



Effects of multi-component parenting and parental mental health interventions on early childhood development and parent outcomes: a systematic review and meta-analysis

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Summary

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See [Comment](#) page 615

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Background Interventions supporting parents of young children often target parenting or parental mental health separately. Multi-component parenting and parental mental health interventions have the potential to improve parenting practices, mental health, and early childhood development. We aimed to examine their impact on child and parent outcomes.

Methods In this systematic review and meta-analysis, we searched MEDLINE, Embase, Web of Science Core Collection, APA PsycINFO, CINAHL Complete, the Cochrane Central Register of Controlled Trials, and the Global Health Database from inception to Jan 23, 2024. Eligible studies were randomised controlled trials of interventions explicitly targeting parenting behaviours and parental mental health antenatally or in children's first 3 years of life. Screening, extraction, and quality assessment were done independently by two authors. Primary outcomes were cognitive and social–emotional functioning in children and depressive symptoms in parents, meta-analysed as standardised mean differences (SMDs), relative to control. This study is registered with PROSPERO, CRD42022302848.

Findings We found 5843 records. After screening 2636 (45·1%) titles and abstracts, we manually identified and screened three additional articles and excluded 2177 records. After screening 462 full-length articles, 25 articles, representing a sample size of 8520 children and caregivers, were included. At baseline, mean caregiver age was 27·7 years (SD 5·9) and mean child age (excluding those enrolled during pregnancy) was 14·4 months (8·0). Interventions lasted a mean of 14 months (SD 11) and used a mean of 3·7 behaviour change techniques (2·0). Most interventions dedicated more time to parenting behaviours than to parental mental health. We found significant intervention effects on children's cognitive (SMD 0·19 [95% CI 0·04 to 0·34]; $I^2=69\%$) and social–emotional (0·26 [0·17 to 0·34]; $I^2=47\%$) outcomes but not on depressive symptoms in female caregivers (−0·18 [−0·36 to 0·002]; $I^2=86\%$) relative to control conditions. Risk of bias across studies was moderate, and we found heterogeneity across results.

Interpretation Multi-component parenting and mental health interventions had a positive effect on child cognitive and social–emotional outcomes, but not on depressive symptoms in parents, suggesting that other factors might contribute to positive ECD outcomes. Interventions might lack adequate focus on mental health to make a discernible impact, highlighting a need for future studies to differentiate and assess contributions of parenting and mental health components to understand independent and collective effects on family outcomes.

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Introduction

An estimated 250 million children worldwide do not meet their developmental potential.¹ Parenting behaviours and parental mental health are key determinants of early childhood development (ECD) that are strongly associated with one another.² Although many interventions to improve ECD outcomes have primarily targeted only one of these two factors, a handful of interventions have targeted both parenting behaviours and parental mental health (particularly depression), as this approach might be more effective in improving child and parent outcomes. Assessing the effect of these interventions in the first 3 years of life—when the developing brain is

most sensitive to experiences and the environment³—can help to advance scientific understanding of the combined effects of improving parenting behaviours and parental mental health on enabling children to attain their full developmental potential.⁴

The experience of depressive symptoms in the perinatal period is a substantial global mental health challenge among mothers (11–25%) and fathers (7–11%).^{5,6} In addition to impairing parents' health and functioning, the experience of depressive symptoms can interfere with parents' ability to actively engage with their child and respond appropriately to their developmental needs.⁷ Parents experiencing depressive symptoms are more

Research in context

Evidence before this study

Previous systematic reviews have investigated the efficacy of parenting or parental mental health interventions in isolation, reporting mixed effects on early childhood development (ECD) and parent outcomes. Observational studies, primarily from high-income countries, have shown robust associations between parental mental health and parenting behaviours; yet, the combined impact of interventions targeting both parenting and parental mental health on parenting and child outcomes has only recently been examined. We searched MEDLINE, Embase, Web of Science Core Collection, APA PsycINFO, CINAHL Complete, the Cochrane Central Register of Controlled Trials, and the Global Health Database for studies published in English, French, Spanish, or Arabic from inception to Jan 23, 2024, using combinations of phrases for search terms such as “parenting interventions,” “mental health interventions,” and “child outcomes”. We found no systematic reviews or meta-analyses on this topic.

Added value of this study

To our knowledge, this study is the first to systematically analyse and quantify the effects of multi-component

interventions that simultaneously target parenting and parental mental health, offering new insights into the combined impact of these interventions on ECD and parent outcomes. Our findings indicate that although these multi-component interventions improved children’s cognitive and social–emotional outcomes, there was no significant effect on depressive symptoms in parents. Although such interventions show promise, our findings also highlight gaps for future improvement to better serve young children and their families.

Implications of all the available evidence

The findings emphasise the importance of an integrated approach in designing interventions for parents and children. The combination of parenting and mental health components in interventions could potentially enhance the efficacy of programmes aimed at improving ECD and parent outcomes. These insights are important for informing future research, clinical practice, and policy making, emphasising the need for comprehensive strategies to improve overall family wellbeing.

likely to engage in less responsive and stimulating parenting behaviours that subsequently have negative effects on ECD outcomes.^{8,9} Other dimensions of parental mental health (eg, parenting stress) affect parents by increasing symptoms of depression, anxiety, and fatigue, reducing the quality of parenting behaviours and increasing the risk of adverse social–emotional outcomes in children.¹⁰

The robust associations of parental mental health and parenting behaviours with ECD outcomes suggest that interventions targeting mental health or parenting behaviours should improve child and parent outcomes. However, meta-analyses of interventions to prevent, reduce, or treat depression, anxiety, or parenting stress across the perinatal period report mixed findings on their efficacy in improving ECD outcomes.^{11,12} Similarly, meta-analytical evidence indicates that interventions in the early years focusing solely on improving parenting behaviours without addressing parents’ underlying mental health are not enough to improve parental mental health outcomes.^{13,14} These findings highlight the need for an integrated approach that jointly targets parental mental health and parenting behaviours to improve child and parent outcomes.⁴

Although the prevalence of depressive symptoms in mothers throughout the perinatal period in low-income and middle-income countries (LMICs; 20–25%)¹⁵ is almost double that in high-income countries (11–13%),⁶ most studies have focused on associations with child outcomes in high-income countries.¹⁶ There are even fewer studies on depressive symptoms in fathers in LMICs and their

association with child outcomes.^{5,17} Data exist on the effect of parenting interventions across sociocultural contexts, with a meta-analysis of parenting interventions finding greater effects on ECD and parenting outcomes in LMICs than in high-income countries.¹⁴ Given sociocultural differences in parenting, and the availability and quality of mental health services, it is necessary to consider global evidence assessing integrated approaches to improve child and parent outcomes.

