REVIEW

Do preventive interventions for children of mentally ill parents work? Results of a systematic review and meta-analysis

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Purpose of review
The transgenerational transmission of mental disorders is one of the most significant causes of psychiatric morbidity. Several risk factors for children of parents with mental illness (COPMI) have been identified in numerous studies and meta-analyses.

Recent findings
Many interventions have been developed for this high-risk group, but data about their efficacy are heterogeneous.

Summary
The current meta-analysis reports on 96 articles including 50 independent samples from randomized controlled trials quantifying effects of preventive interventions for COPMI. Random effect models resulted in small, though significant Effect Sizes (ES) for programs enhancing the mother-infant interaction (ES = 0.26) as well as mothers' (ES = 0.33) and children's (ES = 0.31) behavior that proved to be stable over the 12-month follow-up, except for infants' behavior. Interventions for children/adolescents resulted in significant small effects for global psychopathology (ES = 0.13), as well as internalizing symptoms (ES = 0.17), and increased significantly over time, with externalizing symptoms reaching significance in the follow-up assessments as well (ES = 0.17). Interventions addressing parents and children jointly produced overall larger effects. Higher study quality was associated with smaller effects. There is a dearth of high quality studies that effectively reduce the high risk of COPMI for the development of mental disorders.

Keywords
children, intervention, mentally ill parents, meta-analysis, prevention

INTRODUCTION

The transgenerational transmission of mental disorders (TTMD) is a major risk factor for the development of mental illness across generations [1,2]. According to epidemiological estimates, up to one in five adults will ever show a significant mental health problem [3,4]. Some studies have shown that about 23–32% of adult patients receiving mental healthcare are caring for underage children [5–8].

Having a parent with a mental illness has been associated with multiple psychological and developmental risks for children, such as lower academic achievement [9], increased stress-related somatic health conditions (e.g., higher rates of asthma and other atopic diseases [10]), internalizing/externalizing symptoms [11,12], and the development of severe mental illness (SMI) [13▪▪], thus providing evidence that the TTMD is a major risk factor for the development of SMI, as demonstrated in numerous other studies [1,2,11,13▪▪,14]. Long-term studies have further shown that children of parents with mental illness (COPMI) have a higher life-time risk of developing SMI ranging from 41 to 77%; subclinical symptoms often present earlier, however [1,2]. The BELLA study found that a parental mental

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KEY POINTS

- COPMI are at a high risk to develop severe mental disorders themselves.
- Various interventions have been developed for this high-risk group, though effects in the existing meta-analyses have proved to be small and in some cases also nonsignificant.
- The current meta-analysis addressed mother–infant and child/adolescent interventions and resulted in significant though overall small effects.
- Future studies need to address the high risk of COPMI facilitating the prevention of the intergenerational transmission of mental disorders.
- The results of this meta-analysis (i.e., inclusion of females, interventions addressing both parents and children) points at factors relevant for the improvement of future interventions.

illness was a powerful risk factor [Odds ratio (OR) 2.4] for the development of mental health problems in children and adolescents [15]. Recent studies have added evidence that offspring with two generations previously affected by SMI are at an even greater risk [16,17]. Thus, COPMI are most likely to constitute the next generation of patients with a mental disorder [13▪▪] associated with significant disability adjusted life years (DALYs; loss of healthy years) and economic costs [18–20]. They therefore constitute an essential target group to be addressed by preventive interventions.

Accordingly, various interventions have been developed to meet the needs of this group of young people [1,2,7,10,21–23]. Although the treatment of the parental disorder has been associated with improved child outcome [14,24–28,29▪▪], there are also four meta-analyses reporting on preventive interventions for COPMI [30–32]. One meta-analysis that included 10 studies evaluated interventions enhancing sensitivity of mothers with depression and found a corrected nonsignificant small effect size of 0.19 [33]. Another meta-analysis based on 13 trials showed a significant relative risk reduction of 40% (seven studies) for the same disorder as the parent's illness [30], though such specific transmission of disorders is not typical for COPMI [13▪▪]; overall effects for children's internalizing symptoms were only small (seven studies, effect size = −0.22) and nonsignificant for externalizing symptoms (eight studies, effect size = −0.16) [30]. A recent study focusing on severe parental disorders and community-based interventions [31] found small and nonsignificant effects for children's psychopathology (effect size = 0.06) and social behavior (effect size = 0.23), whereas another meta-analysis on children of depressed mothers found a significant effect on children's mental health (effect size = 0.40) [29▪▪].

In summary, though there is some empirical support that interventions for COPMI might be effective, quantitative reports summarizing such effects are only sparse and report mixed results. Further, one of the meta-analyses [30] mixed effects for infants, children and adolescents, hampering the estimation of effects. This review thus aims to improve the current state of the literature by presenting a comprehensive, quantitative report on the efficacy of prevention programs for COPMI, separately for mother–infant interventions and interventions for children/adolescents.

METHOD

We report on mother–infant interventions (dependent variable: mother–infant interaction), and interventions for children/adolescents (dependent variable: child psychopathology) on a large evidence base (50 independent samples), with post-intervention, 6 and 12-month and long-term follow-up effects. As the existing meta-analyses reported significant heterogeneity of effects [30–32], moderator analyses will target potential influences as identified in the literature [34].

Literature review

Studies were identified through electronic databases (Cochrane, PubMed, PsychInfo, and ERIC), manual search (i.e., *Journal of the American Child and Adolescent Psychiatry* 1987 to January 2015; inspection of included studies in prior meta-analyses/reviews) and personal contact with authors [35]. Search criteria included the population addressed, all mental disorders, and intervention types. Search terms within a category were linked with 'OR', between categories with 'AND'. All possible articles identified were included with no backward limit; the search was terminated in January 2015. We restricted our search to articles of English, German, Italian, French, or Spanish language. In total, 95 studies based on 50 independent samples were identified. Figure 1 shows the flowchart with all study extraction stages.

Inclusion criteria

Parents of children had to be diagnosed with a mental disorder (current or previous) and this had to be the reason for study inclusion. For the

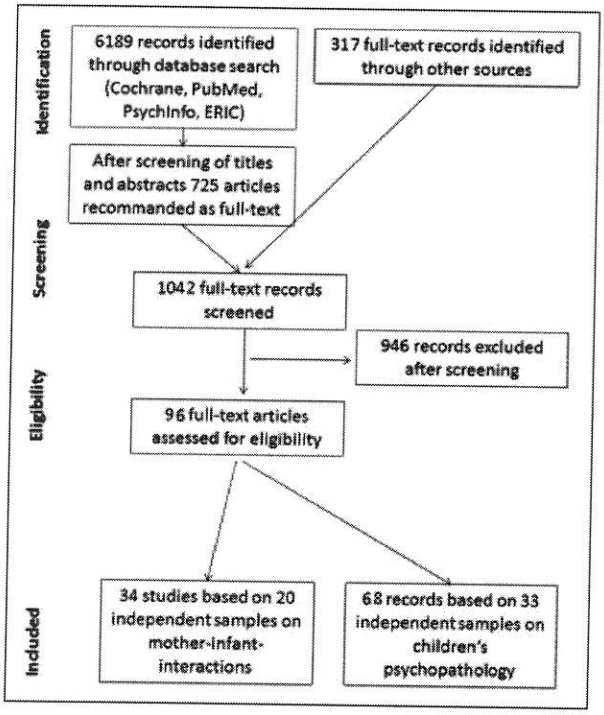

FIGURE 1. Study flowchart; three studies included in the mother–infant interactions were also included in the children's psychopathology sample, thus the total number of independent samples included in both meta-analyses is 50.

meta-analysis on mother–infant interactions, children had to be younger than 6 years of age. In the meta-analysis reporting on children's psychopathology they had to be at least 2 years of age after the intervention and below 18 years of age at the beginning of the study. Studies had to report on psychosocial interventions addressing the parents, the children or both. Control conditions had to be no intervention, treatment as usual (TAU) or an alternative, less intensive or specific intervention. Studies comparing two active interventions (i.e., combination therapy vs. medication only) were excluded. Studies had to report either children's psychopathology scores or mother–infant interaction observations. Only randomized controlled trials with random assignment of individuals were included to ensure that results would not be biased by systematic differences between groups. Studies had to include information that permitted calculation of effect sizes with a sufficient degree of precision (e.g., means and SDs, *t* test for independent samples, chi-square values).

