

Effectiveness of psychosocial interventions on the psychological outcomes of parents with preterm infants: A systematic review and meta-analysis

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ABSTRACT

Background: Parents of preterm infants are often thrown unexpectedly into the care of their vulnerable infant, causing them to be stressed and overwhelmed. Social support has been previously highlighted as a crucial factor in helping parents cope with stress. Several psychosocial interventions have thus been developed to support parents of preterm babies, which warrant further investigations.

Objectives: To evaluate the effectiveness of psychosocial interventions in reducing stress (primary outcome), anxiety, depression, pediatric medical traumatic stress (PMTS) and increasing social support among parents with preterm infants.

Methods: A systematic-review and meta-analysis were conducted. Eight electronic databases were searched for relevant studies from their respective inception dates till September 2023. Meta-analysis was performed with RevMan, using the random-effects model. Heterogeneity was investigated using Cochran Q and I² tests, and publication bias was assessed using funnel plots. Subgroup analyses were conducted for follow-up measurement, gender of parent, type of intervention provider, and setting.

Findings: Eighteen studies were included in this review, and all studies were meta-analysed. Participants who received psychosocial interventions reported significantly lower stress and depression in comparison to control group participants. Psychosocial interventions delivered by psychologists and trained researchers were more effective compared to the nurses. The GRADE assessment indicated that the certainty of evidence for all outcomes were very low.

Conclusion: Psychosocial interventions effectively reduce stress and depression levels in parents with preterm infants. Our findings encourage the implementation of psychosocial interventions to improve parental psychological wellbeing. Future higher quality trials are needed to measure psychological outcomes among parents, especially fathers.

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Introduction

Preterm infants refer to infants who are born before 34 weeks of gestation. These infants commonly have a higher risk of mortality as premature birth brings about complications regarding the infant's survival and development (Behrman & Butler, 2007). Upon successful delivery, preterm infants are directly transferred to the neonatal intensive care unit (NICU) to receive special care, hence preventing parents from providing immediate care to their newborn. Existing research has found that new parents would subsequently develop feelings of helplessness and fear

that persist even after the infant's discharge (Ionio et al., 2016; Osorio Galeano et al., 2017). This fear is a consequence of the constant threat of losing the newborn, due to the parents' perception that a preterm infant is fragile and requires special care that is beyond what they can provide. Furthermore, the inability to fulfil parenting duties during hospitalisation affects the parents' self-efficacy in taking on the parenting role post-discharge (Boykova & Kenner, 2012; Davis-Strauss et al., 2021).

Unsurprisingly, parents of preterm infants have been found to experience greater levels of stress during their infant's first year of life as compared to parents with term infants (Puthussery et al., 2018; Ravn et al., 2012). Poor parental psychological well-being not only has disabling effects on the parent, but also negatively affects the preterm infant's development. Parental stress often stems from concerns regarding the infant's health (Lee et al., 2019). Other forms of psychological distress like

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depression, anxiety, and the recently coined pediatric medical traumatic stress (PMTS) are also common consequences of the fear that parents experience when considering the possibility of losing their newborn (Shea, Athanasakos, Cleeve, Croft, & Gibbs, 2021). Prior to the emergence of PMTS, the trauma that parents experience arising from concerns about their infant's health was often described as post-traumatic stress disorder (PTSD), even though the symptoms experienced may not meet the full diagnostic criteria for PTSD (Shea, Athanasakos, Cleeve, Croft, & Gibbs, 2021). Hence, the term PMTS was developed specifically for use within the a pediatric medical context to better support treatment (Shea, Athanasakos, Cleeve, Croft, & Gibbs, 2021). Zerkowicz, Na, et al. (2011) found that maternal anxiety during the preterm infant's NICU hospitalisation was predictive of poorer cognitive development and internalizing behaviours among infants. In the NICU, exposure to various factors like limited support from staff and the vulnerability of their infant increases parental risk of developing depressive and anxiety symptoms (Davis et al., 2003; Kong et al., 2013; Shaw et al., 2009). The birth of a preterm infant is often an unexpected event that can trigger a post-traumatic response in parents. It was found that 41% of parents with high-risk preterm infants and 26% of parents with low-risk preterm infants experience PMTS symptoms up to 18 months after their infant's birth (Pierrehumbert et al., 2003). As such, parents of preterm infants are often vulnerable to psychological distress and have an increased need for social support (Kara et al., 2013).

Lack of social support often predicts distress in mothers with preterm infants, and social support tends to moderate the adverse effects of stress (Jones et al., 2009; Leahy-Warren et al., 2020). Qualitative studies (Russell et al., 2014; Yu et al., 2020) regarding the experiences of parents with preterm infants demonstrated the importance of support. Parents find it easier to cope when they receive support from nurses in the NICU, as it made them feel more reassured, valued and encouraged (Russell et al., 2014). In contrast, receiving insufficient support causes parents to feel anxious and fearful, as this could further develop into a lack of confidence to care for their infant and result in further distress, since they may not receive reassurance that they are doing well (Yu et al., 2020). Therefore, it is crucial to provide parents with needed care and support to improve their parenting self-efficacy and psychological well-being. Psychosocial interventions are non-pharmacological interventions that adopt a psychological or social approach to improve functioning or well-being (Barbui et al., 2020). They may include psychotherapeutic, psychoeducational, and social support interventions. These interventions often include educational content and therapies offered by trained professionals (Mendelson et al., 2017). Many studies have developed such interventions to improve parental well-being of parents with preterm infants, and evaluation is needed to determine their effectiveness.

Existing systematic reviews evaluating interventions on parents of preterm infants have either focused broadly on all types of NICU-based interventions evaluating different parenting outcomes regardless of infant maturity (Mendelson et al., 2017; Sabnis et al., 2019), or on a specific type of intervention, such as cognitive-behavioural therapy (CBT) and empowerment programs (Seiiedi-Biarag et al., 2020; Zhang et al., 2021). Hence, it is unknown whether psychosocial interventions are effective for reducing parental distress and the conditions that can influence the extent of their effectiveness. Some interventions might be more suitable for mothers and less effective for fathers or are more effective in hospitals compared to community settings. As such, this systematic review aimed to evaluate the effectiveness of psychosocial interventions, implemented in either hospital or community setting, on the psychological outcomes of both mothers and fathers or either, with preterm infants.

Methods

This systematic review was reported according to the Preferred Reporting Items for Systematic reviews and Meta-analyses (PRISMA)

guidelines (Page et al., 2021). The registered protocol can be found on PROSPERO (CRD42021291693).

Search strategy

Eight electronic databases were searched for relevant studies from their respective inception dates till September 2023: PubMed, EMBASE, Cochrane Library, PsycINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, ProQuest Dissertation and Theses, and Clinicaltrials.gov. ProQuest Dissertation and Theses was searched for grey literature, and Clinicaltrials.gov was searched for ongoing trials. References lists of relevant articles and reviews were also reviewed for any additional articles relevant to the topic.

A preliminary search on PubMed and Cochrane Library was first performed to identify relevant keywords. Next, a second search of all mentioned databases was conducted with all identified keywords and index terms to retrieve both published studies and grey literature. Lastly, reference lists of relevant studies were screened to identify additional relevant studies. A sample search strategy has been presented (see Supplementary file 1, Table 1).

Eligibility criteria

Population

According to the World Health Organization (2018), preterm refers to infants born before 37 weeks of gestation. This was used as a criterion for the present review. Study samples including parents aged 18 years and above, and/or those with no history of mental illness were included. Parents with preterm infants who are diagnosed with developmental abnormalities, were awaiting surgery, assessed as being unlikely to survive or have passed on during the NICU stay were excluded.

Intervention

Studies that implemented and evaluated psychosocial interventions, including psychological or social components to support parents, were included. The interventions delivered in any setting (e.g., hospitals, outpatient clinics), any formats (e.g., individual, group, computer-based) and administered by different professionals including psychologists and nurses were included.

Comparator

Studies with controls that involve standard care were included in this review.

Outcome variables

Included studies must measure stress, which is our primary outcome. Our secondary outcomes (depression, anxiety, PMTS and social support) need not be measured by all included studies in this review.

Study design

English language studies with randomised controlled trials (RCTs) and clinical controlled trials (CCTs) were included. Non-experimental studies, qualitative studies, reviews, and studies with one-group pre-test or post-test design were excluded.

Study selection

The selection process was guided by the PRISMA flow diagram (Moher et al., 2009). EndNote 20.2 was used to collate the search results and remove duplicates (Clarivate Analytics, 2020). Two reviewers (Blinded) then screened titles and abstracts of retrieved studies independently. Afterwards, full text screening was done by the first reviewer and the second reviewer verified the results (Higgins et al., 2019). Any discrepancies were resolved through discussions.

Table 1
Characteristics of included studies (N = 18).