Researchers have begun to adopt this integrated approach by developing multi-component interventions that explicitly promote positive parenting behaviours and address parental mental health to improve ECD.^{4,18} In addition to coaching parents on the developmental importance of responsive and stimulating parent–child interactions, these interventions address the psychological wellbeing of parents by including content on topics such as emotional literacy and stress management. Despite this increase in multi-component interventions, there are no reviews of their efficacy in improving child and parent outcomes nor studies on their implementation and whether implementation features moderate intervention impact. Understanding the implementation of these multi-component interventions and their efficacy in improving child and parent outcomes is key for advancing scientific knowledge on how best to design interventions that support parents to promote their wellbeing and their child’s developmental outcomes.¹⁹

The primary aim of this meta-analysis was to examine the effect of multi-component parenting and parental mental health interventions on child and parent outcomes

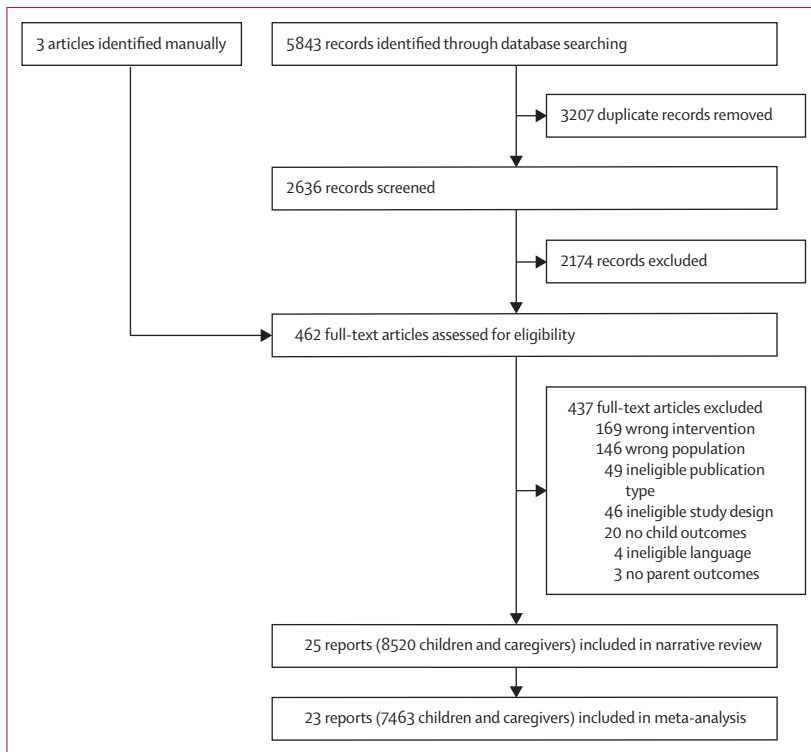


Figure 1: Study selection

globally. We include parent outcomes—specifically, parental mental health and parenting behaviours—as indicators of the potential mechanisms through which the interventions affect child outcomes. The secondary aim was to identify whether intervention effects on child and parent outcomes are moderated by key study characteristics and intervention implementation features.

Methods

Search strategy and selection criteria

This systematic review and meta-analysis follows the PRISMA statement for standard reporting (appendix pp 3–5).²⁰ The protocol was preregistered on PROSPERO, CRD42022302848, and is available online (appendix pp 6–7).⁶⁵

We identified articles on interventions that jointly targeted parenting behaviours and parental mental health during pregnancy and early childhood up to age 3 years by searching MEDLINE (Ovid), Embase (Elsevier), Web of Science Core Collection (Clarivate Analytics), APA PsycINFO (EBSCO), CINAHL Complete (EBSCO), the Cochrane Central Register of Controlled Trials (Wiley), and the Global Health Database (EBSCO), without any date restrictions. Our search strategy (appendix pp 8–16) was informed by search terms from relevant systematic reviews.^{14,21} Controlled vocabulary terms (ie, Medical Subject Headings [MeSH]) were included when available. The searches, prepared by three authors (AAA, PAB, and MNA), were conducted by

PAB across the selected databases and last run on Jan 23, 2024. We also searched bibliographies of included studies and relevant reviews for further studies.

Articles were considered eligible for inclusion if they: (1) explicitly targeted interactions, behaviours, knowledge, beliefs, attitudes, or practices of parents with their children and parental mental health or wellbeing to improve ECD outcomes; (2) used a randomised controlled trial (RCT) design; (3) targeted children and their parents during early childhood (pregnancy until age 3 years);³ (4) were published in a peer-reviewed journal in English, French, Spanish, or Arabic; and (5) assessed an ECD outcome and parenting practices or parental mental health after intervention completion (or shortly thereafter).

Child outcomes were two domains of ECD: (1) cognitive (ie, language, intellectual, and executive functioning capabilities) and (2) social–emotional (ie, socioemotional, behavioural, and attachment) outcomes. We focused on four parent outcomes: (1) positive parenting practices (eg, engagement in play, cognitive stimulation, and warmth), (2) negative parenting practices (eg, hostile parent–child interactions and harsh discipline), (3) depressive symptoms, and (4) parenting stress.

Two authors (AAA and MNA) independently screened titles and abstracts from the initial search. Studies deemed by both authors to not fulfil the inclusion criteria were excluded. The remaining articles were independently read by the two authors, and those meeting the inclusion criteria by mutual agreement were included. Disagreements were resolved in team discussions.

Data analysis

Data from each study were abstracted onto a standardised form by AAA, and MNA independently extracted the same information from a subsample for quality assurance. Study characteristics, including participant race or ethnicity and sex or gender, were extracted as reported by study authors.

