, worry, anxiety, withdrawal, and depression (Briggs-Gowan & Carter, 2006; Groh et al., 2012). Children experiencing dysregulation challenges may demonstrate problems in sleeping and eating, negative emotionality, and sensory sensitivities (Briggs-Gowan & Carter, 2006).

Early signs of SEB problems or delays in social-emotional competence indicate a risk for social-emotional challenges later in life, such as more frequent problem behaviors and challenges in school and social relationships (Arnold et al., 2012; Briggs-Gowan & Carter, 2006; Fagan et al., 2007; Pontoppidan et al., 2017; Treyvaud et al., 2012). This highlights the benefits of early identification. Likewise, favorable early social-emotional development and social-emotional competencies are substantially stable after the first year of life and predict psychosocial functioning and higher emotional well-being later in life (Briggs-Gowan & Carter, 2008; Eisenberg et al., 2010; Englund et al., 2011; Halligan et al., 2013; Treyvaud et al., 2012). Age-appropriate competence skills increase the likelihood of continued competence and may also minimize the emergence of problem behaviors (Bornstein et al., 2010; Briggs-Gowan et al., 2004).

A child's social-emotional development is significantly shaped by early experiences with caregivers. Secure attachment, for example, has a positive impact on social-emotional development (Belsky & Fearon, 2002; Sroufe, 2005). Parents can also affect their children's trajectories by moderating intrinsic biological risk factors, for example by promoting a child's self-regulatory skills to reduce problem behaviors (Degnan et al., 2008; Gardner et al., 1999; Martin et al., 2008). Parent-child relationships also mediate environmental risk factors, such as parental mental health problems, potentially buffering or complicating their effects (Zeanah & Zeanah, 2019). Accordingly, higher parental sensitivity is associated with fewer SEB problems (Behrendt et al., 2019). Furthermore, parental feelings of emotional bonding, especially postnatally, are associated with higher social-emotional competence, whereas bonding difficulties are associated with SEB problems at two years (Behrendt et al., 2019; Le Bas et al., 2019, 2021, 2022; Mason et al., 2011; Rusanen et al., 2024). In contrast, maternal perinatal symptoms of depression or

anxiety are linked with lower maternal sensitivity and predict more SEB problems and delayed competence in one-year-old children (Behrendt et al., 2019; Porter et al., 2019). Child-related factors, including temperament, preterm birth, and, potentially, the child's sex, also influence social-emotional development (Bridgett et al., 2015; Cheong et al., 2017; McIntosh et al., 2021).

Fathers have direct and indirect impacts on their children's development (Cabrera et al., 2018). High-quality father-child interactions, for example during play, support children's secure exploration and may positively contribute to children's social and emotional outcomes (Amodia-Bidakowska et al., 2020; Grossmann et al., 2002; StGeorge et al., 2018). In contrast, problems in the relationship, such as disengaged and remote interactions between fathers and their young infants, may contribute to behavioral problems in early childhood (Ramchandani et al., 2013). Fathers also contribute to a child's developmental environment through other relationships, such as the couple relationship, the coparenting relationship, and triadic family interactions (e.g., Cabrera et al., 2009, 2018; Kolak & Volling, 2013). However, gaps in knowledge remain, for example regarding the impact of prenatal and early postnatal father-child relationships on later child outcomes. Given that both parent-child relationships begin to develop during pregnancy, this appears to be a particularly important period for understanding the determinants of a child's early social-emotional development.

2 Aims of the Thesis

Clear evidence shows that favorable early social-emotional development predicts positive psychosocial functioning later in life. In contrast, early signs of SEB problems or delays in social-emotional competence indicate a risk for future social-emotional challenges. Therefore, identifying significant factors associated with these developmental trajectories is crucial. Accordingly, this thesis focuses on early family relationships, specifically dyadic parent–child relationships and the family triad, as the context of a child’s early social-emotional development (Figure 1). The focus is on pregnancy, the transition to parenthood, and early childhood, which are crucial periods for the development of early family relationships. The context of this thesis is a heteronormative two-parent family in a low-risk sample. Using a longitudinal design, families are followed from pregnancy until the child is 18 months old.

Little is known about the predictive value of fathers’ prenatal representations, although both parents develop representations of the expected child during pregnancy. Previous studies suggest that these representations may demonstrate continuity into the postnatal period and shape parent–child interactions. Therefore, this thesis examines fathers’ prenatal representations in relation to the quality of dyadic father–child interaction (Study I). There is also limited longitudinal research on the long-term effects of parental prenatal representations on children’s social-emotional development. To increase knowledge of the individual and interrelated effects of these representations, this thesis examines associations between both parents’ representations and a child’s social-emotional development (Study III).

Despite strong evidence that fathers have a crucial role as caregivers in their children’s lives, the developmental changes in early father–child interaction are less studied. This thesis aims to expand knowledge on this topic and examines the change and stability in this relationship from infancy to toddlerhood, taking into account the dyadic nature of this relationship and the child as an active partner contributing to the interaction (Study I).

In two-parent families, both parents are important interactive partners for the child, in both dyadic and triadic contexts. Previous studies have rarely examined parent–child subsystems in relation to triadic family interaction, although, family systems theory suggests that triadic interactions are influenced by multiple family

subsystems. This thesis examines patterns of dyadic interaction in both parent–child dyads in infancy and toddlerhood and how these patterns contribute to the quality of triadic family interaction (Study II).

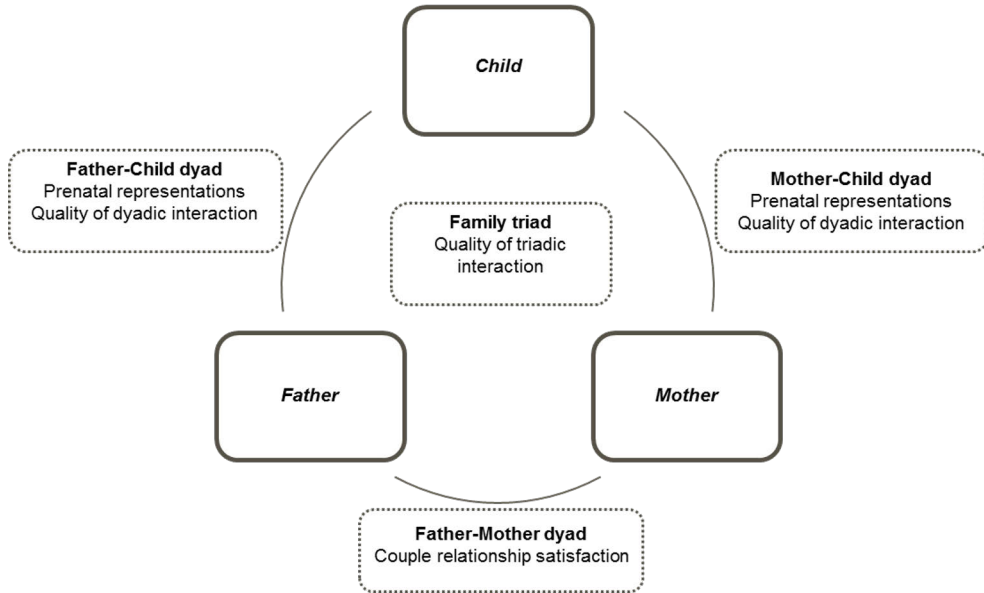


Figure 1. The relational context for a child's social-emotional development in this thesis.

The specific questions addressed in this thesis are:

1. How does the quality of the father's prenatal representations associate with the quality of dyadic father–child interaction when the child is 4 months and 18 months old? (Study I)
2. What kind of changes or stability occur in the quality of dyadic father–child interaction between 4 months and 18 months? (Study I)
3. What kind of profiles can be identified in dyadic parent–child interaction at 4 months and 18 months, and how are they associated with triadic family interaction when the child is 18 months old? (Study II)
4. How does the quality of fathers' and mothers' prenatal representations associate with a child's social-emotional development at 18 months? (Study III)

3 Methods

3.1 Participants

This thesis is based on data from a longitudinal multidisciplinary cohort study, Steps to the Healthy Development and Well-being of Children (the STEPS study; Lagström et al., 2013), which aims to increase understanding and identify the long-term effects of early child development beginning from pregnancy. The cohort population consisted of all Finnish- and Swedish-speaking couples expecting a child ($n = 9,811$) between 2007 and 2009 in the Southwestern Finland Health Care District. Pregnant couples were recruited into the study when they visited the maternity clinic for the first time (between 10 and 15 gestational weeks). From the total cohort population, 1,387 mothers and 1,325 fathers participated in the original follow-up study. The study procedure was approved by the Ethical Committee of the Southwestern Finland Health Care District on February 27, 2007. The intensive follow-up of the families started after recruitment during the first trimester, with the purpose of following the families until the children reached early adulthood. Participating couples completed several questionnaires regarding sociodemographic information during the study inclusion.

