

Effect of Mindfulness Kangaroo Care on Maternal Mental Health and Preterm Infants: A Scoping Review

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Conflicts of interest - The authors declare that there are no known conflicts of interest associated with this publication. Each author affirms that they have no financial, personal, or professional relationships that could be perceived to influence the content, methodology, or outcomes of this review. The research was conducted independently and without any commercial or institutional influence that could lead to bias. No grants, honorary, or other forms of compensation were received from any organisations or individuals in connection with the preparation of this Scoping Review. All authors contributed based on their academic and research expertise and had full access to all stages of the review process, from design to data extraction and analysis. Transparency, academic integrity, and objectivity were maintained throughout the review process. Additionally, the authors confirm that there are no affiliations or involvements that could be construed as a potential conflict of interest related to the institutions, organisations, or products discussed in this review. This statement aligns with the ethical standards and publication guidelines required for scholarly work and reflects the authors' collective commitment to uphold unbiased, evidence-based scoping review.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 1 August 2025 and was last updated on 1 August 2025.

INTRODUCTION

Review question / Objective Review Question - In the current scoping review the question for the review was formulated following the elements of PCC (Population, Comparison, Context) "Among the mothers of preterm infants, what is the available evidence regarding the effect of Mindfulness Kangaroo Care on maternal mental health and preterm infant outcomes?"

Review Objectives - To systematically identify and map the existing evidence on the effects of

Mindfulness Kangaroo Care on maternal mental health and preterm infants.

Background The Neonatal Intensive Care Unit (NICU) is a specialized environment designed to care for preterm infants and neonates with complex medical conditions such as birth asphyxia, respiratory distress syndrome, and low birth weight (Nazari et al., 2020; Suarez et al., 2022). Preterm neonates those born before 32 weeks often require prolonged NICU stays due to feeding, breathing, and neurological challenges (Muir et al., 2022). The primary objective of the

NICU is to stabilize vital functions so that infants can feed, breathe, and regulate temperature before discharge (Chifa et al., 2021).

Globally, about 15 million preterm births occur annually, with complications from prematurity accounting for a high proportion of neonatal deaths (Cai et al., 2022). In 2019 alone, 5.3 million children under five died, with prematurity as the leading cause (Dargahyan et al., 2023). In both high- and low-income countries, NICU admissions are common: 10% in the U.S., 24% in France, and 60,000 annual premature births in the UK (Williams et al., 2018; Boukakiou et al., 2019). Asia and Sub-Saharan Africa represent over 80% of global preterm births (Eduku et al., 2024). In Pakistan, the preterm birth rate reaches 18.9%, with nearly 900,000 preterm births annually and a neonatal mortality rate of 42 per 1,000 live births (Lalani et al., 2021; Rehman et al., 2020).

Preterm birth and NICU admissions significantly impact maternal mental health. Mothers of preterm infants are at increased risk of postpartum depression, anxiety, and post-traumatic stress disorder (Seiiedi-Biarag et al., 2021). Studies report that 39%–63% of NICU mothers experience depression, and 15% experience PTSD (Williams et al., 2018; Gorsky et al., 2023). One study reported suicidal ideation in up to 33% of mothers with NICU-admitted infants (Helmer et al., 2020). Mental health issues in mothers can negatively affect maternal-infant bonding and infant development. Therefore, psychosocial support in NICUs is crucial for both maternal well-being and infant outcomes (Fratantoni et al., 2022; Eduku et al., 2024).

Mindfulness-Based Interventions (MBIs) offer a promising approach to improving maternal mental health. Rooted in Eastern contemplative traditions and popularized by Jon Kabat-Zinn, mindfulness is defined as intentionally paying attention to the present moment without judgment (Kabat-Zinn, 2023). MBIs have demonstrated effectiveness in reducing anxiety, depression, and stress while fostering emotional regulation and self-compassion (Sharma & Rush, 2014; Ginsberg et al., 2023). In NICU settings, mindfulness can help mothers manage uncertainty, reduce guilt, and promote a healthier response to the emotional toll of preterm birth (Grieb et al., 2023).

Kangaroo Mother Care (KMC) is another well-established intervention involving skin-to-skin contact between mother and infant. It has been shown to stabilize vital signs, improve thermoregulation, support breastfeeding, and

reduce maternal stress (Ariff et al., 2021; Siddiqui et al., 2020). In Pakistan, KMC has led to better weight gain and shorter hospital stays for preterm infants (Wasim et al., 2024; Jamil et al., 2021). KMC also has documented psychological benefits, improving maternal confidence and emotional well-being (Landry et al., 2022).

