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Family risk and early attachment development: The differential role of parental sensitivity

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Abstract

Family risks are known to be detrimental to children's attachment development. This study investigated whether parental sensitivity plays different roles in early attachment development in the context of risk: Sensitivity was hypothesized to mediate risk effects on attachment, as well as a moderator that shapes the relation between risk and attachment. Multiple family risks, parental sensitivity (defined as responsivity and supportive presence), and children's attachment security of 197 infants and toddlers ($M_{age} = 15.25$ months) and their caregivers were assessed in a prospective study with a cohort-sequential-design in Germany. Caregivers' sensitivity served as a mediator of risk effects on attachment as well as a moderator that buffers adverse consequences of risk. Early sensitivity might be relevant in setting the stage for attachment development supporting resilience.

KEYWORDS

early attachment development, resilience, risk, sensitivity

1 | INTRODUCTION

Early attachment security is widely known as a core characteristic that is considered to be a protective factor in later psychosocial adjustment (Sroufe, 2005) and an essential aspect of resilience (Hopkins et al., 2013). Groh et al. (2017) demonstrated that securely attached children later show more social competence and fewer externalizing and

internalizing problems compared to children with insecure or disorganized attachment. To understand early attachment development in children growing up among risk contexts, it is important to explore developmental models that focus on processes of vulnerability or resilience. To establish a model of resilience and risk, it is crucial to comprehend the complex (direct and indirect) effects of risk and protective factors on socio-emotional developmental outcomes of children (Whittaker et al., 2011). In his ecological model of child development, Bronfenbrenner (1979) argues that from the child's perspective, more distal variables (e.g., caregiver depression) influence more proximal variables (e.g., parenting behavior), which, in turn, influence child outcomes, such as attachment security (Hopkins et al., 2013).

1.1 | Attachment security in children growing up in high-risk environments

Children living in socio-economically disadvantaged families or having caregivers with psychiatric disorders were consistently reported to have a higher rate of insecure attachment patterns or lower attachment security scores compared to normative samples (Cyr et al., 2010).

Research has identified a multitude of single risk factors, like parental psychopathology, substance abuse, inter-parental violence, and low socio-economic status, as having adverse effects on attachment development (e.g., Espinosa et al., 2001; Fish, 2001; Laurent et al., 2008; Martins & Gaffan, 2000). In their meta-analysis, Cyr et al. (2010) concluded that cumulative risks do not better explain the development of insecure attachment than single risk factors. However, numerous studies have reported that specific constellations of risks are generally less strongly associated with negative developmental child outcomes than accumulated risk factors, and many families experience multiple risk factors (Evans et al., 2013; Sparks et al., 2018). Furthermore, empirical evidence shows that cumulative risk can indeed play a central role in the development of attachment insecurity (Candelaria et al., 2011; De Falco et al., 2014; Shaw & Vondra, 1993). Thus, it remains important to test whether cumulative risk also has a detrimental effect on attachment security.

Moreover, it is important to examine the process of how family risk leads to insecure attachment. Attachment theory proposes that individual differences in attachment security are affected, among other factors, by the quality of care children receive from their caregivers (Ainsworth, 1979; Sroufe, 1985). Maternal sensitivity was found to be a reliable but moderate predictor of children's attachment security in infancy (DeWolff & van Ijzendoorn, 1997; Zeegers et al., 2017), as well as in middle child-

KEY FINDINGS AND THEIR IMPLICATIONS FOR PRACTICE/POLICY

Key Finding 1: Multiple family risks are detrimental to children's early attachment security.
Key Finding 2: Parental sensitivity is the mechanism transmitting negative risk influences on children's attachment security.
Key Finding 3: Parental sensitivity despite risk serves as a protective factor buffering the adverse effects of risks on attachment security.

STATEMENT OF RELEVANCE TO THE FIELD OF INFANT AND EARLY CHILDHOOD MENTAL HEALTH

The influence of multiple family risks on early attachment security is transmitted by parental sensitivity, which in itself is also affected by risks. However, infants can gain security if parents are able to maintain sensitivity despite risk. Therefore, it is important for child welfare systems and practitioners to focus on maternal sensitivity in at-risk families and to support them by providing attachment-based interventions, in particular sensitivity trainings, to buffer risk effects on attachment security.

hood and adolescence (Koehn & Kerns, 2018). In particular, when mothers provide care characterized by emotionally warm, responsive behavior, and appropriate reactions to the child's needs, children develop a balanced ratio of exploration and proximity-seeking, and secure base behavior characteristic of attachment security (Ainsworth et al., 1978).

1.2 | The importance of sensitivity

Risk and maternal sensitivity cannot be considered independently. Insensitive caregiving can result from risk factors families are exposed to, such as parenting stress and contextual or socio-economic risk factors (Burchinal et al., 2008; Fößel, 2019; Pereira et al., 2012; Riley et al., 2014). Several developmental models delineating the impact of the environment on child development ascribe a mediating role to parenting behavior (e.g., Belsky, 1984; Bronfenbrenner, 1979). Highly burdened parents might have difficulties

in providing sensitive caregiving necessary for a healthy cognitive, affective, and social development of children (Sameroff & Seifer, 1983). Children of high-risk parents are at greater risk being exposed to their parents' stress and developing maladaptive developmental outcomes themselves (Jaffee et al., 2013; Shonkoff et al., 2012). Research indicates indirect associations between risk factors and different child outcomes (e.g., socio-emotional competence, behavior problems, or cognitive development), and parenting behavior appears to be the transmitting variable (Burchinal et al., 2008; Trentacosta et al., 2008; Whittaker et al., 2011). Other researchers reported similar results for predicting attachment security. Hopkins et al. (2013) found that the effects of stress and family conflict on 4-year-old's attachment security were mediated by maternal behavior (i.e., sensitivity and scaffolding). In a sample of preterm infants and their mothers, the impact of socio-demographic and psychosocial risk on attachment security was transmitted by maternal sensitivity (Candelaria et al., 2011).