From the STEPS study cohort, a sub-sample of participants was invited to take part in a substudy focusing on the psychological welfare of the family and child development. Both expectant parents completed the Revised Dyadic Adjustment Scale (RDAS; Busby et al., 1995), at 20 gestational weeks, assessing the quality of their dyadic couple relationship. Based on their RDAS scores, 435 families were invited to participate in the substudy. The cut-off score was used to distinguish couples experiencing distress in their relationship from those with no distress. The RDAS cut-off score was based on the distribution of the existing data from the whole cohort, corresponding with the upper-20th percentile, and was equal to the cut-off proposed by Crane et al. (2000). Compared to the original RDAS scale by Busby et al. (1995), an inverted scale was used in this study. In approximately half of the families, one or both spouses scored 36 or higher on the RDAS, indicating distress in the relationship. In the other half, both spouses scored below 36, indicating no distress in the couple relationship. In total, 153 families (35%; 72 distressed, 81 nondistressed) returned their written consent and agreed to participate in the

substudy (Figure 2). Participating couples had higher educational levels and were more likely to be married compared to nonparticipating couples (Ahlqvist-Björkroth et al., 2016). These 153 families form the initial sample for Studies I, II, and III in this thesis.

3.1.1 Study I

All 153 families of the subsample were invited to attend an interview concerning parental prenatal representations of the expected child and relationship with the child at the beginning of the third trimester of pregnancy. The sample of Study I consists of 134 fathers who agreed to participate in the interview and their children. Interviews were conducted between 29 and 32 gestational weeks (Figure 2). Families were contacted after the child was born, and the father–child interaction was videotaped when the child was 4 months old ($n = 129$) and 18 months old ($n = 99$). Demographic characteristics of the sample are reported in Table 1.

3.1.2 Study II

The initial sample of Study II ($n = 153$) consists of families who participated in dyadic parent–child interaction situations at 4 months and 18 months, as well as a triadic interaction situation at 18 months. Of these families, 134 father–child dyads and 125 mother–child dyads participated in the 4-month assessment, and 104 father–child dyads and 121 mother–child dyads participated in the 18-month assessment. Additionally, 120 families participated in a triadic interaction situation when the child was 18 months old (Figure 2). Demographic characteristics of the sample are reported in Table 1. When fathers reported lower prenatal couple relationship satisfaction, both fathers ($U = 1380.50, p = .034$) and mothers ($U = 671.50, p = .023$) were less likely to participate in dyadic parent–child interaction situations at both assessment points. Furthermore, in families who did not take part in the triadic interaction situation ($n = 33$), fathers' prenatal couple relationship satisfaction was lower ($U = 858.00, p = .009$), and mothers were less frequently primiparous ($\chi^2(1) = 4.22, p = .04$), compared to participating families ($n = 120$).

3.1.3 Study III

The data for Study III includes families from the subsample ($n = 153$) who participated in the prenatal interview concerning parental representations of the expected child and relationship with the child between 29 and 32 gestational weeks and who completed the assessment of their child's social-emotional development at 18 months ($n = 97$) (Figure 2). Demographic characteristics of the sample are

reported in Table 1. The mothers of excluded families ($n = 56$) reported slightly more prenatal symptoms of depression ($M = 7.81$, $SD = 4.41$) compared to the mothers ($M = 5.81$, $SD = 4.40$) in the included families ($U = 1446.00$, $p = .007$). No other differences were found between the excluded and included families.

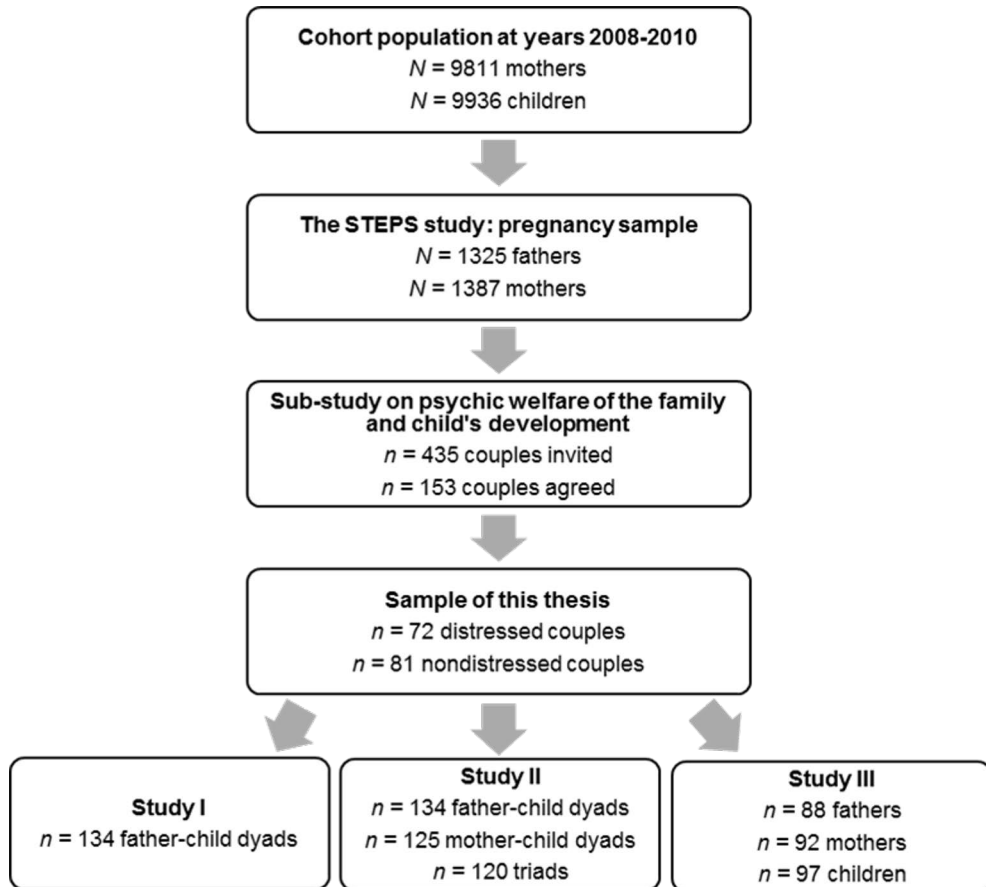


Figure 2. Flowchart of the participants in this thesis.

Table 1. Demographic characteristics of the samples in studies I, II and III.

	Study I n = 134		Study II n = 143		Study III n = 97	
	M (SD)	n (%)	M (SD)	n (%)	M (SD)	n (%)
Child sex (female)		65 (49)		70 (49)		48 (50)
First child status		74 (55)		75 (53)		51 (53)
Parental age						
Father	33.49 (5.06)		33.40 (5.11)		33.27 (4.38)	
Mother	31.65 (3.95)		31.61 (3.99)		31.46 (3.57)	
Marital status						
Married		98 (73)		103 (73)		72 (74)
Cohabited		35 (26)		39 (28)		25 (26)
Single		1 (0.7)				
Couple relationship satisfaction ^a						
Father	31.36 (6.00)		31.60 (6.44)		31.52 (5.82)	
Mother	32.00 (6.38)		32.19 (6.69)		32.26 (6.76)	
Professional occupational level ^b						
Father		75 (56)		78 (63)		50 (61)
Mother		76 (57)		80 (64)		58 (66)
Full-time employment						
Father		109 (81)		118 (83)		82 (84)
Mother		92 (69)		99 (70)		70 (71)
Family income (Total net monthly)						
over 4000 €		22 (16)		23 (16)		16 (17)
2000–4000 €		89 (66)		97 (68)		67 (69)
< 2000 €		21 (16)		22 (16)		14 (14)

^a Revised Dyadic Adjustment Scale (RDAS) sum score at 20 gestational weeks.

^b Professional refers managers but also intermediate level professionals, such as nurses; nonprofessional refers to service workers and industry, for example.

3.2 Procedure

After the inclusion of 153 expectant couples in the substudy, the parents were separately interviewed between 29 and 32 gestational weeks regarding their prenatal representations of the expected child and relationship with the child by master's students in psychology who were trained for the interview procedure. As part of the data collection, parents completed several questionnaires concerning the well-being

and characteristics of the family during pregnancy (at 10–15 gwk and 20 gwk) and after the child was born (at 4 months, 8 months, and 18 months). Childbirth-related information was obtained from the Finnish Medical Birth Register, which is administered by the National Institute for Health and Welfare.

Parent–child interactions were videotaped at 4 months during home visits and at 18 months in a laboratory at Turku University Hospital. Fathers and children interacted during structured tasks consisting of a diaper change and a short play session (at 4 months) and play and teaching with specific equipment (at 18 months). Mothers and infants interacted during a feeding situation in both assessments. Both parent–child dyads were videotaped during the same research visits, and the order of interaction situations followed the family’s preference. During the 18-month visit, families also participated together in a triadic interaction situation in the laboratory. When the child reached 18 months of age, parents completed a questionnaire measuring the social-emotional development of their child.

3.3 Measures

3.3.1 Prenatal Representations

Fathers’ and mothers’ prenatal representations were measured using the prenatal version of the Working Models of the Child Interview (WMCI; Benoit, Parker, et al., 1997; Zeanah et al., 1996). This semi-structured one-hour interview includes general questions followed by probes eliciting examples and elaborations. The interview systematically explores parental thoughts, feelings, and perceptions of their expected child and relationship with that child. Interviews were rated by two trained researchers using the WMCI coding manual (Zeanah et al., 1996). The rating process had two stages. First, using a 5-point Likert scale, the quality and content of the parental narratives were rated on eight subscales: Richness of Perceptions, Openness to Change, Intensity of Involvement, Coherence, Caregiving Sensitivity, Acceptance, Infant Difficulty, and Fear for the Infant’s Safety. Secondly, based on these subscales, parental representations were classified into three categories: balanced, disengaged, and distorted. Balanced representations are coherent, flexible, and rich descriptions of parental perceptions and experiences. They describe positive emotional involvement, appreciation of the child and the relationship, acceptance of the child’s needs and experiences, and openness to change. Nonbalanced disengaged representations are characterized by a sense of emotional distance and detachment. Descriptions of the child can be rigid, restricted, and intellectualized, with the parent lacking genuine interest in the child’s experiences and emotional needs. Nonbalanced distorted representations are characterized by incoherent and inconsistent narratives of the parental role and may be confused and distracted by

other concerns. The main coder rated all the interviews, and 25% of the interviews were double-scored for reliability. Interrater agreement for the three-way classification was 80% ($\kappa = .65$).

