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To cite this article: G.J. Suess, U. Bohlen, E.A. Carlson, G. Spangler & M. Frumentia Maier (2016) Effectiveness of attachment based STEEP™ intervention in a German high-risk sample, Attachment & Human Development, 18:5, 443-460, DOI: [10.1080/14616734.2016.1165265](https://doi.org/10.1080/14616734.2016.1165265)

To link to this article: <https://doi.org/10.1080/14616734.2016.1165265>



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Published online: 01 Apr 2016.



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Effectiveness of attachment based STEEP™ intervention in a German high-risk sample

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ABSTRACT

STEETM™ was one of the first attachment-based early intervention programs. The program applied findings from the Minnesota Longitudinal Study on Risk and Adaptation to the development of a supportive program for young high-risk mothers and their infants. STEETM's effectiveness was evaluated first in a randomized controlled study launched in 1987. The study showed effects of the one-year intervention on important individual and parenting variables, but not on quality of mother–infant attachment. In the current German study with young mothers at risk for abuse and neglect, a two-year adaptation of STEETM was evaluated within a quasi-experimental design. STEETM mother–infant pairs ($N = 78$) were compared with pairs who received standard services of the German Child Welfare System (GCWS, $N = 29$). Compared with GCWS pairs, significantly more mother–infant pairs in the intervention group showed secure attachment patterns in Ainsworth's Strange Situation when the infants were 12 months of age. At the end of the intervention (infant age = 24 month), attachment security scores derived from Waters' Attachment Q-Sort were in the predicted direction and showed a medium effect size, but did not reach criteria of statistical significance. At both time points, the STEETM group showed significantly fewer signs of attachment disorganization than the comparison group.

ARTICLE HISTORY

Received 28 September 2015
Accepted 9 March 2016

KEYWORDS

Attachment based early intervention; STEETM program; translational research; young high-risk mothers

Integral to attachment theory is the idea that early patterns of interactions between infants and their caregivers provide a foundation for later socio-emotional functioning, including the development of expectations, or representations, of the self and others in relationships, and eventually the development of psychopathology years later (Bowlby, 1969/1982). There is now ample empirical evidence for Bowlby's ideas (Carlson, 1998; Fearon & Belsky, 2011; Groh, Roisman, Van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Madigan, Atkinson, Laurin, & Benoit, 2013; Sprangler, Fremmer-Bombik, & Grossmann, 1996; Sroufe, Egeland, Carlson, & Collins, 2005; Suess, Grossmann, & Sroufe, 1992; Wartner, Grossmann, Fremmer-Bombik, & Suess, 1994; Weinfield, Sroufe, Egeland, & Carlson, 2008). In particular, the Minnesota Longitudinal Study of Risk and

Adaptation documents the legacy of attachment security within the first three years for healthy long term development and documents the continuous interplay between experience, representation and adaptation (Carlson, Sroufe, & Egeland, 2004; Sroufe et al., 2005). Further, mental representations developed from early relationship experience have been found to be moderately stable across time (Fraley, 2002; Groh et al., 2014; Grossmann, Grossmann, & Waters, 2005; Pinquart, Feussner, & Ahnert, 2013; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000) and to be influential in parent-child interactions with the next generation (Kovan, Chung, & Sroufe, 2009). In particular, children of adults with histories of trauma and attachment disorganization are at increased risk for forming disorganized attachments (Egeland, Jacobvitz, & Sroufe, 1988; Madigan et al., 2006; Raby, Steele, Carlson, & Sroufe, 2015). Based on longitudinal and cross-generational research that validates attachment concepts, attention has turned to intervention with a focus on mechanisms of change (see Steele & Steele, 2008; Berlin, Zeanah, & Lieberman, 2008).

Attachment-based interventions for infants and toddlers have targeted processes associated with the development of secure early relationships, at the same time addressing the origins of attachment disorganization (Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2003, 2005). Important mechanisms related to security include parental sensitivity (Ainsworth, Blehar, Waters, & Wall, 1978; De Wolff & Van IJzendoorn, 1997; Grossmann, Grossmann, Spangler, Suess, & Unzner, 1985; Pederson, Bailey, Tarabulsy, Bento, & Moran, 2014) and factors associated with parental capacity to provide sensitive care, including knowledge and understanding of child behavior and development, availability of positive social support (Sroufe et al., 2005; Suess & Sroufe, 2005), and reflective functioning in adult representational models of attachment (Berlin, 2005; Bretherton & Munholland, 2008).

An intervention focus on improving parental sensitivity (Steele et al., 2014) has been substantiated through empirical evidence. Numerous studies, beginning with Van Den Boom (1994) have demonstrated positive outcomes of interventions targeting change in parental sensitivity (Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2008). Practical advantages of focusing on sensitivity include the relatively clear structure of a behavior-focused approach, which simplifies staff training and assurance of program integrity, as well as limiting the intervention to parent-infant interaction rather than other challenges the family may encounter.