Author & year (Country)	Research design	Population	Parental age and infant's gestational age (mean ± SD, median – interquartile range/range) or n(%)	Sample size		Intervention details	Outcomes/instruments	ITT
				Intervention group	Control group			
Abdeyazdan et al. (2014) (Iran)	Two-arm CCT	Parents of preterm infants hospitalized in the NICU	I: M - 25.2 ± 4.7 F - 29.6 ± 2.7 P - 31.4 ± 1.8 C: M - 26.5 ± 4.8 F - 30.9 ± 4.9 P - 31.3 ± 2.7	25 couples	25 couples	NICU-based family support intervention in 2 stages: informational + observational phase and support provision <i>Comparator:</i> Standard care <i>Delivered by:</i> Researcher <i>Duration:</i> 1x60min session; 1x2h session	Stress: Parental stressor scale: NICU (PSS:NICU)	Unclear
Al-Maghaireh et al. (2020) (Jordan)	Two-arm RCT	Mothers with infants hospitalized in a level III NICU	I: M - 28.2 ± 6.7 P - 35.8 ± 7.3 C: M - 28.8 ± 6.6 P - 34.9 ± 7.1	25 mothers	25 mothers	NICU-based emotional support program that involves 2 stages: informational and supportive stages <i>Comparator:</i> Standard care <i>Delivered by:</i> First and last authors <i>Duration:</i> 7x95min group sessions	Stress: Stanford Acute Stress Reaction Questionnaire (SASRQ)	NA
Benzies et al. (2020) (Canada)	Two-arm cluster RCT	Mothers of preterm infants admitted into a level II NICU	I: M - 30.7 ± 5.7 C: M - 31.3 ± 5.3	325 mothers	329 mothers	Alberta FiCare™ (NICU-based), a psychoeducational model of care with 3 main components: relational, communication, parent education, and parent support <i>Comparator:</i> Standard care <i>Delivered by:</i> Trained nurses <i>Duration:</i> Infant admission till discharge	Stress: PSS:NICU <i>Depression:</i> Edinburgh Postnatal Depression Scale (EPDS) <i>Anxiety:</i> State-Trait Anxiety Inventory (STAI)	Yes
Castel et al. (2016) (France)	Two-arm RCT	Families with preterm infants from the Neonatology Department of the University Hospital of Caen	I: M - 29.6 ± 5.2 F - 31.4 ± 5.9 P - 31.7 ± 2.7 C: M - 31.2 ± 4.4 F - 33.3 ± 6.2 P - 32.5 ± 2.0	66 parents	64 parents	Community-based triadic parent-infant Relationship Therapy <i>Comparator:</i> Standard care <i>Delivered by:</i> Psychologist <i>Duration:</i> Homevisits twice a month for the first 4 months post-discharge; monthly consultations in neonatology ward from 5 months till 18 months corrected age	Stress: Parenting Stress Index Short Form (PSI-SF) <i>Depression:</i> EPDS <i>PMTS:</i> Perinatal Post-Traumatic Stress Disorder (PTSD) Scale	Unclear
Chen et al. (2019) (Taiwan)	Two-arm CCT	Fathers of preterm infants admitted into Special Care Nursery (SCN)	I: F - 35.8 ± 4.7 P - 33.4 ± 2.2 C: F - 35.3 ± 5.4 P - 33.5 ± 1.8	41 fathers	41 fathers	NICU-based nursing support intervention/early fatherhood intervention program providing support to fathers of preterm infants. <i>Comparator:</i> Standard care <i>Delivered by:</i> Nurses <i>Duration:</i> 6 sessions <i>Follow-up:</i> 1 month	Stress: Parental Stressor Scale: Infant Hospitalisation (PSS: IH) <i>Social support:</i> Paternal support to mother in child-rearing report form	NA
Cho et al. (2013) (Japan)	Two-arm CCT	Mother-infant dyads from three Tokyo hospitals	I: M - 32.9 ± 4.6 C: M - 34.5 ± 3.4	26 dyads	40 dyads	Japanese Infant Mental Health Pro- gram (JIMHP), a supportive inter- vention that is both NICU and community based. <i>Comparator:</i> Standard care <i>Delivered by:</i> Nurses and psychologists <i>Duration:</i> 6 sessions	Stress: Japanese ver- sion of the PSI (JPSI) <i>Depression:</i> Japanese version of the Center for Epidemiologic Studies Depression Scale <i>Social support:</i> Social support scale	No
Choi et al. (2021) (South Korea)	Two-arm CCT	Mothers of premature infants admitted to the NICU	I: M - 32.9 ± 3.7 C: M - 32.1 ± 3.5	17 mothers	21 mothers	NICU-based Rational Emotive Behaviour Therapy-based Emotion Regulation Program. <i>Comparator:</i> No treatment <i>Delivered by:</i> Researcher <i>Duration:</i> 8x70min group sessions in 3–4 weeks	Stress: PSS:NICU <i>Depression:</i> EPDS – Korean version <i>Anxiety:</i> STAI form-Korean YZ (STAI-KYZ) (only state subscale used)	No
Ebadi et al. (2022) (Iran)	Two-arm RCT	Mothers of premature neonates admitted to the NICU	I: M - 29.73 ± 5.30 C: M - 31.62 ± 6.50	30 mothers	30 mothers	Midwife-based Listening Visit (LV) <i>Comparator:</i> No treatment <i>Delivered by:</i> Nurses <i>Duration:</i> 6 counselling sessions held twice a week Supportive educational	Stress: Depression, Anxiety, Stress Scale-21 (DASS-21) <i>Depression:</i> (DASS-21) <i>Anxiety:</i> (DASS-21)	Unclear

(continued on next page)

Table 1 (continued)

Author & year (Country)	Research design	Population	Parental age and infant's gestational age (mean \pm SD, median – interquartile range/range) or n(%)	Sample size		Intervention details	Outcomes/instruments	ITT
				Intervention group	Control group			
Ericson et al. (2018) (Sweden)	Two-arm RCT	Breastfeeding mothers of preterm infants	I: M - 31 \pm 5.3 P - 34(2) C: M - 30 \pm 5.1 P - 34(2)	231 mothers	262 mothers	Community-based proactive telephone support <i>Comparator:</i> Standard care <i>Delivered by:</i> Nurses <i>Duration:</i> Daily telephone calls from day 1–14 post-discharge <i>Follow-up:</i> 8 weeks	<i>Stress:</i> Swedish Parenting Stress Questionnaire (Swedish version of the PSI)	Yes
Fotiou et al. (2016) (Greece)	Two-arm RCT	Parents of preterm infants admitted into the NICU of a tertiary maternity hospital	I: Parents - 34.5 (30.5, 39.5) P - 33.0 (31.0, 35.0) C: Parents - 37.5 (33.0, 41.0) P - 33.0 (32.0, 34.0)	31 parents	28 parents	Relaxation techniques (NICU-based) <i>Comparator:</i> Standard Education <i>Delivered by:</i> First author <i>Duration:</i> 5x90min sessions <i>Follow-up:</i> 3 months	<i>Stress:</i> Perceived Stress Scale (PSS-14) <i>Anxiety:</i> STAI	No
Karimi et al. (2022) (Iran)	Two-arm RCT	Mothers of preterm infants	I: M - 27.43 \pm 7.09 C: M - 27.65 \pm 6.83	40 mothers	40 mothers	Empowerment counselling <i>Comparator:</i> No treatment <i>Delivered by:</i> Researchers <i>Duration:</i> 4 sessions	<i>Stress:</i> PSS	NA
Lee et al., (2013) (Taiwan)	Two-arm CCT	Fathers of preterm infants admitted into the NICU of a medical centre	I: F - 35.9 \pm 6.2 P - 30.8 \pm 2.4 C: F - 36.6 \pm 5.5 P - 29.4 \pm 2.9	34 fathers	35 fathers	Supportive educational NICU-based nursing support intervention/early fatherhood intervention program that provides support to fathers of preterm infants. <i>Comparator:</i> Standard care <i>Delivered by:</i> Nurses <i>Duration:</i> 5 sessions	<i>Stress:</i> PSS: NICU <i>Social support:</i> Nurse-parent support tool (NPST)	NA
Liu et al. (2010) (Taiwan)	Two-arm CCT	Mother or father (not both) with preterm infants expected to discharge from a NICU at a medical centre	I: \leq 30 years: 10 (28.6%) 30–34 years: 14 (40.0%) \geq 35 years: 11 (31.4%) P - 25–28 weeks: 10 (28.6%) 29–32 weeks: 12 (34.3%) 33–36 weeks: 13 (37.1%) C: \leq 30 years: 11 (31.4%) 30–34 years: 13 (37.1%) \geq 35 years: 11 (31.4%) P - 25–28 weeks: 6 (17.1%) 29–32 weeks: 14 (40.0%) 33–36 weeks: 15 (42.9%)	35 parents	35 parents	Community-based empowerment support group – includes key elements such as partnership, awareness, sense of control, self-efficacy, and self-help. <i>Comparator:</i> Standard care <i>Delivered by:</i> Health professionals <i>Duration:</i> 12x2h sessions once every 2 weeks	<i>Stress:</i> PSS <i>Depression:</i> Beck Depression Inventory (BDI)	NA
Månsson et al. (2019) (Sweden)	Two-arm CCT	Parents of preterm infants admitted into a NICU	I: M - 29 \pm 5.2 F - 31 \pm 6.8 P - 33 (28–36) C: M - 30 \pm 5.3 F - 32 \pm 6.2 P - 33 (28–36)	101 parents	130 parents	NICU-based neonatal parent support programme focusing on supportive parent-centered communication <i>Comparator:</i> Standard care <i>Delivered by:</i> Nurses <i>Duration:</i> 4 sessions	<i>Stress:</i> Swedish version of PSS: NICU	No

Table 1 (continued)