3.3.2 The Quality of Parent–Child Interaction

The quality of parent–child interaction was assessed using the Parent–Child Early Relational Assessment (PCERA; Clark, 1985). This assessment focuses on how the child and parent experience each other during the interaction, the affective and behavioral characteristics they bring to the interaction, and the quality and tone of the dyadic relationship (Clark, 1999). The PCERA has demonstrated reliability, internal consistency, discriminant and concurrent validity, and sensitivity to change (Clark, 1999; Clark et al., 1997; Clark et al., 2008).

The PCERA includes a total of 65 items: 29 parental, 28 child, and 8 dyadic items. These are rated based on a 5-minute videorecorded parent–child interaction using a 5-point Likert scale. The scale describes *areas of concern* (scores 1 and 2), *areas of some concern* (score 3), and *areas of strength* (scores 4 and 5). The rating was performed in sets of 10 items at a time, considering factors such as frequency, duration, and intensity of the behavior. The data were independently rated by two experienced raters who were blinded to all contextual information, and 20% of the tapes were double-scored for interrater reliability. Drift sessions were held throughout the rating process. Reliability calculations were based on categorical differences between the raters and represent percent agreement. At 4 months, the interrater agreement was 79% for fathers and 80% for mothers, while at 18 months, it was 85% for fathers and 80% for mothers.

The original 5-point PCERA scale was used in the analyses, and the items were combined into six (Study II) or seven (Study I) subscales following the PCERA manual (Clark, 1985, 2015). These subscales included two (Study II) or three (Study I) parental scales: Parental Positive Affective Involvement, Sensitivity, and Responsiveness; Parental Negative Affect and Behavior; and Parental Intrusiveness, Insensitivity, and Inconsistency (Study I only); and two child scales: Infant/Child Positive Affect, Communicative and Social Skills; and Infant/Child Dysregulation and Irritability; and two dyadic scales: Dyadic Mutuality and Reciprocity; and Dyadic Tension. The scale scores represent the means of the included items (Appendix 1; Appendix 2). In all subscales, high scores indicate either more positive parent–child interactions or a lack of negative affect or behavior.

3.3.3 Triadic Family Interaction

The quality of triadic family interaction was assessed using the Lausanne Trilogue Play setting (LTP; Fivaz-Depeursinge & Corboz-Warnery, 1999), which examines the degree to which family members coordinate their interactions and work as a team during triadic interaction. Parents and a child are sited within a triangle, and interaction is recorded with two time-synchronized cameras. The family is instructed to engage in spontaneous play, offering pre-selected toys for use. The four distinct phases of interaction follow the configurations of daily triadic family interaction. First, one parent interacts and plays with the child while the other parent observes. Then, parents switch roles. The order of parents was balanced in the data collection. During the third phase, all three family members participate in joint play, and finally, the child takes a third-party position and observes while the parents talk to each other. Completing the LTP procedure takes around 12 minutes.

The quality of triadic family interaction during the LTP setting was rated using the Family Alliance Assessment Scale (FAAS; Favez et al., 2011), which assesses family alliance and coordination. First, family coordination was rated using five hierarchically organized dimensions: participation, organization, focalization, affect sharing, and synchronization. These dimensions included a total of 11 items, which were rated on a 3-point scale (0 = *inappropriate*; 1 = *moderate*; 2 = *appropriate*). A global sum score, the familyscore, was calculated, ranging from 0 to 22. Higher scores indicated more positive family coordination. Second, families were classified into three alliance categories based on different patterns of family coordination: cooperative, conflicted, or disordered alliance. In a cooperative alliance, family members effectively coordinate their interaction and work as a team, acknowledging and valuing each other's roles. A conflicted alliance is characterized by conflict and competition, where parents are unable to share roles, negotiate, and cooperate. In a disordered family alliance, one family member is excluded from the interaction.

The ratings were carried out by two trained researchers who were blinded to all background information, and 20% of the tapes were double-scored. Interrater agreement was .96 (ICC) with a 95% confidence interval from .89 to .98 for family coordination and .83 (weighted kappa) for family alliance.

3.3.4 A Child's Social-Emotional Development

A child's social-emotional and behavioral problems and competencies were assessed using the Brief Infant-Toddler Social-Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2006), which is a parent-report screening instrument. The questionnaire includes 42 items, of which 31 measure possible social-emotional problems (e.g., externalizing, internalizing, dysregulation), and 11 measure social-emotional competencies (e.g., compliancy, prosociality, empathy, play skills). Each

item is rated on a 3-point scale (0 = *not true/rarely*, 1 = *somewhat true/sometimes*, 2 = *very true/often*). The BITSEA has been acknowledged as a comprehensive, reliable, and valid measure (Pontoppidan et al., 2017). Total sum scores for social-emotional problems range from 0 to 62, with higher scores indicating more SEB problems. Total sum scores for competence range from 0 to 22, with higher scores indicating higher competence. These total sum scores for SEB problems and social-emotional competence were used as continuous variables.

Internal consistency (Cronbach's alpha) was .62 for the competence scale and .67 for the problem scale. The BITSEA was completed mainly by the mothers, with only three questionnaires completed by fathers. The children were 16 to 19 months old during the assessment: 58 children were 18 months old, and 30 children were 17 months old.

3.3.5 Background and Control Variables

3.3.5.1 Demographic Characteristics

Family characteristics were drawn from the parental questionnaires completed during pregnancy (at 10–15 gwk and at 20 gwk). These included parental age, socioeconomic status of the family, parental employment status, marital status, family income, parity, and the number of the children in the family. Childbirth-related information, such as the infant's gestational age at birth, child sex, birth weight, and Apgar score at five minutes after birth, was obtained from the Finnish Medical Birth Register, which is administered by the National Institute for Health and Welfare.

3.3.5.2 Couple Relationship Satisfaction

Because the sample was based on parental self-reported prenatal couple relationship satisfaction, these scores were controlled in Studies I, II and III. Parental prenatal couple relationship satisfaction was assessed at 20 gestational weeks with the 14-item Revised Dyadic Adjustment Scale (RDAS; Busby et al., 1995). Each item was rated from 1 to 5/6. The scale was inverted for consistency with the other scales in the data collection and higher scores indicated lower satisfaction in the couple relationship. A sum score was calculated separately for the fathers and mothers, ranging from 14 to 83. Scores of 36 or above indicated distress in the relationship. The internal consistency (Cronbach's alpha) was .80 for the fathers and .81 for the mothers.

3.3.5.3 Child Temperament

Child temperament was controlled in Study III due to its possible associations with parental reports of social-emotional development. Parents completed the Infant Behavior Questionnaire–Revised Short Form (IBQ-R SF; Gartstein & Rothbart, 2003; Putnam et al., 2014) when their child was eight months old. The 91-item questionnaire was rated on a seven-point Likert scale from 1 (*never*) to 7 (*always*). Scale means were calculated for Surgency/Extraversion, Negative Affectivity, and Orienting/Regulation subscales. Higher scores indicated a higher level of each temperament feature. In 48% of the families, the questionnaire was completed by the mothers, and in 52% of the families, parents completed the questionnaire together. When the questionnaire was completed by both parents together, children were rated higher in surgency/extraversion compared to maternal reports ($t(91) = -4.63, p < .001$). The internal consistency (Cronbach’s alpha) of the scale was .86 for negative affectivity, .77 for orienting/regulation, and .87 for surgency/extraversion.

3.3.5.4 Depressive Symptoms

Prenatal symptoms of depression in both parents were measured with the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) at 20 weeks of gestation. The EPDS is a self-reported questionnaire with 10 items which are rated on a 4-point scale (0–3). The calculated total sum score ranged from 0 to 30, with higher scores indicating more severe symptoms of depression.

3.4 Statistical Analyses

3.4.1 Study I

Study I first examined associations between fathers’ prenatal representations and the quality of father–child interaction at 4 months and 18 months using a general linear model. In this model, prenatal representation categories were predictors and continuous dyadic PCERA scores were outcome variables. Because couples were selected for the study based on their prenatal couple relationship satisfaction scores, both parents’ prenatal RDAS scores were examined in relation to fathers’ prenatal representations and the father–child interaction, that is, the PCERA scores at 4 and 18 months. Consequently, mothers’ prenatal couple relationship satisfaction was included as a covariate in the model due to its significant associations with father–infant interactions at 4 months. In addition, the association between qualitative and content variables of fathers’ representations and the quality of father–child interaction at both assessment points was examined with correlation and multiple

linear regression. To address the second research question, the stability of the father–child interaction quality between 4 and 18 months was assessed using correlations and paired-samples *t*-tests representing individual-order stability and group mean level change. All analyses were conducted using SPSS Statistics (version 25.0) software.

