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„Father-Child Interaction & Attachment:
A study of the association between attachment style
and quality of interaction in father-child dyads.“

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Laura Asperud Thomsen, BSc

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Univ.-Prof. Dipl.-Psych. Dr. Stefanie Höhl

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1. Introduction

Attachment refers to the affectional bond between a child and its caregiver. Attachment behaviours, for example the seeking of closeness, is thought to have evolved because they protected children from predators and other dangers (Bowlby, 1969; Van IJzendoorn, Dijkstra, & Bus, 1995). Establishing secure attachments with caregivers is of crucial importance for favourable child development and has been associated with a number of positive outcomes regarding physical and mental health, socio-emotional competence, behaviour, and cognition. Contrarily, so-called insecure attachments adversely affect such developmental outcomes with significant links to later psychopathology (Ranson & Urichuk, 2008; Van IJzendoorn et al., 1995).

Bowlby and Ainsworth, the pioneers of attachment research, and their successors mainly studied infant-mother relations, as fathers were marginally involved with child rearing practises at the time. However, in the last decades fathers have become increasingly involved with their children, but their role in relation to child attachment and development still remains inconclusive. Research on absent fathers has suggested that fathers play a significant part in the life of their children, which is distinct from and complementary to that of mothers (Lamb, 2010). Thus, it is imperative to study the unique effects of fathering and the specific factors responsible for promoting the father-child relationship.

It has been proposed that joint interactive experiences are particularly important for the father-child relationship, and especially the quality of interaction seems to have a profound impact on shaping the child's attachment to the father. However, so far studies have only found weak associations with paternal behaviour qualities during joint interactions, which calls for a different approach and/ or for more research in this area. For instance, it has been suggested that examining dyadic features of interaction could yield more conclusive results. Moreover, the majority of previous studies have focused on infants and toddlers, which leaves a gap in parent-child interaction research for later stages in development. Since fathers are thought to be more involved with their preschool children, assessing qualities of father-child interaction seems especially relevant in this phase of childhood.

In sum, to this day a large portion of unexplained variance in attachment security remains, and there is continuously a strong need to examine various potential

contributors to the father-child relationship. The current study provides important information to this field of research by investigating the interplay between qualitative aspects of father-child interaction in the preschool period and attachment styles.

In the following, a theoretical background will provide an overview of the most significant research findings in the field of father-child attachment, paternal and dyadic behaviour quality, attachment and father-child interaction in the preschool years as well as of other associative factors to the father-child relationship.

Subsequently, two research questions will be presented. Then the sample and procedure of the current study are described and the applied methods of measurement are presented. Following a thorough statistical analysis and presentation of the results, the study's findings and its implications are discussed. Finally, the present study's limitations are reflected upon and ideas and notions for future investigations are offered.

2. Theory

The following chapter provides an overview of the theoretical background and current research findings on attachment, father-child dyadic interaction quality, and their associative factors.

2.1 Attachment

According to attachment theory, attachment is formed through a balance of parents providing a secure base for the child and encouraging the child to explore from it (Ainsworth, 1979). It is manifested through behaviours, which promote proximity and contact and range from physical closeness to interaction and communication (Ainsworth & Bell, 1970). These attachment behaviours “are organized within the individual in response to a particular history of internal and external cues” (Cassidy, 2016, p. 5). Bowlby (1969) described this organisation as the child forming mental representations of its attachment figures and the self, which through repeated attachment-related experiences become representational models or “inner working models”. These allow the child to anticipate future behaviour of its attachment figures and in turn plan their own behaviour accordingly. Hence, over time the child learns which behaviours are most effective in order to achieve a certain goal, depending on the circumstances and on the caregiver (Cassidy, 2016).

Infants form the first attachments within the first year of life (Paquette, 2004), usually to the mother and father, and these attachments remain moderately stable from infancy to preschool age (Moss, Cyr, Bureau, Tarabulsy, & Dubois-Comtois, 2005). Children are thought to have an attachment hierarchy, in which the child chooses primary attachment figures for various types of interactions (Cassidy, 2016), hence the child may choose one person for seeking comfort and another for playing.

Parent-child attachment can be divided into two main categories: secure and insecure attachments, the latter which can be further divided into the insecure-avoidant type and the insecure-ambivalent/resistant type (Tracy & Ainsworth, 1981). Essentially, securely attached children are confident that their attachment figure is available and responsive, when needed, whereas insecurely attached children lack this confidence (Cassidy, 2016).

It is estimated, that slightly under two-thirds of all children are securely attached to their mothers and fathers (Ahnert, Pinquart, & Lamb, 2006), whose

increased sensitively responsive and affectionate behaviour cultivates secure relationships (Bureau et al., 2017; Lamb & Lewis, 2012). The quality of parent-child attachment is furthermore strongly influenced by the parent's own attachment experiences (Van IJzendoorn, 1995).

Secure attachments have been connected with a range of positive emotional, social and cognitive outcomes for the child (Berk, 2005; Van IJzendoorn et al., 1995), as well as psychological well-being and adjustment (National Institute of Child Health and Human Development Early Child Care Research Network, 2004). Furthermore, according to meta-analyses, insecurity is linked to increased externalising (i.e. aggressive, oppositional, or conduct problems) (Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010) and internalising symptoms (i.e. depression, anxiety) (Groh, Roisman, Van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012). These research findings clearly underline the relevance for identifying factors that promote secure relationships.

2.2 Father-child attachment

The role of the father for child development has long been neglected and depreciated in the public and scientific debate. However, in line with fathers increased involvement with childcare over the last decades (Lamb, 2000), the recognition of the father's influence on and importance for children's development has proliferated, evident through increasing interest and research (Lamb, 2010; Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004).

It is now generally recognised that children do form attachments to their fathers (Bureau et al., 2017; Lamb & Lewis, 2012), and evidence shows that fathers play a distinct role in the development of their child, which is complementary to the role of mothers (National Institute of Child Health and Human Development Early Child Care Research Network, 2004). Specifically, it has been suggested, that fathers may play a particularly important part in promoting the exploratory side of the child's attachment development (Bureau et al., 2017; Grossmann et al., 2002; Paquette, 2004). Furthermore, several researchers have pointed out the father's role as being a mentor, play partner, one who motivates initiative-taking, encourages and supports his child in the face of challenges and risks (Grossmann et al., 2002; Lamb, 2010;

Paquette, 2004), which further underlines the mediating role of fathers between the child and the outside world.

Although they may often not be primary caregivers, research confirms that fathers are also a source of comfort and security for their children, evident through empirical findings of attachment-related behaviours towards the father upon reunion in Ainsworth's Strange Situation Procedure (Ainsworth & Bell, 1970; Lamb & Lamb, 1976; Lamb & Lewis, 2013). However, Bureau et al. (2017) emphasise that "fathers are more likely to show attachment-related behaviour such as providing psychological security during joint exploration and play" (p. 132) and numerous studies (see Brown, Mangelsdorf, Shigeto, & Wong, 2018) support the notion that interactions during play are at least in part responsible for promoting the father-child relationship.

2.3 Paternal behaviour quality and attachment

Early research on fathering has shown, that fathers are involved with their children through their accessibility, interaction (or engagement) and responsibility (Lamb, 2010), and that these behavioural dimensions are critical for the father-child relationship (see Grossmann et al., 2002). Previously, research predominantly looked at quantitative aspects of parenting, such as time spent with the child (Lamb, 2000). However, multiple experts and researchers criticised this approach and instead emphasized the importance of looking at qualitative aspects of parenting behaviour (Lamb, 2010). Due to a vast body of research, it is now agreed that the quality of parenting behaviour is important for the parent-child relationship and for child development (Brown, McBride, Shin, & Bost, 2007; Bureau et al., 2017; Cabrera, Shannon, & Tamis-LeMonda, 2007; Mills-Koonce et al., 2015).

In the case of fathers, paternal involvement and behaviour have been linked with positive social and emotional child development (Cabrera, Shannon, et al., 2007; Easterbrooks & Goldberg, 1984) as well as cognitive (Mills-Koonce et al., 2015; Radin, 1973; Tamis-LeMonda et al., 2004; Towe-Goodman et al., 2014) and linguistic development (Cabrera, Shannon, et al., 2007; Tamis-LeMonda et al., 2004). Furthermore, in a meta-analysis, McWayne, Downer, Campos and Harris (2013) reviewed 21 studies and found that the quantity of father's positive activity engagement (e.g. play, reading to child, helping with homework) and paternal parenting quality (e.g. responsiveness, disciplinary style) are important determinants

for children's cognitive and academic skills, prosociality, and self-regulatory capacities.

Together these findings underline the importance of conducting research with various aspects of fathering.

Literature on which particular fathering behaviours are related to attachment is scarce. Hitherto, researchers have focused on concepts such as paternal affect (i.e. see Brown et al., 2007), supportive presence and intrusiveness (i.e. Cabrera, Shannon, et al., 2007), and respect for autonomy and hostility (i.e. National Institute of Child Health and Human Development Early Child Care Research Network, 2008). Especially, parental *sensitivity*, which “refers to parent's abilities to respond warmly and consistently to the cues of their children” (Brown et al., 2007, p. 200), has dominated attachment research in regard to parenting behaviours and is thought to be a key source of mother-child attachment security (Lucassen et al., 2011). Yet several studies have failed to find an association between paternal sensitivity and father-child attachment (see overview Brown et al., 2018). However, this inconsistency might be due to differences in assessment methods. Hence, some researchers (see Bureau et al., 2017) argue, that paternal sensitivity should be measured in situations where fathers engage in challenging play activities with their child, rather than contexts of comfort and reassurance. In accordance, numerous studies (Brown et al., 2018; Bureau et al., 2017; Grossmann et al., 2002) assessing paternal sensitivity in various play contexts have delivered significant results in support of this proposition.

2.4 Intergenerational transmission of attachment

According to research, the quality of parent-child attachment is related to the parent's own attachment experiences (Van IJzendoorn, 1995). Studies (see review Van IJzendoorn, 1992) reveal, that parents who are classified as secure-autonomous (assessed with the Adult Attachment Interview coding system, Main, Kaplan, & Cassidy, 1985) mostly have secure relationships with their children, and insecure parent classifications are equally associated with insecure child attachment patterns. This finding is corroborated by meta-analytic evidence (Van IJzendoorn, 1995) revealing a significant correspondence rate between the Adult Attachment Interview (AAI) and the father-infant attachment relationship observed in the Strange Situation

Procedure (SSP, Ainsworth & Bell, 1970). Analysing the distribution of attachment classifications of the AAI, Bakermans-Kranenburg and Van IJzendoorn (2009) found that in a combined sample of 482 non-clinical fathers, 58% were classified as secure-autonomous, 28% as insecure-dismissing, and 15% as insecure-preoccupied. This finding was similar to that of mothers in the same study and corresponds largely to the attachment classification distribution of child-parent relationships assessed with the SSP (Van IJzendoorn & Kroonenberg, 1988).

In sum, these findings imply a strong intergenerational transmission of attachment between parents and their children (Belsky, 2005). Furthermore, several studies suggest that the transmission of attachment between father and child is mediated by parental sensitivity (for a review, see Van IJzendoorn et al., 1995). Hence, secure-autonomous fathers respond more sensitively to the signals of their children, who thus in turn are more likely to develop secure attachments with the father (De Haas, Bakermans-Kranenburg, & Van IJzendoorn, 1994).

2.5 Dyadic interaction and attachment

Although several suggestions have been made concerning the association between various paternal behaviour qualities and attachment, a clear link has yet to be established. One reason for the lack of clarity concerning factors relating to the father-child relationship may be the hitherto exclusive focus on paternal behaviour, instead of examining father and child behaviour as a dyadic interaction.