Author & year (Country)	Research design	Population	Parental age and infant's gestational age (mean \pm SD, median – interquartile range/range) or n(%)	Sample size		Intervention details	Outcomes/instruments	ITT
				Intervention group	Control group			
Pouyan et al. (2019) (Iran)	Two-arm RCT	Primiparous mothers with neonates admitted to NICU in Kamali Hospital, Alborz	I: M - 25.5 \pm 4.8 C: M - 26.1 \pm 5.4	46 mothers	46 mothers	NICU and community-based interpersonal psychotherapy <i>Comparator:</i> Standard care <i>Delivered by:</i> Researcher <i>Duration:</i> 2x60min sessions, <i>Follow-up:</i> 2 weeks	Stress: PSS: NICU	No
Rajabzadeh et al. (2020) (Iran)	Two-arm CCT	Parents of premature infants admitted to a NICU ward	I: M - 28.3 \pm 6.0 F - 32.5 \pm 5.6 P - 33.2 \pm 1.8 C: M - 31.0 \pm 6.2 F - 34.8 \pm 6.2 P - 32.7 \pm 1.6	80 parents	80 parents	NICU-based family-centred educational-supportive program <i>Comparator:</i> Standard care <i>Delivered by:</i> Researcher <i>Duration:</i> 5x60min sessions	Stress: PSS: NICU	Unclear
Silverstein et al. (2011) (United States)	Two-arm RCT	English or Spanish-speaking mothers of infants \leq 33 weeks gestation, admitted to either of two urban, level III NICUs.	I: M - 26.2 \pm 6.1 P - 28.5 \pm 3.5 C: M - 27.9 \pm 6.9 P - 29.3 \pm 3.2	25 mothers	25 mothers	NICU-based problem-solving education (PSE), a manualized cognitive behavioural prevention intervention <i>Comparator:</i> Standard care <i>Delivered by:</i> Graduate students majoring in relevant fields <i>Duration:</i> 4 sessions weekly or biweekly <i>Follow-up:</i> 6 months	Stress: PSS <i>Depression:</i> Quick Inventory of Depressive Symptoms (QIDS)	No
Zelkowitz, Na, Wang, Bardin, and Papageorgiou (2011) (Canada)	Two-arm RCT	Mothers of VLBW infants admitted into the NICU of 2 tertiary care hospitals	I: M - 31 \pm 5.3 P - 28.0 \pm 2.3 C: M - 30.8 \pm 6.1 P - 27.9 \pm 2.2	60 mothers	61 mothers	NICU and community-based Cues program to educate mothers to recognize signs of their anxiety/distress, learn various strategies to alleviate their distress, and understand their infant's communication cues <i>Comparator:</i> Standard care <i>Delivered by:</i> Nurse and psychologist <i>Duration:</i> 6x60min sessions	Stress: PSS: NICU <i>Depression:</i> EPDS <i>Anxiety:</i> STAI <i>PMTS:</i> Perinatal PTSD questionnaire	No

I = Intervention, C = Control, M = Mothers, F = Fathers, P = Preterm infant, NA = Not applicable, ITT = Intention to treat.

Data extraction

A data extraction form adapted from Cochrane Handbook of Systematic Reviews of Interventions (Higgins et al., 2019) was used to extract important characteristics related to the study's sample, design, measured outcomes, data management and intervention. Data extraction form was pilot tested on five included studies independently by two reviewers. No changes were made in the extraction form. Two reviewers independently continued with the extraction of the rest of the included studies, and any disagreements were resolved through discussions.

Quality appraisal

Included studies were assessed for risk of bias (ROB) using Cochrane's risk of bias tool, which assessed five types of biases in seven domains – random sequence generation (selection bias), allocation concealment (selection bias), blinding of participants and personnel (performance bias), blinding of outcome assessment (detection bias), incomplete outcome data (attrition bias), selective reporting (reporting bias), and other sources of bias (Higgins et al., 2011). Each domain was graded 'low' or 'high' risk depending on the study details. A study was marked with 'unclear' risk when insufficient information was available. Two reviewers conducted the assessment independently, and any discrepancies were resolved through discussions.

The certainty of evidence was also assessed using the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) approach (Xie & Machado, 2021), where evidence was rated as "high", "moderate", "low" or "very low". RCTs were initially rated "high", but the rating was dropped when any of the five factors were compromised: risk of bias of individual studies, inconsistency, directness of evidence, precision of effect estimates and publication bias (Higgins et al., 2019).

Data synthesis

Meta-analysis was performed using the RevMan version 5.4 under the random-effects model. Continuous data were analysed using the inverse variance method and the effect sizes were reported as standardised mean difference (SMD) with 95% confidence intervals (CI). Effect sizes were interpreted based on Cohen's d, where 0.2 represented a small effect size, 0.5 a moderate effect, and 0.8 a large effect (Cohen, 1988).

Heterogeneity was assessed using Cochran's $Q\chi^2$ test and I^2 statistic. Statistically significant heterogeneity was identified when its corresponding p value was <0.10 for the X^2 test. Heterogeneity among studies using I^2 statistic was interpreted as low (0–40%), moderate (30–60%), substantial (50–90%), and considerable (75–100%) (Higgins et al., 2019). Sensitivity analysis was also performed to

identity outliers. Publication bias was assessed using funnel plots. For studies that could not be meta-analysed, narrative synthesis was conducted instead.

Subgroup analysis was conducted on follow-up measurement, gender of the parent, type of professional provider, setting of intervention, geographical distribution and intervention type.

Results

Search outcomes

In total, 3484 studies were retrieved from the eight databases and one from reference list searching. After removing duplicates and articles based on titles and abstracts, the remaining 153 studies were screened. Finally, 18 primary studies were included in this systematic review (Abdeyazdan et al., 2014; Al-Maghaireh et al., 2020; Benzie et al., 2020; Castel et al., 2016; Chen et al., 2019; Cho et al., 2013; Choi et al., 2021; Ebadi et al., 2022; Ericson et al., 2018; Fotiou et al., 2016; Karimi et al., 2022; Lee et al., 2013; Liu et al., 2010; Månsson et al., 2019; Pouyan et al., 2019; Rajabzadeh et al., 2020; Silverstein et al., 2011; Zolkowitz, Feeley, et al., 2011). The PRISMA flow diagram is presented in Fig. 1. All 18 studies were included in the meta-analysis, and two

were narratively synthesised for the depression outcome (Silverstein et al., 2011; Zolkowitz, Feeley, et al., 2011).

Study characteristics

The 18 included studies analysed 2153 parents from 10 different locations: Canada ($n = 2$), France ($n = 1$), Greece ($n = 1$), Iran ($n = 5$), Japan ($n = 1$), Jordan ($n = 1$), South Korea ($n = 1$), Sweden ($n = 2$), Taiwan ($n = 3$) and United States of America ($n = 1$). There were RCTs ($n = 10$) and CCTs ($n = 8$) included in the review. The sample sizes of each study ranged from 41 to 654, and the parents' age ranged from 25 to 37 years old. Gestational ages of preterm infants ranged from 28 to 36 weeks.

The majority of the studies involved only mothers ($n = 10$), six involved both parents and two involved only fathers. Supportive educational elements were present in 13 studies, while five studies involved psychotherapeutic elements (cognitive behavioural therapy, interpersonal psychotherapy, rational emotive behaviour therapy, relaxation therapy and relationship therapy). Most studies were conducted in the NICU ($n = 12$). The other studies were conducted in community or home settings ($n = 3$), or during the transition from NICU to home ($n = 3$). All studies conducted their intervention face-to-face, with the