Data were also extracted for study quality assessment using the Cochrane Collaboration Risk of Bias Assessment Tool for RCTs.²² For each study, AAA and MNA independently rated risk of bias across seven dimensions (random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other) as low (0), unclear (1), or high (2). We then assigned studies an overall rating: low (low risk of bias across the first six dimensions), unclear (unclear risk of bias in at least one of these six dimensions), or high (high risk of bias in at least one of these six dimensions).²² Following Cochrane guidelines,²² we accounted for differences between cluster and individual RCTs where appropriate. To examine publication bias, we used Egger's regression test and funnel plots to test the null hypothesis of small-study bias.²³

See Online for appendix

Sample (randomised controlled trial type)	Primary beneficiaries	Primary beneficiaries' race or ethnicity and sex or gender*	Mean child age at baseline, months†	Average intervention duration	Type of intervention	Dosage and delivery	Behaviour change techniques‡	Post-intervention outcome assessment, months§	Early childhood development outcomes assessed	Parent outcomes assessed
Luoto et al, 2018–19, Kenya (LMIC) ³⁵	Mothers and fathers	Luhya	14·1	7 months	Universal	Four 60-min, fortnightly, individual home visits and 12 90-min, fortnightly, community-based group sessions	Family engagement, print media, performance—self and performance—other, problem solving, social support—community, and other (attendance gift)	4	Cognitive and social—emotional	Positive parenting practices, depressive symptoms, and other (or composite) mental health
Barlow et al, 2006–11, USA (HIC) ³⁶	Mothers only	American Indian 100% women	Antenatal (±32 weeks)	38 months	Targeted: pregnant adolescents (American Indian)	43 60-min individual home visits of varied frequency	Print media, performance—other, problem solving, other (therapeutic alliance), collaborative goal setting, and rapport-building	0	Social—emotional	Positive parenting practices, depressive symptoms, parenting stress, and other (or composite) mental health
Barnhart et al (years not reported), Rwanda (LMIC) ³⁷	Primary caregivers	56% female and 25% male¶	23·5	4 months	Targeted: low-income families	12 60–90-min, weekly, individual home visits	Social support—community	0	Cognitive and social—emotional	Positive parenting practices, depressive symptoms, other (or composite) mental health
Baumgartner et al, 2018–20, Ghana (LMIC) ³²	Mothers (fathers and grandmothers invited)	Mamprusi and Nabit 100% women	Antenatal (not reported)	7 months	Universal	7 monthly individual home visits and 14 60-min, fortnightly, community-based group sessions	Family engagement	0	Social—emotional	Depressive symptoms
Castel et al, 2006–10, France (HIC) ³³	Mothers and fathers	..	0	18 months	Targeted: families with pre-term infants	8 individual home visits (twice a month) and 14 monthly individual clinic visits	Performance—self and rapport building	0	Cognitive and social—emotional	Depressive symptoms, parenting stress, and other (or composite) mental health
Demeusey et al, years not reported, USA (HIC) ³⁴	Mothers only	African-American, Caucasian, Latina, and other 100% women	5·2	Varied	Targeted: at-risk families	Individual home visits (varied frequency and number)	Family engagement, social support—community, and collaborative goal setting	0	Social—emotional	Depressive symptoms and parenting stress
Doss et al, and Tomfohr-Madsen et al, years not reported, USA (HIC) ^{38,39}	Mothers and fathers	Non-Hispanic White, Hispanic White, Native American or Alaskan Native, Asian or Pacific Islander, and African American 50% women and 50% men	Antenatal (6–8 months)	6 months	Targeted: at-risk families	Four 90-min individual clinic visits	Print media, problem solving, and collaborative goal setting	0	Social—emotional	Depressive symptoms and other (or composite) mental health

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Sample (controlled trial type)	Primary beneficiaries	Primary beneficiaries' race or ethnicity and sex or gender*	Mean child age at baseline, months†	Average intervention duration	Type of intervention	Dosage and delivery	Behaviour change techniques‡	Post-intervention outcome assessment, months§	Early childhood development outcomes assessed	Parent outcomes assessed
(Continued from previous page)										
Edward and Hans, years not reported, USA (HIC) ³⁷	Mothers only	Black or African American, Latina (Mexican), Multiracial or Ethnic or other, and White or European American 100% women	Antenatal (<34 weeks)	30 months	Targeted: pregnant, low-income adolescents	Individual home visits (varied frequency and number)	Materials (book and age-appropriate toy), performance—self, rapport-building, and social support—community	0	Social-emotional	Positive parenting practices and negative parenting practices
Fergusson et al, 2000-04, New Zealand (HIC) ³⁸	Primary caregivers	White or Māori 100% women	2	36 months	Targeted: socially vulnerable families	176-120-min, weekly, individual home visits	Collaborative goal setting, problem solving, social support—community, and rapport building	0	Social-emotional	Negative parenting practices
Fisher et al, 2018-21, Vietnam (LMIC) ³⁹	Mothers (fathers and grandmothers invited)	Vietnamese or Kinh	Antenatal (<20 weeks)	14 months	Universal	19-60-90-min community-based group sessions every 2-4 weeks One individual home visit	Family engagement, audiovisual and print media, and performance—self	0	Cognitive and social-emotional	Positive parenting practices and other (or composite) mental health
Havighurst et al, 2015-17, Australia (HIC) ⁴⁰	Primary caregivers	89% women and 11% men	25.6	1.5 months	Universal	Six 120-min, weekly, community-based group sessions	Materials (posters), audiovisual and print media, performance—other, social support—community, and other (homework)	12	Social-emotional	Positive parenting practices, negative parenting practices, and other (or composite) mental health
Hayes et al, years not reported, Australia (HIC) ⁴¹	Mothers only	100% women	8.7	1 day	Targeted: socially vulnerable families	One 6-h clinic visit consisting of individual and group sessions	Collaborative goal setting, performance—self and performance—other, and rapport building	0.5	Social-emotional	Depressive symptoms
Jacobs et al, 2008-12, USA (HIC) ³²	Mothers only	Non-Hispanic White, and non-Hispanic Black 100% women	0	14.7 months	Targeted: adolescent mothers	118 individual home visits	Collaborative goal setting	0	Social-emotional	Negative parenting practices and parenting stress
Jensen et al, 2018-19, Rwanda (LMIC) ⁴³	Primary caregivers	64% female and 29% male**	21.5	3 months	Targeted: low-income families	12-75-min, weekly, individual home visits	Family engagement, performance—self, problem solving, social support—community	0	Cognitive and social-emotional	Positive parenting practices
Kemp et al, years not reported, Australia (HIC) ⁴⁴	Mothers only	100% women	Antenatal (not reported)	27 months	Targeted: at-risk families	52-60-90-min, weekly, individual home visits	Family engagement and social support—community	0	Social-emotional	Positive parenting practices, depressive symptoms, and other (or composite) mental health

(Table continues on next page)

