



Article

Still Mother after All These Years: Infants Still Prefer Mothers over Fathers (If They Have the Choice)

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Abstract: Fathering and mothering have changed in many ways within the last decades. Earlier studies showed a clear hierarchy in infant attachment figures with a preference for mothers. This study examined whether infants in the 21st century still prefer mothers over fathers in their expression of attachment behaviors, whether differences in parental involvement still exist, and whether this will result in differences in attachment security to mother and father. A total of 50 German families with infants between 10 and 19 months were observed in an experimental setting and during home visits. Parents reported on their involvement. The results revealed a clear hierarchy with regard to the duration of attachment behaviors directed towards mothers, followed by fathers and strangers. Mothers reported to be more involved in child care on weekdays compared to fathers. Involvement was not associated with attachment variables. Attachment security to mother and father was positively related and did not differ significantly. Infants in the 21st century in a Western country still prefer mothers over fathers in their expression of attachment behaviors. Mothers were more involved in child care than fathers. However, these differences did not result in differences in attachment security to mother and father.

Keywords: mother attachment; father attachment; involvement; attachment behavior; attachment security; AQS; early childhood



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1. Introduction

1.1. Historical Changes in Parenting and Parenting Roles

Societal changes in economic, political, or educational conditions and affordances and their effects on the living conditions and arrangements of families can result in changes in individual developmental processes over time (Bronfenbrenner and Crouter 1983; Sameroff 1990). In many Western countries, family constellations, family life, and the corresponding parenting roles and styles have changed in many ways within the last decades (Cowan and Cowan 2019; Walker 2008). Trifan et al. (2014) reported a change from traditional complementary family roles of fathers as decision makers and mothers as caregivers to a more egalitarian household decision-making between parents comparing three cohorts of families from the 1950s until 2011 studying 207 to 457 Swedish families. In parallel, authoritarian parenting also declined, and a more egalitarian family life between parents and children has been established at least in Sweden. Collishaw et al. (2012) reported increases in parents' monitoring and expectations about children's behavior but also increases in quality time that both mothers and fathers spend with their children in the United Kingdom comparing self-reports of adolescents and their parents in two national samples between 1986 and 2006. Several representative surveys in the United States, Australia, and Germany also reported an increase in time that mothers and fathers spend in intense and supportive interaction with their children (Ramey and Ramey 2009; Dotti Sani and Treas 2016; Craig et al. 2014; BMFSFJ 2021). Although more parents in many Western countries seem to spend more time with their children than in former decades, they do not necessarily seem

to feel more self-reliant or comfortable in doing so. [Glatz and Buchanan \(2021\)](#) reported a decline in parental self-efficacy in the beginning of the 21st century in the United States. Parental self-efficacy assesses parents' beliefs in their ability to influence their child in ways that foster positive child development ([Jones and Prinz 2005](#)). Thus, the historical trend to more intense parenting may not be paralleled by feeling more secure or competent in caregiving and support. This may be of special relevance for fathers, as a higher rate of father involvement increases the importance of parenting efficacy in fathers ([Rominov et al. 2016](#); [Donithen and Schoppe-Sullivan 2021](#)).

1.2. Father Involvement in Child Care

Father involvement includes paternal engagement, accessibility, and responsibility for child care ([Lamb et al. 1985](#)). [Pleck \(2010\)](#) proposed a revised conceptualization of father involvement with the components of positive engagement and activities, warmth and responsiveness, and control. [Cabrera et al. \(2000\)](#) especially emphasized the importance of qualitative characteristics of parent–child interactions such as warmth, affect, sensitivity, as well as participation in specific activities with the child for positive child development.

There are some historical changes in popular opinion or expectations regarding father involvement. In an analysis of cultural models of father involvement from the 1920s to 2006, [Milkie and Denny \(2014\)](#) reported a shift from an ideal of enjoyment of fathering to an ideal of paternal involvement as fulfillment in the United States. Moreover, fathering ideals may differ ([Iwanski et al. Forthcoming](#)). Father involvement also became a hot topic in the scientific literature on family characteristics, parenting, or child development within the last decades. A Web of Science search on the number of articles on father involvement reveals an increase from one article in 1962 to 502 listed articles in 2020.

In popular publications as well as in scientific studies, fathers are increasingly expected to show more involvement in child care and more shared responsibilities. In the literature on parenting or child development, this is mainly associated with positive developmental outcomes for children ([Cabrera et al. 2018](#); [Jia et al. 2012](#)). However, there is variability in the actual amount of father involvement depending on specific characteristics of the family, the age of the child, maternal depression, parental conflicts, or the father's personality ([Planalp et al. 2013](#); [Planalp and Braungart-Rieker 2016](#); [Donithen and Schoppe-Sullivan 2021](#)). In many countries, fathers still spend less time with their children than mothers and engage more in play activities than in caregiving with their children ([Dotti Sani and Treas 2016](#); [Mehall et al. 2009](#); [Robinson et al. 2021](#); [BMFSFJ 2021](#)). So, there may still be differences in the effects of maternal and paternal involvement on child development. Nevertheless, the trends to more paternal involvement and changing family roles in many Western societies may also affect the social and emotional experiences of children with their fathers and, as a consequence, may also influence children's attachment relationship to their fathers.

