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Early parenting interventions to prevent internalising problems in children and adolescents: a global systematic review and network meta-analysis

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ABSTRACT

Question We compared the effectiveness of different types of parenting interventions based on an a priori taxonomy, and the impact of waitlists versus treatment as usual (TAU), in reducing child internalising problems.

Study selection and analysis We conducted a systematic review and network meta-analysis of published and unpublished randomised controlled trials (RCTs) until 1 October 2022 that investigated parenting interventions with children younger than 4 years. Exclusion criteria: studies with children born preterm, with intellectual disabilities, or families receiving support for current abuse, neglect, and substance misuse. We assessed the certainty of evidence using the Confidence in Network Meta-Analysis framework. We used random-effects network meta-analysis to estimate standardised mean differences (SMDs) with 95% credible intervals (CrIs).

Findings Of 20 520 citations identified, 59 RCTs (18 349 participants) were eligible for the network meta-analysis. Parenting interventions focusing on the dyadic relationship (SMD: −0.26, 95% CrI: −0.43 to −0.08) and those with mixed focus (−0.09, −0.17 to −0.02) were more effective in reducing internalising problems than TAU at the first time point available. All interventions were more effective than waitlist, which increased the risk of internalising problems compared with TAU (0.36, 0.19 to 0.52). All effects attenuated at later follow-ups. Most studies were rated as with 'high risk' or 'some concerns' using the Risk of Bias Assessment Tool V.2. There was no strong evidence of effect modification by theoretically informed components or modifiers.

Conclusions We found preliminary evidence that relationship-focused and mixed parenting interventions were effective in reducing child internalising problems, and the waitlist comparator increased internalising problems with implications for waiting times between referral and support. Considering the high risk of bias of most studies included, the findings from this meta-analysis should be interpreted with caution.

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WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Child internalising problems (anxiety and depression) represent an important and increasing societal and economic burden globally. While most commonly used parenting programmes have robust evidence supporting their effectiveness in reducing child behavioural problems, National Institute for Health and Care Excellence (NICE) and World Health Organization (WHO) guidelines for reducing internalising problems are lacking. In the scientific literature, no network meta-analysis to date has explored the comparative effectiveness of early parenting interventions on child internalising problems, which may have very different mechanisms. To fill this gap, we performed a systematic review and network meta-analysis including any parenting programme regardless of their original aim, where internalising problems were measured (even if not published).

WHAT THIS STUDY ADDS

⇒ Using 59 randomised controlled trials, we investigated the effects of early parenting interventions across the following relevant outcomes: child internalising and externalising problems, parental depressive symptoms and sense of self-efficacy. Considering all the outcomes at different time points, parenting interventions that focused on the parent–child relationship and had mixed intervention targets were most successful in reducing internalising and externalising problems in children at the first time point available but with no long-term (>3 years post-intervention) sustained effects; in addition, we found strong evidence that those assigned to waiting list reported worse symptoms on all outcomes. There was weak evidence that all parenting interventions improved self-efficacy and that home visiting interventions reduced parental depressive symptoms. We did not identify moderators or intervention components that affected the interventions' effectiveness.

BACKGROUND

In 2022, the WHO identified internalising problems (eg, anxiety and depression) as a priority outcome when evaluating the effectiveness of parenting interventions.[1] Childhood internalising problems are among the most common mental health disorders worldwide.[2 3] They represent a major risk factor for later psychopathology,[4] including for adult internalising problems which are leading causes of morbidity and mortality globally.[5 6]

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings from this network meta-analysis represent the best available evidence base to guide decisions about psychological treatment using parenting interventions for internalising problems in children and may assist in shared decision-making between families, clinicians, and policymakers. However, our conclusions regarding the comparative effectiveness of one parenting intervention class over the other should be tempered by the potential limitations of the current analysis, the quality of the available evidence, the reporting of the outcomes, the subjectivity of the parenting taxonomy, and the uncertainties that might result from choice of intervention intensity or treatment setting.

Developing effective preventive interventions at the earliest stage in the child's life could help to increase children's and families' quality of life and have major societal and economic benefits by improving population health.

The quality of parent–child relationships in early childhood represents a unique time window for child emotional and social development,[7] providing a potentially salient period for preventative intervention. Furthermore, interventions delivered at younger ages are associated with larger beneficial effects and lower intervention cost.[8–10]

In the protocol for this study, we summarised evidence from meta-analyses of randomised controlled trials (RCTs) of the effect of parenting interventions on internalising problems.[11] Since the publication of this study protocol (ie, 2020), four meta-analyses[12–15] of RCTs of parenting interventions including internalising problems as an outcome have been published. All[12–15] of these meta-analyses reported a small to moderate positive effect of the intervention in reducing child internalising problems, but one[13] also included non-RCTs. Moreover, these studies either focused exclusively on a specific modality of delivery (eg, online parenting interventions[12 14]), a specific population (ie, children with acquired brain injuries)[13] or a specific intervention type (ie, Triple P).[15] Finally, none of these meta-analyses have explored the comparative effectiveness of the programmes or their intervention components (eg, via a network meta-analysis (NMA)).