Sample (randomised controlled trial type)	Primary beneficiaries	Primary beneficiaries' race or ethnicity and sex or gender*	Mean child age at baseline, months†	Average intervention duration	Type of intervention	Dosage and delivery	Behaviour change techniques‡	Post-intervention outcome assessment, months§	Early childhood development outcomes assessed	Parent outcomes assessed
(Continued from previous page)										
Maselko et al, 2014–19, Pakistan (LMIC) ⁴⁵	Mothers only	100% women	Antenatal (third trimester)	30 months	Universal	Ten individual home visits and 22 community-based group sessions, both of varied frequency	Family engagement, performance—other, problem solving, rapport building, and social support—community	0	Cognitive and social-emotional	Depressive symptoms
Pitchik et al, 2017–18, Bangladesh (LMIC) ⁴⁶	Primary caregivers	100% women	7·3	9 months	Universal	Nine 22·5-min, monthly, individual home visits and nine 52·5-min, monthly, community-based group sessions	Family engagement, materials (low-cost toys and picture books), print media, performance—self and performance—other, problem solving, and social support—community	0	Cognitive and social-emotional	Positive parenting practices and depressive symptoms
Rockers et al, 2015–16, Zambia (LMIC) ⁴⁷	Primary caregivers	Tonga	8·5	12 months	Universal	23 fortnightly individual home visits and 20 fortnightly community-based group sessions	Materials (play materials) and performance—self	0	Cognitive and social-emotional	Depressive symptoms
Rohder et al, 2017–19, Denmark (HIC) ⁴⁸	Mothers and fathers	52% female and 48% male	Antenatal (not reported)	11 months	Targeted: at-risk families	Nine individual home visits (varied frequency)	Audiovisual media	0	Social-emotional	Depressive symptoms, parenting stress, and other (or composite) mental health
Singla et al, 2012–13, Uganda (LMIC) ⁴⁹	Mothers and fathers	Lango 63% women and 37% men	22·3	7 months	Universal	1·5–45-min individual home visits and 13·75-min fortnightly community-based group sessions	Family engagement, materials (home-based play materials), print media, performance—self and performance—other, problem solving, rapport building, social support—community, and other (homework and motivational interviewing)	3	Cognitive	Positive parenting practices and depressive symptoms
Slade et al, years not reported, USA (HIC) ⁵⁰	Mothers (fathers and grandmothers invited)	Hispanic or Latino, African American, White or non-Hispanic, and other 100% women	Antenatal (second trimester)	26 months	Universal	Individual home visits of varied frequency	Collaborative goal setting, family engagement, rapport building, and social support—community	0	No	Depressive symptoms and other (or composite) mental health

(Table continues on next page)

	Sample (randomised controlled trial type)	Primary beneficiaries	Primary beneficiaries' race or ethnicity and sex or gender*	Mean child age at baseline, months†	Average intervention duration	Type of intervention	Dosage and delivery	Behaviour change techniques‡	Post-intervention outcome assessment, months§	Early childhood development outcomes assessed	Parent outcomes assessed
(Continued from previous page)											
Tofail et al, 2015–16, Bangladesh (LMIC) ⁵¹	Intervention n=105 and control n=117 (cluster)	Mothers only	100% women	15.4	12 months	Targeted: at-risk families	24 60–75-min fortnightly, clinic-based, group sessions	Materials (toys and books), print media, and performance—self and performance—other	12	Cognitive and social-emotional	Positive parenting practices, negative parenting practices, and depressive symptoms
Jeong et al, 2018–21, Tanzania (LMIC) ⁵²	Intervention n=167 and control n=154 (cluster)	Mothers and fathers	Kuria, Zanaki, and Luo 50% female and 50% male	11.5	12 months	Universal	24 sessions (every 2 weeks) over 12 months (18 peer community-based group sessions and six individual home visits because of the COVID-19 pandemic)	Family engagement, print media, performance—self and performance—other, problem solving, rapport building, and social support—community	2	Cognitive	Positive parenting practices, negative parenting practices, depressive symptoms, and parenting stress
Skeen et al, 2020–21, Tanzania, Zambia (LMIC) ⁵³	Intervention n=234 and control n=229 (individual)	Primary caregivers	77% female and 23% male	20.3	1.5 months	Universal	Six weekly sessions (1.2–2 h) over 1.5 months delivered remotely via WhatsApp groups	Materials (digital books), audiovisual media, performance—self and performance—other, rapport building, and other (homework and motivational interviewing)	0	Cognitive and social-emotional	Positive parenting practices, depressive symptoms, parenting stress, and other (or composite) mental health

An empty or partially completed cell indicates that data were not clearly reported. HIC=high-income country, LMIC=low-income or middle-income country. *Racial and ethnic groups for each study are listed in order of their representation in the sample, from largest to smallest. In the absence of direct data on race or ethnicity, we deduced ethnicity of participants on the basis of district-level demographic data provided by the authors, assuming that individuals' ethnicities aligned with the majority in their respective districts; sex and gender are listed as reported. No study reported the methods used to identify sex or gender. †A value of 0 indicates that baseline assessments were done when children were, on average, younger than 1 month. ‡Behaviour change techniques refer to the strategies used by the intervention to facilitate behaviour change in caregivers, categorised as collaborative goal setting (supporting caregivers' autonomy, control, and ability to make choices throughout intervention, with check-ins to see if the caregiver has adjusted or redefined them), family engagement (leveraging caregivers' relationship with family members as a source of support to facilitate behaviour change), materials (provision of materials such as books or play objects), audiovisual media (use of media such as radio [or audio] or television [or video] to convey messages); print media (use of print media such as pamphlets, posters, or flipcharts to convey messages), performance—other (use of demonstrations by delivery agents or another caregiver to model a behaviour), performance—self (caregivers themselves practising with their child and getting feedback or coaching), problem solving (identification of barriers and facilitators to behaviour change and solutions to overcoming barriers), rapport building (using strategies that increase the quality of the relationship between the delivery agent and primary beneficiary through socially appropriate interactions and making the caregiver feel comfortable), social support—community (leveraging caregivers' relationship with community members and resources as a source of support to facilitate behaviour change), and other techniques (other behaviour change techniques described by authors that do not fall into any of the aforementioned categories). §A value of 0 indicates that the post-intervention outcome assessment was done immediately after intervention completion. ¶Grandparents and aunts or uncles were primary caregivers in 19% of families; however, the male-to-female ratio in these families was not reported. ||Value reported by study authors is a mean of –0.6 months (SD 5.1); some mothers were still pregnant at baseline (mean reflects mothers' due date). **Grandparents were primary caregivers in 6% of families; however, the male-to-female ratio in these families was not reported.