Taking a closer look at the role of parenting behavior in attachment development in the context of family risk, caregiving quality could be more than just a mediating or transmitting variable of risk effects. Early caregiving can also fulfill a moderating function in the attachment development of children growing up among family risk. Research in developmental psychopathology has shown that (early) caregiving quality can be a moderator of risk effects (Egeland et al., 1993; Garmezy, 1985; Laucht et al., 2002; Richter & Reck, 2013). Additionally, some studies highlighted the buffering effect of maternal sensitivity on child outcomes in the presence of risk (Rosenblum et al., 2020). Laucht et al. (2002) assumed that individual coping abilities in children growing up in the presence of risk seem to be limited, and thus, caregivers' availability and behavior should be important for children's coping. In light of the well-established concept of parents as agents of socialization (for an overview, see Maccoby, 2015), positive parenting behavior, especially sensitivity, could be essential for supporting children to successfully adapt to stressful experiences (Manning et al., 2014). These authors found mothers' sensitive parenting to be shaping the effects of inter-parental violence on toddlers' externalizing behavior problems and pro-social development. Such negative effects of inter-parental violence were not found in the presence of high maternal sensitivity. Beyond studies of high-risk groups, L. Atkinson et al. (2005) assessed the interaction of the mother's attachment representation and sensitivity as predictors of infant attachment security in two mother-infant-samples. These authors investigated whether maternal sensitivity might diminish or increase the impact of maternal attachment representation on the child's quality of attachment. Sensitivity was found to be a moderator that can impede the intergenerational transmission of insecure attachment strategies, especially when the mother's own attachment representation was insecure and her sensitivity was still high (L. Atkinson et al., 2005). Similar findings regarding the moderating effect of maternal sensitivity were reported for the genetic risk of developing attachment disorganization (Spangler et al., 2009).

To summarize, the existing research first provides evidence for maternal sensitivity as a transmitting variable in the prediction of attachment by psychosocial and socio-demographic risk factors (Candelaria et al., 2011; Hopkins et al., 2013). Second, other research supports the notion that sensitive parenting behavior can play a moderating role in the prediction of attachment security. Additionally, in the presence of risks, maternal sensitivity might buffer the negative consequences of several risk factors on children's attachment development (Manning et al., 2014; Richter & Reck, 2013).

1.3 | Aims of the study

The existing literature underlines the importance of extensively investigating risk and protective factors in young children from high-risk families. Although research on risk effects has a long tradition in developmental psychopathology (e.g., Rutter, 1979), little is known about the interaction of family risk, parental sensitivity, and early attachment security in German samples. The present study adds to previous research by incorporating German families with multiple family risks and modeling the impacts of parental sensitivity both as a mediator and moderator of risk effects on attachment security in infancy and toddlerhood. The major objective of the present study was to examine the effects of multiple, accumulated family risks on children's attachment security in early childhood. In addition, we wanted to explore those processes predicting attachment security despite family risk exposure. Thus, the second aim was to analyze the differential role of parental sensitivity in the development of attachment security of children placed at risk, either as a mediator transmitting family risk or as a moderator dampening risk influences.

According to Bronfenbrenner's (1979) ecological model of child development, assuming that more distal variables affect more proximal variables, which in turn influence child outcomes, it seems plausible that parenting quality might mediate the influence of family risk factors on parent-child-attachment (Candelaria et al., 2011; Hopkins et al., 2013). In addition, we predicted that parental sensitivity as a proximal factor itself is the most meaningful predictor of children's attachment security. If family risk factors affect children's attachment security, they first

must exert an influence on parents' sensitive behavior (cf. Tarabulsy et al., 2005). This mediator hypothesis proposes that family risk factors predict lower levels of children's attachment security by affecting sensitivity.

The proposition that parenting behavior is a moderator is in line with recent studies reporting the buffering effect of maternal sensitivity in the presence of risk factors on several child outcomes (e.g., Laucht et al., 2002; Manning et al., 2014). Therefore, in this study, we wanted to investigate the differential development of children growing up among families exposed to family risk by using the caregiver's sensitive interaction behavior as a potential moderator of risk effects (moderator hypothesis). More precisely, we assume that children's attachment security in high-risk families is only impaired if parents' sensitive caregiving quality is low. For children living in high-risk families with parents showing sensitive caregiving behavior, no differences in attachment security are expected compared to low-risk families.

2 | METHODS

2.1 | Design and main study

This study is part of the German Developmental Study with a short-term longitudinal cohort-sequential-design (Zimmermann et al., 2016). The aim of this study was to investigate correlates and developmental outcomes of proximal and distal family risk factors in early childhood in a representative sample of families with infants and toddlers in Germany. To be enabled to discover risk effects, high-risk families were oversampled compared to normative samples. Early family risk factors were assessed prospectively, and the subsequent data assessment included two waves. Collection of data at wave 1 occurred between September 2014 and February 2015. Wave 2 was performed 7 months later.

2.2 | Sample

Participants were 197 primary caregiver-child dyads from two large German cities in North-Rhine-Westphalia, selected out of 937 families participating in the pre-assessment of the National Centers for Early Intervention in Germany (Eickhorst et al., 2015). At wave 1, children's age ranged between 10 and 14 months ($M = 11.81$; $SD = 1.02$) in cohort I and between 17 and 21 months ($M = 18.66$; $SD = 1.04$) in cohort II. At wave 2, children were between 17 and 22 months of age in cohort I ($M = 18.93$; $SD = 1.05$) and between 23 and 28 months of age in cohort II ($M = 25.64$; $SD = 1.23$). The gender ratio of participating children was

balanced with 49.7% of girls at wave 1 and 48.9% of girls at wave 2.

The primary caregiver was the mother in 191 cases (97%), the father in five cases (2.5%), and the stepfather in one case (0.5%). The age of primary caregivers ranged between 20 and 64 years ($M = 33.31$, $SD = 5.51$). Most of the primary caregivers (85.3%) were born in Germany, 12.5% were born in another country (6.5% Eastern Europe, 4% Asia, 1.5% Africa, 0.5% Western Europe), and 2.2% did not provide any information. Around one-quarter (25.4%) of primary caregivers had an immigration background, meaning that either they were born in Germany, but their parents were immigrants or that they had immigrated to Germany themselves.