Exclusion criteria

Studies with other target groups e.g., high-risk populations or premature babies) or when reporting on children with diagnosed disorders were excluded, to ensure estimation of preventive effects. Studies reporting on interventions starting before children were born, or reporting on parental medical therapy only were also excluded, as were studies reporting mother–infant interaction ratings in form of attachment or without observational data.

Study characteristics

Each study was coded on a number of domains: characteristics e.g., publication status and year, country), study participants (i.e., age, sex of parents/children, type of parental disorder, single parent status, socioeconomic status, ethnicity, and psychopathology in children), characteristics of the intervention (i.e., type of intervention, length, setting, target group, individual, family, or group setting, intervention leader), and type of control group (i.e., no intervention, intervention leader, TAU, alternative, less intensive, or less specific intervention; refer to Table 1 for details). Study quality was coded on an 8-point scale as proposed in previous research [36]. The coder completed a standardized form for each study and discrepancies were discussed. A subset of studies was coded by two raters independently (M.T. and an independent colleague) to permit calculation of inter-rater reliability (categorical variables: Cohen's κ; continuous variables: intraclass correlations). Inter-rater agreement was $\kappa = 0.718–1.00$, an excellent agreement according to Greve and Wentura [37]. Intraclass correlations were between 0.921 and 1.0 indicating excellent agreement as well.

Effect size calculation

For the meta-analysis reporting on mother–infant interaction, the standardized mean difference Cohen's *d* was calculated and converted to Hedges' *g* to correct for small sample bias. For the meta-analysis reporting on children's psychopathology we calculated Morris' *g* [38] that corrects for small sample bias and pre-test differences between groups. A positive effect size indicates an improvement in children's functioning or outperformance of the control group by the experimental group, and a negative effect size deterioration or outperformance of the experimental group by the control group.

When multiple dependent measures were given for one sample, the data was aggregated into one effect size respecting all these measures. In the case of more than one possible control group, the least intensive one was chosen; in the case of more than one intervention group, the behavioral therapy one was chosen, in the case of two behavioral

Table 1. Study characteristics of the meta-analysis on mother–infant interaction studies with means, SDs, percentages as well as details on meta-analytic results

Characteristics of mother–infant interaction studies	
Mother's disorder	Depression: 14 studies Substance use disorders: 5 studies Eating disorders: 1 study
Mothers age	28.5 (SD 3.7, range 17–33 years)
White	59.3% (SD 35.7)
Single parents	36.6%
Socioeconomic status (SES)	5% studies high 35% studies medium 35% studies low 25% studies not reported
Children's age	0.68 months (SD 1.07, range 0–4 years)
Children's sex	47.0% female
Staff delivering the intervention	Three studies: trained professionals 5 studies: less qualified professionals (e. g. nurses) 7 studies: professionals from different professions (e.g., nurses and psychologists) 5 studies: not reported
Intervention setting	Setting: 10% clinic 50% home 10% more than one setting 15% other settings 15% not reported Intervention format: 45% family-based 30% mother only 15% group-based 10% not reported/not definable
Intervention length	Mean # sessions 11.1 (SD 7.46, range 2–33) Session length 70.9 min (SD 70.5, range 15–300)
Intervention types	40% cognitive-behavioral therapy 15% interpersonal therapy 45% not reported/not definable
Intervention target	70% mother and infants 30% mothers only
Control group	45% treatment as usual 40% alternative, less intensive or specific treatment 15% not reported
Effects of the mother-infant interaction studies (post-intervention)	
Total ES = 0.26 (19 studies) 95% CI (0.09; 0.44); $z = 2.89$; $P = 0.0038$ [variance of ES = $\hat{\tau}^2 = 0.08$, 95% CI (0.02; 0.33); $I^2 = 58.07\%$, 95% CI (25.65; 84.37)] [Results of Cochrans Q-test: Q = 41.59 (df = 18), $P = 0.00$]	
Mothers' behavior during interactions ES = 0.35 (15 studies) 95% CI (0.13; 0.57); $z = 3.13$; $P = 0.0017$, [variance of ES = $\hat{\tau}^2 = 0.11$, 95% CI (0.02; 0.35); $I^2 = 37.27\%$, 95% CI (25.23; 84.27)] [Results of Cochrans Q-test: Q = 37.27 (df = 14), $P = 0.00$]	
Children's behavior during interactions ES = 0.31 (11 studies) 95% CI (0.06; 0.56); $z = 2.43$; $P = 0.0151$, [variance of ES = $\hat{\tau}^2 = 0.11$, 95% CI (0.03; 0.70); $I^2 = 66.59\%$, 95% CI (31.35; 92.63)] [Results of Cochrans Q-test: Q = 28.74 (df = 10), $P = 0.00$]	
Mother-infant follow-up effects (up to 12 months after post-intervention)	
Total ES = 0.22 (7 studies) 95% CI (0.03; 0.40); $z = 2.25$; $P = 0.0241$; $\hat{\tau}^2 = 0.02$, 95% CI (0.0; 0.34); $I^2 = 31.41\%$, 95% CI (0; 88.81)] [Results of Cochrans Q-test: Q = 9.20 (df = 6), $P = 0.16$]	
Mothers' behavior during interactions ES = 0.33 (6 studies) 95% CI (0.16; 0.50); $z = 3.87$; $P = 0.0001$; $\hat{\tau}^2 = 0$, 95% CI (0.0; 0.34); $I^2 = 0\%$, 95% CI (0; 87.92) [Results of Cochrans Q-test: Q = 5.27 (df = 5), $P = 0.38$]	
Children's behavior during interactions ES = 0.22 (5 studies) 95% CI (0.14; 0.59); $z = 1.20$; $P = 0.2294$; $\hat{\tau}^2 = 0.12$, 95% CI (0.01; 1.58); $I^2 = 71.94\%$, 95% CI (15.02; 97.06) [Results of Cochrans Q-test: Q = 12.71 (df = 4), $P = 0.01$]	

CI, confidence interval; ES, effect size.