Aksan, Kochanska and Ortmann (2006) suggest a relationship-based approach to investigating parent-child dyads, and Funamoto and Rinaldi (2015) argue, that the father-child relationship is bidirectional and is based on mutuality (e.g. “back-and-forth positive interaction consisting of mutual enjoyment, cooperation, and responsiveness”, p. 3), which has been found to foster secure attachments (Smith, 2010). In line with this argumentation, research confirms that parent-child mutuality is an indicator of the quality of parent-child relationships and has been linked with a number of positive developmental outcomes (Lindsey, Cromeens, & Caldera, 2009). For instance, “mutually responsive parent-child dyads have been characterized by higher levels of child autonomy, positive mood, higher rates of future compliance, greater conscience, less antisocial behaviour, and more successful communication between the dyad” (Funamoto & Rinaldi, 2015, p. 5). Bureau et al. (2014)

demonstrated in their study that synchronous interactions and emotional attunement are important factors for the quality of parent-child interactions during play. Specifically, they found a significant main effect for dyadic synchrony (e.g. well-timed, reciprocal, and mutually rewarding (Smith, 2010)) for playful father-child interactions in the preschool years. Hence, securely attached children displayed better dyadic father-child relationship qualities, whereas attachment disorganisation (e.g. temporary collapse of attachment strategy (Hesse, 2016)) was associated with a lack of dyadic synchrony (Bureau et al., 2014).

Moreover, results (see Crandell, Fitzgerald, & Whipple, 1997) indicate that dyadic parent-child interaction quality is associated with parental attachment representations. For instance, a study by Crandell et al. (1997) indicated, that maternal attachment representations assessed with the Adult Attachment Interview were related to the quality of dyadic mother-child interaction in the preschool years. Specifically, secure-autonomous mothers and their children displayed more dyadic reciprocal interactions than insecure mothers and their children, and secure mothers were warmer and more affectionate towards their children. Crandell et al. clarify this relation by arguing, that secure attachment representations allow for “open, sensitive, and contingent caregiving to a broad range of child verbal and nonverbal behaviour” and insecure representations “create restrictive, intrusive, and/or inconsistent parental responses to child behaviour” (1997, p. 250). These parental behaviour qualities influence parent-child interactions by structuring “dyadic interchanges on a behavioural and affective level” (Crandell et al., 1997, p. 250).

These study findings indicate that examining the dyadic interaction could yield more information about attachment styles, than investigating paternal and child behaviour distinct from each other. However, in addition to specific dyadic components of parent-child interactions, also individual characteristics of the parent and of the child bi-directionally affect and shape the nature of the dyadic interaction (Soukup-Ascensão, D’Souza, D’Souza, & Karmiloff-Smith, 2016). This notion emphasises the necessity for taking individual behaviour as well as the dyadic aspects of the interaction into account.

The quality of dyadic interaction is described in contemporary literature through a variety of terms, however many are in fact synonymous or cover the same aspects of

dyadic interactions, such as reciprocity, responsiveness, coordination, and emotional attunement. Researchers (see Cassidy, 2016) have argued, that “individual differences in attachment security have much to do with the ways in which emotions are responded to, shared, communicated about, and regulated within the attachment relationship” (Cassidy, 2016, p. 7), which accentuates the relevance of including emotion as an indicator of interaction quality.

In the following two terms are used to describe quality of dyadic interaction: *affective mutuality/ felt security*, defined as “the degree to which emotion is expressed between parent and child and the level of intimacy or security expressed during activity” (Connell & Prinz, 2002, p. 182), and *reciprocity*, defined as shared positive affect, eye contact, a “turn taking” quality of interaction and behavioural flow (Nguyen et al., submitted).

2.6 Attachment and father-child interaction in the preschool years

In comparison with infancy, the preschool years seem to imply a decline in attachment-related behaviours (i.e. close physical contact) (Lamb & Lewis, 2013; Marvin, Britner, & Russell, 2016), as tasks such as autonomy, self-control, independence and socialisation become more centralised for the developing young child. However, continuing a connection to caregivers remains of essential importance (Cicchetti, Cummings, Greenberg, & Marvin, 1993; Creasey & Jarvis, 2007).

Bowlby (1969) argued that attachment security in the preschool age is marked by a *goal-corrected partnership* with the parent, meaning that the child is more capable of participating in collaborative relationships oriented towards a common goal and display increased perspective-taking skills (Cicchetti et al., 1993; Meins, Bureau, & Fernyhough, 2018). Specifically, while interacting with a parent, secure preschool children communicate openly and are able to appreciate the needs and desires of themselves and of the caregiver. Conversely, insecure preschoolers are unable to express their feelings freely and show no or little understanding for the caregiver’s point of view (Meins et al., 2018). Hence, preschooler’s advanced abilities for linguistic expression of affect and cognition offer additional insights to the child and its attachment representations, which “differ from infancy primarily in the increased verbal negotiation and planning between parent and child” (Bureau et al.,

2017, p. 131). Also, Cicchetti et al. (1993) have argued, that part of the goal-oriented partnership is an orientation to dyadic representational plans and goals. Therefore, assessing various qualities of dyadic interaction in the parent-child relationship becomes especially relevant and applicable in the preschool period.

Although disputed, research suggests, that fathers become gradually more involved with child-rearing practices, as the child moves from infancy to toddlerhood and preschool age (Bureau et al., 2017; Lamb, 2010). Observational data confirms, that elements of father involvement, such as play (Lamb, 2000), teaching and encouragement (National Institute of Child Health and Human Development Early Child Care Research Network, 2004) are prominent components in father-child interactions and have been linked with a number of positive outcomes associated with developmental tasks of the preschool age, and with facilitators in the transition to school and for early school success (McWayne et al., 2013).

A study (National Institute of Child Health and Human Development Early Child Care Research Network, 2004) found that children whose fathers displayed more sensitivity and support for child autonomy during interactions with their children showed higher social skills with others in the school setting (e.g. cooperation, assertion, self-control) and less externalising and internalising behaviours, and less conflict with the teacher. Furthermore, additional empirical evidence (National Institute of Child Health and Human Development Early Child Care Research Network, 2008) revealed that fathers' sensitive support for child autonomy at preschool age promoted their sons' (but however not their daughters') reading and math achievement gains at 8-9 years, which was mediated by the boys' self-reliance in the classroom.

In sum, converging evidence suggests that sensitive paternal interactions, that support the development of child autonomy at preschool age, are important for the child's later school success and for the development of social skills. It has thus been suggested, that fathers encourage the development of competences that children need in the school setting and generally outside the family (Grossmann et al., 2002), and serve as companions to their preschool children in this exploration and process of maturation and development.

Examinations of the role of child behaviour during parent-child interactions have been scarce (Bae, Hopkins, Gouze, & Lavigne, 2014). However, as previously discussed, individual behaviour is likely to influence joint interactions through dynamic and bidirectional processes, and therefore should be included. For instance, *child agency/autonomy* (e.g. the degree to which the child shows confidence, positive affect, engagement, enjoyment, persistence and participation) during parent-child interaction has been linked with various social and academic outcomes (for a review see de Ruiter & Van IJzendoorn, 1993; Moss, Gosselin, Parent, Rousseau, & Dumont, 1997).

Accordingly, study-results (Moss et al., 1997) indicate that securely attached preschoolers display greater task persistence, task engagement, and more self-confident behaviour than insecure children during problem-solving tasks with their parents. Also, previous studies (for a review see de Ruiter & Van IJzendoorn, 1993; Easterbrooks & Goldberg, 1984; Moss et al., 1997) suggest that secure children display longer attention spans, more positive affect, competence, persistence, enthusiasm, compliance and less frustration and ignoring the parent than avoidant or ambivalent children.

Conclusively, certain child characteristics (i.e. child agency/autonomy) during joint interactions have been associated with secure attachment, and paternal support for child autonomy during interactions with their preschool children has been linked with positive child outcomes and important developmental tasks of the preschool age. However, empirical research is limited with hitherto findings being mixed and partly failing replication, which thus calls for further investigation.

2.7 Contextual influences

Various moderating factors have been associated with attachment and parent-child interaction quality, such as age and sex of the child, parenting stress, paternal motivation, child temperament, caregiver depression, parental scaffolding and socioeconomic status (Bureau et al., 2017; Hopkins, Gouze, & Lavigne, 2013). Especially, parenting stress (Lamb, 2010; see Mitchell & Cabrera, 2009) and child temperament (Bates & Pettit, 2007; Cabrera, Fitzgerald, Bradley, & Roggman, 2007) have been found to influence the father-child relationship, and to a wider degree than on the mother-child relationship (Bureau et al., 2017). Hence, these contextual factors

representing father (parenting stress) and child (temperament) characteristics are described below.

2.7.1 Parenting stress

Parenting stress is “defined as parent’s perception of lack of support (e.g. spousal support), children’s difficult behaviour, and feelings of incompetence in the parenting role” (Mitchell & Cabrera, 2009, p. 201). It has been linked to increases in negative parenting (e.g. physical discipline), which in turn leads to child behaviour problems (Crnic, Gaze, & Hoffman, 2005). Parents who experience stress in the parental role display more authoritarian parenting styles, less supportive and nurturing interactions with their children, and are less involved (see Crnic et al., 2005; Mitchell & Cabrera, 2009). Furthermore, Crnic et al. (2005) found that cumulative parenting stress influenced the quality of dyadic parent-child interactions negatively. Specifically, more parenting daily hassles (e.g. being nagged, whined at or complained to) significantly predicted lower dyadic pleasure. Finally, numerous studies have linked parental stress with insecure patterns of attachments (e.g. Diener, Casady, & Wright, 2003). Also, Moss, Cyr and Dubois-Comptois (2004) found an association between maternal stress and insecure attachments in the preschool years.

2.7.2 Child temperament

Temperament is defined as “constitutionally based individual differences in reactivity and self-regulation” (Rothbart, Ahadi, Hershey, & Fisher, 2001, p. 1395). Moreover, researchers generally agree that child temperament is largely hereditary, formed early in life and is rather stable across the lifespan (see Allan, Lonigan, & Wilson, 2013). Difficult temperament influences the parent-child relationship, because it is more likely to elicit negative emotional responses from the parent (Lindsey et al., 2009). A study by Braungart-Rieker, Garwood, and Stifter (1997) found that mothers of children with more difficult temperament provided less guidance during various tasks and exerted more control over their children. Additionally, study findings suggest that difficult temperament is a vulnerability factor, that can lead to adjustment problems especially in combination with other factors such as low marital adjustment or family conflict (Shigeto, Mangelsdorf, & Brown, 2014). In general, numerous temperamental characteristics have been associated with both externalising and internalising child behaviours, and it has been

suggested that various factors such as parental behaviour mediates the effect of child temperament on psychopathology (Ryan & Ollendick, 2018). Furthermore, child temperament is considered an important determinant for the parent-child relationship (Putnam, Sanson, & Rothbart, 2002), and has been associated with overall quality of dyadic interaction (Wilson & Durbin, 2012).

2.7.3 Father-child interactions across contexts

Research suggests, that certain contexts elicit different patterns of parent-child interaction. For instance, Volling, McElwain, Notaro and Herrera (2002) found that parents are more emotionally available in a free play context compared to a teaching context, and Lindsey et al. (2009) demonstrated that dyads display higher mutual compliance and higher levels of shared positive emotion during play than in caregiving interactions. Also reciprocity in parent-infant dyads potentially differs across contexts (Harel & Scher, 2003; Volling et al., 2002).

Nonetheless, there seems to be a general consensus, that play contexts are particularly apt for investigating father-child relationships, especially in situations where fathers engage in challenging play activities with their child (Brown et al., 2018; Grossmann et al., 2002). Therefore, and especially given the different nature of parent-child interaction in the preschool years in comparison with infancy or toddlerhood, challenging play might represent a highly suitable setting for assessing the relation between father-preschooler interaction and attachment.

3. Research questions and hypotheses

To date, studies examining the interplay between attachment and behavioural interaction quality during the preschool years have been scarce and inconclusive.

Empirical research has suggested that fathers are especially important in the preschool period, and that the development of the attachment system changes from infancy to the preschool years (Hopkins et al., 2013). Hence, there is a need for empirical work with preschool children to elucidate the factors underlying father-child attachment at this stage in development. The current study thereby seeks to contribute novel findings to research on father-child attachment.