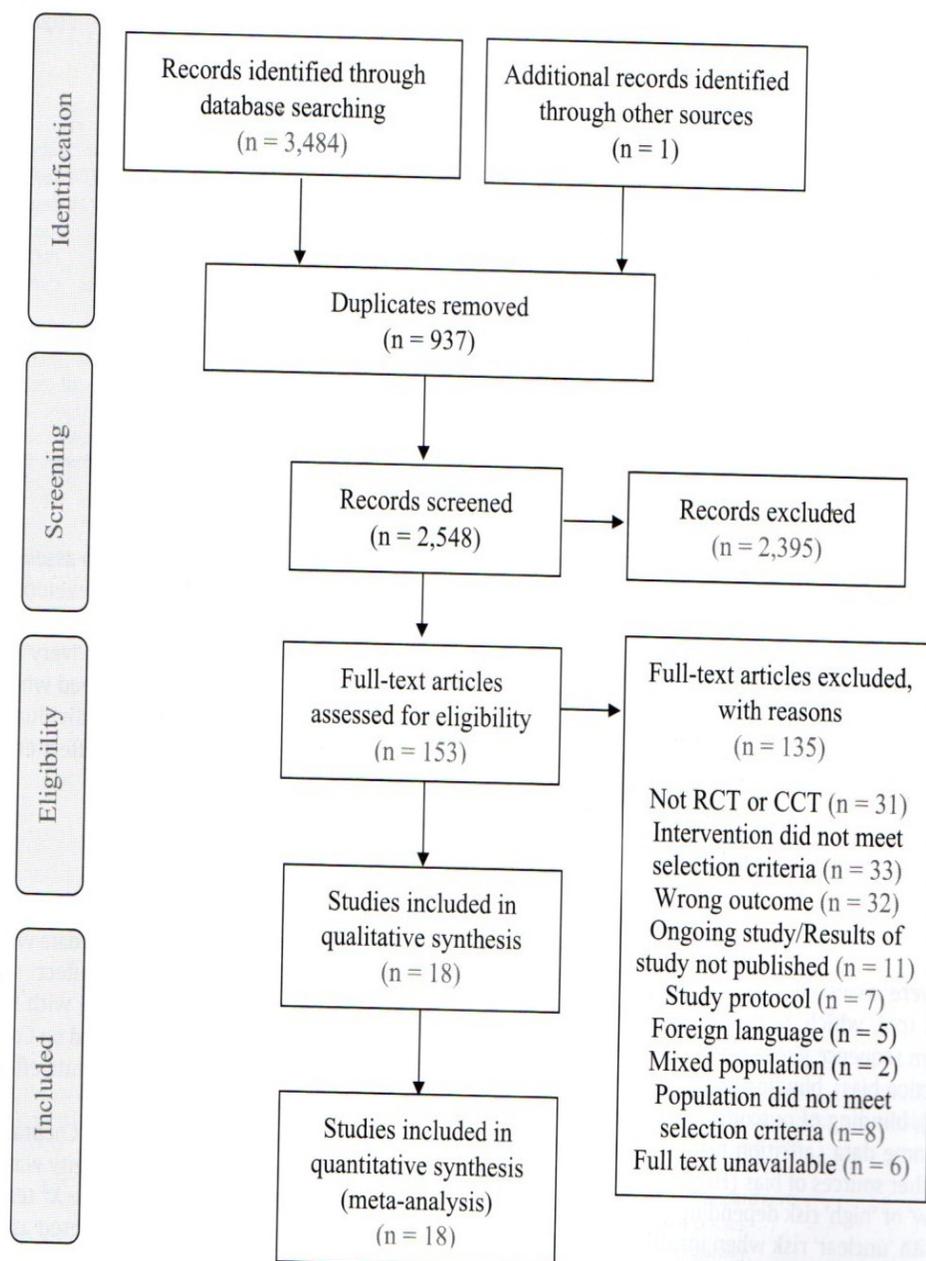


Fig. 1. PRISMA flow diagram.

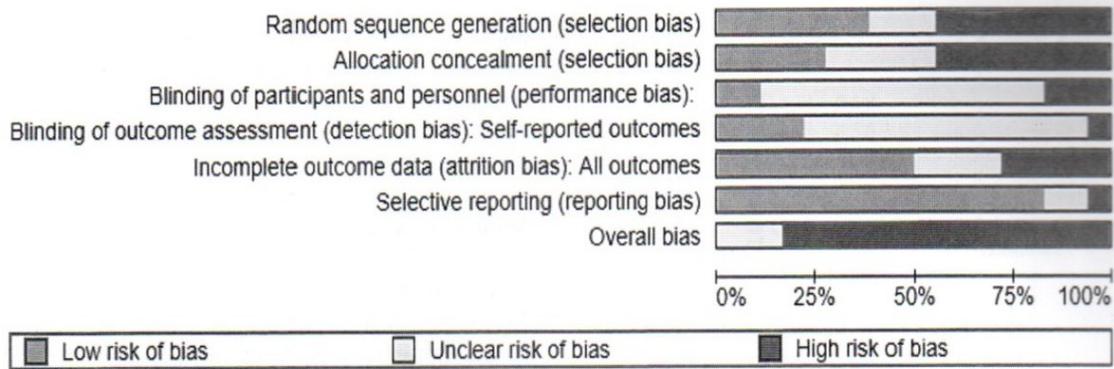


Fig. 2. Risk of bias graph.

exception of one which did so over the phone (Ericson et al., 2018). Details of included studies can be found in Table 1.

Quality appraisal

The Cochrane risk-of-bias tool was used to assess ROB for all included studies (Figs. 2 and 3). Overall, three studies had unclear ROB (Al-Maghairah et al., 2020; Ericson et al., 2018; Karimi et al., 2022), while the rest of the studies had a high ROB in general. The high ROB may be attributed to the high ROB in random sequence allocation and allocation concealment, as randomisation was not conducted in eight of the included studies. Most of the studies were also ranked “unclear” in the domains of blinding procedure and outcome assessment. One study (Pouyan et al., 2019) had high ROB in selective reporting as depression was mentioned as a primary outcome but its results were not reported.

A funnel plot of standard error against SMD was generated for the outcome of stress as the meta-analysis included >10 studies. Visual inspection of the plot revealed no observed pattern of publication bias. According to the GRADE assessment of evidence quality, the overall certainty for stress, depression, anxiety, PMTS, and social support was rated as very low.

Stress

The 18 included studies measuring stress post-intervention were meta-analysed. Results showed that psychosocial interventions significantly decreased stress symptoms with a moderate effect size (SMD: -0.84, 95% CI: -1.16 to -0.52, $Z = 5.09$, $p < 0.001$) and significant substantial statistical heterogeneity ($I^2 = 91%$, $p < 0.001$) (see Fig. 4).

Sensitivity analysis was carried out to investigate heterogeneity, but no outliers were identified. Subgroup analysis was conducted (see Table 2), and statistically significant subgroup differences were found for the type of professional provider ($I^2 = 88.2%$, $p < 0.001$). Heterogeneity was reduced to moderate levels for the nurse subgroup ($I^2 = 60%$, $p = 0.03$) and to low levels for the mixed subgroup ($I^2 = 0%$, $p = 0.50$). A subgroup analysis according to geographical distribution showed statistically significant subgroup differences. The North America and Europe subgroups reported statistically non-significant small effects, while the Asia subgroup reported statistically significant large effects. No significant subgroup differences were found for follow-up measurement, gender of parent, intervention settings, and intervention type ($p \geq 0.05$).

Depression

Meta-analysis was conducted on six studies, which assessed depression among 789 participants. Two studies (Silverstein et al., 2011; Zekowitz, Feeley, et al., 2011) measuring depression were not included in the meta-analysis as the mean and standard deviation could not be retrieved despite contacting the authors. Psychosocial interventions

significantly reduced depression symptoms with a moderate effect size (SMD: -0.67, 95% CI: -1.05 to -0.29, $Z = 3.48$, $p < 0.05$) and statistically significant substantial heterogeneity ($I^2 = 77%$, $p < 0.05$) (see Fig. 5).

Sensitivity analysis did not identify any outliers. Depression was affected by the type of professional provider and heterogeneity was reduced to moderate levels for the mixed subgroup ($I^2 = 43%$, $p = 0.18$) (see Table 2). A subgroup analysis according to geographical distribution showed statistically significant subgroup differences. The North American subgroup had a statistically significant negligible effect, while the Asia and Europe subgroups reported statistically significant moderate effects (see Table 2). Depression was not affected by the gender of the parent, setting of intervention, and intervention type, as subgroup analyses showed statistically insignificant subgroup differences ($p \geq 0.05$). Subgroup analyses for follow-up measurement were not conducted as the five studies assessed depression within one month post-intervention.

Anxiety

Five studies assessed anxiety as an outcome of psychosocial interventions. The meta-analysis showed a statistically significant (small) effect (SMD: -0.35, 95% CI: -0.69 to -0.01, $Z = 2.02$, $p = 0.04$), favouring the intervention group with significant substantial heterogeneity ($I^2 = 69%$, $p = 0.01$). Sensitivity analysis did not identify any outliers. No significant subgroup differences ($p \geq 0.05$) were found for geographical location, follow-up measurement, the gender of the parent, type of professional provider, setting of intervention, and intervention type (see Table 2).

PMTS

Meta-analysis was conducted on two studies assessing PMTS. Results revealed a statistically insignificant effect size (SMD: -0.41, 95% CI: -1.01 to -0.19, $Z = 1.33$, $p = 0.18$) with significant considerable heterogeneity ($I^2 = 77%$, $p = 0.04$). No sensitivity analysis was conducted as there were insufficient studies. Subgroup analysis was conducted (see Table 2), and significant subgroup differences were found for the type of professional provider, setting of intervention, geographical region, and intervention type ($I^2 = 77%$, $p = 0.04$). PMTS was not significantly affected by parent's gender ($p \geq 0.05$). Subgroup analyses were not conducted for follow-up measurement as both studies assessed PMTS within one month post-intervention.

Social support

Social support was assessed in three studies, and a meta-analysis was conducted on these studies. Meta-analysis of social support showed statistically insignificant effect size (SMD: 1.08, 95% CI: -0.21 to 2.37, $Z = 1.64$, $p = 0.10$) with significant considerable heterogeneity ($I^2 = 94%$, $p < 0.001$). Sensitivity analysis did not identify any outliers.

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Self-reported outcomes	Incomplete outcome data (attrition bias)	All outcomes	Selective reporting (reporting bias)	Overall bias
Abdeyazdan et al. 2014	-	-	?	?	?	+	+	-	-
Al-Maghaireh et al. 2020	?	?	?	?	+	+	+	?	?
Benzies et al. 2020	+	?	-	?	+	+	+	-	-
Castel et al. 2016	+	?	?	+	-	+	+	-	-
Chen et al. 2019	-	-	?	?	+	+	+	-	-
Cho et al. 2013	-	-	?	?	-	+	+	-	-
Choi et al. 2021	-	-	?	?	+	+	+	-	-
Ebadi et al. 2022	?	+	-	-	?	?	?	-	-
Ericson et al. 2018	+	+	+	?	+	+	+	?	?
Fotiou et al. 2016	+	?	?	?	-	+	+	-	-
Karimi et al. 2022	?	+	?	+	?	?	?	?	?
Lee et al. 2013	-	-	?	?	+	+	+	-	-
Liu et al. 2010	-	-	-	?	+	+	+	-	-
Månsson et al. 2019	-	-	?	?	+	+	+	-	-
Pouyan et al. 2019	+	?	?	?	+	-	-	-	-
Rajabzadeh et al. 2020	-	-	?	?	?	+	+	-	-
Silverstein et al. 2011	+	+	+	+	-	+	+	-	-
Zelkowitz et al. 2011	+	+	?	+	-	+	+	-	-

Fig. 3. Risk of bias summary.