Attachment theory and research have also highlighted the importance of parental history of care and concurrent supportive relationships as mechanisms of development, intergenerational transmission, and change in relationship experience (Bretherton & Munholland, 2008; Steele & Steele, 2008). As John Bowlby (1988) articulated, a therapeutic relationship provides individuals with a *secure base* for the exploration of feelings, expectations, and attitudes related to behavior in past and present relationships, including relationships with other family members and professionals (Suess et al., 2015). Integrating representational experience and utilizing the therapeutic relationship in intervention leads to more complex, integrative programs with potential long term gains (Cicchetti, Rogosch, & Toth, 2006; Lieberman, 2004; Pickreign Stronach, Toth, Rogosch, & Cicchetti, 2013). For example, in a study of infants with histories of abuse (Cicchetti et al., 2006), children were assigned randomly to three different intervention strategies: (1) the Lieberman infant-parent psychotherapy (CPP; Lieberman, Weston, &

Pawl, 1991), which primarily focuses on changing mothers' representations through the therapeutic relationship; (2) the psycho-educational Nurse Family Partnership Program (NFP; Olds, 2006; Olds, Henderson, Tatelbaum, & Chamberlin, 1986) focusing on stress management, parenting skills and social support; and (3) treatment as usual in the community for maltreated infants and their parents, which served as a control group. Both CPP and the NFP groups showed increases in attachment security as well as impressive reductions in attachment disorganization over the one-year intervention period as compared to the control group. However, 12 months following intervention, there were differential effects of CPP and NFP, with higher rates of secure and lower rates of disorganized attachment in the attachment-based CPP intervention (Pickreign Stronach et al., 2013), indicating that attachment-based intervention focused on representation may be more effective than targeted psycho-educational approaches in maintaining secure attachment.

In contrast, a meta-analysis of attachment-based interventions (Bakermans-Kranenburg et al., 2003), including 70 studies of 88 different early intervention programs, concluded that sensitivity-focused interventions with a moderate number of sessions are more effective in promoting secure attachment than more complex, long-lasting interventions focusing on a combination of sensitivity, representation and support (Egeland, Weinfield, Bosquet, & Cheng, 2000). The resulting *less is more* assertion has stimulated the development of numerous short-term intervention programs and evaluations (e.g., Bernard et al., 2012; Cassidy, Woodhouse, Sherman, Stupica, & Lejuez, 2011; Hoffman, Marvin, Cooper, & Powell, 2006; Moss et al., 2011).

The studies, covered in the Bakermans-Kranenburg et al. (2003) meta-analysis, target a variety of developmental periods, ranging from early infancy (three months) to the toddler period (24 months). However, researched benefits of interaction- versus representation-focused intervention programs do not refer to comparable time periods. Moreover, it has been repeatedly suspected that it may be easier to improve the quality of the mother–infant relationship than to promote its maintenance, especially during the second year of the child's life (see Pickreign Stronach et al., 2013; Zwönitzer et al., 2015)). Thus, it is unclear when (i.e., infancy, toddler, preschool period) and with whom (e.g., parents with histories of trauma, mental illness, etc.) distinct or combinations of strategies are likely to be most effective (Stern, 2004). However, preliminary data suggest that in infancy, focusing on parenting skills, knowledge and attitudes and on infant–parent interactions may initiate cascades of positive change. In addition, representational interventions appear to be more effective than psycho-educational approaches (Toth, Maughan, Manly, Spagnola, & Cicchetti, 2002). In the meta-analysis by Bakermans-Kranenburg et al. (2003), where short and interaction-focused intervention programs showed better effectiveness results, three studies focused on comprehensive intervention targeting parent–child interaction, representation, as well as social support (Egeland & Erickson, 1993a; Heinicke et al., 1999; Lieberman et al., 1991), and only one study was effective with regard to attachment security (Heinicke et al., 1999), the CPP program (Lieberman et al., 1991) has demonstrated effectiveness since then.

Steps Toward Effective and Enjoyable Parenting (STEEP, Egeland & Erickson, 1993b) was one of the early comprehensive intervention programs. The attachment-based STEEP program was developed by B. Egeland and M.F. Erickson (Egeland & Erickson, 1993a, 1993b) as a translation and application of findings and insights from attachment theory and research and from the Minnesota Longitudinal Study (Sroufe et al., 2005) to

intervention with families at risk. The main goal besides keeping the baby safe was to support the development of secure infant–parent attachment by (1) enhancing maternal sensitivity using video feedback (Seeing is Believing® SIB; Erickson, Endersbe, & Simon, 1999), (2) addressing maternal attachment representations by encouraging mothers to explore past and current relationship experiences and their influence on parenting (*looking back moving forward*), and (3) promoting the development of effective social support (e.g., with partners, family members, friends) through bi-weekly individual visits and mother–child group experiences beginning during pregnancy and continuing until the child’s second birthday. According to Bowlby (1988), the professionals see themselves as companions of the parents, providing a “secure base”, serving as a role model to deal with specific vulnerabilities, and respectfully challenging the parents to become “good enough” parents. A STEEP Facilitator’s Guide provides suggestions for several session topics, but there is no specific curriculum. Rather, the facilitator assists the parent through individualized open-ended questioning.

