

Effectiveness of Digital-Based Psychological Support for Mothers with Postpartum Depression

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Article Info	ABSTRACT
<p>Keywords: Postpartum Depression, Digital Intervention, Maternal Mental Health, Cbt, Psychological Support.</p>	<p>Postpartum depression is a common mental health disorder that often goes untreated, particularly due to limited access to conventional psychological services. Along with the development of technology, digital-based psychological support offers an alternative intervention that is more affordable and flexible. This study aims to evaluate the effectiveness of digital-based psychological support in reducing depression levels and improving the psychological well-being of postpartum mothers. The study used a quasi-experimental design with two groups (experimental and control), involving 60 purposively selected participants. The intervention was delivered for eight weeks through a digital platform that integrated Cognitive Behavioral Therapy (CBT) and mindfulness modules. Depression levels were measured using the Edinburgh Postnatal Depression Scale (EPDS), as well as additional indicators such as anxiety, stress, and the quality of the mother-child relationship. The results of paired t-test and independent t-test analyses showed a significant reduction in EPDS scores and improvement in psychological well-being indicators in the experimental group ($p < 0.001$), with a large effect size (Cohen's $d = 2.37$). ANCOVA analysis confirmed the effectiveness of the intervention after controlling for covariate variables. The qualitative component through semi-structured interviews revealed that ease of access, time flexibility, and emotional support were contributing factors to participants' engagement. These findings indicate that digital interventions can be an effective and applicable approach to managing postpartum depression, and should be integrated into the broader maternal health care system.</p>
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INTRODUCTION

Postpartum maternal mental health is one of the crucial aspects in determining the quality of maternal life and optimal child development (Hill *et al.*, 2006; Saharoy *et al.*, 2023). Postpartum depression (PPD) is a common mood disorder that occurs within six weeks to a year after childbirth, with symptoms such as prolonged feelings of sadness, excessive anxiety, sleep disturbances, and loss of interest in daily activities (Kingston, Tough and Whitfield, 2012; Alderdice, McNeill and Lynn, 2013). According to the World Health Organization (WHO), the global prevalence of postpartum depression is estimated at 10-20%, with higher rates in developing countries, including Indonesia. This condition not only negatively affects the mother's psychological well-being, but can also disrupt emotional attachment with the baby, worsen the quality of parenting, and increase the risk of child development disorders in the early stages of life (Belsky and Fearon, 2002; Mercer, 2005; Tharner *et al.*, 2012). In Indonesia, the challenges in treating postpartum depression are exacerbated by limited access to mental health services, a lack of professionals in the field of clinical psychology, and the high social stigma still attached to individuals who experience psychological disorders (Idaiani and Basuki, 2012; Putri *et al.*, 2023). On the other hand, the development of digital technology in the field of health (digital health) offers innovative opportunities to bridge these limitations through the provision of psychological support services that are more flexible, affordable, and widely accessible without having to face geographical or social barriers. Digital-based interventions, such as mobile apps, online platforms, and e-counseling programs, are increasingly being developed as alternatives to complement or even replace conventional services in addressing various mental health issues, including postpartum depression. However, the effectiveness of these approaches still requires systematic and contextualized scientific testing, especially in the Indonesian postpartum mother population, which has cultural diversity, digital literacy levels, and specific psychosocial needs (Hunter and Schmidt, 1983; Kour, El-Den and Sriratanaviriyakul, 2019).

Previous studies have highlighted the effectiveness of psychological interventions in addressing postpartum depression, particularly through cognitive behavioral therapy (CBT), interpersonal counseling and structured social support approaches. These studies have shown that face-to-face psychological interventions can significantly reduce depressive symptoms and improve mothers' emotional well-being. However, these traditional intervention models often face obstacles in implementation, such as limited professional human resources, geographical barriers, and low rates of maternal visits to mental health facilities. Along with the development of technology, digital-based approaches are starting to be looked at as a potential solution that can answer these challenges. Several international studies, such as those conducted by Haga *et al.* (2013) and Shorey *et al.* (2023) have shown that the use of online applications and web-based self-intervention programs can significantly reduce symptoms of postpartum depression and increase mothers' participation in intervention programs. Most of these studies were conducted in countries with high digital infrastructure and technological literacy, so the findings are not fully generalizable to the context of developing countries such as Indonesia. In addition, most of the digital interventions tested are still early prototypes, with diverse and not fully

standardized evaluation methods. Therefore, this study was designed to fill this gap by developing and testing the effectiveness of digital-based psychological support that is adapted to the local context, in terms of language, culture and accessibility. This research also responds to recommendations from previous studies that suggest the need for context adaptation in the application of mental health technologies as well as the importance of testing the sustainability and long-term effectiveness of digital interventions on a wider and more diverse population.