No significant subgroup differences ($p \geq 0.05$) were found for subgroup analysis based on the gender of the parent, type of professional provider, and setting of intervention (see Table 2). Subgroup analyses of

follow-up were not conducted because all included studies assessed social support within one-month post-intervention. Subgroup analyses according to geographical region and intervention type were not conducted as all three studies conducted supportive educational interventions in Asia.

Narrative synthesis

Two studies, (Zelkowitz, Feeley, et al., 2011) and Silverstein et al. (2011) were narratively synthesised for the depression outcome. Zelkowitz, Feeley, et al. (2011) implemented a six-session Cues program, which was delivered during the infant's stay in the NICU until two to four weeks post-discharge. It focused on recognising and responding to distress in mothers and their infants. The program was not as effective as compared to standard care in reducing depression among mothers. Depression was measured post-intervention by the number of mothers who scored >12 on the Edinburgh Postnatal Depression Scale.

Silverstein et al. (2011) implemented problem-solving education, a manualised cognitive behavioural prevention intervention. Depression was measured using the Quick Inventory of Depressive Symptoms, it was reported that participants in the intervention group were less likely to experience moderately severe depressive symptoms across a six-month follow-up period.

Discussion

This systematic review evaluated the effectiveness of psychosocial interventions on stress, depression, anxiety, PMTS, and social support among parents with preterm infants. Most of the studies were conducted in East Asia and Europe, and the majority of them involved only mothers. Based on the meta-analyses conducted, psychosocial interventions significantly improved stress, depression, and anxiety outcomes in parents with preterm infants. This was consistent with previous literature showing the significant effects of NICU-based interventions among parents with newborns admitted to the NICU (Mendelson et al., 2017; Sabnis et al., 2019). Sabnis et al. (2019) found that NICU-based non-pharmacological interventions reduced stress-related distress significantly, and Mendelson et al. (2017) reported that NICU-based depression and anxiety-reduction interventions had significantly reduced symptoms.

Informational and emotional support were common types of formal support provided to the parents through the interventions conducted in the included studies. Information support educated parents on how they should care for their preterm infant, and this could have enabled them to feel more confident in their parenting abilities (Chen et al., 2019). The emotional support provided by the interventions reduced parental distress by providing a comfortable environment in which parents could share their feelings and troubles with healthcare professionals or other parents (Al-Maghaireh et al., 2020; Månsson et al., 2019). Therefore, the included studies demonstrated that psychosocial interventions have been consistently effective in reducing stress and depression symptoms of parents with preterm infants through providing education and psychological support.

Unique to this review, it was found that while interventions incorporating ways to support parents significantly reduced stress and depression, the results of the meta-analysis on perceived social support by parents remained insignificant. This could be because the majority of the included studies measuring social support used scales that mainly focused on parents' perception of informal support delivered by family members and friends, rather than on the parent's perception of social support delivered by healthcare professionals (Chen et al., 2019; Cho et al., 2013). The studies measuring social support developed interventions that were focused on the parents' individual needs rather than on family dynamics. As such, an insignificant result could be expected, as there was no intervention aimed at improving perceived social support

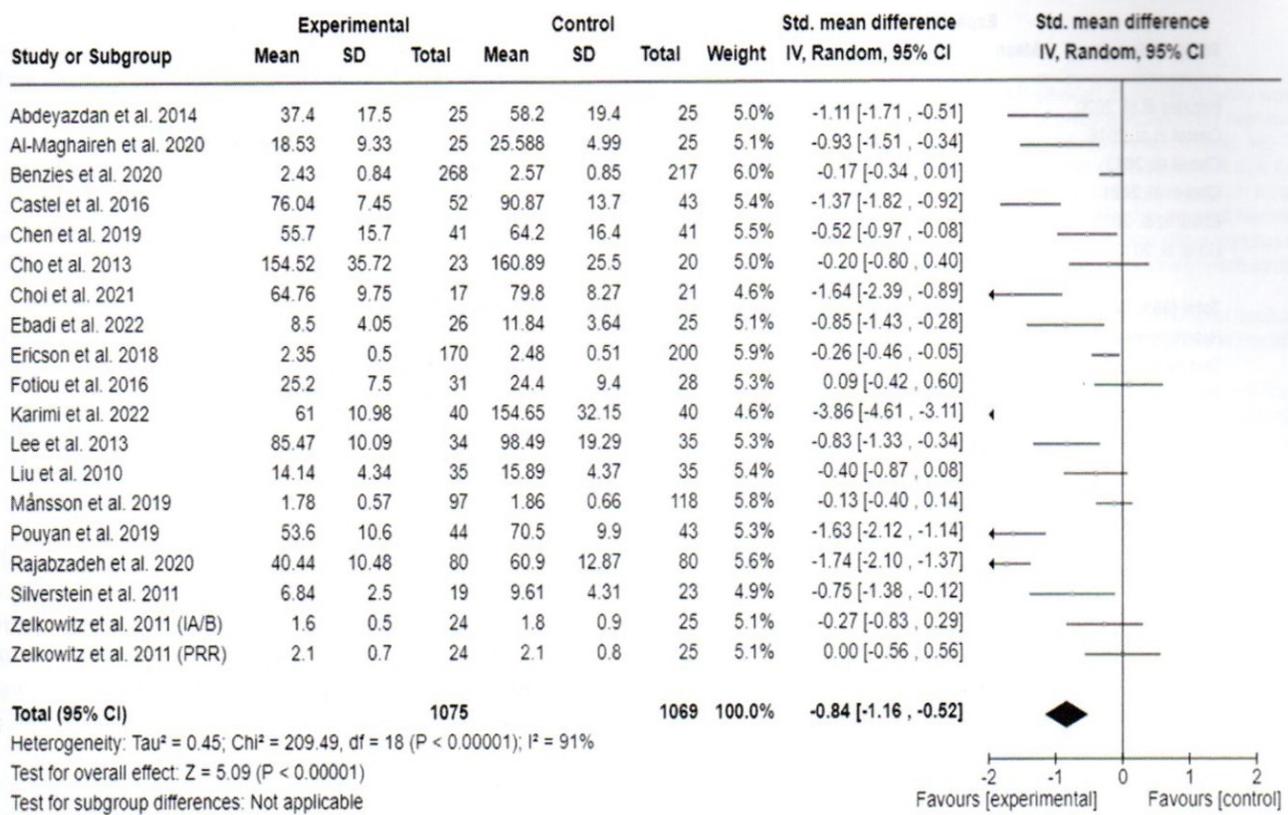


Fig. 4. Forest plot of stress at post-intervention in the 18 included studies.

from family and friends. Future trials should use scales that holistically measure both formal and informal support to evaluate a more complete effect of psychosocial interventions on social support.

The impact of the interventions on anxiety and PMTS was statistically significant, but the effect size was small. Based on the overall findings of the four studies that measured anxiety levels (Benzies et al., 2020; Choi et al., 2021; Fotiou et al., 2016; Zelkowitz, Feeley, et al., 2011), the psychosocial interventions were less effective in reducing parental anxiety. However, the intervention groups in all four studies reported mean anxiety scores that were at least slightly lower than that of the control group. Zelkowitz, Feeley, et al. (2011) explained that the insignificant difference between intervention and control groups may be because both the intervention and standard care were equally effective in reducing anxiety. In the study, both groups of mothers expressed satisfaction with the program they received and felt that it was useful. Several studies have also pointed out that anxiety levels in parents of preterm infants tended to decrease over time and as the infant's condition improves (Pace et al., 2016; Zelkowitz, Feeley, et al., 2011). Overall, due to the small number of studies measuring anxiety and PMTS (only two studies) as outcome variables, it is likely that there was insufficient evidence to demonstrate the effectiveness of psychosocial interventions in reducing anxiety and PMTS levels (Mendelson et al., 2017).

A previous review on psychosocial interventions for fathers with preterm infants highlighted that there were few existing interventions catered solely to the fathers' psychological needs (Ocampo et al., 2021). The lack of studies focusing on only fathers has also been highlighted in other recent reviews (Filippa et al., 2021; Sabnis et al., 2019). Similarly, the present review showed that the majority of the included studies involved either mothers or both parents. This is an issue that is worthy of attention, as fathers have an important role to play in providing support for both mothers and infants. They are often responsible for ensuring the emotional, physical, and financial aspects of the family dynamics (Mackley et al., 2010). Fathers have expressed vulnerability and have similar psychosocial needs as mothers, especially in the postpartum period, hence, they require similar attention and support (2020). The subgroup analysis on the gender of parents showed no significant subgroup differences, indicating that the efficacy of psychosocial interventions may be similar between mothers and fathers. Future research should focus on engaging and supporting fathers more in such psychosocial interventions, to increase paternal involvement across perinatal care.