Furthermore, the current study wishes to expand previous research by examining dyadic aspects of father-child interaction instead of focusing solely on individual factors and link the findings with attachment patterns. Hence, the association between qualitative aspects of interactions and father-child attachment during the preschool years is examined. Thus, the study addresses the following questions:

1. How does the quality of dyadic interaction (*affective mutuality* and *reciprocity*) and of distinct father (*sensitivity*) and child (*agency*) interactional characteristics in a joint father-child problem-solving task relate to attachment?
2. Does parental stress or child temperament influence this relation?

In order to answer these questions, the following hypotheses will be examined:

1. The quality of dyadic interaction is correlated with attachment styles. Hence, father-child dyads with secure attachments display higher quality of interactional behaviour, characterised through higher scores on the affective mutuality and reciprocity scales than dyads with insecure attachments.
2. Moreover, the quality of distinct father and child interactional characteristics is correlated with attachment styles. Hence, father-child dyads with secure attachments display higher quality of interactional behaviour, characterised through higher scores on the paternal sensitivity and child agency scales, than dyads with insecure attachments.
3. The contextual factors parental stress and child temperament moderate these relationships.

The first two hypotheses are based on this study's assumption that the quality of interaction in a father-child dyad serves as an indicator for attachment styles. Thus, pleasant and more optimal interactive patterns are indicators of secure attachment representations, and unpleasant and more dysfunctional styles of interaction indicate insecure representations. Moreover, as suggested in previous literature, it may be that the association between dyadic interaction quality and attachment is moderated by either stress of the father or the temperament of the child or by both, which is why the third hypothesis was included.

Finally, the current study examines father-child interaction during a collaborative problem-solving task. This task provides the potential to elicit various individual behaviours, such as paternal cognitive and emotional support (aspects of paternal sensitivity), child confidence and task-persistence (aspects of agency/autonomy), as well as dyadic interactive behaviours, such as expression of affect, responsiveness and mutuality.

4. Methods

4.1 Sample

Sixty-five fathers and children were recruited from a voluntary databank and tested in Leipzig, Germany. Data collection began in May 2018 and proceeded until March 2019. Children were between 4 years and 6 months and 5 years and 11 months old at the time of participation ($M = 5.03$, $SD = 0.128$). There were 35 boys (54,7%) and 29 girls (45,3%) who took part in the study. The fathers were between 29 and 49 years of age ($M = 38.58$, $SD = 5.2$). The dyads received compensation for their participation.

4.2 Study

The study comprised three conditions. In the first condition, the father and child were asked to collaborate on a problem-solving task. In the second condition, they performed the same task, however this time individually. In the third condition, the child was given preschool sheets and the father was asked to help the child solve the exercises. The first and the second condition were performed twice for 2 minutes each and counterbalanced in order to control for order effects.

All interactions were videotaped. Only the first condition was included in the current study. Additionally, the task performance for the dyads and for the children in the individual condition was assessed. Furthermore, a range of information was collected, whereby attachment styles, parental stress and child temperament were considered in the present study.

Father and child were seated at a table across from each other. Three video cameras recorded the interactions from different angles. Since the present study is part of a bigger examination into neurobehavioral synchrony in father-child dyads, the participants were equipped with fNIRS (functional near infrared spectroscopy) optodes on their heads during the interactions. However, this data will not be considered here.

An experimenter instructed the dyad of the procedure and upcoming tasks in the beginning of the testing phase and between each condition.

The problem-solving task was a puzzle task, comprised of seven wooden blocks of different shapes and sizes. At the beginning of every condition, the participants were given four sheets with various patterns, which they had to reconstruct by using the wooden blocks. The puzzles were intentionally constructed so that the children would have difficulty with performing the task independently and would require the father's assistance in order to complete it successfully.

4.3 Procedure & measurements

The quality of dyadic interaction, paternal sensitivity and child agency was assessed from the video recordings of the problem-solving task with scales adapted from CARE (Nguyen et al., submitted).

Attachment style was assessed with the German version of the Adult Attachment Interview Gloger-Tippelt (2012), which is described below.

Particular paternal and child characteristics were assessed with a German and adapted version of the questionnaire "Parenting Stress Index" from Abidin (1995) and the German version of the "Very Short Children's Behavior Questionnaire" from Putnam and Rothbart (2006) respectively.

Finally, task performances of the dyads and of the children in the individual condition were assessed from the video recordings.

4.3.1 *Quality of interaction*

Fathers and children participated in a 2x2 minutes problem-solving task, in which they were asked to collaborate. The dyadic interaction quality was assessed in the videotaped problem-solving task by the means of two scales; *affective mutuality/felt security* and *reciprocity*, the latter which was rated for verbal and for behavioural reciprocity separately. The dimensions were assessed on a 7-point scale ranging from 1 (low) to 7 (high), with higher scores considered more optimal and lower scores representing more dysfunctional interactive patterns.

Furthermore, one paternal scale (*sensitivity*) and one child scale (*agency/autonomy*) were included in order to assess distinct characteristics of the father and the child during the interaction. Both dimensions were assessed on a 7-point scale ranging from 1 (low) to 7 (high).

The employed scales were adapted from the CARE-study (Nguyen et al., submitted), which adapted the scales from Pianta (1994) and Owen, Vaughn, Barfoot and Ware (1996). A short description of the employed scales is provided below (for a more detail see appendix C).

Affective mutuality/felt security: This scale captures availability of emotion, the degree of emotional connection in the dyad and how secure the child feels with the parent. It also assesses to what extent affect is expressed, exchanged and accepted between the parent and the child. Hence, high affective mutuality is characterised by pleasurable moments, shared affect, mutual responsiveness, personal exchanges and involvement with each other. In the low end of the scale, dyads seem to be out of tune with each other, tense, conflicted, or strictly focused on the task. Communication and behaviour seem to be restricted or not mutual or the parent might dampen the child's behaviour or expression of emotion.

Verbal reciprocity: The scale assesses the degree of verbal exchanges and engagement in the dyad. Dyads scoring high on verbal reciprocity are characterised by high turn taking, a sustained back-and-forth verbal interaction coupled with shared affect, such as expressions of excitement or joy. The verbalisations are well-timed responses to the partner and have a conversation-like style and reciprocal flow. Low verbal reciprocity is found in dyads, which verbalise very little or not at all, do not respond to each other's verbalisations, or which interrupt each other.

Behavioural reciprocity: Similar to the former scale, behavioural reciprocity assesses well-timed behavioural responses to the partner and mutual engagement to the task and each other. In the higher end of the scale, dyads engage in the task together by taking turns in initiative and actions, are attentive to the actions of the partner and take interest and pleasure in the mutual task completion and in the interaction. Furthermore, dyads with high scores display reciprocal behaviours coupled with signs of shared affect, such as smiling or eye contact. Dyads scoring low on the scale are characterised as being impatient or having disregard for the partner's actions, being passive or completing the task in parallel without any shared experience.

Paternal sensitivity: The scale entails the father's prompt, appropriate and sensitive response to his child and its signals. Hence, fathers that score high on this scale are continuously oriented towards the child's needs and wishes, are loving and

warm, and give appropriate and supportive feedback in a way that motivates the child. Low sensitivity is characterised as low emotional engagement with the child or in the interaction, and being insensitive to the child's cognitive and emotional needs.

Child Agency/ Autonomy: This scale captures the way the child approaches the task. High scores are assigned to a child that show interest, vigour, enthusiasm and eagerness to do the tasks. The child invests efforts in his or her activities, is confident and values success. Moreover, high scores also indicate that the child takes on a leading role. Low scores imply a lack of confidence, interest or excitement, hesitant behaviour or restrained affect.

The five scales were employed and assigned to a dyad in the first and the second interaction. Hence, each dyad received two scores from each scale. A t-test confirmed that the first four scale-scores did not differ significantly between the first and the second interaction, and the scores could therefore be averaged into one score per dyad (*Affective mutuality* = 0.057, *Verbal reciprocity* = 0.370, *Behavioural reciprocity* = 0.666, *Sensitivity* = 0.242). Only *Agency* differed significantly from the first to the second interaction ($M_{Agency1} = 3.61$, $M_{Agency2} = 3.84$), showing a slight increase from the first to the second interaction. However, the scale was still averaged due to theoretical consideration that this would not influence the results.

Interaction quality data of 64 dyads was analysed, revealing the following mean scores: *Affective mutuality*, $M = 2.00$ ($SD = 1.06$); *Verbal reciprocity*, $M = 3.17$ ($SD = 0.98$); *Behavioural reciprocity*, $M = 1.86$ ($SD = 0.86$); *Sensitivity*, $M = 3.52$ ($SD = 1.01$); *Agency*, $M = 3.73$ ($SD = 1.23$).

Coder-reliability was assessed via intraclass correlations (Pearson's) on approximately 25% of the sample cases, which had been randomly chosen. The coder-reliability ranged from acceptable to high: *Affective mutuality*, $r_{ICC} = .794$, *Verbal reciprocity*, $r_{ICC} = .817$, *Behavioural reciprocity*, $r_{ICC} = .744$, *Sensitivity*, $r_{ICC} = .826$, and *Agency*, $r_{ICC} = .884$. Any discrepancy between coders was reviewed and consensus was obtained.

4.3.2 Adult Attachment Interview

The AAI (Main et al., 1985) is an extensively applied semi-structured interview consisting of 18 questions designed to explore an adult's mental

representations of personal childhood attachment experiences (Hesse, 2016; Reiner, Fremmer-Bombik, Beutel, Steele, & Steele, 2013; Van IJzendoorn, 1995). The interview assesses the adult's "state of mind" (e.g. mental representation of attachment) and reliably predicts parenting and subsequent child-parent attachment (Bakermans-Kranenburg & Van IJzendoorn, 2009), as corroborated by a series of studies (see review Van IJzendoorn, 1992).

The AAI contains questions regarding general attachment relationships, specific memories relevant to loss, separation, rejection and trauma, as well as current relationships to parents and other important attachment figures (Bakermans-Kranenburg & Van IJzendoorn, 2009; Roisman, Fraley, & Belsky, 2007). The goal of the interview is thereby to make participants "retrieve attachment-related autobiographical memories from early childhood and to evaluate these memories from their current perspective" (Bakermans-Kranenburg & Van IJzendoorn, 2009, p. 224). Attachment is measured through the provision of a more or less coherent or contradictory narrative (Van IJzendoorn, 1995), and through evaluation on a series of rating scales (i.e. role reversal, idealization, preoccupying anger, inability to recall) (Belsky, 2005). Based on these evaluations, individuals are subsequently classified into one of the three main adult attachment classifications: secure-autonomous (F), insecure-dismissing (Ds), or insecure-preoccupied (E) (Roisman et al., 2007), which correspond to and predict child attachment of the secure, insecure-avoidant, and insecure-ambivalent/resistant patterns respectively (Hesse, 2016).

Parents that are classified as *secure-autonomous* provide a coherent and consistent presentation and evaluation of their favourable or unfavourable attachment-related experiences, and give clear, relevant and reasonably succinct responses. *Insecure-dismissing* adults speak incoherently, and describe their parents either in a derogatory manner or in highly positive terms (idealisation), however without being able to provide support to these representations or these might be contradicted by later recounts. Furthermore, dismissing parents often claim an inability to recall experiences in their childhood related to attachment, or refuse to discuss a particular event or attachment figure. Parents are classified as *insecure-preoccupied* when they display an angry, confused, or passive preoccupation with attachment related experiences and persons. Their discourse lacks coherence, and is ambivalent, unbalanced or indecisive (Hesse, 2016; Van IJzendoorn, 1995).

In sum, the AAI and hence the way adults talk about their childhood

experiences with caregivers, is a reliable indicator of the quality of parent-child attachment. In the current study, the AAI was conducted with the fathers in the German version (Gloger-Tippelt, 2016) by trained instructors and subsequently assessed by qualified coders.

4.3.3 Paternal Stress

Paternal stress was measured with a valid and widely accepted tool for parental stress, the “Eltern-Belastungs-Inventar” (Tröster, 2011), which is based on the “Parenting Stress Index”-questionnaire from Abidin (1995). The questionnaire measures stress related to child and parental characteristics. On a 5-point Likert-scale, fathers were asked to rate a series of statements ranging from *strongly disagree* (1) to *strongly agree* (5), as exemplified below:

“I feel trapped by my responsibilities as a parent” (Mitchell & Cabrera, 2009, p. 209).