3.4.2 Study II

Study II explored distinct profiles of dyadic parent–child interaction and their associations with triadic family interaction using latent profile analysis (LPA). Unlike traditional variable-oriented approaches, which typically examine individual dimensions of parent–child interaction and their associations, latent profile analysis enables the examination of combinations of interaction qualities. Multiple latent profile analyses were conducted to identify subgroups of parent–child dyads with distinct interaction patterns across different dimensions of the dyadic interaction in an exploratory data-driven manner. The goal was to divide a heterogeneous population into subgroups (profiles) in which individuals within a subgroup are similar to each other but different from individuals in other subgroups. Consequently, each profile had a unique set of characteristics distinguishing it from other profiles. Due to limited sample size, separate models were calculated for father–child and mother–child dyads at 4 and 18 months.

Assuming Missing at Random (MAR), the parameters of the models were estimated using full-information maximum likelihood estimation with standard errors that are robust against nonnormal distributions (Muthén & Muthén, 2017). The selection of the optimal solution for the LPA was based on 1) the log-likelihood (log L) value; 2) model fit that is, Akaike information criterion (AIC) and the Bayesian information criterion (BIC) (Akaike, 1987); 3) distinguishability of the profiles (entropy values and average latent class posterior probabilities should be over .80) (Wang & Bodner, 2007); 4) latent class proportions; and 5) theoretical justification and interpretability of the latent profiles. Latent groups were then compared in relation to family alliance, family coordination, and relevant background variables (child sex, parity, couple relationship satisfaction, family socioeconomic status, and family income) using the Mplus auxiliary function with the BCH/du3step method (Asparouhov & Muthén, 2014). Group comparison was based on a Wald chi-squared test for statistical significance, with Bonferroni correction. The analyses were performed using Mplus (version 8) (Muthén & Muthén, 2017) and SPSS Statistics (version 25.0) software.

3.4.3 Study III

In Study III, the aim was to examine associations between parental prenatal representations and children's social-emotional problems and competence. These associations were examined separately for each parent's representations, as well as using a family-level approach that combined the quality of both fathers' and mothers' representations. First, crucial covariates were examined using Spearman correlation, chi-square tests, independent samples t-tests, Mann–Whitney U-tests, and Kruskal–Wallis tests. Associations between parental prenatal representations and children's social-emotional problems and competence were initially examined using Mann-Whitney U-tests and Kruskal–Wallis tests. Afterwards, hierarchical regression models were conducted to examine these associations, including confounding variables in the models. Bonferroni adjustment was applied when required. A post hoc power analysis, G*Power 3.1.9.7 (Faul et al., 2007), indicated that the sample of 97 families was sufficient to identify a medium-sized effect ($f^2 = .15$, power = .86, $\alpha = .05$) in a regression model with four predictors. Statistical analyses were performed using SPSS Statistics (version 25.0) software.

4 Overview of the Studies

Study I

Lindstedt, J., Korja, R., Vilja, S., & Ahlqvist-Björkroth, S. (2021). Fathers' prenatal attachment representations and the quality of father–child interaction in infancy and toddlerhood. *Journal of Family Psychology*, 35(4), 478–488.

Father–child relationships begin to develop during pregnancy. However, there is a significant gap in knowledge regarding whether and how fathers' prenatal representations are associated with postnatal father–child interaction. This prospective study aimed to explore the quality of fathers' prenatal representations of the expected child and relationship with the child, and their associations with the quality of father–child interaction during infancy (at 4 months) and toddlerhood (at 18 months). Additionally, the study examined stability and change in the quality of father–child interaction from infancy to toddlerhood. Prenatal representations of fathers ($n = 120$) were assessed between 29 and 32 gestational weeks using the Working Model of Child Interview (WMCI). The quality and content of the representational narratives were evaluated, and representations were classified as balanced, disengaged, or distorted. Father–child interaction was videotaped during a structured interaction task at 4 and 18 months and analyzed using the Parent–Child Early Relational Assessment (PCERA).

The results showed that 57.5% of the fathers had balanced prenatal representations, 26.7% had disengaged representations, and 15.8% had distorted representations. General linear models showed that balanced prenatal representations were associated with more positive paternal affective involvement, sensitivity, and responsiveness in interactions with four-month-old infants compared to fathers with disengaged prenatal representations. Consistent with this finding, linear regression models indicated that positive interactive behaviors of fathers were associated with qualitative scales of representations, such as openness to change, intensity of involvement, and caregiving sensitivity. However, the quality of prenatal representations was not associated with dyadic father–child interaction when the child reached 18 months of age. Positive changes appeared to occur in the quality of father–child interaction between 4 and 18 months across all three representation

categories. In addition to positive mean-level changes, some characteristics of interaction demonstrated continuity within individuals and dyads from infancy to toddlerhood. Specifically, characteristics such as paternal positive affective involvement, sensitivity, and responsiveness, as well as the infant's positive affect, communicative and social skills, and dyadic mutuality and reciprocity, showed continuity. These results suggest that the early relationship between fathers and children is open to change and develops between infancy and toddlerhood. Nevertheless, fathers' balanced prenatal representations seem to provide a favorable basis for the early dyadic father–child interaction.

Study II

Lindstedt, J., Ahlqvist-Björkroth, S., Junntila, N., & Korja, R. (2024). Latent profiles of dyadic parent–child interaction and associations with triadic family interaction in early childhood. *Family Relations*, 73(4), 2564–2581.

Family relationships, including dyadic parent–child and parent–parent, as well as triadic father–mother–child relationships, are interrelated and mutually influence each other. Following the family systems perspective, this study investigated how the quality of interaction within each parent–child dyad is associated with the quality of triadic family interaction when the child is 18 months old. Distinct patterns of dyadic parent–child interaction were examined using latent profile analysis. Parents were individually videotaped during dyadic interaction situations with their child ($n = 120$) at 4 months and 18 months. Fathers and children were interacting during a structured task and mothers and children during a feeding situation. The quality of dyadic parent–child interaction was assessed using the Parent–Child Early Relational Assessment (PCERA). Triadic family interaction was evaluated using the Family Alliance Assessment Scale within a Lausanne Trilogue Play (LTP) setting when the child reached 18 months of age. The quality of triadic family interaction was analyzed in terms of family alliance (cooperative, conflicted, or disordered) and coordination. The observational methods and latent profile analysis offered a novel approach to examining associations between early family relationships.

Four latent profiles of parent–child interaction were identified for all parent–child dyads at each assessment point (Study II; Figure 1 and Figure 2), each representing a distinct pattern of dyadic interaction. Interactions characterized by reciprocity, positive affect, and low negativity were associated with higher coordination in triadic family interaction. Conversely, dyadic interactions lacking reciprocity, exhibiting negativity, and demonstrating dyadic tension were linked to less coordinated triadic family interaction in these families. Associations were more robust for father–child dyads.

Early observations of reciprocity deficits and emotional distance in dyadic father–child interaction during infancy may indicate a risk for subsequent challenges in triadic family interaction. Moreover, if fathers struggle to establish a well-functioning interaction with their child, it may foster competition and conflict within triadic family interactions. These findings underscore how challenges within one subsystem can impact other family systems. The study emphasizes the pivotal role of the father–child interaction in shaping triadic family interaction. Based on these results, supporting early parent–child relationships is crucial for fostering well-functioning and coordinated triadic family interaction. Furthermore, interventions aimed at improving family dynamics should include fathers.

Study III

Lindstedt, J., Korja, R., Carter, A., Pihlaja, P., & Ahlqvist-Björkroth, S. (2024). Parental prenatal representations of the child are related to 18-month-old children’s social-emotional competence. *Attachment & Human Development*, 26(4), 383–401.

Parental representations play a crucial role in shaping the parent–child relationship and fostering secure attachment in children, thereby promoting positive developmental outcomes in children, including higher social-emotional functioning. However, the links between prenatal representations of the expected child and the relationship with the child and children’s early social-emotional development are not fully understood, particularly in relation to fathers’ prenatal representations. The aim of this study was to examine how the quality of fathers’ and mothers’ prenatal representations in two-parent families is associated with an 18-month-old child’s social-emotional and behavioral problems and social-emotional competence. The quality of prenatal representations (balanced vs. nonbalanced) of fathers ($n = 88$) and mothers ($n = 92$) was assessed between 29 and 32 weeks of gestation using the Working Model of the Child Interview (WMCI). Sixty percent of fathers and 64% of mothers had balanced prenatal representations. Parents, predominantly mothers, completed the Brief Infant-Toddler Social and Emotional Assessment when their child ($n = 97$; 49.5% girls) was 18 months old to evaluate social-emotional and behavioral problems and competencies in their children. Infant temperament at eight months, prenatal couple relationship satisfaction, and maternal prenatal symptoms were considered crucial confounding variables in the analyses.

Hierarchical regression models showed that both fathers’ and mothers’ balanced prenatal representations were associated with higher social-emotional competence in toddlers. Moreover, a child’s social-emotional competence was higher when both parents had balanced prenatal representations. These associations remained

significant after accounting for confounding variables. However, no significant associations were found between parental prenatal representations and a child's social-emotional and behavioral problems. Together, these results underscore the importance of balanced prenatal representations of both parents for fostering social-emotional competence in young children. This finding holds significance, as early social-emotional competence not only increases the likelihood of continued competence but also may prevent the emergence of problem behaviors later in childhood. Pregnancy represents a significant period for both parents and the expected child, emphasizing the need to support parent–infant relationships during this transition to promote positive social-emotional development in young children.