Results of the subgroup analysis suggest that the type of intervention providers can affect the effectiveness of psychosocial interventions on the psychological outcomes of parents. Psychosocial interventions

Table 2
Results for subgroup analyses across all outcomes.

Outcomes	Subgroups					
	Follow-up	Gender	Professional provider	Setting	Geographical location	Intervention type
Stress	48.8	0	88.2	0	85.0	0
Depression	$p < 0.14$	$p = 0.83$	$p < 0.0001$	$p = 0.53$	$p = 0.001$	$p = 0.46$
Anxiety	0	0	0	0	81.8	0
PMTS	$p = 0.94$	$p = 0.62$	$p = 0.40$	$p = 0.39$	$p = 0.004$	$p = 0.36$
Social support	-	46.8	0	0	58.1	0
		$p = 0.17$	$p = 0.75$	$p = 0.37$	$p = 0.09$	$p = 0.51$
		0	77.2	77.2	77.2	77.2
		$p = 0.66$	$p = 0.04$	$p = 0.04$	$p = 0.04$	$p = 0.04$
		49.1	49.1	49.1	-	-
		$p = 0.16$	$p = 0.16$	$p = 0.16$		

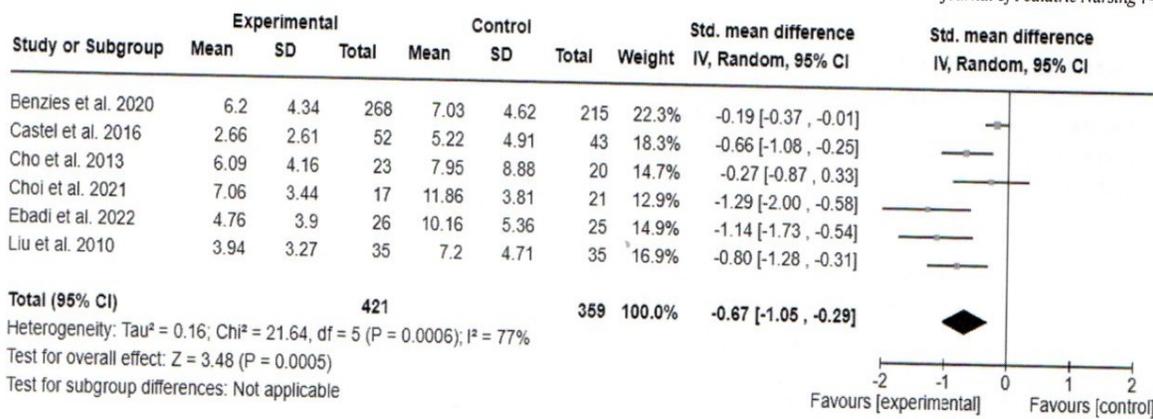


Fig. 5. Forest plot of depression at post-intervention in six included studies.

delivered by trained researchers and psychologists were found to be more effective as compared to nurses. One reason for this could be that nurses have to maintain vigilance over their NICU patients and juggle an immense workload on top of administering the interventions (Hall et al., 2015). This could potentially hamper effective intervention delivery as the additional workload would affect the performance of the nurses due to increased stress as well as the possibility of burnout. Psychologist-led and trained researchers-led interventions may have been more effective because psychologists have the expertise and are more qualified, and the researchers are specifically trained in delivering such interventions. Though not evaluated in this review, interventions delivered by trained peer volunteers have been found to positively enhance maternal mental well-being across perinatal periods (2019; 2019). As existing studies have evaluated these interventions among mothers of healthy infants, such interventions could be explored to support parents of preterm infants. As such, more research is required to examine the influence of the different intervention providers especially complementing nurses with psychologists or other trained individuals to support the findings of the present review.

Psychosocial interventions in home settings were found to be more effective for PMTS compared to those conducted during the period of transition from hospital to home or in the NICU. It is possible that the hectic transitional period involves parents undergoing discharge preparation and requires them to adapt quickly to the changes in the environment (O'Donovan & Nixon, 2019). Parents may thus feel rushed or unprepared to leave the hospital and be fully responsible for their preterm baby, hence resulting in added psychological distress that undermines the effectiveness of the intervention (Aydon et al., 2018). Additionally, most of the interventions included in this review were NICU-based. NICU settings may have triggered flashbacks of the trauma that parents of preterm infants experienced and affected the effectiveness of the intervention (Clotney & Dillard, 2013). However, as there is a limited number of studies measuring PMTS, the reasoning behind this finding is inconclusive. Further research is needed to explore the influence of different intervention settings on the efficacy of psychosocial interventions.

This review's results showed that the interventions conducted in Asia and the Middle East were more effective in reducing parental stress. Greater improvements in parental depression and anxiety levels following interventions were also noted in studies conducted in Asia. Cultural differences can be observed in the type of stressors an individual faces, as well as how they experience these stressors (Gopalkrishnan, 2018). A systematic review by Cuijpers and colleagues (2018) found similar results when comparing the effectiveness of psychotherapies in Western countries with those conducted in non-Western countries. The authors considered the possibility that the mental healthcare sector in many non-Western countries may not be as accessible nor as widely accepted. As such, care-as-usual control groups in these countries usually imply no treatment at all (Cuijpers et al., 2018). On the other hand, care-as-usual in Western countries often implies that patients get access to a range of

treatment options like mental health services (Cuijpers et al., 2018). Therefore, interventions conducted in Asian and Middle Eastern countries may seem to be more effective as they usually do not receive any other treatments. This could be attributed to the general stigmas toward mental illnesses that are more prominent in these cultures, causing individuals to be less inclined to seek mental health services (Au, 2017; Zolezzi et al., 2018).

While there is no statistically significant subgroup difference for intervention type, the effect size for the psychotherapeutic subgroup is larger than the supportive educational subgroup for all outcomes. This suggests that psychotherapeutic interventions could be more effective at improving parents' psychological well-being, as they focus more directly on helping parents identify and change the underlying beliefs and thoughts that may be maladaptive (National Institute of Mental Health, 2023). However, more research is needed to examine the possible explanations for this finding. Similarly, there were no significant differences between different follow-up durations of psychosocial interventions (e.g. up to one month, one to three months, or more than three months) across all outcomes. This may indicate that psychosocial interventions have similar effects on parental stress and anxiety, regardless of the duration of outcome measurement. Similar analysis has not been conducted for psychosocial interventions before, hence future reviews are warranted to validate these findings.

Strengths and limitations

To the best of our knowledge, this is the first systematic review and meta-analysis that evaluated the psychosocial interventions on psychological outcomes of parents with preterm infants. The comprehensive literature search and rigorous nature of the search strategy used aptly identified studies relevant to the topic of the review. Independent judgments of study eligibility and risk of bias were also carried out, hence minimising errors in the study screen and appraisal.

One key limitation of this study was that only English language studies were included, thus there is potential publication bias. High levels of heterogeneity were also present in the included studies despite the use of the random-effects model in meta-analysis. Thus, findings should be interpreted with caution. As not all studies measured the secondary outcomes examined in this review, some meta-analyses and subgroup analyses had only one or two studies, which affects the reliability and validity of the results. Furthermore, the GRADE assessment indicated that the certainty of evidence for all included studies was very low. This indicates that the actual effect size may vary significantly from what was estimated, hence the translation of findings to practice might be limited.

Implications to practice

The findings of this review have shown that psychosocial interventions could be implemented by healthcare providers to support parents

struggling to manage the stressors of having a preterm infant. As healthcare professionals often interact with parents, they are in the prime position to identify any parents suffering from psychological distress. Hence, they can offer psychosocial interventions that incorporate informational and emotional support to parents to promote good parental mental well-being and empower them to better manage the care of their infant.

Additionally, future trials should focus on implementing psychosocial interventions that cater to the needs of fathers, as they are underrepresented in current literature. Future qualitative studies could also be conducted to explore both parent's and healthcare providers' experiences with psychosocial interventions so that relevant enhancements can be proposed. Finally, with the certainty that evidence is rated very low, there is a need for higher-quality studies that involve larger samples and incur lower risk of bias.

Conclusion

This first-of-its-kind systematic review evaluated the effectiveness of psychosocial interventions in either hospital or community settings, on the psychological outcomes of both mothers and fathers with preterm infants. The findings suggested that psychosocial interventions for parents with preterm infants could help reduce stress and depression symptoms. Effective psychosocial interventions often consist of information and emotional support to promote good parental psychological well-being. This review has also found that psychosocial interventions delivered by psychologists and trained researchers were more effective. Future studies can explore nurse-led interventions to identify additional barriers that impede their effectiveness as well as obtain qualitative data from participants to triangulate the findings before making relevant enhancements.

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Author contribution

1. Chan Sian Hui was responsible for retrieving the articles, extracting relevant information and analysing the included articles.
2. Dr. Shefaly Shorey was responsible for the inception of the idea for the review and supervised the review.

Data availability

All the data have been provided via supplementary files. Any further information can be requested from the corresponding author via email upon reasonable request.

Declaration of Competing Interest

The authors of this paper declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pedn.2023.10.028>.