The questionnaire is comprised of 48 items, which each can be assigned to one of 12 subscales that have been identified as being important for the parent-child system. The subscales are divided into a child and a parent domain. The child domain consists of five subscales (*Distractibility/Hyperactivity, Adaptability, Demandingness, Mood, and Acceptability*), which relate to the parent’s perception of the skills and behaviour of the child that might have an impact on the parent. High scores are associated with child qualities that pose a challenge to the parent and exert stress on the parent (Abidin, 1995). The other seven subscales (*Competence, Isolation, Attachment, Health, Role Restriction, Depression, and Spouse*) relate to parental characteristics. High scores indicate that the sources of stress and possible compromised parent-child system are related to the parent’s functioning (Abidin, 1995).

The scoring was carried out by summarising the items into the 12 subscales and computing them into three composite scores for the child domain, the parent domain, and an overall stress score respectively.

The internal consistency range between questionable to good for all subscales in the child domain (.68 and .77) and for all subscales in the parent domain (.61 and

.83) However, Cronbach's α for the whole child domain and for the parent domain is excellent (.91 and .93 respectively) (Piskernik, Supper, & Ahnert, 2018).

Forty-nine questionnaires were analysed, revealing a mean score for the child domain of 47.06 ($SD = 9.66$), for the parent domain of 62.53 ($SD = 13.80$), and for the overall score of 109.59 ($SD = 22.64$).

4.3.4 Child temperament

Fathers completed the German version of the "Very Short Children Behavior Questionnaire" (Putnam & Rothbart, 2006), which assesses the child's temperament from the caregiver's perspective. The questionnaire measures central constructs of temperament, such as emotional reactivity, arousability, and self-regulation (Rothbart et al., 2001) in children between the ages of 3 and 8 (Putnam & Rothbart, 2006). Items are rated on a 7-point Likert-scale ranging from 1 (*extremely untrue of your child*) to 7 (*extremely true of your child*).

Example, item 23: "*Is very difficult to soothe when s/he has become upset.*" (Allan et al., 2013, p. 307)

The questionnaire consists of 36 items based on three broad dimensions of temperament with 12 items respectively. *Surgeency/ Extraversion* is associated with affective responses such as desire, positive emotionality and sociability, and behavioural characteristics such as smiling, impulsivity, and activity level. *Negative Affectivity* on the other hand concerns individual differences in experiencing and expressing negative emotions such as sadness, fear and frustration, and behavioural characteristics such as irritability and heightened vigilance. Finally, *Effortful Control* relates to perceptual sensitivity, compliance, persistence, inhibitory control, and the ability to focus and shift attention, and regulate emotions (Allan et al., 2013; Clark et al., 2016; Rothbart et al., 2001; Wilson & Durbin, 2012).

In general, positive child emotionality and effortful control is associated with more positive dyadic interactive patterns, and conversely negative child emotionality is related to more negative parent-child interactions (Wilson & Durbin, 2012).

The three scales demonstrate adequate internal consistency (S/E : between .63 and .76, NA between .65 and .72, and EC between .62 and .78) (Allan et al., 2013) and good temporal stability (Rothbart et al., 2001).

The item values for each of the three scales were summarized and averaged, hence creating one score for each dimension. There were 49 questionnaires available for analysis, revealing a mean score for *Surgency/ Extraversion* of 5.15 ($SD = 0.76$), for *Negative Affectivity* of 4.66 ($SD = 0.76$), and for *Effortful Control* of 3.58 ($SD = 0.72$).

4.3.5 Task performance

Due to empirical evidence linking certain aspects of parenting quality with children's cognitive abilities, task performance for each dyad and each child was assessed. Hence, it was examined how many puzzles each dyad and each child (in the individual condition) solved and in what time they solved them.

Overall, the dyads solved considerably more puzzles than the children alone during the individual condition. The dyads solved 2.69 puzzles on average ($SD = 0.34$) and the children 0.81 puzzles on average ($SD = 1.07$). Fifty per cent of the children did not solve any puzzle on their own, which confirm the intention of the study to construct a task slightly too difficult for the children to accomplish alone. The dyads were also faster in solving the puzzles than the children alone ($M_{DYAD} = 01.03$, $M_{INDI} = 01.13$).

5. Results

In the present study a p -value of .05 was considered statistically significant and values below $p < .01$ were considered highly significant.

In order to measure the importance of the results, effect sizes are reported, which according to Field (2009) can be interpreted as follows: a Pearson's correlation coefficient r of .10 constitutes a small effect, .30 a moderate effect, and .50 a large effect. Cohen's d effect sizes are interpreted as small ($d = 0.2$), medium ($d = 0.5$), and large ($d = 0.8$) respectively (Cohen, 1988).

Multicollinearity between variables was tested and controlled with Tolerance and Variance of Inflation. Tolerance values below 0.1 and VIF values above 10 were considered as indicators of multicollinearity (Field, 2009).

5.1 Preliminary analyses

First, the descriptive statistics of the study will be presented. Second, exploratory correlation analyses are presented, which provide an overview of the data and of the general relations between the variables.

5.1.1 Attachment classification

Attachment classification data of 45 fathers was available for analysis, of which 23 were classified as secure-autonomous, 18 as insecure-dismissing and 4 as insecure-preoccupied.

Dividing the classifications into secure versus insecure patterns, showed an almost equal distribution of patterns, since 23 were classified as secure and 22 as insecure. Due to a very small sample size of the insecure-preoccupied group ($n = 4$), the following analyses are based on the two-way classification of attachment (0 = secure, 1 = insecure).

The frequencies for both classification types are displayed in figure 1 and figure 2.

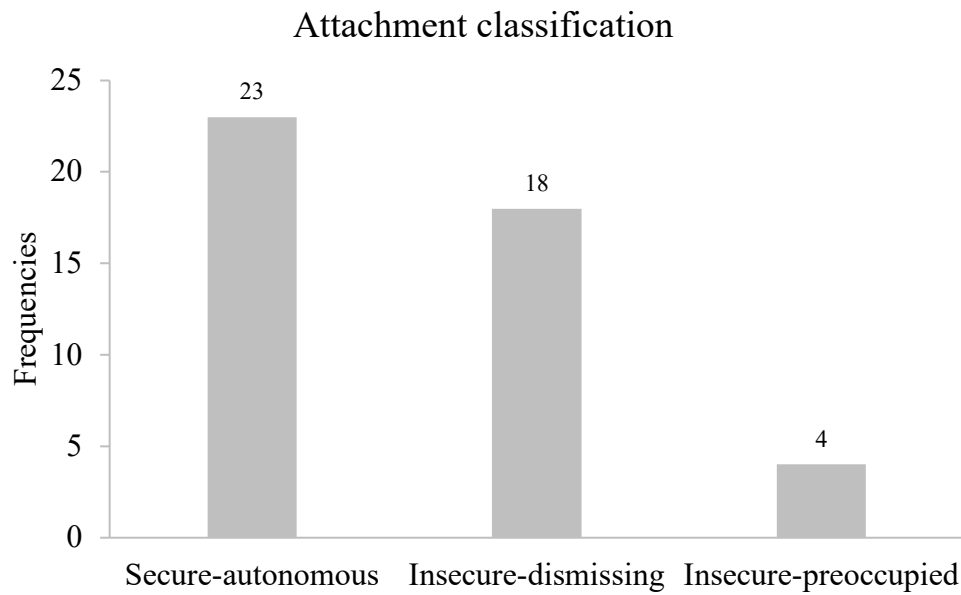


Figure 1. Frequencies of fathers classified as secure-autonomous, insecure-dismissing and insecure-preoccupied.



Figure 2. Frequencies of secure and insecure fathers.

5.1.2 Correlations

Quality of interaction

A Pearson's correlation analysis revealed large significant and positive associations between *Affective mutuality* and *Sensitivity* ($r(62) = .743, p = .000$), *Affective mutuality* and *Verbal reciprocity* ($r(62) = .547, p = .000$), and *Sensitivity* and *Agency* ($r(62) = .541, p = .000$). A test for collinearity indicated that multicollinearity was not a concern (*Affective mutuality*: *Tolerance* = .37, *VIF* = 2.67; *Sensitivity*:

Tolerance = .39, *VIF* = 2.57; Verbal reciprocity: *Tolerance* = .70, *VIF* = 1.44; Agency: *Tolerance* = .68, *VIF* = 1.48).

Positive moderate and significant correlations were found between *Affective mutuality* and *Behavioural reciprocity* ($r(62) = .382, p = .002$), *Affective mutuality* and *Agency* ($r(62) = .485, p = .000$), *Verbal reciprocity* and *Sensitivity* ($r(62) = .431, p = .000$), *Verbal reciprocity* and *Agency* ($r(62) = .359, p = .004$), and *Behavioural reciprocity* and *Sensitivity* ($r(62) = .385, p = .002$).

Finally, small positive but non-significant associations were found between *Verbal reciprocity* and *Behavioural reciprocity* ($r(62) = .152, p = .231$), and *Behavioural reciprocity* and *Agency* ($r(62) = .146, p = .249$).

The results of the correlation analysis are presented in table 1.

Table 1

Correlations between variables of quality of interaction

	1.	2.	3.	4.	5.
1. Affective mutuality	-				
2. Verbal reciprocity	.547**	-			
3. Behavioural reciprocity	.382**	.152	-		
4. Sensitivity	.743**	.431**	.385**	-	
5. Agency	.485**	.359**	.146	.541**	-

Notes. ** $p < .01$ (two-tailed). N = 64.

Quality of interaction and contextual factors

Affective mutuality, *Behavioural reciprocity* and *Sensitivity* did not correlate significantly with any other contextual variable. However, results of the Pearson's correlation indicated a significant positive association between *Verbal reciprocity* and Negative affectivity ($r(47) = .334, p = .019$) and a significant positive relation between *Agency* and Surgency/ extraversion ($r(47) = .325, p = .023$), and between *Agency* and individual task performance ($r(62) = .382, p = .002$).

Significant associations between the contextual variables of the study are presented in table 2.

Table 2

Significant associations between variables

Variable	Significant association	<i>r</i>	<i>p</i>	<i>n</i>
Verbal reciprocity	Negative affectivity	.334	.019*	49
Agency	Surgency/ extraversion	.325	.023*	49
	Task performance, individual	.382	.002**	64
Child age	Task performance, collaboration	.329	.009**	63
Father age	Paternal Stress (parent)	-.354	.014*	48
	Paternal Stress (overall)	-.294	.042*	48
Surgency/ extraversion	Paternal Stress (parent)	-.430	.002**	49
	Paternal Stress (overall)	-.373	.008**	49
	Task performance, individual	.296	.039*	49
Effortful control	Paternal Stress (child)	.523	.000**	49
	Paternal Stress (parent)	.548	.000**	49
	Paternal Stress (overall)	.557	.000**	49
Paternal Stress (child)	Paternal Stress (parent)	.856	.000**	49
	Paternal Stress (overall)	.949	.000**	49
Paternal Stress (parent)	Paternal Stress (overall)	.975	.000**	49
Task performance, collaboration	Task performance, individual	.468	.000**	64

Notes. * $p < .05$, ** $p < .01$ (two-tailed). r = Pearson's correlation.

5.2 Association between attachment style and quality of interaction

In the following, the first and second hypotheses are tested with a logistic regression analysis. Hence, it is examined whether attachment style is related to dyadic features (*Affective mutuality*, *Verbal* and *Behavioural reciprocity*) and to distinct individual characteristics (*Sensitivity*, *Agency*) of interaction quality. It is furthermore explored, whether several contextual factors are related to attachment style.

For the present analysis, the logistic regression analysis was performed with attachment (0 = secure, 1 = insecure) as dependent variable and *Affective mutuality*, *Verbal reciprocity*, *Behavioural reciprocity*, *Sensitivity*, and *Agency*, as well as child age, child sex, child temperament (Surgency/extraversion, Negative affectivity,

Effortful control) and paternal stress (overall score) as predictors. Enter was selected as method of variable entry.

