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Effectiveness and treatment moderators of parenting interventions in Finnish perinatal primary care

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Abstract

Perinatal parenting interventions may be important for enhancing parenting quality, but previous research has mostly focused on parental sensitivity. Other important outcomes, such as parental self-efficacy (PSE), have rarely been studied. Research is also contradictory on whether parenting interventions can also enhance maternal mental health and how treatment-related moderators affect treatment outcome. In this study, we examined the effectiveness of three individually tailored perinatal parenting interventions (therapeutic parent-infant work, maternity and child health clinic psychologists, and practical help) for parenting and mental health in naturalistic community settings in Finnish primary care. We further examined whether mental health symptoms moderated parenting efficacy and how treatment-related factors moderated parenting and mental health outcomes. The sample comprised 263 Finnish-speaking mothers: 177 in different interventions and 86 non-clinical controls from the same area. Parenting was examined with Maternal Self-Efficacy Scale and Emotional Availability (EA) self-report, depression with Edinburgh Postnatal Depression Scale and anxiety with Overall Anxiety Severity and Impairment Scale at the beginning of treatment, post-treatment, and at the six-month follow-up. Therapeutic work was the most broadly effective, with long-term effects on both parenting and mental health outcomes, regardless of maternal symptom level. Spouse participation, postnatal onset, and higher treatment dosage increased intervention effectiveness.

KEYWORDS

effectiveness, intervention, mental health, parenting, postnatal, prenatal

1 | INTRODUCTION

The early parent-infant relationship is important for child development and mental health (Rattaz et al., 2022). Its two core facets include Emotional Availability (EA) and parental self-efficacy (PSE). EA represents the dyadic ability to share an emotionally healthy connection, including aspects such as parental sensitivity, that is, emotional and behavioral responsiveness to infant signals (Biringen et al., 2022). PSE refers to parental confidence

in performing parenting tasks competently and effectively (Teti & Gelfand, 1991). Both are highly influential for healthy child and adult functioning (Albanese et al., 2019; Biringen et al., 2014) and serve as vital targets of early parenting interventions (Biringen et al., 2014; Jones & Prinz, 2005; Timmermans, 2019). In this study, we examine changes in EA and PSE in three perinatal community-based parenting interventions (therapeutic parent-infant work, maternity and child health clinic psychologists, and practical help) in Finland, where the quality of perinatal care is considered by the World Health Organization (WHO) as exemplary (Horakova et al., 2024).

Perinatal mental health problems are common, with pre- and postnatal depression and anxiety affecting about 10%–15% of new parents (Dennis et al., 2017; Shorey et al., 2018). They are also highly intertwined with parenting difficulties (Field, 2010, 2018; Wilson & Durbin, 2010), forming an additional risk for child development (Lucarelli et al., 2023). While parenting interventions are generally found to be effective in improving the parent-infant relationship (Mihelic et al., 2017), it is less clear whether they also improve parental mental health (Letourneau et al., 2017). We therefore study also maternal anxiety and depression as intervention outcomes. Furthermore, research is scarce on treatment moderators. In this study, we first examine whether parental mental health problems moderate the effectiveness of parenting interventions on parenting. Second, we examine whether treatment-related factors (dosage, prenatal onset, and spouse participation) moderate the effectiveness of parenting interventions on parenting and mental health outcomes.

Key findings

1. Perinatal parenting interventions conducted in Finnish primary care settings improved parenting and mental health
2. Perinatal psychotherapeutic interventions may be effective also for mothers with depressive symptoms
3. Higher treatment dosage, postnatal treatment onset, and spouse participation may increase treatment effectiveness

A statement of relevance for infant mental health

Parenting is critical for early development, and perinatal interventions aimed at improving parenting may play a key role in preventing infant mental health challenges. This study advances the field of infant mental health by examining the effects of community-based parenting interventions on both parenting practices and parental mental health outcomes. Moreover, the research identifies key moderators of intervention effectiveness, offering valuable insights into how these programs can be tailored to better meet the needs of mothers and their infants.

1.1 | Effectiveness of parenting interventions for maternal parenting and mental health

Several meta-analyses and systematic reviews have examined the overall effectiveness of interventions targeting early parenting and perinatal mental health (Letourneau et al., 2017; Mihelic et al., 2017; Nillni et al., 2018). Early parenting interventions seem to be generally effective in improving maternal sensitivity, a meta-analysis reporting on average moderate to large effect sizes (Mihelic et al., 2017). Changes in PSE have been examined mostly in the context of psychoeducational interventions, deemed to be highly effective (Dol et al., 2019; Liyana Amin et al., 2018). Nonetheless, studies are discrepant in whether early parenting interventions are also effective for maternal perinatal mental health (Letourneau et al., 2017). Some studies suggest that interventions targeting parenting behavior (e.g., sensitivity) may be particularly effective for also improving maternal mental health (Adina et al., 2022; Everett et al., 2021). However, others show no effects on mental health, unless specific cognitive-behavioral mental health modules are integrated as part of the intervention (Jeong et al., 2021; Waldrop et al., 2021). Finally, most parenting intervention studies have examined parental depression, with less research on the effectiveness of interventions for perinatal anxiety (Nillni et al., 2018). A recent Finnish study (Partanen et al., 2024) showed that parent-infant psychotherapy (PIP) may be more effective for anxiety than depressive symptoms. In this study, we thus examine both anxiety and depression as intervention outcomes.

Much of the earlier research has concerned *psychotherapeutic parenting interventions* such as PIP or Infant-Parent Psychotherapy (IPP), which are psychodynamic and attachment-based. These have a dual focus on both parental representations and the parent's interactive behavior with the infant, also emphasizing a good working alliance with the therapist (Guedeney et al., 2014). Some evidence indicates parent-infant psychotherapies

improve parental sensitivity and child attachment security (Barlow et al., 2016; Guild et al., 2021; Mattheß et al., 2021), but no previous studies exist on their effectiveness for PSE. A recent meta-analysis also found only short-term effectiveness on parental mental health (Huang et al., 2020). A few studies have also indicated that psychotherapeutic parenting interventions may also be beneficial when implemented in community-based naturalistic settings (Rosenblum et al., 2020; Salomonsson et al., 2021).

Far less is known about the effectiveness of *parental counseling not directly involving the infant*, although some research suggests that these interventions may be less effective than those focused on the mother-infant interaction (Thanhäuser et al., 2017). While some researchers claim that individually focused treatments are effective for both depression and parenting problems (Cuijpers et al., 2015), others suggest they may only affect depression (Forman et al., 2007; Kersten-Alvarez et al., 2011).

Some parenting interventions also focus on *practical parenting issues*, that is, direct child-care help for parental fatigue or psychoeducation with behavioral management of infant sleep or crying and improvement of other parental everyday coping skills. While psychoeducational or behavioral parent management trainings are often found to improve parenting, they may be less effective for parental mental health (Everett et al., 2021). Some studies even show null findings. For example, a preventive practical support intervention by trained health visitors, sensitizing the mothers to infant characteristics, and managing behavioral problems (crying, feeding, sleeping) was no more effective for depression than a no-treatment condition (Cooper et al., 2015). However, child-care help was found to protect mothers with poorly sleeping infants from mental health problems (Armstrong et al., 2022).

1.2 | The Finnish primary care setting and interventions used in this study

Most intervention research has focused on homogenous samples and used strict exclusion criteria, such as comorbid mental health disorders (Shedler, 2018). While randomized controlled trials (RCTs) are highly valuable for scrutinizing the causal effects of interventions, they may lack ecological validity and do not always reflect the reality of naturalistic treatment settings (Desmet, 2013). Naturalistic quasi-experimental studies are thus an important addition to intervention studies.

Community-based primary care settings may work particularly well as a platform for early parenting interventions (Peacock-Chambers et al., 2017; Smith et al., 2020). WHO has evaluated the Finnish perinatal mental healthcare to be among the best in Europe (Horakova et al., 2024). For example, 99.7% of families expecting a baby and 99.5% of families with a 0–6 year-old child attend regular health check-ups in free well-baby clinics (Riihonen et al., 2021), which makes it easy to recognize problems early and to offer low-threshold services. Finnish perinatal primary care settings may thus offer an important naturalistic context for early parenting intervention studies.

In this study, we examine the effectiveness of three different community-based parenting interventions in the capital region of Finland: *Therapeutic parent-infant work*, *maternity and child health clinic psychologist services*, and *practical help*, and compare them with a no-treatment control group from the same population. Further, we include a 6-month follow-up, as some studies have found especially mental health effects to diminish over time (Huang et al., 2020). The interventions of this study are described below.

Therapeutic parent-infant work is offered as part of social welfare services in family centers. The model is conceptually close to PIP. It is an individually tailored, intensive treatment that starts during pregnancy or postpartum, typically involving weekly sessions with a psychotherapist or a psychologist specialized in infant mental health. Families are referred from well-baby clinics or other services, such as delivery hospitals or adult psychiatric clinics. The referral is typically based on severe parenting difficulties, often related to parents' own difficult childhood experiences, and concurrent problems with mental health, family relations, or infant behavior. The treatment is voluntary and requires capacity for verbal therapeutic processing. The work is family-based, involving at least one parent and the infant in all sessions and other family members, such as the spouse, siblings, or grandparents, to a varying degree. Home visiting is often used, as is collaboration with the family's other service networks such as well-baby clinics, delivery hospitals, child protection services, or adult psychiatry. The treatment typically includes both direct work with the parent-infant interaction as well as work with parental representational world such as making sense of how their own childhood experiences affect their parenting. No previous studies have been conducted on this treatment model.

Maternity and child health clinic psychologist services is another form of support offered in the Finnish community settings. It is a low-threshold treatment provided by licensed psychologists working with families with 0–6-year-old children or during pregnancy. It has therapeutic elements but is less intensive and aimed at a more restricted range of problems related to parenting and parental and child well-being than therapeutic parent-infant work. During the perinatal period, it typically involves individual work with the parent's own well-being but offers less direct support for the parent-infant

interaction. Typical perinatal referrals are related to worries during pregnancy, for example, due to previous miscarriages, fear of delivery or traumatic delivery experiences, or mild to moderate perinatal mental health issues.