References

- Abdeyazdan, Z., Shahkolahi, Z., Mehrabi, T., & Hajjheidari, M. (2014). A family support intervention to reduce stress among parents of preterm infants in the neonatal intensive care unit. *Iranian Journal of Nursing and Midwifery Research*, 19(4), 349–353.
- Al-Maghaireh, D. A. F., Khalaf, I. A., Abdullah, K. L., Chan, C. M., Basyoun, N. R., & Kawafha, M. M. (2020). The effect of an emotional support training program on acute stress disorder among mothers of preterm infants hospitalized in neonatal intensive care units. *Journal of Neonatal Nursing*, 26(5), 273–277. <http://libproxy1.nus.edu.sg/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=145696878&site=ehost-live>.
- Au, A. (2017). Low mental health treatment participation and Confucianist familial norms among east Asian immigrants: A critical review. *International Journal of Mental Health*, 46(1), 1–17. <https://doi.org/10.1080/00207411.2016.1264036>.
- Aydon, L., Hauck, Y., Murdoch, J., Siu, D., & Sharp, M. (2018). Transition from hospital to home: Parents' perception of their preparation and readiness for discharge with their preterm infant. *Journal of Clinical Nursing*, 27(1–2), 269–277. <https://doi.org/10.1111/jocn.13883>.
- Barbui, C., Purgato, M., Abdulmalik, J., Acarturk, C., Eaton, J., Gastaldon, C., ... Thornicroft, G. (2020). Efficacy of psychosocial interventions for mental health outcomes in low-income and middle-income countries: An umbrella review. *The Lancet Psychiatry*, 7(2), 162–172. [https://doi.org/10.1016/S2215-0366\(19\)30511-5](https://doi.org/10.1016/S2215-0366(19)30511-5).
- Behrman, R. E., & Butler, A. S. (2007). *Mortality and acute complications in preterm infants. Preterm birth: Causes, consequences, and prevention*. National Academies Press (US).
- Benzie, K. M., Aziz, K., Shah, V., Faris, P., Isaranuwatthai, W., Scotland, J., ... Lodha, A. (2020). Effectiveness of Alberta family integrated care on infant length of stay in level II neonatal intensive care units: a cluster randomized controlled trial. *BMC Pediatrics*, 20(1), 535.
- Boykova, M., & Kenner, C. (2012). Transition from hospital to home for parents of preterm infants. *The Journal of Perinatal & Neonatal Nursing*, 26(1), 81–87. <https://doi.org/10.1097/JPN.0b013e318243e948>.
- Castel, S., Creveuil, C., Beunard, A., Blaizot, X., Proia, N., & Guillois, B. (2016). Effects of an intervention program on maternal and paternal parenting stress after preterm birth: A randomized trial. *Early Human Development*, 103, 17–25.
- Chen, Y. L., Lee, T. Y., Gau, M. L., & Lin, K. C. (2019). The effectiveness of an intervention program for fathers of hospitalized preterm infants on paternal support and attachment 1 month after discharge. *The Journal of Perinatal & Neonatal Nursing*, 33(2), 160–169.
- Cho, Y., Hirose, T., Tomita, N., Shirakawa, S., Murase, K., & Komoto, K. (2013). Infant mental health intervention for preterm infants in Japan: Promotions of maternal mental health, mother-infant interactions, and social support by providing continuous home visits until the corrected infant age of 12 months. *Infant Mental Health Journal*, 34(1), 47–59. <https://doi.org/10.1002/central/CN-00853172/full>.
- Choi, H. S., Lee, K. E., & Shin, Y. (2021). Effects of an emotional regulation program on maladaptive cognitive emotion regulation, stress, anxiety, and postpartum depression among south Korean mothers of premature infants in the neonatal intensive care unit. *Child Health Nursing Research*, 27(1), 24–33. <http://libproxy1.nus.edu.sg/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=148865593&site=ehost-live>.
- Clarivate Analytics (2020). *EndNote*, 20 (In Clarivate).
- Clotey, M., & Dillard, D. M. (2013). Post-traumatic stress disorder and neonatal intensive care. *International Journal of Childbirth Education*, 28(3), 23.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- Cuijpers, P., Karyotaki, E., Reijnders, M., Purgato, M., & Barbui, C. (2018). Psychotherapies for depression in low- and middle-income countries: a meta-analysis. *World Psychiatry*, 17(1), 90–101. <https://doi.org/10.1002/wps.20493>.
- Davis, L., Edwards, H., Mohay, H., & Wollin, J. (2003). The impact of very premature birth on the psychological health of mothers. *Early Human Development*, 73(1), 61–70. [https://doi.org/10.1016/S0378-3782\(03\)00073-2](https://doi.org/10.1016/S0378-3782(03)00073-2).
- Davis-Strauss, S. L., Johnson, E., & Lubbe, W. (2021). Information and support needs of parents with premature infants: An integrative review. *Journal of Early Intervention*, 43(3), 199–220. <https://doi.org/10.1177/1053815120957734>.
- Ebadi, N., Attarha, M., & Nokani, M. (2022). The effect of midwife-based listening visit on stress, anxiety, and depression among mothers of premature infants in the neonatal intensive care unit: Randomized clinical trial study. *Iranian Journal of Nursing and Midwifery Research*, 27(6), 581–586. https://doi.org/10.4103/ijnmr.ijnmr_344_21.
- Ericson, J., Eriksson, M., Hellström-Westas, L., Hoddinott, P., & Flacking, R. (2018). Proactive telephone support provided to breastfeeding mothers of preterm infants after discharge: a randomised controlled trial. *Acta Paediatrica*, 107(5), 791–798.
- Filippa, M., Saliba, S., Esseily, R., Gratier, M., Grandjean, D., & Kuhn, P. (2021). Systematic review shows the benefits of involving the fathers of preterm infants in early interventions in neonatal intensive care units. *Acta Paediatrica (Oslo, Norway: 1992)*, 110(9), 2509–2520. <https://doi.org/10.1111/apa.15961>.
- Fotiou, C., Vlastarakos, P. V., Bakoula, C., Papagaroufalas, K., Bakoyannis, G., Darviri, C., & Chrousos, G. (2016). Parental stress management using relaxation techniques in a neonatal intensive care unit: A randomised controlled trial. *Intensive & Critical Care Nursing*, 32, 20–28.
- Gopalkrishnan, N. (2018). Cultural diversity and mental health: Considerations for policy and practice. *Frontiers in Public Health*, 6, 179. <https://doi.org/10.3389/fpubh.2018.00179>.