5 Discussion

This thesis focused on associations between parental prenatal representations, dyadic parent–child interaction, triadic family interaction, and a child’s early social-emotional development in two-parent families. Participating families were part of a Finnish longitudinal cohort study, Steps to the Healthy Development and Well-being of Children (the STEPS study). Families were followed from pregnancy until the child reached 18 months of age. The findings increased knowledge about parental prenatal representations and their associations with the postnatal quality of father–child interaction and a child’s early social-emotional development. Moreover, new insights were gained into how distinct patterns of early parent–child interaction contribute to the quality of triadic family interaction. Particular attention was given to the contribution of fathers and father–child relationships.

The main findings of the studies are illustrated in Figure 3. First, it was found that balanced prenatal representations of both parents had significant positive effects. Fathers’ balanced prenatal representations were associated with higher quality early father–child interaction (Study I). They also predicted more positive social-emotional competence in toddlers, together with maternal balanced prenatal representations (Study III). Second, aspects of stability and openness to change were identified in the quality of dyadic father–child interaction between infancy and toddlerhood. Positive changes, such as increases in mutuality and reciprocity, were observed at mean levels, along with moderate stability, particularly in positive characteristics of dyadic interaction (Study I). Third, the quality of early parent–child interaction, particularly between fathers and children, was associated with the quality of triadic family interaction during toddlerhood (Study II). In particular, well-functioning dyadic interaction between parents and children was associated with higher family coordination and cooperative family alliance.

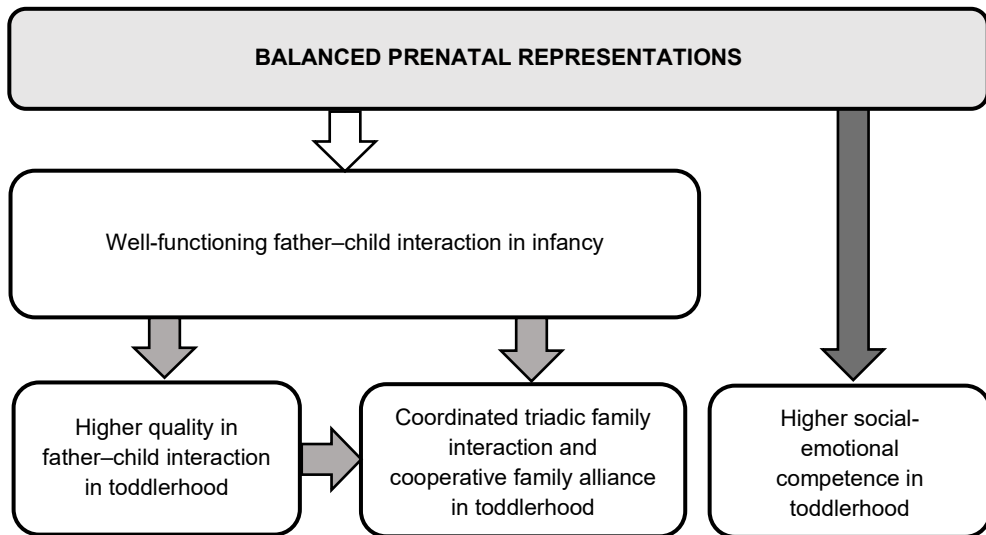


Figure 3. Summary of the main findings from studies I, II and III.

5.1 Prenatal Representations

The design and findings of this thesis are valuable and unique because they aimed to fill the existing gap in knowledge regarding prenatal representations, particularly those of fathers. Most parents, approximately 60%, had balanced representations regarding their expected child during the third trimester of pregnancy. Fathers and mothers demonstrated similar distribution of prenatal representation categories. Fathers did not have a higher proportion of disengaged representations compared to mothers, although this difference has been previously reported (Vreeswijk et al., 2015). However, 70% of fathers' nonbalanced representations were disengaged. In 78% of the families, one or both of the parents had balanced representations. To conclude, these findings reflect the representation profile of a nonclinical, low-risk sample of two-parent families. When the level of risk factors is low during pregnancy, parents are more likely to have balanced representations both prenatally and postnatally (Vreeswijk et al., 2015). Accordingly, balanced prenatal representations have previously been more frequently observed among fathers and mothers in nonclinical samples and nonbalanced representations in clinical samples of mothers (Vreeswijk et al., 2012; Vreeswijk, Maas, Rijk, & van Bakel, 2014).

5.1.1 Prenatal Representations, Early Father–Child Interaction and a Child’s Social-Emotional Development

This study was among the first to demonstrate associations between fathers’ prenatal representations and the postnatal quality of father–child interaction. Fathers with balanced prenatal representations exhibited higher quality early father–infant interactions, consistent with previous findings among mothers (Dayton et al., 2010; Theran et al., 2005). These fathers showed higher positive affective involvement, sensitivity, and responsiveness when interacting with their four-month-old infants compared to fathers with disengaged representations. The narratives of these fathers also indicated higher openness to change, intensity of involvement, and caregiving sensitivity.

In contrast, characteristics linked to disengaged representations, such as emotional distance and detachment, were observed in paternal interactions with their four-month-old infants. Moreover, qualitative and content features of the fathers’ prenatal representations, such as infant difficulty, low acceptance, and low openness to change were associated with dyadic disorganization and tension in postnatal father–infant interactions.

Interestingly, differences in the quality of father–child interaction between fathers with balanced or disengaged prenatal representations were observed only during infancy, and this difference did not remain into toddlerhood. It is possible that for some fathers, nonbalanced representations turn into balanced after concrete experiences with the child (George & Solomon, 1996; Vreeswijk et al., 2015). As suggested, the conservative force of the prenatal representation may decline as the child becomes a more active participant in the relationship, and accumulating interactions begin to exert a bidirectional influence on the quality of parental representation (Stern, 1991; Zeanah et al., 1986). Furthermore, stability has been observed most frequently among balanced and distorted representations, indicating that prenatal disengaged representations may be more susceptible to postnatal change (Benoit, Parker, et al., 1997; Vreeswijk, Maas, Rijk, Braeken, et al., 2014).

It was demonstrated that nonbalanced prenatal representations of fathers did not indicate a risk for persistent problems in dyadic father–child interaction. Similarly, nonbalanced representations of both parents did not pose a risk for social-emotional or behavioral problems in toddlers, which is a typical finding in low-risk samples (e.g., Bates et al., 1985; Belsky et al., 1998; Fagot & Kavanagh, 1990). However, in the presence of other contextual risks, such as maternal depression or low socioeconomic status, the influence of nonbalanced representations may be more prominent (Belsky & Fearon, 2002; Sokolowski et al., 2007; Vreeswijk et al., 2012; Wood et al., 2004). Factors such as unwanted pregnancy, history of maltreatment, and lack of support are related to maternal distorted prenatal representations, which

often coexist with symptoms of depression and anxiety (Korja et al., 2009; Theran et al., 2005; Vreeswijk et al., 2012, 2015).

It is important to point out that mothers' experiences of the couple relationship during pregnancy, together with paternal representations of the child, had an impact on the quality of father–child interaction at four months. Higher satisfaction of mothers was related to more positive and mutual interaction between fathers and their infants. As suggested, relationships between caregivers may spill over into dyadic parent–child relationships (Fagan, 2020; Sears et al., 2016; Stroud et al., 2011). Father–child relationships may be vulnerable to negative effects resulting from marital problems, especially when reported by the mother (Coiro & Emery, 1998; Cummings et al., 2004). Mothers experiencing low couple relationship satisfaction may also display more frequent gatekeeping behaviors and attitudes, while higher satisfaction may reduce these behaviors (Allen & Hawkins, 1999; Altenburger et al., 2018; Schoppe-Sullivan et al., 2015). Through such behaviors, mothers may either discourage or foster and support fathers in developing a relationship with their expected child (Schoppe-Sullivan et al., 2008).

The results of this thesis highlight the benefits of balanced prenatal representations, which promote positive interactions between fathers and infants during early infancy. The crucial impact of balanced prenatal representations was further demonstrated by the association between balanced representations of both parents and a child's higher social-emotional competence during toddlerhood. Thus, it seems beneficial for the child's social-emotional development if both parents construct balanced representations of the child and their relationship during pregnancy. Considering that balanced representations also show high stability (Benoit, Parker, et al., 1997; Vreeswijk, Maas, Rijk, Braeken, et al., 2014), they may create an optimal basis for the parent–child relationship and function as a protective factor. Among mothers, the quality of prenatal representations has shown predictive value above postnatal representations in predicting child attachment security (Madigan et al., 2015), suggesting that the quality and organization of prenatal representation may be of special significance.