Table: Characteristics of studies included in the systematic review

We summarised study characteristics and implementation features narratively. We estimated effect sizes as the standardised mean difference (SMD) between intervention and comparison groups (eg, no intervention or standard of care) with respect to change in mean values from baseline to endline after standardisation by their pooled SD. The mean, SD, and sample size of control and intervention groups were extracted from each study to estimate the SMD. When studies did not provide these data, we contacted authors directly. Out of eight authors contacted, five provided data. In multi-arm studies, the comparison group was the intervention group without any parenting and mental health components. If intervention groups differed only in delivery modalities, one group was randomly selected for analysis. We ran sensitivity analyses to assess whether studies using this approach affected estimates. We used outcome measurements from the timepoint closest to intervention completion for analyses.

We used meta-analysis with robust variance estimation to estimate pooled effects across studies, accounting for multiple dependent effect-size estimates per trial per outcome to increase power and precision. As per our pre-registered protocol, a minimum of ten studies reporting data for a given outcome was required to run a meta-analysis for that outcome. Pooled estimates were based on random-effects models, and *p* values of less than 0.05 denoted statistical significance. For children's social-emotional outcomes, we meta-analysed absolute values of effect sizes because the direction of effects varied across measures, and we were interested in examining differences in magnitude rather than direction of effects. We assessed heterogeneity of pooled effect sizes using the *I*² statistic. Effect size magnitudes were interpreted in the context of public health, paediatric, and early education interventions, and the practical significance with respect to outcomes.²⁴

We examined potential sources of heterogeneity in the pooled effect of each outcome by doing subgroup analyses using random-effects meta-regression models. We included the following pre-specified study characteristics and implementation features (the choice of which was informed by an implementation review of parenting interventions¹⁹): country income level (high-income country vs LMIC per World Bank classifications), child mean age at baseline (antenatal or <12 months vs ≥12 months), intervention duration (<12 months vs ≥12 months), delivery modality (individual vs group and a combination of individual and group),²⁵ delivery setting (single setting [ie, home, clinic, or community] vs a combination of home, clinic, or community settings),²⁶ and study risk of bias (a binary variable based on the median split of the total risk of bias score). Additional analyses were done by nature of intervention (targeted vs universal), number of behaviour-change techniques used (<3 vs ≥3), and caregiver age (based on intervention beneficiaries; continuous). The categorisation of

behaviour change techniques was inspired by Aboud and Yousafzai²⁷ and Pedersen.²⁸ Two-sided *p*<0.05 indicated a significant difference between subgroups based on the regression of meta-analytic estimates onto each subgroup in separate models. All analyses were done using the *robumeta* 2.0 package²⁹ in R (version 4.0.3).

Involvement of individuals with lived experience

We involved two individuals with lived experiences of caring for young children and living with mental health problems in all aspects of the study from the conceptualisation of research questions to manuscript preparation.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

Our search returned 5843 records. After removal of 3207 (54.9%) duplicates, we identified 2636 (45.1%) unique records; three additional records were identified through manual scanning of article references. After screening the titles and abstracts of these 2639 records, 462 (17.5%) articles underwent full-text screening and, of these, 25 (5.4%) articles published between 2005 and 2023 (24 unique RCTs) were included in the systematic review (8520 children and caregivers) and 23 in the meta-analysis (7463 children and caregivers; figure 1). Analytical sample sizes ranged from 19 to 616 individuals (mean 160 [SD 117]; table).

Mean caregiver age was 27.7 years (SD 5.9, range 18.0–39.0 years): 25.2 years (4.6) for mothers and 29.2 years (6.0) for fathers. In five (21%) studies that jointly reported fathers' and mothers' mean age or included the child's primary caregiver, the mean age was 34.3 years (4.6). Female caregivers (mothers in most cases) were the primary beneficiaries in 12 (50%) interventions, with the other 12 targeting couples (six [25%]) or the child's primary caregiver, which included a mix of mothers, fathers, and other caregivers (six [25%]), with female caregivers making up the majority of intervention beneficiaries where reported. Of the 12 interventions targeting female caregivers, three (25%) invited other caregivers (fathers or partners, grandmothers, and other family members) to some sessions. Most interventions were delivered by community volunteers (eight [33%]) and community health workers (six [25%]). Interventions' parenting content primarily focused on improving parent-child interactions and ECD outcomes through education on health, nutrition, hygiene, responsive caregiving, and early language learning, as well as implementing positive conflict resolution and discipline strategies. Authors who referenced sources for parenting interventions cited Healthy Families America and Care for Child Development. For mental health

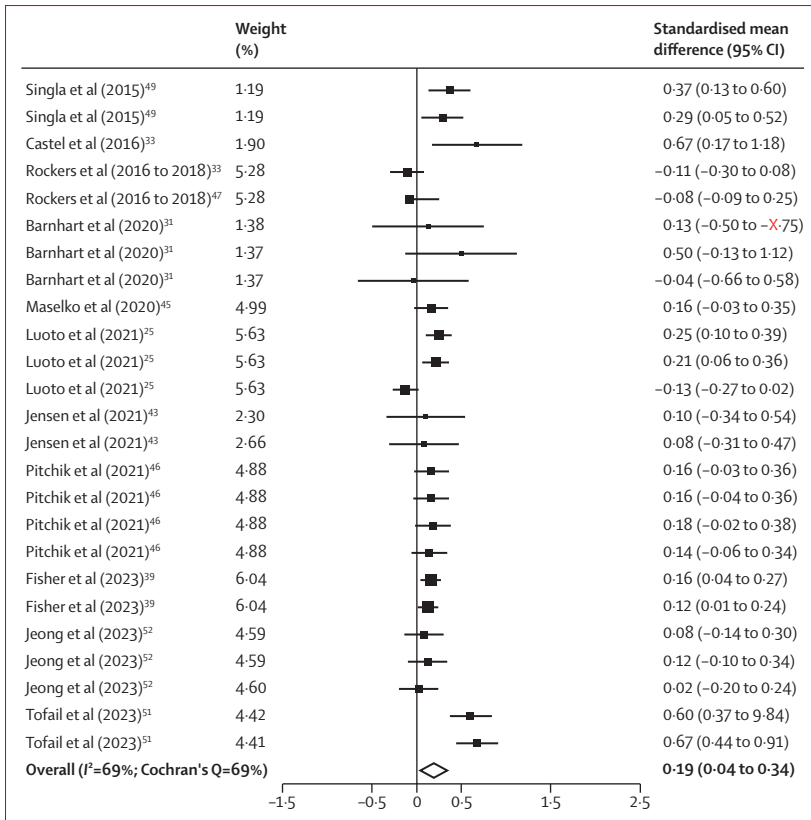


Figure 2: Forest plot of the effect of multi-component parenting and parental mental health interventions on children's cognitive development

Squares represent the standardised mean difference for each study. The whiskers represent the 95% CI. The diamond shows the overall pooled effect size using a random-effects model, which is centred at the point estimate, with the diamond width representing the 95% CI.

intervention content, the Thinking Healthy Program was predominant, focusing on addressing perinatal depressive symptoms by using cognitive behavioural strategies to engage parents. Study characteristics are shown in the table; no study reported the methods used to identify participants' sex or gender.

