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THE EFFECTIVENESS OF MOMEDU CARE ON PREGNANCY-RELATED ANXIETY AMONG THIRD-TRIMESTER PREGNANT WOMEN

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ABSTRACT

Pregnancy-related anxiety is common in the third trimester and may reduce maternal psychological readiness for childbirth. Although online antenatal education is expanding, evidence on a locally designed, smartphone-based platform integrated with primary care remains limited. This study evaluated MomEdu Care, a virtual antenatal education platform providing information on pregnancy danger signs, childbirth preparation, and anxiety management, among third-trimester pregnant women at Puskesmas Pulomerak. A pre-experimental one-group pretest-posttest design involved 30 participants selected through purposive sampling. Participants used MomEdu Care independently for two weeks. Pregnancy-related anxiety was measured before and after the intervention using the Pregnancy-Related Anxiety Questionnaire-Revised 2 (PRAQ-R2). Because the scores were not normally distributed, changes were analyzed using the Wilcoxon signed-rank test. The median anxiety score decreased from 37 (33-40) before the intervention to 29 (26-32) afterward ($p < 0.001$). These findings indicate a meaningful temporal reduction in anxiety after MomEdu Care use. The study contributes preliminary evidence on a context-specific digital antenatal education model for primary healthcare. However, the absence of a control group prevents causal attribution. MomEdu Care may support, rather than replace, professional antenatal counseling; controlled studies with larger samples and longer follow-up are needed.

Keywords

Pregnancy-Related Anxiety, Digital Antenatal Education, MomEdu Care, Telemidwifer, Pregnant Women

INTRODUCTION

Pregnancy involves major physical and emotional adaptations. During the third trimester, concerns about childbirth, fetal health, and maternal competence may develop into pregnancy-related anxiety. This construct is more specific than general anxiety because it focuses on fears and

worries arising directly from pregnancy and birth. Persistent symptoms may disrupt sleep, reduce psychological readiness for labor, and increase vulnerability to postpartum mental health problems; therefore, early identification and accessible support are important components of antenatal care.

Pregnancy-related anxiety remains a common problem worldwide. Al Ghadeer et al., (2021) found that many pregnant women experienced anxiety related to labor pain, childbirth, and fetal safety. Interestingly, the study also reported that social media exposure could increase anxiety among pregnant women, particularly when mothers relied on unverified online information. In many cases, information obtained through the internet may create unnecessary fear and confusion instead of reassurance.

A similar condition is also found in Indonesia. Kusumawati et al., (2023) reported that most third-trimester pregnant women experienced moderate to severe anxiety before childbirth. Many mothers felt worried about labor pain, delivery complications, and the safety of their baby. Physical discomfort that becomes more noticeable near the end of pregnancy may also contribute to emotional stress and anxiety.

Besides physical changes, maternal anxiety is influenced by several other factors such as age, educational level, occupation, parity, and emotional support from family members. Paz-Pascual et al., (2024) explained that pregnant women who received limited emotional support tended to experience higher levels of anxiety and depression during pregnancy. Women with lower educational backgrounds were also found to be more vulnerable to psychological distress. This suggests that emotional support and appropriate health education are important during pregnancy.

Pulomerak is one of the busiest districts in Cilegon City because it serves as the main transportation gateway between Java and Sumatra. The area is characterized by high mobility, industrial activities, and dense transportation flow. These environmental conditions may indirectly affect the psychological well-being of pregnant women, especially those approaching labor. However, increasing internet access and smartphone use in the community also provide opportunities to develop digital health education programs. According to Haryanto, (2024), internet penetration in Indonesia has reached more than 78%, with smartphones becoming the most commonly used device for accessing information.

A preliminary study conducted at Puskesmas Pulomerak in January 2026 showed that 7 out of 10 third-trimester pregnant women reported feeling anxious about childbirth. Most of them were worried about labor pain, possible complications, and the safety of their baby. Interestingly, many respondents admitted that they searched for pregnancy information more often through social media than through face-to-face maternal classes because it was easier and more practical. However, some mothers also stated that information from social media sometimes made them feel even more afraid because not all sources were reliable.