Emerging studies highlight the synergistic potential of combining mindfulness with KMC, known as Mindful Kangaroo Care (MKC). This dual intervention integrates physical bonding with emotional resilience strategies. MKC has shown feasibility and effectiveness in improving maternal mindfulness, reducing anxiety and depression, and enhancing neonatal outcomes such as weight gain and breastfeeding success (Landry et al., 2022; Ouyang et al., 2024).

Despite promising findings, MKC remains underexplored in low-resource settings like Pakistan, where the burden of preterm births and maternal psychological distress is high. Therefore, this scoping review aims to explore the integration of mindfulness with Kangaroo Care to evaluate its effectiveness on maternal mental health and preterm infant outcomes, addressing a critical gap in the.

Rationale Preterm birth remains a pressing global health challenge, with approximately 15 million premature births annually and a disproportionately high burden in low- and middle-income countries (LMICs), especially in South Asia (Cai et al., 2022; Farrokhian et al., 2023). Pakistan, in particular, records a preterm birth rate of 18.9%, which exceeds that of neighboring countries such as India and Bangladesh (Lalani et al., 2021). The resulting neonatal mortality rate in Pakistan stands at 42 per 1,000 live births, with prematurity accounting for a significant proportion of these deaths (Gulshan et al., 2023; Rehman et al., 2020). The majority of these neonates require admission to Neonatal Intensive Care Units (NICUs) where they are stabilized before discharge (Chifa et al., 2021; Seiiedi-Biarag et al., 2021).

While NICU interventions have improved neonatal survival, the psychosocial impact on parents—particularly mothers—has received limited attention. Mothers of preterm infants frequently experience elevated levels of stress, postpartum depression, anxiety, and even post-traumatic stress disorder (Seiiedi-Biarag et al., 2021; Williams et al., 2018). Literature suggests that up to 51% of NICU parents report significant stress, with 30% experiencing persistent mental health challenges beyond the first year of birth (Landry et

al., 2022; Fratantoni et al., 2022). Suicidal ideation among NICU mothers has also been reported in up to 33% of cases (Helmer et al., 2020; Segre et al., 2022). These outcomes underscore the urgent need for psychological support interventions tailored for NICU environments.

Kangaroo Mother Care (KMC), a low-cost intervention has demonstrated physiological and psychological benefits for both mothers and neonates. It has shown efficacy in reducing maternal anxiety and depression while improving neonatal outcomes such as weight gain and vital sign stability (Wasim et al., 2024; Siddiqui et al., 2020). Likewise, mindfulness-based interventions (MBIs) have proven effective in managing psychological distress by promoting emotional regulation, reducing anxiety and depression, and enhancing maternal resilience (Ginsberg et al., 2023; Grieb et al., 2023). However, the integration of mindfulness into KMC practices, known as Mindful Kangaroo Care (MKC), is a relatively new and underexplored approach.

Preliminary studies have highlighted the potential of MKC in reducing maternal stress, enhancing mindful awareness, and improving infant feeding and growth outcomes (Landry et al., 2022; Ouyang et al., 2024). Yet, most of this evidence originates from high-income countries, with limited research in LMICs like Pakistan where maternal mental health support is minimal, and cultural or structural barriers may impede intervention adoption.

Given the dual burden of high preterm birth rates and inadequate maternal mental health services in Pakistan, there is a critical need to map existing evidence on MKC. This scoping review is therefore justified to systematically explore the available literature on the integration of mindfulness with Kangaroo Care and its effects on maternal mental health and neonatal outcomes. The findings can guide future research and inform culturally appropriate, scalable interventions in resource-limited NICU settings.

METHODS

Strategy of data synthesis The search strategy for this scoping review was developed by the primary author with the collaboration of the secondary author. An initial search was conducted on mutually selected Databases including PubMed, Research 4 Life, and Ebsco using the keywords “Neonate”, “Maternal Health”, “Mindfulness”, “Kangaroo Mother Care” and “Neonatal Intensive Care Units”. The Boolean operators (AND, OR, and NOT) were used for

reducing the data and bringing it more specific to the concerned topic. The second search was conducted to collect more specific and relevant studies on the topic and it was performed on Google Scholar with the same strategy that was used in the first search. The data was restricted to 2019 onwards for extracting the more recent articles for the final review. A total of 6 articles from the three databases were included in the scoping review. The brief overview is mentioned in Figure 1 PRISMA-ScR

Evidence Screening and Selection Process

All primary studies reported on Kangaroo Mother Care and Mindfulness on maternal mental health and preterm infant outcomes. The duration of the studies was restricted to last 5 years from 2019 onward except for information from newspapers, literary magazines, web zines, and conference abstracts. Studies that were reported in a language other than English were excluded. Research other than focus on mothers and neonatal outcomes was excluded from the study.