Studies were done across 14 countries, with six (24%) in the USA. Regarding the mean age of children at baseline, 17 (71%) studies included children with a mean age younger than 12 months, of which ten (59%) studies enrolled pregnant mothers and seven (29%) included children aged 12 months or older (table). Children's mean age—not including those enrolled during pregnancy—was 14.4 months (SD 8.0). 12 of 24 interventions targeted specific populations, such as “at-risk” or “socially vulnerable” families (eg, those with psychosocial vulnerabilities or a combination of socio-economic and demographic risk factors), adolescent mothers, low-income families, and families with preterm infants. Six of these targeted interventions reported the baseline prevalence of mental health problems (10.3–41.5%). Of the 12 universal interventions, three (25%) reported baseline rates of

3.2–45.5% mental health problems. None of the remaining 15 (63%) studies (six [25%] targeted and nine [38%] universal) reported these data.

Mean intervention duration was 14 months (SD 11), ranging from 1 day to 38 months (table). Various techniques were used across interventions to increase participant engagement and support behaviour change. Interventions used a mean of 3.7 behaviour change techniques (SD 2.0), with performance-based techniques such as demonstrations and modelling of key behaviours or direct parent–child engagement being the most widely used (n=13 [15%]; table).

The mean total risk of bias score was 5.00 (SD 2.73), ranging from 0 to 11.00 on a 0–14-point scale.²² Risk of bias was generally low for random sequence generation, blinding of outcome assessment, incomplete outcome data, and selective reporting (appendix p 17). All but one study had a high or unclear risk of bias for the masking of participants and personnel (appendix p 17), a common issue in psychoeducational and behavioural parenting interventions when parents' active involvement in the intervention makes masking difficult. Egger's regression tests were non-significant and funnel plots were fairly symmetrical, suggesting little evidence of publication bias for outcomes included in the meta-analysis (appendix pp 18–19).

Following our preregistered protocol, we did meta-analyses on outcomes reported in at least ten studies. We therefore did not conduct meta-analyses on positive or negative parenting practices and parenting stress in female and male caregivers, and depressive symptoms in male caregivers. In the narrative synthesis, improvements were seen in positive parenting practices but not in negative parenting practices or parenting stress in male and female caregivers (appendix p 20). Only one (out of three) study found significant reductions in depressive symptoms in male caregivers; the others found no significant effect. Data from 23 articles (22 RCTs) were included in the meta-analysis.

11 studies provided 25 effect sizes for children's cognitive development. The Bayley Scales of Infant and Toddler Development was the most frequently used measure (seven [64%] studies). The pooled result showed a small positive effect of multi-component parenting and parental mental health interventions on children's cognitive outcomes (SMD 0.19 [95% CI 0.04–0.34]; I²=69%; figure 2).

20 studies provided 32 effect sizes for children's social-emotional outcomes. The most frequently used measures were the (Brief) Infant and Toddler Social Emotional Assessment and the Ages and Stages Questionnaire (Social Emotional; five [21%] studies each). The pooled result showed a small positive effect on children's social-emotional outcomes (SMD 0.26 [95% CI 0.17–0.34]; I²=47%; figure 3).

16 studies provided 16 effect sizes for depressive symptoms in female caregivers. The Centre for