Only 9.6% of primary caregivers had no professional qualification, whereas 26.9% completed an apprenticeship or reported to have a degree from a vocational school. Most of the primary caregivers (60.4%) reported having a university degree or applied sciences, and 3.1% did not provide any information. Close to one-third of primary caregivers (31.5%) were gainfully employed, 45.7% were taking parental leave (taking parental leave during the first 3 years of the child's life is a common practice in Germany), 19.3% were not employed or seeking work, and 3.5% did not provide any information. Families monthly net income varied in a range of 600 to 60000€ ($Md = 3000€$), 16.2% of the families lived below the poverty-line (the poverty-line in Europe is below 60% of the median national net equivalent income (A. B. Atkinson et al., 2004), and the German net equivalent income in 2014 was $Md = 1644.42€$ per month (Statistisches Bundesamt, 2021)). On average, families were living with 3.5 persons in the household.

Most of the families (94.2%) attended the second wave, resulting in 182 primary caregiver-child-dyads at wave 2. The dropout rate was not related to children's age. However, there was a selective dropout regarding risk status with significantly more dropouts of families in the high-risk group.

2.3 | Procedures

At each wave, primary caregiver-child dyads were observed during semi-structured home visits, each lasting about 3 h. After initial greetings, the home visit started with a dyadic free play situation followed by the application of the Bayley Scales of Infant and Toddler Development (Third Edition) (Bayley, 2006) in order to assess children's cognitive and language development. Afterward, the primary caregiver and the child were asked to perform a structured play task with challenging toys for the child, followed up by situations for observing children's autonomy behavior and emotion regulation

competencies (Iwanski & Zimmermann, 2014). All home visits were videotaped for further examination. Furthermore, we examined the individual characteristics of primary and secondary caregivers and their children using standardized questionnaires (Zimmermann et al., 2016). All participating families gave their written consent for the study and received an allowance of 50€ per wave.

2.4 | Measures

2.4.1 | Family risk

The family risk was systematically measured in a pre-assessment using the KiD: 0–3, a standardized self-report questionnaire for parents. For defining risk factors, the KiD: 0–3 includes items from other validated and standardized questionnaires, official national guidelines, and socio-demographic items adapted from the literature (Eickhorst et al., 2015). Based on the information provided by parents in the self-report, the presence of individual risk factors was objectively rated by experts. The assessment included 11 distal risk factors (poverty, crowding, unemployment, single parent, migration, low education, primary caregiver's experience of maltreatment and/or neglect in childhood, early motherhood, more than two siblings, lifetime psychiatric disorder, lifetime substance abuse) and 10 proximal risk factors (parental quarrel, disagreement between parents, inter-parental violence, current depression, negative attitude during pregnancy, negative attitude in nurturing, risk for child maltreatment and/ or neglect, current stress, child's poor health condition, child's challenging temperament). See Table 1 for detailed information on the definition and prevalence of the individual risk factors. Each risk factor was coded with 0 = *not given* or 1 = *given*, and a cumulative family risk index was calculated by summing up all risk factors (cf. Evans et al., 2013). Afterward, participants were categorized into three risk groups: Low risk (0−1 risk factors); medium risk (2−3 risk factors); and high risk, with at least four risk factors (Zimmermann et al., 2016). At wave 1, 73 families were in the low-risk group, 67 were in the medium-risk group, and 57 in the high-risk group. At wave 2, 15 families dropped out, resulting in 72 families in the low-risk group, 64 in the medium-risk group, and 46 in the high-risk group. Boys and girls were nearly evenly distributed over all risk groups.

2.4.2 | Children's attachment security

Children's attachment security was assessed using the German version of the Attachment Q-Sort (AQS) by Waters and Deane (1985) (Schölmerich & Leyendecker, 1999) with some minor change in wordings. The AQS is considered one of the gold standard procedures to estimate attachment security in early childhood, can be applied for children between 12 and 60 months of ages, and is frequently used in field studies (Cadman et al., 2018; van Ijzendoorn et al., 2004). Trained coders observe attachment behaviors of children in a natural setting and sort the 90 items describing children's behavior, yielding an individual profile for each child. Individual profiles are correlated with a profile of an "ideal securely attached child" rated by experts. Thus, attachment security scores range between -1 and +1, with higher scores representing higher attachment security. Although there are country-specific expert profiles, the American expert profile was used to ensure international comparability. The nearly perfect correlation of the American and the German expert profiles of an "ideal securely attached child" ($r = .93$) proves a very high agreement, and can therefore be considered as equivalent.

Meta-analyses show high validity of the AQS (Cadman et al., 2018; van Ijzendoorn et al., 2004), and previous studies have also demonstrated its validity in German-speaking countries (e.g., Ahnert et al., 2006; Bovenschen et al., 2016; Gabler et al., 2014; Lang et al., 2016).

Waters and Deane (1985) recommended several raters for each subject to increase reliability using the Spearman-Brown-Formula. In the present study, AQS ratings were provided by a trained observer immediately after the home visit. Observers were blind to families' risk status. To increase reliability, one master coder and five extra trained independent observers additionally rated the videotapes of home visits. Coders were masked to families' risk exposure, and different coders rated the videotapes of wave 1 and wave 2. Interrater concordance between ratings after home visits and ratings from videotapes were assessed. Calculated with the Spearman-Brown-Formula, the averaged reliability was .68 at wave 1 and .70 at wave 2. The correlation of security scores of home visits and video ratings ranged between .68 and .77 at wave 1 and .69 and .73 at wave 2. Therefore, we averaged children's security scores resulting from home visit ratings and video ratings. Video-coders established reliability using 20 cases, randomly drawn from the present study. The intra-class correlation of five observers and the master coder ranged between .86 and .92.

As the attachment security scores are correlation coefficients that are not normally distributed, the scores were Fisher-Z-transformed before being used in statistical analyses.