Structured antenatal education can reduce uncertainty by replacing fragmented or unreliable information with clear guidance on pregnancy, childbirth, and coping. Recent reviews show that online antenatal education is valued for flexibility and repeated access, while digital interventions for perinatal anxiety and depression show promising but heterogeneous effects (Arifin et al., 2024; Whitworth et al., 2024). Digital delivery should therefore be understood as a

supported care strategy rather than a stand-alone substitute for professional assessment.

Despite the growth of digital maternal health, three gaps remain relevant to primary healthcare. First, many interventions were developed outside Indonesia and may not reflect local language, service pathways, or information needs. Second, digital antenatal programs often emphasize knowledge or service access rather than pregnancy-specific anxiety. Third, evidence from community health centers remains limited, even though these settings are central to antenatal care. These gaps support evaluation of a context-specific platform linked to routine primary care.

MomEdu Care was developed as a smartphone-based virtual antenatal education platform containing locally relevant information on pregnancy danger signs, childbirth preparation, and anxiety management. The novelty of this study lies in evaluating a context-specific, self-accessible platform using a pregnancy-specific anxiety outcome (PRAQ-R2) in a primary-care population at Puskesmas Pulomerak. Unlike general online classes, MomEdu Care combines clinical preparation and anxiety-management content in one repeat-access resource. This study aimed to determine whether pregnancy-related anxiety scores changed after two weeks of MomEdu Care use and to provide preliminary evidence for a future controlled telemidwifery trial.

METHOD

This study used a pre-experimental one-group pretest-posttest design to examine changes in pregnancy-related anxiety before and after MomEdu Care. The design was selected as a preliminary service-based evaluation in which all eligible participants received the digital education. Because no concurrent comparison group or random allocation was used, observed changes cannot be attributed exclusively to the intervention. The study was conducted at Puskesmas Pulomerak from January to March 2026.

The target population comprised third-trimester pregnant women attending antenatal care at Puskesmas Pulomerak during the study period. Thirty participants were recruited through purposive sampling because eligibility required both clinical relevance to the third trimester and practical ability to access the smartphone intervention. Inclusion criteria were third-trimester pregnancy, ability to understand Bahasa Indonesia, ownership of a smartphone, and willingness to participate. Women with severe pregnancy complications and participants who did not complete the intervention were excluded. The sample size reflected feasibility for this preliminary evaluation rather than a reported a priori power calculation; consequently, statistical precision and generalizability are limited.

The independent variable was exposure to MomEdu Care, and the dependent variable was pregnancy-related anxiety. Anxiety was assessed using the 10-item Pregnancy-Related Anxiety Questionnaire-Revised 2 (PRAQ-R2), which covers fear of giving birth, worries about the child's health, and concerns about maternal appearance. Each item is scored on a five-point scale, producing a total score of 10-50, with higher scores indicating greater pregnancy-related anxiety. International psychometric studies support the instrument's three-factor construct validity, applicability to nulliparous and parous women, and acceptable internal consistency; one third-trimester validation reported Cronbach's alpha of 0.85 for the total scale (Huizink et al., 2016; Mudra et al., 2019). Because a study-specific reliability coefficient and formal validation of the Bahasa Indonesia version were not reported,

this limitation is stated explicitly and should be addressed in future research.

MomEdu Care is a smartphone-based virtual antenatal education platform covering pregnancy danger signs, childbirth preparation, and anxiety management. Materials were presented in simple language and could be accessed repeatedly. Participants were instructed to use the platform independently for two weeks. The same access period and instructions were provided to all participants; however, objective usage logs, content-completion rates, and exposure duration were not reported, limiting assessment of intervention adherence and dose.