Parenting interventions are complex,[16] often with multiple components[17] (eg, groups of contents or techniques that characterise the intervention) or stages to the intervention. Emerging evidence[17–19] supports the utility in investigating components of parenting interventions to determine their effectiveness and inform the development of improved treatment strategies. Understanding the comparative effectiveness of specific interventions and their components is important as it may inform the development of better treatments, maximising their effectiveness and reducing their costs.

Objective

The aim of this study was to conduct a systematic review and NMA of RCTs to identify the most effective parenting intervention and intervention components for preventing internalising problems.

Study selection and analysis

This work is based on our published protocol.[11] Complete information on the methods used in the systematic review and meta-analysis and changes to the published protocol are provided in the protocol or in the online supplemental appendix 1.1–1.2.

Search strategy and selection criteria

The search strategy was developed in collaboration with systematic review experts and with a medical librarian with expertise in systematic reviews. Six online bibliographical databases were searched from inception to 1 October 2022. Existing systematic reviews and meta-analyses known to the authors were also handsearched. After the removal of duplicate records using EndNote, two reviewers (IC and EP) independently screened the titles and abstracts for relevance using Rayyan[20] (figure 1). Discrepancies were resolved through discussion at each stage. Where the two reviewers were not able to reach agreement via discussion, RMP was consulted for final decision. Reference lists and citation indexes of all the included full texts were searched. No restrictions were placed on the target population, setting, intervention type (indicated, selective or universal) or language. Only one of the included studies was not published entirely in English.[21] The authors provided a thesis chapter published in English partially covering the study details and checked the accuracy of the translation to English of the original paper obtained using Google Translate (https://translate.google.co.uk/).

Eligible studies were any RCTs of parenting interventions which took place prenatally or when at least 75% of the children in the trial were younger than 4 years of age (details on age calculation provided in online supplemental appendix 1.1). Parenting interventions were defined as those that have a central focus on parenting abilities and behaviours. No limitations on the intensity of the intervention, length of follow-up or theoretical framework were imposed.

Data extraction

At least two reviewers (IC, VH, AC, RMP, JE, NB or TT) extracted data from relevant full-text records using an exhaustive extraction form developed and piloted using SRDR+.[22] If data were missing or unclear, IC contacted the corresponding author or other authors of the publication by email for clarification (online supplemental table 1). Eight studies[23–30] were excluded through this process (online supplemental table 2 for reasons). Intervention and study characteristics that may be relevant moderators of intervention effectiveness (eg, setting or intensity) were also extracted (online supplemental tables 3 and 4). For study characteristics relevant for inclusion in the analysis (as either key moderators or classification of parenting interventions in groups for NMA) (online supplemental table 5), consensus sessions were held by IC, RMP and JE.

Outcomes

Our primary outcomes were child internalising problems at any time point available, taking the first endpoint available for each study. Separate analyses by time point were performed where sufficient data were available, otherwise follow-up time was included in the model in order to obtain time-adjusted estimates. Secondary outcomes included post-intervention child externalising scores, parental depression, anxiety and parental self-efficacy. Where primary and secondary outcomes had been measured with more than one standardised rating scale, we used a predefined hierarchy specified in the study protocol. Where the researchers were uncertain over the eligibility of the measure, discussion between IC and RMP was conducted until a consensus was reached. A total of 137 authors were contacted