2.4.3 | Parental sensitivity

Parents' sensitive interaction behavior was assessed by observer ratings of sensitivity during a 10 min free play

TABLE 1 Definition and prevalence of family risk factors

Family risk factors	Description	Frequency, N (%)
Distal risk factors		
01. Poverty	The family is a social welfare recipient or recipient for public financial support.	28 (14.2)
02. Crowding	Person to room/ living space ratio >1.	53 (26.9)
03. Unemployment	Both parents (or one parent for single parents) are unemployed and not taking parental leave or receive a pension.	20 (10.2)
04. Single parent	Parent lives permanently separated from the other parent and no other partner is living in the same household.	12 (6.1)
05. Migration	Parent has a non-German nationality or has a German nationality and her/his parents are not born in Germany.	50 (25.4)
06. Low education	Parent has no high school graduation and no professional qualification[a].	18 (9.1)
07. Parent's experience of maltreatment or neglect in childhood	Parent has experienced maltreatment, abuse, or neglect in her/his own childhood.	57 (28.9)
08. Early motherhood	Maternal age was younger 21 years at time of childbirth.	4 (2.0)
09. More than two siblings	Three or more children younger than 48 months living in the household.	5 (2.5)
10. Lifetime psychiatric disorder	At least one parent has ever been treated professionally for a mental disease.	35 (17.8)
11. Lifetime substance abuse	At least one parent had ever had problems with alcohol or drug use.	15 (7.6)
Proximal risk factors		
01. Parental quarrel	Loud quarrel or arguments occur at minimum frequently with parents.	52 (26.4)
02. Disagreement in parenting between parents	Disagreements about parenting occur at minimum frequently among parents.	17 (8.6)
03. Inter-parental violence	In the last 6 months, there has been one or more incidents of physical violence between parents/within the partnership.	1 (.5)
04. Current depression	Parent currently often feels down, sad, depressed, or hopeless, and/or has significantly less motivation and enjoyment for things she/he usually likes to do.	53 (26.9)
05. Negative attitude during pregnancy	Parent was not looking forward to the child during pregnancy and/or was thinking about abortion/adoption.	7 (3.6)
06. Negative attitude in nurturing	On average, the parent agrees on the statements that the child only cries to annoy her/him, that she/he does not enjoy watching the child while playing, or that children are spoiled when given to much attention.	25 (12.7)
07. Risk for child maltreatment and/or neglect	The parent reported to touch the child roughly when being out of herself/himself, leaving the child out of sight and hearing, and that she/he ever did not have enough food for the child at home for the weekend.	43 (21.8)
08. Current stress	On average, the parent indicates that she/he has at least often experienced stress or mental overload in the recent past.	20 (10.2)
09. Child's poor health condition	The child's general health condition is described at least as sometimes poor.	2 (1.0)
10. Child's challenging temperament	The child is described as challenging in at least three characteristics of temperament (low positive affect, high negative emotionality, emotional dysregulation, difficulties in sleeping and feeding).	15 (7.6)

Note. Risk factors were assessed using the standardized questionnaire KiD: 0-3 (Eickhorst et al., 2015).

[a]In Germany, there are three types of school; and the duration of schooling in years is reported here: The low school education lasts a total of 9 years, the medium school education lasts a total of 10 years and the high school education lasts a total of 12–13 years. With a high school degree people can study at a university. In Germany, it is very difficult to find a job without graduation and without a professional qualification.

session and a series of caregiver-child structured play situations adapted from Matas et al. (1978). In the structured play situation, children were presented with two challenging toys (stacking rings and hand puppets) that are difficult for children at this age to complete or explore without some caregiver assistance. Caregivers were instructed to play with their child with both toys for 5 min each.

Parental behavior was analyzed using three subscales adapted from the sensitivity scales of the NICHD Study of Early Child Care and Youth Development (1999) (Cox, 1997; Frosch & Owen, 2006; Owen et al., 2009, see manual for the German version by Förthner et al., 2014). Previous studies have shown the validity of the NICHD scales in Germany (Bovenschen et al., 2016; Gabler et al., 2014).

Trained observers rated caregivers' sensitivity using three subscales: (a) *responsivity and supportive presence*; (b) *intrusiveness*; and (c) *negative regard* of the child. We used nine-point Likert-type scales with five behavioral anchors ranging from 1 (*not at all characteristic*) to 9 (*mainly characteristic*) (cf. Fößel, 2019).

The subscale *responsivity and supportive presence* encompasses parenting behavior that is characterized by emotional warmth, sensitive reactions to the child's needs, and a synchronal and child-centered interaction in emotion and play regulation. *Intrusiveness* includes parental behavior, which is more adult-centered than child-centered, overstimulating, disregards the child's interests and has a high rate of interaction. In contrast, every behavior of caregivers that shows markers of verbal as well as non-verbal negative affectivity or emotions like anger, harshness or disapproval, and punishment without explanation was coded as *negative regard*.

Five observers were trained in advance until satisfying levels of interrater reliability on each subscale (weighted Cohen's Kappa $K_w \geq .70$). The post hoc reliability of the observers was calculated from ten videos randomly chosen from the sample. Weighted Cohen's Kappa ranged from $K_w = .92–.93$ for responsivity, $K_w = .76–.88$ for intrusiveness, and $K_w = .81–.91$ for negative regard (Fößel, 2019). Coders were blind to families' risk exposure. In 87% of the cases, videotapes of parent-child-interaction were rated by different coders at wave 1 and wave 2.

Due to high cross-situational correlations between values of parenting dimensions in the free play and the structured play situation (responsivity and supportive presence: $r_{wave1} = .72$, $p < .001$, $r_{wave2} = .79$, $p < .001$; intrusiveness: $r_{wave1} = .65$, $p < .001$, $r_{wave2} = .68$, $p < .001$; negative regard: $r_{wave1} = .45$, $p < .001$, $r_{wave2} = .36$, $p < .001$), a composite measure for each of the parenting dimensions was computed by averaging the scores of both play situations.

2.5 | Data analyses

First, bivariate correlations were performed to examine the relations among children's attachment security, parental sensitivity, and family risk. Next, we analyzed the impact of family risk on children's attachment security by conducting a repeated-measures ANOVA with the wave as the repeated measure factor of attachment security and family risk groups as between-subject factor. A serial multiple mediation was used to test the impact of the continuous family risk on attachment security at wave 2. Parental sensitivity at wave 1 and wave 2 in serial were entered in the model. Finally, for the analysis of the moderator hypothesis we divided the sample into two sub-groups, one with a sensitivity score of 5 and above, and the other with a sensitivity score with less than 5. We wanted to test parental sensitivity as a protective factor and expected a minimum level of sensitivity for developing its protective function in the context of risks. Therefore, we used this theoretical cutoff to ensure a clear threshold of high versus low sensitivity. In the next step, we conducted two univariate ANOVAs, separately for each wave, with family risk groups and dichotomized parental sensitivity as between-subject factors, and attachment security as an outcome. Calculations were performed using IBM SPSS 26. For testing the serial multiple mediation model, the PROCESS macro (version 3.4) for SPSS by Hayes (2013) was used. All statistical analyses were done two-tailed using an alpha level of $p < .05$, but results with an alpha level of $p < .10$ were reported as trends.