The initial STEEP implementation engaged families from late pregnancy until the infants’ first birthday. In a randomized clinical trial including 154 high-risk first time mothers, the intervention did not prove to be effective in increasing secure attachment patterns at 13 and 19 months (Egeland & Erickson, 2004). These mothers were assigned high-risk status on the basis that they were young (17–25), single, and had a low socio-economic status and education level (Egeland & Erickson, 1993a). Due to the overwhelming number of secure relationships in the high-risk control group, lack of evidence of attachment pattern treatment effects was interpreted, in part, as a ceiling effect (e.g., Bakermans-Kranenburg, Juffer, & van IJzendoorn, 1998). However, whereas intervention group mothers showed continuity of attachment throughout the second year, control group mothers tended to move toward more insecurity. Despite comparable life stress levels in both groups, the STEEP mothers also showed increased sensitivity, improved understanding of child development, better life management skills, fewer depressive symptoms, and fewer repeat pregnancies within two years as compared to control group mothers (Egeland & Erickson, 2004). Qualitative records kept throughout the initial study suggested that it took months for many of the participants to build sufficient trust with the STEEP workers to explore difficult attachment relationships and representations. Similarly, it seemed difficult for many participants to cope with the termination of the program as just as important relationships with the intervenors were developing and as their babies were becoming toddlers with new developmental challenges.

Building on lessons from the initial implementation and evaluation of STEEP as well as CPP (Lieberman et al., 1991), Heinicke et al. (1999) developed a complex two year intervention program (UCLA) starting in late pregnancy with weekly homevisits during the first year and every other week during the second year with a focus on the relationship of the mother to her infant, to her family of origin, the intervener, and to her romantic partner. The UCLA program not only is a complex program but it also integrates the partner relationship (Cowan, Powell, & Cowan, 1998) and thus translates research results into practice, for instance that the comings and goings of romantic partners are a major challenge, and that a supportive partner serves as a protective factor for attachment development (Sroufe et al., 2005). Within a randomized controlled study the UCLA intervention yielded significant effects on attachment security. A decade

after Bakermans-Kranenburg et al.'s (2003, 2005) meta-analyses, the Lieberman's CPP program (Lieberman et al., 1991) has demonstrated its effectiveness within randomized controlled studies. At least one of the studies does not involve the developers and it has demonstrated sustained efficacy up to one year after intervention ended, thus fulfilling criteria that CPP can now be regarded as a well-established evidence-based program (Toth, Gravener-Davies, Guild, & Cicchetti, 2013, p. 1604). The same is true for Dozier's Attachment and Biobehavioral Catch-Up intervention (ABC; Bernard et al., 2012; Dozier, Lindhiem, & Ackerman, 2005), a short (10 sessions) but complex intervention program for multiple risk families including foster care after maltreatment. Moss et al. (2011) could demonstrate significant change from insecurity or disorganization to attachment security within a short intervention for 1–5-year-old maltreated children using video-feedback. This program "meets criteria for a probably efficacious treatment as its efficacy has not yet been replicated by an independent investigator or team" (Toth, Gravener-Davis, Guild, & Cicchetti, 2013, p. 1604).

Research suggests that in poverty samples and in the context of high stress, attachment patterns may require more time to become consolidated and may be vulnerable to change (Sroufe et al., 2005). Based on this research and our own clinical experience, we expected that intervention for high-risk parents may require a comprehensive, stable, protracted approach. The two-year STEEP program promised to be a good platform because of its foundation in longitudinal research and its history of its application across community samples (Egeland & Erickson, 2004; Erickson & Egeland, 2004; O'Connor & Nilsen, 2005).

The purpose of the study was to replicate and contribute to evidence regarding the effectiveness of the STEEP intervention. Whereas ample evidence supports efforts to improve maternal sensitivity (e.g., Bakermans-Kranenburg et al., 1998; Bakermans-Kranenburg et al., 2008), the link between attachment-focused intervention trials and resulting attachment security is weaker (see Van IJzendoorn, Bakermans-Kranenburg, & Juffer, 2005). Therefore, we mainly focused on effects of intervention on attachment patterns using the Ainsworth Strange Situation Procedure (SSP) and the Waters Attachment Q-Sort (AQS) and its continuity throughout the second year of children's life. Specifically we hypothesized that, compared to the control group, (1) significantly more mother–infant pairs participating in the STEEP intervention would develop secure attachments and (2) significantly fewer mother–infant pairs in the STEEP intervention would exhibit disorganized attachment.