Table 2. Studies included for meta-analysis with the dependent variable mother–child interaction

Study	Country	Mother's disorder	Intervention	Child's age in years	Study quality	Assessment	N (post)	g (post)	N (FU)	g (FU)
Beeber *et al.* (2010) [47]	USA	Depression	Interpersonal psychotherapy (IPT)	1.3	6	HOME (mother's interaction behavior)	71 71 –	−0.14 (*T*) −0.14 (*M*) –	71 71 –	−0.05 (*T*) −0.05 (*M*) –
Beeber *et al.* (2013) [48]	USA	Depression	IPT combined with parenting enhancement	2.1	6	HOME (mother's interaction behavior)	– – –	– – –	158 158 –	0.35 (*T*) 0.35 (*M*) –
Berlin *et al.* (2014) [49]	USA	SUD	Attachment and Biobehavioral Catch-up (ABC) intervention	0.8	3	MBQS	16 16 –	0.64 (*T*) 0.64 (*M*) –	– – –	– – –
Britt and Myers (1994) [50]	USA	SUD	Brazelton-plus-MABI	newborn	3	NCAFS	26 – –	0.13 (*T*) – –	– – –	– – –
van Doesum *et al.* (2008) [51]; Kersten-Alvarez *et al.* (2010) [32]; van Doesum *et al.* (2005) [52]	Nether-lands	Depression	KOPP Program	0.5	6	EAS; evaluation of mother's interaction behavior according to Erickson *et al.* (1985) and Smeekens *et al.* (2008) scales	71 71 71	0.41 (*T*) 0.32 (*M*) 0.58 (*C*)	71 71 71	0.52 (*T*) 0.42 (*M*) 0.71 (*C*)[a]
Field *et al.* (2000) [53], Study 2	USA	Depression	3-month intervention program (i.e., massage, mother–child interaction training, and relaxation)	0.3	2	Interaction Rating Scale (Field, 1980)	96 96 96	0.45 (*T*) 0.43 (*M*) 0.46 (*C*)	– – –	– – –
Forman *et al.* (2007) [54]; O'Hara *et al.* (2010) [55]; Nylen *et al.* (2010) [56]; Forman *et al.* (2003) [57]	USA	Depression	IPT	0.5	7	Mother's sensitivity (Ainsworth *et al.*, 1971; Kochanska, 1988); infants' observed positive and negative mood (Goldsmith and Rothbarth, 1994; Forman *et al.*, 2003)	108 108 108	−0.10 (*T*) 0.08 (*M*) −0.19 (*C*)	– – –	– – –
French *et al.* (1997) [58]	USA	SUD	Mother–child interaction training	newborn	1	NCAFS	40 40 40	1.05 (*T*) 1.10 (*M*) 0.63 (*C*)	– – –	– – –

Table 2 (*Continued*)

Study	Country	Mother's disorder	Intervention	Child's age in years	Study quality	Assessment	N (post)	g (post)	N (FU)	g (FU)
Horowitz *et al.* (2001) [59]	USA	Depression	Interaction coaching for at-risk parents and their infants (ICAP; Censullo, 1993, 1994)	0.11	6	DMC	117 – –	0.41 (T) – –	– – –	– – –
Horowitz *et al.* (2013) [60][b]	USA	Depression	Communicating And Relating Effectively (CARE)	0.11	5	NCATS	126 – 126	0.04 (T) – 0.16 (C)	125 – 125	−0.07 (T) – 0.13 (C)
Letourneau *et al.* (2011) [61]	Canada	Depression	Home-based peer support	0.44	5	NCAST (feeding and teaching scales)	46 – –	−0.32 (T) – –	– – –	– – –
Murray *et al.* (2003) [62]; Cooper *et al.* (2003) [63]	UK	Depression	CBT with 'interaction guidance treatment' according to McDonough (1993) (without video feedback)	0.15	7	Global rating sales of mother–infant interaction (Murray *et al.*, 1996); only mother's behavior	89 89 –	−0.41 (T) −0.41 (M) –	– – –	– – –
O'Higgins *et al.* (2008) [64]	UK	Depression	Mother–infant massage	0.20	3	Global ratings of mother–infant interaction (Murray *et al.*, 1996)	62 62 62	−0.02 (T) −0.07 (M) −0.02 (C)	62 62 62	0.17 (T) 0.54 (M) −0.31 (C)
Onozawa *et al.* (2001) [65]; Glover *et al.* (2002) [66]	UK	Depression	Mother–infant massage	0.17	2	Global ratings of mother–infant interaction (Murray *et al.*, 1996)	22 22 22	1.40 (T) 1.02 (M) 1.55 (C)	– – –	– – –
Puckering *et al.* (2010) [67]; Puckering *et al.* (2005–6) [68]	UK	Depression	Mellow babies	0.27	4	Mellow Parenting Observation Coding Scheme	17 17 –	0.67 (T) 0.57 (M) –	– – –	– – –
Sembi *et al.* (2014)[c] [69,70]; Caramlau *et al.* (2011) [71]	UK	Depression	Mums 4 Mums (peer support)	0.15	5	CARE-Index	16 16 16	0.13 (T) 0.17 (M) −0.17 (C)	– – –	– – –
Schuler *et al.* (2000) [72]; Schuler *et al.* (2002) [73]; Nair *et al.* (2003) [74][d]	USA	SUD	Home intervention (based on IHDP Program, IHDP, 1990)	0.04	6	Scoring mother–infant interaction according to Cowan and Cowan (1992a,b)	171 171 171	0.37 (T) 0.75 (M) 0.00 (C)	131 131 131	0.12 (T) 0.25 (M) 0.00 (C)

Table 2 (*Continued*)

Study	Country	Mother's disorder	Intervention	Child's age in years	Study quality	Assessment	N (post)	g (post)	N (FU)	g (FU)
Sheeber *et al.* (2012) [75]	USA	Depression	Mom-Net (internet-based cognitive behavioral intervention)	4.60	6	LIFE DPICS (assessment of harsh parenting)	69 69 –	0.57 (*T*) 0.57 (*M*) –	– – –	– – –
Stein *et al.* (2006) [76]; Woolley *et al.* (2008) [77]	UK	Eating Disorder	Video Feedback Intervention to Promote Positive Parenting (VIPP)	0.42	7	Mother–infant interaction (Ainsworth *et al.*, 1974; Stein *et al.*, 1994; 1999)	77 77 77	0.58 (*T*) 0.36 (*M*) 0.85 (*C*)	– – –	– – –
Suchman *et al.* (2010 [78]; 2011[79]; 2012) [80]	USA	SUD	Mothers and toddlers programme (MTP)	1.47	5	NCAST	47 47 47	0.29 (*T*) 0.52 (*M*) 0.07 (*C*)	47 47 47	0.70 (*T*) 0.71 (*M*) 0.70 (*C*)

Annotation: *N* (post) = sample size for effect size estimation at post-test; *g* (post) = effect size *g*-Hedges at post-test; *T* = total effect size for mother–child interaction; *M* = effect size for mother's behavior during interaction; *C* = effect size for child behavior during interaction; *N* (FU) = sample size for effect size calculation for follow-up assessment up to 12-month post-test; if effect sizes were aggregated in studies, the aggregated effect size is reported. DMC, Dyadic Mutuality Code (Censullo, 1991; Censullo *et al.*, 1987); EAS, Emotional Availability Scales (Biringen *et al.*, 1998); HOME, Home Observation for Measurement of the Environment Inventory (Caldwell and Bradley, 1980; for details see Holditch *et al.*, 2007); LIFE, Living in Family Environments Coding System (Hops *et al.*, 1995); MBQS, Maternal Behavior Q-Sort (Pederson *et al.*, 1990; Tarabulsy *et al.*, 2009); NCAFS, Nursing Child Assessment Feeding Scale (Barnard, 1978ab; see also Huber, 1991); NCAST, Nursing Child Assessment Satellite Training (Sumner and Spietz, 1994ab); NCATS, Nursing Child Assessment Teaching Scale (Barnard and Eyres, 1979).

[a] $g = -1.82$ for the mothers' behavior at long-term follow-up.

[b] Classifying this study was not easy due to different measuring points in the study; we decided to count the 6-month home visit as post-test and the visit 3-month later as follow-up.

