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Regular Article

A mother–child intervention program for adolescent mothers: Results from a randomized controlled trial (the TeeMo study)

Christine Firk[1,2,*], Brigitte Dahmen[3,*], Astrid Dempfle[4], Anke Niessen[3], Christin Baumann[3], Reinhild Schwarte[3], Julia Koslowski[3], Kerstin Kelberlau[3], Kerstin Konrad[1,5,**] and Beate Herpertz-Dahlmann[3,**]

[1]Child Neuropsychology Section, Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, RWTH Aachen University, Aachen, Germany; [2]Catholic University of Applied Sciences, Aachen, Germany; [3]Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, RWTH Aachen University, Aachen, Germany; [4]Institute of Medical Informatics and Statistics, Kiel University, Kiel, Germany and [5]JARA-Brain Institute II, Molecular Neuroscience and Neuroimaging, RWTH Aachen & Research Centre Juelich, Germany

Abstract

Children of adolescent mothers are a high-risk group for negative child development. Previous findings suggest that early interventions may enhance child development by improving mother–child interaction. The purpose of the current study was to evaluate a mother–child intervention (STEEP-b) program in high-risk adolescent mother–infant dyads ($N = 56$) within a randomized controlled trial (RCT). Mother–child interaction was assessed at baseline (T1), postintervention (T2), and follow-up (T3). The primary outcome was the change in maternal sensitivity and child responsiveness from T1 to T2 that was measured by blinded ratings of videotaped mother–child-interaction with the Emotional Availability Scales. A modified intention-to-treat analysis was performed to examine the data. No intervention effect was found for maternal sensitivity, 95% CI [-0.59–0.60], $p = .99$, and child responsiveness, 95% CI [-0.51–0.62], $p = .84$. Maternal sensitivity and child responsiveness did not change over time in both groups (all $ps > .05$). A statistically nonsignificant, but potentially clinically meaningful difference emerged between rates of serious adverse events, SC: 4 (14.8%), STEEP-b: 1 (3.4%), possibly driven by different intensity of surveillance of dyads in the treatment groups. The current findings question the effectiveness of STEEP-b for high-risk adolescent mothers and do not justify the broad implementation of this approach.

Keywords: adolescent parenting, child development, child mental health, early mother–child intervention, maternal sensitivity

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Adolescent mothers and their children frequently suffer from psychological, social, and economic difficulties (Jaffee, Caspi, Moffitt, Belsky, & Silva, 2001). The young mothers have a higher risk for psychiatric disorders, such as postpartum depression, posttraumatic stress syndrome, substance abuse, and personality disorders than adult mothers do (Hodgkinson, Beers, Southammakosane, & Lewin, 2014). In their own childhood, they have more often experienced adversity in the forms of neglect, physical and sexual abuse, out-of-home placement, and inconsistent parenting than have adult mothers (Garwood, Gerassi, Jonson-Reid, Plax, & Drake, 2015). Adolescent pregnancy in industrialized countries is more common among individuals with lower socioeconomic status and poor education (Penman-Aguilar, Carter, Snead, & Kourtis, 2013). Although adolescent mothers represent a very heterogeneous group with some mothers and their children not being exposed to the mentioned risk factors (Lee et al., 2016), there is a strong association between adverse childhood experiences, adolescent pregnancy, and long-term psychosocial consequences (Hillis et al., 2004). Adolescent pregnancy poses a risk factor for socioeconomic disadvantage for the majority of mothers (Brannstrom, Vinnerljung, & Hjern, 2016; Leftwich & Alves, 2017; Otterblad Olausson, Haglund, Ringbäck Weitoft, & Cnattingius, 2001). All of these factors contribute to inadequate mother–child interactions and less favorable child development. Previous studies have shown that adolescent mothers show less sensitivity towards the child's needs, have more instrumental and less vocal exchanges, and engage more in harsh parenting behavior than do adult mothers (Krpan, Coombs, Zinga, Steiner, & Fleming, 2005; Lee, 2009). These factors are also associated with an increased risk of child neglect and maltreatment (Crittenden, 1985). Maltreatment during early life has devastating long-term effects on the child's later psychosocial and cognitive development (Cicchetti & Lynch, 1993; Perez & Widom, 1994). Attachment insecurity and attachment disorganization are also highly prevalent among maltreated children (Cyr, Euser, Bakermans-Kranenburg, & van Ijzendoorn, 2010), which is associated with an increased risk for psychopathology later in life (Widom, DuMont, & Czaja, 2007). Thus, children of adolescent mothers present a high-risk group for child adversity compared with children of adult mothers (D'Onofrio et al., 2009; Jaffee

*both authors contributed equally

Author for Correspondence: Christine Firk, Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, RWTH Aachen University,Neuenhofer Weg 21, 52074 Aachen, Germany; E-mail: cfirk@ukaachen.de

**both authors contributed equally

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et al., 2001). Given the high burden of adolescent parenting, countervailing the transmission of risk across generations is a major challenge for our society. Therefore, to stop this cycle of adversity, a better understanding of the underlying mechanisms of this intergenerational transmission along with effective interventions are urgently needed.

In numerous studies on parent–child interaction, sensitive parental interaction with the child (i.e., identifying the child's needs and responding adequately and promptly to them) has been identified as a protective factor for a child's development (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003; Sroufe, Coffino, & Carlson, 2010). Sensitive parental interaction with the infant promotes secure and stable attachment formation to the primary caregivers (De Wolff & van Ijzendoorn, 1997; van Ijzendoorn, Juffer, & Duyvesteyn, 1995), which supports the infant in learning to regulate emotions and behavior (Braungart-Rieker et al., 2014; Mikulincer & Shaver, 2018). Therefore, low maternal sensitivity, a key factor for the development of insecure attachments, may contribute to the transmission of adversity across generations. Recent neurobiological studies highlight the role of adversity on brain development and the stress system, and such studies also show long-term consequences on the adult's brain (Teicher, Samson, Anderson, & Ohashi, 2016), in particular in prefrontal-limbic and reward pathways that are associated with affect regulation and are critical for parenting (Feldman, 2015; Lupien, McEwen, Gunnar, & Heim, 2009). Thus, neurobiological changes brought about by early-life maltreatment might contribute to dysfunctional parenting behaviors and thus perpetuate the intergenerational cycle of abuse.

Previous international studies in high-risk families have shown that early intervention programs focusing on mother–child interaction significantly improve maternal sensitivity (Bakermans-Kranenburg et al., 2003), enhance attachment security (Letourneau et al., 2015; Mountain, Cahill, & Thorpe, 2017), reduce attachment disorganization (Mountain et al., 2017; Wright et al., 2017), and reduce child maltreatment (Thomas & Zimmer-Gembeck, 2011). However, effect sizes are typically small (Bakermans-Kranenburg et al., 2003), suggesting heterogeneous outcomes. Furthermore, many intervention programs are not suitable for high-risk adolescent parents due to their specific needs, and adolescent mothers frequently refuse to participate in traditional programs or drop out (Chablani & Spinney, 2011). Egeland and Erickson (1993) developed a home-visiting program called Step Towards Effective and Enjoyable Parenting (STEEP, Erickson, Egeland, Simon, & Rose, 2002) based on attachment theory and research from the Minnesota Longitudinal Study (Sroufe, Egeland, Carlson, & Collins, 2005) for young mothers with a focus on maternal sensitivity to enhance attachment security. The STEEP program was evaluated in a randomized controlled trial in 154 high-risk first-time mothers, yielding inconsistent results. Although mothers in the STEEP program arm were more sensitive than were mothers in the control arm after the intervention, children's attachment security was not increased in the STEEP group compared with the control group. This has partly been explained by a ceiling effect due to an inexplicably high rate of attachment security in the control group (Erickson & Egeland, 2004). More recently, this program was evaluated in 107 high-risk mother–child dyads in Germany by using a quasiexperimental design (Suess, Bohlen, Carlson, Spangler, & Frumentia Maier, 2016). Suess et al. (2016) found a higher rate of secure attachment among children in the STEEP group compared with those in the control group when the children were 12 months of age and a lower rate of disorganized attachment in the STEEP group compared with the control group when children were 24 months of age. However, these promising results should be further elucidated in high-quality randomized controlled trials. This is particularly important because a previous systematic review(Taubner, Munder, Unger, & Wolter, 2013) on the effectiveness of early prevention programs for parents with children until 3 years of age implemented in Germany could not find positive effects on maternal competencies and child development. This included eight studies with a focus on the mother–child relationship, for example, "attachment-based psychotherapeutic intervention for preterm birth" (Brisch, Bechinger, Betzler, & Heinemann, 2003) or "nobody slips through the net" (Sidor, Kunz, Eickhorst, & Cierpka, 2013). Nevertheless, due to a current lack of a sufficient amount of high-quality trials in Germany, the results of this review should be verified by further studies. Thus, the objective of the Teenage Mothers–Study (TeeMo) in the framework of the German UBICA-consortium (Understanding and Breaking the Intergenerational Cycle of Abuse) was to evaluate the effects of STEEP-b, an adaptation of the original STEEP program for adolescent mothers (for further details see below), on mother–child interaction. The current study was designed as a randomized-controlled trial (RCT). In the intervention condition, high-risk adolescent mothers received the video-feedback intervention STEEP-b in addition to standard care, i.e., the usually provided health and social support by the German health care and child welfare system. The video-feedback intervention group was compared with a group of high-risk adolescent mothers who only received standard care (SC). A previous meta-analysis of attachment-based interventions (Bakermans-Kranenburg et al., 2003) revealed that sensitivity-focused interventions with a moderate number of sessions including video feedback were more effective in promoting secure attachment than complex, long-lasting interventions. Therefore, STEEP-b was designed to be relatively brief, completed in 12–18 sessions with video feedback over a 9-month period, with a focus on maternal sensitivity.