1.3. Early Research on Attachment to Fathers: Are Fathers Attachment Figures?

Early research on infant–father attachment examined whether fathers are attachment figures at all. In one of the fundamental studies, [Cohen and Campos \(1974\)](#) used an experimental design similar to the one that Harlow had developed for rhesus monkeys ([Harlow and Zimmermann 1959](#)) to test whether “the father is an attachment object in infancy” (p. 154). Mother, father, and a stranger sat within equal distance to the infant, and the infant's attachment and affiliation behavior was observed. Infants showed a shorter latency and a longer duration of attachment behaviors towards their mothers compared to their fathers, but both parents were preferred over the stranger in this study with 60 infants in the United States. Infants stayed 66% of the time close to their mothers and 33% of the time close to their fathers. However, vocal signs of distress on separations from mother or father did not differ. Thus, [Cohen and Campos \(1974\)](#) concluded that fathers are attachment figures for infants and remarked that some infants of their study even preferred their fathers over their mothers, which is similar to observations reported by [Ainsworth \(1967\)](#). Another

early study on attachment to father in the UK found that 75% of the infants showed signs of attachment to father at 18 months but not yet at 10 months of age where only 30% showed signs of attachment to their fathers in reaction to different forms of separations (Schaffer and Emerson 1964). Lamb (1976) reported similar proportions of attachment behaviors of infants towards mothers and fathers during home visits in a smaller sample of 20 families in the United States. Subsequent studies on attachment to mothers and fathers using the Strange Situation Paradigm (SSP) in Germany, the United States, and Israel showed that patterns of attachment to mothers and fathers are comparable in percentage and are independent (Grossmann et al. 1981; Steele et al. 1996; Sagi et al. 1985). These early studies on infant–father attachment were conducted during times where fathers were less involved in caregiving than today and when infant daycare was not common. Given this low amount of caregiving by fathers in the last decades, it may seem somehow surprising that infants did show attachment behaviors towards their fathers and that the percentage of secure attachment patterns to fathers was comparable to that of infant–mother attachment already in these early studies.

1.4. Child–Father Attachment: The Role of Paternal Involvement and Paternal Sensitivity

Theorizing and empirical literature on factors influencing the development of attachment security to fathers and on characteristics of the emotional relationship between children and fathers are quite diverse (Paquette 2004; Grossmann et al. 2008; Brown et al. 2007; Cabrera 2020; Ahnert and Schoppe-Sullivan 2020). One major topic refers more to the quantity of the father–child interaction, focusing on father involvement, parental responsibility, and caregiving time. The other major influential factor is the quality of father–child interaction.

Shared time with infants is a widely used operationalization of father involvement (Pleck 2012). Research in the United States shows that fathers spend more time with older children and also increase their number of shared activities from infancy to toddlerhood (Planalp et al. 2013). However, the quantity of paternal involvement is not always positively associated with children’s attachment security nor with sensitive or appropriate fathering (Lickenbrock and Braungart-Rieker 2015; Grossmann et al. 2002). Brown et al. (2007) showed that the amount of time that fathers spent with their children was negatively associated with children’s attachment security to fathers. This is especially the case when the time spent together is characterized by poor interactive play quality, bad paternal mood, and high paternal intrusiveness. Lickenbrock and Braungart-Rieker (2015) reported that paternal involvement was not significantly associated with attachment security to father and paternal sensitivity. Moreover, Brown et al. (2012) reported no associations or even negative associations between paternal involvement and paternal sensitivity. Some theorists on fathering and empirical evidence suggest that many fathers tend to shape their interaction with their children in a more active and challenging form than mothers (Paquette 2004; Grossmann and Grossmann 2020; StGeorge et al. 2021). Therefore, some studies differentiate between caregiving and play when assessing paternal involvement (Planalp and Braungart-Rieker 2016). However, this has not yet been clearly differentiated in attachment research.

Beside quantitative aspects of fathering, the quality of the father–child interaction may also influence the development of secure attachment to fathers. Children need their attachment figures as a secure haven in times of challenging distress but also as a secure base to explore the surroundings when experiencing more positive affect (Ainsworth 1989; Bowlby 1982; Grossmann et al. 2008). Parents can offer both safe haven and secure base behavior by showing both sensitivity and sensitive exploration support (Grossmann et al. 2008; Kerns et al. 2015). Thus, the quality of caregiving is relevant for attachment security. There is ample evidence that maternal sensitivity and not maternal involvement is a central factor for an infant’s attachment security (Ainsworth et al. 1978; Grossmann et al. 1981; Leerkes 2011). However, studies on paternal sensitivity as a predictor of attachment security and other developmental outcomes do not reveal identical effects as for maternal sensitivity

(Grossmann et al. 2002; Rodrigues et al. 2021). The mean effect size of the association between maternal sensitivity and child's attachment security to mother is moderately strong ($r = 0.24$), while associations of paternal sensitivity as providing a safe haven with attachment security to father are less strong ($r = 0.12$) (Lucassen et al. 2011; Zimmermann 2017). Earlier studies only showed small positive and negative associations of father involvement and attachment security, and the associations with paternal sensitivity are smaller compared to results from research on mother–infant attachment. If the current historical trend to more father involvement fosters the development of secure attachment, this might be seen in an increase of specific attachment behaviors that infants express directed to their fathers and in more attachment security to fathers.

1.5. Caregiver Preference and Attachment Security to Mother and Father

Attachment research has shown that infants expressed their attachment behaviors longer to their mothers compared to their fathers if the experimental situation forces a choice (Cohen and Campos 1974) and in natural observations including separations that activate the attachment system (Schaffer and Emerson 1964) but not in non-distressing situations (Lamb 1976; Umemura et al. 2013). These results suggest an attachment hierarchy at least in early childhood, with a preference of proximity to mother over father when the attachment system is activated. However, the duration of proximity seeking or bodily contact to a caregiver is no sufficient indicator of attachment security, as security also includes the regulation of negative affect with the caregiver and exploration (Ainsworth et al. 1978). In order to put the preference of proximity to one caregiver in attachment-related situations into context, it is important to examine whether this is also an indicator of differences in attachment security and whether attachment security can be found more often for infant–mother compared to infant–father attachment.