[c] Unpublished data.

[d] Due to this very complex intervention study, we used the 6-month home visit data in the study by Schuler et al. (2000) as post-test and the data with the 18-month follow-up as follow up within the first year after intervention termination (Schuler *et al.*, 2002).

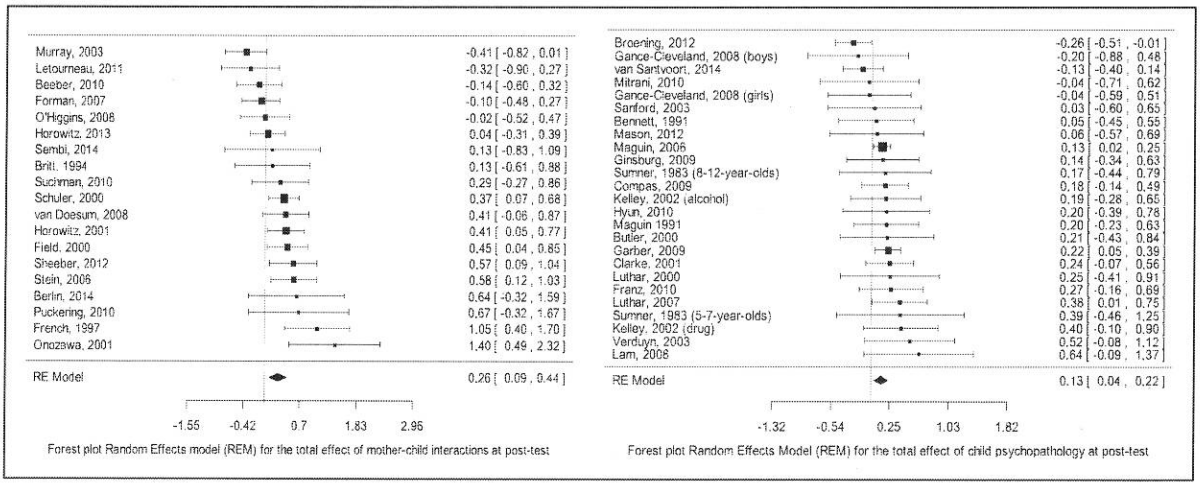

FIGURE 2. Forest plots for the meta-analyses on mother-child interactions and child psychopathology at post-test.

interventions the one enhancing parenting skills, and the most intensive treatment was chosen in cases without behavioral interventions.

Meta-analyses were performed with Metafor version 1.6.0 [39,40] for R version 2.15.2 using the random effect models ([41]) with the restricted maximum likelihood estimator for the random effects variance $\hat{\tau}^2$. Further, heterogeneity of the estimated true effect was examined using Cochran's Q test for homogeneity [42] and the I^2-statistic [43]. Moderator analyses followed heterogeneous effects to identify possible influences of effects. For continuous variables moderator analyses were performed with metafor using univariate meta-regression models (MEM [41]) under the assumption of the MEM. Categorical moderator analyses were performed with the SPSS macro METAF.SPS [44], since this macro allows a meta-analytic moderator test in the ANOVA-frame-work. For all estimated true effects, sensitivity analyses were performed using fixed effect models (FEM [45]) to examine biases due to the choice of the meta-analytic model. Metafor was used for all sensitivity analyses (i.e., impact of potential outliers as well as of potential influential studies [46]; publication bias with funnel plot inspection and tests of asymmetry with a rank correlation and regression tests).

RESULTS

Mother–infant interaction

Data of 20 independent intervention–control comparisons with $N = 1445$ mother–infant dyads ($N = 712$ intervention and $N = 733$ control group) were available for analyses (19 studies on mother–infant interactions; 15 studies on mother's sensitivity behavior; 11 studies on child behavior; and seven studies with 12-month follow-up data). Study quality was overall moderate with a score of 4.8 (min. 1, max 7).

Total pre-post effects were overall small (effect size = 0.26), with slightly larger effects for mother's sensitivity (effect size = 0.35) and children's (effect size = 0.31) behavior during interactions. Effects were stable for follow-up assessments (up to 12 months post-intervention) for total effects (effect size = 0.22) as well as for mother's behavior during interactions (effect size = 0.33). However, childrens' did not reach significance at follow-up (effect size = 0.22). Only one study [32] presented long-term follow-up effects that showed an outperformance of the control group (effect size = −1.82). For details please refer to Tables 1 and 2 as well as Fig. 2 for the overall effect size as well as effect sizes for each study included.

Sensitivity analyses under the FEM resulted in similar effects. A few studies were identified as outliers or influential. Controlling for those did not result in marked differences, thus the studies were not excluded for analyses. Sensitivity analyses to control for publication bias were non-significant for all meta-analyses on mother–child interaction.

Moderator analyses for post-test mother–child interaction revealed the following significant moderators: study quality ($\hat{\beta} = -1.0$, $Q_{model} = 4.47$, df = 1, $P = 0.0340$), with lower study quality producing larger effects; joint mother–child interventions producing larger effects (effect size = 0.40) than targeting mothers only (effect size = −0.07) ($Q_{between} = 10.01$, df = 1, $P < 0.0016$); and group (effect size = 0.38) or family (effect size = 0.38) settings resulting in larger effects than individual (effect size = −0.14) interventions ($Q_{between} = 15.02$,

Table 3. Study characteristics of the meta-analysis on child/adolescent intervention studies with means, SDs, percentages as well as details on meta-analytic results