Method

Participants

Participants were drawn from child welfare agencies serving mothers at risk for neglect and abuse. For this study, of the mothers recruited, 78 mother–infant dyads participated in the intervention assessments at 12 month. The control group included 29 mother–infant dyads. All mothers were eligible for child welfare support. In cases of informed consent, mothers were included in the study. Furthermore, recruitment process of mothers was controlled by available resources of the participating agencies. Group characteristics did not differ between geographic locations. At the beginning of the

study, implementation of STEEP together with training and data collection required more resources than were available at that time. Therefore, we concentrated on implementation and data collection in the intervention group at the initial stage and only started to recruit mothers for the control group at infants' age of 12 months. Data could not be collected in reliable form of all subjects, resulting in variable *Ns* in the tables.

In the intervention group, 48.7% of mothers were younger than 18 years, compared to 34.5% in the control group. The average age was 18.08 and 19.34 years for treatment and control groups, respectively. Of mothers in the treatment group, 42.1% had not graduated from school, compared to 41.4% of the control group mothers, and the rates of single mothers were 83.1% and 72.4%, in treatment and control groups, respectively.

More than one-fifth of mothers in the intervention group reported having mental health problems and, overall, mothers described relationships with their families of origin as highly stressed. Nearly one-third (30.3%) of STEEP mothers had spent a significant part of childhood in out-of-home settings.

At the time of birth, all children were healthy and not affected by physical illness or disability. There were no premature infants. Fifty-four children (47.4%) of the intervention group were male, compared to 18 (62.1%) in the control group.

There was a major loss of data due to drop out and missing values. Rates were 39.7% in intervention and 24.1% in control group at 12 months and to 49.5% (STEPP) and 51.7% (control group) at 24 month. A comparable long term intervention program, carried out in Germany with support of the National Center of Early Prevention (Renner & Heimeshoff, 2011) reported a dropout rate of 42% over the two-year intervention period (Jungmann et al., 2015).

Study design and procedure

Beginning in 2004, STEEP was implemented in three German cities (Hamburg, Frankfurt, Offenburg) within different child welfare agencies. The STEEP Facilitators' Guide (Erickson & Egeland, 2002) was translated and adapted for use in German-speaking countries (Erickson & Egeland, 2009). Over a period of several years, the primary authors worked to establish a training program for practitioners, met together with researchers and service providers in the US and Germany, and established opportunities for case consultation and personal exchange between STEEP facilitators in the two countries, the developers of STEEP at the University of Minnesota and German STEEP providers and trainers.

The implementation process included staff training and follow-up on-site reflective consultation for leaders and STEEP facilitators, done in close cooperation with one of the developers of STEEP to ensure program integrity and quality (see Bohlen, 2015; Sueess, Erickson, Egeland, Scheuerer-Engelisch, & Hartmann, *in press*). STEEP training focused on facilitator qualities and skills, beginning with an assessment of the facilitator Inner Working Models (IWM) of experiences in relationships. In a special training unit, trainees are encouraged to critically reflect on various influences on self as well as its possible influences on the intervention process in supervision (see Sueess et al., 2015). Mothers in the intervention group were recruited during pregnancy or, in some cases, shortly after the birth of the baby. Control group families were recruited when the babies were 12

months of age. Both groups were followed until the babies were 24 months of age. Treatment group mothers were guided in the STEEP program at the three sites. Control group mothers received standard support as usual in the German Child Welfare System (GCWS), which includes home visits by a MA-level social worker, with no early intervention training requirements and without the application of video feedback methods. Due to rules within the GCWS at that time, it was not possible to randomly assign mothers to treatment and control groups. However, control group mothers were recruited from welfare agencies other than those conducting STEEP interventions, in order to avoid spillover effects of STEEP principles and techniques. On average, 30 ($SD = 18.8$) home visits with 12 ($SD = 9.56$) video interventions were delivered with frequencies showing no effect on intervention effectiveness. Up to four family nights during intervention for close friends and family members as well as one or two group trips with program mothers are an additional element to strengthen social support on top of the group sessions.

Data were collected at three time points: the beginning of the study (time 0), at child's age of 12 months (time 1), and at the end of intervention (child's age of 24 months; time 2) over a period of five years. Attachment was assessed at times 1 and 2. Parental stress, childrearing attitudes, and depressive symptoms were assessed at times 0, 1 and 2.

Measures

Attachment assessment: Strange Situation Procedure

The Strange Situation attachment procedure (Ainsworth et al., 1978) was conducted at child's age of 12 and 24 months (times 1 and 2). The Strange Situation is a well-validated and extensively used 25-minute laboratory procedure to assess patterns of infant–parent attachment in children 12–18 months old. Across eight episodes, each lasting up to three minutes, child behavior is observed in free play and in response to two separations from and reunions with mothers. Based on videotaped SSP sessions, infants are classified as securely attached, insecure avoidant, or insecure resistant. In addition to organized patterns, assessments are also coded for the disorganized/disoriented attachment (Main & Solomon, 1990). The disorganization coding scheme provides categorical (disorganized/disoriented versus organized attachment classification) as well as a 9-point dimensional rating. The attachment disorganization ratings range from no signs of disorganization (rating = 1) to extreme disorganization (rating = 9). The videotaped attachment assessments were coded by expert coders from the University of Minnesota. Of the 100 12-month assessments, 25 were rated by a second trained rater with 80% and 79% agreement on ABC and D respectively. Of the 56 24-month assessments, three divergent cases were resolved through conference.