Already the first studies on infant attachment quality with both parents using the SSP showed a quite comparable distribution of attachment patterns to mother and father (Grossmann et al. 1981; Steele et al. 1996). A review of attachment patterns to fathers in early childhood including 15 studies assessing and reporting the SSP with both mothers and fathers, including 1155 families, found a comparable rate of secure attachment patterns (66.5% to father; 67% to mother). Moreover, an odds ratio of 1.16 (95% CI [0.96 to 1.41], $p = 0.12$) also suggests independence of attachment patterns to mother and father in infancy in the same family (Zimmermann 2017). Comparably, the mean attachment security score to mother and father using the Attachment Q-Sort (AQS) shows no general significant difference (Cadman et al. 2018). Studies on infant and toddler attachment security do not show more attachment security to either mother or father. Therefore, it is important to examine whether the duration of expressed attachment behaviors is an indicator of attachment security and whether this is similar for mothers and fathers.

In a historical perspective, the comparable percentages of secure attachment patterns to mothers and fathers may seem somehow surprising given the fact that many studies on attachment to father were conducted within the last decades, which were characterized by lower paternal involvement for child care compared to the 21st century. Interestingly, a recent study on infant attachment also reports comparable rates of 66% and 63% secure infant attachment patterns to mother and father, respectively (Kuo et al. 2019), as found in earlier studies.

Therefore, a study examining potential caregiver preferences in expressing attachment behaviors comparable to the early studies in father attachment can offer insights in whether changes in parenting roles and involvement over time also lead to changes in preferences of mothers over fathers. The currently reported increase in father involvement in many Western societies might increase infants' tendencies to direct their attachment behaviors towards their fathers. This may especially be the case in situations that activate the attachment system (e.g., stranger approach, negatively valenced stimuli). Moreover, if the amount of involvement is a relevant variable for the development of attachment security, this might be relevant for both mothers and fathers. However, a complete interpretation

of an attachment preference for one caregiver needs the inclusion of overall attachment security to mother and father within the same family.

1.6. Aims of the Study

If fathers in the 21st century spend more time with child care, this might affect infants' reactions towards their fathers, perhaps also in the attachment domain. Thus, our study had four aims.

- (1) First, we wanted to replicate and expand an earlier study on characteristics of infant–father and infant–mother attachment conducted more than 40 years ago (Cohen and Campos 1974). More precisely, we wanted to examine whether infants in the 21st century still prefer mothers over fathers in their expression of attachment behaviors in direct triadic interactions. Thus, we expected infants to show a comparable duration of attachment behaviors towards mothers and fathers. However, both parents still should be preferred over strangers.
- (2) Second, we examined differences in involvement between mothers and fathers in the sample to test whether we find empirical evidence for the general trend in society in community samples of current parents. We specifically studied different domains of involvement.
- (3) Third, we studied more closely whether the duration of infants' attachment behaviors and also whether attachment security (assessed by the AQS) are associated with involvement in mothers and fathers.
- (4) Fourth, as an extension to our earlier research questions, we examined whether infant attachment security (AQS) differs between mothers and fathers. We did not expect differences in attachment security between parents.

2. Materials and Methods

2.1. Participants

The sample consisted of 50 infants (52% female) and their mothers and fathers from Germany. Infants' age ranged from 10 to 19 months with a mean age of 14.07 months (SD = 2.89 months). Mothers' age ranged from 21 to 40 years (M = 30.88 years; SD = 4.42 years) and fathers' age from 22 to 53 years (M = 33.62 years; SD = 6.08 years). Most parents were highly educated with 76% of the mothers and 62% of the fathers reporting a general university entrance qualification (German Abitur or Fachabitur). Twenty-two percent of the mothers and 34% of the fathers reported a secondary school certificate or at least ten years of school (German Realschulabschluss), and only 2% of the mothers and 4% of the fathers had no educational qualification. Most parents finished professional education (58% of the mothers and 66% of the fathers). Approximately one third of the parents reported a university degree (38% of the mothers and 28% of the fathers). Only 4% of the mothers and 6% of the fathers had no professional qualifications. In 49 out of the 50 participating families, parents reported the mother to be the primary caregiver, whereas one family reported the father to be the primary caregiver.

Approximately half of the mothers (46%) were employed with an average working time of 10.85 hours per week (SD = 13.84 hours), but nearly all fathers (92%) were working with an average of 38.89 working hours per week (SD = 14.96 hours). All mothers took parental leave with a range from eight to 78 weeks (M = 46.66 weeks, SD = 17.02 weeks), whereas only half of the fathers (48%) reported parental leave ranging from two to 60 weeks (M = 4.64 weeks; SD = 8.91 weeks). We recruited families in public kindergartens, daycare facilities, and via social media.

2.2. Procedure and Measures

Two experimenters visited all families at home and videotaped an experimental interaction similar to Cohen and Campos (1974) and family interactions including dyadic tasks between the infant and only one parent, short separations, and triadic tasks. The home visits lasted about 1.5 h.

Attachment security was observed by six independent raters based on the complete home visit by use of the AQS. The duration of single attachment behaviors was only observed during the experimental interaction using an event-sampling procedure by two different and independent raters who did not also score the AQS and did not observe the complete home visit. Parental involvement was assessed by self-reports, separately by mothers and fathers.