The study procedures began with obtaining permission from the health center and recruiting eligible respondents. After receiving explanations regarding the study objectives and procedures, respondents signed informed consent forms and completed the pretest questionnaire. Participants were then given access to MomEdu Care and instructed to use the platform independently for two weeks. At the end of the intervention period, respondents completed the posttest questionnaire using the same instrument.

Univariate analysis summarized participant characteristics and anxiety scores. Normality was assessed using the Shapiro-Wilk test because the sample was small. Pretest and posttest distributions were non-normal; therefore, medians and ranges were emphasized, and the paired Wilcoxon signed-rank test was used to evaluate within-participant change. Statistical significance was set at $p < 0.05$. The value reported by statistical software as $p = 0.000$ was presented as $p < 0.001$ because a probability value cannot equal zero. The analysis identifies temporal change within one group and does not establish comparative effectiveness or causality.

This study applied ethical principles including informed consent, confidentiality, anonymity, beneficence, and non-maleficence. All participant information was kept confidential and used solely for research purposes.

RESULTS

1. Respondents' Characteristics

This study involved 30 third-trimester pregnant women who received antenatal care services at Puskesmas Pulomerak. Respondent characteristics included age, educational background, and occupation.

Table 1. Distribution of Respondents' Characteristics

Characteristics	F	%
Age		
20–25 years	22	73.3
>25 years	8	26.7
Education		
Senior High School	12	40.0
Diploma/Bachelor Degree	18	60.0
Occupation		
Housewives	16	53.3
Employed	14	46.7

Table 1 shows that most respondents were aged 20–25 years (73.3%). More than half of the participants had Diploma or Bachelor educational backgrounds (60.0%). In terms of occupation, the majority were housewives (53.3%).

2. Pregnancy-Related Anxiety Before the Intervention

Table 2. Pregnancy-Related Anxiety Scores Before the MomEdu Care Intervention

Variable	N	Mean ± SD	Min–Max
Pretest Pregnancy-Related Anxiety	30	36.63 ± 1.97	33–40

As shown in Table 2, the mean anxiety score before the intervention was 36.63 ± 1.97, with scores ranging from 33

to 40. This finding indicates that many respondents experienced relatively high anxiety before using MomEdu Care.

3. **Pregnancy-Related Anxiety After the Intervention**

Table 3. Pregnancy-Related Anxiety Scores After the MomEdu Care Intervention

Variable	N	Mean ± SD	Min–Max
Posttest Pregnancy-Related Anxiety	30	29.20 ± 1.67	26–32

Table 3 shows that the mean anxiety score decreased to 29.20 ± 1.67 after the intervention, with scores ranging from 26 to 32. This suggests that respondents experienced lower anxiety levels after using MomEdu Care.

4. **Normality Test**

The Shapiro-Wilk test was performed to assess whether the data were normally distributed before conducting bivariate analysis.

Table 4. Results of the Shapiro-Wilk Normality Test

Variable	Statistic	p-value	Interpretation
Pretest	0.881	0.003	Not Normal
Posttest	0.919	0.025	Not Normal

Based on Table 4, the p-values for both pretest and posttest scores were below 0.05, indicating that the data were not normally distributed. Therefore, non-parametric analysis was used in the next step.

5. **Bivariate Analysis**

The Wilcoxon Signed Rank Test was used to compare pregnancy-related anxiety scores before and after the intervention.

Table 5. Differences in Pregnancy-Related Anxiety Scores Before and After the MomEdu Care Intervention

Variable	Pretest Median (Min–Max)	Posttest Median (Min–Max)	p-value
Pregnancy-Related Anxiety	37 (33–40)	29 (26–32)	<0.001

The median pregnancy-related anxiety score decreased from 37 (range 33-40) before the intervention to 29 (range 26-32) after the intervention. The Wilcoxon signed-rank test indicated a statistically significant paired difference ($p < 0.001$). Thus, anxiety scores were lower after two weeks of MomEdu Care use; however, the one-group design does not demonstrate that the platform alone caused the change.

