Effectiveness of Prenatal Class Participation on Maternal Anxiety: A Scoping Review

Rahmawati[1*], Asri Hidayat[1], Endang Koni Suryaningsih[1]

[1] Faculty of Health Sciences, Aisyiyah Yogyakarta University

ABSTRACT

Background: Pregnancy-related anxiety is a common condition that can negatively affect both maternal and fetal health. This type of anxiety has been associated with a higher risk of complications such as premature birth and low birth weight. One intervention shown to be effective in reducing anxiety during pregnancy is prenatal education through structured classes for expectant mothers.
Method: The scoping review adapted the PICO (Population, Intervention, Comparison, Outcome). Framework and was systematically reported using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart, then selected from the PubMed, Biomed Central, Wiley Online Library, and ResearchGate databases. A total of 2.078 articles were screened using inclusion and exclusion criteria, resulting in 16 articles to be reviewed. These were then further selected by assessing the quality of the articles using the Critical Appraisal JBI (Joanna Briggs Institute) Checklist based on the type of research from the reviewed articles.
Result: Five main themes emerged from the reviewed studies: the role of prenatal classes in reducing anxiety, their impact on birth outcomes and maternal-infant health, the use of technology-based and online learning platforms, maternal mental health during pregnancy and postpartum, and various models and approaches in delivering prenatal education. Both in-person and online formats were found to be beneficial, especially when tailored to the individual needs and circumstances of pregnant women. Prenatal education classes are an effective strategy to lower anxiety levels during pregnancy and to improve maternal readiness for childbirth. Additionally, such education supports better health outcomes for both mother and baby. The delivery method whether face-to-face or digital should be selected based on the specific needs of the participants to maximize the benefits of the program.

INTRODUCTION

Anxiety during pregnancy is a significant issue, especially in developing countries like Indonesia, where the prevalence of pregnancy anxiety ranges from 10-25%.(1) This anxiety can negatively impact pregnancy, including the risk of premature birth and low birth weight.(2) Therefore, it is important to find effective interventions to reduce this anxiety. Prenatal classes have been identified as one of the interventions that can help reduce anxiety in pregnant women. Studies show that participation in Prenatal classes can reduce levels of anxiety and depression, as well as improve the mental well-being of mothers later on. Prenatal classes not only provide knowledge about pregnancy and childbirth but also enhance coping skills that are important for managing stress during pregnancy.(3)

Prenatal classes are educational programs aimed at improving the health of mothers and babies through various interventions. Some risk factors that need to be considered are oral health, which can affect pregnancy outcomes and child health (4), as well as domestic violence, which increases risks for pregnant women with unintended pregnancies.(5) In terms of behavioral change, educational programs for pregnant women place more emphasis on increasing knowledge rather than empowerment, so the role of midwives needs to be strengthened.(6) while smoking cessation interventions in primary care have been proven to improve the success of pregnant women in quitting the habit.(7) From a nutritional perspective, adherence to dietary guidelines remains low, especially in developing countries, with age and education as the main influencing factors.(8) while pregnant women undergoing dialysis require more specific nutritional planning.(9) Autonomy in choosing the method of delivery is also influenced by the doctor's recommendations and previous experiences, where

midwives tend to encourage normal delivery by providing more comprehensive education. Another challenge in promoting maternal health includes health literacy, which is still underutilized as an intervention to enhance mothers' understanding of health, as well as the patient-provider relationship, which can affect health outcomes, especially for vulnerable groups and requires a culturally-based approach.

From the aspects of previous research results backed by the same literature review study, namely scoping review, there is currently no aspect that discusses maternal mental health, particularly anxiety, linked to prenatal classes as an intervention. However, despite the ongoing research on the effectiveness of prenatal classes, there are still several aspects that have not been extensively explored. Most previous studies have focused on improving knowledge, coping skills, and pregnancy readiness, but there has yet to be a comprehensive review identifying how prenatal classes affect maternal anxiety in various contexts, intervention models, and implementation methods. In addition, variations in research design and sample population characteristics have resulted in inconsistent findings regarding its effectiveness.

To address this gap, this study uses the scoping review method to systematically map the available literature on the effectiveness of prenatal classes in reducing maternal anxiety. Unlike a systematic review that assesses the quality and outcomes of specific interventions, a scoping review is more useful in identifying research gaps, summarizing key themes, and providing a broader understanding of the existing evidence. With this approach, this research aims to provide a holistic picture of the contribution of prenatal classes to maternal mental health, particularly maternal anxiety, identify areas that still require further research, and offer recommendations for the development of more effective intervention programs.

