Effectiveness of Mobile Applications in Mental Health Counseling for Pregnant Women : A Systematic Review

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ABSTRACT

Background: Mental health technology, especially versatile mobile applications, can aid in treating prenatal depression, which affects 12% of pregnant women.
Objective: This systematic review aims to gather the latest evidence on the effectiveness of mobile applications for mental health support among expectant mothers.
Methods: The methodology followed the PRISMA guidelines for systematic reviews and meta-analyses, utilizing a systematic review design. The PICOS framework guided the search strategy. A literature search was performed using PubMed, Wiley, and ScienceDirect. The inclusion criteria encompassed seven original, English-language studies published between 2019 and 2024, focusing on the effectiveness of mobile applications in mental health counseling for pregnant women. All studies employed a randomized controlled trial design. The Cochrane Risk of Bias 2 tool was used to assess the quality of each study.
Results: The articles were sourced from Germany, Singapore, Brazil, China, Japan, the Netherlands, and South Korea. All seven studies utilized a randomized controlled trial design with quantitative research. The risk of bias assessment revealed five studies with concerns and two with low risk. Pregnant women using these apps reported lower levels of depression and anxiety, along with enhanced social support, indicating that these applications offer a cost-effective alternative for mental health treatment.
Conslusion: App-based therapies, such as cognitive behavioral therapy and mindfulness training, have been shown to improve mental health and prenatal care. While the results are promising, some studies suggest further evaluation is needed to fully understand the efficacy of technology-based interventions. Overall, mobile app technology holds significant potential for improving perinatal health outcomes and supporting the mental

Keywords: *Pregnant women, mental health counseling, effectiveness, mobile application.*

BACKGROUND

Prenatal depression that is detrimental and incapacitating affects about 12% of expectant mothers. Mental health techniques based on technology can be used to address many of these problems. Today's digital platforms are flexible enough to help us avoid, identify symptoms early, and provide a variety of treatment alternatives. Numerous websites provide psychoeducation and emphasize prevention, such as those that deal with mental health screening and treatment (Novick et al., 2022). Specialists in psychosocial therapies are hard to come by in low- and middle-income nations. In these circumstances, mobile-based therapies have a lot of promise (Zuccolo et al., 2021). In the current technological era, electronic gadgets like tablets and cell phones have become indispensable in daily life. These gadgets have an impact on how people think and conduct their lives, whether they are utilized professionally or informally. across the past 20 years, the fast rise of Internet-based communication technology has drastically changed people's lifestyles all across the world (Mazaheri et al., 2024). Even if they weren't created with pregnancy in mind, mobile applications can nevertheless benefit from having material about anxiety, postpartum depression, pregnancy readiness, and sleep challenges. Furthermore, social support measures for expectant mothers are a desired aspect of applications (Green et al., 2022). Widespread access to resources that assist in preventing mother anxiety, raise symptom awareness, and expedite care is made possible by mobile health technologies. Through text messaging, blogs or forums, social media, and applications, portable electronic devices are employed in mobile health technologies to promote public health and provide health services (Novick et al., 2022). Through amiable assessment, attentive listening, and clinical and laboratory testing, prenatal consultation can assist in controlling and identifying clinical issues and indicators of dangerous behaviors for expectant mothers. This enables medical personnel to intervene right away to avoid unfavorable labor and delivery outcomes. However, the appearance of pregnant women for consultation, adherence to educational protocols, and most crucially, receiving instructions, are substantially correlated with the success of prenatal care (Souza et al., 2021). Midwives advise expectant mothers on a monthly basis to keep an eye on their health and to identify and address any concerns they may have. In this period, the examination or counseling findings are documented in the Maternal and Child Health (MCH) book that is acquired from the independent practice of the midwife or puskesmas. Previous records completed by medical personnel who do examinations at the puskesmas and at the midwife's independent practice are included in this KIA book. When medical personnel want to view the health history records of expectant mothers, they will first want to inspect this KIA book. Pregnant women should have access to an easy-to-use program that saves time without erasing data. Medical officials can record examination findings from prior counseling sessions and view the patient's medical history using this program (Lee et al., 2023).