Study Selection Process

The selection of the final studies for the review retrieved from the databases was carried out via a filtering process following PRISMA-ScR protocols and was performed in four phases: (i) Phase-I identification phase, where search queries were applied to the databases followed by the removal of duplicates; (ii) Phase-II screening phase, where titles and abstracts of articles were screened to exclude irrelevant articles; (iii) Phase-III eligibility phase, where the full-texts of articles were read to assess their relevancy to this study; and (iv) Phase-IV included study phase, where the final studies were highlighted to be reviewed. The second and third phases were conducted autonomously by two reviewers for accurate relevancy. If there was any disagreement among the reviewers, a third reviewer formally known in the review as a tiebreaker was consulted to assist in the decision-making of inclusion or exclusion of the study.

Eligibility criteria

Evidence Screening and Selection Process

All primary studies reported on Kangaroo Mother Care and Mindfulness on maternal mental health and preterm infant outcomes. The duration of the studies was restricted to last 5 years from 2019 onward except for information from newspapers, literary magazines, webzines, and conference abstracts. Studies that were reported in a language other than English were excluded. Research other than focus on mothers and neonatal outcomes was excluded from the study. The study eligibility criteria are summarized in Table 1.

Table 1: Inclusion and Exclusion Criteria

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Criteria Specified Criteria

Inclusion Studies that focus Kangaroo Mother care and Mindfulness

Studies that were conducted in NICU.

Primary studies on Maternal Mental Health & Preterm Infant outcomes

Studies published in 2019 Onwards

Exclusion Studies reported in a language other than English

Information from magazines, newspapers, conference abstracts

Studies that targeted the training other than the involvement of infants and their families.

Source of evidence screening and selection

Study Selection Process

The selection of the final studies for the review retrieved from the databases was carried out via a filtering process following PRISMA-ScR protocols and was performed in four phases: (i) Phase-I identification phase, where search queries were applied to the databases followed by the removal of duplicates; (ii) Phase-II screening phase, where titles and abstracts of articles were screened to exclude irrelevant articles; (iii) Phase-III eligibility phase, where the full-texts of articles were read to assess their relevancy to this study; and (iv) Phase-IV included study phase, where the final studies were highlighted to be reviewed. The second and third phases were conducted autonomously by two reviewers for accurate relevancy. If there was any disagreement among the reviewers, a third reviewer formally known in the review as a tiebreaker was consulted to assist in the decision-making of inclusion or exclusion of the study.

Data management

Data Extraction

In the current scoping review, the data was extracted by using two data extraction forms. Firstly, on the data extraction form the data was extracted by eliciting the main characteristics of the study including, author, year of publication, country of origin, title of the study, study design, sample size, target population methodology utilized in the study, intervention delivered to participants and outcome measures. Similarly, the second data extraction form elicited a brief explanation about the intervention of Mindfulness and Kangaroo Mother Care. How these interventions were delivered and integrated throughout the design process includes extracting types of theories and frameworks, approaches used for the integration of the intervention, key outcomes, key challenges, key implementation considerations, and future considerations for the intervention. The data extraction form was drafted, revised, and agreed upon by two reviewers after an

iterative process of implementing the extraction form on a sample of paper.

Reporting results / Analysis of the evidence Results

A total of 1165 studies were identified from the search. After the removal of 20 duplicate studies, 1145 studies were screened for titles and abstracts, and 50 full-text papers met the eligibility criteria. After a full-text review, 6 studies fulfilled the inclusion criteria and were included in the scoping review analysis. Figure-1, a PRISMA-ScR flow diagram illustrates the paper selection process.

Study Characteristics

In the current scoping review a total of 6 studies were included for review. Among the 6 selected studies according to the methodology of the study, 5 were quantitative, and 1 was mixed method research. According to the design of the study, 5 out of the total 6 studies were randomized control trials while 1 study was a quasi-experimental study. According to the intervention of the study 3 studies utilized mindfulness intervention on maternal mothers while 3 studies utilized the kangaroo or skin-to-skin care on maternal mothers. The outcome that was measured in the studies was maternal mental health in 5 studies, among them 3 studies also measured the neonatal outcomes. One of the studies was conducted to assess the evaluation of the feasibility and acceptability of the intervention of mindfulness kangaroo care on maternal mental health. The geographical locations where the study was conducted two were conducted in USA, while the rest were in UK, Sweden, Iran and China.