2.2.1. Observation of Attachment Behaviors

Infants' attachment behaviors were observed in interaction with the infant, both parents, and a female stranger, for a total of four experimental trials (adapted from [Cohen and Campos 1974](#)). The presence of the stranger (in the first two trials) combined with presenting audiotaped infant cries for emotion contagion (in the last two trials) served to activate the infant's attachment system, consequently eliciting attachment behaviors ([Geangu et al. 2010](#)).

Procedure: Both parents and the stranger were seated on the floor in front of the infant at a 1.5 m distance on marked spots. The positions of mother and father (to the left or to the right of the stranger) were counterbalanced across subjects. At the beginning of each trial, the experimenter seated the infant on a specific spot on the floor. The stranger showed a neutral facial expression and did not interact with the infant or the parents during the trials. The parents were instructed to react to their infants' signals as they would usually do but not to initiate interaction by themselves and not to leave their assigned spots during trials. The infant was free to move throughout the room during trials. Each trial lasted one minute. The total duration of the observation was about five minutes.

Coding: We observed the duration of three attachment behaviors: (1) proximity seeking, (2) bodily contact, and (3) distress vocalization, and, in addition, (4) duration of looks. All behaviors were coded independently directed to either the mother, the father, or the stranger by two independent raters with extensive training. One rater coded two trials per infant. The second rater independently coded the other two trials. The interrater reliability was good with $K > 0.65$.

2.2.2. Observation of Attachment Security

Infant's attachment security to mother and father was assessed by use of the Attachment Q-Sort ([Waters 1995](#)). The AQS consists of a set of 90 cards that each contain a written characteristic of child attachment behavior as well as affective reactions and explorative behaviors in their familiar home environment. In order to describe a particular infant based on the video tapes of the conducted home visits, reliable coders sorted these 90 items equally into nine categories ranging from 1 = "not at all characteristic" through 5 = "neither characteristic nor uncharacteristic" to 9 = "very characteristic" with 10 items per category depending on how characteristic these behaviors were for the observed infant. Each infant's Q-Set was correlated with the prototype for attachment security ([Waters 1995](#)), resulting in scores ranging from -1.00 to 1.00 with higher scores indicating higher attachment security.

Six raters, who received extensive training, coded attachment security to mother and father separately and independently. Interrater reliability was good with a mean agreement of $r = 0.75$ on all Q-Sort-items and a maximum mean deviation of 0.10 with regard to attachment security prototypicity.

2.2.3. Self-Report of Parental Involvement

We assessed parental involvement by the use of six items with an open-response format. Two questions asked how much time the respective parent spends at home on average during the week and on weekends (e.g., "On average, how much time do you spend at home during the week?"). The other four items asked about the amount of time spent in direct interaction with the infant. Two items asked how much time on average parents spent reading to the infant during the week and on weekends. Two further items

asked how much time on average parents spent caring for the infant, also during the week and on weekends.

One father did not provide information on his involvement. Thus, the analyses were based on 49 father-involvement data.

2.3. Data Analysis

Data were analyzed with SPSS28 (IBM Corporation 2021). As the participants in our study came from families, data for infants, mothers, and fathers were not independent. Therefore, we analyzed infants' attachment behaviors and their attachment security to their mother and father as a within-subject MANOVA design. We used paired *t*-tests for expected differences between attachment behaviors directed to mother compared to father within the same family and differences to the expression towards the stranger. We first report results for infants' attachment behaviors towards the mother, the father, and the stranger examining differences of the person towards whom infants directed their attachment behaviors. Second, we used paired *t*-tests to examine differences in involvement between parents. Third, we report zero-order correlations between infant's attachment behavior, attachment security, and parental involvement. Finally, we examined differences in infant attachment security towards mother and father using a paired *t*-test.

3. Results

3.1. Differences in Duration of Observed Infant Attachment Behaviors towards Mother, Father, and Stranger

A repeated-measures MANOVA showed a significant effect of the person towards whom the infant expressed attachment behaviors, $F(2,48) = 19.64$, $p < 0.0001$, $\eta^2 = 0.345$ (see Figure 1). Posthoc paired *t*-tests showed that the duration of attachment behaviors towards the mother was significantly longer compared to the duration of attachment behaviors towards the father, $t(49) = 3.26$, $p = 0.002$, Cohen's $d = 0.75$, and the stranger, $t(49) = 5.32$, $p < 0.001$, Cohen's $d = 1.12$. Additionally, the duration of attachment behaviors towards the father was significantly longer compared to behaviors towards the stranger, $t(49) = 2.69$, $p = 0.010$, Cohen's $d = 0.55$.

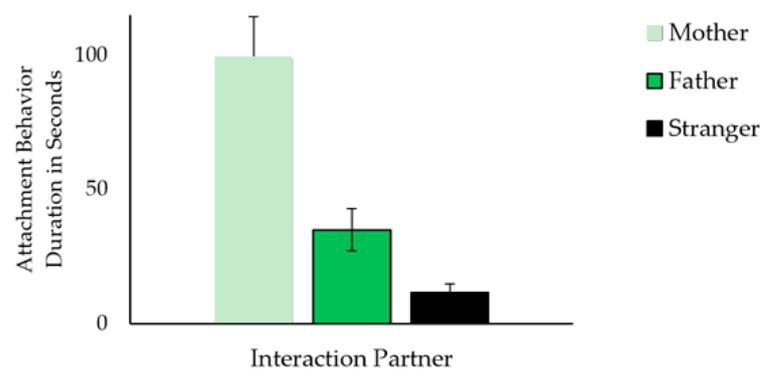


Figure 1. Duration of attachment behaviors towards mother, father, and stranger (means and SE).