Attachment assessment: Attachment Q-Sort

The Attachment Q-Sort (AQS; Ahnert, Eckstein-Madry, Supper, Bohlen, & Suess, 2012; Waters, 1995) was applied at time 2 (child age of 24 months) as an additional measure of attachment security. The AQS consists of 90 cards with behavioral descriptions of 12–60-month-old children with a special emphasis on secure base behaviors. Two students, blind to group status, observed each child for 90 minutes to three hours in the home and subsequently sorted the AQS cards independently into nine piles, indicating how

characteristic each description was for the individual child. The correlation between the two Q-sorts was $r = .70$ ($p < .01$). The rating means were correlated with the criterion Q-sort provided by Waters and the correlation coefficients were subsequently z-transformed for purposes of data analysis in this study.

Parental Stress Index Short Form

The Parental Stress Index short form (PSI-SF; **Abidin, 1995**) is a 36-item questionnaire that measures overall parental stress as well as three subscales, including parental distress (PD, $\alpha = 0.87$), dysfunctional parent-child interaction (PCDI, $\alpha = 0.80$) and "difficult child" (DC, $\alpha = 0.85$) for which validity is sufficiently examined (Greer, Gulotta, Masler, & Laud, 2007). Internal consistency is good ($\alpha = 0.91$). Scores above the 85th percentile are considered clinically significant for risk of child maltreatment (Abidin, 1995). Clinically significant cutoff scores are total score (>86), PD (>38), PCDI (>22) and DC (>27).

Adult/Adolescent Parenting Inventory

The Adult/Adolescent Parenting Inventory (AAPI; **Bavolek, 1989**) was used to assess mother's attitudes concerning child-rearing and education. The 40-item questionnaire measures five constructs, including inappropriate expectations of children (S1), lack of empathy toward the needs of children (S2), belief in the use of corporal punishment (S3), inappropriate parent-child family roles (S4), and discouraging child power and independence (S5). The AAPI has been validated in a large, heterogeneous sample (Conners, Whiteside-Mansell, Deere, Ledet, & Edwards, 2006) and used successfully to assess maltreatment. To calculate an AAPI overall risk score, subscale scores were converted to dichotomized risk indices (1 = risk; 0 = no risk based on clinical cut-offs) and summed across the five scales. For the 12 months AAPI subscales Cronbach's alpha was .63 and for the 24 months subscales Cronbach's alpha was .75.

Edinburgh Postnatal Depression Scale

The Edinburgh Postnatal Depression Scale (EPDS; **Cox, Holden, & Sagovsky, 1987**) is used to identify depression in new mothers. It consists of 10 short items to which mothers choose one of four possible answers scored from 0 to 3 according to increased severity. Mothers scoring above the threshold 92.3% (scores > 11) are likely to be suffering from a depressive illness. The reported internal consistency is $\alpha = 0.87$ (Cox et al., 1987).

Risk exposure

The assessment of the degree of risk exposure was measured by counting the number of risk factors, including (1) age under 18 years (age of consent), (2) no or low level of education, i.e. no more than a German "Hauptschulabschluss", which is the lowest educational qualification attained after completion of 9th grade, (3) financial state subsidy, (4) living as single mother, (5) mental illness, (6) history of adoption or foster care, and (7) death of a parent.

Results

Risk exposure and differential attrition

Because randomization was not possible in this study, differences in risk exposure were examined across groups. In these analyses, STEEP group mothers showed a significantly higher level of exposure to risk factors compared to the GCWS control group ($t [134] = -2.52, p = .013, d = .529$; STEEP $M = 4.26, SD = 0.91$; GCWS $M = 3.79, SD = 0.77$).

Risk exposure was also used to test differential attrition (see Table 1) with respect to the 12-month assessment and the 24-month assessment by comparing exposure of subjects in the STEEP and the GCWS groups remaining in the sample compared to drop-out subjects (or subjects with missing data). For each assessment a group (STEEP versus GCWS) by attrition (remaining, drop-out) ANOVA for risk exposure revealed a main effect for group (12-month: $F [1,132] = 6.13, p < .05, \eta^2 = .044$; 24-month: $F [1,132] = 5.79, p < .05, \eta^2 = .047$). There was no significant interaction effect indicating possible differential attrition biases and no main effect for attrition.

Attachment: Strange Situation

At the child's age of 12 months, 71.8% of the mother–infant pairs in the STEEP group as compared to 45.5% of GCWS group pairs developed a secure attachment relationship after one year of intervention (see Table 2). The odds of developing a secure attachment, a primary goal of the intervention, were 3.1 times higher for STEEP group than for GCWS

Table 1. Differential attrition of intervention (STEEP) and control (GCWS) groups.