- Hall, S. L., Cross, J., Selix, N. W., Patterson, C., Segre, L., Chuffo-Siewert, R., ... Martin, M. L. (2015). Recommendations for enhancing psychosocial support of NICU parents through staff education and support. *Journal of perinatology: official journal of the California Perinatal Association*, 35(Suppl. 1), S29–S36. <https://doi.org/10.1038/jp.2015.147>.
- Higgins, J.P.T., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M.J., & Welch, V.A. (Eds.). (2019). *Cochrane Handbook for Systematic Reviews of Interventions* (2nd Edition). Chichester (UK: John Wiley & Sons).
- Higgins, J.P.T., Altman, D.G., Gøtzsche, P.C., Jüni, P., Moher, D., Oxman, A.D., ... Sterne, J.A.C. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ*, 343, Article d5928. <https://doi.org/10.1136/bmj.d5928>.
- Higgins, J.P.T., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M., & Welch, V. (2019). *Cochrane handbook for systematic reviews of interventions* (2nd ed.). Wiley-Blackwell.
- Ionio, C., Colombo, C., Brazzoduro, V., Mascheroni, E., Confalonieri, E., Castoldi, F., & Lista, G. (2016). Mothers and fathers in NICU: The impact of preterm birth on parental distress. *Europe's Journal of Psychology*, 12(4), 604–621. <https://doi.org/10.5964/ejop.v12i4.1093>.
- Jones, L., Rowe, J., & Becker, T. (2009). Appraisal, coping, and social support as predictors of psychological distress and parenting efficacy in parents of premature infants. *Children's Health Care*, 38(4), 245–262. <https://doi.org/10.1080/02739610903235976>.
- Kara, S., Tan, S., Aldemir, S., Yilmaz, A., Tatli, M., & Dilmen, U. (2013). Investigation of perceived social support in mothers of infants hospitalized in neonatal intensive care unit. *Hippokratia*, 17(2), 130–135. <https://pubmed.ncbi.nlm.nih.gov/24376317>. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3743616/>.
- Karimi, M., Bakht, R., Tapak, L., Refaei, M., & Basiri, B. (2022). The effect of empowerment counseling on stress and self-esteem of mothers with hospitalized premature infants. *Journal of Reproductive and Infant Psychology*, 1–12. <https://doi.org/10.1080/02646838.2022.2081674>.
- Kong, L.-P., Cui, Y., Qiu, Y.-F., Han, S.-P., Yu, Z.-B., & Guo, X.-R. (2013). Anxiety and depression in parents of sick neonates: a hospital-based study. *Journal of Clinical Nursing*, 22(7–8), 1163–1172. <https://doi.org/10.1111/jocn.12090>.
- Leahy-Warren, P., Coleman, C., Bradley, R., & Mulcahy, H. (2020). The experiences of mothers with preterm infants within the first-year post discharge from NICU: Social support, attachment and level of depressive symptoms. *BMC Pregnancy and Childbirth*, 20(1). <https://doi.org/10.1186/s12884-020-02956-2>.
- Lee, J. Y., Lee, J. H., Yeon, G. M., & Jung, Y. J. (2019). Parental anxiety regarding premature infants and factors affecting parental concern. *Journal for Specialists in Pediatric Nursing*, 24(4), Article e12266. <https://doi.org/10.1111/jspn.12266>.
- Lee, T., Wang, M., Lin, K., & Kao, C. (2013). The effectiveness of early intervention on paternal stress for fathers of premature infants admitted to a neonatal intensive care unit (Vol. 69). <https://pubmed.ncbi.nlm.nih.gov/22813358/>.
- Liu, C. H., Chao, Y. H., Huang, C. M., Wei, F. C., & Chien, L. Y. (2010). Effectiveness of applying empowerment strategies when establishing a support group for parents of preterm infants. *Journal of Clinical Nursing*, 19(11), 1729–1737.
- Mackley, A. B., Locke, R. G., Spear, M. L., & Joseph, R. (2010). Forgotten parent: NICU paternal emotional response. *Advances in Neonatal Care*, 10(4). https://journals.lww.com/advancesinneonatalcare/Fulltext/2010/08000/Forgotten_Parent__NICU_Paternal_Emotional_Response.10.aspx.
- Månsson, C., Sivberg, B., Selander, B., & Lundqvist, P. (2019). The impact of an individualised neonatal parent support programme on parental stress: a quasi-experimental study. *Scandinavian Journal of Caring Sciences*, 33(3), 677–687.
- Mendelson, T., Cluxton-Keller, F., Vullo, G. C., Tandon, S. D., & Noazin, S. (2017). NICU-based interventions to reduce maternal depressive and anxiety symptoms: A Meta-analysis. *Pediatrics*, 139(3). <https://doi.org/10.1542/peds.2016-1870>.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The, P. G. (2009). Preferred reporting items for systematic reviews and Meta-analyses: The PRISMA statement. *PLoS Medicine*, 6(7), Article e1000097. <https://doi.org/10.1371/journal.pmed.1000097>.
- National Institute of Mental Health (2023). Psychotherapies. Retrieved 4 April 2023 from <https://www.nimh.nih.gov/health/topics/psychotherapies>.
- Ocampo, M. J., Tinero, J. A., & Rojas-Ashe, E. E. (2021). Psychosocial interventions and support programs for fathers of NICU infants – A comprehensive review. *Early Human Development*, 154, Article 105280. <https://doi.org/10.1016/j.earlhumdev.2020.105280>.
- O'Donovan, A., & Nixon, E. (2019). "Weathering the storm:" Mothers' and fathers' experiences of parenting a preterm infant [doi:10.1002/imhj.21788]. *Infant Mental Health Journal*, 40(4), 573–587. <https://doi.org/10.1002/imhj.21788>.
- Osorio Galeano, S. P., Ochoa Marín, S. C., & Semenic, S. (2017). Preparing for post-discharge care of premature infants: Experiences of parents. *Investigación y Educación en Enfermería*, 35(1). <https://doi.org/10.17533/udea.iee.v35n1a12>.
- Pace, C. C., Spittle, A. J., Molesworth, C. M. -L., Lee, K. J., Northam, E. A., Cheong, J. L. Y., ... Anderson, P. J. (2016). Evolution of depression and anxiety symptoms in parents of very preterm infants during the newborn period. *JAMA Pediatrics*, 170(9), 863–870. <https://doi.org/10.1001/jamapediatrics.2016.0810>.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, Article n71. <https://doi.org/10.1136/bmj.n71>.
- Pierrehumbert, B., Nicole, A., Muller-Nix, C., Forcada-Guex, M., & Ansermet, F. (2003). Parental post-traumatic reactions after premature birth: Implications for sleeping and eating problems in the infant. *Archives of Disease in Childhood. Fetal and Neonatal Edition*, 88(5), F400–F404. <https://doi.org/10.1136/fn.88.5.f400>.
- Pouyan, F., Kamrani, M. A., Rahimzadeh, M., Jamshidimanesh, M., & Esmaelzadeh-Saeieh, S. (2019). Effect of interpersonal psychotherapy oriented child birth education on stress and role adaptation in mothers with premature birth: A randomized clinical trial. *Iranian Journal of Psychiatry and Behavioral Sciences*, 13(1). <https://www.embase.com/search/results?subaction=viewrecord&id=L628532270&from=export>. <https://doi.org/10.5812/ijpbs.86645>.
- Puthussery, S., Chutiyami, M., Tseng, P.-C., Kilby, L., & Kapadia, J. (2018). Effectiveness of early intervention programs for parents of preterm infants: a meta-review of systematic reviews. *BMC Pediatrics*, 18(1), 223. <https://doi.org/10.1186/s12887-018-1205-9>.
- Rajabzadeh, Z., Moudi, Z., Abbasi, A., & Aliabad, G. M. (2020). The effect of family-centered educational supportive intervention on parental stress of premature infants hospitalized in the NICU. *Medical-Surgical Nursing Journal*, 9(3), 1–7. <http://libproxy1.nus.edu.sg/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=AN=148169955&site=ehost-live>.
- Ravn, I. H., Lindemann, R., Smeby, N. A., Bunch, E. H., Sandvik, L., & Smith, L. (2012). Stress in fathers of moderately and late preterm infants: a randomised controlled trial. *Early Child Development and Care*, 182(5), 537–552. <https://doi.org/10.1080/03004430.2011.564279>.
- Russell, G., Sawyer, A., Rabe, H., Abbott, J., Gyte, G., Duley, L., & Ayers, S. (2014). Parents' views on care of their very premature babies in neonatal intensive care units: a qualitative study. *BMC Pediatrics*, 14(1), 230. <https://doi.org/10.1186/1471-2431-14-230>.
- Sabnis, A., Fojo, S., Nayak, S. S., Lopez, E., Tarn, D. M., & Zeltzer, L. (2019). Reducing parental trauma and stress in neonatal intensive care: Systematic review and meta-analysis of hospital interventions. *Journal of perinatology: official journal of the California Perinatal Association*, 39(3), 375–386. <https://doi.org/10.1038/s41372-018-0310-9>.
- Seiiedi-Biarag, L., Mirghafourvand, M., & Ghanbari-Homayi, S. (2020). The effect of cognitive-behavioral therapy on psychological distress in the mothers of preterm infants: a systematic review and meta-analysis. *Journal of Psychosomatic Obstetrics and Gynecology*, 41(3), 167–176. <https://doi.org/10.1080/0167482X.2019.1678019>.
- Shaw, R. J., Bernard, R. S., DeBlois, T., Ikuta, L. M., Ginzburg, K., & Koopman, C. (2009). The relationship between acute stress disorder and posttraumatic stress disorder in the neonatal intensive care unit. *Psychosomatics*, 50(2), 131–137. <https://doi.org/10.1176/appi.psy.50.2.131>.
- Shea, T., Athanasakos, E., Cleeve, S., Croft, N., & Gibbs, D. (2021). Pediatric Medical Traumatic Stress. *The Journal of Child Life: Psychosocial Theory and Practice*, 2(1), 42–54. <https://doi.org/10.55591/001c.22525>.
- Silverstein, M., Feinberg, E., Cabral, H., Sauder, S., Egbert, L., Schainker, E., ... Beardslee, W. (2011). Problem-solving education to prevent depression among low-income mothers of preterm infants: a randomized controlled pilot trial. *Archives of Women's Mental Health*, 14(4), 317–324.
- World Health Organization (2018). Preterm birth. <https://www.who.int/news-room/fact-sheets/detail/preterm-birth>.
- Xie, C. X., & Machado, G. C. (2021). Clinimetrics: Grading of recommendations, assessment, development and evaluation (GRADE). *Journal of Physiotherapy*, 67(1), 66. <https://doi.org/10.1016/j.jphys.2020.07.003>.
- Yu, X., Zhang, J., & Yuan, L. (2020). Chinese Parents' lived experiences of having preterm infants in NICU: A qualitative study. *Journal of Pediatric Nursing*, 50, e48–e54. <https://doi.org/10.1016/j.pedn.2019.11.002>.
- Zelkowitz, P., Feeley, N., Shrier, I., Stremler, R., Westreich, R., Dunkley, D., ... Papageorgiou, A. (2011). The cues and care randomized controlled trial of a neonatal intensive care unit intervention: Effects on maternal psychological distress and mother-infant interaction. *Journal of Developmental and Behavioral Pediatrics*, 32(8), 591–599. <https://doi.org/10.1097/DBP.0b013e318227b3dc>.
- Zelkowitz, P., Na, S., Wang, T., Bardin, C., & Papageorgiou, A. (2011). Early maternal anxiety predicts cognitive and behavioural outcomes of VLBW children at 24 months corrected age [doi:10.1111/j.1651-2227.2010.02128.x]. *Acta Paediatrica*, 100(5), 700–704. <https://doi.org/10.1111/j.1651-2227.2010.02128.x>.
- Zhang, Q., Wu, J., Sheng, X., & Ni, Z. (2021). Empowerment programs for parental mental health of preterm infants: A meta-analysis. *Patient Education and Counseling*, 104(7), 1636–1643. <https://doi.org/10.1016/j.pec.2021.01.021>.
- Zolezzi, M., Alamri, M., Shaar, S., & Rainkie, D. (2018). Stigma associated with mental illness and its treatment in the Arab culture: A systematic review. *International Journal of Social Psychiatry*, 64(6), 597–609. <https://doi.org/10.1177/0020764018789200>.