Our primary hypothesis was that maternal sensitivity (mother's ability to read and respond to the child's signals) and child responsiveness—a child's eagerness and willingness to respond to the mother (e.g., Biringen, 2000; Biringen, Derscheid, Vliegen, Closson, & Easterbrooks, 2014)—would improve from baseline to postintervention more strongly in the intervention group than in the SC group. Maternal sensitivity and child responsiveness were selected as primary outcome variables because of their specific relevance to the development of secure attachment behaviors. Further, we expected that STEEP-b would have a positive effect on child socioemotional and cognitive development and maternal well-being including maternal mental health and parental stress.

Materials and Method

Study design

The Teemo study was designed as a mono-center, randomized-controlled superiority trial (RCT) with two parallel groups. Primary endpoints were maternal sensitivity and child responsiveness after 9 months of intervention. The trial was located at the Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, University Hospital RWTH Aachen, Germany. The study procedures were conducted in accordance with the

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declaration of Helsinki and approved by the ethical committee of the Medical Faculty of RWTH Aachen University (see for the trial protocol Firk et al., 2015).

Participants

Our sample consisted of adolescent mothers who were between 14 and 21 years old at the time of pregnancy with children between 3 and 6 months old who agreed to participate in the study and met the inclusion and exclusion criteria. The inclusion and exclusion criteria are listed in Table 1. All mother–child dyads received financial compensation for the assessments and travel expenses.

Procedure

Mother–child dyads were recruited in cooperation with the local youth welfare system, obstetric clinics, midwife practices, and pediatrician practices in the catchment area of Aachen, Germany. Mothers who indicated an interest in participating were contacted for further screening. Those who fulfilled the inclusion criteria were visited at home to present and explain the research procedures. Mothers gave written informed consent. Infants were only included if the adolescent or adult mother and father and—in case of the adolescent mothers—the legal guardian (s) had all given informed consent. Mother–child dyads were invited to the lab to assess primary and secondary outcome measures when their children were between 3 and 6 months old before the start of the intervention (baseline, T1), after the 9-month intervention (postintervention, T2), and 6 months after the end of the intervention (follow-up, T3). Moderators of treatment outcomes and sociodemographic data were assessed at T1. Concomitant care was documented at all measurement points.

Table 1. Inclusion and exclusion criteria

Inclusion criteria		
	Maternal criteria	21 years old or younger at the beginning of pregnancy
		Mother and child live together
		Sufficient verbal and intellectual abilities to participate in a verbal training program
		Caucasian
		Written informed consent of the mother and, if < 18 years old, of the caregiver of the mother
	Child criteria	Between 3 and 6 months old
		Written informed consent of the caregiver
Exclusion criteria		
	Maternal criteria	Current substance abuse
		Current suicidal ideation
		Psychotic disorders
		Separation from the child (> 3 months)
	Child criteria	Preterm birth (< 36 weeks gestation)
		Serious medical problems
		Genetic syndromes

Randomization and blinding

After T1, participants were randomly assigned to either group by using a web-based randomization system (http://www.randomizer.at) in a ratio 1:1. The data entry for randomization was done by the STEEP-b trainer. The randomization tool was supervised by the Institute of Medical Biometry and Informatics of the University of Heidelberg, Germany. Block randomization using fixed block lengths was applied, stratified by mother's age (<18 years or ≥18 years). Due to the nature of the intervention neither the participants nor the STEEP-b trainers could be blinded to allocation status. However, all assessments of the outcome measures were performed by members of the research staff that were blinded to group assignment.

Intervention

The intervention (STEEP-b) is an adaptation of the STEEP program (Erickson & Egeland, 2006). The STEEP program was one of the first attachment-based early intervention programs for young high-risk mothers. The main goals of STEEP are to promote secure parent–child attachment by enhancing sensitive parental care by using video-feedback techniques to reflect maternal attachment representations and their influence on parenting behavior and to enhance social support (Erickson & Egeland, 2006). The STEEP-b program was adapted to be relatively brief, completed in 12–18 sessions over a 9-month period, and focused on parental sensitivity. Briefly, adolescent mothers were visited at home every 2–3 weeks by the same trainer for 9 months depending on clinical appropriateness. Video feedback from free and structured interaction situations was used to enhance maternal sensitivity. The original STEEP program was not manualized; however, as treatment manualization is considered an important factor in treatment integrity and effectiveness (Bakermans-Kranenburg et al., 2003; Weisz, Jensen-Doss, & Hawley, 2006), STEEP-b was modularized, with every session focusing on one of four modules (child development, maternal sensitivity, frightening and intrusive behaviors of the mother, and sensitive parental discipline practices). Every module was worked on twice during the intervention, with the order depending on individual appropriateness.

All of the participants (SC group and STEEP-b group) received publicly funded health care (e.g., infant health checkups, immunization) as usual in Germany and social services (e.g., social support by the German child welfare system) depending on clinical appropriateness. The SC group did not receive any intervention making use of video-feedback methods. All of the STEEP-b trainers were child and adolescent psychiatrists, psychotherapists, or qualified clinical social workers who had prior experience in psychotherapeutic interventions. To ensure that all of the trainers implemented STEEP-b, all of them were educated before the beginning of the study and their use of the modularized sessions was monitored. In addition, the trainers were supervised by an experienced STEEP therapist (G.J. Suess, STEEP training director in Germany). For the assessments of adherence and competence, the sessions were audiotaped. Participants were also asked to rate

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their satisfaction with the intervention on a 15-item questionnaire (including items on overall satisfaction with STEEP-b training, video-feedback, and participant-therapist alliance) by using a 5-point Likert-type scale ranging from 1 "*strongly disagree*" to 5 "*strongly agree*."

Primary outcome measures

The primary outcome variables were maternal sensitivity and child responsiveness as change from baseline to postintervention. These variables were assessed in a standardized mother–child interaction task consisting of a 12-min free-play period (at all measurement points) and an age-appropriate stress situation (6 min at T1 and 12 min at T2 and T3), which was video-recorded for later coding. For the free-play period mothers were told to interact with their child as they normally would do in a free-play situation. For the age-appropriate stress situation, mother–child dyads participated in the still face procedure (Tronick, Als, Adamson, Wise, & Brazelton, 1978) at T1. At T2 and T3, mother–child dyads were given two boxes and mothers were instructed to have their child spend time with the toys in the boxes.

Mother–child interaction was coded using the fourth edition of the Emotional Availability (EA) Scales (Biringen, 2008) and the Emotional Attachment Zones Evaluation (EA-Z, Wurster, Sarche, Trucksess, Morse, & Biringen, 2019). The EA scales assess the emotional quality of dyadic interactions between an adult and a child. Emotional availability has been conceptualized as a research construct that was derived from attachment theory, and it is supported by the empirical literature demonstrating robust links between assessments of attachment and EA in parent–child interactions (Easterbrooks, Bureau, & Lyons-Ruth, 2012; Ziv, Aviezer, Gini, Sagi, & Koren-Karie, 2000). For an overview on EA and EA-Z see Biringen et al. (2014) or Saunders et al. (2015).

The EA scales consist of six dimensions. The adult dimensions are sensitivity, structuring, nonintrusiveness, and nonhostility. The child dimensions are responsiveness to the adult and involvement with the adult. All of the scales range from 1 "*low*" to 7 "*high*." The EA-Z allows researchers to globally measure the parent–child relationship, focusing on attachment-related behaviors for adult and child. The EA-Z is scored on a 100-point scale that is divided into four categorical zones: "emotionally available," "complicated," "detached," and "problematic/disturbed" (Wurster, 2019). The EA-Z maps broadly onto the four attachment styles: secure (emotionally available), insecure-anxious (complicated), insecure-avoidant (detached), and insecure-disorganized (problematic) (Saunders et al., 2015; Wurster et al., 2019). The EA-Z and the EA Scales, especially maternal sensitivity and child responsiveness, are associated with measures of attachment security (Biringen, 2014) and therefore maternal sensitivity and child responsiveness were chosen as primary outcome variables.

The coding was done by independent raters (CF and RS) who were blinded regarding group status. The coders were trained by the developer of the method for coding EA, and they were certified as reliable on standard cases. Intraclass correlation coefficients were calculated on 37 randomly selected cases throughout the study and indicated very good inter-rater agreement for the EA scales (sensitivity: .963; structuring: .891; nonintrusiveness: .935; nonhostility: .944; child responsiveness: .946; child involvement: .894). For the EA-Z, inter-rater agreement was calculated by using Cohen's kappa (.772).

Secondary outcome measures

Secondary outcome measures for the child were social-emotional, cognitive, motor, and language development. Cognitive and motor development were assessed with the Bayley Scales of Infant and Toddler Development (BSID-III; Bayley, 2005), social-emotional development was assessed with the Brief Infant Toddler Social Emotional Assessment (BITSEA; Briggs-Gowan, Carter, Irwin, Wachtel, & Cicchetti, 2004), child temperament was assessed with the Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbarth, 2003), and child attachment was assessed with the Strange Situation Procedure (SSP; Ainsworth & Bell, 1970). Secondary outcome measures for the mother were overall psychopathological symptoms, assessed with the Brief Symptom Inventory (BSI-18; Spitzer et al., 2011); depressive symptomatology, assessed with the Beck Depression Inventory (BDI-II; Beck, Steer, Ball, & Ranieri, 1996); parental stress, measured with the Parental Stress Index (PSI; Abidin, 1995); and child abuse potential, measured with the Child Abuse Potential Inventory (CAPI; Milner, Gold, & Wimberley, 1986). Additional secondary outcome measures to assess the emotional quality of the mother–child dyad were the remaining subscales of the EA dimensions: structuring, nonintrusiveness, nonhostility, and child involvement as well as maternal EA-Z.