5.2 Dyadic and Triadic Interaction

5.2.1 Stability and Change in Father–Child Interaction from Infancy to Toddlerhood

Research focusing on changes and stability in father–child interaction is limited and previous studies have particularly examined the stability of parenting behaviors (e.g., Hall et al., 2015). This ignores the dyadic and interrelated nature of parent–child interactions. This thesis aimed to fill the gap by examining the longitudinal change

and stability in the quality of dyadic father–child interaction from infancy to toddlerhood. The results showed that father–child relationships develop and change over time, although some aspects of interaction demonstrate continuity. Significant changes in mean levels were observed across most areas of interaction, indicating positive development as the child grew older. The greatest increase in mean levels occurred in dyadic mutuality and reciprocity. Higher quality interaction may be promoted by the developmental achievements of 18-month-old children, enabling them to engage in and regulate dyadic interactions with more sophisticated and complex skills, such as advances in language. Additionally, these interactions are fostered by accumulating joint experiences of fathers and children.

Although positive mean-level changes occurred in the quality of dyadic interaction, some characteristics of interaction demonstrated continuity within individuals and dyads from infancy to toddlerhood. Specifically, paternal positive affective involvement, sensitivity, and responsiveness, and the infant’s positive affect, communicative, and social skills showed continuity. For example, fathers who exhibit high positive affective involvement, sensitivity, and responsiveness in interactions with their four-month-old infants are likely to do so also when their children are toddlers. Conversely, fathers with low levels of these interaction features during infancy tend to maintain low levels during toddlerhood. This finding aligns with previous research showing that particularly positive interactive behaviors, such as sensitivity, are stable over time (Bigelow et al., 2010; Dallaire & Weinraub, 2005; Else-Quest et al., 2011; Hall et al., 2015). This thesis also showed that dyadic mutuality and reciprocity are relatively stable characteristics of dyadic interaction, even though the mean levels generally increased. Negative aspects of interaction demonstrated lower continuity in this study, as well as in previous ones (e.g., Dallaire & Weinraub, 2005), which may indicate that they are more affected by other, for example, situational factors. It needs to be emphasized that the majority of previous research on stability and change has been conducted among mothers.

5.2.2 Characteristics of Latent Profiles and the Child’s Contribution to Dyadic Parent–Child Interaction

High-quality dyadic interaction requires the active involvement of both interaction partners. A sophisticated approach, latent profile analysis, was used in this thesis to examine all aspects of dyadic interaction (parental, infant, and dyadic aspects) together, which has rarely been applied before. The identified profiles were quite similar in infancy and toddlerhood for both father–child and mother–child dyads, although the number of dyads in each profile differed.

The profiles also represented the characteristics of a child’s affective and behavioral styles and their level of regulation during interaction. This emphasizes

the reciprocal nature of parent–child interactions and adds to the current literature by demonstrating the active contribution of the child as a crucial interaction partner, even during infancy. Accordingly, in well-functioning father–child interactions, the infant also expressed positive affect and communicative behaviors toward the father, resulting in mutual and reciprocal interaction. The child’s interactive style closely resembled the parental interaction style in several other profiles as well, highlighting the need to consider the child’s contribution when assessing the quality of parent–child interaction in future studies.

During infancy, most father–child dyads demonstrated lack of reciprocity and low paternal affective involvement, sensitivity, and responsiveness. In contrast during toddlerhood, this interaction profile was demonstrated only by a few father–child dyads. These observed differences, along with the results of study I, suggest that emotional distance, low affective involvement, and lack of reciprocity may be particular characteristics of early interaction between fathers and their four-month-old infants. For some fathers, it may take more time to build a relationship with their child (e.g., Baldwin et al., 2018; Solberg et al., 2023; van Bakel et al., 2013).

5.2.3 Associations Between Dyadic and Triadic Interactions

Consistent with family systems theory, this thesis demonstrated that challenges or strengths within one subsystem, such as the dyadic relationship between one parent and the child, affect other systems in the family, particularly the triadic family interaction. This study examined the contribution of all three family members (father, mother, and child) to the quality of triadic family interaction, indicating that the child also has a crucial role in shaping these interactions. In this thesis, 49% of family alliances were classified as cooperative, 34% as conflicted, and 17% as distorted. Children who grow up in a cooperative alliance may more frequently experience moments of affect sharing in multi-person contexts, creating a favorable environment for learning to understand multiple perspectives (Favez et al., 2012; Tissot et al., 2022). Cooperative alliances appear to be particularly stable throughout the postpartum period, providing a social context that positively fosters child development, including social cognition (Favez, Frascarolo, Carneiro, et al., 2006; Tissot et al., 2022).

In this thesis, cooperative alliance was linked with higher quality in parent–child interaction, particularly in father–child interaction. In cooperative families, father–child dyads exhibited reciprocity and paternal affective involvement, sensitivity, and responsiveness during toddlerhood. Consistently, similar interactions observed between fathers and their infants even earlier, at four months, contributed to higher family coordination during toddlerhood.

In contrast, conflicted alliances, which are considered dysfunctional alliances (Favez et al., 2011), were more frequently observed in families where father–child interaction during toddlerhood was characterized by high or moderate dyadic tension, negative affect and behavior, and lack of mutuality. Moreover, challenges in dyadic father–child interaction, either a lack of reciprocity or high negativity, indicated lower family coordination during triadic interaction.

Few associations were observed between mother–child interaction and the quality of triadic family interaction. However, triadic interaction was less coordinated during toddlerhood if mother–child interaction had been very negative during infancy. Mother–child interaction represented less variability between the latent profiles (Study II: Figure 2), which may partly explain the lack of significant associations.

On the other hand, the quality of triadic family interaction appears to be particularly related to maternal couple relationship satisfaction, as previous findings from the same study population have shown (Korja et al., 2016). Higher maternal couple relationship satisfaction was associated with higher-quality triadic family interaction (Korja et al., 2016). Accordingly, a mother may be more likely to reduce gatekeeping behaviors and support the father–child relationship when she is satisfied with the couple relationship (Allen & Hawkins, 1999). In addition, fathers' involvement with their infants during triadic play situations is also affected by the level of maternal gatekeeping behaviors (Cannon et al., 2008). The findings of this thesis suggest that the quality of the father–child relationship further contributes to the overall quality of triadic family interaction. In addition, well-functioning father–child interaction, paternal sensitivity, and attachment security have previously been associated with higher functioning coparenting relationships (Brown et al., 2010; Bureau et al., 2021). These associations suggest a link between different family subsystems that affect each other and warrant further investigation.

Moreover, mother–child dyads are less prone to contextual effects compared to father–child dyads and may form the main unit of the interaction while fathers maintain a distance (de Mendonça et al., 2011). When mothers and children display high levels of mutual engagement during interaction, fathers' positive interaction behaviors in triadic situations may be inhibited (Kwon et al., 2012). The results of this thesis also suggest that when fathers are unable to establish a well-functioning dyadic relationship with their child, it may contribute to competition and conflict in triadic family interaction. In contrast, triadic family interaction during toddlerhood may be fostered by well-functioning father–child interaction as early as infancy.

5.3 Social-Emotional Development in Toddlerhood

This thesis demonstrated that balanced prenatal representations of both parents have a significant positive influence on an 18-month-old child's social-emotional competence. However, the quality of prenatal representations was not associated with parental reports of social-emotional and behavioral problems in their children. Early social-emotional competence and age-appropriate competence skills are significant predictors of later competence and may reduce the emergence of SEB problems (Carter et al., 2004; Eisenberg et al., 2010; Englund et al., 2011; Halligan et al., 2013; Treyvaud et al., 2012). Moreover, the level of social-emotional competence at age two predicts prosocial behaviors and peer relationship problems at age five, indicating positive developmental pathways from early social-emotional competence (Treyvaud et al., 2012). Consequently, the findings of this thesis are important and enhance our understanding of the factors contributing to positive social-emotional development.

The results indicated a unique contribution to toddlers' social-emotional competence, even after controlling for confounding variables such as couple relationship satisfaction and child temperament. As demonstrated, prenatal representations, particularly balanced representations, appear substantially stable and guide early parenting practices, constituting a basis for the postnatal parent-child relationship (Dayton et al., 2010; Hall et al., 2014; Korja et al., 2010; Solomon & George, 1996; Theran et al., 2005). The quality of this relationship further contributes to the development of attachment security, which predicts positive social-emotional development in children (Belsky & Fearon, 2002; Condon et al., 2013; Huth-Bocks et al., 2011; Sroufe, 2005; Tambelli et al., 2020; Trombetta et al., 2021). In conclusion, the quality of parental postnatal representations, parent-child interaction, and a child's secure attachment may serve as mechanisms through which prenatal representations impact a child's social-emotional development.

The results of this thesis also support the idea that the organization of multiple attachment relationships and their effects on later child development are significant (Dagan & Sagi-Schwartz, 2018). The network of infant-mother and infant-father attachment relationships may predict a child's developmental outcomes more strongly than either relationship alone (Dagan & Sagi-Schwartz, 2018; van Ijzendoorn et al., 1992). The benefits of having two sensitive parents have been demonstrated, for example, concerning early cognitive and language skills (Ryan et al., 2006). In contrast, a child's insecure relationship with both parents indicates a higher risk of developing behavioral problems in middle childhood compared to children who were secure with at least one parent (Kochanska & Kim, 2013). Therefore, assessing the effect of a network of relationships may enhance the predictive power of early attachment patterns on later outcomes because the other parent may have an added effect on a child's developmental trajectory (Dagan &

Sagi-Schwartz, 2018). This also provides a more ecologically valid approach to understanding the individual's developmental trajectory than examining the effects of a single relationship alone (Belsky, 1981). However, there are no previous studies assessing the impact of prenatal representations of both parents using a family-level approach. As the findings of this study tentatively suggest, having two parents with balanced prenatal representations may be beneficial for a child's social-emotional development in early childhood.