Practical help in our study represents a combination of two different low-threshold services (combined in this study because the families received both simultaneously). Direct child-care help (babysitting) does not include talk therapy, instead giving the mother an opportunity to rest. Practical guidance is not therapeutic in content, but focused on psychoeducation-based, behavioral interventions for infant-related issues, such as problems with sleep, eating or excessive crying. Families are typically referred from well-baby clinics if they have mental health issues or severe fatigue, practical life challenges, or their infants show regulatory difficulties. The practitioners are not mental health professionals but may be practical nurses (with vocational training) or social advisors with a bachelor's degree in social services.

1.3 | Treatment moderators in perinatal parenting interventions

Research is scarce and contradictory on the role of treatment moderators in early perinatal parenting interventions. First, parenting outcomes may be affected by *the presence of parental mental health symptoms*. Especially behavioral management and other practical help interventions have been suggested to be less effective in families with parental mental health issues (Hummel & Kiel, 2016; Maliken & Katz, 2013). Some research also suggests that psychotherapeutic parent-infant interventions may be particularly helpful for parents with perinatal depression, as their focus on parental representations allows work with attachment-related issues in the mother's own past that commonly underlie both perinatal depression and parenting difficulties (Erickson et al., 2019; Guedeney et al., 2014).

Surprisingly little research has examined the effectiveness of *pre- versus postnatal onset* of parenting interventions. The parent-child relationship begins to form already during pregnancy and its prenatal quality is known to predict postnatal parenting and child development (Foley & Hughes, 2018; Le Bas et al., 2020). Maternal prenatal mental health problems may also biologically impair fetal regulatory development via direct exposure to maternal stress hormones (Korja et al., 2017). It is possible that prenatal interventions could be more effective due to their ability to directly buffer fetal regulatory development and prevent problems in the early relationship. Some authors have recommended that parenting interventions should begin before any significant problems occur, preferably early in pregnancy (Morrison et al., 2014). Others have found postnatal interventions to be more effective due to the direct focus on early interaction (Bakermans-Kranenburg et al., 2003). Finally, some suggest that pre- and postnatal interventions are equally effective (Pettman et al., 2023; Pinquart & Teubert, 2010).

Research is contradictory on the role of *treatment dosage* (number of sessions) in success of the intervention. In their community-based early parenting interventions (IPP), both Stacks et al. (2022) and Rosenblum et al. (2020) found dose-response effects on improved sensitivity, with better outcomes for longer interventions. By contrast, two reviews (Bakermans-Kranenburg et al., 2003; Mihelic et al., 2017) concluded that brief interventions were more effective in improving parental sensitivity than longer ones. It is also possible that intervention dosage increases benefits only to a certain threshold. Pinquart & Teubert (2010) found that interventions lasting between 3 and 6 months had the largest effects on parenting, followed by shorter interventions and then longer interventions.

Finally, *spouse involvement* may be highly important for treatment effectiveness. Parenting interventions have been found to be more effective for mothers when the partner is involved (Cluxton-Keller & Bruce, 2018; Thanhäuser et al., 2017), and one study also indicates that the same may be true for PIP (Hervé et al., 2009). In this study, we consider the role of these possible treatment moderators on intervention outcomes.

2 | AIMS OF THE STUDY

In this study, we *first* examine in naturalistic primary care settings whether there is change in maternal self-reported parenting (PSE, EA) in three different community-based treatments (therapeutic parent-infant work, maternity and child health clinic psychologist services, and practical help). We compare them with non-clinical control families in the same area not attending parenting interventions beyond regular well-baby clinic visits. We examine both changes from the beginning of the intervention to post-intervention as well as over a 6-month follow-up. We hypothesize that therapeutic parent-infant work is especially effective in improving parenting due to its broad focus on both direct work with parent-infant interaction and the parent's representational world.

Second, we examine whether early parenting interventions also improve maternal mental health (depression and anxiety). We hypothesize that maternal mental health improves more in all three different interventions than in non-clinical controls. We hypothesize that the treatments

improve both outcomes, but the therapeutic parent-infant work may be especially effective in improving anxiety.

Third, we examine the moderating role of parental mental health in effectiveness of different interventions for PSE. We hypothesize that therapeutic parent-infant work is especially effective for mothers with higher perinatal mental health symptoms, and practical help is less effective. Due to scarcity of research, we offer no hypothesis about differences in anxiety and depression but examine them as separate moderators.

Finally, we examine the moderating role of treatment-related factors, including treatment onset (prenatal vs. postnatal), dosage (number of sessions), and spouse involvement on maternal PSE and mental health (depression and anxiety). We expect that spouse participation will enhance treatment outcome in all areas. Due to contradictory earlier studies, we offer no hypothesis on the role of other moderators.

3 | METHODS

3.1 | Participants and procedure

The study involved 263 mothers: 177 mothers attending early parenting interventions in the capital region of Finland (Helsinki and two neighboring cities), starting during pregnancy ($n = 66$) or postpartum ($n = 111$), and 86 non-clinical control mothers recruited from well-baby clinics during pregnancy ($n = 34$) or postpartum ($n = 52$) in the same cities. The prenatally starting mothers were typically in the third trimester of pregnancy (intervention group mean: gestational week 29.28, SD = 7.11, range 13–39; control group mean 30.29, SD = 6.99, range 15–39). For postnatally starting participants, the average age of the infant at the beginning of the study was 5.16 months (SD = 2.79, range 1–12) in the intervention groups and 4.92 months (SD = 3.33, range 1–12) in the control group. The mean age of mothers in the intervention group was 33.20 years (SD = 4.21, range 21–42) and in the control group 32.27 years (SD = 3.56, range 22–40), which is close to the mean age of giving birth in Finland (31.6 years; National Institute of Health and Welfare, 2023). In the intervention groups, 89 mothers (50.3%) attended therapeutic parent-infant work, 38 mothers (21.5%) received psychologist services and 50 mothers (28.2%) participated in practical help interventions (mostly home-delivered services of child-care help and psychoeducational guidance).

All parents attending parental support services were asked to participate in the study by the staff member working with the client in their first meeting. Also their spouses were asked to participate, independent of whether they were clients at the services. In the control group, health care nurses asked parents to participate during the routine pregnancy or infant follow-up visits in the well-baby clinics. The inclusion criteria for both groups involved being able to fill in the forms in Finnish and expecting a baby or having a child who was less than 12 months of age. In the control group, the exclusion criteria also involved attending any parenting support services. Moreover, single parents or parents in same-sex marriages were eligible to participate. Only maternal data were used in this study.

Parents were informed about the study by the staff members and, if interested, received detailed written information and an opportunity to contact researchers before the decision to participate. Participation was voluntary and did not affect the services provided to the clients. Those willing to participate signed an informed consent form and returned it to the researchers in a pre-paid envelope. They then filled in an electronic questionnaire at baseline (T1). Only the researchers, not clinic staff, had access to participant data. For the intervention group, the staff members asked participants to fill in the same electronic questionnaires again at the end of treatment (T2). For the control group, the T2 questionnaire was sent after 6 months. The researchers further sent a follow-up questionnaire to both groups 6 months after the previous questionnaire (T3). The participants in the intervention groups also gave consent for the staff to report about treatment-related factors. In this study, we include treatment dosage, spouse's involvement, and pre- versus postnatal onset as treatment-related factors. The study received ethical approval from Regional Ethics Committee of the Expert Responsibility area of Tampere University Hospital and adhered to the principles laid down in the Declaration of Helsinki.

3.2 | Measures

Background factors comprised education level (classified as low = 1, *secondary education or lower*, or high = 2, *tertiary education, i.e., bachelor's or master's degree)*, marital status (married/cohabiting = 1 or single/divorced = 2), parity (1 = primiparous, 2 = multiparous), child sex (1 = girl, 2 = boy) and child age (months) or gestational week at the beginning of treatment. The time interval (weeks) between T1 and T2 (which for the intervention groups was also approximately the duration of treatment) was obtained directly from the dates of filling in the questionnaires.

Treatment-related factors reported by staff comprised intervention dosage (number of visits), intervention onset (1 = pregnancy, 0 = postpartum), and spouse's

participation (0 = not at all, 1 = sometimes or regularly; the latter two options were combined due to small cell sizes).

3.2.1 | PSE

Mother's PSE was measured at all time points with *Maternal Self-Efficacy Scale* (Teti & Gelfand, 1991), comprising 10 items regarding the mother's feelings of competence in taking care of the infant, such as in putting the infant to sleep or soothing the infant. The mothers answered on a four-point Likert scale (1 = not at all good – 4 = very good). A total mean score was used, with higher values indicating higher PSE. For expectant mothers, the measure was otherwise similar, but wording was slightly changed as to instruct parents to imagine themselves as parents (Leerkes & Burney, 2007). Cronbach's alphas in our data were good, with .86 at T1, .81 at T2, and .86 at T3.

3.2.2 | EA

Mothers who started the study postnatally also self-reported about the EA in the relationship with their child at all time points with *Emotional Availability Self-report* (EA-SR, Vliegen et al., 2009). This is a 36-item measure that can be divided into five subscales and three domains. *Adult domain* comprises the subscales of parental intrusiveness and parental hostility (six items each, higher scores indicating more negative EA). *Dyadic domain* comprises the subscales of mutual attunement (10 items) and affect quality (5 items), higher scores indicating more positive EA. C*hild domain* comprises child involvement (9 items, higher scores indicating more positive EA). The mothers answered on a five-point Likert scale (0 = disagree completely, 4 = agree completely). Total mean scores were constructed separately for adult, dyadic and child domains. Cronbach's alphas in our data were satisfactory, for adult scale ranging from .66 to .71, for dyadic scale from .76 to .80, and for child scale ranging from .84 to .85.

3.2.3 | Depression

Maternal depressive symptoms were measured at all time points with *Edinburgh Postnatal Depression Scale* (EPDS, Cox et al., 1987), a ten-item measure involving descriptions about depression-related thoughts, feelings, and behaviors. The mothers answered on a four-point Likert scale (0–3) how well the descriptions matched their symptoms during the past week. A total summary score was constructed by summing all items. Cronbach's alphas in our data were .90 at all time points.