For a detailed characterization of the sample, at baseline (T1) mothers additionally completed assessments of intellectual functioning (Culture Fair Intelligence Test–Scale 2, Revision [CFT-20R]; Weiß, 2006) and psychiatric health (Mini-International Neuropsychiatric Interview [M.I.N.I]; Sheehan et al., 1998). For psychiatric health, they also completed the Structured Clinical Interview for DSM-IV axis II personality disorders including DSM-IV criteria for conduct disorder (SCID-II; Wittchen, Zaudig, & Fydrich, 1997), the State-Trait Anxiety Inventory (STAI; Spielberger, Gorssuch, Lushene, Vagg, & Jacobs, 1983), Conners Adult ADHD Rating Scale (CAARS; Christiansen et al., 2011), child abuse history (Childhood Experiences of Care Abuse Questionnaire [CECA-Q]; Kaess et al., 2011), attachment history (Vulnerable Attachment Style Questionnaire [VAS]; Bifulco, Mahon, Kwon, Moran, & Jacobs, 2003), Experiences in Close Relationships Scale–Revised (ECR-R; Ehrenthal, Dinger, Lamla, Funken, & Schauenburg, 2009), perception of parental rearing behaviors, a questionnaire measuring perceptions of parental rearing behaviors (EMBU; Perris, Jacobsson, Lindstrom, von Knorring, & Perris, 1980), impulsivity (Barratt Impulsiveness Scale [BIS-15]; Spinella, 2007), emotion regulation skills (Difficulties in Emotion Regulation Scale [DERS]; Gratz & Roemer, 2004), and empathic concern (Interpersonal Reactivity Index [IRI]; Paulus, 2009). Furthermore, sociodemographic data was collected, including standard questions on age, marital status, and educational level. Serious adverse events were documented at T2 and T3.

Statistical analysis

The intended sample size ($n = 120$) could not be achieved within the period of funding, so the trial was terminated before the intended sample was achieved. The current sample size of $n = 56$ still allows for the detection of a large effect ($f = 0.4$) with a power of 80% for a two-sided significance level of 5% (G-Power 3.1). All statistical analyses were performed by using IBM SPSS Statistics Version 25.0. (IBM, Armonk, New York, USA). We tested our primary hypotheses by using analysis of covariance

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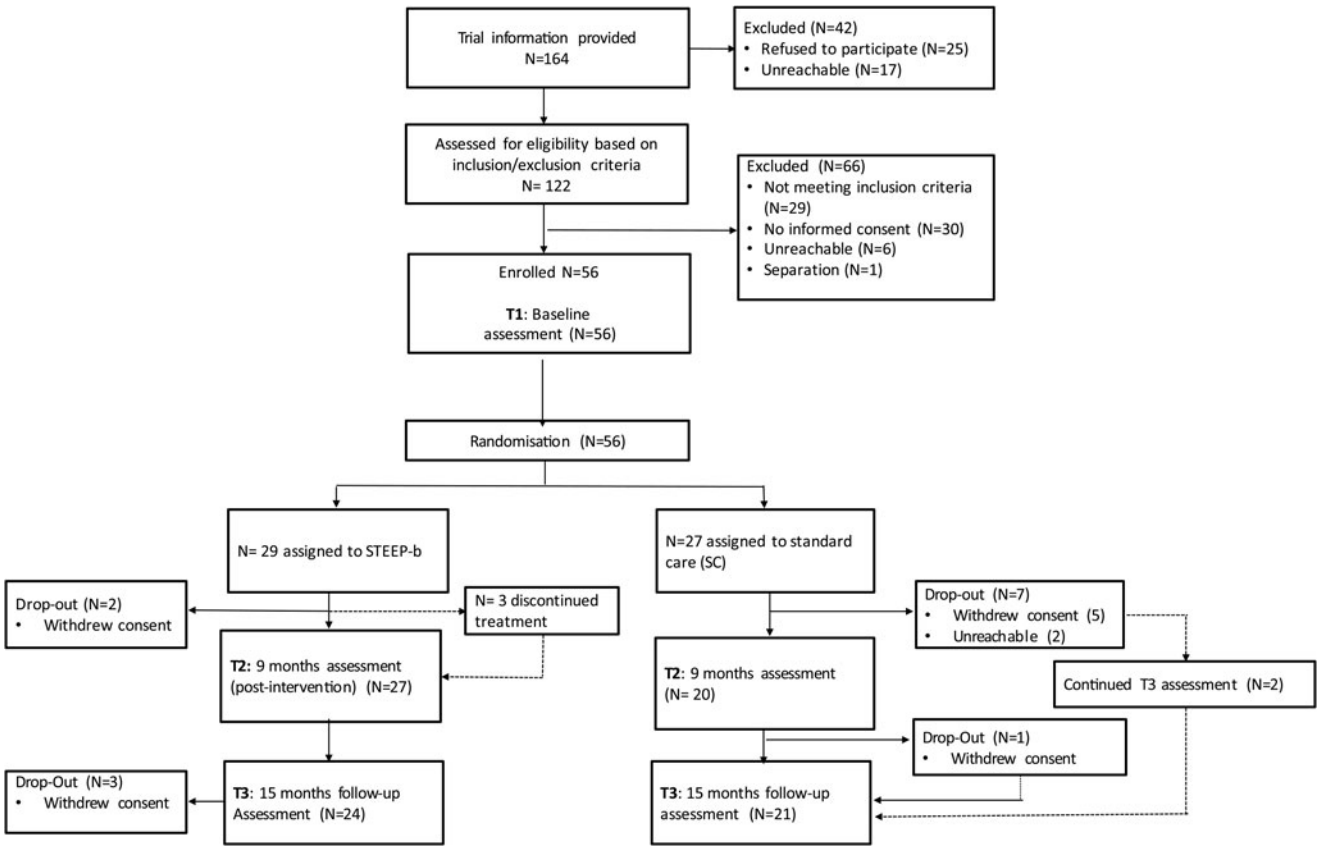

Figure 1. Study flow chart.

(ANCOVA), with the EA scores at postintervention (T2) as dependent variables and the baseline values as covariates. To control for the effect of mother's age (< or ≥ 18 years at child's birth), we stratified the randomization for mother's age (< or ≥ 18 years). Further, we included the dichotomized factor maternal age (< or ≥ 18 years) as a fixed factor in a first step. However, as there was no effect of maternal age (< or ≥ 18 years) on the outcome variables, it was not included as covariate or fixed factor in the final analyses. Similarly, we compared the continuous secondary outcome variables by using ANCOVA with the respective baseline value as covariate. We calculated the *p* values and 95% confidence intervals (CI) based on these models. Secondary categorical outcome variables (e.g., attachment style) were analyzed by using chi-square or Fisher exact tests. Means and standard deviations or absolute and relative frequencies are reported according to the underlying scale level. The analyses of all primary and secondary endpoints were based on the modified intention-to-treat principle (Polit & Gillespie, 2010), assessing each mother–child dyad with available data at T2 or T3 in the group to which they were randomly assigned irrespective of the number of intervention sessions they received. An independent data monitoring committee, reporting to an independent steering committee, oversaw the study. The trial is registered at the German Clinical Trials Register (DRKS0000440).

Results

The flow of participants from recruitment through the end of the study is shown in Figure 1. From October 2012 to December 2014, 122 mother–child dyads were screened for eligibility of whom 93 fulfilled the inclusion and exclusion criteria. Of the total, 37 were not included in the study (for reasons, see Figure 1). A total of 56 mother–child dyads were randomly allocated to treatment groups ($n = 29$ STEEP-b vs. $n = 27$ SC). Sample characteristics are presented in Table 2. In the STEEP-b group, three mothers discontinued the intervention and two mothers withdrew consent. The number of sessions of the mother–child dyads who completed the intervention ranged between 8 and 19 (mean: 12.29; *SD*: 3.2) sessions including 4 to 10 (mean 6.21; *SD*: 1.7) video-feedback sessions. Of the 29 mothers who were allocated to STEEP-b, 27 completed the postintervention assessment and 24 completed the follow-up assessment. Of the 27 mothers allocated to the control group, 20 completed the postintervention assessment and 21 completed the follow-up assessment.