This study aims to conduct a scoping review to identify and summarize evidence regarding the effectiveness of participation in prenatal classes on maternal anxiety. Thus, it is hoped that this research can provide recommendations for more effective intervention programs in the future.

METHOD

A scoping review is an approach that is useful for synthesizing research evidence, although its goals and methods differ from those of a systematic review. A scoping review aims to provide an overview of the existing literature on a specific topic, identify research gaps, and map evidence from various sources. This method is often used to answer broad research questions and to gather information before conducting a systematic review.(10) The steps of the scoping review framework are identifying the scoping review question, identifying relevant articles, article selection, and data charting.

Scoping review is an approach to synthesizing research evidence with a different purpose from a systematic review. Thus, it has a distinctive conceptual model indicating that this study uses the scoping review approach, namely the Arksey and O'Malley (2005) Framework, which serves as the main model in scoping reviews, encompassing five stages : identifying the research question, literature search, study selection, data extraction, and synthesis and reporting of results.(11) This study follows that framework by using the PRISMA Flowchart for transparency in article selection.(12) In addition, PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) was developed as a reporting guideline to ensure completeness in the scoping review process. In formulating the research question, this study applies the PICO (Population, Intervention, Comparison, Outcome) Framework, which focuses on pregnant women as the population, prenatal classes as the intervention, a group not attending classes as the comparison, and anxiety as the measured outcome.(13) JBI (Joanna Briggs Institute) Scoping Review Framework, which emphasizes transparency in data extraction and analysis, is also used in this study to assess the quality of articles through JBI (Joanna Briggs Institute) Critical Appraisal.(14)

Identifying scoping review questions

The Scoping Review question is based on existing phenomena, thus using the PICO framework (Population, Intervention, Comparison, Outcome). The PICO (Population, Intervention, Comparison, Outcome) framework is a tool used to formulate clinical questions in evidence-based midwifery practice (EBM). It is an acronym for Problem/Population, Intervention, Comparison, and Outcome. The use of PICO (Population, Intervention, Comparison, Outcome) helps formulate more focused and effective questions, search for relevant medical literature, and determine inclusion and exclusion criteria.

Table 1. Framework research question

P (Population)	Pregnant women who attend prenatal classes
I (Intervention)	Online or Offline prenatal classes
C (Comparison)	Pregnant women who do not attend prenatal classes
O (Outcome)	Maternal Anxiety

In the framework above, it shows that the emerging scoping review questions are whether attending prenatal class can reduce maternal anxiety, and which prenatal classes materials are most effective in reducing maternal anxiety? and is there a difference in maternal anxiety between those who attend prenatal classes and those who do not?