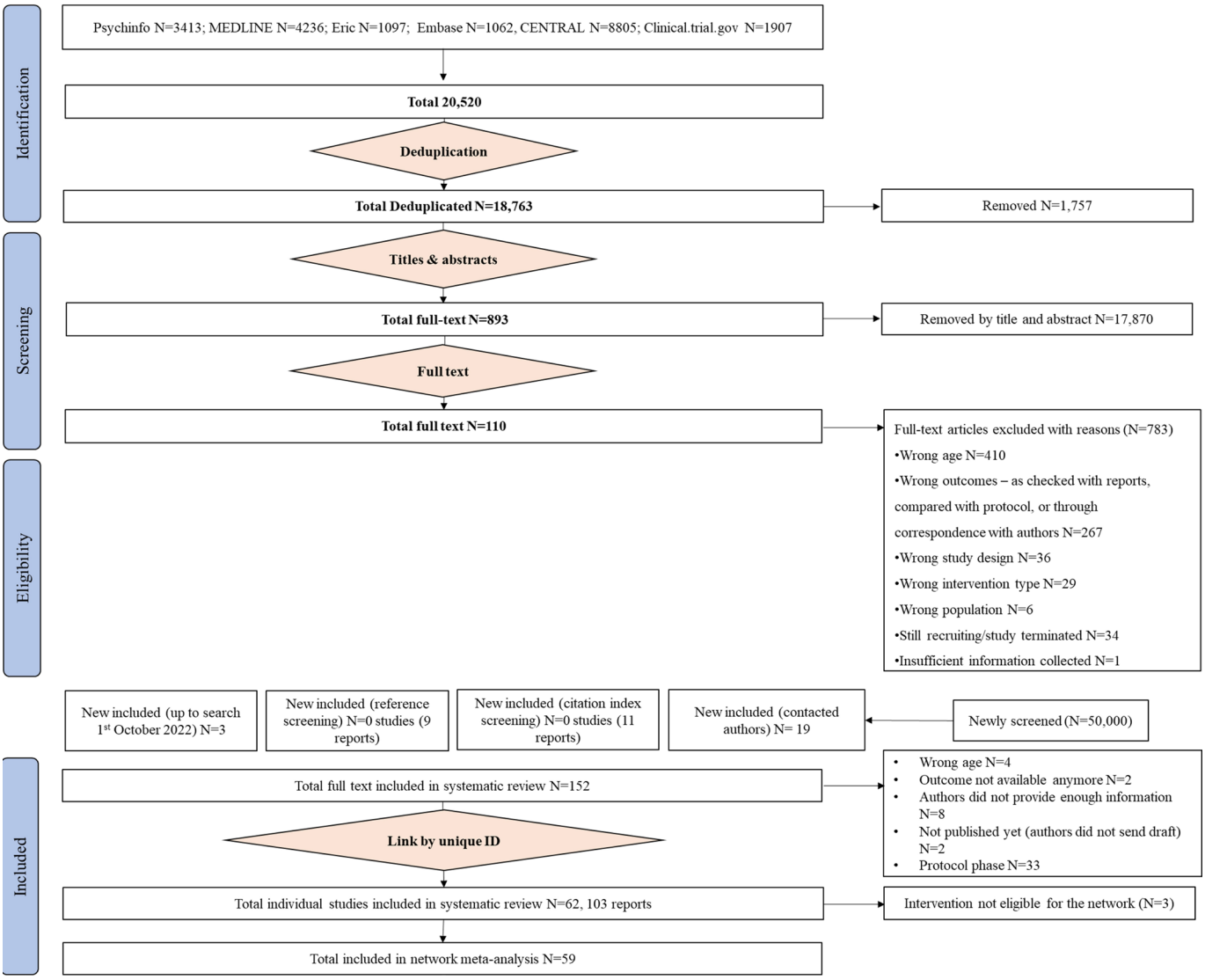

Figure 1 Study selection process.

to obtain missing information on the primary outcomes or other necessary data for inclusion.

Grouping of parenting interventions and their components

Parenting interventions and comparator interventions (eg, treatment as usual (TAU), enhanced TAU, waitlist) were classified based on an a priori taxonomy obtained via a consensus among IC, RMP and JE (online supplemental table 6). Ten intervention groups were identified: four pertaining exclusively to control conditions and six actual parenting interventions.

We used a fine-grained system to identify relevant components of the interventions. Components of the interventions were identified via both a top-down (ie, using previously identified components of parenting interventions as a starting point)[18 19 31] and bottom-up approach (ie, informed by the components we identified through data extraction that we thought to be separate to those already present). The 63 intervention components extracted (complete list with examples provided in online supplemental table 7) were clustered into 14 groups by three coauthors who were blind to the classification of each component to the intervention type, study and results. Where agreement was not reached, IC and RMP resolved any conflicts (online supplemental table 8).

Data analysis

We conducted a Bayesian NMA of intervention classes and component-based network meta-regressions using the multinma package in RStan,[32] all using random-effects with 95% credible intervals (CrIs) for continuous outcomes (standardised mean differences).[33] Missing SDs were imputed following guidance in Cochrane Handbook for Systematic Reviews of Interventions, Section 6.5.2.7,[34] and SEs were adjusted for clustering following Cochrane Section 23.1.4.[35] Further details on statistical analyses are provided in the published protocol[11] and in online supplemental appendix 1.1–1.2. Network geometry is described for the child primary and secondary outcome at the first time point available and reported in the appendix for caregiver outcomes and other time points available, as identified in the study protocol.[36] Effect size multiplicity was addressed following guidance in López-López *et al*[37] (online supplemental figure 1). Moderator analyses were conducted on child internalising outcomes at the first time point available using random-effects meta-regression models to explore potential sources of heterogeneity in the average effect by prespecified sample, intervention and study characteristics (online supplemental table 1).

To assess transitivity, we compared the distribution of clinical and methodological variables that could act as effect modifiers

across treatment comparisons (online supplemental tables 5 and 9). We assessed the presence of statistical heterogeneity through the examination of the between-study SD parameter (τ).

At least two independent reviewers evaluated risk of bias by report and not by study following Cochrane guidance[38] using Cochrane Risk of Bias Assessment Tool-V.2 (RoB-2)[39] (online supplemental table 10). However, when multiple outcomes of interest were reported, the risk of bias focused on the primary outcome. If the report evaluated did not present data on the primary outcome, the following order of priority for risk of bias assessment was applied: child externalising problems, parent mental health, parenting style, parent–child interactions, other child or parent outcomes. We discussed certainty of evidence based on several criteria, including the Confidence in Network Meta-Analysis framework (CINeMA)[40] (online supplemental appendix 1.10).