Details of participants' baseline characteristics (means and standard deviations for all primary and secondary outcome variables at T1 are presented in Table 3. The mothers had mean sensitivity scores of 3.80 (1.0), STEEP-b: 3.76 (1.0); SC: 3.85 (1.0), and their children had mean responsiveness scores of 3.82 (1.0), STEEP-b: 3.77 (0.9); SC: 3.86 (1.0). The mother–child dyads were dichotomized based on their EA sensitivity and responsiveness scores to further explore the proportion of mothers rated as sensitive, which was defined as a score of at least 5.5 (low end of neutral sensitivity) to 7 (reflecting high sensitivity), and children rated as responsive, defined as a score of at least 5.5 (low end of moderately optimal in responsiveness) to 7 (reflecting optimal in responsiveness). At baseline, only 7.3% (STEEP-b: 6.9%, SC:7.7%) of the mothers were rated as sensitive and only 7.3%

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Table 2. Sample characteristics

		N		*N*
	SC	27	STEEP-b	29
Mother's age T1 (in years)	18.3 (2.0)		18.8 (2.0)	
≤18 years at child birth	19 (70.4)		18 (62.1)	
Infant's age at T1(in months)	5.29 (1.1)		5.41 (1.3)	
Infant's age at T2 (in months)	14.50 (1.1)		14.67 (1.3)	
Infant's age at T3 (in months)	21.00 (1.6)		21.08 (1.5)	
Sex of infant (♂ : ♀)	14:13		15:14	
Maternal nationality				
German	27 (100%)		28 (96.6%)	
Other	0 (0%)		1 (3.4%)	
Marital status				
Married	3 (11.1%)		1 (3.4%)	
Partnership	19 (70.4%)		19 (65.5%)	
Single	5 (18.5%)		9 (31.0%)	
Education		26		29
No degree	4 (15.4%)		5 (17.2%)	
Lower than secondary degree	9 (34.6%)		13 (44.8%)	
Secondary degree	13 (50.0%)		11 (37.9%)	
Government welfare payments	11 (42.3%)		15 (51.7%)	
Maternal IQ	86.31 (15.4)		86.55 (10.9)	
Current psychiatric disorder	6 (22.2%)	27	9 (31.0%)	29
STAI	38.54 (9.9)	26	38.41 (7.9)	29
CECA-Q				
Mother antipathy	20.50 (9.9)	26	16.45 (8.3)	29
Mother neglect	16.50 (7.9)	26	13.62 (6.5)	29
Father antipathy	15.29 (6.9)	24	16.54 (10.0)	26
Father neglect	17.92 (8.0)	24	15.08 (6.5)	26
VASQ	59.00 (9.3)	26	61.69 (9.6)	29
ECR-R				
Attachment-related anxiety	45.92 (21.8)	26	58.34 (27.7)	29
Attachment-related avoidance	35.73 (20.3)	26	45.62 (19.2)	29
EMBU (Mother of Mother)		25		29
Rejection and punishment	10.56 (3.0)		11.03 (5.5)	
Maternal warmth	21.88 (7.3)		25.14 (5.4)	
Control and overprotection	15.04 (4.8)		13.86 (4.2)	
EMBU (Father of Mother)		25		27
Rejection and punishment	9.60 (1.8)		10.56 (4.6)	
Maternal warmth	21.48 (5.9)		22.81 (6.2)	
Control and overprotection	13.96 (4.9)		12.33 (4.1)	
BIS-15	33.88 (7.5)	26	31.28 (6.9)	29
DERS	74.92 (23.5)	26	73.07(21.7)	29
IRI Empathy	37.35 (9.4)	26	35.55 (8.1)	29

Note: Data are mean (*SD*) or *n* (%). Maternal IQ was measured with the Culture Fair Intelligence Test—Scale 2, Revision (CFT 20-R). Current psychiatric health was assessed with the Mini-International Neuropsychiatric Interview, (M.I.N.I), the Structured Clinical Interview for DSM-IV axis II personality disorders (SCID-II) including DSM-IV criteria for conduct disorder, and the Conners Adult ADHD Rating Scale, (CAARS). The abbreviations are as follows: STAI = The State-Trait Anxiety Inventory; CECA-Q = Childhood Experiences of Care Abuse Questionnaire; VASQ = Vulnerable Attachment Style Questionnaire; ECR-R = Experiences in Close Relationships Scale-Revised; EMBU = a questionnaire measuring perceptions of parental rearing behaviors; BIS-15, Barratt Impulsiveness Scale (2007); DERS = Difficulties in Emotion Regulation Scale; IRI = Interpersonal Reactivity Index.

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Table 3. Baseline characteristics (T1)

	SC	*N*	STEEP-b	*N*
Primary Outcomes				
EA scales		26		29
Maternal sensitivity	3.85 (1.0)		3.76 (1.0)	
Child responsiveness	3.77 (0.9)		3.86 (1.0)	
Secondary Outcomes				
EA scales		26		29
Maternal structuring	3.90 (0.9)		4.17 (0.7)	
Maternal nonintrusiveness	4.58 (1.1)		4.59 (0.9)	
Maternal nonhostility	5.94 (0.8)		5.79 (0.8)	
Child involvement	3.58 (0.8)		3.52 (1.2)	
EA-Z		26		29
Emotionally available	1 (3.8%)		3 (10.3%)	
Complicated	15 (57.7%)		11 (37.9%)	
Detached	7 (26.9%)		13 (44.8%)	
Problematic	3 (11.5%)		2 (6.9%)	
BDI-II	9.70 (5.5)	27	7.76 (5.4)	29
BSI-18	6.54 (8.0)	26	5.00 (3.8)	28
PSI		27		29
Total scale	100.56 (27.3)		96.28 (28.3)	
Parental domain	59.11 (18.7)		61.28 (19.1)	
Child domain	41.22 (10.8)		34.8 (11.1)	
CAPI	163.86 (28.9)	27	171.93 (28.5)	29
BSID-III		26		29
Cognition	10.04 (2.1)		9.66 (2.0)	
Language receptive	8.42 (1.1)		8.34 (1.8)	
Language expressive	8.12 (1.4)		8.21 (1.1)	
Motor fine	11.69 (1.8)		10.90 (2.7)	
Motor gross	8.77 (2.0)		9.14 (2.8)	
IBQ-R		27		29
Surgency	4.79 (0.7)		4.78 (0.7)	
Negative affectivity	3.20 (0.6)		3.19 (.0.9)	
Regulation	4.88 (0.7)		4.96 (0.7)	

Note: Data are mean (*SD*) or *n* (%). SC, standard care as usual; STEEP-b, intervention; BDI-II, Beck Depression Inventory; BSI-18, Brief Symptom Inventory-18; PSI, Parental Stress Index; CAPI, Child Abuse Potential Inventory; BSID-III, Bayley Scales of Infant and Toddler Development; BITSEA, Brief Infant-Toddler Social and Emotional Assessment; IBQR, Infant Behavior Questionnaire–Revised.

(STEEP-b: 13.8%, SC:0.0%) of the children were rated as responsive towards their mothers. There was a strong positive correlation between maternal sensitivity and child responsiveness ($r = .856$, $p < .001$), reflecting that EA dimensions are relationship variables.

To assess the primary endpoints, ANCOVAs were performed with maternal sensitivity or child responsiveness at T2 as outcome variables, treatment group as a fixed factor (STEEP-b vs. SC), and baseline values as covariates. In contrast to our expectation, we did not find an intervention effect for maternal sensitivity, F (1, 44) = 0.001, $p = .98$, or child responsiveness, F (1, 44) = .04, p = .84, although—because of the small sample size—we only had enough power to detect a large effect. The effect size ($\eta p^2 < .001$) shows that the intervention did not result in any meaningful changes. Also, there was no improvement across time in the outcome variables in both groups (all *p*s > .05, Figure 2). Means, standard deviations, 95% CIs of the difference between groups, and *p* values are presented in Table 4. Additionally, exploratory per-protocol analyses and intention-to-treat analyses (using multiple imputation for missing data at T2) also showed no intervention effect for maternal sensitivity, per protocol: 95% CI [-0.56–0.69], $p = .84$; intention to treat: 95% CI [-0.67–0.50], $p = .77$, and child responsiveness, per protocol: 95% CI [-0.46–

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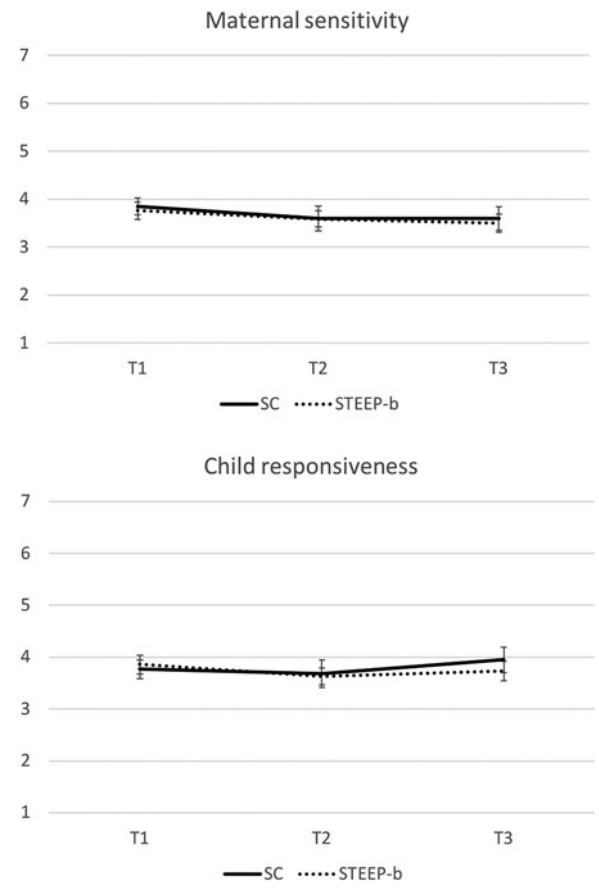

Figure 2. Maternal sensitivity and child responsiveness over time in both groups. Data are mean (*SE*).

0.72], $p = .66$, intention to treat: 95% CI [-0.67–0.56], $p = .85$. Further subgroup analyses including only participants who received at least 12 sessions ($n = 13$) also revealed no intervention effect for maternal sensitivity, 95% CI [-0.17–0.62], $p = .25$, and child responsiveness, 95% CI [-0.24–0.47], $p = .50$. Finally, we explored whether the probability of improvement using the dichotomized EA sensitivity and responsiveness measure differed across treatment groups. However, no treatment effect was found for maternal sensitivity (Fisher exact test, $p = .57$) and child responsiveness (Fisher exact test, $p = .57$).