Identifying relevant articles

In the next stage, identifying relevant articles from the article search plan, the keywords used, the database targeted for the search, the publication time frame of the articles, and the language used. To identify relevant articles, inclusion and exclusion criteria are determined according to the framework used. Inclusion criteria include full text accessible, original articles, articles in English, a publication range of 5 years (2020-2025), and original research methods such as quantitative, qualitative, and mixed methods. And the Exclusion Criteria are articles that do not specifically discuss pregnancy women classes. Then, the databases used in the article search are PubMed, Wiley Online Library, Biomed Central, and ResearchGate. PubMed is managed by the National Library of Medicine (NLM), providing access to medical literature that has undergone a rigorous selection process, offering access to over 30 million articles, including MEDLINE and PubMed Central, covering various health disciplines, with many articles available for free, and users can access articles subsidized by libraries. Wiley Online Library offers access to highly reputable peer-reviewed journals in various fields, including science, technology, and health. Having more than 1.600 articles, providing extensive access to the latest research. All articles published in BioMed Central are freely accessible, supporting the wider dissemination of scientific knowledge, focusing on biomedicine and health, with over 300 journals covering various research topics, articles published through peer-review, ensuring the integrity and quality of research. Research Gate allows researchers to share articles, data, and collaborate with peers worldwide. Many articles can be downloaded for free, allowing researchers to keep up with the latest developments in their field. Next, enter the predetermined keywords using Boolean operators such as AND, OR, NOT, and Truncation to connect the keywords, resulting in focused and relevant article searches. For the search, the following keywords are used: Effectiveness OR Efficacy OR Effective AND Participation OR Involvement OR Contribution AND Maternity Classes OR Prenatal classes OR Antenatal Classes OR Prenatal Classes OR Prenatal Education OR Parenting Classes OR Expectant Parent Education AND Mothers OR mother OR motherhood OR maternal OR women OR mums AND Anxiety.
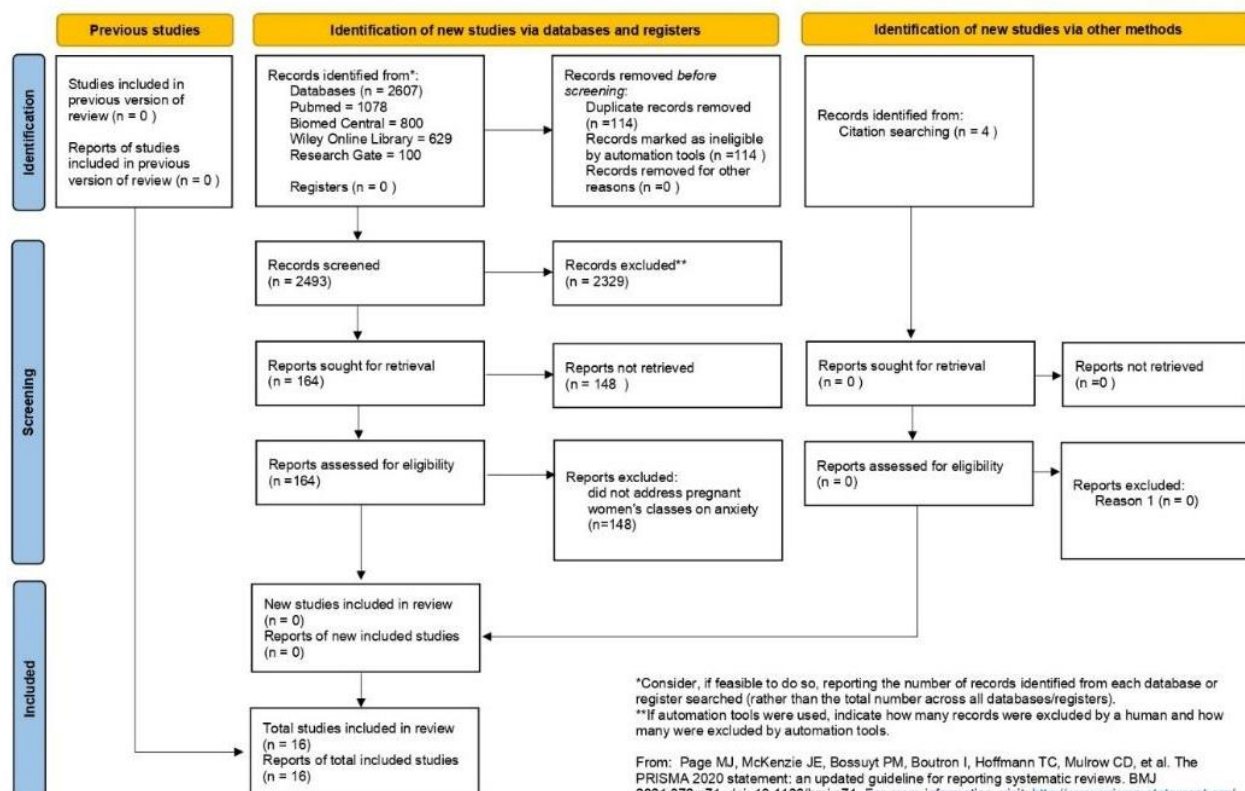

Figure 1. PRISMA Flowchart

Selection Studies

In the article selection stage, create a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart and Critical Appraisal. By using AI, specifically Rayyan as an online software, which helps to identify duplicate articles and assists the authors in selecting articles based on the title and abstract, followed by a further selection of full-text articles that meet the inclusion and exclusion criteria. Previously, the author used the Zotero software tool to help export articles into RIS format, which supports uploading the search results from the database to Rayyan. Then, the results of the screening for article content suitability, population, methods, and results were subjected to Critical Appraisal. It was found that 16 articles underwent critical appraisal using JBI (Joanna Briggs Institute), and all articles received Grade A with evaluation scores from each checklist for quasi-experimental methods, Randomized Controlled Trial (RCT), Cross Sectional, Quantitative (Pre-experimental, Comparative, survey), and Mixed Method (Quantitative and qualitative).