This study aims to evaluate the effectiveness of digital-based psychological support in reducing depressive symptoms in postpartum mothers. Specifically, this study was designed to assess the extent to which the digital intervention developed - through an online platform or mobile application - can improve psychological well-being, reduce the intensity of depressive symptoms, and encourage active user involvement in the postpartum recovery process. In addition, the study also aimed to identify supporting and inhibiting factors in the implementation of the digital intervention, including aspects of accessibility, acceptability, and usability in the Indonesian maternal population. Using a quantitative and qualitative-based evaluative approach, this study is expected to produce empirical findings that can serve as the basis for the development of more adaptive, contextual, and sustainable digital psychological services to support postpartum mothers' mental health in the era of digital transformation.

Although research on psychological interventions for postpartum depression has shown promising results, there are significant gaps in the implementation and evaluation of digital-based interventions, especially in developing countries such as Indonesia. Most of the existing studies focus on developed country contexts with high healthcare infrastructure and digital literacy, while studies in developing countries are still very limited and tend not to consider local cultural, linguistic, and socio-economic factors in depth. In addition, the digital intervention approaches developed in previous studies were generally not accompanied by long-term effectiveness tests and thorough evaluations of user engagement and acceptability among postpartum mothers. Previous studies have also tended to under-explore the subjective experience of users, which is crucial in determining the success of technology implementation in mental health contexts. This void in the literature makes clear the need for research that not only quantitatively assesses the effectiveness of digital interventions, but also deeply understands the dynamics of user participation in a local context. Therefore, this study aims to fill this gap by presenting an evidence-based approach that combines quantitative analysis of intervention effectiveness and qualitative analysis of user experience. Thus, this research will not only contribute to the scientific development in the field of perinatal psychology and digital mental health, but also provide practical implications for the design and implementation of more inclusive and sustainable digital psychological support services in Indonesia.

This study offers a novelty contribution in the development and evaluation of a digital-based psychological support model specifically contextualized for mothers with postpartum depression in Indonesia. Different from previous studies that were mostly developed in developed countries, this study integrates technology-based intervention approaches with local wisdom, cultural preferences, and psychosocial needs of postpartum mothers in the context of developing countries. In addition to quantitatively assessing the effectiveness of

the intervention through measuring changes in depression levels, this study also includes qualitative analysis of users' subjective experiences, which is rarely addressed in similar studies. This combination of methods allows for a more comprehensive understanding of the benefits, challenges and dynamics of using digital interventions to support postpartum psychological recovery. The justification for this study lies in the urgency of providing widely accessible mental health services, especially amidst the limited professional resources and geographical barriers faced by many mothers in Indonesia. In the era of digital transformation, technology-based service innovation is a potential strategic solution, but its development needs to be evidence-based and adapted to the local context. Therefore, this research is not only academically relevant as a contribution to the enrichment of the literature on e-mental health and perinatal psychology, but also has practical significance in supporting more adaptive, inclusive and sustainable digital-based maternal mental health policies.

METHODS

This study used a quantitative approach with a quasi-experimental design that aimed to evaluate the effectiveness of a digital-based psychological support intervention for mothers experiencing postpartum depression (Hussien *et al.*, 2021). This design was chosen because it allows measuring the impact of the intervention on a group of subjects in field conditions that do not allow full random assignment. Data were collected before and after the intervention, involving two groups: an experimental group that received the digital intervention and a control group that received conventional services (if available) or no additional intervention (Tong *et al.*, 2023).

The population in this study were mothers experiencing symptoms of postpartum depression identified through clinical criteria and initial assessment using the Edinburgh Postnatal Depression Scale (EPDS) instrument. The sample was determined through purposive sampling technique by considering inclusion criteria, such as a maximum postpartum age of 6 months, having access to a digital device (smartphone or computer), and willing to participate in the intervention program. Sample size was calculated based on power analysis to detect significant differences between groups with a 95% confidence level and a minimum power of 0.80.

The digital intervention was designed in the form of a psychological support module consisting of several interactive online sessions covering cognitive-behavioral techniques, relaxation, and increasing social support. All content was validated by clinical psychologists and developed through a user-centered design approach. The intervention lasted for 6 weeks, with monitoring and mentoring through the app or platform provided.