3.2. Differences in Proximity Seeking, Bodily Contact, Distress Vocalization, and Looks towards Mother, Father, and Stranger

Next, we examined differences in the duration of the three observed attachment behaviors: proximity seeking, bodily contact, and distress vocalization towards mother, father, and stranger. Furthermore, we tested differences in the duration of looks to mother, father, and stranger. Therefore, we present results comparable to the original study by Cohen and Campos (1974) (see Figure 2). Paired *t*-tests revealed that infants showed significantly longer proximity seeking, bodily contact, and distress vocalization towards mother than father (proximity seeking: $t(50) = 3.27$, $p = 0.002$, Cohen's $d = 0.75$; bodily contact: $t(50) = 3.10$, $p = 0.003$, Cohen's $d = 0.69$; distress vocalization: $t(50) = 2.27$, $p = 0.028$,

Cohen’s $d = 0.37$) and stranger (proximity seeking: $t(50) = 4.94, p < 0.001$, Cohen’s $d = 1.03$; bodily contact: $t(50) = 5.51, p < 0.001$, Cohen’s $d = 1.14$; distress vocalization: $t(50) = 3.15, p = 0.003$, Cohen’s $d = 0.46$). Furthermore, infants sought proximity ($t(50) = 1.80, p = 0.077$, Cohen’s $d = 0.36$) and bodily contact ($t(50) = 3.41, p = 0.001$, Cohen’s $d = 0.73$) longer towards father than stranger. The duration of distress vocalization towards father and stranger did not differ significantly. Paired t -tests showed that the duration of looks to mother compared to father did not differ significantly. In contrast, looks to stranger were significantly longer than looks to mother, $t(50) = -3.29, p = 0.002$, Cohen’s $d = -0.60$), and the father, $t(50) = -4.21, p < 0.001$, Cohen’s $d = -0.64$).

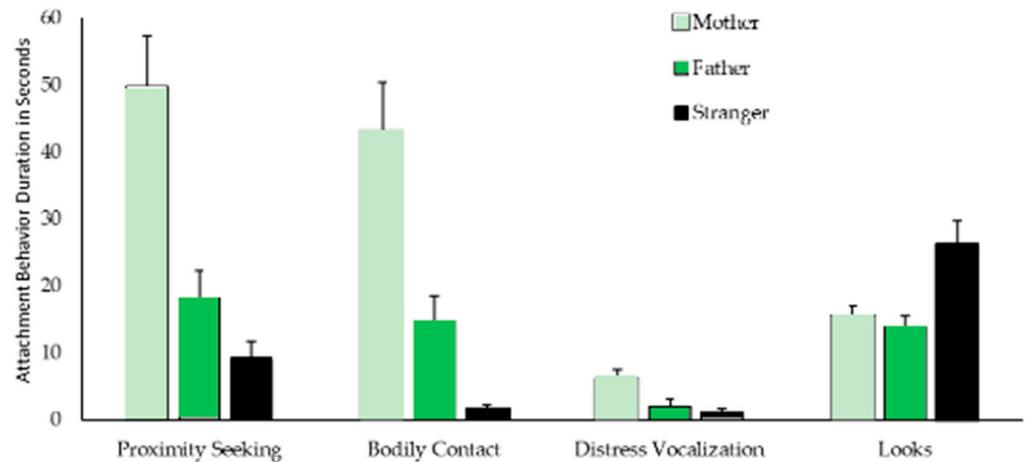


Figure 2. Duration of observed attachment behaviors and looks to mother, father, and stranger (means and SE).

3.3. Differences in Maternal and Paternal Involvement

Mothers reported to spend significantly more time at home on weekdays ($t(49) = -2.38, p = 0.021$, Cohen’s $d = 0.36$) than fathers, but not on weekends. Mothers also reported to spend more time reading and caring for the infant than fathers ($t(50) = 5.10, p < 0.001$, Cohen’s $d = 0.60$) (see Figure 3).

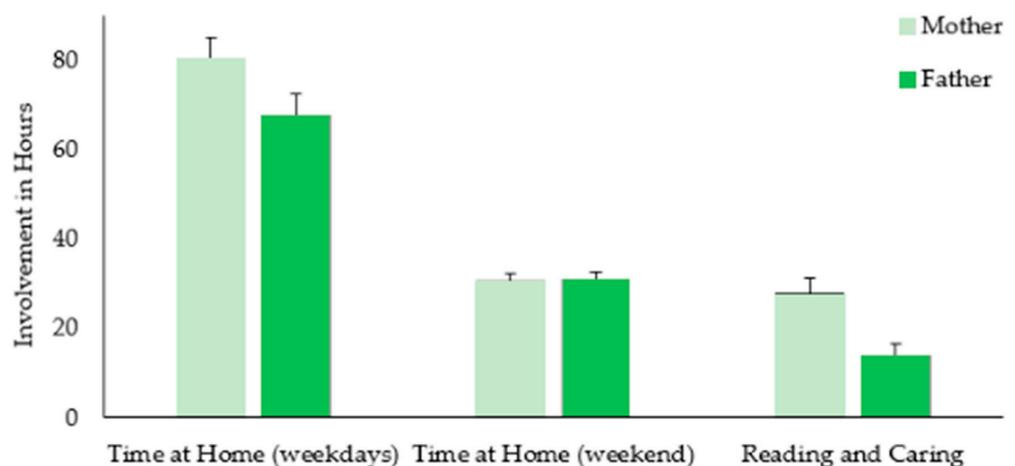


Figure 3. Self-reported parental involvement by mothers and fathers (means and SE).