Characteristics of interventions for children and adolescents	
Parent with disorder	Mothers 78.0%
Disorders	Depression: 14 studies Substance use disorders: 14 studies Mixed disorders: 4 studies Anxiety disorder: 1 study
Mean age parents	36.0 years (SD 5.3, range 26–44)
White	61.6%
Single parents	35.5%
Socioeconomic status (SES)	3.0% studies high 36.4% medium 45.4% low 15.1% not reported
Children's age	9.1 years (SD 4.4)
Children's sex	45.3% female
Intervention leader	33.3% trained professionals (e.g. clinician, psychologist) 24.2% less qualified professionals (e.g. social worker, nurse) 39.4% mixed staff 3.4% not reported
Intervention setting	Setting: 36.4% clinic 21.2% home 15.1% other (i.e. school, university, local places) 21.2% different settings 21.2% not reported intervention format: 27.3% family-based 6.1% individual interventions 51.5% group-based 21.2% not reported
Intervention length	Mean # sessions 16.2 (SD 12.9, range 2–72) Session length 74.0 min (SD 30.8, range 25–180)
Intervention types	51.5% cognitive-behavioral therapy 9.1% interpersonal psychotherapy 3.0% systemic approaches 36.4% not reported
Intervention target	51.5% parents and children 30.3% parents only 18.2% children only
Other intervention characteristics	Training of parenting skills in 64.6% of studies Involvement of other parent 54.4% of studies
Control group	33.3% no treatment 27.3% treatment as usual 39.4% alternative, less intensive or specific treatment
Effects of the intervention studies for children and adolescents (post-test)	
Total ES = 0.13 (25 studies) 95% CI (0.04; 0.22); $z = 2.94$; $P = 0.0033$ [Q = 23.89, df = 24, $P = 0.47$; $\hat{\tau}^2 = 0.01$, 95% CI [0; 0.03], $I^2 = 22.83\%$, 95% CI (0; 44.36)] Internalizing symptoms: ES = 0.17 (17 studies) 95% CI (0.03; 0.30), $z = 2.45$; $P = 0.0143$ [Q = 21.95, df = 16, $P = 0.14$; $\hat{\tau}^2 = 0.02$, 95% CI [0; 0.06]; $I^2 = 35.79\%$, 95% CI (0; 60.18)] Externalizing symptoms: ES = 0.10 (10 studies) 95% CI (−0.03; 0.23), $z = 1.53$; $P = 0.1260$ [Q = 10.71, df = 9, $P = 0.30$; $\hat{\tau}^2 = 0.01$, 95% CI [0; 0.14]; $I^2 = 23.43\%$, 95% CI (0; 82.50)] ES = 0.15 (9 studies without the influential outlier study (Bröning, Moesgen *et al.* 2012 [87]), 95% CI [0.05; 0.24], $z = 3.04$, $P = 0.0023$ [Q = 4.50; df = 8, $P = 0.81$; $\hat{\tau}^2 = 0$, 95% CI (0; 0.12], $I^2 = 0\%$, 95% CI (0; 76.78)]	
6-month follow-up effects of intervention studies for children and adolescents	
Total ES = 0.23 (21 studies) 95% CI (0.12; 0.33), $z = 4.22$; P<0.0001 [Q = 29.34, df = 20, $P = 0.08$; $\hat{\tau}^2 = 0.02$, 95% CI (0; 0.09); $I^2 = 38.09\%$, 95% CI (0; 75.62)] Internalizing symptoms: ES = 0.28 (11 studies) 95% CI (0.07; 0.48), $z = 2.61$; $P = 0.0090$ [Q = 29.31, df = 10, $P = 0.0011$; $\hat{\tau}^2 = 0.08$, 95% CI (0.02; 0.33); $I^2 = 70.29\%$, 95% CI (31.88; 91.19)] Externalizing symptoms: ES 0.17 (10 studies) 95% CI (0.08; 0.26), $z = 3.72$; $P = 0.0002$ [Q = 3.78, df = 9, $P = 0.93$; $\hat{\tau}^2 = 0$, 95% CI (0; 0.02); $I^2 = 0\%$, 95% CI (0; 34.67)]	
12-month follow-up effects of intervention studies for children and adolescents	
Total ES = 0.28 (15 studies) 95% CI (0.17; 0.38), $z = 5.14$; $P < 0.0001$ [Q = 21.08, df = 14, $P = 0.10$; $\hat{\tau}^2 = 0.01$, 95% CI (0; 0.17); $I^2 = 20.29\%$, 95% CI (0; 85.77)] Internalizing symptoms: ES = 0.45 (9 studies) 95% CI (0.25; 0.67), $z = 4.31$; $P < 0.0001$ [Q = 16.60, df = 8, $P = 0.03$; $\hat{\tau}^2 = 0.05$, 95% CI (0; 0.41); $I^2 = 55.81\%$, 95% CI (0; 91.21)] Externalizing symptoms: ES = 0.17 (9 studies) 95% CI (0.08; 0.26), $z = 3.60$; $P = 0.0003$ [Q = 4.33, df = 8, $P = 0.83$; $\hat{\tau}^2 = 0$, 95% CI (0; 0.06); $I^2 = 0\%$, 95% CI (0; 66.59)]	

Table 3 (*Continued*)

Characteristics of interventions for children and adolescents
Long-term follow-up (over 12 months)
Total ES = 0.08 (8 studies) 95% CI (−0.14; 0.30), $z = 0.73$; $P = 0.4633$ [$Q = 19.48$, df = 7, $P = 0.07$; $\hat{\tau}^2 = 0.07$, 95% CI (0.01; 0.667); $I^2 = 68.95\%$, 95% CI (27.46; 95.59)]
Total ES = 0.18 (7 studies without the influential outlier study [32]) 95% CI (0.05; 0.30), $z = 2.85$; $P = 0.0044$ [$Q = 5.26$, df = 6, $P = 0.51$; $\hat{\tau}^2 = 0$, 95% CI (0; 0.11); $I^2 = 0$, 95% CI (0; 79.82)]
Internalizing symptoms: ES = −0.04 (6 studies) 95% CI (−0.46; 0.38), $z = 0.19$; $P = 0.8487$ [$Q = 26.28$, df = 5, $P < 0.0001$; $\hat{\tau}^2 = 0.25$, 95% CI (0.07; 2.09); $I^2 = 89.77\%$, 95% CI (71.05; 89.68)]
Internalizing symptoms: ES = 0.18 (5 studies without the influential outlier study [32]) 95% CI (0.04; 0.31), $z = 2.62$; $P = 0.0089$ [$Q = 2.03$, df = 4, $P = 0.73$; $\hat{\tau}^2 = 0$, 95% CI (0; 0.07); $I^2 = 0\%$, 95% CI (0; 75.40)]
Externalizing symptoms: ES = −0.04 (5 studies)95% CI (−0.30; 0.22), $z = 0.32$; $P = 0.7460$ [$Q = 10.35$, df = 4, $P = 0.03$; $\hat{\tau}^2 = 0.05$, 95% CI (0; 0.82); $I^2 = 61.45\%$, 95% CI (0; 96.15)]

CI, confidence interval; ES, effect size.

df = 2, $P = 0.0005$). The mothers' behavior during interactions showed greater improvement for single mothers ($\hat{\beta} = 0.75$, $Q_{model} = 7.11$, df = 1, $P = 0.0077$). Again, effects were larger for joint mother–child interventions (effect size = 0.51) ($Q_{between} = 7.09$, df = 1, $P = 0.0078$) and for interventions targeting individual families (effect size = 0.60) ($Q_{between} = 9.57$, df = 2, $P = 0.0084$). Larger effects were found for substance-abusing (effect size = 0.75) 0.75) than for depressed mothers (effect size = 0.17) ($Q_{between} = 8.19$, df = 1, $P = 0.0042$). Infants' behavior during the interaction showed significantly greater effects when persons delivering the intervention had different professional backgrounds (effect size = 0.81) ($Q_{between} = 21.68$, df = 3, $P = 0.0001$).

Interventions for children and adolescents

Data of 33 independent intervention–control comparisons reported in 68 studies was available for meta-analyses; three studies that were included in the mother–infant analyses were also included since children were older than 2 years of age at the follow-up assessments and data for child psychopathology was provided. The 33 studies reported on $N = 3020$ children and adolescents, with $N = 1620$ in the intervention and $N = 1400$ in the control group. Sample sizes ranged from $N = 14$ up to $N = 674$ subjects, with a mean of 91.5 young people recruited. Study quality was overall moderate with a score of 5.1 (min. 2, max. 8).

The total effect size for child psychopathology was overall small (effect size = 0.13), with significant effects for internalizing symptoms (effect size = 0.17), but nonsignificant effects for externalizing ones (effect size = 0.10). Heterogeneity for total effects was overall low [$Q = 23.89$, df = 24, $P = 0.47$; $\hat{\tau}^2 = 0.01$, 95% confidence interval (CI) (0; 0.03); $I^2 = 22.83\%$, 95% CI (0; 44.36)], and equally low for the analyses on internalizing ($I^2 = 35.79\%$) and externalizing symptoms ($I^2 = 23.43\%$). The total effect size increased for follow-up assessments, with significant total effects for the 6 (total effect size = 0.23; internalizing symptoms effect size = 0.28; externalizing symptoms effect size = 0.17) and 12-month follow-ups (total effect size = 0.28; internalizing symptoms effect size = 0.45; externalizing symptoms effect size = 0.17). Effects proved to be stable for further follow-up assessments after exclusion of the relevant outlier and influential study [32] with the exception of externalizing symptoms. For details please refer to Tables 3 and 4 as well as Fig. 2 for the overall effect size as well as effect size for each study included.