The overall fit of the model was significant at first step, $\chi^2(11) = 20.09, p = .044, n = 41$.

Behavioural reciprocity ($\chi^2(1) = 4.83, p = .028$) and *Sensitivity* ($\chi^2(1) = 4.40, p = .04$) were both significant, and hence predicted attachment, table 3.

The odds ratio showed, that when *Behavioural reciprocity* increased, so did the relative probability that the attachment pattern was insecure (OR = 8.19, 95% CI: 1.26, 53.38). Conversely, when *Sensitivity* increased, the probability for insecure attachment decreased (OR = 0.12, 95% CI: 0.02, 0.87).

The R^2 was .517 (Nagelkerke), which according to Cohen (Salkind, 2019) constitutes a large effect ($f = 0.92$).

Table 3

Logistic Regression analysis of the influence of attachment on quality of interaction and various contextual variables

Predictor	B	SE B	Wald χ^2	<i>p</i>	OR	95% CI OR
Affective mutuality	1.20	0.83	1.73	.188	2.99	[0.59, 15.29]
Verbal reciprocity	0.97	0.65	2.24	.134	2.63	[0.74, 9.34]
Behavioural reciprocity	2.10	0.96	4.83	.028*	8.19	[1.26, 53.38]
Sensitivity	-2.16	1.03	4.40	.036*	0.12	[0.02, 0.87]
Agency	0.23	0.54	0.17	.679	1.25	[0.43, 3.62]
Child sex	-1.56	1.20	1.70	.193	0.21	[0.02, 2.20]
Child age	-11.89	14.81	0.64	.422	0.00	[0.00, 27880510.34]
Surgency/ extraversion	0.25	0.81	0.09	.76	1.28	[0.263, 6.21]
Negative affectivity	0.80	0.76	1.13	.289	2.23	[0.51, 9.79]
Effortful control	0.79	0.89	0.79	.375	2.20	[0.39, 12.63]
Paternal stress (overall)	0.03	0.02	2.15	.142	1.04	[0.99, 1.08]

Notes. $R^2 = .517$ (Nagelkerke). * $p < .05$ (two-tailed). OR = odds ratio, CI = confidence intervals. N = 41.

5.3 Group differences for secure and insecure attachment styles

In order to test for differences between the secure and insecure patterns of attachment, a t-test for independent samples with attachment (0 = secure, 1 = insecure) as the independent variable was performed. The five facets of interaction quality, three facets of child temperament, and three paternal stress scores were included as dependent variables. For exploratory reasons, child age, father's age and task performance for the individual and collaborative condition were also included.

The family-wise error was controlled by performing a Bonferroni correction, which resulted in a p -value of .00333.

The results of the t-test are reported below and displayed in table 4.

5.3.1 Quality of interaction

On average, insecure dyads ($M = 2.02$, $SD = 0.85$) and secure dyads ($M = 1.94$, $SD = 1.20$) did not differ significantly in regard to *Affective mutuality*, $t(43) = -0.28$, $p > .00333$, and there was no effect $d = -.09$.

For *Verbal reciprocity*, insecure dyads ($M = 3.30$, $SD = 0.90$), did not differ on a significant level from secure dyads ($M = 3.02$, $SD = 1.10$), $t(43) = -0.91$, $p > .00333$, with a small effect $d = -.28$. Similarly for *Behavioural reciprocity*, insecure dyads ($M = 1.93$, $SD = 0.76$) and secure dyads ($M = 1.59$, $SD = 0.63$) did not show significant differences, $t(43) = -1.66$, $p > .00333$, however the effect was moderate $d = -.51$.

In the secure dyads, fathers did not show significantly more sensitive behaviour towards their child ($M = 3.54$, $SD = 1.15$), than fathers in insecure dyads ($M = 3.39$, $SD = 0.94$), $t(43) = 0.50$, $p > .00333$, and there was no effect $d = .15$. Similarly, securely attached children did not demonstrate significantly more *Agency* ($M = 3.76$, $SD = 1.25$), than insecure children ($M = 3.73$, $SD = 1.40$), $t(43) = 0.09$, $p > .00333$, and there was no effect $d = .03$.

5.3.2 Contextual factors with effects

On average, children of insecure fathers ($M = 4.87$, $SD = 0.65$) and children of secure fathers ($M = 4.60$, $SD = 0.74$) did not differ significantly for Negative affectivity, $t(39) = -1.20$, $p > .00333$. There was a small effect $d = -.39$.

Similarly for Effortful control, children of insecure fathers ($M = 3.63$, $SD = 0.68$) did not show significantly different scores from children of secure fathers ($M = 3.41$, $SD = 0.69$), $t(39) = -1.04$, $p > .00333$, and the effect was small $d = -.33$.

Insecure and secure fathers did not differ significantly in the three variables of paternal stress. For the child domain, insecure fathers showed a mean score of 48.43 ($SD = 10.82$) and secure fathers one of 44.20 ($SD = 9.17$), $t(39) = -1.35$, $p > .00333$, with a small effect $d = -.43$.

For the parent domain, insecure fathers had a mean score of 66.05 ($SD = 15.22$) and secure fathers one of 56.60 ($SD = 10.92$), $t(39) = -2.27$, $p > .00333$, with a moderate effect $d = -.73$.

For the overall paternal stress domain, insecure fathers had a mean score of 114.48 ($SD = 25.28$) and secure fathers one of 100.80 ($SD = 19.03$), $t(39) = -1.95$, $p > .00333$, with a moderate effect $d = -.63$.

The results of the independent t-test for secure and insecure attachment patterns indicated that child age, father's age and task performance (individual and collaboration) did not significantly differ between the groups and there were no effects.

Table 4

Results of the independent t-test for the secure and insecure groups with corresponding effect sizes

Outcome	Group				<i>t</i>	<i>d</i>
	Secure (n = 23)		Insecure (n = 22)			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Affective mutuality	1.94	1.2	2.02	0.85	-0.28	-.09
Verbal reciprocity	3.02	1.10	3.30	0.90	-0.91	-.28
Behavioural reciprocity	1.59	0.63	1.93	0.76	-1.66	-.51
Sensitivity	3.54	1.15	3.39	0.94	.50	.15
Agency	3.76	1.25	3.73	1.40	.09	.03
Surgency/ extraversion	5.25	0.72	5.10	0.85	.59	.19
Negative affectivity	4.60	0.74	4.87	0.65	-1.20	-.39
Effortful control	3.41	0.69	3.63	0.68	1.04	-.33
Paternal stress (child domain)	44.20	9.17	48.43	10.82	-1.35	-.43
Paternal stress (parent domain)	56.60	10.92	66.05	15.22	2.27	-.73
Paternal stress (overall)	100.80	19.03	114.48	25.28	1.95	-.63
Child age	5.05	0.04	5.05	0.04	.242	.07
Father's age	38.62	5.89	37.95	4.86	.414	.12
Task performance, collaboration	2.74	1.39	2.86	1.32	-0.31	.09
Task performance, individual	0.96	1.19	1.09	1.15	-0.39	.11

Notes. * $p < .05$ (two-tailed). d = Cohen's d (.2 = small, .5 = medium, .8 = large effect).

In sum, none of the results were significant, hence the mean values of the two groups did not differ significantly. However, the effect sizes show some to fairly substantial effects. Insecure dyads showed higher scores with small effects for *Verbal reciprocity*, Negative affectivity, Effortful control, and paternal stress (child domain), and higher scores with moderate effects for *Behavioural reciprocity* and paternal stress (parent domain and overall score). No effects were found for the secure group.

5.4 Influencing variables on quality of interaction

In order to examine what influences quality of interaction, a multiple linear regression was performed. Each of the five variables in quality of interaction were

tested one after the other as the dependent variable, and with the following variables as predictors: child age (in years), father's age, child sex (0 = male, 1 = female), attachment (0 = secure, 1 = insecure), child temperament (Surgency/extraversion, Negative affectivity, Effortful control), paternal stress (only the overall score was included, because of multicollinearity), and task performance (collaboration and individual). The backwards method of regression was selected as method of variable entry, due to the lower risk of producing Type-II-errors (Field, 2009).

Cohen's f^2 effect sizes are reported, because of its applicability within the context of multiple linear regression (Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012). According to Cohen (1988), $f^2 \geq 0.02$, $f^2 \geq 0.15$, and $f^2 \geq 0.35$ represent small, medium, and large effect sizes respectively.

The results of the multiple linear regression analysis are reported by category below and presented in table 5.

For *Affective mutuality* as the dependent variable, child sex was the only significant predictor, $b = .715$, $t = 2.24$, $p = .031$. Hence, girls scored .715 higher on *Affective mutuality* than boys. The adjusted R^2 was .091, which accounts for a small effect ($f^2 = .10$).

For *Behavioural reciprocity* as the dependent variable, attachment predicted the outcome significantly, $b = .470$, $t = 2.04$, $p = .049$. Hence, insecure dyads scored .470 higher on *Behavioural reciprocity* than secure dyads. The adjusted R^2 was .054, which according to Cohen (1988) represents a small effect ($f^2 = .06$).

Results indicated that child age ($b = 12.223$, $t = 2.72$, $p = .010$) and Surgency/extraversion ($b = .556$, $t = 2.30$, $p = .027$) significantly predicted *Agency*, whereas paternal stress ($b = -.016$, $t = -2.01$, $p = .052$) almost significantly did. Hence, the results suggested, that older children and children with higher scores in Surgency/extraversion displayed more *Agency*, and that higher scores in paternal stress is associated with lower scores in *Agency*. The adjusted R^2 was .296, which represents a large effect ($f^2 = .42$).

There were no significant predictors for *Verbal reciprocity or Sensitivity*.

Table 5

Results of the multiple linear regression with corresponding effects sizes

Variable	Significant Predictor(s)	<i>p</i>	R^2_{adj}	f^2
Affective mutuality	Child sex	.031*	.091	.10
Verbal reciprocity	-	-	-	-
Behavioural reciprocity	Attachment	.049*	.054	.06
Sensitivity	-	-	-	-
Agency	Child age	.010*	.296	.42
	Surgency/ extraversion	.027*		
	Paternal Stress	.052		

Notes. * $p < .05$ (one-tailed). R^2_{adj} = adjusted R-square. f^2 = Cohen's f^2 (.02 = small, .15 = medium, .35 = large effects).

All assumptions for the multiple linear regression were met and are presented in table 6, along with the applied tests.

Table 6

Assumptions and corresponding tests for the multiple linear regression analysis

Assumption	Test
Dependent variable is continuous	Theoretical
Independent variables continuous or nominal	Theoretical
Linear relationship	Residual analysis *ZPRED vs. *ZRESID
Homoscedasticity	Residual analysis *ZPRED vs. *ZRESID
Normally distributed residuals	Histogram, Cook's Distance
Independence of observations	Study design
No multicollinearity	Variance Inflation Factor VIF and Tolerance
Additivity	Theoretical
Predictors are uncorrelated with 'external variables'	Theoretical

5.5 Exploratory analyses

5.5.1 Association between attachment style and child sex

For exploratory reasons, the association between child sex and attachment was examined. Since both variables were nominal, a contingency analysis was performed,

table 7. Furthermore, Yates correction for continuity was performed because the sample size was below $N < 60$.

Table 7

Contingency table for attachment and child sex

Child sex		Attachment		Total
		Secure	Insecure	
Male	Count	10	14	24
	Expected count	12.27	11.73	24.0
	% within child sex	41.7%	58.3%	100.0%
Female	Count	13	8	21
	Expected count	10.73	10.27	21.0
	% within child sex	61.9%	38.1%	100.0%
Total		23	22	45

The results indicated no association ($\chi^2(1) = 1.20, p = .175, n = 45$) between attachment and child sex. The frequencies are displayed in figure 3 below.