OBJECTIVE

Finding the most recent research on the usefulness of mobile applications for mental health counseling for expectant mothers was the main objective of this systematic review.
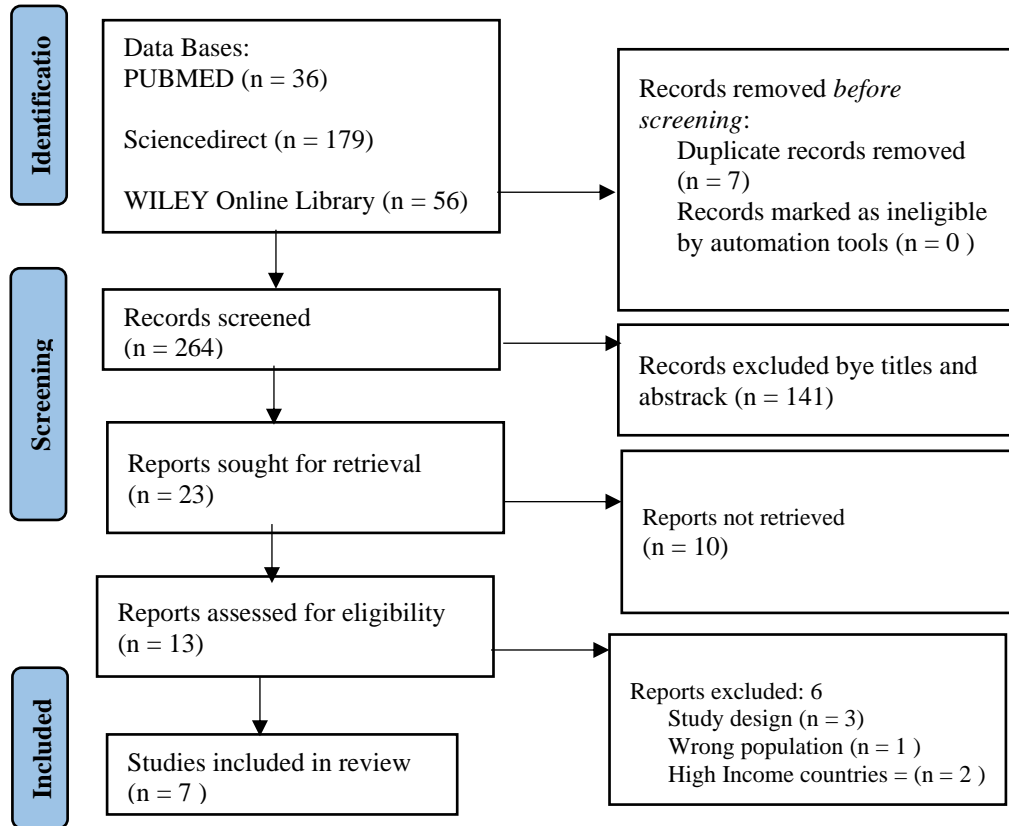
METHODS

The methodological criteria for systematic reviews and meta-analyses (PRISMA) were adhered to by the study design, which employed a systematic (Sterne et al., 2019). The PICOS framework (Population, Intervention, Comparison, Outcome, and Study Design) was employed in this study's search approach to make finding papers easier.

Tabel 1. *Framework* PICOS

P (Population)	I (Intervention)	C (Comparison)	O (Outcome)	S (Study Design)
Pregnant women	A mobile app for mental health therapy	Frequent Guidance	Pregnant women can benefit from mobile application-based mental health therapy by experiencing reduced levels of stress, anxiety, or depression, as well as increased social support and cost-effectiveness.	RCT