DISCUSSION

1. **Respondents' Characteristics**

The sample was dominated by women aged 20-25 years, participants with Diploma or Bachelor's education, and housewives. These characteristics describe the users who completed the intervention but should not be interpreted as determinants of anxiety or treatment response because no subgroup, correlation, or interaction analysis was conducted. They also suggest that the findings may apply most directly to relatively young and digitally capable antenatal-care users rather than to all pregnant women.

Higher education may support digital navigation and health literacy, but it does not eliminate pregnancy-specific fears. Anxiety may persist despite access to information when content is unverified, emotionally alarming, or not tailored to individual clinical concerns. This distinction supports MomEdu Care's emphasis on structured information, while also indicating that education alone

may be insufficient for women who require individualized psychological or clinical care.

Most respondents in this study were housewives. This condition may have helped respondents access the MomEdu Care platform more flexibly because they had more time to use the educational media independently. Nevertheless, housewives may also experience emotional stress related to family responsibilities and childbirth preparation. Similar findings were reported by Tamirat et al., (2025), who stated that psychosocial stressors and inadequate emotional support were important contributors to antenatal anxiety among pregnant women.

The demographic characteristics of Pulomerak may also influence maternal psychological well-being. Pulomerak is known as a busy industrial and transportation area with high community mobility. Environmental stressors, crowded activities, and social demands may indirectly increase stress levels among pregnant women. On the other hand, internet access and smartphone use in the community are relatively high, making digital educational interventions more feasible and accessible. According to Haryanto, (2024), internet penetration in Indonesia has exceeded 78%, with smartphones being the primary device used to access digital information.

Occupation and available time may affect opportunities to engage with a digital platform, yet this study did not measure frequency of use or compare engagement by occupational status. Therefore, the assumption that housewives used MomEdu Care more intensively cannot be confirmed. Future studies should collect automated usage data and examine whether engagement mediates changes in anxiety.

Pulomerak offers a relevant implementation context because high mobility may complicate attendance at scheduled classes, whereas smartphone access enables asynchronous learning. Nevertheless, digital feasibility cannot be inferred from internet penetration alone. Device quality, data affordability, digital literacy, privacy, and the need for professional follow-up should be evaluated before broader implementation.

2. Pregnancy-Related Anxiety Before the MomEdu Care Intervention

Before the intervention, the median PRAQ-R2 score was 37 (range 33-40), indicating substantial pregnancy-specific concerns within this sample. The score should be interpreted as a continuous measure of symptom burden rather than assigned to an unvalidated clinical category. Concerns about labor, fetal health, and maternal readiness are consistent with the domains measured by PRAQ-R2 and with recent literature on prenatal anxiety (Paz-Pascual et al., 2024; Val et al., 2025).

Although age, parity, education, occupation, and social support may be associated with antenatal anxiety, the present study did not test these variables as predictors. Consequently, the baseline score cannot be attributed to younger age, household responsibilities, or the Pulomerak environment. This distinction prevents descriptive characteristics from being presented as explanatory findings.

The coexistence of relatively high education and anxiety supports the view that information availability and emotional reassurance are not equivalent. Online searches may expose pregnant women to inconsistent or alarming information, whereas structured education can organize information around actionable preparation. Individual counseling remains necessary when anxiety is severe, persistent, or accompanied by functional impairment.

The characteristics of respondents may partly explain these findings. Most respondents were aged 20–25 years (73.3%), which represents a young reproductive age group. Although physically considered healthy for pregnancy, younger mothers often experience greater emotional uncertainty and fear before childbirth because they have limited childbirth experience. In addition, most respondents were housewives (53.3%), which may increase emotional pressure related to family responsibilities and preparation for labor. Anxiety during pregnancy is common because mothers begin to think more seriously about the labor process and the safety of their baby Singh & Metgud, (2022).

Educational background may also influence maternal anxiety levels. Although 60.0% of respondents had Diploma or Bachelor educational backgrounds, many still experienced anxiety before the intervention. This suggests that access to information alone may not fully reduce emotional concerns during pregnancy. Several respondents reported that they frequently searched for pregnancy information through social media rather than consulting healthcare providers directly. According to Al Ghadeer et al., (2021), excessive exposure to unverified online information may increase pregnancy-related anxiety among pregnant women.