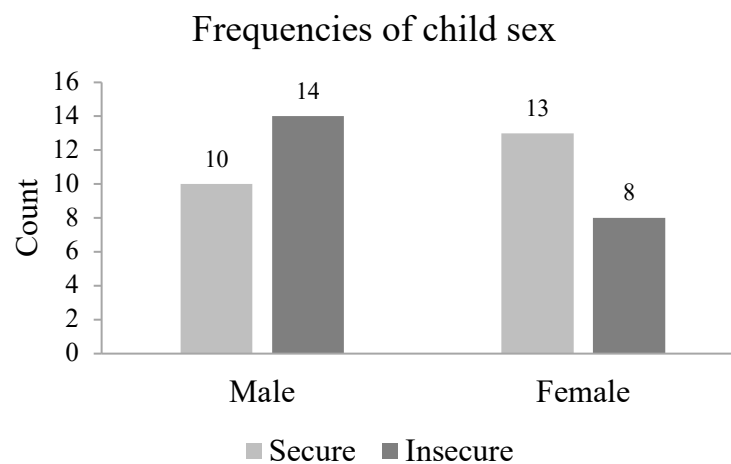


Figure 3. Frequencies of child sex for secure and insecure dyads.

6. Discussion & conclusions

Summary

The focus of the present study was on the relation between attachment and quality of interaction in the preschool years. It was hypothesised, that higher quality of interaction was associated with secure attachment and lower quality with insecure attachment. Quality of interaction consisted of three dyadic features (affective mutuality, verbal and behavioural reciprocity) and of two distinct individual characteristics of the father (sensitivity) and of the child (agency/ autonomy) respectively. Moreover, paternal stress and child temperament were assumed to influence the relationship between attachment and interaction quality.

The first hypothesis could not be confirmed, since affective mutuality and verbal reciprocity were not associated with attachment. Contrarily, a link was found between behavioural reciprocity and attachment insecurity. Hence, dyads with insecure fathers showed greater behavioural reciprocity than dyads with secure fathers. The second hypothesis was partly confirmed, because sensitivity significantly predicted attachment security, agency however did not. Finally, due to a lack of significant results, moderating effects for paternal stress and child temperament on the relation between attachment and quality of interaction were not further explored.

Attachment and quality of interaction

The present study provides further empirical support for previous research findings evidencing that secure attachment is related to increased paternal sensitivity during father-child interactions in the preschool years (Bureau et al., 2017; Crandell et al., 1997). Specifically, our results indicate that the paternal ability to sensitively engage in interactions with their child, is related to the fathers own representational model of attachment, which corresponds to findings by Crandell et al. (1997) in mother-child dyads.

Furthermore, our finding that attachment security was positively associated with paternal sensitivity, lends support to the suggestion, that indicators of attachment can successfully be assessed in the context of challenging play, which as suggested in previous literature (Bureau et al., 2017; Grossmann et al., 2002) potentially serves as a particularly favourable setting for the display of paternal behaviours related to attachment security.

Contrary to Bureau et al. (2014) and Crandell et al. (1997), the present study was unable to find positive associations between dyadic parent-child interaction qualities and attachment. In fact, in our study, attachment security was negatively associated with behavioural reciprocity. Hence, insecure dyads behaved more reciprocally than secure dyads. Additionally, there were indications that insecure dyads displayed higher verbal reciprocity. Although the association was not significant, there was a small effect, which is notable given the small sample size.

During the problem-solving task, it was observed that on several occasions fathers verbally guided their children through the puzzle task and did not involve themselves in physically placing the puzzle pieces. In turn, many children did not answer verbally, but instead followed instructions silently. Even though this verbal-to-behaviour interaction could not be coded as either verbal or behavioural reciprocity, the interaction was there and did not necessarily seem incoherent, non-reciprocal or like non-mutual task engagement.

On a cautionary note, perhaps this kind of interaction was more frequent for secure fathers, who through sensitive verbal guidance and increased provision of structure, helped their children complete the puzzle task. This theory corresponds to previous studies (see Crandell et al., 1997) examining relations between maternal attachment security and mother-child interaction quality, which found that secure mothers provided more structure than insecure mothers.

Our results further contradict previous results (Bureau et al., 2014; Crandell et al., 1997; Lindsey et al., 2009; Smith, 2010), which linked dyadic mutual positive affect, enjoyment and responsiveness to attachment security. In the current study affective mutuality was not associated with attachment. It is possible, that the applied experimental task did not offer enough potential for mutual and affectionate displays within the dyad. Indeed, the experimental settings in previous studies consisted of more open and playful contexts with less problem-solving character, which might account for the discrepancy. For instance, in the study by Bureau et al. (2014), fathers and their preschool children participated in a playful interaction without toys, in which fathers were instructed to make their child laugh. In comparison, the collaborative problem-solving task of this study, was more structured, which might have limited the dyads ability to interact more freely. In support of this hypothesis,

mean scores revealed that all dyads scored very low on affective mutuality in both attachment groups.

Notably, many fathers acted as teachers towards their children, instead of as collaborative partners, and the children were often very focused on the task and not on the interaction. It was furthermore observed, that some dyads seemed more interested in competing with each other, than collaborating. These factors could all lead to more displays of negative or non-mutual emotion, even in secure dyads.

In the present study, child agency/ autonomy was unrelated to attachment, which contradict previous empirical research. For instance, Moss et al. (1997) investigated child agency in a joint problem-solving interaction, and despite a correspondingly small sample size, they found a significant association with secure attachment. The sample consisted of younger children (3-4 years of age) and assessed mother-child attachment. It is thus possible, that the relation between child agency and attachment changes with increasing child age, and/ or that child agency is not associated with attachment. Contradicting the latter proposition however, are the findings by Easterbrooks and Goldberg (1984), who showed that children with secure attachments to their fathers displayed more behaviours constituting child agency (e.g. positive affect and task orientation) while problem-solving, than insecurely attached children.

Contextual influences

In correspondence with previous research (e.g. Diener et al., 2003; Moss et al., 1997), the current study found an indication of a link between attachment insecurity and higher paternal stress. However, our data could not support findings from Crnic et al. (2005), which evidenced a link between higher paternal stress and lower dyadic interaction quality. Instead, we found an almost significant association between higher paternal stress and lower child agency. Previous empirical evidence relates paternal stress with negative parenting and parents being less supportive and nurturing in interactions with their child (Crnic et al., 2005; Mitchell & Cabrera, 2009). Conceivably, these negative parenting behaviours exert an influence on the child's behaviour and self-confidence, and hence could explain the lower levels of child agency/ autonomy in dyads with higher paternal stress.

The results also indicated, that difficult child temperament, higher negative affectivity, was related to insecure attachment with a small effect, which corresponds to previous findings (Wilson & Durbin, 2012). That is, in our sample fathers with insecure attachment representations more often had children with difficult temperament or at least more often perceived it so.

Interestingly, also greater effortful control, which is expected to be associated with positive interaction (Wilson & Durbin, 2012), showed a relation to insecure attachment with a small effect. There was no effect for surgency/ extraversion.

Our study further revealed interesting associations between the included factors through exploratory analyses. For instance, father-daughter dyads displayed significantly more affective mutuality than father-son dyads, and children from dyads with high verbal reciprocity were more often characterised as having difficult temperament by their fathers. Children with greater levels of agency were generally older and more often reported by their fathers as having characteristics of positive emotionality (child temperament) than children with lower levels of agency. High agency and was also associated with higher levels of paternal stress, and more solved puzzles in the individual condition, which lends support to findings of a relation between higher agency and better academic outcomes (for a review see de Ruiter & Van IJzendoorn, 1993; Moss et al., 1997). Older fathers more often reported lower stress levels, and older children generally solved more puzzles while collaborating with their fathers. Furthermore, children of dyads that solved more puzzles, also solved more puzzles in the individual condition, than children of dyads with low task performance.

Finally, large positive associations between paternal sensitivity and child agency corresponds to previous findings (National Institute of Child Health and Human Development Early Child Care Research Network, 2008), which state that sensitive paternal behaviour supports the development of child agency/ autonomy. Similarly, a large positive relation between child agency and affective mutuality, lends support to previous assumptions as reported by Funamoto and Rinaldi (2015).

Limitations and implications for future studies

The sample size of the current study was a limitation to the validity of the study's results. Although sixty-five dyads were included, it was only possible to

obtain attachment data from forty-five dyads, which resulted in only twenty-three secure and twenty-two insecure father-child dyads. Moreover, the participants in the study were included on a voluntary basis, which creates a bias in our data and thereby limits our interpretations. Therefore, future studies should aim at increasing the sample size as well as its diversity, for instance by including high-risk father-child dyads.

A further limitation to this study was the cross-sectional nature of the data assembly, which in comparison to longitudinal studies limits the validity of the results. Hence, longitudinal studies examining the development of father-child interaction across childhood and the factors involved with fostering secure and insecure attachments could yield different and more conclusive results.

Finally, there were some caveats to the operationalisation of the dyadic scales, which might account for the lack of significant results in the present study. First, almost all dyads scored very low on all three dyadic interaction scales, which questions their applicability to the current study. In future examinations, it would be interesting to compare mother-child and father-child dyads in relation to the applied dyadic interaction quality scales, in order to investigate whether parents differ in this aspect of interaction with their preschool child. It is possible that the dyadic scales, which were adapted from studies with mother-child dyads, are simply not as readily applicable for father-child dyads. Conceivably, father-child interaction is significantly different from mother-child interaction, and demand distinct scales especially designed for fathers.

Second, there was evidence of reciprocal interaction, which could not be assessed with the applied reciprocity scales, because the observed interaction was not exclusively verbal or behavioural. Hence, the strict division of verbal versus behavioural reciprocity potentially resulted in lost data and obscured the results. Future studies should consider combining the two scales or consider a way to include mixed reciprocity, which could lead to a different pattern of results.

Conclusions

In summary, the present study adds to the growing body of literature on father-child interaction, by confirming previous results but also partially failing to replicate previous findings. One key finding of the study was that fathers who behave sensitively toward their preschool child are more likely to have secure attachment

representations. Due to discrepancies in previous studies, this result is especially important and points to the validity of the assumption, that indicators of attachment styles in father-child dyads are more readily assessed in contexts of challenging play rather than of comfort and reassurance. A second important result was the surprising finding that insecure fathers and their children behaved more reciprocal than secure dyads, and results indicated that this was also the case for verbal reciprocity.

The findings of the current study highlight the importance of conducting more research with fathers and possibly rethink father-child interaction and attachment styles apart from mother-child relations, in order to understand the distinct mechanisms of father-child relationships and father's unique contribution to child well-being and development.

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Appendix A: Abstract

The aim of the current study was to examine the association between father-child interaction quality and attachment styles. Sixty-five father-child dyads were observed while interacting in a collaborative problem-solving task and rated according to three dyadic aspects of interaction quality (*affective mutuality*, *verbal* and *behavioural reciprocity*) and two distinct characteristics of the father (*sensitivity*) and child (*agency*) respectively. Attachment styles were assessed with the Adult Attachment Interview (Main, Kaplan & Cassidy, 1985), which classified fathers as either “secure” or “insecure”. Children were between 4,5 and 6 years old. Child temperament and paternal stress were included as contextual factors.

The results showed, that secure fathers expressed more warmth and were more sensitively responsive towards their child, than fathers who had been classified as insecure. Insecure fathers and their children engaged in more fluid back-and-forth interactions, than secure fathers and their children. There was no difference in attachment styles in regard to the level of affective mutuality or child agency, however the results revealed tendencies, that insecurity was associated with higher paternal stress and difficult child temperament. Finally, difficult child temperament was associated with higher dyadic interaction qualities, and positive child temperament with more child agency.

Appendix B: Abstract (deutsch)

Das Ziel der vorliegenden Arbeit war die Untersuchung der Assoziation zwischen Vater-Kind-Interaktionsqualität und Bindungsmustern. Fünf-und-sechzig Vater-Kind-Dyaden wurden beim gemeinsamen Lösen einer Puzzle-Aufgabe beobachtet und hinsichtlich drei dyadischer Merkmale (*affective mutuality*, *verbal* und *behavioural reciprocity*) und zwei individueller Merkmale (*paternal sensitivity*, *child agency*) kodiert. Für die Klassifizierung des Bindungsmusters kam das Adult Attachment Interview (Main, Kaplan & Cassidy, 1985) zum Einsatz, wodurch die Väter als entweder „sicher“ oder „unsicher“ eingestuft wurden. Die Kinder waren zwischen 4,5 und 6 Jahre alt. Das kindliche Temperament und väterlicher Stress wurden als Kontextvariablen in die Untersuchung inkludiert.