Data	12 months (SSP)			24 months (AQS)		
	Number of risks			Number of risks		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
STEEP						
Enrolled	76*	4.28	0.86	54	4.11	0.86
Dropout **	31	4.23	1.05	53	4.42	0.95
GCWS						
Enrolled	22***	3.86	0.64	14	3.86	0.66
Dropout	7	3.57	1.13	15	3.73	0.88

SSP = Strange Situation Procedure; AQS = Attachment Q-Sort (t-tests: no significant differences; GCWS = German Child Welfare System; STEEP = Intervention.

* Data with regard to risk exposure were not available for two mothers

** Dropout from STEEP intervention as well as missing data sets

*** Attachment status of seven mothers was not available

Table 2. Distribution of attachment security and attachment disorganization (assessed by the SSP) across the intervention (STEEP) and the control group (GCWS).

Variable	12 months		24 months	
	STEEP (<i>N</i> = 78)	GCWS (<i>N</i> = 22)	STEEP (<i>N</i> = 38)	GCWS (<i>N</i> = 18)
Attachment security				
Secure	56	10*	30	14
Insecure	22	12	8	4
Attachment disorganization	24	8	5	7
Disorganized				
Organized	54	14	33	11**

Note: Attachment security (Strange Situation category B) versus insecurity (Strange Situation categories A and C); Disorganized versus Organized (Strange Situation, category D versus not D).

* $p < .05$; Odds Ratio 3.1; ** $p < .05$; Odds Ratio 4.2

group. This difference in the distribution of secure and insecure attachment in the two groups was significant ($\chi^2 [1,100] = 5.301, p = .02, Cramer V = .23$). The odds ratio of 3.1 indicates a medium effect. At 24-months, distributions of secure and insecure children were similar for STEEP and GCWS group, and there were no significant group effects.

Regarding attachment disorganization, at 12 months, the proportions of infants in the intervention and control groups classified as disorganized versus non-disorganized did not differ significantly. In contrast, at 24 months significantly more children in the GCWS group (38.9%) as compared to the STEEP group (13.2%) developed disorganized patterns of attachment with their mothers ($\chi^2 [1, 56] = 4.81, p = .04, Cramer's V = .29$; see Table 2). In other words, for the STEEP group, the odds of developing an organized pattern of attachment by 24 months were 4.2 times higher than for control group members. This indicated a medium effect size.

Attachment disorganization was also compared across intervention and control groups using the continuous 9-point disorganization rating and controlling for risk exposure. Significant effects were indicated at both 12 and 24 months (see Table 3). Infants in the GCWS group received significantly higher disorganization ratings at 12 months ($M = 4.45, SD = 1.99$) than those of STEEP group infants ($M = 3.50, SD = 1.95, F [1, 95] = 4.95, p = .03, d = 0.49$), indicating a medium effect size. Similarly, at 24 months, children in the GCWS control group received significantly higher ratings of disorganized behavior ($M = 3.61, SD = 2.25$) than children in the STEEP intervention group ($M = 2.35, SD = 1.62, F [1, 52] = 5.8, p = .02, d = 0.7$). The two measures also differentiated between the two groups when we did not control for risk exposure, as *t*-tests showed.

Attachment: Attachment Q-Sort

Although mother–infant pairs in the two groups did not differ with respect to categorical differences in attachment security (SSP), at 24 months, the STEEP group mothers showed a tendency (see Table 3) toward higher secure base behavior scores based on the Attachment Q-Sort, controlling for risk indicators ($F [1, 66] = 3.17, p = .08$; STEEP: $M = 0.29, SD = 0.30$; GCWS: $M = 0.18, SD = 0.22$), with a medium effect size ($d = 0.42$).

Intervention effects on parental stress, attitudes, and depression

Parental stress index (PSI), childrearing attitudes (AAPI), and depression (EPDS) were compared for intervention (STEEP) and control groups (GCWS; see Table 4). At the child's age of 12 months, STEEP group mothers received significantly higher total PSI scores

Table 3. Intervention and control group (GCWS) comparisons of continuous attachment measures controlling for risk exposure.

Variable	Time	STEEP M (SD)	GCWS M (SD)	F (df)	D
D-Score	12 months	3.50 (1.95)	4.45 (1.99)	4.95 (1.95)*	.49
	24 months	2.35 (1.62)	3.61 (2.25)	5.80 (1.52)**	.70
AQS	24 months	.29 (.30)	.18 (.22)	3.17 (1.66)+	.42

Procedure: AQS = Attachment Q-Sort; GCWS = German Child Welfare System treatment as usual; STEEP = Intervention group.

* $p = .03$; ** $p = .02$; + $p = .08$

Table 4. ONEWAY ANOVA results for parental stress (PSI), parenting attitudes (AAPI) and depression (EPDS) by Intervention (STEEP) and Control group (GCWS) status.