3.4. Correlational Analyses

Table 1 shows zero-order correlations between all study variables. Correlation coefficients for mother variables are presented below the diagonal, whereas father variables are presented above the diagonal.

Infants' attachment security to father measured with the AQS was significantly positively related to the observed duration of infant attachment behaviors towards father. There were no other significant associations between father variables.

For mothers, the reported time spent at home during weekdays and weekends was significantly positively correlated. The attachment security (AQS) to mother was significantly negatively related to the duration of looks to mother during the experimental task. There were no other significant associations between the mother variables.

Table 1. Correlations of all variables (correlations for mothers below diagonal, correlations for fathers above diagonal).

	Involvement			Attachment Security (AQS)	Duration of	
	Time at Home (weekdays)	Time at Home (weekends)	Reading and Caring		Attachment Behaviors Towards Parent	Looks
Involvement:						
Time at Home (weekdays)	-	0.18	0.16	-0.21	-0.27	-0.08
Time at Home (weekends)	0.66 ***	-	-0.15	-0.17	0.02	-0.09
Reading and Caring	0.06	-0.14	-	-0.26	-0.05	-0.14
Attachment Security (AQS)	-0.15	-0.12	-0.26	-	0.38 **	0.20
Duration of Attachment Behaviors	-0.10	0.00	-0.11	0.08	-	0.14
Duration of Looks	0.13	0.19	-0.17	-0.31 *	0.03	-

N = 49–50; *** $p < 0.0001$, ** $p < 0.01$, * $p < 0.05$.

3.5. Differences in Infant Attachment Security to Mother and Father

Finally, we tested for differences in infant attachment security to mother and father (AQS). A paired t-test revealed no significant differences in attachment security to mother and father. Thus, infants are comparably securely attached to mother and father (see Figure 4). Attachment security scores in the AQS were significantly positively associated ($r(50) = 0.47, p < 0.001$).

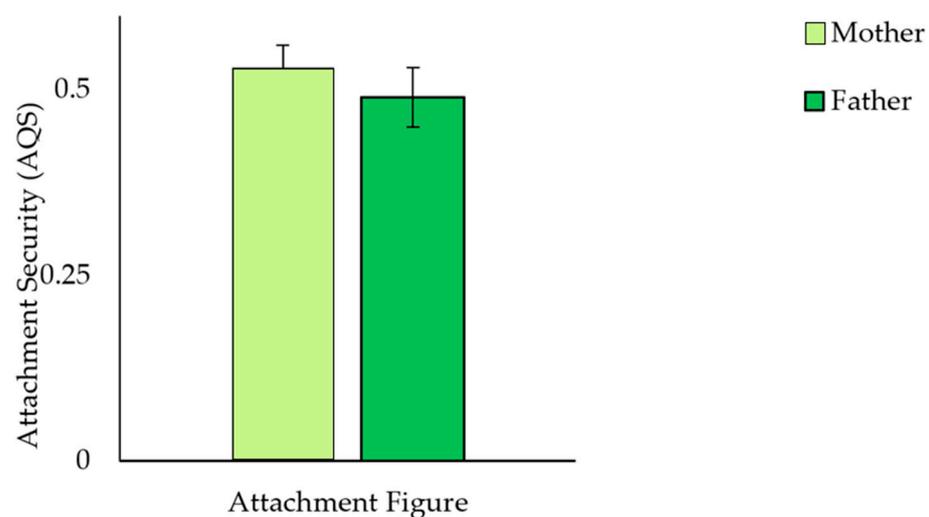


Figure 4. Attachment security (AQS) to mother and father (means and SE).

4. Discussion

The current study had four aims: (1) We wanted to examine whether infants in the 21st century still prefer mothers over fathers in their expression of attachment behaviors, (2) to

examine differences in involvement between mothers and fathers, (3) to study whether the duration of infants' attachment behaviors and also whether attachment security are associated with maternal and paternal involvement, and (4) to examine whether infant attachment security differs between mothers and fathers.

4.1. Caregiver Preference

In this study, we aimed to replicate and expand an earlier study on characteristics of infant–father and infant–mother attachment conducted more than 40 years ago in the United States (Cohen and Campos 1974) now in the 21st century. Cohen and Campos (1974) reported that infants prefer their mothers over their fathers as attachment figures by showing more proximity seeking and bodily contact towards mothers in an experimental study. Given the many changes in family life within the last decades and empirical studies reporting an increasing number of fathers who are willing to show more involvement in child care, we wanted to examine whether in attachment contexts it is still the mother who is preferred over the father after all these years.

Actually, the results of the study suggest no change in infants' preferences to stay closer to their mothers compared to their fathers in more than 40 years of change in family life. Even in the 21st century, infants show a longer duration of attachment behaviors directed to their mothers compared to their fathers. Infants stayed longer in close proximity, had longer bodily contact, and also directed their vocal signs of distress longer to their mothers compared to their fathers.