3.2.4 | Anxiety

Maternal anxiety was measured at all time points with Overall Anxiety Severity and Impairment Scale (OASIS; Norman et al., 2006). OASIS is a brief, five-item measure of anxiety symptoms over the past week, known to tap a variety of different anxiety disorders as well as sub-threshold symptoms. It is commonly used in Finnish clinical settings as a brief screener of general (not pregnancy-related) anxiety symptoms, also during the perinatal period. Several earlier studies have also used OASIS during pregnancy (e.g., Dunkel Schetter et al., 2022; Irwin et al., 2020). The mothers answered on a five-point Likert scale (0–4) how well their symptoms match the symptom descriptions. A total summary score was constructed by summing all items. Scale reliabilities in our data were .90 at T1 and T2, and .83 at T3.

3.3 | Statistical analyses

Analyses were conducted with SPSS 28 and R 4.3.3 (R Core Team, 2024). Package lme4 (Bates et al., 2015) was used to fit linear mixed models, afex (Singmann et al., 2024) to run the omnibus tests of predictor significance and ggeffects (Lüdecke, 2018) to estimate and plot marginal means. To examine the associations between background and study variables, and differences between pre- and postnatally starting mothers, descriptive analyses were conducted with Pearson's correlations and Student's *t*-tests for normally distributed variables (PSE and adult and dyadic EA) and with Spearman's correlations and Mann–Whitney *U*-tests for non-normally distributed variables (child EA, maternal depression, and anxiety). For descriptive purposes, we also examined correlations between baseline levels and changes (represented by difference scores, e.g., PSE at T1 – PSE at T2) in the outcomes.

To examine intervention effectiveness, linear mixed models (LMMs) were used to examine changes in PSE and dyadic and adult EA. Since residuals with an LMM were not normally distributed for dependent variables child EA, depression, and anxiety, their change was examined with Generalized Linear Mixed Models (GLMMs) with gamma distribution assumption. In all models, we first tested with *F*-test (Satterthwaite method) for the LMMs and with a likelihood ratio test (LRT) for the GLMMs whether including Group and Group × Time interaction terms increased model fit significantly, before including them in the model.

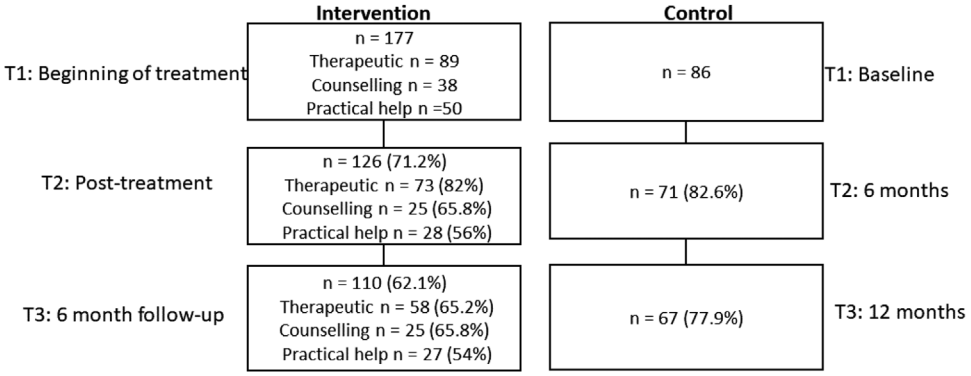

FIGURE 1 The study flow chart.

The results involving an interaction with time were of primary interest, as only *change* between the time points can be considered an effect of the interventions.

When studying the moderating effect of maternal depression and anxiety on changes in PSE, we only added moderators that had significant two- or three-way interactions with group and time (e.g., Depression × Group, Depression × Time, and Depression × Group × Time) according to the omnibus tests. The same process was applied to the treatment-related moderators (treatment onset and dosage, and spouse participation) on PSE and mental health. Treatment moderators were not examined regarding EA variables due to small group sizes, as EA was measured only for postnatally starting mothers. In all analyses, we controlled for mother's educational level as it related to missingness, and the time interval between T1 and T2 (which also represents treatment duration for the intervention groups) as it varied between participants. Based on previous research, we also controlled for child sex for PSE (Glatz et al., 2024), and child sex and age for EA (Bornstein et al., 2010). Regarding the spouse participation model, we only included parents who were partnered. According to recommendations regarding LMMs, missing values were not imputed (Twisk et al., 2013).

4 | RESULTS

4.1 | Attrition analyses

Figure 1 presents the study flow chart. Attrition was associated with group status at T2, $\chi^2(3) = 17.47$, $p < .001$, practical help and psychologist services groups showing more attrition than therapy group or controls, and at T3, $\chi^2(3) = 9.57$, $p = .023$, the practical help group showing more attrition than controls. At T2 and T3, there was more attrition in those with lower education level, $\chi^2(1) = 4.43$, $p = .035$ and $\chi^2(1) = 6.46$, $p = .011$, respectively. Attrition was not associated with the baseline level of study variables (PSE, EA, depression, or anxiety) or other background factors (marital status, parity, child sex, child age/gestational week at the beginning of treatment, or pre- versus postnatal treatment onset), indicating missingness at random.

4.2 | Descriptive statistics

4.2.1 | Background variables

Table 1 displays means and standard deviations of the study variables in three intervention groups and the control group. Table 2 shows the background characteristics in control and intervention groups. There were more single/divorced parents in the practical help group than in the control group. No group differences emerged in maternal education level, child sex, parity, or child age/gestational week in the beginning of treatment. Table 3 displays the associations between background and study variables. Older infant age was correlated with higher child involvement at all time points. Parity was associated with T1 child involvement, multiparous parents scoring higher. Child sex was associated with PSE and dyadic EA at T2, mothers of girls scoring higher. Lower education level was associated with higher PSE at T3. Table S1 also shows that there were no differences in background variables or baseline study variables between those who started pre- versus postnatally in different groups. Table S2 reveals that higher baseline levels were associated with more change in study variables.

4.2.2 | Treatment characteristics

Table 4 shows that treatment dosage (number of sessions) was higher in the therapeutic group than in either psychologist services or practical help. About half of the treatments in the therapeutic and psychologist services groups started

TABLE 1 Means, standard deviations and observed ranges in study variables by group.

	Therapeutic			Psychologist			Practical help			Control		
	M	SD	Range	*M*	SD	Range	*M*	SD	Range	*M*	SD	Range
PSE T1	3.01	0.45	1.40–4.00	3.12	0.34	2.50-3.90	3.13	0.33	2.50–4.00	3.25	0.37	2.00–4.00
PSE T2	3.28	0.33	2.70–4.00	3.04	0.43	1.90-3.70	3.20	0.37	2.40–4.00	3.35	0.32	2.50–4.00
PSE T3	3.32	0.34	2.70–4.00	3.13	0.43	2.50-4.00	3.25	0.33	2.70–4.00	3.40	0.38	2.60–4.00
Adult EA T1	1.82	0.61	0.58–2.92	1.84	0.75	0.58-3.42	1.63	0.49	0.50–3.00	1.65	0.55	0.58–2.83
Adult EA T2	1.72	0.57	0.42–3.00	1.72	0.55	0.58-2.92	1.70	0.51	0.67–2.67	1.64	0.49	0.50–3.33
Adult EA T3	1.91	0.60	0.67–3.33	1.88	0.66	1.58-3.92	1.80	0.50	0.92–2.75	1.76	0.53	0.83–3.25
Dyadic EA T1	2.68	0.48	1.15–3.60	2.93	0.48	2.15-3.70	2.94	0.43	1.90–3.70	3.04	0.39	1.90–3.70
Dyadic EA T2	3.02	0.39	2.20–3.90	2.94	0.53	1.85-3.80	3.02	0.43	2.25–3.75	3.20	0.34	3.40–4.80
Dyadic EA T3	2.96	0.48	1.75–3.85	2.90	0.49	1.75-3.70	3.00	0.37	2.35–3.70	3.13	0.36	2.05–3.70
Child EA T1	2.96	0.66	0.89–4.00	3.24	0.48	2.44-3.89	3.12	0.71	2.11–3.89	3.10	0.52	2.00–4.00
Child EA T2	3.36	0.55	1.56–4.00	3.26	0.57	2.33-4.00	3.45	0.48	2.11–4.00	3.30	0.54	1.22–4.00
Child EA T3	3.60	0.44	2.33–4.00	3.46	0.46	2.11-4.00	3.51	0.42	2.67–4.00	3.54	0.51	1.78–4.00
Depression T1	11.44	5.78	0–27	10.50	5.75	0-27	8.74	5.18	0–27	4.26	3.04	0–12
Depression T2	8.29	6.10	0–26	7.36	5.24	0-20	7.71	5.70	0–18	4.52	4.13	0–22
Depression T3	8.45	5.46	1–27	8.49	5.45	0-21	7.94	6.60	0–26	5.08	4.75	0–24
Anxiety T1	7.33	3.59	0–16	6.76	3.64	0-15	5.06	3.44	0–17	2.52	2.37	0–10
Anxiety T2	5.57	3.67	0–16	5.13	3.73	0-14	5.37	3.54	0–13	2.60	2.85	0–11
Anxiety T3	5.59	3.65	0–15	5.10	3.67	0-11	5.52	3.84	0–13	2.95	3.03	0–12

Abbreviations: EA, Emotional Availability in the mother-infant relationship; PSE, parental self-efficacy.

TABLE 2 Background factors for the three intervention groups and the controls.