Finding pertinent articles comes next after determining the review questions. Three databases were employed in the literature search: Science Direct, Wiley, and Pubmed. All original studies published in English between 2019 and 2024 that addressed the efficacy of mobile application interventions in mental health counseling for expectant mothers met the inclusion criteria for this study. Keywords were used to search the articles. The terms "mobile application," "mental health counseling," "pregnant women," "effectiveness," "anxiety," "depression," and "stress" were utilized. 271 articles were found in the first search across three databases: Pubmed (36 articles), Wiley (56 articles), and Science Direct (179 articles). Seven items were repeated. Seven papers were found after removing duplicates and screening them for titles and abstracts. Following that, the papers were examined in accordance with the review objectives about the usefulness of mobile applications for mental health counseling among expectant mothers. Included were comparison studies with any kind of control group that did not employ mobile applications to offer pregnant women mental health therapy. Since RCTs are the suggested study design for determining causation, only RCT designs were considered. The quality of all included studies was evaluated using the Cochrane Risk of bias 2 tool in five domains: bias resulting from the randomization process, bias resulting from deviance from the intended action, bias resulting from missing outcome data, bias resulting from errors in outcome measurement, and bias resulting from the selection of reported outcomes. A grade of 'Low', 'High', or 'Some concern' is assigned to each domain. The study's overall bias was decided by the domain with the lowest score (Sterne et al., 2019). The method of evaluating quality was carried out by two impartial raters, JC and SS. Conflicts were debated until an agreement was achieved.

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Data Bases:
PUBMED (n = 36)

Sciencedirect (n = 179)

WILEY Online Library (n = 56)
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Identificatio

Records removed *before screening*:
    Duplicate records removed (n = 7)
    Records marked as ineligible by automation tools (n = 0)

Records screened (n = 264)

Screening

Records excluded bye titles and abstrack (n = 141)

Reports sought for retrieval (n = 23)

Reports not retrieved (n = 10)

Reports assessed for eligibility (n = 13)

Included

Reports excluded: 6
    Study design (n = 3)
    Wrong population (n = 1)
    High Income countries = (n = 2)

Studies included in review (n = 7)

RESULTS

Risk of Bias Assessment

    The seven chosen papers' quality was evaluated using the Cochrane Risk of Bias 2 method. There were two low-risk publications and five ones that raised concerns.

Gambar 2 Penilaian Resiko Bias

Study	D1	D2	D3	D4	D5	Overall
Müller et al., 2020	!	!	+	+	+	!
Shorey et al., 2023	+	!	+	+	+	!
Lucia, 2021	+	!	+	+	+	!
Sun et al., 2021	+	!	+	+	+	!
Nishi et al., 2020	+	!	+	+	+	!
Heller et al., 2020	+	+	+	+	+	+
Lee et al., 2023	+	+	+	+	+	+

+ Low risk
! some concerns
- high risk

D1 Randomisation process
D2 Deviations from the intended interventions
D3 Missing outcome data
D4 Measurement of the outcome
D5 Selection of the reported result

Data Charting

    Using a database, journals were chosen for the journal search according to the predetermined inclusion and exclusion criteria of the literature research. Once the journals

were located, it was discovered that they were all eligible and indexed. Title, first author, year of publication, nation, purpose of publishing, study design, research implementer, and research outcomes were among the elements of a standardized template that was used to collect data (Peters et al., 2020). The usefulness of mobile applications in mental health counseling for expectant women will then be examined in their entirety, with the goal of meeting one of the criteria for this literature review, which will yield seven publications. The articles that have been acquired are from Germany, Singapore, Brazil, China, Japan, the Netherlands, and South Korea, among other nations. Seven of the seven articles A1, A2, A3, A4, A5, A6, and A7 were gained by quantitative research employing an RCT (randomized controlled trial) approach.

Tabel 2. Data Charting

No	Title/author/year	Country	Objective	Jenis penelitian	Result
1.	The mindmom research protocol for a randomized controlled clinical trial examines the efficacy and cost-effectiveness of an electronic mindfulness-based intervention (eMBI) on mother mental health during pregnancy. 21(1) Trials, 1-11. (Müller et al., 2020)	German	Evaluating the cost- and clinical-effectiveness of eMBI (mindmom app).	RCT 1. eMBI application 2. Face-to-face	For expectant mothers experiencing psychological anguish, the app offers a potentially helpful, affordable, and efficient method of assistance.
2.	A Randomized Controlled Trial was conducted to assess the supportive parenting app's effectiveness on parental outcomes (Shorey et al., 2015)	Singapore	Assess the Supportive Parenting App's (SPA) efficacy.	RCT 1.Supportive parenting application 2. regular counseling	Mobile health apps like SPA can be a convenient source of support for parents.
3.	Randomized clinical experiment evaluating the impact of mobile applications on expectant mothers' compliance with prenatal visits (Lucia, 2021a)	Brazil	Examine if using mobile applications can encourage pregnant women to attend prenatal appointments more often, which would	Parallel RCTs 1. mobile app 2. face-to-face consultation	1. It has been demonstrated that the "healthy pregnancy" smartphone application helps expectant mothers adhere to prenatal treatment better. 2. This study demonstrates that mobile application technology can be a