The experimental design of the study with equal distance to the mother and the father, counterbalancing the location of the parents during the trials and reducing and controlling active initiation of interactions by both parents, increased the probability that the observed duration and the direction of attachment behaviors depend on the infant's choice. This is similar in the SSP, which is designed to make the infant's attachment pattern salient and not the infant's reaction to the parent's caregiving in that specific moment (Ainsworth et al. 1978). In contrast, during natural observations, parents usually differ in their distance and activity when interacting with the child, as reported by Lamb (1977) who found that fathers vocalized more than mothers to their children during home visits. Therefore, in natural observations, parental behavior may influence infants' proximity seeking, and consequently the results are confounded. Moreover, attachment behaviors can only validly be assessed by proximity seeking or bodily contact when the attachment system is activated and infants are mildly distressed (Ainsworth et al. 1978; Waters and Sroufe 1983). Indeed, differences in preference of close contact to one parent over the other are mainly shown when children are distressed but not when they are content (Umemura et al. 2013). In this study, we used the stranger and negative-emotion contagion by playing audio-taped infant cries as mild-distress elicitors. Thus, we conclude that staying closer to one parent compared to the other may not be elicited by a parental difference in offers to play or to interact. The results of our study on the duration of attachment behaviors towards mothers and fathers might be interpreted as indicating an attachment hierarchy favoring mothers. Umemura et al. (2013) similarly interpreted their results in this direction showing that mothers were preferred over fathers in their study. This study also reveals evidence that infants in the 21st century prefer one parent over the other when feeling distressed, resulting in an individual attachment hierarchy towards the primary caregiver during distress (Umemura et al. 2013). However, there is no preference when the infant's attachment system is not activated (i.e., infants are content).

Our study also showed that infants expressed their attachment behaviors longer towards parents compared to the stranger. The clear preference of parents over strangers in attachment-behavior duration also replicates the results by Cohen and Campos (1974). However, infants looked longer towards the stranger compared to both parents, showing that the stranger is of interest to them. Long looks of infants to the stranger have also been reported by Lamb (1976) during home visits. However, looking without signaling distress

has been interpreted as affiliative behavior or a sign of curiosity and not as attachment behavior (Lamb 1977).

Our results also revealed that infants show longer durations of proximity seeking, bodily contact, and distress vocalization towards their mothers compared to their fathers. The effect sizes of these differences were greater for proximity seeking and bodily contact than for distress vocalization. We assume that distress vocalization is a parent-activating attachment behavior signaling the need for external support. In contrast, the other two forms of attachment behaviors are autonomous actions of the infants. Moreover, distress vocalization has a shorter mean duration compared to proximity seeking and bodily contact suggesting that children directed their attachment needs to both parents but then did not remain passively seated but moved closer to one attachment figure. One of the most intriguing results of this study is the preference of proximity and close bodily contact to mothers over fathers. This may be a result of still-existing differences in interaction styles between parents. Many studies showed that mothers provide more affection and offer more proximity towards their children, while the father's interaction style is more characterized by active play and structuring (Sabey et al. 2018; Barnett et al. 2008; Starrels 1994; StGeorge et al. 2021). Children's expectations regarding their parents' behavior are based on their experiences with each parent. We therefore assume that young children expect more closeness and regulation via body contact from their mothers compared to their fathers. Moreover, mothers may also influence the longer duration of bodily closeness by intentionally maintaining physical contact with their children. In some cases, the duration of bodily contact may not only reflect the decision of the child but also a decision of the mother.

4.2. Parental Involvement

The second aim of our study was to examine whether the participating parents indeed live according to the postulated trend towards more paternal involvement and shared responsibilities. The results showed that mothers spend more time at home with the child and spend more time with child care during the week compared to fathers. In contrast, during weekends, the time with child care and reading is similar. However, the effect sizes of these differences are small to moderate. We conclude that the families studied here do not equally share responsibility for child care, but the time difference is not huge. This distribution of child care is rather common for German families and seems similar to other studies showing that although there is a historic increase in paternal involvement or attitudes that favor more paternal involvement, mothers still spend more time with child care than fathers in many Western countries (McMunn et al. 2017; Dotti Sani and Treas 2016; Walper and Lien 2018; BMFSFJ 2021).

4.3. Involvement and Attachment

Third, we examined associations of attachment behaviors and attachment security with parental involvement. We tested whether high paternal involvement would promote infants' attachment behavior towards their fathers or attachment security to their father. The results showed no significant association between any of the father-involvement variables and the duration of attachment behaviors expressed towards him. Moreover, paternal involvement showed negative but non-significant associations with attachment security to the father as assessed with the AQS. This is in line with earlier research on involvement and attachment to father showing no significant associations or even negative associations (Brown et al. 2007; Lickenbrock and Braungart-Rieker 2015). Thus, fathers' time spent at home or even time spent with reading and caring seems to be no guarantee that infants seek them as attachment figures when the mother is available at the same time. Father involvement also does not promote infants' attachment security to their fathers, as assessed during home visits. Thus, as research on infant–father attachment has shown, fathers' quality of interaction and not quantity of interaction seems to be relevant for infant–father attachment security (Brown et al. 2007; Grossmann et al. 2002).

However, the results are similar for mothers. Maternal involvement is also not significantly associated with the duration of infants' attachment behaviors directed to them and also not with infant–mother attachment security in the AQS. The rich literature on maternal sensitivity and attachment security quite early focused on the quality of interaction (Ainsworth et al. 1978; Grossmann et al. 1981; Leerkes 2011) and not on involvement or time spent with the infant. However, the associations between maternal involvement and infant attachment are also diverse and differ between studies and samples. Fuertes et al. (2016) reported that mothers of securely attached children showed higher involvement in play and lower involvement in primary care than mothers of insecurely attached children. As we had no longitudinal or intervention design, we cannot interpret the results as causal associations.