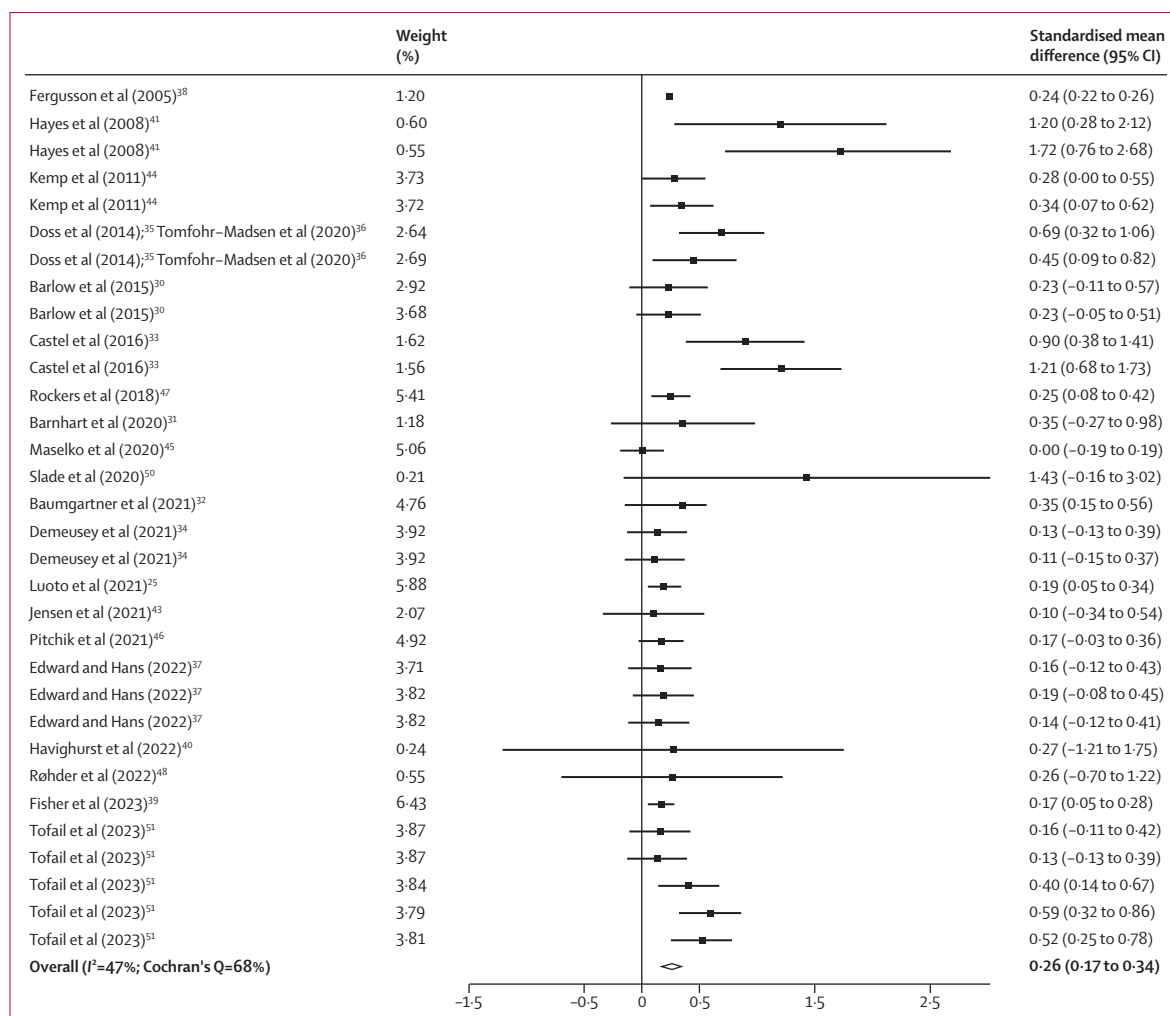


Figure 3: Forest plot of the effect of multi-component parenting and parental mental health interventions on children's social-emotional outcomes. Squares represent the standardised mean difference for each study. The whiskers represent the 95% CI. The diamond shows the overall pooled effect size using a random-effects model, which is centred at the point estimate, with the diamond width representing the 95% CI.

Epidemiologic Study–Depression Scale (eight [38%] studies) and the Edinburgh Postnatal Depression Scale (three [14%] studies) were the most common measures. Only five [29%] studies reported whether measures were validated for use against a gold standard to establish local cutoff scores. The meta-analysis revealed that multi-component parenting and parental mental health interventions did not significantly reduce depressive symptoms in female caregivers (SMD -0.18 [95% CI -0.36 to 0.002]; $I^2=86\%$; figure 4).

We did moderator analyses to explore heterogeneity across pooled estimates. We found no difference in the effect of parental health interventions on children's social-emotional outcomes between high-income countries and LMICs. None of the other characteristics significantly moderated interventions' meta-analytical effects on children's cognitive and social-emotional outcomes or depressive symptoms in female caregivers.

These results, as well as the results of sensitivity analyses, are summarised in the appendix (pp 21–22).

Discussion

This global systematic review and meta-analysis summarises the effect of interventions explicitly targeting parenting behaviours and parental mental health on ECD and parent outcomes. These multi-component interventions had small, positive effects on children's cognitive and social-emotional outcomes but not on depressive symptoms in female caregivers. Narrative results suggested improvements in positive parenting but not negative parenting practices or parenting stress in male and female caregivers. However, there were too few studies examining these outcomes for inclusion in the meta-analysis. We provide, to our knowledge, the first quantitative summary of the effect of multi-component parenting and parental mental health interventions on

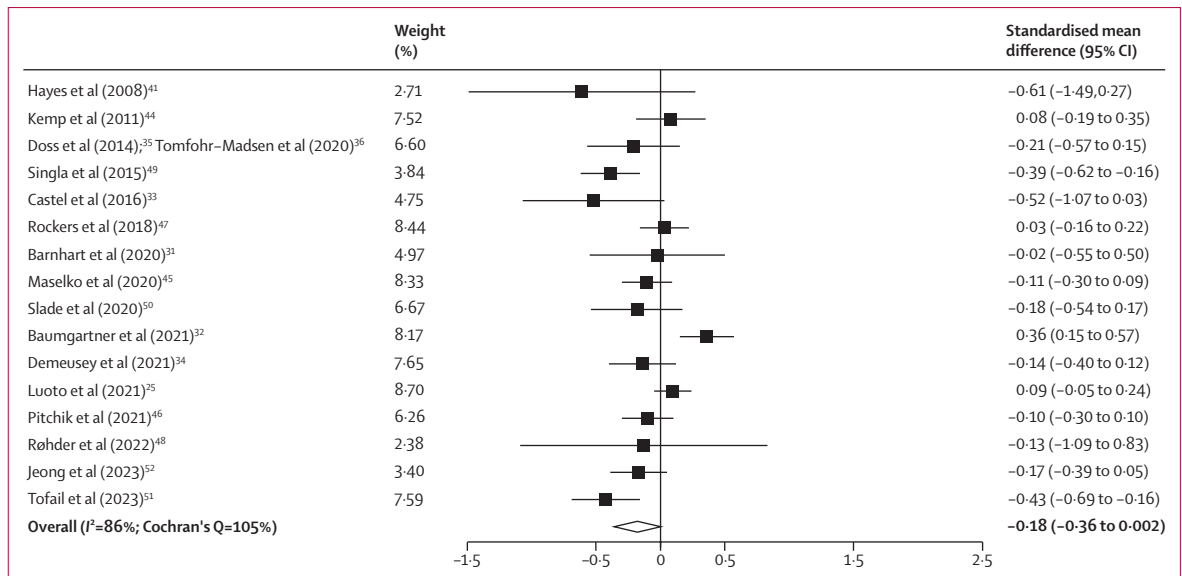


Figure 4: Forest plot of the effect of multi-component parenting and parental mental health interventions on depressive symptoms in female caregivers
 A negative standardised mean difference represents a favourable outcome as it indicates a reduction in depressive symptoms. Squares represent the standardised mean difference for each study. The whiskers represent the 95% CI. The diamond shows the overall pooled effect size using a random-effects model, which is centred at the point estimate, with the diamond width representing the 95% CI.

child and parent outcomes, highlighting both the promise of such interventions and the gaps that need to be addressed to better realise the potential of such interventions to support young children and their families.