Variable	Time	STEEP			GCWS			<i>F</i> (df _M , df _R)
		<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	
PSI-TS	t1	71	74.97	15.30	28	67.78	18.50	3.92 (1,97) *
	t2	57	75.07	17.09	19	74.57	20.50	0.01 (1,74)
AAPI-Risk	t1	73	0.63	0.90	27	0.70	1.10	0.11 (1,98)
	t2	54	0.31	0.50	19	0.79	0.71	1.10 (1,71) **
EPDS	t1	77	9.00	5.90	28	8.14	6.80	0.42 (1,103)
	t2	61	8.31	5.69	20	7.05	4.14	0.83 (1,79)

Note: GCWS = German Child Welfare System; STEEP = Intervention group; t1 = 12 months; t2 = 24 months; PSI = Parental Stress Index; TS = Total score; AAPI = Adult-Adolescent Parenting Inventory Risk score; EPDS = Edinburgh Postnatal Depression Scale.

* $p = .05$; ** $p = .002$

than those in the GCWS control group ($F [1, 97] = 3.92, p = .05$; STEEP: $M = 74.97, SD = 15.30$; GCWS: $M = 67.78, SD = 18.50$). Post hoc analyses indicated a significant group difference on the PSI-DC ("difficult child") subscale ($F [1, 98] = 4.64, p = .03$; STEEP: $M = 27.79, SD = 6.87$; GCWS: $M = 24.42, SD = 7.33$). These differences were not present one year later at the 24-month assessment.

At 12 months, no significant differences were found in parenting attitudes based on the Adult Adolescent Parenting Attitude overall risk index. In contrast, at 24 months of age STEEP group mothers received significantly lower AAPI risk scores ($F [1, 71] = 1.10, p = .002$, STEEP, $M = 0.31, SD = 0.5$; GCWS, $M = 0.79, SD = 0.71$). Post hoc tests indicated significant differences in STEEP versus control group mothers' attitudes on two subscales (AAPI S5: $F = 4.11, [1,75], p = .039$; AAPI S2: $F = 3.99, [1,75], p = .049$). The findings indicated that, compared with control group mothers, STEEP mothers were more likely to endorse appropriate levels of empathy (i.e., to understand and value children's needs, AAPI-S2) and to value children's power and ability to solve problems, i.e., to encourage children to express their views and make good decisions (AAPI-S5). On AAPI-S2, two mothers of the GCWS group and none of the STEEP group mothers scored within the clinical range (*Fisher's Exact*: $p = .065$). On AAPI-S5, 47.4% of GCWS group mothers versus 22.4% of STEEP group mothers scored within the clinical range (*Fisher's Exact*: $p = .046$).

Intervention (STEEP) and control (GCWS) groups did not differ on the depression screening measure (EPDS) at 12 and 24 months.

Discussion

The current study aimed to examine the effectiveness of the STEEP intervention model using a sample in the GCWS under real conditions in the widespread practice (Greenberg, 2005). Such a community outreach has been recommended (Cicchetti, 2013; O'Connor & Nilsen, 2005) for program dissemination and translational research and is the legacy of John Bowlby (1988). The STEEP replication focused on mechanisms underlying the development of attachment security as promising protective processes in supporting young high-risk mothers and their infants (Masten, 2011; Pickreign Stronach et al., 2013; Sroufe, 2005; Sroufe & Rutter, 1984).

The first endeavor was to establish acceptance for the STEEP program in the field, as implementing a long-term, multifaceted intervention such as STEEP in a standard way

may be particularly challenging. Consequently, potential positive outcomes of such a complex program may not become apparent due to implementation problems (see Van IJzendoorn et al., 2005). Although a randomized controlled study was not possible within child welfare practice in Germany, the National Center for Early Prevention (NZFH; Cierpka & Evers, 2015; Renner & Heimeshoff, 2011) supported the process of establishing a research-oriented culture in practice evaluation. All of those factors are regarded as either supporting or obstructing the implementation process, and thus influencing the testing the effectiveness of STEEP.

Results of the current study indicated an overall group difference in exposure to risk factors, with STEEP group mothers experiencing significantly higher exposure to risk than the control group mothers. Thus, any intervention group differences cannot be interpreted as a consequence of low risk conditions or less stress; rather, treatment effects needed to be demonstrated against and above the higher risk exposure of STEEP group pairs. In addition, drop out and missing data exclude biases due to differential attrition.

Attachment security and disorganization, orthogonal relational dimensions, were the primary foci of the effectiveness research. With respect to the secure-insecure dimension of attachment, significantly more children involved in the STEEP program exhibited secure attachment at 12 months in the laboratory Strange Situation as compared to children in the GCWS treatment as usual group. Attachment security as measured categorically did not differ at 24 months. However, using the Attachment Q-Sort, the STEEP group pairs scored higher on the dimensional Attachment Q-Sort at 24 months, controlling for risk exposure. As the Strange Situation Procedure is recommended up to 18 months and usually not for 24 months, this could be an explanation, as well as the greater power of dimensional measures like the AQS to detect effects. Overall, regardless of the group differences, the attachment security rate found in the GCWS group was remarkable for high-risk samples and can be viewed as a demonstration of the quality of child and family services in Germany, a country in which high rates of insecure-avoidant attachments (49% A versus 33% B) have been reported (Grossmann et al., 1985).