Depression levels were measured at the beginning and end of the intervention period using the EPDS, and additional psychological well-being indicators such as stress levels, anxiety, and the quality of the mother-child relationship were also measured. Quantitative data were analyzed using paired t-test and independent t-test to compare scores before and after the intervention, as well as between the experimental and control groups. In addition, ANCOVA analysis was used to control for relevant covariate variables.

To complement the quantitative results, the study also included a qualitative component through semi-structured interviews with a subset of participants from the experimental group to explore their experiences with the digital intervention. Qualitative

data were analyzed using a thematic approach to identify factors that supported or hindered effectiveness and engagement in the intervention. This methodology was designed to ensure that the evaluation of the effectiveness of the intervention was thorough, valid and could contribute meaningfully to the development of technology-based psychological services to support postpartum maternal mental health in developing country contexts.

RESULTS AND DISCUSSION

Table 1. Characteristics of the Research Sample

No.	Characteristics	Criteria
1.	Target Population	Postpartum mothers (max. 6 months after delivery)
2.	Age of Respondents	20 - 40 years old
3.	Clinical Status of Postpartum Depression	EPDS score \geq 10 (indicating mild to moderate depressive symptoms)
4.	Access to Digital Technology	Own and able to operate a smartphone or other digital device
5.	Digital Literacy	At least basic level (can access apps, read digital text)
6.	Domicile Location	Live in an urban/suburban area with internet access
7.	Inclusion Criteria	- Willing to follow the digital intervention for 6 weeks - Not currently undergoing psychological therapy or pharmacological treatment
8.	Exclusion Criteria	- Have a history of severe mental illness - Have severe postpartum complications that require intensive care
9.	Sampling Technique	Purposive sampling
10.	Initial Sample Size	\pm 60 respondents (30 experimental group, 30 control group)

Results Measurement and Data Analysis

Measurement of depression levels was conducted at the beginning (pre-test) and end (post-test) of the intervention period using the Edinburgh Postnatal Depression Scale (EPDS). In addition, additional psychological well-being indicators measured included levels of stress, anxiety, and quality of mother-child relationship, each assessed using valid instruments such as the Perceived Stress Scale (PSS), Generalized Anxiety Disorder-7 (GAD-7), and Mother-Infant Bonding Scale (MIBS). Descriptive analysis showed that prior to the intervention, there was no significant difference between the experimental and control groups in terms of EPDS scores ($p > 0.05$), indicating relatively comparable baseline conditions. After six weeks of intervention, there was a significant decrease in EPDS scores in the experimental group compared to the control group. The paired t-test showed a decrease in the mean EPDS score from 14.6 (SD = 2.8) to 8.3 (SD = 2.5) in the experimental group ($t = 9.21, p < 0.001$), while there was no significant change in the control group ($t = 1.07, p = 0.293$).

An independent t-test of EPDS post-test scores showed a significant difference between the experimental and control groups ($t = 5.68, p < 0.001$), indicating the effectiveness of the digital-based intervention in reducing postpartum depression levels. To ensure that the change was not influenced by covariate variables such as age, parity, employment status, or initial level of social support, an ANCOVA analysis was conducted. The results showed that the digital intervention still had a significant effect on post-test EPDS scores after controlling for these variables ($F = 17.45, p < 0.001, \eta^2 = 0.284$). In addition to depression measures, there was a significant decrease in anxiety (GAD-7) and stress (PSS) scores, as well as an increase in positive scores on mother-child relationship quality (MIBS) in the experimental group ($p < 0.01$ each), while the control group showed no significant changes. Overall, these findings suggest that digital-based psychological support is effective in reducing depressive symptoms, lowering stress and anxiety, and improving the quality of the emotional bond between mother and baby. The findings strengthen the argument that digital interventions can be a viable and efficient alternative in supporting the mental health of postpartum mothers, particularly in the context of limited access to conventional psychological services.

Table 2. Summary of Statistical Results

Group	Pre-test Mean (SD)	Post-test Mean (SD)	Effect Size (Cohen's d)	95% CI Post-test
Experiment	14.6 (2.8)	8.3 (2.5)	2.37	7.41 – 9.19
Control	14.4 (2.7)	13.9 (2.9)	0.18	12.86 – 14.94

The graph shows a significant decrease in EPDS scores in the experimental group after the digital psychological intervention, while the control group showed an insignificant decrease. The large effect size in the experimental group indicates a substantial impact of the intervention.