	Therapeutic		Psychologist		Practical help		Control			
	n	%	*n*	%	*n*	%	*n*	%	$\chi^2(3)$	*p*
Education									5.64	.13
Low	8	9.4	1	2.9	8	17	6	7.1		
High	77	90.6	34	97.1	39	83	79	92.9		
Marital status									29.49	**<.001**
Relationship	79	92.9	35	92.1	34	70.8	84	98.8		
Single/divorced	6	7.1	3	7.9	14	29.2	8	1.2		
Child sex									3.03	.39
Girl	41	48.8	17	54.8	19	39.6	43	54.4		
Boy	43	51.2	14	45.2	29	60.4	36	45.6		
Parity									1.42	.70
Primiparous	55	64.7	24	63.2	33	68.8	50	58.8		
Multiparous	30	35.3	14	36.8	15	31.3	35	41.2		
	M	SD	*M*	SD	*M*	SD	*M*	SD	*F*(df)	*p*
Child age (mo)	4.81	.46	6.29	.72	5.07	.44	4.92	.42	1.12(3150)	.34
Gw	30.15	1.11	28.05	1.61	18.00	7.00	30.29	1.32	1.40 (3,84)	.25

Note: Child age is in months (mo).
Abbreviation: gw, gestational week.

prenatally, while in the practical help group only two participants started during pregnancy. Meeting the spouse at least sometimes was common in the therapeutic and practical help groups while in the psychologist services group the spouse was met in only one-third of treatments.

4.3 | Changes in parenting

Our first research question concerned changes in parenting from the beginning of intervention to post-intervention and to the 6-month follow-up. Table 5 and Figures 2–4 display these changes. There was a significant Time × Group interaction on PSE, $F(6, 339.48) = 5.25$, $p < .001$. More specifically, there was more positive change in the therapeutic group than in controls in PSE from the beginning to post-treatment (Therapeutic × T1–T2 Change), which remained at the 6-month follow-up (Therapeutic × T1–T3 Change). Significant improvement in PSE also occurred in the control and practical help groups, but they did not differ significantly from each other. Therapeutic and practical help groups, but not psychologist services, also showed lower PSE at baseline than controls.

There were significant Time × Group interactions on dyadic EA, $F(6, 189.39) = 2.87$, $p = .011$, and child EA, $F(6, 192.51) = 2.41$, $p = .029$. Partially aligning with our hypothesis, a positive change occurred from the beginning of treatment to post-treatment (T1–T2) in dyadic and child EA in the therapeutic group relative to controls; the change remained significant at the 6-month follow-up (T1–T3).

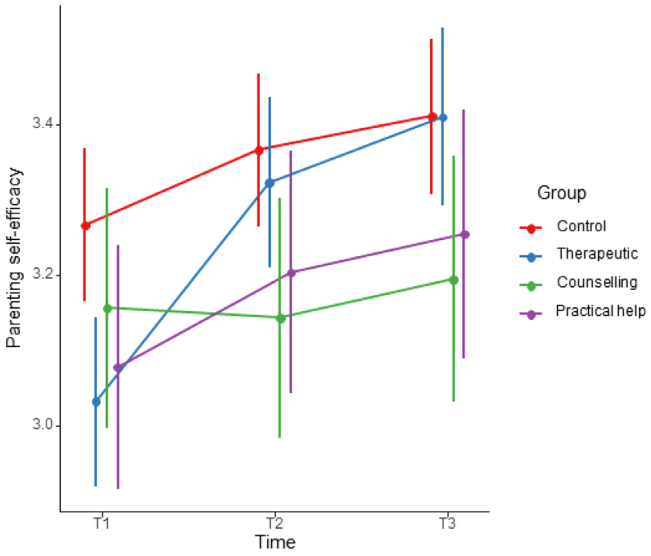

FIGURE 2 Changes in maternal parenting self-efficacy by group.

Mothers in the therapeutic group also showed lower baseline (T1) dyadic EA than controls. For child EA, there was also a positive change over time in all groups, while dyadic EA tended to diminish over time in other groups. For adult EA, a non-significant omnibus test indicated that adding the Group × Time interaction did not improve the model.

TABLE 3 Associations between background and study variables.

	T1 Parenting efficacy			T1 EA adult			T1 EA dyadic			T1 EA child		T1 Depression		T1 Anxiety	
	M	**SD**	***t***	***M***	**SD**	***t***	***M***	**SD**	***t***	**Md**	***U***	**Md**	***U***	**Md**	***U***
Education level			.76			1.07			−.14		899		2220		2057
Low	3.19	.29		1.86	.68		2.89	.49		3.00		9.00		6.00	
High	3.13	.41		1.68	.56		2.91	.45		3.22		7.00		5.00	
Marital status			.06			1.12			−.87		1198		3054		3017
Married/cohabiting	3.13	.40		1.73	.57		2.88	.45		3.11		8.00		5.00	
Single/divorced	3.13	.37		1.56	.62		2.99	.48		3.33		8.00		6.00	
Parity			−.65			−.53			−1.31		**2974***		7870		7134
Primiparous	3.11	.41		1.70	.57		2.86	.48		3.11		7.50		5.00	
Multiparous	3.15	.38		1.75	.59		2.96	.38		3.33		8.00		5.00	
Child sex			.60			1.73			-.06		2693.50		6643.50		6439
Girl	3.14	.47		1.80	.57		2.89	.45		3.11		8.00		6.00	
Boy	3.11	.35		1.63	.57		2.89	.46		3.17		7.00		5.00	
	Pearson's *R*			**Pearson's *R***			**Pearson's *R***			***R*S**		***R*S**		***R*S**	
Child age	**.18***			.04			.14			**.31*****		−.00		−.03	
Gestational week	−.13			–			–			–		−.06		.08	
	T2 Parenting efficacy			**T2 EA adult**			**T2 EA dyadic**			**T2 EA child**		**T2 Depression**		**T2 Anxiety**	
	M	**SD**	***t***	***M***	**SD**	***t***	***M***	**SD**	***t***	**Md**	***U***	**Md**	***U***	**Md**	***U***
Education level			0.10			0.31			−0.86		1048		923.50		896.50
Low	3.28	.52		1.73	.41		2.98	.49		3.56		8.00		6.00	
High	3.27	.34		1.68	.54		3.08	.41		3.44		6.00		3.00	
Marital status			.23			.17			.003		1416		1560		1497
Married/cohabiting	3.27	.36		1.69	.54		3.07	.41		3.44		6.00		3.00	
Single/divorced	3.24	.36		1.67	.48		3.07	.46		3.50		6.00		4.50	
Parity			.46			.88			-.76		4181.50		4262		3870.50
Primiparous	3.27	.38		1.71	.55		3.06	.43		3.44		6.00		4.00	
Multiparous	3.25	.32		1.64	.50		3.10	.38		3.50		6.00		3.00	

(Continues)

TABLE 3 (Continued)

	T2 Parenting efficacy			T2 EA adult			T2 EA dyadic			T2 EA child		T2 Depression		T2 Anxiety	
	M	**SD**	***t***	***M***	**SD**	***t***	***M***	**SD**	***t***	**Md**	***U***	**Md**	***U***	**Md**	***U***
Child sex			**2.67****			−.24			**2.59****		4140.50		4973		5028
Girl	3.33	.36		1.68	.50		3.15	.37		3.53		5.56		3.00	
Boy	3.20	.32		1.70	.56		3.01	.41		3.44		6.00		4.00	
	Pearson's *R*			**Pearson's *R***			**Pearson's *R***			***R*S**		***R*S**		***R*S**	
Child age	.03			.10			.10			**.34*****		.06		.01	
Gestational week	−.05			–			–			–		.02		.23	
	T3 Parenting efficacy			**T3 EA adult**			**T3 EA dyadic**			**T3 EA child**		**T3 Depression**		**T3 Anxiety**	
	M	**SD**	***t***	***M***	**SD**	***t***	***M***	**SD**	***t***	**Md**	***U***	**Md**	***U***	**Md**	***U***
Education level			**2.33***			−.67			1.49		785.50		810.50		1350
Low	3.59	.36		1.71	.38		3.22	.41		3.78		7.50		3.88	
High	3.31	.37		1.83	.59		3.02	.42		3.67		6.00		4.00	
Marital status			.87			.61			.81		839		976		1631.50
Married/cohabiting	3.33	.38		1.84	.59		3.03	.43		3.67		6.00		4.00	
Single/divorced	3.23	.37		1.76	.41		2.93	.39		3.61		7.00		5.00	
Parity			.20			.39			-.81		3407.50		3968		4930.50
Primiparous	3.32	.39		1.85	.59		3.00	.44		3.67		6.00		4.00	
Multiparous	3.31	.36		1.81	.55		3.06	.39		3.67		7.00		4.00	
Child sex			.08			.58			.05		3165		3998.50		5369
Girl	3.32	.40		1.86	.55		3.03	.44		3.78		6.00		4.00	
Boy	3.31	.36		1.81	.59		3.02	.43		3.67		6.00		5.00	
	Pearson's *R*			**Pearson's *R***			**Pearson's *R***			***R*S**		***R*S**		***R*S**	
Child age	.06			.09			.05			**.30****		−.01		−.00	
Gestational week	−.22			–			–			–		.18		.22	

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

TABLE 4 Descriptives of treatment characteristics.

	Therapeutic			Psychologist			Practical help			
	M	SD	Range	*M*	SD	Range	*M*	SD	Range	*H*(df)
Dosage	25.85	17.88	3–77	11.03	10.18	1–45	11.22	11.84	1–50	30.77(2)***
	n	%		*n*	%		*n*	%	χ^2(df)	
Onset										
Prenatal	43	48.3		21	55.3		2	4	33.45(3)***	
Postnatal	46	51.7		17	44.7		48	96		
Spouse participation									22.37(3)*	
Regularly	25	29.4		2	6.9		3	10.7		
Sometimes	40	47.1		7	24.1		13	46.4		
Never	20	23.5		20	69		12	42.9		

Note: Differences in *n*'s are due to missing values.
*$p < .001$.