To assess the secondary endpoints, ANCOVAs were performed for continuous outcomes and chi-square tests or a Fisher exact test were used for categorical outcomes. We only found an intervention effect on the parental domain scale of the PSI, 95% CI [-0.63–18.67], $p = .04$, showing that mothers in the STEEP-b group were less stressed than mothers in the SC group were at postintervention. However, this effect did not survive corrections for multiple comparisons. Although not correcting for multiple comparisons, no intervention effect was found for any other secondary outcome variable. Means, standard deviations, 95% CIs, and p values are presented in Table 5 (postintervention) and Table 6 (follow-up).

The groups did not differ with respect to the proportion of adverse events (AE, mainly hospitalization associated with infants' infections, STEEP-b: 11 of 29, SC: 7 of 27, $\chi^2 = .95$, $p = .32$. There were four serious adverse events (SAEs) in the SC group (one child death and three out-of-home placements) and one out-of-home placement in the STEEP group. The difference in SAEs was not statistically significant (Fisher exact test, $p = .18$). No adverse events were considered related to the intervention.

Participants in the STEEP- b intervention group reported overall satisfaction with the intervention (mean: 4.7, *SD*: .03), 95% of the mothers would recommend the training to other mothers, and 80% reported that the training was helpful to better understand their infant's needs.

Discussion

Adolescent mother–child dyads are a high-risk population for negative child development. Although adolescent birthrates have declined in high income nations, the negative consequences of adolescent motherhood have intensified over time (Coyne, Langstrom, Lichtenstein, & D'Onofrio, 2013; Maughan & Lindelow, 1997). On the other hand, serious efforts have been made to develop effective prevention programs. Thus, there is an urgent need to study the effectiveness of these programs to improve parental child-rearing attitudes and practices, particularly in at-risk mothers.

By means of a RCT, the main purpose of the current study was to investigate the effectiveness of a 9-month home-visiting mother–child intervention program (STEEP-b) compared with SC (i.e., standard support from the child welfare system) on maternal sensitivity and child responsiveness in adolescent, high-risk mothers. Regarding demographic risk factors, the current sample of adolescent mother–child dyads is comparable to previously studied high-risk adolescent mother–child dyads (Jaffee et al., 2001; Lounds, Borkowski, & Whitman, 2006). With respect to the primary outcomes before the start of the intervention, only 7.3% of the mothers were rated as sensitive while interacting with their child and only 7.3% of their children were rated as responsive towards their mothers, which is comparable to other high-risk groups (Frigerio, Porreca, Simonelli, & Nazzari, 2019). Further, these findings are in line with previous studies showing that adolescent mothers are less sensitive and show more intrusive and hostile interactive behaviors compared with adult mothers (Krpan et al., 2005; Lee, 2009; Madigan, Moran, & Pederson, 2006). In contrast to our expectation, we did not find a positive effect of the current intervention on maternal sensitivity and child responsiveness, and mother–child interaction did not improve over time in both groups. Maternal sensitivity has previously been shown to be of major significance for children's attachment and social-emotional development (De Wolff & van Ijzendoorn, 1997) and has also been associated with children's cognitive development (Mills-Koonce et al., 2015). Therefore, the reduced quality of maternal parenting behaviors in adolescent compared with adult mothers might also contribute to the influence of adolescent motherhood on offspring's negative developmental outcomes (Firk, Konrad, Herpertz-Dahlmann, Scharke, & Dahmen, 2018). In the current study, 30% of the children showed a disorganized attachment style in the Strange Situation Procedure at T2 and 44% scored above the cutoff for behavior problems at T2 and T3. These findings underline that there is indeed an urgent need for effective early mother–child intervention programs for high-risk adolescent mothers to enhance socio-emotional development in their children.

Although behavior observations of mother–child interaction did not show a positive effect of the intervention, participants' overall satisfaction with the intervention program was very high. These findings underline the importance of objective measures for evaluating intervention programs. Subjective satisfaction

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Table 4. Primary outcomes: Maternal sensitivity and child responsiveness (T2, postintervention)

	SC		STEEP-b			
Primary outcomes	Mean (*SD*)	*N*	Mean (*SD*)	*N*	95% CI-Diff	*p*
Maternal sensitivity	3.60 (1.2)	20	3.59 (0.9)	*27*	−.59–.60	.98
Child responsiveness	3.68 (1.0)	20	3.63 (0.9)	*27*	−.51–.62	.84

Note: SC, standard care as usual; STEEP-b, intervention.

with an intervention may be influenced by dissonance reduction (to justify the personal effort mothers have put into the intervention) (Festinger, 1957) and a positive relationship with the trainer. Interestingly, a significant intervention effect on the parental domain scale of the parenting stress index was found, indicating lower levels of parental stress, which might be driven by an increase in social support through the intervention. Nevertheless, this effect must be interpreted cautiously, as it did not survive correction for multiple comparisons.

Of note there was a statistically nonsignificant but potentially clinically meaningful difference in the prevalence of SAEs, with four SAEs in the standard care condition and only one SAE in the STEEP-b condition. Although we do not have enough evidence to conclude that the lower rate of SAEs in the STEEP-b condition is due to the intervention, it might be driven by different intensity of surveillance of dyads in the treatment groups.

The implemented intervention (STEEP-b) is an adaptation of the STEEP program (Erickson & Egeland, 2006). Recently, Suess et al. (2016) showed that STEEP has a positive effect on attachment development by using a quasiexperimental design. In contrast to STEEP, which already starts prenatal and lasts up to 2 years, STEEP-b was designed to be relatively brief—based on a previous meta-analysis (Bakermans-Kranenburg et al., 2003) that concluded "less is more"—to improve compliance with the intervention and treatment effectiveness. Although previous short-term interventions employing video feedback in various populations have shown positive effects on parental sensitivity (Bakermans-Kranenburg et al., 2003), the current findings suggest that a short-term, narrowly-focused intervention program might not be sufficient to enhance positive parenting behavior and child development in high-risk adolescent mothers. Interestingly, a recent meta-analysis (Wright et al., 2017) including only RCTs indicates that only interventions with more than 16 sessions improve attachment disorganization. This is also supported by a meta-analysis on the effectiveness of home-visiting programs showing that programs with frequent sessions (more than 3 per month) are more effective than programs with less frequent sessions (Nievar, Van Egeren, & Pollard, 2010), although none of these studies were performed in adolescent mother–child dyads only. Therefore, the current intervention might have been too short to change maternal parenting behaviors. Accordingly, the positive effect of another previous short-term attachment-based intervention on maternal sensitivity in families at risk for child abuse in Germany (Pillhofer et al., 2015) was no longer seen at follow-up 8–22 months later (Zwönitzer et al., 2015).

The absence of evidence for the effectiveness of the current intervention program in high-risk adolescent mothers in Germany is also in line with recent RCTs (Barnes et al., 2017; Robling et al., 2016) in other countries. An intervention for adolescent mothers, which has previously shown to be effective in adolescent mothers in the United States to enhance parental care (Olds, Henderson, Chamberlin, & Tatelbaum, 1986), was not effective in the UK for reducing child maltreatment risk or enhancing parental caregiving behaviors in this high-risk group. These findings suggest that different treatment approaches may have different effects in different populations. It should be noted that in Germany as well as in the UK, adolescent mothers receiving standard care have access to many health and social services per se, which might have diluted the effect of the additional intervention program. Furthermore, a nonrandomized pilot study from Italy (Riva Crugnola, Ierardi, Albizzati, & Downing, 2016) with adolescent mothers and their infants suggests that to start an intervention right after the child's birth might be more effective in promoting sensitive parenting behaviors than a program starting later in the child's first year of life. In the current study, based on the results of a previous meta-analysis (Bakermans-Kranenburg et al., 2003), the intervention for most dyads started when the infants were 3–6 months of age. By this time, problematic interaction patterns may have already emerged and it might be more challenging to change inadequate maternal behaviors.

The current findings should be interpreted in light of the following limitations: First, the planned sample size could not be recruited within the time of funding, so only large treatment effects could have been detected. However, the current effect size ($\eta p^2 < .001$) supports our results and suggests that the intervention does not have a clinically relevant effect. Second, three participants who discontinued the intervention were included in the intention-to-treat analyses. However, exploratory per-protocol analyses for the primary outcome measures yielded similar findings as the intention-to-treat analyses did. Third, the coding of the mother–child interactions might not have been sensitive enough to detect subtle changes in the quality of mother–child interactions. However, the null findings are also supported by the secondary measures (e.g., child attachment, child development, maternal mental health) for which also no intervention effect was found.