The study participants were drawn from a nonclinical, low-risk sample, indicating a low frequency of SEB problems, which may explain why the quality of prenatal representations was not associated with a child's social-emotional and behavioral problems. It has been shown, for example, that in high-risk samples, child attachment insecurity more frequently predicts behavior problems in early childhood, whereas in low-risk samples, this association is generally not observed (e.g., Belsky et al., 1998; Erickson et al., 1985; Fagot & Kavanagh, 1990; Shaw & Vondra, 1995). Considering that nonbalanced prenatal representations are less stable, some may have become balanced postnatally in this sample, resulting in a substantially high proportion of balanced representations in this study. Moreover, previous postnatal studies have reported that particularly distorted representations may contribute to less optimal outcomes in the quality of parent-child interactions (Hall et al., 2014; Korja et al., 2010). In this study, the proportion of distorted representations was small, and they were combined with disengaged representations into a nonbalanced category. On the other hand, it can be considered a positive finding that nonbalanced prenatal representations do not necessarily indicate a negative impact on a child's developmental outcomes. This may be particularly true in low-risk samples such as this.

5.4 Strengths and Limitations

Family relationships and processes are an extremely complex area of research due to the interrelated nature of these relationships. By employing observational and interview measures, the present study responds to the challenges within the field and offers a new understanding of parent-child relationships and family interactions. The main strength of this thesis is the longitudinal study design, which enabled following expectant couples and parent-child dyads from pregnancy into the child's toddlerhood, and the inclusion of fathers as early as pregnancy. Moreover, the methodological strengths obtained using observational assessments (PCERA, LTP) and in-depth interviews (WMCI) make this prospective study unique. This study also emphasizes the child's contribution as an important interaction partner, which was highlighted in the assessment measures both when examining dyadic as well as triadic interaction.

The longitudinal design is a benefit and enables the examination of associations, but these do not allow inferences about causality. Although the limited sample size in this thesis prevented path analyses and more sophisticated family-level analyses, the findings encourage further investigations using larger samples, longitudinal assessments, and complex designs that follow the family systems perspective. Further investigation of these associations requires the consideration of individual and combined effects of father–child and mother–child relationships, the couple relationship, and the larger family context.

This study used a nonclinical, low-risk sample, and the results cannot be generalized to high-risk samples. The distribution of prenatal representations in this study is typical of nonclinical samples. However, balanced representations may have been overrepresented in this sample, as nonbalanced representations often develop into balanced representations postnatally. This may have resulted in an even higher proportion of balanced representations postnatally in this study. Combined with the limited sample size, the distribution of representations meant that nonbalanced categories were combined in Study III. Therefore, the unique contributions of both disengaged and distorted representations were not examined. Future research could particularly focus on distorted representations due to their high stability and impact on less optimal outcomes for parent–child relationship, as well as their co-existence with other psychosocial risks, such as symptoms of depression and anxiety (Hall et al., 2014; Korja et al., 2009, 2010; Theran et al., 2005; Vreeswijk et al., 2012). Disrupted representations, an additional category introduced by Crawford and Benoit (2009), have been linked with parental childhood interpersonal trauma and represent more severe distortions in representations, thus demonstrating the most problematic and detrimental type of representations (Ahlf-Dunn et al., 2022). Therefore, future studies could focus also on these representations and their associations with SEB problems using high-risk or clinical samples.

Some criticism can also be directed toward the use of different interaction tasks for fathers and mothers. Nevertheless, the tasks indicate ecological validity as these situations reflect everyday caretaking experiences for parent–child dyads in many two-parent heteronormative families. Fostering secure exploration by challenging the child to play in more mature ways, actively supporting the child’s continuing motivation, and taking the child’s point of view when giving explanations and making suggestions, has been suggested as a central characteristic of the father–child interaction (Grossmann et al., 2002). In line with this, the structured tasks of the PCERA utilized in this study encourage father behaviors that align well with fostering secure exploration. In addition, the latent profile analysis offered a more multifaceted perspective on parent–child interaction, which also demonstrated rather similar dyadic interaction profiles across parents and situations, providing support for the validity of the situations and tasks. It should also be noted that both dyadic

interaction situations were videotaped during the same research visit. Therefore, different interaction tasks with parents helped sustain the child's interest in the interaction.

The assessment of a child's social-emotional development in the present study was completed mainly by mothers, which may have affected the results. Moreover, using a single questionnaire to examine social-emotional development provides only a narrow assessment of the overall social-emotional functioning of the child. However, particularly with young children, parents are valuable informants because they are familiar with the child's functioning across several contexts (Squires et al., 2001). Additionally, mothers have demonstrated high accuracy in rating their child's behavior as early as 12 months of age (Carter et al., 1999). When evaluating the clinical significance of the SEB symptoms, parental reports of severity also need to be taken into account (Carter et al., 2004). However, limited background information concerning the children were used in the analyses, which are important to include in future studies.

Finally, having a father is not a prerequisite for favorable child development. The data for this thesis were collected approximately 15 years ago. During these years, knowledge and awareness of family diversity have increased significantly. In Finland, where this thesis was conducted, two-parent heteronormative families still represent almost 80% of all families with children (OSF, 2023). However, in contemporary families, the roles of parents may be closer to each other. Therefore, the associations found in this thesis may not be father- or sex-specific. Instead, they may reflect the father's role as a non-pregnant partner and caregiver, or differences between parents' primary and secondary caregiving roles. Inevitably, parents, their caregiving, and parental roles are affected by social expectations and the ways fathers and mothers are socialized to parent (Ding et al., 2020; Ellis-Davies et al., 2022). Accordingly, concurrent sociocultural changes, which are associated with the involvement and direct childcare experiences of fathers, are also connected with neurobiological changes in fathers' brains and hormonal systems (Abraham et al., 2014; Abraham & Feldman, 2022; Bakermans-Kranenburg et al., 2019). These changes occurring during the transition to parenthood appear not to be sex-specific; instead, they demonstrate the interrelationship between the brain and the parental caregiving role, social experiences, and expectations, simultaneously indicating flexibility, plasticity, and reciprocity (Abraham et al., 2014; Storey et al., 2020). Considering these aspects, family diversity, the division of childcare tasks, and parental roles in each family should be examined more explicitly in future studies, using more diverse samples of families.

6 Conclusions and Clinical Implications

The findings of this thesis add to the knowledge of father–child relationships as part of the early relational context and their contribution to a child’s social-emotional development. In particular, these findings highlight the role of parental prenatal representations, which have been less studied among fathers. These findings are among the first to demonstrate that fathers’ prenatal representations have a crucial impact on the quality of early postnatal father–child interaction. Furthermore, the results show that balanced representations of both parents are associated with higher social-emotional competence in toddlers. The results of this study also demonstrate that the quality of parent–child interaction, particularly between fathers and children, plays an essential role in shaping triadic family interaction. Therefore, these findings suggest that balanced prenatal representations and well-functioning parent–child interactions are crucial for fostering positive family relationships and a child’s social-emotional development in low-risk, heteronormative, two-parent families.

The role of the father is important, both in its own right and as part of the family context. Fathers’ balanced prenatal representations are associated with higher quality early father–child interactions in infancy, thus demonstrating a positive father contribution. Well-functioning father–child interactions, characterized by reciprocal and mutual dyadic connection, in turn contribute to higher family coordination and a cooperative family alliance in early childhood. Children of fathers with balanced prenatal representations also show higher social-emotional competence in toddlerhood.

In contrast, nonbalanced prenatal representations of fathers may result in less optimal early father–child interactions during infancy. Moreover, a lack of reciprocity and mutuality in early father–child interaction, as well as dyadic tension and negativity later in the interaction, may contribute to less optimal triadic family interaction during toddlerhood. Nonbalanced prenatal representations are also associated with less favorable development of a child’s social-emotional competence during toddlerhood. However, nonbalanced representations do not necessarily indicate a risk for long-lasting challenges in the father–child interaction or social-emotional and behavioral problems in toddlers, at least in low-risk families.

Nevertheless, it seems important to identify those father–child dyads that, for some reason, do not experience positive changes after infancy.

It remains unclear whether prenatal representations have a direct impact on children’s social-emotional development or whether this association is mediated by the quality of dyadic or triadic interaction, or by other related factors not examined in this thesis. These pathways need to be further explored to discover the distinct and complementary effects of different family relationships beyond the context of this study.

Based on the findings of this thesis, it seems important to find ways to support the development of balanced prenatal representations in both parents. Since some fathers experience barriers in engaging with their partner’s pregnancy (Steen et al., 2012; Widarsson et al., 2015), it is crucial to remove these barriers and support the representational processes of fathers during pregnancy. Offering interventions for fathers with a specific focus on representations during the prenatal period may enhance their early postnatal relationships with their infants. Expectant families could benefit from knowledge about the significant impact of the prenatal period on both parents and their expected baby. This awareness may enhance maternal gate-opening behaviors and attitudes, as well as father engagement, further contributing to positive outcomes in father–child relationships and triadic family interaction.