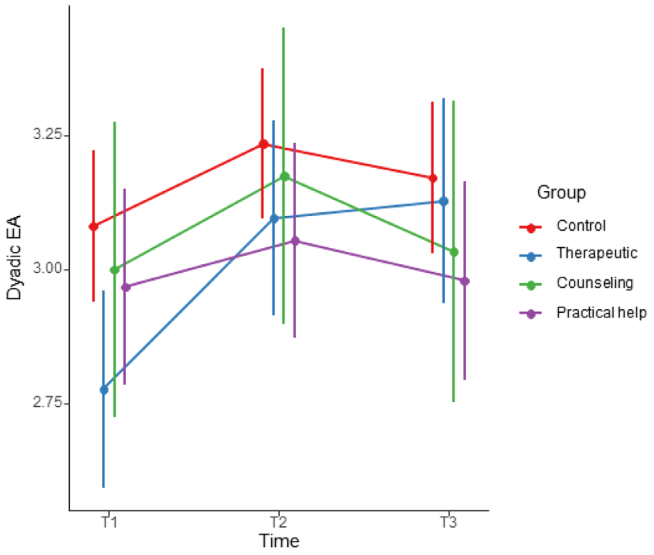

FIGURE 3 Changes in maternal dyadic EA by group. EA, emotional availability.

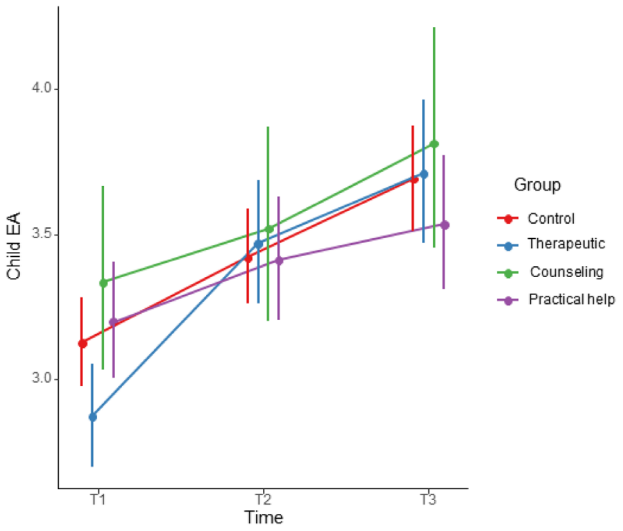

FIGURE 4 Changes in child EA by group. EA, emotional availability.

4.4 | Changes in mental health

Our second question concerned changes in maternal mental health from the beginning of the intervention to post-intervention and further to the 6-month follow-up. The results are displayed in Table 6 and Figures 5 and 6. There was a significant Time × Group interaction on maternal depression, $\chi^2(6) = 20.24$, $p = .003$. There was a greater T1–T2 decrease in depressive symptoms in the therapeutic and psychologist services and a marginally greater decrease in the practical help group than in controls. The change from T1 to T3 remained significant in the therapeutic group and marginally so in the psychologist services group.

TABLE 5 Changes in parenting.

	Parental self- efficacy				Adult EA			Dyadic EA			Child EA[a]		
	B	**SE**	***p***		***B***	**SE**	***p***	***B***	**SE**	***p***	***B***	**SE**	***p***
Covariates				**Covariates**									
Time interval (T1–T2)	−.00	.00	.52	Time interval (T1–T2)	.01	.00	**.03**	−.00	.00	.09	−.01	.02	.61
Child sex	−.06	.05	.24	Child sex	.05	.10	.61	−.13	.08	.08	−.02	.03	.46
Education level	−.11	.10	.26	Child age	.01	.02	.39	.02	.01	.20	.04	.02	**.03**
Reference: Control				Education level	−.13	.20	.51	.13	.15	.38	−.01	.07	.87
Fixed effects													
Constant	3.48	.20	<.001		1.79	.21	<.001	2.95	.16	<.001	1.15	.07	<.001
Time[b]													
Change T1 to T2	.10	.04	**.01**		.07	.07	.34	.15	.05	**.003**	.09	.02	**<.001**
Change T1 to T3	.14	.04	**<.001**		.15	.08	.05	.09	.05	.08	.17	.03	**<.001**
Groups[c]													
Therapeutic T1	−.23	.07	**.001**		.02	.15	.87	−.30	.11	**.005**	−.08	.05	.09
Psychologist T1	−.11	.09	.23		.20	.22	.36	−.04	.16	.81	.08	.07	.26
Practical help T1	−.19	.09	**.03**		−.04	.15	.78	−.10	.11	.37	.02	.05	.66
Interaction effects													
Therapeutic × T1 to T2 change	.19	.05	**<.001**		−.02	.11	.84	.17	.08	**.03**	.10	.04	**.009**
Psychologist × T1 to T2 change	−.11	.08	.14		−.30	.18	.09	.04	.12	.77	−.02	.06	.70
Practical help × T1 to T2 change	.03	.07	.73		.00	.12	.99	−.07	.08	.42	−.03	.04	.52
Therapeutic × T1 to T3 change	.23	.06	**<.001**		−.07	.12	.55	.26	.08	**.002**	.09	.04	**.03**
Psychologist × T1 to T3 change	−.11	.08	.18		−.20	.18	.28	−.04	.12	.75	−.05	.06	.40
Practical help × T1 to T3 change	.03	.08	.68		.11	.13	.37	−.08	.09	.35	−.07	.04	.11

Note: The change was also significant in the practical help group: Change T1 to T2: $B = .14$, SE = .06, $p = .03$; Change T1 to T3: $B = .19$, SE = .07, $p = .004$ and in the therapy group: Change T1 to T2 $B = .30$, SE = .04, $p < .001$; Change T1 to T3 $B = .39$, SE = .04, $p < .001$ but not in the psychologist services group: Change T1 to T2: $B = -.03$, SE = .08, $p = .69$; Change T1 to T3: $B = .04$, SE = .07, $p = 57$.

Goodness-of-fit data for M_0 (null model, includes fixed and random intercept and) and for M_f (the final model). R^2 is conditional R^2.

Efficacy: M_0: AIC: 373.16 BIC: 385.99 R^2: .56 ICC: .56. M_f: AIC: 340.52 BIC: 413.23 R^2: .68 ICC: .64.

EA dyadic: M_0: AIC: 238.80 BIC: 249.95 R^2: .66 ICC:.66. M_f: AIC: 262.12 BIC: 328.97 R^2: .75 ICC: .70.

EA adult: M_0: AIC: 411.47 BIC: 422.62 R^2:.64 ICC: .64. M_f: AIC: 469.81 BIC: 536.65 R^2: .67 ICC: .65.

EA child: M_0: AIC: 466.81 BIC: 477.95 R^2: .32 ICC: .32. M_f: AIC: 420.45 BIC: 487.30 R^2: .60 ICC: .45.

[a]Child EA is on log scale

[b]This refers to change in time in the control group.

[c]This refers to differences in the baseline level T1 as compared to the reference group (control).

TABLE 6 Changes in depression and anxiety (both on log scale).

	Depression			Anxiety		
	B	SE	*p*	*B*	SE	*p*
Covariates						
T1T2 time interval	.10	.07	.16	.12	.06	.07
Education level	−.14	.25	.56	.04	.22	.86
Reference: Control						
Fixed effects						
Constant	1.70	.25	<.001	1.12	.23	<.001
Time[a]						
Change to T2	−.09	.07	.23	−.07	.08	.35
Change to T3	.02	.07	.78	.00	.08	.99
Groups[b]						
Therapeutic T1	.75	.17	**<.001**	.77	.16	**<.001**
Psychologist T1	.79	.22	**<.001**	.90	.20	**<.001**
Practical help T1	.70	.21	**<.001**	.67	.19	**<.001**
Interaction effects						
T1T2 change × Therapeutic	−.34	.10	**<.001**	−.28	.11	**.01**
T1T2 change × Psychologist	−.38	.14	**.008**	−.42	.16	**.007**
T1T2 change × Practical help	−.24	.14	.08	−.02	.15	.91
T1T3 change × Therapeutic	−.42	.11	**<.001**	−.37	.11	**<.001**
T1T3 change × Psychologist	−.28	.15	.06	−.54	.16	**<.001**
T1T3 change × Practical help	−.20	.14	.17	−.04	.15	.77

Note: Goodness-of-fit data for M_0 (null model, includes fixed and random intercept and) and for M_f (the final model). R^2 is conditional R^2.
Depression: M_0: AIC: 2940.25 BIC: 2953.08 R^2: .57 ICC: .57 M_f: AIC: 2873.96 BIC: 2938.11 R^2: .65 ICC: .55.
Anxiety: M_0: AIC: 2679.19 BIC: 2692.16 R^2: .52 ICC: .52. M_f: AIC: 2617.91 BIC: 2682.78 R^2: .61 ICC: .48.
[a]This refers to change in time in the control group.
[b]This refers to differences in the baseline level T1 as compared to the reference group (control).

There was a significant Time × Group interaction on maternal anxiety, $\chi^2(6) = 19.94$, $p = .003$. There was a greater T1–T2 decrease in anxiety symptoms in both the therapeutic and psychologist services groups than in controls. The change remained significant from T1 to T3. There was no change in anxiety in the practical help group or the control group. The baseline levels of depression and anxiety were higher for all intervention groups than for the control group.

4.5 | Role of mental health in changes in parenting

Our third question was whether the baseline level of maternal depression and anxiety symptoms moderated the effectiveness of parenting interventions on maternal PSE. The results in Table 7 supported our hypothesis that the therapeutic group would be especially effective when mothers show more baseline depressive symptoms. There was a significant three-way interaction of Time × Group × Depressive symptoms on PSE, $F(6, 334.75) = 2.58$, $p = .018$. Specifically, the therapeutic group mothers showed more positive change from T1 to T3 than controls when they had more depressive symptoms at baseline. Similarly, the practical help group differed, albeit marginally, from controls in their more positive change from T1 to T3 when mothers had higher depression levels at baseline. Based on non-significant omnibus tests, adding two- or three-way interaction of anxiety did not improve the model, indicating that the baseline level of maternal anxiety did not moderate intervention effectiveness on PSE.

4.6 | Treatment-related moderators

Our fourth question was whether treatment-related factors moderate intervention effectiveness on maternal PSE, depression, and anxiety. The results are presented in Table 8.

4.6.1 | Treatment dosage

There was a significant two-way Time × Dosage interaction on PSE, $F(2, 172.98) = 3.29$, $p = .04$. Specifically,

TABLE 7 Depression and anxiety as moderators of change in PSE.