3 | RESULTS

3.1 | Preliminary analyses

Descriptive statistics of children's attachment security, parenting behavior, and the sum of family risk factors (family risk index) are shown in Table 2.

To determine whether children's attachment security, different characteristics of parental sensitivity, and familial risk exposure were associated, bivariate correlations were calculated (Table 2). All correlations were in the expected direction, showing negative relations between attachment security and intrusiveness and negative regard. Parental responsivity and supportive presence showed by far the highest positive association with attachment security, so we decided to select only parental responsivity and supportive presence for further analyses.

Comparing the mean security scores from this sample with the mean security score for trained observers from the

TABLE 2 Descriptive statistics and correlation coefficients of children's attachment security, parental sensitivity and family risk

	N	$M (SD)$	Min	Max	2.	3.	4.	5.	6.	7.	8.	9.
1. Attachment security (wave 1)	197	.34 (.25)	−.46	.87	.50***	.52***	.46***	−.39***	−.36***	−.33***	−.25***	−.22**
2. Attachment security (wave 2)	182	.37 (.24)	−.51	.86		.34***	.47***	−.29***	−.33***	−.19*	−.29***	−.25**
3. Responsivity/supportive presence (wave 1)	196	5.00 (1.69)	1.00	9.00			.73***	−.68***	−.56***	−.61***	−.50***	−.26***
4. Responsivity/supportive presence (wave 2)	182	5.37 (1.65)	1.00	9.00				−.59***	−.67***	−.51***	−.55***	−.30***
5. Intrusiveness (wave 1)	196	4.16 (1.66)	1.00	8.50					.70***	.56***	.49***	.28***
6. Intrusiveness (wave 2)	182	3.41 (1.50)	1.00	8.50						.50***	.55***	.23**
7. Negative regard (wave 1)	196	2.76 (1.37)	1.00	6.50							.55***	.20**
8. Negative regard (wave 2)	182	2.30 (1.22)	1.00	7.50								.08
9. Family risk index (pre-assessment)	197	2.70 (2.22)	0	10								

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

meta-analysis by Cadman et al. (2018) $M = .34$, $N = 10786$, there were no significant differences to our security scores at wave 1 ($t(196) = -.19$, *ns*) and marginally significant higher security scores at wave 2 ($t(181) = 1.88, p < .10$). Children's attachment security was moderately stable over a 7-month interval ($r = .50, p < .001$). To analyze possible gender or cohort effects, we conducted a repeated-measures MANOVA with wave (1 and 2) as the repeated measure factor and gender and cohort as between-subject factors, resulting in a significant main effect for children's gender ($F(1178) = 5.16, p < .05, \eta_p^2 = .03$). Girls had higher scores of attachment security than boys ($M_{girls} = .40, M_{boys} = .33$). There were no main effects for cohort or wave and no significant interaction effects. Therefore, the cohort was not included in further analyses.

3.2 | Attachment security and family risk

To examine attachment security's change over time as a function of risk status we conducted a repeated-measures ANOVA with the wave as the repeated measure factor and gender as a covariate. In addition to the effect of the covariate gender ($F(1178) = 4.63, p < .05, \eta_p^2 = .03$), there was a main effect for risk status ($F(2178) = 4.50, p < .05, \eta_p^2 = .05$). Least significant difference (LSD) comparisons showed that high-risk families had children with lower attachment security ($M_{high-risk} = .30, SD = .23$) compared to low-risk families ($M_{low-risk} = .41, SD = .17$) ($p < .01$). Attachment security scores of children from medium-risk families were somewhat lower than those from low-risk families ($M_{medium-risk} = .35, SD = .23$) ($p < .10$), but did not significantly differ from families exposed to a high level of risk. There were no significant main or interaction effects between risk status and wave, indicating that attachment
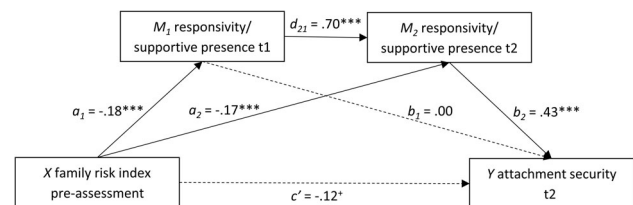
FIGURE 1 Statistical diagram and standardized regression coefficients of the serial multiple mediation model for predicting children's attachment security. +$p < .10$, ***$p < .001$

security seems to be stable over the 7-month interval in all groups of risk status.