We fitted the same models using unrelated mean effects (UMEs) which relax the consistency assumption, and we compared the fit of the NMA (consistency) and the UME models by assessing the residual deviance, deviance information criterion (DIC) and τ[41] (online supplemental appendix 1.9).

We tested both additive and full interaction models. In the additive model, we assume that each intervention effect is the sum of the effects of its components' parts. Conversely, the full interaction model allows each possible combination of components to have distinct effect (ie, considered as a separate intervention).

In the NMA, we used group-level data. Pooled estimates were obtained using the Markov chain Monte Carlo method (further details in online supplemental appendix 1.12).

Findings

Selection and inclusion of studies

The first literature search yielded 20 520 initial articles. After removal of duplicates and exclusion of studies based on their abstracts or through examining their full text, 62 unique studies were identified as eligible for inclusion (figure 1).

Characteristics and risk of bias of included studies

The aggregated characteristics of the 62 included studies are presented in online supplemental table 5. The 62 studies randomised 28 265 participants. Child age was inconsistently reported, for instance, some studies only reported whether the child was younger than 3 years of age (without providing measures of central tendency). When incorporating the child's gestational age, the median age at the start of an intervention was 16.7 months (IQR: 8–27.6). Participants were recruited from the community, hospitals, child centres and other settings. The studies included participants from 18 countries and 6 continents; most studies were performed in the USA and Netherlands. The majority of the studies were conducted in high-income countries (HICs: 92%) compared with low/middle-income countries (8%). Studies were published between 1997 and 2022. The study sample sizes ranged from 34 to 4410 participants.

Internalising problems were mostly reported by the primary caregiver (k=58, 98%). Most of the studies employed a primary preventative strategy (95%) and were directed to a selective population (81%) (see online supplemental appendix 1.5 for definitions and further details on reporters of the outcomes, scales used and facilitators of the interventions; see online supplemental figures 2 and 3 for illustration of intervention groups and intervention components). The majority of included studies aimed to increase positive parenting behaviours and decrease and/or prevent child behavioural problems. Only six (10%) of the included studies aimed to prevent internalising problems or enhance emotional well-being in the child.

Of the 137 authors contacted, 34 provided data that were included in this meta-analysis. We also retrieved unpublished information on the primary outcome for 25 (40%) of 62 included trials.

Risk of bias assessment

Figure 2 shows risk of bias across included studies for the main outcome according to the Cochrane RoB-2.[39] In terms of overall risk of bias, out of the 103 reports included (k=62), 1 (0.01%) was rated as low risk, 56 (54%) at some concern and 46 (45%) at high risk. Eighty-three (81%) of the 103 reports were assessed as being at low risk of bias for both random sequence generation and allocation assignment (online supplemental table 10).

Network plots

Figure 3 shows the network of eligible comparisons for child primary and secondary outcomes at the first endpoint available (separate follow-up network plots are presented in online supplemental figures 4 and 5). In terms of geometry of the networks, the corresponding network plots were well connected for the internalising and externalising outcomes, with no standalone nodes. However, the networks obtained for the parental outcomes (online supplemental figure 6) and for the full interaction model of the intervention components (online supplemental figure 7) had a sparser structure, suggesting that the results obtained from these networks may be unreliable.

NMAs on child primary and secondary outcomes

The main results of the NMA including 59 studies for internalising problems are presented in figure 4, which illustrates the relative effects of the NMA for internalising problems against TAU at the first time point available. We found some evidence that relational (−0.26, 95% CrI: −0.43 to −0.08) and mixed (−0.09, –0.17 to −0.02) parenting interventions were more effective than TAU in reducing internalising problems, whereas waitlist showed a detrimental effect (0.36, 0.19 to 0.53). The between-study posterior median SD (τ) was 0.04 (0.00 to 0.09) for internalising problems, indicating low heterogeneity for the main outcome. Model fit and comparison statistics suggested that the consistency assumption was met (online supplemental appendix 1.13).

We also conducted an NMA on 57 studies for the externalising outcome. Using TAU as the reference, we found comparable evidence supporting a potentially small but beneficial effect of mixed (−0.09, –0.19 to −0.01) and relational (−0.26, –0.26 to −0.07) interventions, and a moderate negative effect of waitlist (0.46, 0.25 to 0.66) on externalising problems, τ was 0.06 (0.00 to 0.13). All interventions were more effective than waitlist in reducing internalising and externalising problems (online supplemental figure 8).

The certainty of the evidence for the primary outcome was evaluated based on several criteria, including the NMA assumption checks, RoB and CINeMA grading (online supplemental figures 9–15).

Overall, we found evidence supporting the robustness of our main findings; however, due to the high risk of bias within studies, our confidence is at best moderate.