„Sichere“ Väter zeigten mehr Wärme und Fürsorglichkeit gegenüber ihrem Kind, im Vergleich zu Vätern die als „unsicher“ klassifiziert worden waren. „Unsichere“ Väter und ihre Kinder erlebten eher fließende, reziproke Interaktionen, die durch ein Geben und Nehmen charakterisiert waren, als „sichere“ Väter und ihre Kinder. Es zeigten sich keine Unterschiede im Bindungsmuster im Bezug auf *affective mutuality* und *child agency*. Allerdings gab es Tendenzen, dass Bindungsunsicherheit mit höherem väterlichem Stress und schwierigerem Temperament des Kindes assoziiert war. Darüber hinaus war ein schwieriges Temperament des Kindes mit höherer dyadischer Interaktionsqualität assoziiert und positives Temperament des Kindes mit mehr *child agency*.

Appendix C: Scales

The employed scales were adapted from Nguyen et al. (submitted), who modified their scales from Pianta (1994) and Owen, Vaughn, Barfoot and Ware (1996).

Affective mutuality/felt security

This scale assesses availability and mutuality of emotion between the child and parent and how secure the child feels with the parent. The child appears free to express positive or negative emotions or feelings. There is an emphasis on the child having a sense that the parent has his/her own best interests in mind. There is also an emphasis on verbal and non-verbal communication, what the parent and child communicate and how they do it. Open and free communication will be marked by emotion exchanged and a sense of personal involvement and engagement. Availability of affect is also marked by the parent's tone of voice communicating warmth and regard for the child.

At the low end, closed communication or lack of mutuality will be reflected in interaction that is stifled or non-reciprocal. At the low end there may be a veneer of intimacy or mutuality covering an impoverished experience; emotional experience of the parent may be quite different from experience of the child. The rater must be alert to exchange of emotion and the subtle cues that reflect this.

Essentially, we are interested in behaviours, which reflect on intimacy in the dyad. Dyads high on this scale almost always have a moment of shared emotion that is pleasurable. At the low end we see stifling of emotion, dampening behaviours, which avoid or negate expression of emotion, or lots of conflict between the parent and the child. The rater will need to distinguish between affect that is muted because of parents' focus on task (but which still regards child's feelings) and that which has as its purpose to stifle expression.

Does the parent respond to child's emotions and vice versa? Are there personal exchanges, eye contact? Does emotion and communication flow freely? Are positive emotions shared with one another?

High affective mutuality characterise dyads in which the father and child mostly share positive experiences and a few negative experiences, and the child seems

free to express positive or negative feelings (McElwain, Booth-LaForce, Lansford, Wu, & Justin Dyer, 2008).

Further characteristics: father and child are tuned to each other (emotionally, tone of voice, sense of regard for each other); there is an exchange of emotion (either through tone, communicative or behavioural cues like smiling or "warm" eye-gazes); personal involvement and engagement with each other (not one way).

Dampening behaviours/ statements: distracting, avoiding behaviour. Father is not responsive to child, but tries to distract or ignores the child.

Felt security: based on attachment-theory. A securely attached child explores, dares to make mistakes in front of the father, and admit them. An insecurely attached child seems restrained, perhaps anxious, is focused on pleasing the father.

1. Very Low. There are three possibilities:

- 1) the dyad appears disengaged or can only engage around positive experiences and there is an almost staged like quality to those;
- 2) there is underlying conflict or ambivalence apparent (parent may make it clear he or she would 'd rather be somewhere else); or
- 3) parent and child have very little coordinated emotion and appear emotionally disconnected with each other.

Parent or child may express a positive emotion that is not coordinated with behaviour and the other one responds. There may be underlying tension in the interaction. Parent may be threatened by any negative emotion. Dampening statements may not even be common since this dyad may essentially be disengaged around emotion. They may be highly engaged around the task or around performance but not emotion. There is very little attention to each other in terms of warmth or personal involvement. One may also see a parent giving derogatory glances at the child, directly or indirectly communicating displeasure with the child and/or his/her performance. There is often a veneer of intimacy or a staged-like interaction masking an impoverished experience for the parent and child. No warmth, no sense of genuine regard, mutuality, sharing of experience, or no security to behave and communicate freely.

2. Low. These dyads may seem cold or emotionless (like 1) but with some expressiveness and warmth (possibly underlying) at limited times or, they may be conflicted. Parents may be threatened by child's emotion and there may be signs of disengagement or conflict when child needs the parent. Parent may show signs of being annoyed or upset with the child (angry look). Behaviour or communication seems somewhat restricted. There might be (or might be a feeling of) some warmth, interest and regard for each other but these are never sustained and might occur under minimal stress. The experience might be partly shared.

3. Moderately Low. There are no bouts of sustained emotion shared between the two; instead, there is an increased emphasis on avoidance of emotion, negative emotion, and especially, non-mutual emotion. The parent may ignore or discourage the child's expression of emotion. The child's experience may begin to take on an anxious quality, perhaps unsure that s/he can count on parent for assistance. The child rarely initiates bids for security or parent affect. Despite possible bouts of tension, however, there is a general sense the dyad likes each other, that they are interested in the interaction and each other, but they might be struggling a bit to figure it out or show it overtly. The experience is partly shared.
4. Moderate. These dyads show a mixture of warmth and more restrictive, tense or "cold" behaviours (or tone of voice). There may be moments of tension and disengagement. Parent may seem a bit threatened if the child expresses frustration or anger and there may be an effort to "accentuate the positive" despite the child's needs to have feelings expressed. Dampening messages may be given, usually in a covert manner. Despite possible bouts of tension, however, there is a general sense the dyad likes each other, that they are interested in the interaction and each other, evident through mutual warm tones of voices, glances at each other, smiles, verbal acknowledgement or a certain amount of attentiveness to each other. There is a feeling that father and child share positive or negative experience.
5. Moderately High. Brief periods of conflict or avoidance may be noted in an otherwise relaxed interaction, with a mutual genuine regard for each other and a feeling that they both enjoy the interaction, evident for instance through a few smiles or warm eye gazes. There is a true sense of the dyad sharing the experience. Or parent and child may have one or two interchanges in which emotional experience differs (e.g. angry child, happy parent), but there is an attempt to reconcile experience.
6. High. Very similar to number 7 though a somewhat less active and overt exchange of emotions is noted. There may be a few 'dampening' behaviours when the child shows negative affect (parent looks away or diverts attention) or when parent focuses heavily on instruction, but generally the child feels understood. The dyad interacts in a relaxed fashion even if there is not a lot of eye contact, etc. There is an underlying warmth and appreciation between the two that is expressed even without lots of overt signs. No conflict or avoidance of emotion.
7. Very High. There is a sense that experiences (both positive and negative) are shared, that the parent shows a response to the child's emotion and vice versa. Smiling back and forth takes place. Eye contact occurs when the child or parent

seeks it. There are personal exchanges such that the child uses "I" statements to talk about feelings. First person pronouns are used. There may also be physical proximity seeking behaviours, help seeking, or some reflection on the experience with the toys (e.g. "this is hard" or "this is silly"), that are responded to in a fashion that supports the mutuality observed in the dyad. There are almost no "dampening" behaviours by either partner, so that emotion and communication flows freely. There is at least one sustained bout of reciprocally communicated, positive emotion shared by the partners.

Reciprocity

Are dialogues, bouts of interaction, and turn taking characterised by contingent responsiveness and engagement on the part of both parent and child? Contingent responsiveness is indicated by appropriate, well-timed behavioural or verbal responses to comments, questions, or suggestions on the part of the parent and/or the child. A "turn taking" (i.e. conversation-like) quality of interaction and behavioural flow.

Behavioural reciprocity is mutual task engagement; touching the same puzzle pieces and completing the puzzle together (not in parallel)/ or taking turns in placing the pieces; moving the pieces together; one follows the actions of the other person with interest, understanding and pleasure, however the dyad takes turns in placing the pieces (e.g. father watches as child manages to fit a piece in the puzzle); smiling at each other or making eye contact (signs of affect); having a sense of common understanding for something (about the puzzle, about a movement or figure drawing, shared intention etc.)

Not characterised as reciprocal behaviours: father gives the pieces to child in the correct order, child then places the pieces (e.g. the father determines the interaction and the child follows his lead); father points to drawing in order to help the child and child places the pieces accordingly (turns attention to father and tries to follow); father observes the child and its actions and corrects by pointing to the drawing if necessary (which would constitute joint attention and not reciprocity); one person is verbal, the other behavioural; looking at the actions of the other person is not reciprocity.

Important for behavioural reciprocity is taking turns in leading, initiating and performing actions relating to the task and reciprocally engaging in the task and the interaction.

Separate ratings for behavioural and verbal reciprocity.

1. Very low. No evidence of reciprocity. Parent and child constantly interrupt one another and/or talk over each other.
Behavioural: takes puzzle pieces out of each other's hands, no regard for what the other person does/ is about to do. Marked impatience and disregard for the actions of the other person. Or complete parallel task-completion. No shared experience of the task. Each person works alone. Or only one person performs actions and the other one talks/ leads/ directs.
2. Low. One or two instances of reciprocity.
3. Moderately low. A few/ several instances of reciprocity. The pair occasionally carries on reciprocal conversations/ behaviours, but these instances are never sustained.
4. Moderate. Moderate levels of reciprocity; some evidence of "conversation-like" interaction. Reciprocal interactions may be one-sided (i.e., father makes suggestions, child responds, or child drives interaction, father goes along) rather than true "turn-taking."
5. Moderately high. Clear evidence of reciprocity, that is sustained for several "turns" between father and child; maybe even one or two episodes of intense shared positive affect coupled with eye contact;
6. High. Substantial reciprocity that is sustained for several "turns"; involving numerous episodes of intense shared positive affect coupled with eye contact; only one or two instances of non-reciprocity
7. Very high. Highly integrated and reciprocal - constant shared positive affect and eye contact that never loses "turn taking" quality. There is a sense of back-and-forth interaction, communicated by looks, verbal expressions, or actions, and/or the cause-and-effect of behaviours or verbalizations is clear to the child

Paternal Sensitivity

Nach Ainsworth stellt die Feinfühligkeit eine entscheidende Verhaltenskategorie in der Eltern-Kind-Interaktion dar und sie bezeichnet sie als wesentliche Entwicklungsvoraussetzung für eine sichere Bindungsbeziehung. In Anlehnung an

Ainsworths Konzept wird die väterliche Feinfühligkeit mittels Rating erfasst, für das vorerst folgende Überlegungen als Beurteilungsgrundlage herangezogen werden:

- Gelingt es der Bezugsperson, sich einer Sache gemeinsam mit dem Kind zu widmen (sich aufeinander abzustimmen)?
- Beachtet die Bezugsperson die offensichtlichen Signale des Kindes und geht sie darauf prompt und angemessen ein (Wünsche, Ideen, Schwierigkeiten, Unterstützungsbedarf des Kindes)?
- Gelingt es der Bezugsperson, den kindlichen Blickwinkel einzunehmen (Weiterführen der kindlichen Aktivitäten, Humor, Anerkennung, Verständnis für Emotionen des Kindes)?
- Werden die Aktivitäten des Kindes angeregt und seine Initiativen aufgegriffen? Rücken eigene Ideen der Bezugsperson in den Hintergrund?
- Wie reagiert die Bezugsperson auf die Leistungen des Kindes (Zwischenergebnisse)? Reagiert sie prompt und angemessen?
- Ist der Sprachstil der Bezugsperson dem kindlichen Entwicklungsstand angemessen?