	Depression as moderator			Anxiety as moderator		
PSE	**B**	**SE**	**p**	**B**	**SE**	**p**
Reference: control						
Fixed effects						
Constant	3.40	.20	<.001	3.40	.21	<.001
Time[a]						
T2	.16	.07	**.01**	.16	.06	.007
T3	.06	.07	.41	.14	.06	.03
Groups[b]						
Therapeutic	.01	.10	.89	-.05	.09	.55
Psychologist	.05	.11	.67	-.04	.11	.72
Practical help	-.01	.11	.90	-.07	.10	.48
2-way interactions						
T1T2 Change × Therapeutic	.05	.08	.57	.08	.07	.28
T1T2 Change × Psychologist	-.17	.10	.08	-.16	.10	.10
T1T2 Change × Practical	-.06	.09	.53	-.04	.09	.68
T1T3 Change × Therapeutic	.23	.08	**.007**	.19	.08	**.02**
T1T3 Change × Psychologist	-.02	.10	.84	-.09	.10	.38
T1T3 Change × Practical	.11	.09	.26	.04	.09	.65
T1T2 Change × Mental health	.02	.01	.24	.02	.02	.19
T1 T3 Change × Mental health	-.02	.01	.13	-.00	.02	.87
Therapeutic × Mental health	-.00	.02	.96	-.01	.02	.76
Psychologist × Mental health	.03	.02	.14	.05	.03	.06
Practical × Mental health	.02	.02	.38	.01	.03	.60
3-way interactions						
T1T2 Change × Mental Health × Therapeutic	.01	.01	.47	.01	.02	.76
T1T2 Change × Mental health × Psychologist	-.02	.02	.24	-.03	.03	.29
T1T2 Change × Mental health × Practical	-.00	.02	.98	-.01	.02	.78
T1T3 Change × Mental Health × Therapeutic	.05	.02	**.002**	.03	.02	.17
T1T3 Change × Mental health × Psychologist	.02	.02	.23	-.00	.03	.92
T1T2 Change × Mental health × Practical	.04	.02	.06	.02	.03	.48

Note: The models are covaried by education level, child sex and time interval between T1 and T2 measurement.

Goodness-of-fit data for M_0 (null model, includes fixed and random intercept and) and for M_f (the final model). R^2 is conditional R^2.

PSE and depression: M_0: AIC: 366.34 BIC: 379.15 R^2: .56 ICC: .56 M_f: AIC: 407.26 BIC: 531.12 R^2: .70 ICC: .63.

PSE and anxiety: M_0: AIC: 366.34 BIC: 379.15 R^2: .56 ICC: .56 M_f: AIC: 419.03 BIC: 542.89 R^2: .69 ICC: .63.

Abbreviation: PSE, parental self-efficacy.

[a]This refers to change in time in control group.

[b]This refers to differences in the baseline level T1 as compared to the reference group (control).

TABLE 8 Treatment-related moderators for PSE, depression, and anxiety.

	PSE			Depression			Anxiety		
	B	**SE**	***p***	***B***	**SE**	***p***	***B***	**SE**	***p***
Dosage									
Reference: therapeutic									
Fixed effects									
Constant	3.26	.31	<.001	−.84	.30	.005	1.66	.32	<.001
Time[a]									
T2	.26	.04	<.001	−.41	.06	<.001	−.39	.08	<.001
T3	.36	.05	<.001	−.38	.07	<.001	−.41	.08	<.001
Groups[b]									
Psychologist	.03	.13	.82	.23	.24	.34	.23	.26	.38
Practical help	−.19	.17	.27	.06	.31	.84	.13	.34	.71
2-way interactions									
T1T2 Change × Psychologist	−.23	.12	**.04**	−.05	.16	.72	−.30	.20	.14
T1T2 Change × Practical	−.05	.13	.72	.27	.18	.14	.35	.23	.13
T1T3 Change × Psychologist	−.26	.13	.07	.10	.20	.62	−.36	.21	.08
T1T3Change × Practical	.10	.25	.67	.69	.34	.04	−.04	.25	.88
T1T2 Change × Dosage	.00	.00	.05	.12	.06	.04	.01	.00	.25
T1T3 Change × Dosage	.00	.00	.08	.08	.07	.20	.01	.00	.20
Psychologist × Dosage	−.00	.01	.73	.23	.31	.47	.01	.02	.78
Practical × Dosage	−.00	.01	.65	.35	.29	.22	.03	.02	.12
3-way interactions									
T1T2 Change × Dosage × Psychologist	.00	.01	.94	−.26	.21	.23	−.02	.02	.11
T1T2 Change × Dosage × Practical	.01	.01	.12	−.26	.19	.16	−.02	.01	.23
T1T3 Change × Dosage × Psychologist	.00	.01	.93	−.22	.28	.43	−.03	.02	**.048**
T1T2 Change × Dosage × Practical	.02	.02	.29	.11	.40	.78	−.06	.02	**<.001**

(Continues)

TABLE 8 (Continued)

	PSE			Depression			Anxiety		
	B	**SE**	***p***	***B***	**SE**	***p***	***B***	**SE**	***p***
Onset (pre- vs. postnatal)									
Reference: therapeutic[c]									
Fixed effects									
Constant	3.23	.34	<.001	3.41	.98	<.001	1.53	.38	<.001
Time[a]									
T2	.32	.06	<.001	.62	.27	**.02**	−.40	.11	**<.001**
T3	.40	.07	<.001	.62	.29	**.03**	−.45	.11	**<.001**
Groups[b]									
Psychologist	.34	.14	**.02**	−.26	.73	.73	.19	.29	.52
2-way interactions									
T1T2 Change × Psychologist	−.31	.13	**.02**	.48	.71	.50	−.01	.22	.97
T1T3 Change × Psychologist	−.29	.14	**.03**	.10	.71	.89	−.01	.23	.98
T1T2 Change × Onset	−.06	.08	.49	.10	.37	.80	.09	.14	.51
T1T3 Change × Onset	−.04	.09	.68	.04	.40	.92	.16	.14	.28
Psychologist × Onset	−.39	.19	**.04**	.21	.95	.83	−.10	.38	.78
3-way interactions									
T1T2 Change × Onset × Psychologist	.02	.17	.91	−.39	.87	.65	−.25	.30	.40
T1T3 Change × Onset × Psychologist	−.07	.18	.69	−.35	.86	.68	−.30	.30	.30
Spouse participation									
Reference : therapeutic									
Fixed effects									
Constant	3.55	.29	<.001	−1.01	.21	<.001	1.53	.35	<.001
Time[a]									
T2	.05	.09	.57	.18	.06	<.001	−.17	.16	.27
T3	.12	.11	.31	−.21	.06	<.001	−.13	.16	.41
Groups[b]									
Psychologist	−.20	.15	.19	−.32	.17	.06	.31	.31	.31
Practical help	−.15	.39	.71	−.24	.18	.19	.55	.81	.50

(Continues)

TABLE 8 (Continued)

	PSE			Depression			Anxiety		
	B	**SE**	***p***	***B***	**SE**	***p***	***B***	**SE**	***p***
2-way interactions									
T1T2 Change × Psychologist	−.08	.13	.53	.10	.07	.16	−.03	.23	.89
T1T2 Change × Practical	.25	.35	.49	.12	.08	.14	.49	.57	.39
T1T3 Change × Psychologist	−.14	.15	.36	.02	.07	.82	−.18	.22	.43
T1T3 Change Practical	.48	.36	.18	−.06	.08	.46	.61	.57	.28
T1T2 Change × Spouse	.29	.11	**.006**	−.10	.06	.12	−.25	.18	.16
T1T3 Change × Spouse	.32	.12	**.01**	.05	.06	.40	−.32	.18	.07
Psychologist × Spouse	.65	.21	**.003**	−.35	.16	.03	−.24	.44	.58
Practical × Spouse	.18	.41	.66	.11	.18	.54	−.42	.85	.62
3-way interactions									
T1T2 Change × Spouse × Psychologist	−.29	.19	.13	.07	.07	.34	−.42	.32	.19
T1T2 Change × Spouse × Practical	−.52	.37	.17	−.09	.08	.27	−.13	.61	.83
T1T3 Change × Spouse × Psychologist	−.14	.21	.52	−.10	.07	.17	−.29	.32	.37
T1T3 Change × Spouse × Practical	−.84	.38	**.03**	.09	.08	.23	−.06	.61	.93

Note: *B* values of depression and anxiety are on log scale. The PSE models is covaried by education level, child sex and time interval between T1 and T2 measurement. Depression and anxiety models are covaried by education level and time interval between T1 and T2 measurement. Goodness-of-fit data for M_0 (null model, includes fixed and random intercept and) and for M_f (the final model). R^2 is conditional $R^{2.}$

Dosage:.

Efficacy: $M_{0:}$AIC: 230.76 BIC: 241.60 R^2: .48 ICC: .48 M_f: AIC: 298.15 BIC: 381.25 $R^{2:}$ .69 ICC: .63.

Depression: $M_{0:}$AIC: -179.20 BIC: −168.36 $R^{2:}$ .51 ICC: .51 M_f: AIC: −216.95 BIC: −137.47 R^2: .63 ICC: .52.

Anxiety: $M_{0:}$AIC: 1541.7 BIC: 1552.75 $R^{2:}$ .45 ICC: .45. M_f: AIC: 1506.57 BIC: 1587.61 R^2: .59 ICC: .48.

Onset:.

Efficacy: M0:AIC: 222.48 BIC: 233.11 R^2: .48 ICC: $_{.48}$ M_f: AIC: 216.53 BIC: 276.73 $R^{2:}$ .67 ICC: .60.

Depression: $M_{0:}$AIC: −142.76 BIC: −132.13 $R^{2:}$ .50 ICC: .50 M_f: AIC: −176.43 BIC: −119.77 R^2: .61 ICC: .55.

Anxiety: $M_{0:}$AIC: 1430.36 BIC: 1441.19 R^2: .44 ICC: .44 Mf: AIC: 1396.72 BIC: 1454.47 R^2: .58 ICC: .48.

Spouse participation:.

Efficacy: $M_{0:}$AIC: 232.19 BIC: 242.95 R^2: .47 ICC: .47 M_f: AIC: 232.27 BIC: 314.78 R^2: .67 ICC: .59.