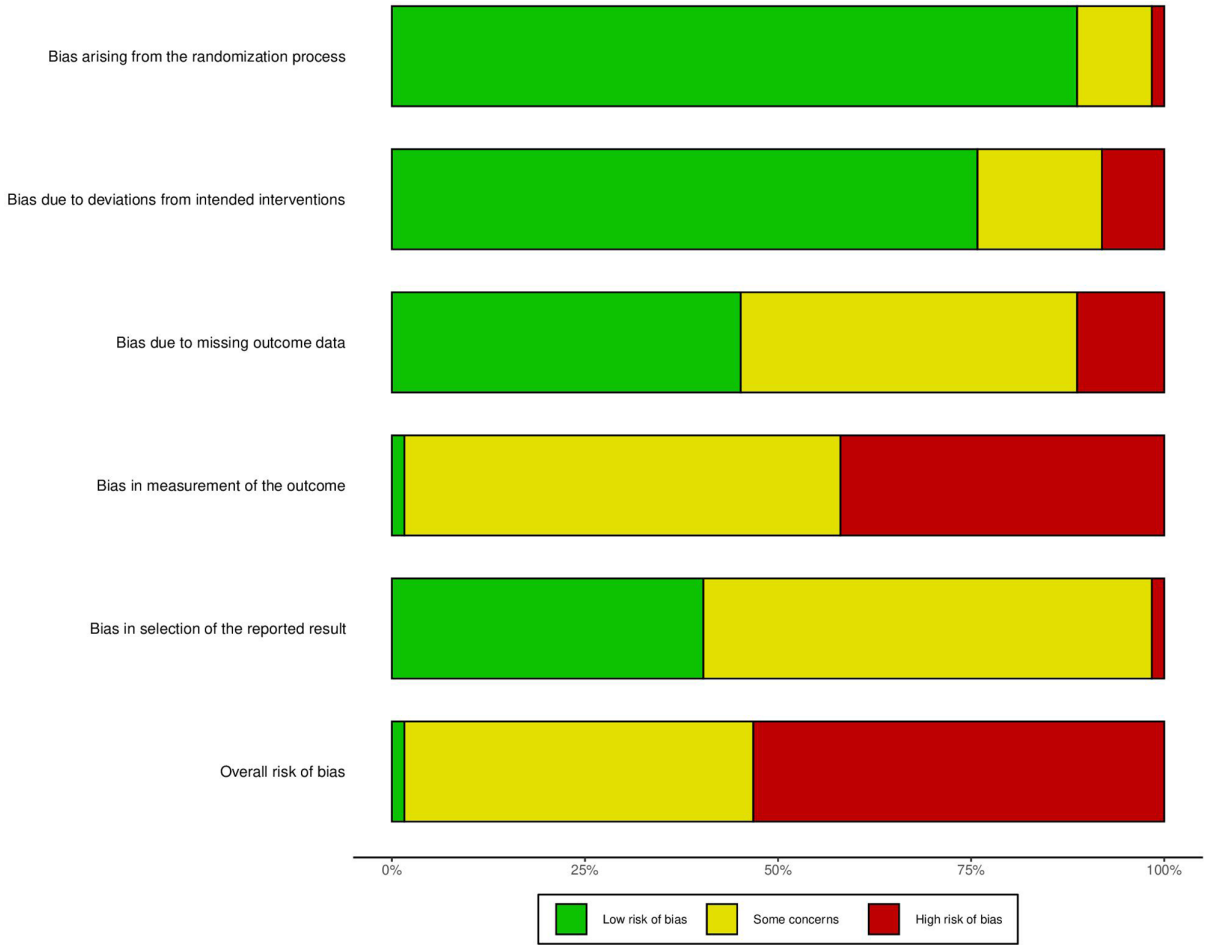

Figure 2 Risk of bias across reports using Cochrane Risk of Bias Assessment Tool-V.2. Across risk of bias indicators, reporting of the outcome showed the highest risk of bias. This is because most of the child outcomes were reported by the parent, who is also actively involved in the treatment (further details in online supplemental appendix 1.9).

Sensitivity and meta-regression analyses on primary outcome

In meta-regression analyses, we did not find strong evidence of an effect modification by any of the 11 effect modifiers included (online supplemental table 12); however, point estimates indicate a slightly improved effectiveness in later follow-up times, and in home and mixed settings. Similarly, we did not find strong evidence of effect modification for any of the identified intervention components (online supplemental table 13). When fitting a full interaction NMA, we found limited evidence that some combinations may work better than others (online supplemental table 14).

We compared the NMA and the UME models, where the consistency assumption was relaxed. The UME model provided a higher estimated between-study SD than the NMA model, suggesting low evidence of inconsistency. Furthermore, the NMA had the smaller DIC, indicating that, taking model complexity and fit into consideration, it should be preferred over the UME model (online supplemental figures 8 and 9 and online supplemental table 15).