Presentation of the results Demographics

According to the study findings, all reported the demographic characteristics of the participants. Three studies conducted on mindfulness intervention had been conducted among which one explored the influence of mindfulness intervention on mothers' experiences, the second study conducted a randomized control trial by providing mindful kangaroo care to the maternal mothers, while the third study conducted on nurse assisted MKC on maternal stress and preterm infants. Four studies have provided the intervention of kangaroo care or skin-to-skin care. The outcome that was measured among all six studies, 5 had measured maternal outcome while two studies measured infant's outcome that included the vital signs, weight gain and breast-feeding rate of the pre-term infants. The target population of the study was maternal mothers and pre-term infants. According to the demographic characteristics in 5 studies, the mean age of the

maternal mothers was documented while in one study the pre-term infant's gestational age was documented. The mean age in a study conducted by (Grieb et al., 2023) is 28.1-32.4 with a mean age of 29.9, (Landry et al., 2022) reported as 34-33 years, (Dargahyan et al., 2023) mentioned as mean age of 29.7 years, (Crenshaw et al., 2019) mentioned the mean age of 33 years, while (Helmer et al., 2020) reported the gestational age of the infants that were mean of 34 weeks, (Ouyang et al., 2024) mentioned the mean age of mothers 29.72 ± 6.44 , gestational mean age of 29.59 ± 1.62 . According to the qualification documented in four studies (Crenshaw et al., 2019) reported the educational level where 50% had college-level education, (Landry et al., 2022) mentioned the median level of education that was college or undergraduate level, (Helmer et al., 2020) mentioned as 15 out of the 17 participants were holding higher level education. The rest of the demographic characteristics vary in the studies. (Ouyang et al., 2024) mentioned the qualification 53% were bachelors, 21% high school degree, 14.8% were having master degree.

Themes from the included studies

The analysis of the five studies concluded with the identification of four key themes that include: (1) Physiological and psychological benefits of Kangaroo Care for mothers and newborns (2) Role of mindfulness in reducing maternal stress, anxiety, and depression (3) Synergistic Effects of Integrating Mindfulness with Kangaroo Care (4) Importance of supportive environment in the NICU. The themes are further explored in the following section of the review.

Language restriction Yes, language limits were imposed. Only studies published in English were included, while non-English language studies were excluded as per the defined exclusion criteria in the review. English.

Country(ies) involved Pakistan.

Other relevant information The review highlights a significant gap in research from low- and middle-income countries. Future studies should explore the feasibility of Mindfulness Kangaroo Care in these underrepresented settings.

Keywords Neonate", "Maternal Health", "Mindfulness", "Kangaroo Mother Care" and "Neonatal Intensive Care Units".

Dissemination plans The findings of this scoping review will be disseminated through multiple channels to reach academic, clinical, and policy-making audiences. The primary method of

dissemination will be through submission to peer-reviewed journals focused on maternal health, neonatal care, and mental health to ensure academic rigor and visibility. Presentations at national and international conferences in nursing, maternal-child health, and neonatal intensive care will also be pursued to share findings with healthcare professionals and researchers. Additionally, the results will be shared with healthcare institutions, particularly those operating NICUs in low- and middle-income countries (LMICs), such as Pakistan, where the integration of cost-effective interventions like Mindfulness Kangaroo Care (MKC) can significantly benefit both maternal and infant outcomes.

The review identifies that while Kangaroo Mother Care (KMC) and mindfulness interventions individually offer psychological and physiological benefits, their combined application (MKC) presents a promising holistic approach to improving outcomes in NICU settings. However, current literature on MKC is limited and largely based in high-income countries. Disseminating these findings is essential to inform clinical protocols, encourage further research in resource-limited settings, and guide the development of scalable interventions for maternal mental health support.

Furthermore, the dissemination process will include workshops and educational sessions for NICU staff to raise awareness of MKC's benefits and feasibility. By targeting both academic and clinical stakeholders, the dissemination strategy aims to bridge the gap between evidence and practice, fostering implementation of MKC as a standard care practice in NICUs, especially in LMICs.

Contributions of each author

Author 1 - Shakir Ullah - Primary author who conducted the scoping review and contributed at every stage, including developing the protocol, designing and executing the search strategy, selecting studies, extracting and analysing data, and drafting the manuscript. Their role was central to ensuring methodological rigor and the overall completion of the review.

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Author 2 - Dr Yasmin Amarsi - Author 2 served as the academic supervisor, providing oversight and expert guidance throughout the scoping review. She supported the development of the protocol, ensured methodological accuracy, and reviewed the manuscript for intellectual content and clarity.

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Author 3 - Dr Jodie Bigalky - Author 3 served as a supervisor, providing continuous guidance and direction throughout the review process. She contributed to refining the methodology, offered critical feedback, and edited the manuscript to enhance its clarity, coherence, and academic quality.

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Author 4 - Amjad Ali - Author 4 contributed to data screening, study selection, and data extraction. He assisted in applying inclusion and exclusion criteria, organising extracted data, and ensuring accuracy and consistency throughout the review process.

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