Data Charting

Data charting is one of the important steps in the scoping review process aimed at organizing and presenting data collected from various studies. This process helps in identifying key themes and systematically organizing information for further analysis. Data charting involves the collection of important information from selected studies, such as authors, publication year, study location, type of intervention, study population, objectives, methodology, and significant outcomes. This information is then organized in a format that allows for thematic analysis and pattern identification.(15)

Table 2. Data charting

Article Code	Title/Year/ Grade	Author	Purpose	Design	Country	Population	Results
A1	A Psychoeducational Intervention in Prenatal Classes: Positive Effects on Anxiety, Self-Efficacy, and Temporal Focus in Birth Attendants/ 2022/A	Pierluigi Diotaiuti, Giuseppe Valente, Stefania Mancone, Lavinia Falese, Stefano Corrado, Thais Cristina Siqueira, and Alexandro Andrade	Comparing the effects of a psychoeducational intervention, a traditional prenatal course, and no course on anxiety, self-efficacy, and time focus in pregnant women	Quasi-experimental study with three groups (psychoeducational intervention, traditional course, and control)	Italy	240 pregnant women (80 / group) in their first pregnancy, mean age 32.24 years	The psychoeducational intervention group showed significant decreases in anxiety, increases in self-efficacy, and a more positive time focus than the other groups.
A2	An interactive childbirth education platform to improve pregnancy-related anxiety: a randomized trial / 2023/A	Kelly B. Zafman, Melissa L. Riegel, Lisa D. Levine, Rebecca F. Hamm	To compare an interactive online childbirth education platform ("Birthly") with traditional prenatal education on pregnancy-related anxiety, emergency health care utilization, and	Randomized controlled trial with two groups (intervention and control).	United States of America	Nulliparous pregnant women, aged ≥18 years, <20 weeks gestation, English-speaking, with internet access, with high-risk pregnancies (certain medical or mental disorders). The majority	The intervention group showed significantly lower third trimester anxiety scores than the control group (44.6 vs. 53.9, p<0.01). The decrease in anxiety scores was greater in the intervention group (-8.3 vs. -0.7, p<0.01). Fewer unscheduled emergency visits in the intervention group (1 vs. 2, p=0.003). There were no significant differences in delivery outcomes,

		birth outcomes in high-risk pregnancies.			of the population comes from urban clinics serving patients with limited resources.	but the intervention group had higher breastfeeding rates at hospital discharge (80% vs. 56.1%, p=0.03). Satisfaction with childbirth education was higher in the intervention group (94.6% vs. 64.9%, p<0.01).
A3	Analysis of online antenatal education class use via a mobile terminal app during the COVID-19 pandemic / 2022/A	Xiao-Wen Chen, Li-Yuan Jiang, Ya Chen, Li-Fang Guo, and Xu-Hong Zhu	Understanding the use of online antenatal education classes through the "Mother and Child Health Handbook" application during the COVID-19 pandemic to provide a basis and suggestions for optimizing internet education during pregnancy in a public health emergency situation.	A comparative study analyzing data from two periods, namely before (2019) and during the COVID-19 pandemic (2020).	China (Hangzhou City).	Pregnant women who registered and used the "Mother and Child Health Handbook" application between January 1, 2019 and December 31, 2020. A total of 229,794 pregnant women were recorded, with 124,273 in 2019 and 105,521 in 2020.	Pregnant women's participation in online antenatal education classes increased from 23.5% (2019) to 34.5% (2020). More young pregnant women (aged 18–34 years) participated compared to older age groups (≥35 years). The most popular courses vary by trimester of pregnancy, with "Pregnancy and Fetal Development Care" being the main choice during early and middle pregnancy, while "Infant Care" is the focus in late pregnancy. During the pandemic, there was an increase in attention to nutrition and exercise but a decrease in courses on psychological health.
A4	Antenatal Classes in the Context of Prenatal Anxiety and Depression during the COVID-19 Pandemic/2022/A	Aleksandra Ciochoń, Anna Apanasewicz, Dariusz P. Danel, Andrzej Galbarczyk, Magdalena Klimek, Anna Ziomkiewicz, and Urszula M. Marcinkowska.	To investigate the association between participation in antenatal classes (face-to-face or online) with levels of anxiety and depression in pregnant women during the COVID-19 pandemic.	A survey-based longitudinal study that uses the GLM statistical model to analyze the relationships between variables.	Poland.	1,774 non-smoking adult pregnant women, aged 19–43 years, in the second or third trimester of pregnancy, in Poland.	Women who attended face-to-face antenatal classes had lower levels of anxiety and depression than those who attended online classes or no classes at all. There was no significant difference in depression levels between women who took online classes and those who did not. Participation in antenatal classes is directly associated with better mental health in pregnant women during