Long-term effects

We conducted an NMA with the 13 studies that reported internalising and externalising outcomes, at 3 or more years post-intervention. We did not find evidence supporting lasting beneficial effects of early parenting interventions on internalising or externalising problems (online supplemental tables 16–19).

NMAs on parent secondary outcomes

We found weak evidence that parenting interventions improved parental self-efficacy in all interventions compared with TAU except for waitlist, where we found suggestive evidence of a detrimental effect on parental self-efficacy (−0.36 to –0.86 to 0.17) (online supplemental table 20). Parenting interventions were not more effective than TAU in reducing parental depressive symptoms. However, we found some evidence that home visit interventions worked better at alleviating symptoms of depression in parents (−0.13 to –0.28 to 0.02) (online supplemental table 21).

DISCUSSION

To our knowledge, this systematic review and NMA is the most comprehensive data synthesis on the effectiveness of early parenting interventions in reducing internalising problems in children. We developed and employed an a priori taxonomy of parenting intervention classes and intervention components to investigate their comparative effectiveness and generate new knowledge on potential mechanisms of change. Relational and mixed interventions show the most potential for reducing internalising problems as reported by parents at the first time point available; however, uncertainty around the estimates was moderate and the effect sizes were small. Furthermore, we did not find evidence supporting beneficial long-term effects. Due to the small number of studies and the great uncertainty around the

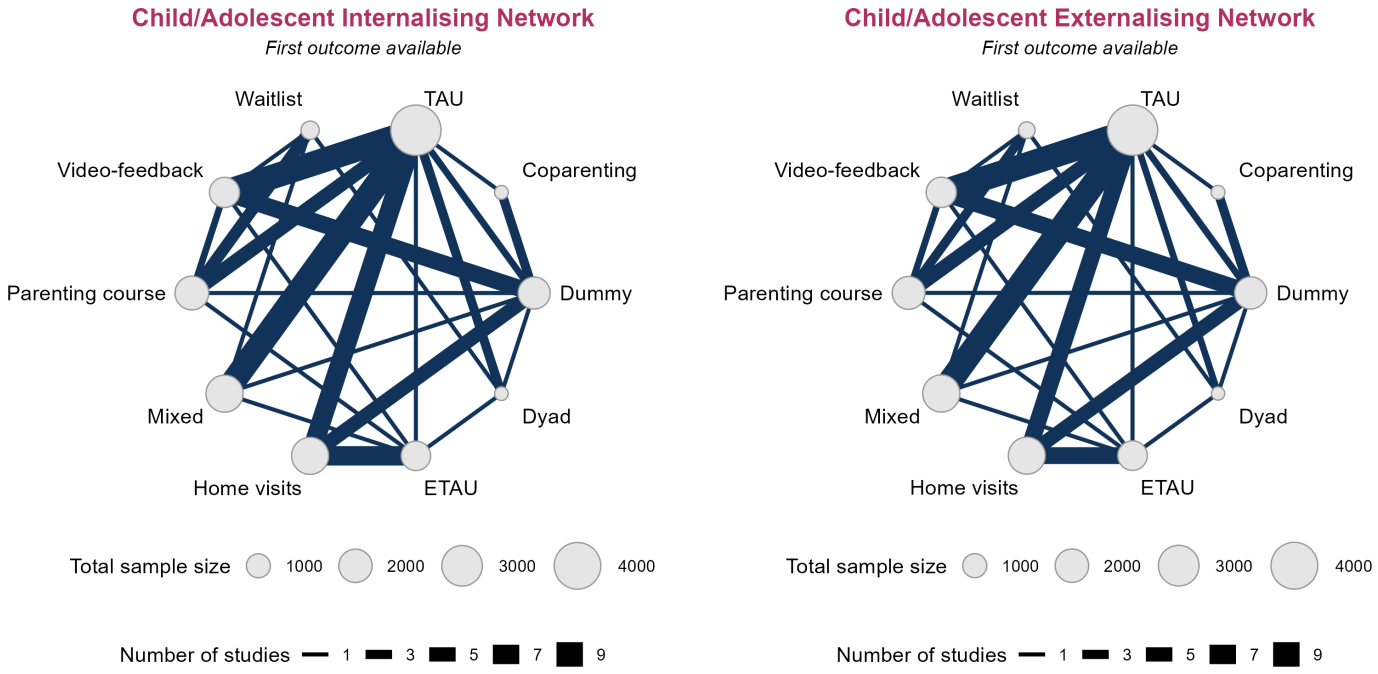

Figure 3 Network geometry of primary and secondary child outcomes at first follow-up time point available. Network plots of eligible direct comparisons among intervention groups in our network meta-analyses. Each treatment is represented by a node. Where direct trial evidence exists, treatments are joined by a line. The size of the nodes is proportional to the number of participants included, and the width of the line to the number of treatment arms for each comparison. 'Dyad' intervention refers to the 'relational'/'dyadic' parenting intervention group. Twelve studies[30 51–61] delivered interventions based primarily on home visits, 16[21 62–75] on video feedback, 6[76–81] focused on dyadic relationship, 12[82–91] had a 'parenting course' format, 3[92–94] focused on coparenting, 12[95–105] included interventions delivering mixed therapeutic approaches and 3[106–108] were ineligible for the network. Twenty-six (42%) of the trials included TAU or no treatment, 15 (24%) included an attention control condition (dummy intervention), 10 (16%) included ETAU, 7 (11%) included waitlist and 4 (6%) included an active treatment comparison. Further details are shown in online supplemental appendix 1.12 and online supplemental table 11. ETAU, enhanced TAU; TAU, treatment as usual.

estimates, it is difficult to draw any conclusion about long-term beneficial effects of parenting interventions.