			enhance the quality of care provided to mothers and expectant mothers.		useful instrument in helping expectant mothers receive better prenatal care.
4.	Randomized controlled experiment evaluating the impact of smartphone-based mindfulness training on prenatal depression in mothers. (Sun et al., 2021)	China	examining the impact on perinatal depression in expectant mothers of smartphone-based mindfulness training.	RCT 1.smartph one-based mindfulne ss applicatio n 2. regular counseling	Pregnant women who practice mindfulness using a smartphone throughout their pregnancy report a reduction in perinatal depression symptoms.
5.	A large-scale randomised controlled study strategy for internet-based cognitive-behavioural treatment (iPDP) to avoid depression during pregnancy and in the postpartum period. (Suryavanshi et al., 2020)	Japan	evaluating the effectiveness of cognitive-behavioral treatment (CBT) delivered via a smartphone in preventing pregnant women from developing serious depression.	RCT 1. mobile applicatio n 2. regular counseling	evaluating the effectiveness of cognitive-behavioral treatment (CBT) delivered via a smartphone in preventing pregnant women from developing serious depression.
6.	A Randomized Controlled Trial was conducted to evaluate the efficacy of MamaKits Online, a guided internet-based tool for treating anxiety and depression during pregnancy. (Heller et al., 2020)	Nethe rlands	Examining how well online MamaKits, a guided internet intervention, work for expectant mothers who exhibit anxiety or	RCT 1. online mamakits applicatio n 2. regular counseling	According to the study, there was no discernible difference in the reduction of affective symptoms between the guided online intervention and control group for pregnant women with depression or anxious symptoms.

			depressive symptoms.		
7.	Randomized controlled study evaluating the efficacy of a mobile-based intervention called Self-care for Pregnant Women at Work. (Lee et al., 2023)	South Korea	assessing how well a mobile-based intervention works in South Korea to help working pregnant women improve their prenatal care practices.	RCT 1.mobile application based intervention 2.regular counseling	Prenatal health habits were shown to be positively impacted by the intervention overall. Pregnancy-related stress and inconveniences were effectively reduced by the smartphone app, which also improved prenatal health habits.

Reducing anxiety and depression

According to research, mindfulness training can help pregnant women feel better mentally by lowering their stress, anxiety, and depressive symptoms and elevating their mood (Abbass-dick et al., 2020; Lucia, 2021b). According to this study, mobile application technology can help pregnant women receive better prenatal care. Maternal prenatal depression changes from baseline to 8 weeks post-treatment. Variations in the prenatal anxiety, quality of life, psychological well-being, physical activity levels, perceived stress, severity of depression, and sleep quality in mothers, as well as changes in the infants' developmental milestones at two months of age, between the baseline and the post-treatment periods. Important new information about the application of internet-based CBT to reduce prenatal depression is provided by this study. 2020; Nishi et al. When compared to the control group, a guided online intervention for pregnant women with anxiety or depressed symptoms did not significantly reduce their affective symptoms (Heller et al., 2020; Zuccolo et al., 2021). Pregnancy-related stress may be effectively reduced and healthy habits can be enhanced with the use of mobile applications (Lee et al., 2023; Nishi et al., 2020).

Enhanced social support

Mobile health apps such as SPA can be a convenient source of support for parents, but further improvements and evaluation are needed (Shorey et al., 2023).

Cost-effective for pregnant women

In order to lessen the detrimental effects on perinatal health outcomes, the eMBI app offers a viable means of offering pregnant women experiencing psycho-psychological discomfort efficient, affordable, and low-cost help (Graf et al., 2020).