In conclusion, the current randomized controlled trial does not support a narrowly focused short-term video-feedback intervention program as a means of enhancing mother–child interaction in this high-risk population of adolescent mother–child dyads. Nevertheless, the current findings support the need to develop specific early mother–child dyad interventions for young mothers, particularly given the low rates of sensitive mother–child interactions and high rates of attachment disorganization in this population. By now video-feedback methods are an accepted approach for treatment of families at risk and are increasingly implemented in several countries (Steele et al., 2014). However, the idea that "less is more" as stated by Bakermans-Kranenburg and colleagues in their meta-analysis in 2003 might not be appropriate for adolescent populations with

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Table 5. Secondary outcomes (T2, postintervention)

Secondary outcomes	SC	*N*	STEEP-b	*N*	95% CI-Diff	*p*
EA scales		20		27		
Maternal structuring	3.88 (1.2)		3.93 (0.7)		−0.60–0.54	.91
Maternal nonintrusiveness	4.65 (1.4)		4.41 (1.1)		−0.49–0.82	.61
Maternal nonhostility	5.43 (1.3)		5.28 (0.8)		−0.51–0.65	.81
Child involvement	3.68 (1.1)		3.54 (1.0)		−0.48–0.78	.64
EA-Z						
Emotionally available	2 (10.0%)	20	1 (3.7%)	27		
Complicated	7 (35.0%)		11 (40.7%)			
Detached	5 (25.0%)		10 (37.0%)			
Problematic	6 (30.0%)		5 (18.5%)			
BDI-II	11.05 (9.4)	20	10.11 (8.5)	27	−5.13–3.25	.65
BSI-18	9.21 (9.5)	20	9.12 (8.6)	27	−5.91–2.21	.36
PSI		20		27		
Total scale	121.25 (34.0)		104.07 (29.7)		−4.27–26.45	.15
Parent domain	71.90 (21.7)		62.22 (19.7)		0.63–18.67	.04
Child domain	49.25 (14.0)		41.26 (12.2)		−4.06–10.89	.36
CAPI	165.62 (34.1)	20	170.55 (30.1)	27	−22.53–15.13	.69
BSID-III		20		27		
Cognition	10.15 (1.4)		9.67 (1.7)		−0.56–1.25	.45
Language receptive	8.30 (2.5)		8.30 (1.9)		−1.29–1.24	.97
Language expressive	9.15 (1.1)		8.78 (1.9)		−0.60–1.14	.53
Motor fine	11.50 (2.2)		10.89 (2.3)		−0.96–1.69	.58
Motor gross	8.95 (1.7)		9.15 (2.7)		−1.26–1.47	.88
IBQ-R		20		27		
Surgency	5.15 (0.59)		5.12 (0.62)		−0.17–0.41	.39
Negative affectivity	3.80 (0.66)		3.54 (0.84)		−0.11–0.71	.15
Regulation	4.65 (0.60)		5.01 (0.66)		−0.48–0.09	.17
BITSEA						
Behavioral problems	13.5 (5.5)		13.9 (6.4)		−2.32–4.85	.48
Risk for problems	11 (55.0%)		10 (37.0%)			
Emotional competences	13.9 (3.1)		14.3 (2.9)		−2.24–1.34	.62
Risk for delay	8 (40.0%)		7 (25.9%)			
Child attachment		19		25		
Secure	10 (52.6%)		10 (40.0%)			
Insecure avoidant	1 (5.3%)		4 (16.0%)			
Insecure anxious	2 (10.5%)		4 (16.0%)			
Disorganized	6 (31.6%)		7 (28.0%)			

Note: Data are mean (*SD*) or *n* (%). SC, standard care as usual; STEEP-b, intervention; BDI-II, Beck Depression Inventory; BSI-18, Brief Symptom Inventory-18; PSI, Parental Stress Index; CAPI, Child Abuse Potential Inventory; BSID-III, Bayley Scales of Infant and Toddler Development; BITSEA, Brief Infant-Toddler Social and Emotional Assessment; IBQ-R, Infant Behavior Questionnaire–Revised. Linear model adjusted for baseline value if applicable. No significant differences in EA zone distributions (Fisher exact test, $p = .62$), child attachment (Fisher exact test, $p = .68$), risk for behavior problems ($\chi^2 = 1.50$, $p = .22$) and risk for emotional delays ($\chi^2 = 1.01$, $p = .31$) were found between groups.

diverse psychosocial problems. High-risk adolescent mothers might need longer and more intensive interventions to improve parenting behaviors possibly in combination with more psychosocial support than other populations. Therefore, although narrowly-focused video-feedback interventions have been effective in some populations, clinical practice, theory, and research should take the differential effects of intervention programs across different populations into account.

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Table 6. Secondary outcomes (T3, follow-up)

Secondary outcomes	SC	*N*	STEEP-b	*N*	95% CI-Diff	*p*
EA scales		21		24		
Maternal sensitivity	3.60 (1.1)		3.50 (0.93)		−0.52–0.68	.79
Maternal structuring	3.86 (1.2)		3.83 (1.1)		−0.66–0.80	.85
Maternal nonintrusiveness	4.81 (1.3)		4.90 (1.0)		−0.83–0.58	.72
Maternal nonhostility	4.98 (1.4)		5.04 (1.0)		−0.84–0.65	.79
Child responsiveness	3.95 (1.1)		3.73 (1.1)		−0.40–0.92	.43
EA-Z						
Emotionally available	2 (9.5%)	21	3 (12.5%)	24		
Complicated	9 (42.9%)		7 (29.2%)			
Detached	4 (19.0%)		6 (25.0%)			
Problematic	6 (28.6%)		8 (17.8%)			
Total scale	114.00 (33.1)	21	109.33 (29.4)	*24*	−15.96–13.13	.85
Parent domain	67.24 (23.1)		68.83 (18.5)		−6.60–11.57	.58
Child domain	46.48 (13.3)		45.13 (12.2)		−10.02–4.09	.40
CAPI	173.03 (31.1)	21	165.99 (29.4)	*24*	−5.98–30.97	.18
BSID-III		21		*24*		
Cognition	9.48 (1.7)		9.57 (1.4)		−1.13–0.74	.68
Language receptive	9.38 (2.0)		9.17 (2.1)		−0.96–1.44	.59
Language expressive	9.52 (1.7)		8.65 (2.0)		−0.29–1.89	.14
Motor fine	10.29 (2.1)		10.50 (1.9)		−1.57–0.78	.50
Motor gross	9.43 (1.2)		9.17 (1.4)		−0.50–1.16	.41
BITSEA		21		*24*		
Behavioral problems	13.43 (6.0)		13.38 (7.6)		−4.11–4.22	.98
Risk for problems	9 (42.9%)		11 (44.8%)			
Emotional competences	16.33 (2.9)		16.96 (2.7)		−2.36–1.11	.47
Risk for delay	4 (19.0%)		5 (20.8%)			

Note: Data are mean (*SD*) or *n* (%). SC, standard care as usual; STEEP-b, intervention; BDI-II, Beck Depression Inventory; BSI-18, Brief Symptom Inventory-18; PSI, Parental Stress Index; CAPI, Child Abuse Potential Inventory; BSID-III, Bayley Scales of Infant and Toddler Development; BITSEA, Brief Infant-Toddler Social and Emotional Assessment. Linear model adjusted for baseline value. No significant differences were found in EA-Z distributions between groups (Fisher exact test, $p = .86$). No significant differences in risk for behavior problems ($\chi^2 = .04$, $p = .84$) and risk for emotional delay ($\chi^2 = 1.01$, $p = .31$) were found between groups.

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References

Abidin, R. R. (1995). *Parenting Stress Index* (PSI) Third Edition. Lutz, FL: PAR.

Ainsworth, M. D. S., & Bell, S. M. (1970). Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation. *Child Development*, *41*, 49–67.

Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin*, *129*, 195–215.

Barnes, J., Stuart, J., Allen, E., Petrou, S., Sturgess, J., Barlow, J., … Elbourne, D. (2017). Randomized controlled trial and economic evaluation of nurse-led group support for young mothers during pregnancy and the first year postpartum versus usual care. *Trials*, *18*, 508. doi:10.1186/s13063-017-2259-y

Bayley, N. (2005). *Bayley Scales of Infant and Toddler Development—third edition*. San Antonio, TX: Psychological Corporation.

Beck, A. T., Steer, R. A., Ball, R., & Ranieri, W. (1996). Comparison of Beck Depression Inventories-IA and -II in psychiatric outpatients. *Journal of Personality Assessment*, *67*, 588–597. doi:10.1207/s15327752jpa6703_13

Bifulco, A., Mahon, J., Kwon, J. H., Moran, P. M., & Jacobs, C. (2003). The Vulnerable Attachment Style Questionnaire (VASQ): an interview-based measure of attachment styles that predict depressive disorder. *Psychological Medicine*, *33*, 1099–1110.

Biringen, Z. (2000). Emotional availability: Conceptualization and research findings. *The American Journal of Orthopsychiatry*, *70*, 104–114.

https://doi.org/10.1017/S0954579420000280 Published online by Cambridge University Press

Biringen, Z. (2008). *The Emotional Availability (EA) Scales and EA Zones Evaluation* (4th ed.). Boulder, Colorado: Emotionalavailabilty.com.

Biringen, Z., Derscheid, D., Vliegen, N., Closson, L., & Easterbrooks, M. A. (2014). Emotional availability (EA): Theoretical background, empirical research using the EA Scales, and clinical applications. *Developmental Review*, *34*, 114–167. doi:10.1016/j.dr.2014.01.002

Brannstrom, L., Vinnerljung, B., & Hjern, A. (2016). Child welfare clients have higher risks for teenage childbirths: Which are the major confounders? *European Journal of Public Health*, *26*, 592–597. doi:10.1093/eurpub/ckw057

Braungart-Rieker, J. M., Zentall, S., Lickenbrock, D. M., Ekas, N. V., Oshio, T., & Planalp, E. (2014). Attachment in the making: Mother and father sensitivity and infants' responses during the Still-Face Paradigm. *Journal of Experimental Child Psycholology*, *125*, 63–84. doi:10.1016/j.jecp.2014.02.007

Briggs-Gowan, M. J., Carter, A. S., Irwin, J. R., Wachtel, K., & Cicchetti, D. V. (2004). The Brief Infant-Toddler Social and Emotional Assessment: screening for social-emotional problems and delays in competence. *Journal of Pediatric Psychology*, *29*, 143–155.