3.3 | Parental responsivity and supportive presence as a mediator

We next analyzed parental responsivity and supportive presence as a mediator of the relation between family risk and children's attachment security. To predict attachment security at wave 2, we used a serial multiple mediation model illustrated in Figure 1. To utilize the total extent of variance, we used the sum of all risk factors assessed as a total family risk index instead of using three discrete risk groups. Table 3 shows regression coefficients, standard errors, and model summary information. Longitudinally, the relation between family risk and children's attachment security was mediated by the responsivity and supportive presence of their caregivers. The total effect was statistically significant with $c = -.03, t(179) = -3.51, p < .01$. The direct effect of family risk on attachment security is negative, but only marginally significant, $c' = -.01, t(177) = -1.78, p < .10$. The first indirect effect of family risk through caregiver's responsive behavior and
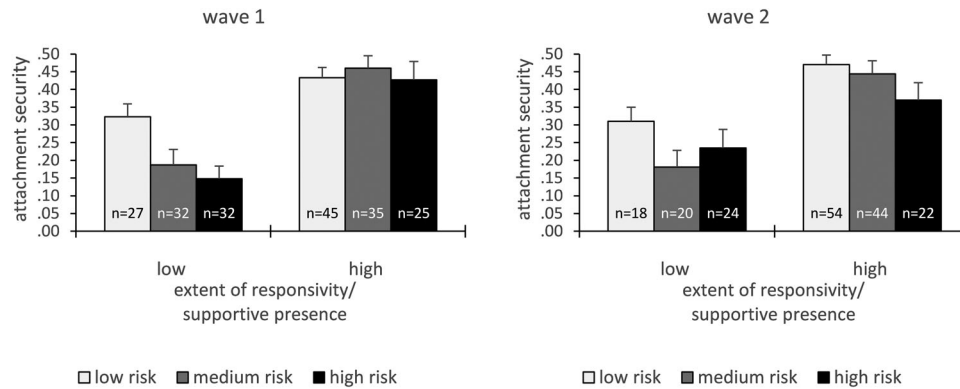
supportive presence at wave 1 on children's attachment security at wave 2 (a_1b_1 = .00, $CI_{95\%}$ [-.005, .005]) was not statistically significant. However, the second specific indirect effect of family risk on attachment security at wave 2 through parental responsivity and supportive presence at wave 2 was estimated as a_2b_2 = -.01, $CI_{95\%}$ *[-.017, -.003]* and shows a significant mediation as the bootstrap confidence interval does not include zero (cf. Hayes, 2013). Moreover, the third specific indirect effect of family risk through parental responsivity and supportive presence at wave 1 and longitudinally to wave 2 on attachment security at wave 2 is significant and estimated as $a_1d_{21}b_2$ = -.01, $CI_{95\%}$ [-.013, -.001]. A higher quantity of family risk predicted lower quality in parental responsivity at wave 1, which in turn predicted parental responsivity and supportive presence at wave 2 and lastly predicted lower attachment security.

3.4 | Parental responsivity and supportive presence as a moderator

Our final goal was to examine the potential moderating role of parental responsivity and supportive presence as a protective factor. Hence, we tested attachment security in different risk contexts with varying parental responsivity and supportive presence. In the German Developmental Study, risk groups were negatively related to parental responsivity and supportive presence. In the high-risk group, parental responsivity and supportive presence was significantly lower than in the low-risk group (Fößel, 2019). To investigate the potential moderating role of parental responsivity and supportive presence we first dichotomized parental responsivity and supportive presence by the theoretical cutoff in the middle of the scale (5.0) into a high and low extent for each of the two measurements. In the next step, we conducted a univariate ANOVA with risk groups and dichotomized parental responsivity and supportive presence as between-subject factors, and attachment security as the outcome variable, separately for each wave. Results are displayed in Figure 2. At wave 1, there was a significant main effect for parental responsivity and supportive presence ($F(1190)$ = 49.54, $p < .001$, η_p^2 = .21) qualified by a significant interaction effect of risk group and parental responsivity and supportive presence ($F(2190)$ = 3.20, $p < .05$, η_p^2 = .03). The main effect of parental responsivity and supportive presence was visible in the higher attachment security scores in children of highly responsive caregivers ($M_{high\ responsivity}$ = .44, $M_{low\ responsivity}$ = .21). This effect was present for each of the risk groups, albeit to a different extent. The interaction effect indicates individual differences depending on risk status only in children with unresponsive and

TABLE 3 (Un-) standardized regression coefficients, standard errors and model summary information for the presumed attachment security serial multiple mediation model depicted in Figure 1

Antecedent		M_1 (responsivity/supportive presence t1)					M_2 (responsivity/supportive presence t2)					Y (attachment security t2)				
		b	β	SE	p		b	β	SE	p		b	β	SE	p	
X (family risk index)	a_1	-.15	-.18	.06	<.05	a_2	-.14	-.17	.04	<.001	c'	-.02	-.12	.07	<.10	
M_1 (responsivity/supportive presence t1)		–	–	–	–	d_{21}	.71	.70	.05	<.001	b_1	-.00	-.00	.02	ns	
M_2 (responsivity/supportive presence t2)		–	–	–	–		–	–	–	–	b_2	.06	.43	.02	<.001	
Constant	i_{M1}	5.51	–	.19	<.001	i_{M2}	2.05	–	.31	<.001	i_Y	.07	–	.07	ns	
		R^2 = .034					R^2 = .566					R^2 = .232				
		$F(1179)$ = 6.33, $p < .05$					$F(2178)$ = 116.25, $p < .001$					$F(3177)$ = 17.80, $p < .001$				

FIGURE 2 Children's attachment security as a function of risk groups and parental responsivity and supportive presence at wave 1 and wave 2

emotionally non-supportive caregivers. According to LSD comparisons, there were no significant differences between the risk groups if caregivers were highly responsive and emotionally supportive. In contrast, there were significant mean differences between the risk groups in children with only low responsive and emotionally non-supportive caregivers, with the low-risk group showing significantly higher security scores than both the medium-risk group ($p < .05$) and the high-risk group ($p < .01$), while the latter two did not differ significantly.

At wave 2, there was a significant main effect for parental responsivity and supportive presence ($F(1176) = 26.03$, $p < .001$, $\eta_p^2 = .13$) with higher attachment security for children whose caregivers showed highly responsive and emotionally supportive interaction behavior ($M_{high\ responsivity} = .44$, $M_{low\ responsivity} = .24$). However, there were no significant interaction effects regarding risk group status.

4 | DISCUSSION

This prospective study examined the development of attachment security in the presence of family risk and the differential role of parental sensitivity in this context. Our findings showed that children born into disadvantaged family environments are at greater risk for lower attachment security. Parental sensitivity plays a two-fold role in this developmental process. On the one hand, considering that family risk negatively predicted parental behavior, sensitivity functioned as a mediator of risk effects on attachment security. On the other hand, high parental sensitivity despite high family risk moderated these effects and prevented the development of lower attachment security.

4.1 | Children's attachment security and cumulative family risk

Analyses of attachment security as a function of family risk groups clearly showed that a high level of risk negatively predicted children's early attachment development. As expected, in the high-risk group, attachment security was strongly diminished, and even a medium level of risk was predictive for less attachment security (Candelaria et al., 2011; De Falco et al., 2014; Shaw & Vondra, 1993). Unlike our results, findings from a meta-analysis revealed that attachment security was not additionally affected by cumulative risk, but that the mere presence of specific single risk factors (e.g., maltreatment, single mother) showed medium effect sizes in their negative impact on children's attachment security (Cyr et al., 2010). Rutter (1979) postulated a threshold model suggesting a sharp increase of maladaptive developmental outcomes beyond four risk factors. Our findings correspond to the work of Rutter's group and others, who reported a threshold of negative child outcomes (e.g., Biederman et al., 1995; Rutter et al., 1976). However, children's attachment security in the medium-risk group with two to three risk factors already tended to be lower in comparison to the low-risk group, indicating that even a small extent of risk exposure might have a negative impact on attachment development.