To complement the quantitative findings, this study also adopted a qualitative approach through semi-structured interviews conducted with 10 participants from the experimental group. The interviews aimed to explore the mothers' subjective experiences in participating in the digital-based psychological support intervention, including perceptions of ease of use, content relevance, social interaction, and the emotional impact felt during the program. Data were analyzed using a thematic approach based on Braun and Clarke's (2006) framework. This process involved verbatim transcription, repeated readings, open coding, and identification of key themes. The analysis revealed five central themes:

1. Accessibility and Convenience

Most participants stated that the digital format made it easier for them to access psychological support without having to leave home, which was particularly important given their postpartum physical and emotional state. "I can join the sessions anytime when the baby is sleeping. This is very helpful," said one respondent.

2. Structured Emotional Support

Mothers felt a sense of companionship even though it was virtual. CBT and mindfulness-based modules were reported to provide a sense of control over negative

emotions and thoughts. Many revealed that breathing exercises and digital journaling had a calming effect.

3. Virtual Social Engagement

Online group discussion features facilitate a sense of community and reduce feelings of isolation. However, some participants mentioned that this engagement depended on the engagement of other participants, so it was not always optimal.

4. Technological Barriers and Internal Motivation

Some participants experienced technical difficulties such as unstable internet access or confusing application interfaces. In addition, personal motivation to follow the module consistently was also a challenge.

5. Hopes for a More Personalized and Integrated Service

Some mothers suggested that the service should be more integrated with the primary health system, and feature online personal counseling with a professional psychologist for more severe cases.

These findings support the quantitative results, which showed a significant reduction in depression scores in the experimental group. Qualitative analysis provided a deeper context for how the digital intervention was received, experienced and perceived by the mothers. In addition, the qualitative data also identified critical factors that can be optimized in the future development of the intervention, especially in the aspects of sustainability, engagement, and service integration.

Discussion

The results of this study showed that the digital-based psychological support intervention significantly reduced the level of postpartum depression in mothers in the experimental group, as evidenced by a statistically significant decrease in EPDS scores with a large effect size (Cohen's $d = 2.37$). This effectiveness is consistent with the findings of previous studies highlighting the efficacy of CBT and mindfulness-based digital approaches in the context of postpartum maternal mental health. However, this study strengthened this evidence through a quasi-experimental approach with a rigorous control design and further quantitative analysis using ANCOVA to control for covariate variables. The effectiveness of the intervention was also reflected in additional dimensions of psychological well-being such as decreased anxiety and stress, and improved perceptions of the quality of the mother-child relationship, confirming the multidimensional benefits of this digital approach. Thematic analysis of the semi-structured interviews provided contextual insights into mothers' experiences of the intervention. Accessibility, ease of use, and structured emotional support were the main drivers of the program's effectiveness. However, challenges such as technical barriers and limited participant motivation highlighted the importance of adaptive intervention design that is responsive to users' real-life conditions. In addition, qualitative findings indicate the need to integrate these digital services with the primary health care system for more comprehensive and sustainable support. Thus, this study not only strengthens the empirical evidence on the effectiveness of digital interventions, but also provides a practical contribution to the development of a more inclusive, personalized and contextualized technology-based intervention model in addressing postpartum depression.

CONCLUSION

The study concluded that a digital-based psychological support intervention was significantly effective in reducing the level of postpartum depression in mothers, as well as improving overall psychological well-being. This approach offers an adaptive and accessible solution, especially in the midst of limited access to conventional mental health services. Quantitative findings showing significant reductions in EPDS scores, along with qualitative results confirming participants' positive perceptions of the digital intervention, strengthen the validity of the technology-based intervention model as a relevant alternative in the treatment of postpartum depression. This study makes a significant contribution to the interdisciplinary literature between mental health, digital technology, and community-based interventions. The development and implementation of digital psychological interventions for postpartum mothers consider aspects of content personalization, increased user engagement, and integration with primary health services. The government and health care institutions can adopt the results of this study to design technology-based programs that can reach a wider population of postpartum mothers, especially in areas with limited professional services. Further research is recommended to test the long-term effectiveness of this intervention, integrate hybrid approaches (digital and face-to-face), and explore the potential adaptation of similar interventions to other vulnerable populations. Thus, this study provides an opportunity to strengthen evidence-based psychological intervention policies that are inclusive, efficient and contextualized within the maternal mental health framework.

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