Given the complexity of parenting interventions, it is challenging to disentangle what is driving the observed effects. However, a defining feature separating relational interventions from others was the criterion that such interventions involved an 'in vivo' behavioural component with both parent and child present and a focus on their relationship. The finding that interventions focused on the dyadic relationship are associated with more effectiveness than those delivered to parents only is consistent with previous literature.[10 42] A hypothesised mechanism of change could be that the parents are able to 'practise' parenting skills directly with their children in a supportive environment, with opportunities to try new approaches and receive feedback within sessions. This may lead to greater behavioural change for parents, and may be associated with improvements in self-efficacy and parent–child attachment.

Most studies used parent reports of child internalising problems. Thus, the reported effects rely on the parent's ability to accurately recognise and report child's symptoms. While parent reports show predictive validity for later depression and anxiety disorders reported by the child/clinicians,[43] there are also meaningful differences in parent–child report.[44] Some interventions may increase emotional insight, for example, video feedback interventions guide parents to notice and recognise emotional distress. Therefore, an initial increase in reporting of emotionality may mask effectiveness of some interventions more than others, if relying on parent report.

Furthermore, we did not find statistical evidence for effect modification by any of the hypothesised modifiers. Conclusions regarding effect modification should be interpreted cautiously owing to the fact that we did not have individual-level data, thus these inferences may be due to the ecological fallacy.[45] We also found that assigning families to a waitlist comparator may have detrimental effects on child outcomes. This is methodologically important as it may suggest that previous studies reporting differences in treatment to waitlist controls may be driven by negative effects of waitlist rather than positive effects of the intervention. We suggest that future studies should compare interventions to an active-controlled comparator, as previously recommended.[46] Importantly, our findings suggest that waiting times may not only delay support but actively cause harm (ie, nocebo effect).[47 48] Hypothesised potential mechanisms could include parents' withdrawal from other self-help or community support in usual care and reduced self-efficacy (in line with our secondary outcome findings). We also found less beneficial effects of early parenting interventions than previous meta-analyses, with both fewer interventions being identified as effective and effect sizes being smaller.[49] However, in this NMA, we included several unpublished results which may have corrected for previous publication bias present in the literature. We were also able to explore the role of several effect modifiers and intervention components. However, we were only able to include a limited number of pre-hypothesised effect modifiers due to poor reporting and high missingness in our dataset.

Among the strengths of this study was that we were able to include most eligible RCTs (95%) with 18 349 participants providing an outcome measure, making this, to our knowledge, the largest study of early parenting interventions for child and adolescent internalising problems to date. We also retrieved