Depression: $M_{0:}$AIC: −148.99 BIC: −138.23 R^2: .49 ICC: .49 M_f: AIC: −189.82 BIC: −110.90 R^2: .64 ICC: .53.

Anxiety: $M_{0:}$AIC: 1484.14 BIC: 1495.09 R^2: .46 ICC: .46 M_f: AIC: 1451.72 BIC: 1532.08 R^2: .60 ICC: .49.

Abbreviation: PSE, parental self-efficacy.

[a]This refers to change in time in therapeutic group.

[b]This refers to differences in the baseline level T1 as compared to the reference group (therapeutic)

[c]Prenatal versus postnatal onset is only compared between therapeutic and Psychologist groups.

Bolded values are significant at $p < .05$.

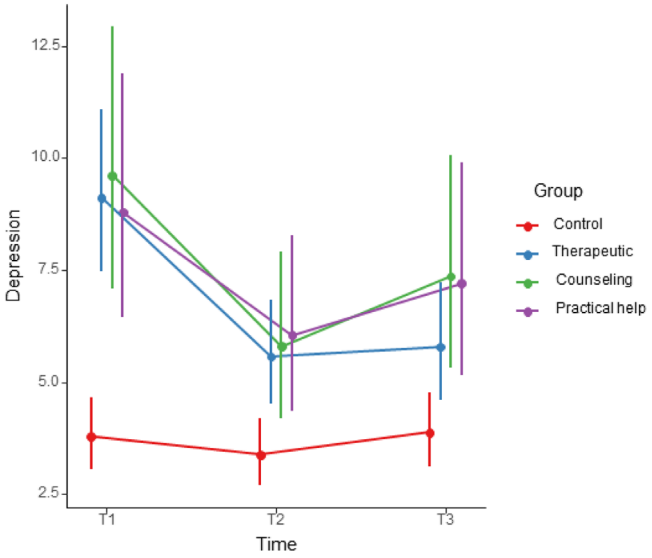

FIGURE 5 Changes in maternal depressive symptoms by group.

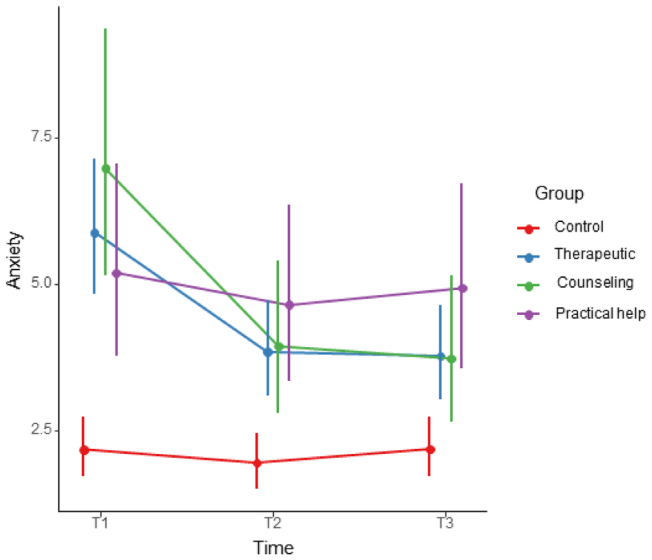

FIGURE 6 Change in maternal anxiety symptoms by group.

there was more positive change from T1 to T2 in PSE, when dosage (number of visits) was higher. This remained marginally significant from T1 to T3. We also found a significant Group × Time × Dosage three-way interaction on anxiety, $\chi^2(4) = 16.28$, $p = .003$. Specifically, higher dosage was associated with decreased anxiety from T1 to T3 only for the psychologist services and practical help groups. For depression, non-significant omnibus tests indicated that adding two- or three-way interaction terms did not improve the model.

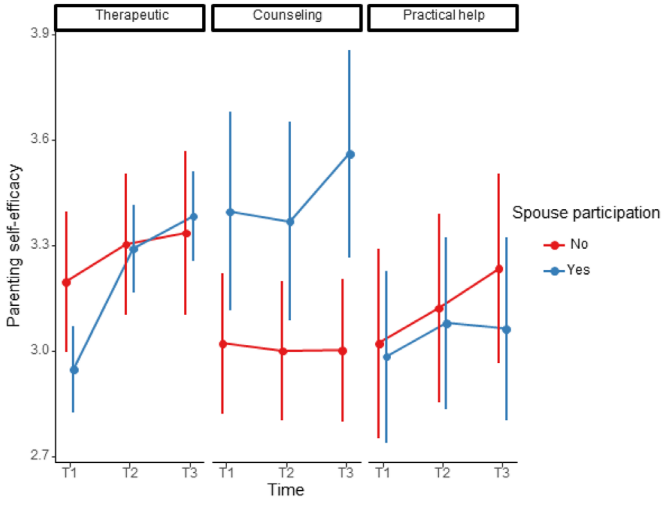

FIGURE 7 The effect of spousal participation as a moderator of parenting self-efficacy.

4.6.2 | Treatment onset

We found a significant two-way Group × Onset interaction on PSE, $F(2, 85.33) = 4.51$, $p = .014$. Specifically, in the psychologist services group, only postnatally starting treatments improved PSE, while both pre- and postnatally starting treatments were equally effective in the therapy group. The comparison was conducted solely between the two groups due to practical help not typically being used prenatally. For depression and anxiety, non-significant omnibus tests indicated that adding two- or three-way interaction terms to the model did not improve the model.

4.6.3 | Spouse's participation in treatment

There was a significant two-way Group × Spouse interaction, $F(2, 85.33) = 4.51$, $p = .014$, on PSE. LMM analyses showed two significant two-way Time × Spouse interactions on PSE, with more overall increase in PSE from T1 to T2 and T1 to T3 in families where the spouse participated in treatment. Although the omnibus test was not significant for a three-way Time × Group × Spouse interaction, the LMM indicated a significant three-way interaction, where spouse participation was associated with T1–T3 increase only in the therapeutic and the psychologist services groups. Figure 7 indicates that in the psychologist services group, PSE was initially higher and increased more from T1 to T3 when the spouse participated, while in the therapy group, those with spousal participation initially had lower levels of PSE but a greater increase from T1 to T3. Spouse participation did not increase PSE in the practical help group. For depression and anxiety,

non-significant omnibus tests indicated that adding two- or three-way interaction terms did not improve the model.

5 | DISCUSSION

In this study, we examined in Finnish naturalistic primary care settings whether three different types of perinatal parenting interventions (*therapeutic parent-infant work, psychologist services, and practical help*) were effective in enhancing maternal parenting (PSE; EA) and decreasing mental health symptoms (depression and anxiety) relative to changes in control mothers from the same area not attending interventions. The results indicated that especially therapeutic parent-infant work was effective in increasing maternal self-reported PSE and dyadic and child EA, while all interventions decreased maternal depressive symptoms and both therapeutic and psychologist services interventions decreased anxiety. We further examined the role of treatment moderators in intervention effectiveness. Therapeutic parent-infant work was effective also for those with higher depressive symptoms. Spouse participation and higher treatment dosage increased treatment effectiveness, and postnatal treatments were more effective in psychologist services.

5.1 | Effectiveness of naturalistic parenting interventions on parenting outcomes

In line with our hypothesis, *therapeutic parent-infant work* was effective in enhancing maternal self-reported PSE and dyadic and child EA. The results align with previous studies showing parent-infant psychotherapies improve maternal sensitivity and child attachment security (Barlow et al., 2016; Guild et al., 2021). The current research thus extends earlier findings in that early parent-infant psychotherapeutic interventions may also be effective for PSE, which has mostly been studied in the context of psychoeducational interventions (Dol et al., 2019). PSE is an important intervention target since it is associated with a multitude of positive child developmental outcomes (Albanese et al., 2019).

Importantly, the intervention effects were also stable over time, with positive changes in both PSE and EA remaining for the therapy group at the 6-month follow-up. Our results suggest that therapeutic group mothers were more able to retain positive changes in dyadic EA despite age-specific regulatory demands for parenting perhaps caused by "the terrible twos", which decreased dyadic EA in other groups. Holistic interventions that work broadly with both maternal representations and mother-infant interaction may be especially likely to bring lasting effects.

Interventions based on practical help also showed promise. PSE increased in the practical help group, although the improvement was not strong enough to differ from controls. Considering that these were mothers with initial parenting risks, it may still be meaningful that they showed a similar amount of positive change as controls. Clinically referred parents often lack natural support networks important for parenting (Stern, 1995). Having a chance for rest with child-care help and receiving psychoeducation to deal with infant-related problems, such as feeding and sleep issues, can increase PSE, which is especially susceptible to social support (Fierloos et al., 2023). As practical interventions do not target the affective quality of the relationship, it is plausible that they may have a lesser effect on EA.

In accordance with the previous literature (Thänhauser et al., 2017), more individually focused *psychologist services* did not change parenting outcomes. The model used in our study did not highly involve family members, such as the infant or the spouse, but was mostly focused on individual discussions with the mother. It is noteworthy that mothers referred to more intensive therapeutic intervention also had more severe parenting problems, while those referred to psychologist services did not differ from controls. The findings may thus also indicate that the referral system worked well.

5.2 | Effectiveness of naturalistic parenting interventions on mental health outcomes

Previous studies are discordant on whether interventions aimed to enhance parenting are also beneficial for parental mental health, especially when systematic mental health components, such as cognitive-behavioral modules, are not implemented (e.g., Everett et al., 2021). Our findings on the effectiveness of therapeutic work and psychologist services for maternal depression and anxiety are promising and indicate that also parenting-focused interventions can be effective for mental health. Importantly, our findings also showed good stability in symptom decrease, although a prior meta-analysis of Huang et al. (2020) indicated that parent-infant psychotherapies may have only short-term efficacy.

There was also some positive effect of practical help on depression only, but the effects were not maintained. It may be that practical support is more dependent on here-and-now support, while psychological interventions can change maternal cognitions and emotions more pervasively. For example, the therapeutic mother-infant work model is very holistic, involving working through parental representations of their own childhood

adversities, potentially important for also mental health outcomes. Further, our results are in accord with previous adult mental health studies showing that interventions performed by trained mental health staff (here psychologists or psychotherapists) may be more effective than those given by other providers (Pettman et al., 2023).