Brisch, K. H., Bechinger, D., Betzler, S., & Heinemann, H. (2003). Early preventive attachment-oriented psychotherapeutic intervention program with parents of a very low birthweight premature infant: Results of attachment and neurological development. *Attachment & Human Development*, *5*, 120–135. doi:10.1080/1461673031000108504

Chablani, A., & Spinney, E. R. (2011). Engaging high-risk young mothers into effective programming: The importance of relationships and relentlessness. *Journal of Family Social Work*, *14*, 369–383. doi:10.1080/10522158.2011.588544

Christiansen, H., Kis, B., Hirsch, O., Philipsen, A., Henneck, M., Panczuk, A., … Schimmelmann, B. G. (2011). German validation of the Conners Adult ADHD Rating Scales-self-report (CAARS-S) I: Factor structure and normative data. *European Psychiatry:The Journal of the Association of European Psychiatrists*, *26*, 100–107. doi:10.1016/j.eurpsy.2009.12.024

Cicchetti, D., & Lynch, M. (1993). Toward an ecological/transactional model of community violence and child maltreatment: Consequences for children's development. *Psychiatry*, *56*, 96–118.

Coyne, C. A., Langstrom, N., Lichtenstein, P., & D'Onofrio, B. M. (2013). The association between teenage motherhood and poor offspring outcomes: a national cohort study across 30 years. *Twin Research and Human Genetics*, *16*, 679–689. doi:10.1017/thg.2013.23

Crittenden, P. M. (1985). Maltreated infants: Vulnerability and resilience. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *26*(1), 85–96.

Cyr, C., Euser, E. M., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2010). Attachment security and disorganization in maltreating and high-risk families: A series of meta-analyses. *Development and Psychopathology*, *22*, 87–108. doi:10.1017/S0954579409990289

De Wolff, M. S., & van Ijzendoorn, M. H. (1997). Sensitivity and attachment: a meta-analysis on parental antecedents of infant attachment. *Child Development*, *68*, 571–591.

D'Onofrio, B. M., Goodnight, J. A., Van Hulle, C. A., Rodgers, J. L., Rathouz, P. J., Waldman, I. D., & Lahey, B. B. (2009). Maternal age at childbirth and offspring disruptive behaviors: Testing the causal hypothesis. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *50*, 1018–1028. doi:10.1111/j.1469-7610.2009.02068.x

Easterbrooks, M. A., Bureau, J. F., & Lyons-Ruth, K. (2012). Developmental correlates and predictors of emotional availability in mother–child interaction: A longitudinal study from infancy to middle childhood. *Development and Psychopathology*, *24*, 65–78. doi:10.1017/S0954579411000666

Egeland, B., & Erickson, M. F. (1993). Attachment theory and findings. Implications for preventionand intervention. In S. Kramer & H. Parens (Eds.), *Prevention in mental health. Now, tomorrow, ever?* (pp. 21–50). Northvale: Jason Aronson.

Ehrenthal, J. C., Dinger, U., Lamla, A., Funken, B., & Schauenburg, H. (2009). Der einsatz des Brief Symptom Inventory 18 (BSI-18) bei psychotherapiepatienten [The usefulness of the Brief Symptom Inventory 18 (BSI-18) in psychotherapeutic patients]. *Psychotherapie, Psychosomatik, Medizinische Psychologie*, *59*, 215–223.

Erickson, M. F., & Egeland, B. (2004). Linking theory and research to practice: The Minnesota Longitudinal Study of Parents and Children and the STEEP™ program. *Clinical Psychologist*, *8*, 5–9.

Erickson, M. F., & Egeland, B. (2006). *Stärkung der Eltern-Kind-Bindung. Frühe Hilfen für die Arbeit mit Eltern von der Schwangerschaft bis zum zweiten Lebensjahr des Kindes durch das STEEP™-Programm* [German version of the facilitators' guide for the Steps Toward Effective, Enjoyable Parenting (STEEP™) program]. Stuttgart: Klett-Cotta.

Erickson, M. F., Egeland, B., Simon, J., & Rose, T. (2002). *STEEP™ Facilitator's Guide*. Minneapolis, MN: Irving B. Harris Training Programs, Center for Early Education & Development, University of Minnesota.

Feldman, R. (2015). The adaptive human parental brain: Implications for children's social development. *Trends in Neurosciences*, *38*, 387–399. doi:10.1016/j.tins.2015.04.004

Festinger, L. (1957). *A theory of cognitive dissonance*. Redwood City, CA: Stanford University Press.

Firk, C., Dahmen, B., Lehmann, C., Niessen, A., Koslowski, J., Rauch, G., … Herpertz-Dahlmann, B. (2015). A mother–child intervention program in adolescent mothers and their children to improve maternal sensitivity, child responsiveness and child development (the TeeMo study): Study protocol for a randomized controlled trial. *Trials*, *16*, 230. doi:10.1186/s13063-015-0747-5

Firk, C., Konrad, K., Herpertz-Dahlmann, B., Scharke, W., & Dahmen, B. (2018). Cognitive development in children of adolescent mothers: The impact of socioeconomic risk and maternal sensitivity. *Infant Behavior & Development*, *50*, 238–246. doi:10.1016/j.infbeh.2018.02.002

Frigerio, A., Porreca, A., Simonelli, A., & Nazzari, S. (2019). Emotional availability in samples of mothers at high risk for depression and with substance use disorder. *Frontiers in Psychology*, *10*, 577. doi:10.3389/fpsyg.2019.00577

Gartstein, M. A., & Rothbarth, M. K. (2003). Studying infant temperament via the Revised Infant Behavior Questionnaire. *Infant Behavior and Development*, *26*, 64–86.

Garwood, S. K., Gerassi, L., Jonson-Reid, M., Plax, K., & Drake, B. (2015). More than poverty: The effect of child abuse and neglect on teen pregnancy risk. *Journal of Adolescent Health*, *57*, 164–168. doi:10.1016/j.jadohealth.2015.05.004

Gratz, K., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment*, *26*, 46–54.

Hillis, S. D., Anda, R. F., Dube, S. R., Felitti, V. J., Marchbanks, P. A., & Marks, J. S. (2004). The association between adverse childhood experiences and adolescent pregnancy, long-term psychosocial consequences, and fetal death. *Pediatrics*, *113*, 320–327. doi:10.1542/peds.113.2.320

Hodgkinson, S., Beers, L., Southammakosane, C., & Lewin, A. (2014). Addressing the mental health needs of pregnant and parenting adolescents. *Pediatrics*, *133*, 114–122. doi:10.1542/peds.2013-0927

Jaffee, S., Caspi, A., Moffitt, T. E., Belsky, J., & Silva, P. (2001). Why are children born to teen mothers at risk for adverse outcomes in young adulthood? Results from a 20-year longitudinal study. *Development and Psychopathology*, *13*, 377–397.

Kaess, M., Parzer, P., Mattern, M., Resch, F., Bifulco, A., & Brunner, R. (2011) Validierung der Deutschen version von fragebogen und korrespondierendem interview sowie ergebnisse einer untersuchung von Zusammenhängen Belastender Kindheitserlebnisse mit Suizidalen Verhaltensweisen. [Childhood Experiences of Care and Abuse (CECA)—validation of the German version of the questionnaire and interview, and results of an investigation of correlations between adverse childhood experiences and suicidal behaviour]. *Zeitschrift fur Kinder- und Jugendpsychiatrie und Psychotherapie*, *39*, 243–252. doi:10.1024/1422-4917/a000115

Krpan, K. M., Coombs, R., Zinga, D., Steiner, M., & Fleming, A. S. (2005). Experiential and hormonal correlates of maternal behavior in teen and adult mothers. *Hormones and Behavior*, *47*, 112–122. doi:10.1016/j.yhbeh.2004.08.006

Lee, Y. (2009). Early motherhood and harsh parenting: the role of human, social, and cultural capital. *Child Abuse & Neglect*, *33*, 625–637. doi:10.1016/j.chiabu.2009.02.007

Lee, J. O., Gilchrist, L. D., Beadnell, B. A., Lohr, M. J., Yuan, C., Hartigan, L. A., & Morrison, D. M. (2016). Assessing variations in developmental outcomes among teenage offspring of teen mothers: Maternal life course correlates. *Research on Adelscence*, *27*, 550–565. doi:10.1111/jora.12293

Leftwich, H. K., & Alves, M. V. (2017). Adolescent Pregnancy. *Pediatric Clinics of North America*, *64*, 381–388. doi:10.1016/j.pcl.2016.11.007

Letourneau, N., Tryphonopoulos, P., Giesbrecht, G., Dennis, C. L., Bhogal, S., & Watson, B. (2015). Narrative and meta-analytic review of interventions aiming to improve maternal-child attachment security. *Infant Mental Health Journal*, *36*, 366–387. doi:10.1002/imhj.21525

Lounds, J. J., Borkowski, J. G., & Whitman, T. L. (2006). The potential for child neglect: the case of adolescent mothers and their children. *Child Maltreatment*, *11*, 281–294. doi:10.1177/1077559506289864

Lupien, S. J., McEwen, B. S., Gunnar, M. R., & Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience*, *10*(6), 434–445.

Madigan, S., Moran, G., & Pederson, D. R. (2006). Unresolved states of mind, disorganized attachment relationships, and disrupted interactions of adolescent mothers and their infants. *Developmental Psychology*, *42*, 293–304. doi:10.1037/0012-1649.42.2.293

Maughan, B., & Lindelow, M. (1997). Secular change in psychosocial risks: The case of teenage motherhood. *Psychological Medicine*, *27*, 1129–1144.

Mikulincer, M., & Shaver, P. R. (2018). Attachment orientations and emotion regulation. *Current Opinion in Psychology*, *25*, 6–10. doi:10.1016/j.copsyc.2018.02.006

Mills-Koonce, W. R., Willoughby, M. T., Zvara, B., Barnett, M., Gustafsson, H., Cox, M. J., & Key, F. L. P. (2015). Mothers' and fathers' sensitivity and children's cognitive development in low-income, rural families. *Journal of Applied Developmental Psychology*, *38*, 1–10. doi:10.1016/j.appdev.2015.01.001

Milner, J. S., Gold, R. G., & Wimberley, R. C. (1986). Prediction and explanation of child abuse: Cross-validation of the child abuse potential inventory. *Journal of Consulting and Clinical Psychology*, *54*, 865–866.