4.4. Attachment Security and Attachment Behaviors to Mothers and Fathers

The fourth aim of our study was to examine whether infant attachment security differs between mothers and fathers. The duration of single attachment behaviors alone does not represent the complete organization of attachment security as a balance of proximity seeking and exploration (Ainsworth et al. 1978). Securely attached infants seek proximity when distressed but recover quickly in contact to the caregiver. Insecure-ambivalently attached infants also show a long duration of attachment behaviors, keeping them close to their caregiver but without effective regulation and exploration. We therefore also examined whether attachment security to mothers and fathers assessed with the AQS differs between parents. Interestingly, and in contrast to the observed duration of attachment behaviors when infants have to choose between their mother and their father in the experimental interaction task, infants showed similar attachment security to mothers and fathers. This is in line with the results of the meta-analysis by Cadman et al. (2018) reporting similar mean AQS scores for attachment to mothers and fathers from mainly independent samples. This is one of the few studies that assessed infants' AQS attachment security to mothers and fathers in the same family at the same time. Similar to the results of our study, Umemura et al. (2013) showed that attachment security (assessed in the SSP) was not associated with caregiver preference when distressed. We conclude that even if infants still express longer attachment behaviors towards their mothers compared to their fathers, this does not mean that they are less securely attached to their fathers.

Interestingly, the duration of attachment behaviors expressed to fathers was positively associated with infants' attachment security to fathers in the AQS. However, this was not the case for attachment security to mothers, suggesting differences in the meaning of duration of expressed attachment behaviors for infants when both parents are present. Especially the duration of proximity seeking and bodily contact in contrast to expressions of secure base behavior in contact with mothers and fathers needs to be explored (Grossmann and Grossmann 2020).

Finally, the only moderate positive association between attachment security to mother and father in the AQS suggests that some infants show quite different attachment security scores to mother than to father. However, this differentiation is not associated with quantitative involvement. Shared time alone does not guarantee attachment security.

4.5. Summary

Taken together, we found a preference for the mother over the father when infants have the choice to address their attachment behaviors to one of their two caregivers when both are closely available. We cannot interpret this attachment preference as an effect of primary caregiver status alone as differences in involvement do not explain this preference. However, when observing infants' interaction during the home visits for a longer period and in other interaction contexts using the AQS, the infant's attachment security to father is not lower than to mother. This shows that mothers and fathers similarly can provide attachment security for their infants, probably functioning as a safe haven as well as a secure base, and independent of the status as primary or secondary attachment figure.

Thus, time for child care does not automatically cause the status as the primary caregiver or an attachment figure for the infant. Additional aspects, e.g., the quality of interaction or the effectiveness of emotion regulation by each parent, might be more significant. Especially for family court decision-making, it is important not to interpret such differences in caregiver preference or attachment behavior duration in one specific context as a valid indicator of a general and overall difference in attachment security to mother and father (Forslund et al. 2021). Nevertheless, the results also show that in such mildly distressing situations when the infant has the immediate choice between both caregivers, the duration of proximity seeking to father is an indicator of attachment security to him. In contrast, AQS attachment security to mother is not associated with the duration of attachment behaviors to her. As the difference of these associations was marginal given the sample size ($p = 0.06$), we conclude that given the general preference of mother over father in this immediate triadic interaction, the duration of attachment behaviors to father might be a valid indicator of attachment security to father but not that much to mother. However, this warrants replications as a certain duration of attachment behaviors when distressed can be observed in the case of insecure-ambivalent attachment as well as secure attachment and may also depend on sample characteristics. Finally, the study does not support the idea that higher paternal involvement supports the development of attachment security to father. However, there still may be a difference between a positive attitude towards fathering and the actual amount of daily fathering.

4.6. Limitations

Although the current study yielded some important and unique findings, it also has limitations. First, the measure used in the study to assess parental involvement is a self-report, which may be affected by social desirability. Infants' attachment security to both parents was assessed using the Q-Sort methodology. During the home visits, both parents were present. Therefore, no conclusions can be made about how infants would behave and show attachment behaviors with only one parent present. Further studies investigating attachment security to both parents in separate settings using the Q-Sort methodology comparing dyadic and triadic interactions are necessary. We can only report concurrent associations between variables. As the present study lacks longitudinal data or an intervention design for improving involvement, we cannot interpret any causal relationships between parental involvement, attachment behaviors, and attachment security. Therefore, future longitudinal studies are needed. The participants in this study came from Germany, were mainly Caucasian, and were highly educated, which limits the generalizability of our findings. Future research may therefore investigate whether comparable results can be found in other samples.

4.7. Implications for Parenting in the 21st Century

This study showed that despite the historical trend of changes in fathering, mothering, family structure, and individual expectations regarding involvement, infants in the 21st century in a Western country still prefer mothers over fathers in their expression of attachment behaviors. We found a clear attachment hierarchy towards mothers, followed by fathers and strangers. It may well also be that in the 21st century several types of fathers still exist that have already been identified in the 1990s, differentiating caretakers, playmates-teachers, disciplinarians, and disengaged dads (Jain et al. 1996). Therefore, a more differentiated assessment of fathering beyond the time spent with the child might be more appropriate (Schoppe-Sullivan and Fagan 2020). However, although mothers are still more involved in child care on weekdays compared to fathers, in Germany, as in many countries, this neither explains infants' preference or the duration of attachment behavior nor the attachment security to mother or father. If replicated, this might be a relief for current mothers and fathers given that it is not the quantity of time but providing emotional security to infants during distress and during exploration when interacting that fosters attachment security.

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