							the COVID-19 pandemic.
A5	Effect of Childbirth Education Program on Maternal Anxiety: A Randomized Controlled Trial Using Roy's Adaptation Model/ 2023/A	Endang Koni Suryaningsih, Meei-Ling Gau, Chien-Huei Kao, Chieh-Yu Liu, Su-Yu Kuo, Jen-Jiuan Liaw.	Testing the effectiveness of a childbirth education program based on Roy's Adaptation Model in reducing maternal anxiety.	A randomized controlled trial with participants divided using computer block allocation randomization.	Indonesia (Yogyakarta).	Pregnant women in their third trimester, aged 25–35 years, first pregnancy, without complications, with a total number of participants of 87 people (52 in the experimental group and 35 in the control group).	The Roy's Adaptation Model-based childbirth education program significantly reduced maternal anxiety levels compared to the standard program (p < .001).
A6	Effect Of Participation In Pregnant Women's Classes On Primigravida Anxiety Levels In Facing Childbirth At Pajarakan Health Center / 2022/A	Fifil Sumarni, Erma Sulistyaningsih, and Leersia Yusi Ratnawat	Analyzing the effect of participation in pregnancy classes on the level of anxiety of primigravida mothers in facing childbirth at the Pajarakan Health Center.	Pre-experimental with a single group pre-test and post-test design.	Indonesian	Primigravida mothers in the working area of Pajarakan Health Center, Probolinggo Regency. Number of samples: 30 people, using purposive sampling technique.	Before attending the pregnancy class, the majority of respondents experienced severe anxiety (76.6%). After attending the pregnancy class, the majority of respondents experienced mild anxiety (80%). Participation in prenatal classes significantly reduced anxiety levels (p = 0.000).
A7	Effects of mindfulness-based childbirth education on prenatal anxiety: A quasi-experimental study / 2023/A	Adnan Innab, Anwar Al-khunaizi, Areej Al-otaibi, and Hamza Moafa.	Assessing the effectiveness of implementing a mindfulness-based intervention to reduce anxiety in pregnant women in the third trimester.	Quasi-experimental with within-subject and between-subject designs. Data were collected at two time points: before and after the intervention.	Saudi Arabia	Nulliparous pregnant women with healthy, low-risk pregnancies, who were at 30 weeks of gestation, with a total of 88 participants (44 in the intervention group and 44 in the control group).	Mindfulness-based intervention significantly reduced pregnancy anxiety levels compared to the control group. Education level and history of spontaneous or medical abortion influenced participants' anxiety levels before the intervention. However, after the intervention, these factors no longer influenced anxiety. This intervention is effective in teaching new skills to cope with anxiety during pregnancy.
A8	Effects of	Quan Shen,	To evaluate	This study was	China, in	A total of 86	The intervention group