The demographic condition of the Pulomerak area may also contribute to maternal anxiety. Pulomerak is a densely populated industrial and transportation area with high community mobility. Environmental stressors, transportation activities, and busy social conditions may indirectly affect maternal psychological well-being during pregnancy. However, the area also has relatively good internet access and high smartphone utilization, creating opportunities for digital educational interventions among pregnant women.

The baseline findings are broadly consistent with Indonesian and international reports that pregnancy-specific anxiety remains relevant in late pregnancy (Kusumawati et al., 2023; Paz-Pascual et al., 2024). However, prevalence or severity cannot be compared directly across studies without considering differences in instruments, cutoffs, populations, and timing of measurement.

3. Pregnancy-Related Anxiety After the MomEdu Care Intervention

After two weeks, the median score was 29 (range 26-32), eight points below the pretest median. This change is statistically significant and potentially meaningful, but the study did not report a validated minimal clinically important difference for PRAQ-R2. The result should therefore be interpreted as a promising within-group signal rather than proof of clinical recovery.

A plausible explanation is that repeated access to organized content reduced uncertainty and supported childbirth preparation. Reviews of online antenatal education describe flexibility, repeated access, and perceived reassurance as valued features, while also emphasizing the importance of credible content and interaction with health professionals (Whitworth et al., 2024). Because knowledge, self-efficacy, platform engagement, and perceived usefulness were not measured, the mechanism of change remains hypothetical.

The result is consistent with evidence that digital and online antenatal interventions may improve psychological outcomes, but effect estimates vary across intervention type, intensity, guidance, and study quality (Arifin et al., 2024; Sari et al., 2023). MomEdu Care adds local preliminary evidence by combining danger-sign education,

childbirth preparation, and anxiety management in one primary-care-oriented platform.

The primary-care setting strengthens contextual relevance because MomEdu Care could potentially complement midwife counseling between visits. Implementation should include clinical referral pathways, privacy safeguards, assistance for users with limited digital literacy, and monitoring to ensure that online information does not delay urgent assessment.

Comparable studies provide cautious support. Online antenatal education has reduced childbirth worries in controlled research (Uludağ et al., 2022), while recent systematic reviews report promising effects of digital interventions on perinatal anxiety and depression but substantial heterogeneity (Arifin et al., 2024). Unlike controlled studies, the present design cannot separate the intervention effect from repeated testing, natural change over time, concurrent counseling, or approaching delivery.

Recent evidence also indicates that antenatal education can improve maternal self-efficacy and reduce fear of childbirth (Zaman et al., 2025). This supports the educational rationale for MomEdu Care, although self-efficacy and childbirth fear were not measured here and should not be assumed to have improved.

Digital antenatal care may increase access and engagement, but effectiveness depends on content quality, human support, usability, and equitable access (Mohamed et al., 2025). MomEdu Care should therefore be integrated with antenatal services rather than offered as an unsupervised replacement for midwifery care.

Tamirat et al., (2025) found that digital mental health interventions during pregnancy effectively reduced emotional stress and improved psychological well-being among pregnant women. Jannah et al., (2024) also reported that digital psychoeducational interventions improved maternal mental health knowledge and helped mothers adapt emotionally during pregnancy.

The observed reduction also aligns with the broader direction of digital mental health research during pregnancy. However, MomEdu Care is primarily an educational platform, not a psychotherapy program; its role is best framed as low-intensity psychoeducation and preparation, with referral for participants needing formal mental health care.

4. Effect of MomEdu Care on Pregnancy-Related Anxiety

The Wilcoxon signed-rank test confirmed a pretest-posttest difference ($p < 0.001$). The study's unique contribution is not simply that online education may reduce anxiety, but that a locally designed, repeat-access platform was evaluated using a pregnancy-specific instrument within an Indonesian community health center. This provides feasibility-oriented evidence for developing a more rigorous comparative trial.