Sensitivity analyses proved effects to be stable under the FEM, with externalizing symptoms reaching significance at post-test [effect size = 0.10, 95% CI (0.01; 0.19); $z = 2.28$; $P = 0.0224$]. Again, some studies were identified as outliers or influential. For children's externalizing symptoms at post-test, the estimated average true effect still reached significance after the exclusion of one influential outlier study [87] (effect size = 0.15; $P = 0.0023$). For some of the follow-up data, sensitivity analyses controlling for publication bias reached significance (not significant anymore including the date of Maguin 1991 significant regression test and rank correlation test for children's total psychopathology at 6-month follow-up, significant regression test only for total and internalizing psychopathology at 12 months and for internalizing symptoms at the long-term follow-up).

Significant heterogeneity was only present for follow-up effects of internalizing symptoms. Moderator analyses for the 6-month follow-up revealed SES as a significant moderator ($Q_{between} = 6.11$, df = 1, $P = 0.01$) with samples with higher SES resulting in larger a effect size (effect size = 0.44, $P = 0.0001$). For the 12-month follow-up sex ($\hat{\beta} = -2.29$, $Q_{model} = 5.50$, df = 1, $P = 0.0190$) and study quality ($\hat{\beta} = -0.21$, $Q_{model} = 5.99$, df = 1, $P = 0.0144$) were significant moderators, with samples with smaller percentages of girls and studies

Table 4. Studies included for meta-analysis with the dependent variable child psychopathology

Study	Country	Parent's disorder	Intervention	Child's age	Study quality	Assessment	N (post)	g (post)	N (FU6M)	g (FU6M)	N (FU12M)	g (FU12M)	N (LFU)	g (LFU)
Beardslee *et al.* (2003) [81]; Beardslee *et al.* (2007) [82]; Beardslee *et al.* (1997) [83]; Beardslee *et al.* (1997) [84]	USA	Depression	Clinician-facilitated intervention (Beardslee family program)	11.60	5	YSR YASR SADS-R CGAS	– – –	– – –	– – –	– – –	52 52 –	0.82 (*T*) *H* 0.80 (*I*) *H* –	122 122 –	0.18 (*T*) *H* 0.18 (*I*) *H* –
Beeber *et al.* (2010) [47]	USA	Depression	IPT	At pre-test older >18 months	6	CBCL, child aggression subscale	– – –	– – –	18 – 18	0.41 (*T*) – 0.41 (*E*)	– – –	– – –	– – –	– – –
Bennett (1991)[a] [85]	USA	Depression	Intervention for hospitalized children of depressed mothers	10.4	2	CDI RCMAS CBCL	37 37 –	0.05 (*T*) 0.11 (*I*) –	37 37 –	−0.03 (*T*) −0.05 (*I*) –	– – –	– – –	– – –	– – –
Bröning, Moesgen *et al.* (2012) [87]; Bröning, Wiedow *et al.* (2012) [89]; Moesgen *et al.* (2012) [88]; Bröning *et al.* (2012) [86]; Klein *et al.* (2013) [90]	Germany	SUD	Trampolin	9.8	5	SDQ	162 172 171	−0.26 (*T*) −0.26 (*I*) −0.18 (*E*)	162 172 171	0.07 (*T*) −0.11 (*I*) 0.08 (*E*)	– – –	– – –	– – –	– – –
Butler *et al.* (2000) [91]	USA	Depression	Family Depression Programme (FDP)	10.1	2	Clinical assessment	37 – –	0.21 (*G*)[#] – –	– – –	(*Control group receives intervention at this time point*)	– – –	– – –	– – –	– – –
Butz *et al.* (2002) [92]; Butz *et al.* (1998) [93]; Belcher *et al.* (2005) [94]	USA	SUD	Home-based nurse intervention (INT)	At pre-test new-borns	6	CBCL PSI-SF, Subscale 'Difficult child'	– – –	– – –	– – –	– – –	100 100 100	0.22 (*T*) *H* 0.28 (*I*) *H* 0.32 (*E*) *H*	– – –	– – –
Catalano *et al.* (1999) [95]; Catalano *et al.* (2009) [96]; Catalano *et al.* (2002) [97]; Haggerty *et al.* (2008) [98]; Haggerty *et al.* (2008) [99]	USA	SUD	Focus on families	10.4	3	Delin-quency Scale CIDI	– – –	– – –	77 – 77	0.34 (*T*) *H* – 0.34 (*E*) *H*	75 – 75	0.15 (*T*) *H* – 0.15 (*E*) *H*	151 – 151	0.06 (*T*) *H* – 0.06 (*E*) *H*
Clarke *et al.* (2001) [100]; Lynch *et al.* (2005) [19]	USA	Depression	Group-based CBT for adolescents (modified version Lewinsohn *et al.*, 1996)	14.6	7	CES-D HAM-D K-SADS CBCL GAF	94 94 94	0.24 (*T*) 0.37 (*I*) 0.21 (*E*)	94 94 –	1.01 (*T*) *H* 1.01 (*I*) *H* –	94 94 94	0.31 (*T*) 0.37 (*I*) 0.10 (*E*)	94 94 94	0.07 (*T*) 0.00 (*I*) −0.27 (*E*)
Coiro *et al.* (2012) [101]; Riley *et al.* (2009) [102]; Miranda *et al.* (2003) [103]	USA	Depression	CBT	6.4	6	BASC, BSI	– – –	– – –	40 – –	−0.09 (*T*) – –	40 – –	0.20 (*T*) – –	– – –	– – –
Compas *et al.* (2009 [104]; Compas *et al.* (2010) [105]; Compas *et al.* (2011) [106]; Compas *et al.* (2011) [107]	USA	Depression	Family group CBT (FGCB)	11.4	7	CES-D CBCL YSR K-SADS-PL	155 155 155	0.18 (*T*) *H* 0.18 (*I*) *H* 0.18 (*E*) *H*	155 155 155	0.29 (*T*) *H* 0.28 (*I*) *H* 0.32 (*E*) *H*	155 155 155	0.37 (*T*) *H* 0.44 (*I*) *H* 0.30 (*E*) *H*	155 155 155	0.30 (*T*) *H* 0.28 (*I*) *H* 0.31 (*E*) *H*
van Doesum *et al.* (2008) [51]; Kersten-Alvarez *et al.* (2010) [32]; van Doesum *et al.* (2005) [52]	Netherlands	Depression	KOPP Programme	0.5	7	CBCL C-TRF	– – –	– – –	– – –	– – –	– – –	– – –	58 58 58	−0.91 (*T*) *H* −1.29 (*I*) *H* −0.53 (*E*) *H*
Franz *et al.* (2010) [108]; Weihrauch *et al.* (2014) [109]; Franz *et al.* (2011) [110]; Franz *et al.* (2009) [111]; Franz *et al.* (2010) [112]	Germany	Depression or anxious symptoms	Preventive parent training for single mothers (PALME)	4.5	7	SDQ	52 – –	0.27 (*T*) – –	28 – –	0.62 (*T*) – –	– – –	– – –	– – –	– – –
Gance-Cleveland and Mays (2008) [113]; Gance-Cleveland *et al.* (2008) [114] (girls)	USA	SUD	School-based support groups (SBSGs)	15.4	6	HDLF-Y, Subscale 'positive mood' and 'negative mood'	53 53 –	−0.04 (*T*) *H* −0.04 (*I*) *H* –	– – –	– – –	– – –	– – –	– – –	– – –
Gance-Cleveland and Mays (2008) [113]; Gance-Cleveland *et al.* (2008) [114] (boys)	USA	SUD	School-based support groups (SBSGs)	15.5	5	HDLF-Y, Subscale 'positive mood' and 'negative mood'	34 34 –	−0.20 (*T*) *H* −0.20 (*I*) *H* –	– – –	– – –	– – –	– – –	– – –	– – –