	needs-based education for prenatal anxiety in advanced multiparas: a randomized controlled trial / 2022/A	Can-Ran Huang, Liu Rong, Shan Ju, Sharon R. Redding, Yan-Qiong Ouyang, and Rong Wang	the effectiveness of a needs-based education program in reducing prenatal anxiety in elderly multiparas compared with routine prenatal education.	a randomized controlled trial (RCT) with two groups, namely an intervention group that received needs-based education and a control group that received routine prenatal care.	a general hospital in Central China	elderly multiparous women (aged ≥ 35 years) with singleton pregnancies at 26–28 weeks of gestation, without pregnancy complications, who received routine prenatal care	showed a significant decrease in pregnancy-related anxiety scores compared to the control group ($P < 0.05$). In addition, systolic blood pressure and heart rate were also significantly lower in the intervention group, indicating that needs-based education is effective in reducing prenatal anxiety.
A9	Evaluation of a short antenatal educational intervention in-person and online for high-risk pregnant women linked to antenatal consultation / 2024/A	Maria A. Heim and Maria Y. Makuch	Evaluating the effectiveness of a brief antenatal education intervention on labor pain, postpartum anxiety, and birth experiences in high-risk pregnant women.	A quasi-experimental study with intervention and non-intervention groups, conducted between November 2019 and May 2021.	Brazil	Pregnant women are at high risk in the third trimester of pregnancy (N=100), including conditions such as gestational diabetes, hypertension, risk of preterm delivery, and others.	The intervention group reported higher levels of delivery satisfaction and lower pain than the non-intervention group. Relaxation techniques and upright positions have been linked to reduced pain during labor. Duration of labor was shorter in the intervention group, and more intervention group participants reported a good or very good labor experience.
A10	Fear of childbirth, anxiety and depression in three groups of primiparous pregnant women not attending, irregularly attending and regularly attending childbirth preparation classes/ 2020/A	Robab Hassanzadeh, Fateme Abbas-Alizadeh, Shahla Meedya, Sakineh Mohammad-Alizadeh-Charandabi, Mojgan Mirghafourv and	Comparing fear of childbirth, anxiety, and depression during pregnancy in three groups of primiparous pregnant women based on their attendance at childbirth preparation classes.	Cross-sectional research uses general linear models for data analysis.	Iran (Tabriz city).	204 primiparous pregnant women with gestational age of 35–37 weeks, divided into three groups (not attending, attending irregularly, and regularly attending childbirth preparation classes).	The group that attended classes regularly had significantly lower fear of childbirth, anxiety, and depression scores than the group that did not attend classes. However, there was no significant difference between the groups that attended regularly and those that attended irregularly.
A11	Pregnancy school education program in mother friendly training and research	Arzu Ayraler, Şebnem Alanya Tosun, and Senem Özkök	Evaluating the impact of a prenatal school education program on anxiety and stress levels in	Cross-sectional study with participants divided into two groups, namely the group	Türkiye, carried out at Giresun Gynecology and Pediatrics Training	Pregnant women aged >18 years with gestational age more than 20 weeks. Total participants were 110	The group receiving prenatal training showed significantly lower levels of trait anxiety than the control group (p=0.033). However, there was no significant difference in

	hospital impact on stress and anxiety/ 2023/A		pregnant women.	receiving training and the control group.	and Research Hospital.	people, with 55 in each group.	state anxiety levels and pregnancy stress scale scores between the two groups.
A12	The 'new normal' includes online prenatal exercise: exploring pregnant women's experiences during the pandemic and the role of virtual group fitness on maternal mental health/ 2022/A	Cristina Silva-Jose, Taniya S. Nagpal, Javier Coterón, Ruben Barakat, Michelle F. Mottola	Exploring the experiences of pregnant women participating in online group exercise programs during the COVID-19 pandemic and their relationship to maternal mental health and well-being.	Mixed Method Phenomenolog ical approach with semi-structured interviews. Qualitative analysis was conducted to identify key themes, supported by quantitative data from the State-Trait Anxiety Inventory (STAI) anxiety questionnaire.	Spanish	24 healthy pregnant women (aged 26–42 years, mean 35.38 years) who participated in an online exercise program during the COVID-19 lockdown between March and October 2020.	Participants felt safer and had more time to exercise at home during the pandemic. Online classes increase social connectedness and provide emotional support. Participants reported improved eating habits, improved quality of life, and decreased anxiety (mean STAI score 32.23 ± 9.31). Online exercise programs were deemed accessible and effective, with suggestions for adding flexible schedules, more detailed guidance and professional guidance.
A13	The Effect of an educational Intervention on Anxiety of Pregnant Women: A Quasi-Experiment al Study / 2022/A	Sajad Pouryousef, Marzieh Kargar Jahromi, Sedigheh Yeganeh, Rouhollah Rouhandeh, Somayeh Paki, Mozhgan Jokar.	To evaluate the effects of educational intervention on anxiety levels in pregnant women.	Quasi-experimental study with intervention and control groups. Anxiety measurements were taken before and after the intervention.	Iran, in the city of Jerash.	Pregnant women who were under 35 years old, in their first or second trimester of pregnancy, and met certain inclusion criteria. A total of 62 participants, 31 in the intervention group and 31 in the control group.	Group discussion-based training significantly reduced anxiety in pregnant women in the intervention group compared to the control group, especially in the dimensions: Fear of the labor process, Fear of giving birth to a child with disabilities, Fear of mood swings, Fear of changes in marital relationships.
A14	The effect of educational intervention based on self-efficacy theory on pregnancy anxiety and childbirth outcomes	Narges Gandomi, Gholamreza Sharifzadeh, Marzieh Torshizi, Ensiyeh Norozi	To examine the effects of self-efficacy theory-based educational intervention on anxiety during pregnancy and delivery outcomes in	Quasi-experimental research with intervention and control groups	Iran (Birjand Province) .	Primiparous women with a gestational age of 26-28 weeks, with no history of prenatal education or pregnancy complications.	Pregnancy anxiety scores decreased significantly in the intervention group after the education session compared to the control group. Mean infant weight was higher in the intervention group (3308 g vs 2934 g).