The results contribute to understanding of differences in maternal perinatal depression and anxiety as parenting intervention outcomes, areas where research is scarce. It could be that perinatal depression indicates lack of secure internalized and real-life relationships where both psychological and practical help can provide necessary holding. Anxiety, on the other hand, may indicate hyper-alertness to threat and inadequate means to soothe high arousal states. This perhaps calls for interventions that increase self-awareness and give concrete tools to self-regulate, requiring more therapeutic approach. A previous study similarly showed that a psychotherapeutic parenting intervention was especially effective for those with anxiety symptoms (Partanen et al., 2024).

5.3 | Mental health as a moderator of parenting intervention effectiveness

Depression has been suggested to diminish the effectiveness of parenting interventions for other outcomes (Rayce et al., 2020). As hypothesized, our results indicated that therapeutic intervention was also effective for depressed mothers in improving their PSE. This is in line with previous findings on the superiority of psychotherapeutic interventions that address both the mother's own childhood experiences and her relationship with the baby, in the context of a good working alliance (Guedeney et al., 2014). Additionally, and contrary to our hypothesis and previous research (e.g., Hummel & Kiel, 2016), there was a trend in the practical help group that it was also effective for mothers with more depressive symptoms. As depression often makes everyday tasks, including infant care, excessively burdensome, practical help may offer much-needed rest and more positive means to relate to the infant. Understanding of anxiety in the context of parenting interventions is limited, and in this study, we did not find any moderating effects of maternal anxiety on intervention effectiveness for PSE.

5.4 | Treatment-related moderators

5.4.1 | Dosage

Previous literature has been controversial regarding the benefits of longer interventions (Mihelic et al., 2017; Stacks et al., 2022). In this study, we found that a higher number of sessions generally increased PSE more and the effects remained in the follow-up. This is in line with Stacks et al. (2022) who noted dose-response effects of parenting interventions on increased sensitivity. Our results thus suggest this may also apply to PSE. To our knowledge, no previous research has examined the moderating role of treatment dosage in effectiveness of parenting interventions for mental health. However, adult psychotherapy research has proposed that the highest symptom decrease occurs early in treatment, and longer treatments bring additional benefits to only some extent (Barkham et al., 2006). In our study, psychologist services and practical help were more effective for maternal anxiety when more sessions were used, while dosage played no role in the effectiveness of therapeutic intervention. This may be because therapeutic interventions were generally longer, lasting on average about six months (25 weekly visits), while other interventions comprised in average 10–11 visits. Pinquart & Teubert (2010) concluded in their review that there may be an optimal duration of parenting interventions of 3–6 months, with longer interventions not increasing the effectiveness. Curiously, treatment dosage had no moderating effect on maternal depressive symptoms, potentially suggesting that especially those with anxiety symptoms may need more sessions.

5.4.2 | Prenatal/postnatal onset

Pregnancy and the first 12 months postpartum are considered sensitive periods for parenting and are an ideal time to implement parenting interventions (Pettman et al., 2023). Our results suggest that in line with Bakermans-Kranenburg et al. (2003) it may be more beneficial to start interventions during the postpartum period, at least for some interventions. Practical help was only used postnatally, but also psychologist services were more effective for PSE when started postnatally. It is uncertain why, and therefore, the results should be repeated with a larger sample. It may be that the focus of prenatal treatments was something other than parenting, such as fear of delivery or current life problems. Psychologist services were equally effective for mental health whether they were initiated during pregnancy or postpartum. Interestingly, treatment onset played no role in the effectiveness of therapeutic parent-infant work, potentially due to more focus on the child, parenting and processing one's own attachment experiences already during pregnancy (Guedeney et al., 2014). It may also simply be that therapeutic interventions were longer and prenatal interventions often continued postnatally, enabling direct support of parenting.

5.4.3 | Spouse participation

In line with the previous literature (Cluxton-Keller & Bruce, 2018), spouse participation was associated with more effectiveness on PSE for the therapeutic and psychologist services groups, and the effects remained at follow-up. Curiously, in psychologist services, those with less problems more often had their spouse participate, while the opposite was true for the therapy group. It is possible that spouse participation is more relevant in therapeutic treatment, as practical support already involves concrete help from the practitioner (e.g., babysitting). Spouse participation did not affect mental health outcomes.

5.5 | Strengths and limitations of the study

The biggest limitation of the current study is its relatively small sample size, especially in the psychologist services group. We were therefore not able to examine moderators of EA due to EA being measured only among those starting the study postnatally. However, the analysis method chosen (LLMs) is especially suitable for small samples and missing data. Our simulation-based a priori power analysis (conducted with R package SIMR; Green & MacLeod, 2016) showed that when the strongest Group × Time interaction effect yields Cohen's $d = 0.44$, nine participants per group would be sufficient to find a significant interaction effect with a power of 80 % ($\alpha = 0.05$). To counteract publication bias of earlier Cohen's d estimates, we used the lower (95% CI) bound of the power estimate.

As previous meta-analyses regarding parenting and mental health outcomes report at least moderate effect sizes (Clinkskales et al., 2023; Dunkel Schatter et al., 2022; Jeong et al., 2021; Mihelic et al., 2017), our sample size was still sufficient for the analyses conducted.

A naturalistic design, although potentially providing more ecologically valid information, prevented us from ruling out baseline differences between the groups. However, these probably reflected that the current referral system worked well as mothers with higher levels of problems were referred to more intensive treatment. Although the analysis methods used in our study (LMM and GLLM) take into account the individual baseline by accounting for random effects, we cannot rule out phenomena such as regression toward the mean, as the study was not an RCT.

Data collection was partially conducted during the COVID-19 pandemic, which led to changes in some interventions (e.g., partially conducting interventions online), several breaks in data collection, and a relatively low participation rate. We do not have exact information on these, which is a limitation. Online psychotherapeutic and educational interventions are also deemed effective for both parenting and mental health (Black et al., 2021; Chua & Shorey, 2022). Due to limited resources, the forms were available only in Finnish, excluding immigrants who did not speak Finnish. Highly educated parents and two-parent families are also over-represented equally in the intervention and control groups. Further, there was more drop-out in participants with a lower education level, although education level was controlled in the analyses. The results are thus less generalizable to more disadvantageous populations. There was also more attrition in the psychologist group and especially the practical help group, making the results concerning these less reliable. It is not entirely clear why dropout was higher. There were more organizational changes in the practical help group during the data collection, which may have affected how well the staff was able to motivate participants to continue in the study. COVID-19 may have especially impacted the practical help services, which were largely home-based. It might also be that the forms were more interesting for those attending therapeutic services since they include more in-depth thinking about family relations, as our questionnaires were also focused on these types of outcomes.

Another limitation was the use of self-reports; observational measures and clinical interviews would have been more reliable. Most previous research has used observational EA or other similar measures to assess parenting quality, and little intervention research thus far has been conducted with self-reported EA (but see Branson Dame et al., 2024; Russell et al., 2024). The results from self-report may differ from observational measures, although some studies have obtained similar findings (Russell et al., 2024). Further, adult EA had a relatively low reliability (.66) at one time point which may have affected our findings. Regarding spouse participation, it would have been ideal to use a continuous variable describing the exact number of visits the spouse participated in. The study was also limited in that the baseline measure was collected after the first visit for practical reasons. Having a pre-intervention baseline would have been ideal since there may be positive change already after the first visit (Del Río Olvera et al., 2022).

5.6 | Conclusion and implications for practice and further research

The results add to the overall evidence that integrated, individually tailored psychotherapeutic parenting interventions work well when performed by highly trained mental health professionals in community settings

(Rosenblum et al., 2020). In our study, these had dual effects on parenting and mental health outcome. Also more individually focused psychologist services were found to improve mental health.

Surprisingly little research has been conducted on practical help, especially child-care help, as an early low-threshold intervention. It can be very important for mothers with mental health issues, poorly sleeping infants, or inadequate support networks, and it does not require mental health training for the staff. Our findings suggest it may be a cost-effective way to improve parenting and mental health. Future studies should separate the effects of child-care and psychoeducational help, since in our study nearly all mothers received both.

Our study also added to the literature regarding the effects of parenting interventions on outcomes beyond sensitivity, highlighting concepts such as PSE. Moreover, the study revealed interesting differences between perinatal depression and anxiety, an understudied area in which more research is needed. Our results suggest that anxious parents may especially need mental health professionals and longer treatments.

Further research is needed on pre- and postnatal mechanisms underlying treatment effectiveness. Interestingly, in this study, postnatal treatments were more effective but only for psychologist services. Identifying the target population and the optimal timing of treatment for parental attachment insecurity or trauma is critical. Also needed is more research on treatment components that explain the effectiveness. Important components of psychotherapeutic parenting interventions could include, for instance, focus on the alliance, the presence of the baby, and the integrative nature of treating both parenting and mental health. Some researchers also emphasize more specific components such as video feedback, facilitator modeling, active encouragement of responsiveness (Mihelic et al., 2017; van IJzendoorn et al., 2022), or mentalization-based work (Slade et al., 2020). For interventions focused on infant problems, Mihelic et al. (2017) suggested that, in addition to psychoeducation, support and skill practice are vital. Further, it is relatively well-established that spousal participation in treatment is useful, but we lack knowledge on who derives the most from this and why. More perinatal intervention research should also be conducted among fathers and on whole-family processes.

Working with the family early on, starting from pregnancy or postpartum, is particularly important and cost-effective (Verbeke et al., 2022), with the potential to improve the well-being of both the parent(s) and the infant. In addition, parents with mental health symptoms may benefit from treatments that are intensive, directly support their interaction with the infant, and highly involve family and other community networks. More systematic treatment models and holistic perinatal treatment systems should be developed all over the world.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

HUMAN SUBJECTS APPROVAL

Regional Ethics Committee of the Expert Responsibility area of Tampere University Hospital has approved the study

DATA AVAILABILITY STATEMENT

Data available on request due to privacy/ethical restrictions.

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