It must be considered that using a minimum of only four (out of 21) risk factors for the definition of the high-risk group may be regarded as a rather weak criterion. We used this criterion to warrant the comparability of our findings to previous studies and to ensure to have big enough sample sizes of sub-groups in statistical analyses. However, it cannot be excluded that higher risk scores would have a more tremendous effect on attachment security. Our findings show at least that the minimum number of four risk factors has a significant effect. Regardless of family

risk, infants' and toddlers' attachment security was rather stable over the examined 7-month-interval. Even the differences between the three risk groups remained stable. Thus, we found short-term stability of attachment security on a behavioral level. Whereas in some recent studies, short-term stability of individual differences in attachment security was not reported (Groh et al., 2014), a meta-analysis published by Fraley (2002) indicated at least modest to moderate stability of individual differences in attachment security during the second year of life. The somewhat higher stability found in our study may be explained using the same assessment procedure and, in addition, by the higher variability in the attachment security measure in our study perhaps by including high- and low-risk families.

Furthermore, we found girls to be more securely attached to their primary caregivers than boys, and this result was independent of risk exposure, child age, and cohort. To our knowledge, many studies neither reported attachment security scores separately for males and females nor tested for mean differences (Cadman et al., 2018; van Ijzendoorn et al., 2004), so this result was quite unexpected. Sex differences can be explained in multiple ways. First, the female gender was previously reported to be a protective factor in early childhood, with girls being less vulnerable to environmental risks than boys (Rutter et al., 1979). Second, the male gender has been hypothesized to be a risk factor (Tronick & Reck, 2009). Male gender could, therefore, indicate vulnerability to adverse experiences in early childhood, and according to our findings also for lower attachment security. Another explanation for sex differences in attachment security might be gender-specific parenting behavior which could lead to different developmental outcomes in boys and girls (Endendijk et al., 2016). However, the results of the German Developmental Study contradict this explanation, as Fößel (2019) did not find any effects of infant's gender on parental responsivity and supportive presence in our sample.

4.2 | The differential role of parenting behavior in the presence of family risk

4.2.1 | Parental responsivity and supportive presence as a mediator

According to Bronfenbrenner's (1979) ecological model of child development and empirical research of attachment development in the context of risks (Hopkins et al., 2013), it was hypothesized that family risk predicts lower parental sensitivity, which then is related to children's attachment security. We tested parental responsivity and supportive presence as a mediator of the relation between family risk

and attachment security. As hypothesized, the mediation model was confirmed by our findings. On the one hand, cumulative family risk predicted parents' responsivity and supportive presence at wave 1 and wave 2. The relation was in the expected direction, with higher risk exposure correlating with lower responsivity and supportive presence. On the other hand, parental responsivity and supportive presence strongly predicted infants' and toddlers' attachment security. Interestingly, the mediation model found in this study indicates the longitudinal transmission of family risk on attachment security via parental responsivity and supportive presence over both waves. This finding suggests that it is the continuous child experience of specific parenting behavior that mediates this effect.

Our findings are consistent with theory and empirical research on family processes proposing and showing a direct impact of socio-economic status and the social environment of families on parenting behavior (Belsky, 1984; Taraban & Shaw, 2018). Many studies reported that mothers exposed to several family risks are having large deficits in their parenting behaviors (e.g., Bovenschen et al., 2012; Dixon et al., 2009; Fößel, 2019).

Regarding the second step in our mediation model, starting with the seminal studies of Ainsworth et al. (1978) and Grossmann et al. (1985), it has been repeatedly shown that high maternal sensitivity is strongly related to children's attachment security (DeWolff & van Ijzendoorn, 1997). Concerning the mediator hypothesis, we found parents' responsive and emotionally supportive behavior to be the transmitting variable of risk effects on children's attachment security. This is in line with findings showing that parenting behavior by itself can serve as a predominant proximal risk factor that mediates the link between distal risk factors and attachment or socio-emotional development (Candelaria et al., 2011; Whittaker et al., 2011). Integrating the results of the presented study and previous research, responsivity and supportive presence can be identified as the mediating family process variable in the model of family risk transmission on children's attachment security.

4.2.2 | Parental responsivity and supportive presence as a moderator

Although high family risk predicts restrictions in sensitive parenting behavior, this is a probabilistic effect. Many parents are not affected by contextual or family risks, meaning they demonstrate resilience (Masten & Monn, 2015). To investigate the mechanisms that could predict attachment security despite the presence of family risk, we explored the role of parents' responsive and emotionally supportive interaction behavior as a potential protective factor. In

fact, we found the primary caregivers' responsive and emotionally supportive behavior to shape family risk effects on children's attachment security at wave 1. Only if parents' responsivity and supportive presence was low, children displayed differences in their attachment security depending on risk-group membership. Compared to low-risk families, children belonging to the medium-risk or the high-risk group showed lower attachment security. In contrast, there were no family risk effects on attachment security when parents' interaction behavior was highly responsive and emotionally supportive.

We found this moderation effect of parental responsivity and supportive presence at wave 1 but not at wave 2. Consistent with current research, the results of the present study highlight the significance of early harmonious and sensitive parent-child-interactions for developmental outcomes of children growing up in high-risk environments (Egeland et al., 1993). Findings also indicate that, specifically, early parental responsivity and supportive presence in infancy and toddlerhood might buffer adverse effects of early risk factors on attachment development (Richter & Reck, 2013), and apparently appears to be a protective factor. Laucht et al. (2002) hypothesized mothers' interaction quality to lay the foundation for the development of vulnerability or resilience. Our findings confirm this hypothesis empirically because high parental responsivity and supportive presence protected children exposed to high family risk from developing more insecure attachments.

One characteristic of protective factors is that their salience is variable over time and age (Fitzpatrick, 1997). Children's age could also be important in this context. Thompson (2016) argues that the continuing maternal sensitivity might be especially substantial in early childhood when children's inner working models of attachment are not yet fully developed. Our results provide evidence for this position on a behavioral level.