Für die eigentliche Beobachtung der Feinfühligkeit der BP kommt eine 7-stufige Ratingskala zur Anwendung:

1. ...sehr geringe Feinfühligkeit
2. ...geringe Feinfühligkeit
3. ...eher geringe Feinfühligkeit
4. ...mittlere Feinfühligkeit
5. ...eher hohe Feinfühligkeit
6. ...hohe Feinfühligkeit
7. ...sehr hohe Feinfühligkeit

Die Ankerpunkte 1, 3, 5 und 7 der Skala werden durch genaue Verhaltensbeschreibungen definiert. Anhand der unten genannten Ankerpunkte erfolgt eine Einschätzung der väterlichen Feinfühligkeit. Sollten auf eine spezielle Sequenz die gegebenen Verhaltensbeschreibungen nicht zutreffen, sollten die oben genannten Beurteilungsgrundlagen zur Einschätzung herangezogen werden. (Die Zwischenstufen 2, 4 und 6 der Feinfühligkeitsskala werden bei dazwischenliegenden Ausprägungen kodiert.)

Ankerpunkt 1: SEHR GERINGE FEINFÜHLIGKEIT

Die Bezugsperson zeigt kein Interesse daran, sich einer gemeinsamen Sache mit dem Kind zu widmen. Sie macht keine Anstalten, sich im Interesse des Kindes am Spielgeschehen zu beteiligen bzw. ihr Handeln auf das Kind abzustimmen. Es fällt

der Bezugsperson offensichtlich schwer bzw. es gelingt ihr nicht, in der Interaktion den Blickwinkel des Kindes einzunehmen und eine allgemeine Freude am Spielen zu zeigen. Die Bezugsperson orientiert sich an den eigenen Ideen und verfolgt ihre eigenen Handlungsabsichten, ohne den Versuch zu unternehmen, das Kind einzubeziehen, oder um Erlaubnis für ihr Eingreifen zu fragen. Es ist sichtbar, dass die Bezugsperson neben dem Kind und nicht mit dem Kind handelt. Sie regt weder die kindlichen Aktivitäten an, noch greift sie die kindlichen Initiativen auf. Auf kindliche Wünsche und Ideen wird nicht eingegangen. Nonverbale Signale des Kindes (z. B. Zeigegesten, Blickkontakt, ...) werden nicht wahrgenommen. Folglich muss sich das Kind verbal Aufmerksamkeit verschaffen, was nicht unbedingt beim ersten Versuch gelingt, da die Bezugsperson intensiv mit den eigenen Tätigkeiten beschäftigt ist. Hat das Kind Schwierigkeiten, bemerkt sie diese erst, wenn das Kind sein Problem äußert. Das Kind wird nicht motiviert, da die Bezugsperson keinerlei Rückmeldungen gibt oder emotionale Beteiligung an der Interaktion zeigt. Der Sprachstil der Bezugsperson ist nicht kindgemäß. Wenn das Kind nicht sofort versteht, reagiert sie unangemessen und ungeduldig, ohne den Sprachstil dem kindlichen Entwicklungsstand anzupassen.

Ankerpunkt 3: EHER GERINGE FEINFÜHLIGKEIT

Die Bezugsperson lenkt die Situation vorwiegend, da ihre Ideen eher häufig durch sie realisiert werden. Kindliche Initiativen, Wünsche und Ideen werden nur teilweise aufgegriffen und umgesetzt. Nur manchmal wird das Kind in die Handlungen einbezogen, das dabei aber die Vorschläge der Bezugsperson, die z. T. als Anweisung formuliert sind, ausführt. Subtilere Kind-Signale nimmt die Bezugsperson nicht wahr, und es kann vorkommen, dass sie aufgrund falscher Interpretationen in das kindliche Spiel „wohlmeinend“ helfend eingreift, obwohl das Kind zu diesem Zeitpunkt (noch) keine Hilfesignale ausgesendet hat und an einer Unterstützung (noch) nicht interessiert ist. Es kann auch vorkommen, dass sich die Bezugsperson grundsätzlich nur wenig in das Spielgeschehen einbringt und das Interesse des Kindes an einer Beteiligung häufig ignoriert. Kindliche Aktivitäten und Zwischenergebnisse bleiben häufig unbeachtet und meist ohne adäquate Rückmeldung. Tauchen Probleme des Kindes auf, werden sie von der Bezugsperson überwiegend eigenständig gelöst, ohne das Kind entsprechend einzubeziehen. Somit wird das selbstständige Denken des Kindes nur wenig angesprochen. Die Bezugsperson zeigt nur wenig emotionale Beteiligung an der Interaktion und es fällt ihr meist schwer, den kindlichen Blickwinkel einzunehmen. Es gelingt der Bezugsperson nur manchmal, sich dem Kind gegenüber verständlich auszudrücken und ihren Sprachstil dem kindlichen Entwicklungsstand anzupassen.

Ankerpunkt 5: EHER HOHE FEINFÜHLIGKEIT

Für die Situation ist kennzeichnend, dass sich die Bezugsperson überwiegend an den Bedürfnissen des Kindes orientiert, meist liebevoll auf die Ideen des Kindes reagiert,

sich entsprechend den kindlichen Interessen in das Spielgeschehen einbringt und ihr eigenes Tätigsein in den Hintergrund stellt, dies allerdings nicht konsistent. Beide arbeiten gemeinsam an einer Sache, jedoch nicht pausenlos, da sich die Bezugsperson zwar häufig, aber nicht immer auf die kindlichen Initiativen und Aktivitäten einzustellen vermag. Die Bezugsperson nimmt die meisten kindlichen Signale wahr und es gelingt ihr relativ gut, darauf in angemessener Weise zu reagieren. Sie bemüht sich, selbständiges Problemlöseverhalten zu fördern, greift aber häufig kurz vor der Vollendung in das kindliche Geschehen ein, da sie sich nicht zurückhalten kann. Die Bezugsperson ist überwiegend daran interessiert, das Kind zu neuen Ideen und Handlungen anzuhalten, was sie durch lobendes Feedback und würdigende Äußerungen zu erreichen versucht. Die sprachliche Verständigung zwischen den beiden funktioniert recht gut, da die Bezugsperson meist bemüht ist, sich kindgemäß auszudrücken.

Ankerpunkt 7: SEHR HOHE FEINFÜHLIGKEIT

Die Situation wird dadurch bestimmt, dass sich die Bezugsperson gänzlich am Kind orientiert, indem sie all ihre Handlungen auf die kindlichen Bedürfnisse abstimmt, und die eigenen Ideen in den Hintergrund rücken. Es gelingt der Bezugsperson besonders gut, den kindlichen Blickwinkel einzunehmen. Sie reagiert prompt und angemessen auf die kindlichen Signale und erkennt, wann und in welcher Weise das Kind Unterstützung benötigt. Die Bezugsperson regt durch ihre emotionale Beteiligung und kontinuierliche, motivierende Rückmeldungen die kindlichen Aktivitäten an. Einzelne Handlungen gehen entweder vom Kind aus oder sind Ergebnis gemeinsamer Vereinbarungen. Setzt sich die Bezugsperson durch, dann mit der offensichtlichen Absicht, dem Kind bei der Realisierung seiner Wünsche zu helfen. Die Bezugsperson orientiert sich in ihrem Sprachstil am Entwicklungsstand des Kindes und ist darauf bedacht, sich stets verständlich auszudrücken. Der Beobachter gewinnt den Eindruck einer reibungslosen, harmonischen Interaktion.

Child's Agency/Autonomy

The child acts with vigour, confidence, and eagerness to do the tasks. Child takes an active interest in his/her activities, invests effort in them (although not necessarily very persistent), and appreciates successes. Agency includes a sense of coordination between affect and behaviour. Child should appear well integrated in the sense of directing his/her energy into activities without conflicting motivations or repression of feelings and with confidence that everything is okay. Agency must be scored for goal-oriented behaviour on the tasks (insofar as parent defines these as goals of the situation). Other goals or expressions of excitement may be in service of distracting the parent, winning approval, etc., and would not represent agency here.

1. Very low. Child displays no agency. Child seems hesitant to engage problems or does so „mechanically" and with no evidence of being interested in or excited by his/her performance (although this child may nonetheless be distraught over failures). Child shows extreme lack of confidence in his/her behaviour and is affectively restrained. Father leads throughout the task.
2. Low. Child generally does not display agency. Child does take some active interest in his/her activities, shows some enthusiasm and becomes engaged for brief periods, but is mostly restrained. Mostly father leads the task.
3. Moderately low. Child shows some clear moments of agency and active, enthusiastic engagement in her/his activities but primarily she/he does not engage the situation in this way. Mostly father leads the task and child engagement changes quickly.
4. Moderate. Child shows a mixture of enthusiasm and restraint or superficiality of effort. This may occur because the child is very slow in "warming up" to the potential of the situation or because his/her enthusiasm waxes and wanes and he or she is not reliably invested in the activities.
5. Moderately high. The child displays agency for much of the session and is basically interested in and enthused about his/her activities. There is a sense of harmony between affect and behaviour in the child's enthusiasm, but child also has periods in which this is not the case. The child is leading the task for about half of the time.
6. High. Child demonstrates agency, enthusiasm and coordinated affect and behaviour for most of the session with only brief and minor periods in which this is not so. The child is quite eager and confident in approaching the activities and enjoys her/his accomplishments. The child is mostly leading the task and there are one or two instances of following the father's lead
7. Very high. Child shows high agency and enthusiasm in activities throughout the session. Child approaches goals eagerly, and with some persistence when she/he encounters difficulties, and the coordination of affect with behaviour gives the child a notable sense of energy in all activities. Child clearly "jumps" on tasks with eagerness and wants to get involved. The child controls the task from beginning to end.

LEBENS LAUF

LAURA ASPERUD THOMSEN

Geburtsdatum: 17. April 1990
Geburtsort: Kopenhagen, Dänemark
Email: laura.asperud.t@gmail.com

Studium/ Schulische Ausbildung

10/2017 –	Masterstudium Psychologie, <u>Universität Wien</u>, Österreich
10/2012 – 01/2017	Bachelorstudium Psychologie, <u>Universität Wien</u>, Österreich
10/2014 – 10/2015	Erasmus-Aufenthalt, Psychologie, <u>Freie Universität Berlin</u>, Deutschland
10/2011 – 01/2012	Translationswissenschaft, Universität Wien, Österreich
10/2011 – 01/2012	Skandinavistik, Universität Wien, Österreich
09/2011	Deutschkurs, Universität Wien, Österreich
07/2011	Deutschkurs, Studieskolen, Kopenhagen, Dänemark
2006 – 2009	Gymnasium, Nærum, Dänemark. Abschluß: Abitur
1996 – 2006	Grundschule, Vedbæk, Dänemark

Berufliche Erfahrung

07/2018 – 10/2018	Psychologisches Praktikum in der Dr. von Haunersches Kinderspital, Kinderpsychosomatik <u>Klinikum der Universität München</u> , Deutschland, unter Leitung von <u>Priv. Doz. Dr. med. Karl-Heinz Brisch</u> . Mit Schwerpunkt: Bindungsstörungen bei Kindern und Jugendlichen.
03/2017 – 06/2017	Studentische Mitarbeiterin in der Entwicklungspsychologie an der Universität Wien bei <u>Prof. Dr. Stefanie Höhl</u>
08/2017 – 10/2017	Forschungsassistentin (HIWI) in der Klinik und Poliklinik für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie an der <u>Ludwig- Maximilian Universität München</u> , Deutschland
03/2016 – 04/2017	Forschungsassistentin (HIWI) in der Klinik und Poliklinik für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie an der <u>Ludwig- Maximilian Universität München</u> , Deutschland

- 11/2015 – 01/2016 Werkvertrag bei Prof. Dr. Katja Liebal, Freie Universität Berlin: Reliabilitätskodierung und Erstellen von Stimuli für einen Fragebogen
- 03/2014 – 06/2014 **Praktikum als Forschungsassistentin** bei Prof. Dr. Katja Liebal, Evolutionäre Psychologie, Freie Universität Berlin, Deutschland

Publikationen

Sfärlea, A., Löchner, J., Neumüller, J., Asperud Thomsen, L., Starman, K., Salemink, E., Schulte-Körne, G., & Platt, B. (2019). Passing on the half-empty glass: A transgenerational study of interpretation biases in children at risk for depression and their parents with depression. *Journal of Abnormal Psychology*, 128(2), 151-161.
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