The first year (12 month) results of attachment disorganization were mixed with respect to dimensional and categorical measure analyses. At both 12- and 24-month assessments, the attachment disorganization rating differentiated groups, with significantly fewer signs of disorganization in the STEEP intervention group. Categorical effects related to attachment disorganization were significant at 24 months, but not at 12 months. Significantly more infant-mother pairs in the control group were classified as disorganized at the end of the intervention, compared with the STEEP group.

STEEP intervention and GCWS control groups differed with respect to parental stress, and parental child rearing attitudes, but not maternal depression (contrary to the original STEEP findings). STEEP participants indicated significantly more stress at 12 months compared with the GCWS group. However, stress scores were equivalent at 24 months with stable stress levels in the STEEP group and increased stress levels in parents in the control group over the child's second year. With parental child-rearing attitudes, indices of risk declined for STEEP group mothers over the course of the intervention. This continuous, high strain characterizes the lives of these mothers, and points to the necessity of more intensive, complex intervention programs. Sensitivity seems to be attainable quickly through video-based interventions, but it appears to be more difficult

to maintain this effect, especially throughout the second year, where children are generally experienced as highly demanding.

Short-term as well as long-term attachment-based interventions may have long-lasting positive effects via different mechanisms with different populations. Both focus on important early dyadic processes that potentially trigger cascades of positive relationship experiences, leading to improved infant adaptation, possibly with more or less robust effects in certain environments, or no effect at all in others. The existing evidence for differential susceptibility in intervention research (e.g., Bakemans-Kranenburg, Juffer, & van IJzendoorn, 1998; Cassidy et al., 2011) call for the development of apposite interventions for different groups. Apart from a better understanding of different types of risks and their differential effects, epidemiological studies are needed in order to examine the prevalence of risk constellations to better plan, offer, and evaluate apposite interventions.

At this stage, a variety of treatment approaches are expected to be beneficial, and a “one size fits all” treatment approach will most likely not improve practice. Further studies are needed to address the complex issues raised by translational research, especially with regard to the *less is more* concept, as it relates to possible long-term effects and the relative benefits of behaviorally versus more representationally-focused forms of intervention (see Pickreign Stronach et al., 2013).

Taken together, our findings support the effectiveness of the STEEP multi-dimensional (i.e., behavioral, representational) program and a more protracted (two- versus one-year) intervention strategy in promoting healthy attachments in high-risk mother–infant dyads. Significant attachment results (increased security, decreased disorganization) were evident at 12 months and at 24 months. At the end of intervention, STEEP-group mothers showed significant less risky child rearing attitudes.

Limitations and future directions

A major study limitation was the inability to randomly assign mother–infant pairs to treatment or control groups, resulting in a quasi-experimental design. In addition, in cooperation with local child welfare institutions, the control group was limited in size. To address these concerns, risk exposure was statistically controlled. Another limitation is that we could not compare results with a placebo group, finding out the effect of STEEP above and beyond contact and gaining attention. Despite the restrictions, results demonstrated medium effect sizes.

Future research should address the question whether short, interaction focused or more complex programs are more effective for different families. It is argued that for some families “less is more”, whereas for others “more is better” (Berlin, 2005; Berlin et al., 2008). At this early stage most “models still require refinement and independent replication” (Greenberg, 2005, p. 329) and it is important to consider whether a high-risk situation is caused by parents (e.g., history of abuse) or by infants (e.g., highly irritable or adopted after maltreatment). If parents are reliable and are better able to act like a dependable partner in the intervention process, shorter programs seem to be convenient. As complex intervention programs are rather difficult to implement, and because a ceiling effect was suspected within the first STEEP evaluation, it seems natural that the present study evaluates a German version of the STEEP program. Replication and

evaluation by research teams not involving program developers is an additional marker of quality.

Acknowledgements

We thank Byron Egeland and Martha Erickson for granting the rights to implement the STEEP program and translate the manual, and Dr. Erickson, for ongoing training and consultation throughout the project; Sue Fust for advising on measures; L. Alan Sroufe for reviewing Strange Situation videos, and, with Inge Bretherton and Byron Egeland, advising the research team; and Alison Giovanelli for manuscript revisions, and Agnes Mali for her support in coordinating the study and data collection. The work is based on a dissertation thesis by the second author.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This research was supported by Federal Ministry of Education and Research (BMBF), National Center for Early Prevention (NZFH), BHF-Bank-Foundation, Rotary Club International (OG-Ortenau, Bergamo-Süd, Chalon-Saint Vincent), Thomas Gottschalk Foundation, and Koerber Foundation.

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