Mountain, G., Cahill, J., & Thorpe, H. (2017). Sensitivity and attachment interventions in early childhood: A systematic review and meta-analysis. *Infant Behavior & Development*, *46*, 14–32. doi:10.1016/j.infbeh.2016.10.006

Nievar, M. A., Van Egeren, L. A., & Pollard, S. (2010). A meta-analysis of home visiting programs: Moderators of improvements in maternal behavior. *Infant Mental Health Journal*, *31*, 499–520. doi:10.1002/imhj.20269

Olds, D. L., Henderson Jr., C. R., Chamberlin, R., & Tatelbaum, R. (1986). Preventing child abuse and neglect: A randomized trial of nurse home visitation. *Pediatrics*, *78*, 65–78.

Otterblad Olausson, P., Haglund, B., Ringbäck Weitoft, G., & Cnattingius, S. (2001). Teenage childbearing and long-term socioeconomic consequences: A case study in Sweden. *Family Planning Perspectives*, *33*, 70–74. doi: doi:10.2307/2673752

Paulus, C. (2009). *Der Saarbrücker Persönlichkeitsfragebogen SPF (IRI) zur Messung von Empathie* [*German version of the Interpersonal Reactivity Index*]. Saarbrücken: Universität des Saarlandes.

Penman-Aguilar, A., Carter, M., Snead, M. C., & Kourtis, A. P. (2013). Socioeconomic disadvantage as a social determinant of teen childbearing in the U.S. *Public Health Report*, *128*, 5–22. doi:10.1177/00333549131282S102

Perez, C. M., & Widom, C. S. (1994). Childhood victimization and long-term intellectual and academic outcomes. *Child Abuse & Neglect*, *18*, 617–633.

Perris, C., Jacobsson, L., Lindstrom, H., von Knorring, L., & Perris, H. (1980). Development of a new inventory assessing memories of parental rearing behaviour. *Acta Psychiatrica Scandinavica*, *61*, 265–274.

Pillhofer, M., Spangler, G., Bovenschen, I., Kuenster, A. K., Gabler, S., Fallon, B., … Ziegenhain, U. (2015). Pilot study of a program delivered within the regular service system in Germany: Effect of a short-term attachment-based intervention on maternal sensitivity in mothers at risk for child abuse and neglect. *Child Abuse & Neglect*, *42*, 163–173. doi:10.1016/j.chiabu.2014.07.007

Polit, D. F., & Gillespie, B. M. (2010). Intention-to-treat in randomized controlled trials: Recommendations for a total trial strategy. *Research in Nursing & Health*, *33*, 355–368. doi:10.1002/nur.20386

Riva Crugnola, C., Ierardi, E., Albizzati, A., & Downing, G. (2016). Effectiveness of an attachment-based intervention program in promoting emotion regulation and attachment in adolescent mothers and their infants: A pilot study. *Frontiers in Psychology*, *7*, 195. doi:10.3389/fpsyg.2016.00195

Robling, M., Bekkers, M. J., Bell, K., Butler, C. C., Cannings-John, R., Channon, S., … Torgerson, D. (2016). Effectiveness of a nurse-led intensive home-visitation programme for first-time teenage mothers (Building Blocks): A pragmatic randomised controlled trial. *Lancet*, *387*, 146–155. doi:10.1016/S0140-6736(15)00392-X

Saunders, H., Kraus, A., Barone, L., & Biringen, Z. (2015). Emotional availability: Theory, research, and intervention. *Frontiers in Psychology*, *6*, 1069. doi:10.3389/fpsyg.2015.01069

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., … Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry*, *59*, 22–33.

Sidor, A., Kunz, E., Eickhorst, A., & Cierpka, M. (2013). Effects of the early prevention program "Keiner fällt durchs Netz" ["Nobody Slips Through the Net"] on child, mother, and their relationship: A Controlled Study. *Infant Mental Health Journal*, *34*, 11–24. doi:10.1002/imhj.21362

Spielberger, C. D., Gorssuch, R. L., Lushene, P. R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory*. Consulting Psychologists Press.

Spinella, M. (2007). Normative data and a short form of the Barratt Impulsiveness Scale. *The International Journal of Neuroscience*, *117*, 359–368. doi:10.1080/00207450600588881

Spitzer, C., Hammer, S., Lowe, B., Grabe, H. J., Barnow, S., Rose, M., … Franke, G. H. (2011). Die Kurzform des Brief Symptom Inventory (BSI -18): Erste Befunde zu den psychometrischen Kennwerten der deutschen Version [The short version of the Brief Symptom Inventory (BSI -18): Preliminary psychometric properties of the German translation]. *Fortschritte der Neurologie-Psychiatrie*, *79*, 517–523. doi:10.1055/s-0031-1281602

Sroufe, L. A., Coffino, B., & Carlson, E. A. (2010). Conceptualizing the role of early experience: Lessons from the Minnesota Longitudinal Study. *Developmental Review*, *30*, 36–51. doi:10.1016/j.dr.2009.12.002

Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, A. (2005). *The Development of the person. The Minnesota Study of Risk and Adaptation from Birth to Adulthood*. Guilford.

Steele, M., Steele, H., Bate, J., Knafo, H., Kinsey, M., Bonuck, K., … Murphy, A. (2014). Looking from the outside in: The use of video in attachment-based interventions. *Attachment & Human Development*, *16*, 402–415. doi:10.1080/14616734.2014.912491

Suess, G. J., Bohlen, U., Carlson, E. A., Spangler, G., & Frumentia Maier, M. (2016). Effectiveness of attachment based STEEP intervention in a German high-risk sample. *Attachment & Human Development*, *18*, 443–460. doi:10.1080/14616734.2016.1165265

Taubner, S., Munder, T., Unger, A., & Wolter, S. (2013). Zur Wirksamkeit präventiver Früher Hilfen in Deutschland-Ein systematisches Review und eine Metaanalyse [Effectiveness of early prevention programs in Germany: A systematic review and a meta-analysis]. *Prax Kinderpsychol Kinderpsychiatr*, *62*, 598–619.

Teicher, M. H., Samson, J. A., Anderson, C. M., & Ohashi, K. (2016). The effects of childhood maltreatment on brain structure, function and connectivity. *Nature Reviews Neuroscience*, *17*, 652–666. doi:10.1038/nrn.2016.111

Thomas, R., & Zimmer-Gembeck, M. J. (2011). Accumulating evidence for parent-child interaction therapy in the prevention of child maltreatment. *Child Development*, *82*, 177–192. doi:10.1111/j.1467-8624.2010.01548.x

Tronick, E., Als, H., Adamson, L., Wise, S., & Brazelton, T. B. (1978). The infant's response to entrapment between contradictory messages in face-to-face interaction. *Journal of the American Academy of Child & Adolescent Psychiatry*, *17*(1), 1–13.

van Ijzendoorn, M. H., Juffer, F., & Duyvesteyn, M. G. (1995). Breaking the intergenerational cycle of insecure attachment: A review of the effects of attachment-based interventions on maternal sensitivity and infant security. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *36*, 225–248.

Weiß, R. H. (2006). *CFT 20-R. Grundintelligenztest Skala 2* [*Basic Intelligence Scale 2 (CFT 20-R)*]. Göttingen: Hogrefe.

Weisz, J. R., Jensen-Doss, A., & Hawley, K. M. (2006). Evidence-based youth psychotherapies versus usual clinical care: A meta-analysis of direct comparisons. *The American Psychologist*, *61*, 671–689. doi:10.1037/0003-066X.61.7.671

Widom, C. S., DuMont, K., & Czaja, S. J. (2007). A prospective investigation of major depressive disorder and comorbidity in abused and neglected children grown up. *Archives of General Psychiatry*, *64*, 49–56. doi:10.1001/archpsyc.64.1.49

Wittchen, H., Zaudig, M., & Fydrich, T. (1997). *Strukturiertes Klinisches Interview für DSM-IV (SKID), Achse II* [*Structured Clinical Interview for DSM-IV Axis II Disorders*]. Göttingen: Hogrefe.

Wright, B., Hackney, L., Hughes, E., Barry, M., Glaser, D., Prior, V., … McMillan, D. (2017). Decreasing rates of disorganised attachment in infants and young children, who are at risk of developing, or who already have disorganised attachment. A systematic review and meta-analysis of early parenting interventions. *PLoS One*, *12*, e0180858. doi:10.1371/journal.pone.0180858

Wurster, H. E., Sarche, M., Trucksess, C., Morse, B., & Biringen, Z. (2019). Parents' adverse childhood experiences and parent-child emotional availability in an American Indian community: Relations with young children's social-emotional development. *Development and Psychopathology*. Advance online publication. doi:10.1017/S095457941900018X

Ziv, Y., Aviezer, O., Gini, M., Sagi, A., & Koren-Karie, N. (2000). Emotional availability in the mother-infant dyad as related to the quality of infant-mother attachment relationship. *Attachment & Human Development*, *2*, 149–169. doi:10.1080/14616730050085536

Zwönitzer, A., Ziegenhain, U., Bovenschen, I., Bressem, K., Pillhofer, M., Fegert, J. M., … Künster, A. K. (2015). Effects of early intervention in children at risk: Short-term and long-term findings from an attachment-based intervention program. *Mental Health & Prevention*, *3*, 98–102.