Maternity clinics and professionals working with expectant families have special opportunities to deliver information and recognize challenges in developing family relationships, such as early disengagement or problems in couple relationships. However, perinatal care primarily focuses on mothers (Lever Taylor et al., 2018), and fathers have been neglected in prenatal interventions aimed at supporting parent–fetus relationships during pregnancy. One of the few interventions including fathers, with promising results, is the Prenatal Video-feedback Intervention to promote Positive Parenting (VIPP-PRE; Alyousefi-van Dijk et al., 2022), which aims to support fathers’ interaction with their unborn infant, increase expectant fathers’ postnatal sensitivity, and enhance paternal involvement using live ultrasound images to visualize father–fetus interactions during pregnancy (de Waal et al., 2022).

In general, there are promising results showing that fathers experience intensified feelings of bonding and connection after seeing the fetus in the ultrasound scan (Freeman, 2000; Walsh et al., 2014). Therefore, prenatal routine ultrasound examinations, which are typically attended by over 80% of all expectant couples, could be considered a way to provoke paternal interest and emotional bonding with the fetus (Walsh, 2020; Walsh et al., 2017). The quality of interaction between ultrasound examination providers and expectant parents, including narration and interpretation of ultrasound images, may contribute to parents’ mental representations and feelings of connection to the baby (Walsh, 2020). Therefore, in addition to their medical screening purpose, routine ultrasound examinations should

be considered interactional situations with the fetus, which have potential value for supporting early parent–infant relationship development of both expectant fathers and mothers.

Furthermore, fathers whose representations are disengaged during pregnancy may particularly need opportunities to build an emotional relationship with their baby after birth. In the presence of high levels of gate-closing from mothers, this process may not be supported, increasing the risk of fathers not being included in family life and leading to lower quality parenting (Altenburger et al., 2018). Early father involvement during pregnancy has been shown to not only support higher father engagement in the future but also to enhance triadic family interactions (Cabrera et al., 2008; Simonelli et al., 2016; Zvara et al., 2013). Early engagement also supports the neurobiological and hormonal processes important in the transition to parenthood (Abraham & Feldman, 2022). The interrelatedness of dyadic parent–child relationships, couple relationship satisfaction, coparenting, and triadic family interaction is crucial in determining the context of a child’s early development and also when designing interventions. Further research is needed to enhance our understanding of these complex family-level associations. Research in the field requires the inclusion of fathers and all other significant caregivers, regardless of their sex, to gain a more profound understanding of the network of relationships in which children develop.

The findings of this thesis are in line with the goal of the STEPS study, which aims to identify steps to promote the healthy development and well-being of children. The findings suggest that the positive quality of early family relationships, as early as during pregnancy, may promote positive developmental outcomes for the child. To conclude, the father’s ability to build an emotional bond with the imagined baby and the impact of the prenatal representational process should not be underestimated. The quality of prenatal representations affects early dyadic parent–child relationships, which also demonstrate substantial stability and contribute to triadic family interaction and the child’s early social-emotional competence. Therefore, supporting expectant families during the transition to parenthood is essential for fostering a positive developmental environment for children.

Abbreviations

AAI	Adult Attachment Inventory
AIC	Akaike Information Criterion
APGAR	Apgar score
BIC	Bayesian Information Criterion
BITSEA	Brief Infant-Toddler Social-Emotional Assessment
EPDS	Edinburgh Postnatal Depression Scale
FAAS	Family Alliance Assessment Scale
GA	Gestational age
GWK	Gestational week
IBQ-R SF	Infant Behavior Questionnaire -Revised Short Form
ICC	Intraclass correlation coefficient
LPA	Latent profile analysis
LTP	Lausanne Trilogue Play
MAR	Missing at Random
PCERA	Parent–Child Early Relational Assessment
RDAS	Revised Dyadic Adjustment Scale
SEB	Social-emotional and behavioral
SSP	Strange Situation Procedure
STEPS	Steps to the Healthy Development and Well-being of Children
VIPP-PRE	Prenatal Video-feedback Intervention to promote Positive Parenting
WMCI	Working Model of the Child Interview

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Appendices

Appendix 1. PCERA Scales, Scale Items and Cronbach's Alphas in Study I.

Scale	Scale items	α	
		4 months	18 months
Parental scales			
1. Parental Positive Affective Involvement, Sensitivity and Responsiveness	2. Expressive, non-flat tone of voice	.94	.85
	3. Warm, kind tone of voice		
	4. Expressed positive affect		
	7. Lack of depressed, withdrawn mood		
	9. Enthusiastic, animated, cheerful mood		
	12. Enjoyment, pleasure		
	13. Positive physical contact		
	15. Visual contact		
	16. Amount of verbalization		
	17. Quality of verbalizations		
	18. Social initiative		
	19. Contingent responsivity to positive behavior		
	21. Structuring and mediating environment		
	22. Sensitivity, reads cues and responds		
23. Connectedness			
24. Mirroring			
26. Creativity			
2. Parental Negative Affect and Behavior	1. Angry, hostile tone of voice	.85	.89
	5. Expressed negative affect		
	6. Angry, hostile mood		
	11. Displeasure		
	20. Contingent responsivity to negative behavior		

3. Parental Intrusiveness, Insensitivity and Inconsistency	14. Negative physical contact	.75	.82
	21. Lack of structuring and mediating		
	22. Insensitivity and unresponsiveness to child's cues		
	25. rigidity		
	27. Intrusiveness		
	28. Inconsistency and unpredictability		
Child scales			
4. Infant Positive Affect, Communicative and Social Skills	30. Expressed positive affect	.87	.82
	32. Happy, pleasant, cheerful mood		
	33. No apathetic or withdrawn mood		
	38. Alertness		
	39. Social initiative		
	40. Social responsiveness		
	45. Exploratory play		
	47. Robustness		
	55. Visual contact		
	56. Communicative competence		
	57. Readability		
5. Infant Dysregulation and Irritability	31. Expressed negative affect	.87	.90
	35. Irritability and angry mood		
	37. Emotional lability		
	43. Aggressivity (18 months)		
	49. Impulsivity (18 months)		
	50. Lack of self-regulation/organization		
Dyadic scales			
6. Dyadic Disorganization and Tension	58. Anger, hostility/irritability	.70	.87
	60. Tension, anxiety		
	64. Dyadic disorganization		
	65. Lack of state similarity		
7. Dyadic Mutuality and Reciprocity	59. No flat, empty, constricted affect	.80	.77
	61. Mutual enthusiasm, enjoyment and "joie de vivre"		
	62. Joint attention and activity		
	63. Reciprocity		

Appendix 2. PCERA Scales, Scale Items and Cronbach's Alphas in Study II.

Scale	Scale items	α		α		
		Father-child dyad		Mother-child dyad		
		4mo	18mo	4mo	18mo	
Parental scales						
1. Parental Positive Affective Involvement, Sensitivity and Responsiveness	2. Flat, unemotional, constricted tone of voice	.94	.83	.94	.89	
	3. Warm, kind tone of voice					
	4. Expressed positive affect					
	7. Depressed mood					
	9. Enthusiastic, animated, cheerful mood					
	12. Enjoyment, pleasure					
	13. Quality and amount of positive physical contact					
	15. Amount and quality of visual contact with child					
	16. Amount of verbalization					
	17. Quality of verbalizations					
	18. Social initiative					
	19. Contingent responsivity to positive and/or age-appropriate behavior					
	22. Parent reads child's cues and responds sensitively and appropriately					
	23. Connectedness					
	24. Mirroring					
	26. Creativity, resourcefulness					
	2. Parental Negative Affect and Behavior	1. Annoyed, angry, hostile tone of voice	.81	.88	.88	.90
		3. Warm, kind tone of voice				
		5. Expressed negative affect				
		6. Irritable, frustrated, Angry mood				
11. Displeasure, disapproval, criticism						
14. Quality and amount of negative physical contact						
16. Amount of verbalization						
20. Contingent responsivity to child's perceived negative and/or unresponsive behavior						
21. Structures and mediates environment						
22. Parent reads child's cues and responds sensitively and appropriately						
25. Flexibility, rigidity						
27. Intrusiveness						
28. Consistency, predictability						

Child scales

3. Child Positive Affect, Communicative and Social Skills	30. Expressed positive affect 32. Happy, pleasant, content, cheerful mood 33. Apathetic, withdrawn, depressed mood 38. Alertness, interest 39. Social behavior of child - initiates 40. Social behavior of child - responds 45. Quality of exploratory play 47. Robustness 55. Visual contact 56. Communicative competence 57. Readability	.87	.82	.96	.82
4. Child Dysregulation and Irritability	31. Expressed negative affect 34. Anxious, tense, fearful mood 35. Irritable, frustrated, angry mood 37. Emotional lability 41. Avoiding, averting, resistance 46. Attentional abilities 50. Self-regulation, organizational capacities 51. Consolability, soothability	.86	.86	.92	.90

Dyadic scales

5. Dyadic Mutuality and Reciprocity	59. Flat, empty, constricted 61. Mutual enthusiasm, joyfulness, enjoyment dyadic "joie de vivre" 63. Reciprocity	.80	.73	.89	.73
6. Dyadic disorganization and tension	58. Frustrated, angry, hostile 60. Tension, anxiety 62. Joint attention, activity 64. Organization, regulation of interactions 65. Goodness of fit	.65	.87	.85	.77



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ISBN 978-951-29-9943-9 (PRINT)
ISBN 978-951-29-9944-6 (PDF)
ISSN 0082-6987 (Print)
ISSN 2343-3191 (Online)