Discussion

The research on the usefulness of mobile applications for mental health counseling during pregnancy to lower anxiety and depression, boost social support, and be cost-effective for expectant mothers was compiled and summarized in this systematic review. According to Müller et al. (2020), mental illnesses, particularly anxiety and depression disorders, are prevalent during the peripartum phase and can have serious repercussions for both the mother and the child. Maternal prenatal depression changes from baseline to 8 weeks post-treatment. Developmental milestones of the newborn at two months of age, as well as changes in the mother's prenatal anxiety, quality of life, psychological well-being, physical activity levels, perceived stress, severity of depression, and sleep quality from baseline to aftercare (Zuccolo et al., 2021). Through amiable and superior clinical and laboratory examinations, prenatal consultations assist in managing and identifying clinical conditions as well as risky behavior indicators for expectant mothers. This enables professionals to intervene early to prevent unfavorable outcomes during labor and delivery (Souza et al., 2021). The review's findings indicate that mobile application technology may be a useful instrument for enhancing expectant mothers' prenatal care. Pregnancy-related stress may be effectively reduced and healthy habits can be enhanced with the use of mobile applications. Prenatal depression can be avoided using internet-based cognitive behavioral therapy.

When compared to the control group, a guided online intervention for pregnant women with anxiety or depressed symptoms did not significantly reduce their affective symptoms. Pregnancy-related stress may be effectively reduced and healthy habits can be enhanced with the use of mobile applications (Lee et al., 2023).According to Müller et al. (2020), the mindmom app is a viable way to support pregnant women who are suffering psychological distress in an efficient, low-threshold, and economical way. This might potentially lessen the adverse effects on perinatal health outcomes. Information and communication technology assistance for health and associated sectors that is both affordable and safe (Marshall et al., 2020). Utilizing technology as a potent tool to enhance health is vital. Furthermore, in Primary Health Care, it may be utilized by medical practitioners to instruct patients on improved maternal health indicators. According to this research, more people worldwide are realizing the potential of digital technology to provide mental health solutions. The body of research on smartphone app treatments to support mental health is expanding, both with and without the help of mental health professionals. E-consultation is one method of enhancing access to mental health professionals, particularly prescribers. E-consultation refers to asynchronous secure electronic contact between the patient's present provider and a specialist. This is distinct from telepsy-chiatry/tele-mental health, in which the mental health practitioner meets the patient directly through video conferencing. This eliminates the need to schedule time for a phone call between two busy practitioners and the sometimes lengthy wait periods for in-person recommendations. It also enables prompt access to specialized knowledge (Novick et al., 2022). Selecting a legitimate application in the current circumstances will be essential to preserving the health of expectant mothers.

Parents may find mobile health apps like SPA to be a useful resource, but more research and development are required. Traditional mindfulness-based therapies have been demonstrated to improve depression symptoms in pregnant women, despite the possibility that in-person workshops might impede accessibility. The effectiveness of self-help and mobile-delivered mindfulness (mHealth) therapies is not well understood,

despite the ease that mobile technology brings. Given that parents are depending more and more on technology, the findings of the research included in this review suggest that prenatal therapies based on mobile apps might enhance parenting outcomes (Cameron et al., 2020). Pregnant women can effectively identify and manage mental health difficulties with the use of mobile apps for digital antenatal care (ANC), which also improves accessibility and monitoring (Tendean, 2023). Numerous studies have examined the efficacy of mobile applications in mental health counseling for expectant mothers, and the results indicate that these apps can significantly improve the mental health of these women (Jedrzejewska et al., 2023).

Conclusion

In order to assess the efficacy of mobile application interventions in mental health counseling for expectant mothers, this study employed a systematic review approach. Seven papers demonstrated how mobile applications may help pregnant women feel less depressed and anxious, connect with others more, and find affordable solutions. Pregnant women's mental health and health habits have been demonstrated to be improved by app-based therapies including CBT and mindfulness training. Despite encouraging outcomes, certain research indicates that more assessment is necessary to determine the efficacy of technology-based therapies. All things considered, mobile app technology has enormous promise for enhancing perinatal health outcomes and assisting the mental health of expectant mothers. Before applying the findings of this systematic review, further thought must be given.

Advice

Based on the above results, further research is needed to develop mobile applications for mental health to increase interactive features so that they can be more effective in reducing anxiety and depression in pregnant women. In addition, further research is needed to evaluate the long-term effectiveness of app-based interventions and understand the factors that influence the acceptance and use of apps by pregnant women, especially in areas with limited access to mental health services.

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