Table 4 (*Continued*)

Study	Country	Parent's disorder	Intervention	Child's age	Study quality	Assessment	N (post)	g (post)	N (FU6M)	g (FU6M)	N (FU12M)	g (FU12M)	N (LFU)	g (LFU)
Garber *et al.* (2009) [115]; · Beardslee *et al.* (2013) [116]	USA	Depression	CBT program (modified by Clarke *et al.*, 2001)	14.8	8	CES-D CDRS-R DSR from LIFE	316 316 –	0.22 (*T*) 0.22 (*I*) –	316 316 –	0.17 (*T*) 0.17 (*I*) –	316 316 –	0.29 (*T*) *H* 0.29 (*I*) *H* –	316 316 –	0.25 (*T*) *H* 0.25 (*I*) *H* –
Ginsburg (2009) [117]	USA	Anxiety	Coping And Promoting Strength program (CAPS)	8.9	5	ADIS-CP SCARED	40 40 –	0.14 (*T*) 0.14 (*I*) –	40 40 –	0.46 (*T*) 0.46 (*I*) –	40 40 –	1.20 (*T*) 1.20 (*I*) –	– – –	– – –
Hyun *et al.* (2010) [118]	South Corea	SUD	Group-based CBT prevention program for children and adolescents	12.5	2	RADS-2	28 28 –	0.20 (*T*) 0.20 (*I*) –	– – –	– – –	– – –	– – –	– – –	– – –
Kelley and Fals-Stewart (2002) [119] (alcohol abusing fathers)	USA	SUD	Behavioral Couples Therapy (BCT)	10.4	4	PSC	43 – –	0.19 (*T*) – –	43 – –	0.26 (*T*) – –	43 – –	0.24 (*T*) – –	– – –	– – –
Kelley and Fals-Stewart (2002) [119] (drug abusing fathers)	USA	SUD	BCT	9.2	4	PSC	39 – –	0.40 (*T*) – –	39 – –	0.29 (*T*) – –	39 – –	0.26 (*T*) – –	– – –	– – –
Lam *et al.* (2008; 2009) [120,121]	USA	SUD	Parent Skills Training with BCT			CBCL CDI RCMAS	20 20 20	0.64 (*T*) 0.68 (*I*) 0.57 (*E*)	20 20 20	0.62 (*T*) 0.69 (*I*) 0.49 (*E*)	20 20 20	0.62 (*T*) 0.70 (*I*) 0.44 (*E*)	– – –	– – –
Luthar and Suchman (2000) [122]; Suchman *et al.* (2004) [123]	USA	SUD	Relational Psychotherapy Mothers' Group (RPMG)	9.5	5	BASC	52 – –	0.25 (*T*) *H* – –	47 – –	0.41 (*T*) *H* – –	– – –	– – –	– – –	– – –
Luthar *et al.* (2007)[124]	USA	SUD	RPMG	9.6	7	BASC (BSI – ESI)	71 71 –	0.38 (*T*) 0.52 (*I*) –	71 71 –	0.09 (*T*) 0.00 (*I*) –	– – –	– – –	– – –	– – –
Maguin *et al.* (2006, June [125]; 2007, May–June [126])[a]; Nochajski *et al.* (2006, June)[a]; Maguin and Safyer (2003) [127]; DeWit *et al.* (2003) [128]; Safyer *et al.* (2003) [129]	USA and Canada	SUD	Strengthening Families Programme (SFP)	10.9	5	OCHS, Scales 'conduct problems', 'oppositional-defiant', 'behavior problems'	674 – 674	0.13 (*T*) – 0.13 (*E*)	674 – 674	0.16 (*T*) – 0.16 (*E*)	674 – 674	0.16 (*T*) – 0.16 (*E*)	– – –	– – –
Maguin (1991) [130]; Maguin *et al.* (1994) [131]; Nye *et al.* (1995) [132]	USA	SUD	Michigan State University Multiple Risk Child Outreach Programme	4.4	6	CBCL, CPQ-M, CBRS-P, and PDR-M	51 51 51	0.20 (*T*) 0.18 (*I*) 0.21 (*E*)	51 51 51	0.01 (*T*) 0.02 (*I*) 0.00 (*E*)	– – –	– – –	– – –	– – –
Mason *et al.* (2012) [133]	USA	Depression	Project Hope	13.9	4	MFQ	24 24 –	0.06 (*T*) 0.06 (*I*) –	– – –	(*Control group receives intervention at this time point*)	– – –	– – –	– – –	– – –
Mitrani *et al.* (2010) [134]; Feaster *et al.* (2010) [135]	USA	SUD	Structural Ecosystems Therapy (SET)	12.9	6	YSR RBPC	24 24 24	−0.04 (*T*) 0.34 (*I*) −0.42 (*E*)	21 21 21	0.38 (*T*) 0.59 (*I*) 0.17 (*E*)	25 25 25	0.65 (*T*) 0.83 (*I*) 0.47 (*E*)	– – –	– – –
Murray *et al.* (2003) [62]; Cooper *et al.* (2003) [63]	UK	Depression	CBT with interaction guidance treatment (McDonough, 1993)	0.1	7	Rutter A2 Scale	– – –	– – –	– – –	– – –	– – –	– – –	66 – –	0.48 (*T*) *H* – –
Sanford *et al.* (2003) [136]	Canada	Depression	Parent-group intervention	10.1	6	CDI	32 32 –	0.03 (*T*) 0.03 (*I*) –	– – –	– – –	– – –	– – –	– – –	– – –
van Santvoort *et al.* (2014) [137]	The Netherlands	Mixed disorders	Support group	10.2	6	SDQ	254 – –	−0.13 (*T*) *H* – –	254 – –	−0.09 (*T*) *H* – –	– – –	– – –	– – –	– – –
Solantaus *et al.* (2012) [138]; Punamäki *et al.* (2013) [139]; Solantaus *et al.* (2010) [140]; Sipilä *et al.* (2010) [141]	Finland	Affective disorders	Family Talk Intervention (FTI)	12.0	7	SDQ SCARED CDI (BDI for patients > 18 years at T3)	– – –	– – –	78 78 78	0.28 (*T*) 0.49 (*I*) 0.13 (*E*)	79 79 79	0.03 (*T*) 0.03 (*I*) 0.03 (*E*)	84 84 84	0.13 (*T*) 0.12 (*I*) 0.04 (*E*)

Table 4 (*Continued*)

Study	Country	Parent's disorder	Intervention	Child's age	Study quality	Assessment	N (post)	g (post)	N (FU6M)	g (FU6M)	N (FU12M)	g (FU12M)	N (LFU)	g (LFU)
Sumner (1983) [142][a]; age 5–7 years	USA	Mixed disorders	CBT problem solving training for COPMI	6.0	2	CPQ DESB (subscales 'Dis-respect/Defiance', 'In-attentive/With-drawn')	14 14 14	0.39 (T) 0.34 (I) 0.25 (E)	– – –	– – –	– – –	– – –	– – –	– – –
Sumner (1983) [142][a]; age 8–12 years	USA	Mixed disorders	CBT problem solving training for COPMI	10.0	2	CPQ DESB (subscales 'Dis-respect/Defiance', 'In-attentive/With-drawn')	26 26 26	0.17 (T) 0.27 (I) 0.22 (E)	– – –	– – –	– – –	– – –	– – –	– – –
Verduyn *et al.* (2003) [143]	UK	Depression	CBT group therapy for mothers and play sessions for children	3.1	4	CBCL ECBI	38 – 37	0.52 (T) – 0.19 (E)	38 – 37	0.41 (T) – 0.23 (E)	38 – 37	0.04 (T) – –0.13 (I)	– – –	– – –