Interventions targeting parenting behaviours or parental mental health alone have mixed evidence of improvements in parenting practices, depressive symptoms, and ECD outcomes across different contexts.^{11,14} Although the findings of our review are consistent with findings that parenting interventions in the first 3 years of life, including some that begin during pregnancy, have no effect on depressive symptoms in parents, reviews of parenting interventions including a wider age range (0–17 years) of children have found small-to-moderate effects on different parental mental health outcomes in LMICs and high-income countries.^{54,55} Given the increased stress of caring for young children and children’s increased vulnerability to their environments, child age is likely to moderate intervention effects on child and parent outcomes.³

Our finding that multi-component parenting and parental mental health interventions have no effect on depressive symptoms in parents is consistent with the non-significant effect of parenting interventions on the same outcome,^{13,14} suggesting that the expected benefits of integrating content on parenting and parental mental health are not being realised. One potential explanation for this finding is that interventions did not include enough content on mental health to significantly influence parents’ symptoms. Although the included studies explicitly targeted parenting behaviours and parental mental health, the few studies that reported the topics of sessions revealed that most focused on content about caring for children’s health and development, with

only one or two sessions focused on helping parents to manage stress and care for their own wellbeing. It is therefore likely that the mental health content was diluted and thus not sufficient for interventions to significantly affect parental mental health outcomes. Evidence from clinical samples supports the hypothesis that adequate support for parental mental health is needed in combination with parenting interventions to improve mental health and parenting outcomes.⁵⁶ For example, Ammerman and colleagues⁵⁷ found parallel improvements in the depressive symptoms and parenting practices of mothers experiencing clinical depression and coming from a low-income background, who received a home-visiting parenting programme and in-home cognitive behavioural therapy. Another potential explanation for the lack of reduction in depressive symptoms is that most caregivers had low symptom severity at baseline. However, we were unable to test this hypothesis as only nine studies provided these data.

In addition to including little content on parental mental health, the design of included interventions made it difficult to identify independent effects of the parenting and parental mental health components on child and parent outcomes. This lack of clarity in the allocation and dosage of intervention components complicates the assessment of the mental health component’s effect and its potential synergistic effects with parenting content. To advance understanding on the effect of improving parental mental health and parenting behaviours—as well as understanding what works and why—intervention studies need to use factorial designs to enable examination of the independent and combined effects of each intervention component.

These multi-component interventions could also have improved ECD outcomes without reducing depressive symptoms in caregivers by other mechanisms.^{7,8} Jeong and colleagues⁵⁸ found that both maternal and paternal stimulation significantly explained the effects of a parenting intervention on children's cognitive and social-emotional development. In addition to parenting practices, a meta-analytical review by Goodman and colleagues⁵⁹ found significant bidirectional associations between depression and parenting self-efficacy, suggesting that improving parental self-efficacy could improve child outcomes, even in the presence of depression in mothers.⁶⁰ Another potential mechanism is parenting knowledge, as one study in this review found that improvements in maternal knowledge led to improvements in child outcomes.²⁵ Overall, additional mediation studies are needed to empirically identify the pathways through which multi-component interventions lead to improvements in child outcomes.

Despite testing multiple moderators as sources of heterogeneity in meta-analytical estimates, we did not find any that significantly explained variation in intervention effects on child or parent outcomes. This finding might suggest that the observed effects are consistent across different contexts. However, it is also possible that we did not have sufficient power to detect conditional differences in efficacy given the small number of studies included. For example, although the difference was not significant, the effect of multi-component interventions on children's social-emotional outcomes in high-income countries was twice as large as that in LMICs. Evidence from a meta-analysis of parenting interventions reported significantly larger effects on child outcomes and parenting practices in LMICs than in high-income countries, suggesting that country income level can moderate the effect of parenting interventions.¹⁴ However, other factors such as the nature of child-rearing practices (eg, involvement of other caregivers beyond the immediate family⁶¹ and availability of parental leave policies) and quality of mental health services (eg, access to community-based services)⁶² are likely to play a moderating role beyond a country's income level. For example, given the involvement of other caregivers in caring for young children (primarily, but not exclusively, in LMICs), interventions targeting a child's legal parent who spends little time interacting with the child might not have as large an effect on child outcomes. Although some interventions included caregivers other than mothers and fathers, few assessed outcomes in these caregivers. Key contextual factors should be reported alongside implementation and evaluation data to improve understanding of how different factors might moderate intervention effects.

This study has important strengths, including its quantitative synthesis of the effect of multi-component parenting and parental mental health interventions

on child and parent outcomes, an exploration of heterogeneity across key study and implementation characteristics, and a narrative review of implementation features. However, some limitations are worth noting. In addition to the limitations regarding insufficient reported data on the mental health content of included interventions, we were possibly unable to detect some significant effects in the meta-analysis and moderator analysis because of the small number of included studies. For example, although the effect of multi-component parenting and parental mental health interventions on depressive symptoms in female caregivers was not significant, the magnitude of the effect (SMD -0.18) was similar to the effect on child cognitive outcomes (SMD 0.19). Additionally, we were unable to conduct meta-analyses for male caregiver outcomes because of the small number of studies that measured these outcomes. Given increasing evidence of the important contribution of male caregivers to their children's development and family wellbeing, future interventions should include fathers in sessions and measure intervention impacts on fathers' outcomes.⁶³ Most studies originated from high-income countries, thus potentially limiting the applicability of results to LMICs, as there is evidence that the effect of parenting interventions on ECD and parent outcomes are moderated by country income level.¹⁴ Studies also used various measures to assess parental mental health outcomes, and information on their psychometric properties was not consistently reported. Results should therefore be interpreted in light of these limitations.

To better understand the effect of multi-component parenting and parental mental health interventions on child and parent outcomes, our findings emphasise a need for an evaluation study design that explicitly examines the independent and joint effects of the same parenting and mental health interventions by testing them in isolation and in combination with one another.⁶⁴ This approach can enable a clearer understanding of the structure of these multi-component interventions and their efficacy in improving child and parent outcomes. These insights are crucial to designing interventions that support parents in promoting their own wellbeing and their children's healthy development.

Contributors

MNA was responsible for the conceptualisation of the study, with input from AAA, SHG, and JJ, and was involved in screening, extraction, and evaluation of data, in addition to writing the first draft of the paper. MNA ran the meta-analysis. AAA was involved in screening, extraction, and evaluation of data, contributed to writing the first draft of the paper, and was primarily responsible for editing the manuscript on the basis of co-author feedback. PAB prepared and executed the search strategy, with input from MNA and AAA. All authors read, provided input at all stages, and contributed to subsequent drafts of the paper. MNA and AAA accessed and verified the data. MNA had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Declaration of interests

We declare no competing interests.

Data sharing

All data collected for this Article, including the study protocol, data extraction tables, and the statistical analysis, will be available from the publication date. To access these data, please direct requests to the corresponding author.

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