Considering the taxonomy of protective factors according to Luthar et al. (2000), the type of moderation found in this study reflects a protective-stabilizing pattern because high parental responsivity and supportive presence preserved children from developing insecure attachments despite the increasing risk.

To interrupt the transmission of family risks on child development, it is important to detect promotors of resilience and to understand the protective effects of parent-child-relationships (Woods-Jaeger et al., 2018). Safe, stable and nurturing relationships between mothers and children have been empirically shown to be able to block negative risk influences on developmental outcomes of children (Jaffee et al., 2013). Intervention studies showed that enhancing sensitive caregiving early in life might actually foster adaptive developmental outcomes and resilience of children exposed to early adverse experiences or family risk (Dixon et al., 2009; Shonkoff et al., 2012). Many studies have reported the efficacy of attachment-based sensitivity training in high-risk samples and early childhood (for a meta-analysis, see Mountain et al., 2017).

The results of our study might provide evidence on a behavioral level that if parents succeeded behaving sensitive to the child's needs in the face of family risks, children were able to develop a comparable level of attachment security as children growing up in low-risk contexts. Our findings clearly show that the transmission of occurring family risk can be broken by parental responsivity and supportive presence. Nonetheless, we currently cannot explain in detail how some parents still managed to behave responsively and emotionally supportive in the context of multiple family risks and further investigations are needed in that area. Two explanations might be provided by previous research: One study reported that interparental violence increased the probability of negative family risk effects on child development, whereas a healthy partner relationship seemed to be a protective factor in the transmission of family risk on children (Jaffee et al., 2013). High qualitative partner relationships are also predictive for positive parenting behavior (Belsky, 1984; Taraban & Shaw, 2018). Other researchers found the association of mother's reflective functioning and infant's attachment to be mediated by parenting behavior, and mother's reflective functioning was impaired by demographic risks (Stacks et al., 2014). The positive relation between maternal reflective functioning and child attachment has been previously reported by others (Fonagy et al., 1991). Future research should focus on protective factors that can enable parents exposed to high family risk to provide responsive, emotionally warm, and sensitive caregiving environments and to block family risk effects on child development.

4.3 | Strengths and limitations

Our study has both strengths and limitations. The main strength of the German Developmental Study is its longitudinal cohort-sequential-design with a large and diverse sample and the prospective assessment of family risk factors in addition to the use of objective observational methods to assess parenting behavior and attachment security. This design enabled us to focus on the developmental pathways of children in the context of risk.

The recruitment strategy of oversampling high-risk families is an additional strength since it increases the ability to detect risk effects, but it also reduces generalizability to normative samples. Moreover, we were able to maintain this quasi-equal risk distribution, as the most families completed both times of measurements. Although we had a low dropout rate in our longitudinal design, the dropout

was selective regarding risk, as it was more frequent in the group of high-risk families. Thus, we cannot definitively exclude selection effects in recruiting our sample. Collecting data in high-risk samples can be a difficult task, especially due to methodological challenges. High-risk families often drop out of longitudinal designs because of excessive load or because families move to a different address in combination with poor accessibility. Selective sampling may be an essential factor when estimating the generalizability of results because families who are at the highest risk could be inaccessible to researchers. Thus, oversampling might be necessary to collect valid data on risk effects.

Another strength of our study is the assessment of many different family risk factors. Nevertheless, the used cumulative family risk index and the three risk groups are by no means all-encompassing. The risk factors reflect risk conditions from the child's perspective in Germany and were derived from previous research (see Eickhorst et al., 2015 for further information). A clear limitation is the lack of additional protective factors in the study. The main objective was to test whether we will find similar risk effects in early childhood in Germany compared to other countries.

Risk must always be seen in the light of the respective cultural context. Compared to the United States or developing nations, Germany has a relatively robust system of protections, for example financial help of the state in case of poverty. Thus, risk effects may be buffered by the German social support system. Therefore, we cannot exclude cultural effects yielding different results compared to other industrialized countries or developing nations. Nonetheless, we found a negative impact even at a medium level of risk. Future research should focus on cumulative family risk effects on early attachment development in different countries, comparing either developing nations as well as industrialized nations.

5 | CONCLUSION AND IMPLICATIONS

The aim of this study was to investigate the mechanisms through which children exposed to different levels of family risk developed attachment security. One key finding demonstrates that cumulative family risks are reflected in parental sensitivity, which are in turn negatively related to children's attachment development in the first 3 years of life. At the same time, early parental sensitivity can serve as a protective factor in families exposed to multiple risk factors. This is important for child development as attachment security can be a protective factor itself and is considered to be an essential aspect of resilience in the presence

of risk (Hopkins et al., 2013). Thus, promoting attachment security as an aspect of resilience is crucial for children's later healthy development (Yates et al., 2003).

In addition, some practical implications for the child and youth welfare system arise from the presented results. Child and youth welfare workers should not only focus on families' risk exposure but also on the parent-child-interaction (Richter & Reck, 2013). Intervention programs focusing on both risk factors and the parent-child-relationship are vitally important (Rosenblum et al., 2020). Parent's interaction behavior is less adequate in the context of multiple risks and might be an additional indicator of a family burden when families need support from the child and youth welfare system. Therefore, we highly recommend evaluated attachment-based intervention programs that include parental sensitivity training in supporting families exposed to multiple risk factors, strengthening parent's capacity to react responsive and emotionally warm to the child's needs (Mountain et al., 2017).

In conclusion, parents' responsivity and supportive presence appear to be included in maintaining the cycle of risk, if their interaction behavior is affected by accumulated risks and consequently not adequate. Nevertheless, if parents manage to stay highly responsive and emotionally supportive, it can block negative risk effects on child development. Early parenting behavior is, therefore, of great importance in establishing the trajectories of a child's attachment development.

DECLARATION OF INTEREST

There are no financial interests or benefits that have arisen from direct applications of our research.

DATA SHARING AND DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on reasonable request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions. The data include individual information (e.g., age, risk factors) which in combination may make it possible to identify individual families. Therefore, the legal provisions on data protection do not allow the data to be made publicly available.

PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES

Not applicable.

CLINICAL TRIAL REGISTRATION

Not applicable.

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