Annotation: N (post) = sample size for effect size calculation at post-test; g (post) = effect size g-Morris at post-test; if g-Hedges was calculated due to data, this is highlighted with an H next to the effect size; T = effect size for psychopathology total; I = effect size for internalizing symptoms; E = effect size for externalizing symptoms; N (FU6M) = sample size for 6-month follow-up effect size calculations; g (FU6M) = g-Morris for 6-month follow-up; N (FU12M) = sample size for 12-month follow-up effect size calculation; g (FU12M) = g-Morris for 12-month follow-up; if effect sizes were aggregated in studies, the aggregated effect size is reported. ADIS-C/P, Anxiety Disorders Interview Schedule for Children-IV (child and parent versions; Silverman and Albano, 1996); BASC, Behavioral Assessment System for Children (daraus: BSI, Behavioral Symptoms Index; ESI, Emotional Symptoms Index; Reynolds and Kamphaus, 1992); BDI, Beck Depression Inventory (Beck *et al.*, 1988); CBCL, Child Behavior Checklist; C-TRF, Cargiver-Teacher Report Form (Achenbach, 1978, 1981, 1991ab, 1992; Achenbach and Edelbrock, 1978, 1983ab; Achenbach and Rescorla, 2000, 2001); CBRS-P, Child Behavior Rating Scale-Preschool Version (Noll and Zucker, 1985a); CDI, Children's Depression Inventory (Kovacs, 1979, 1981, 1985, 1992; Wierzbicki, 1987); CDRS-R, Children's Depression Rating Scale-Revised (Poznanski *et al.*, 1984); CES-D, Center for Epidemiologic Studies Depression Scale (Radloff, 1977, 1991); CGAS, Children's Global Assessment Scale (Shaffer *et al.*, 1983); CIDI, Composite International Diagnostic Interview (Kessler and Üstün, 2004); CPQ, Conners Parent's Questionnaire (Conners, 1972); CPQ-M, Conners Parent Questionnaire-Modified (Conners, 1973; Goyette *et al.*, 1978); DESB, Devereux Elementary School Behavior Rating Scale (daraus die Subskalen 'Disrespect-Defiance' und 'Inattentive-Withdrawn', Spivack and Swift, 1967); ECBI, Eyberg Child Behavior Inventory (Robinson *et al.*, 1980); GAF, Global Assessment of Functioning (American Psychiatric Association, 1987); HAM-D, Hamilton Depression Rating Scale (Hamilton, 1960; aus den K-SADS Depression-Items extrapoliert, vgl. Endicott *et al.*, 1981); HDLF-Y, Health and Daily Living Form (Moos *et al.*, 1990); LIFE, Longitudinal Interval Follow-up Evaluation (daraus DSR, Depression Symptom Rating Scale, Keller *et al.*, 1987); MFQ, Mood and Feelings Questionnaire (Angold *et al.*, 1995); OCHS, Ontario Child Health Study Scales (Boyle *et al.*, 1993); PDR-M, Parent Daily Report-Modified (Noll and Zucker, 1985b); PSC, Pediatric Symptom Checklist (Jellinek and Murphy, 1990); PSI-SF, Parenting Stress Index-Short Form (Abidin, 1995); RADS-2, Reynolds Adolescent Depression Scale-II (Reynolds, 2002; koreanische Version vgl. Hyun *et al.*, 2009); RBPC, Revised Behavior Problem Checklist (Quay and Peterson, 1987); RCMAS, Revised Children's Manifest Anxiety Scale (Reynolds and Richmond, 1978; Reynolds and Paget, 1983); Rutter A2 Scale (Rutter *et al.*, 1970); K-SADS, Schedule for Affective Disorders and Schizophrenia for School-Age Children (Kaufman *et al.*, 1997; Orvaschel and Puig-Antich, 1986; Puig-Antich *et al.*, 1980); SCARED, Screen for Child Anxiety Related Emotional Disorders (Birmaher *et al.*, 1997; 1999); SDQ, Strengths and Difficulties Questionnaire (Bourdon *et al.*, 2005; Goodman, 1997; Muris *et al.*, 2003; Klasen *et al.*, 2000); YSR, Youth Self-Report + YASR, Young Adult Self-Report (Achenbach and Edelbrock, 1987; Achenbach and Rescorla, 2001).

[a]Unpublished data.

[#]Difference between two pre-post effect sizes per group.

of higher quality both resulting in smaller effects. The type of control group proved to be significant ($Q_{between} = 7.79$, df = 2, $P = 0.0203$), with comparisons with control groups receiving no treatment resulting in larger effects (effect size = 1.20) vs. the less intensive treatment (effect size = 0.40) or TAU (effect size = 0.31).

DISCUSSION

With respect to the existing systematic reviews and meta-analyses we were able to replicate significant findings with interventions for mothers and infants resulting in small though significant effect sizes for both mothers' behavior during interactions as well as children's behavior [29▪▪]. Effects proved to be stable over the 12-month follow-up without significant publication bias. Study quality was a significant moderator, with studies of low quality producing larger effects – a well replicated finding in meta-analyses [35].

With respect to interventions addressing children's and adolescent's psychopathology development, our results also replicate findings of a prior meta-analysis [30], although at odds with that study, we were able to show a significant increase of effects over time for both global as well as internalizing and externalizing symptoms. This is of importance for studies in the field, as effects on psychopathology might need time to become observable. Further, as in the prior meta-analysis [30], effects for externalizing symptoms were non-significant at post-test, but reached significance at follow-up. In total, there was no significant publication bias and heterogeneity was only observable for internalizing symptoms over follow-up with a higher SES of study patients and a group setting resulting in larger effect sizes, and higher study quality and a dominance of males producing smaller effects. Comparisons with control groups receiving no treatment resulted in much larger effects, than groups receiving a less intensive treatment or TAU.

The current systematic review also reveals a lack of high-quality interventions for COPMI, with only 96 articles based on 50 independent samples producing overall small effects. With respect to the high risk of the transgenerational SMI transmission that is also associated with significant DALYs, there is an urgent need to address this high-risk group more effectively, adopting rigorous methodologies recommended for the testing of psychosocial interventions [144] and promoting study replications to demonstrate the efficacy of specific interventions delivered by different clinicians and in different treatment and sociocultural settings.

We restricted our search to articles of English, German, Italian, French, or Spanish language: this may have limited our identification of significant studies, though these languages cover a broader range than the existing meta-analyses on the topic [29▪▪,30,31]. A strength of this study is also the inclusion of grey literature, as the inclusion of published articles often results in the 'file-drawer-problem', since published studies most often report significant findings that disturb the overall balance of findings [145].

CONCLUSION

The current study highlights the dearth of high-quality studies on interventions for COPMI, a group at high-risk developing SMI themselves. Established effects are significant, though overall small and thus most likely not sufficient to effectively reduce the risk and burden of COPMI. Future interventions are thus needed to fill in this gap and to enhance prevention of mental suffering in this high risk group.

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Conflicts of interest

There are no conflicts of interest.

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