Potential pathways include reduced informational uncertainty, improved preparation, and repeated exposure to coping guidance. These pathways were not directly tested. A future mediation model should measure knowledge, self-efficacy, perceived support, engagement, and changes in specific PRAQ-R2 domains to clarify how the intervention may work.

Participant characteristics should not be presented as reasons for effectiveness without appropriate analysis. Future studies should prespecify subgroup hypotheses and use sufficiently large samples to assess whether parity, education, occupation,

baseline anxiety, or digital literacy modifies the response.

The result agrees directionally with PROCLASS and online antenatal education studies (Sari et al., 2023; Uludağ et al., 2022), but those interventions, populations, and research designs differ. Direct claims of equal or superior effectiveness are therefore not warranted.

Systematic reviews published in 2024-2025 strengthen the contemporary relevance of digitally supported perinatal care while emphasizing variability in outcomes and study quality (Arifin et al., 2024; Mohamed et al., 2025). The present result should be positioned within that emerging evidence base as preliminary local evidence.

For practice, MomEdu Care may be used to reinforce information between antenatal visits, standardize basic educational messages, and prompt discussion with midwives. It should include clear emergency guidance and cannot replace screening, diagnosis, or individualized management of clinically significant anxiety.

For theory, the findings support further testing of whether accessible, structured information reduces pregnancy-specific anxiety through improved knowledge, self-efficacy, or perceived control. These mediators and the platform's individual components require direct measurement before a mechanism can be established.

For implementation, future versions should document content development, expert review, usability testing, data protection, engagement analytics, and referral procedures. These elements are necessary for safe and scalable telemidwifery in primary healthcare.

The results of this study are also supported by Mohamed et al., (2025), who explained that digital transformation in antenatal care improves accessibility, continuity of education, and maternal engagement in healthcare services. Smartphone-based educational interventions allow pregnant women to access trusted health information more easily and repeatedly, which may strengthen maternal confidence during pregnancy.

Another study conducted by Kim et al., (2025) showed that digital mental health interventions during pregnancy were effective in reducing stress and emotional distress among pregnant women. Jannah et al., (2024), Tamirat et al., (2025) reported that psychoeducational approaches using digital platforms improved maternal mental health knowledge and emotional adaptation during pregnancy.

In addition, the increasing use of digital technology in the community may strengthen the implementation of telemidwifery and digital maternal education programs in primary healthcare settings. The use of trusted digital educational platforms could become an alternative strategy to improve maternal mental health support and antenatal education services, especially in urban and semi-urban communities with high smartphone utilization.

This study has several limitations. The use of purposive sampling, a relatively small sample size, and the inclusion of participants from a single health center may limit the generalizability of the findings. In addition, the quasi-experimental design without randomization and blinding may have introduced potential bias. The study also evaluated only the short-term effects of the MomEdu Care intervention and did not assess long-term outcomes. Therefore, future studies involving larger and more diverse populations, randomized controlled designs, and longer follow-up periods are recommended to further evaluate the

effectiveness and sustainability of digital antenatal education programs such as MomEdu Care.

CONCLUSIONS

Pregnancy-related anxiety scores were significantly lower after third-trimester pregnant women used MomEdu Care for two weeks. The findings provide preliminary evidence that a locally designed digital antenatal education platform is feasible and may support psychological preparation in primary care; however, the one-group design does not establish that MomEdu Care caused the reduction.

Theoretically, the result supports further investigation of structured digital education as a means of reducing pregnancy-specific uncertainty through knowledge, self-efficacy, and perceived control. Practically, MomEdu Care may complement midwife counseling by providing repeat-access information between visits, provided that privacy, digital-literacy support, emergency guidance, and referral pathways are maintained. Larger randomized controlled studies with validated Indonesian measurement, reliability testing, engagement monitoring, effect sizes, and longer follow-up are required before routine implementation.

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