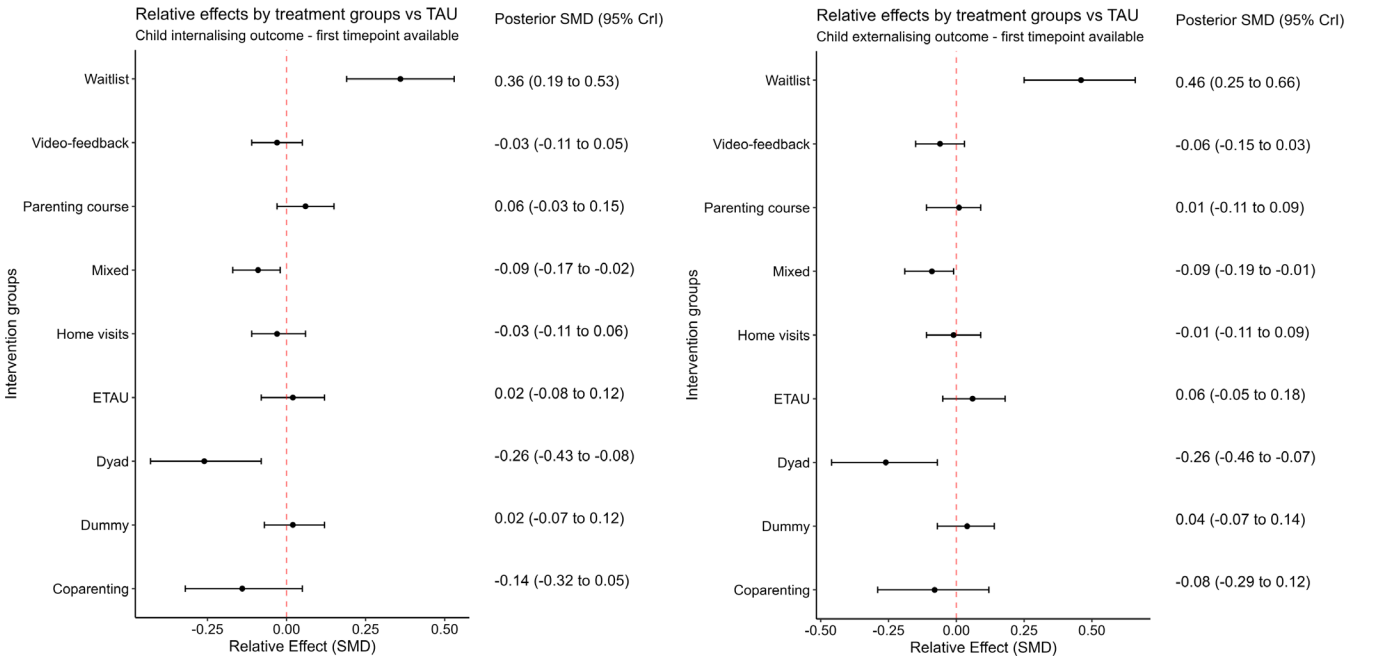

Figure 4 NMA results for child internalising and externalising problems at first time point available. Forest plots indicating relating effects of the main NMA on internalising problems and externalising problems at the first time point available: 37 post-intervention, 12 short-term, 5 medium-term, and 5 long-term and 37 post-intervention, 10 short-term, 5 medium-term, and 5 long-term follow-ups, respectively. Negative estimates indicate a favourable effect of the interventions in lowering internalising and externalising problems, respectively, while positive effect estimates indicate an increase in internalising and externalising problems compared with the reference treatment (TAU). CrI, credible interval; ETAU, enhanced TAU; NMA, network meta-analysis; SMD, standardised mean difference; TAU, treatment as usual.

unpublished data from 40% of the trials, thereby minimising publication bias and reporting outcomes that were usually not the main focus of the study. Finally, we did not find strong evidence for network inconsistency or small-study effects, suggesting that our analyses were robust against critical biases.

Some limitations should be considered when interpreting our findings. First, most of the studies were at 'some concerns' or 'high risk' of bias. Second, we were not able to examine all moderating factors that we prespecified in our protocol due to poor reporting. In an effort to retain as many observations as possible, we focused on commonly reported variables across the included trials. Third, the included trials were mostly conducted in HICs, potentially limiting the generalisability to other settings. Fourth, the CrIs around the effect estimates are wide, suggesting that we cannot exclude the possibility of a clinically significant benefit of any parenting intervention over TAU. These findings should be interpreted with caution because of their observational nature and due to several statistical tests employed.

Our classification of interventions, control and interventions' components was based on previous literature, piloting and discussion among coauthors and with blinded experts in the field. However, categorising salient parenting components and grouping complex parenting interventions are subjective, and future work should focus on the taxonomy for parenting interventions. In addition, our understanding of different interventions may have been limited by inconsistent and/or brief descriptions of these interventions.

Finally, where there were multiple effect estimates presented, we prioritised intention-to-treat (ITT) estimates, as ITT is more appropriate than 'per-protocol' estimates in investigating the effect of being randomised to a certain intervention, thus minimising the potential bias arising from lack of blinding to the intervention assignment. However, due to the poor adherence and high dropout, it is limited in assessing the causal role of receiving the intervention, and the estimates are likely to be conservative compared with the true intervention effect.[50]

Further work is needed to assess the effectiveness of parenting interventions in reducing and preventing internalising problems in children. Most current parenting interventions aim at reducing behavioural problems and often emotional problems are not measured or, if measured, they are not reported. In order to robustly evaluate the effectiveness of parenting intervention for internalising outcomes, rethinking measurement and more consistent reporting of the outcome are needed. Similarly, improving the taxonomy and reporting of parenting intervention components may facilitate exploration of which intervention components are driving observed effects.

Evidence that relational approaches may prevent internalising symptoms aligns with new policies and funding (eg, Family Hubs and Start for Life Programme) to provide timely and high-quality support to families in the first years of life of the child, as well as the need to improve waiting list times and intermediate support.

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Contributors RMP conceived the study and obtained the funding. RMP and IC designed the study. IC, RMP, JAL-L and DC contributed to the methods of the study. IC selected the articles and extracted all the data together with at least another author among AC, VH, TT, NB, JE, RMP and EP. IC, RMP and JE grouped the interventions in the identified intervention classes. DMJ, MC, TJ, IC and RMP clustered the intervention components. IC analysed the data. JAL-L and DC accessed and verified the data. IC wrote the first draft of the manuscript and prepared all the figures and tables. All authors provided feedback to the manuscript. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication. IC and RMP are the garantors of this work.

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