	among Iranian primiparous women / 2022/A		primiparous women in Iran.			Emergency and elective caesarean section rates were lower in the intervention group. There was no significant difference in the incidence of preterm birth between the two groups.
A15	The effect of pregnancy training classes based on Bandura self-efficacy theory on postpartum depression and anxiety and type of delivery / 2021/A	Fatemeh Mohammadi, Shahnaz Kohan, Sedigheh Farzi, Mojgan Khosravi, and Zeinab Heidari.	Examining the effects of pregnancy training classes based on Bandura's self-efficacy theory on postpartum depression, anxiety, and type of delivery.	Quasi Experimental Clinical study with two groups (intervention and control) and three-stage evaluation.	Iran (performed at the Comprehensive Health Center in Isfahan).	Pregnant women aged 18–35 years with singleton pregnancies, 20 weeks of gestation, and no complications that endanger normal delivery. The sample size consisted of 64 pregnant women (32 intervention groups and 32 control groups).	Pregnancy training based on Bandura's self-efficacy theory significantly reduced depression scores at 1 week and 1 month after delivery in the intervention group. Mean overt and covert anxiety also decreased in the intervention group, although not statistically significant. The normal delivery rate was higher in the intervention group (80.55%) than in the control group (58.33%), which was statistically significantly different.
A16	The effect of prenatal education on health anxiety of primigravid women / 2024/A	Sahar Nikoozad, Faranak Safari-Dehcheshmeh, Farangis Sharifi, and Forouzan Ganji.	To examine the effects of prenatal education on health anxiety in primigravida (first pregnancy) women.	Quasi-experimental study	Iran, precisely at the comprehensive health services clinic in the city of Shahrekord.	Involving intervention and control groups with a total of 122 pregnant women. First pregnant women (primigravida), 20 weeks gestation, without pregnancy complications or anxiety disorders based on certain criteria.	Prenatal education decreased health anxiety, shortened the duration of active and latent phases of labor, and increased newborn weight compared to the control group. There were no significant differences in type of delivery, Apgar scores, or time to first breastfeeding.

RESULT AND DISCUSSION

Synthesis Results

After data charting was completed, the next step was to create a synthesis of the results related to the topics in 16 articles that had been given an A grade from the JBI (Joanna Briggs Institute) assessment. The results of the thematic synthesis are presented in narrative form, depicting the main themes and how these themes are interconnected.

Table 3. Thematic Analysis

No	Theme	Reference
1	The Role of Prenatal Education in Reducing Anxiety	A1, A2, A5, A6, A10, A13, A16
2	The Impact of Prenatal Education on Delivery Outcomes and Maternal-Infant Health	A5, A14, A15, A16
3	Prenatal Education based on Technology and Online	A3, A4, A9, A12
4	Mother's Mental Health during Pregnancy and Postpartum	A1, A4, A10, A11, A15
5	Model and Approaches in Prenatal Education	A5, A7, A14, A15

Study selection

Article searches have been conducted from 4 databases, namely PubMed, Biomed Central, Wiley Online Library, and ResearchGate, with findings of 1078 articles from PubMed, 800 articles from Biomed Central, 629 articles from Wiley Online Library, and 100 articles from ResearchGate. The total number of articles from the 4 databases is 2.607. From the article selection process, the articles were re-selected based on predetermined inclusion and exclusion criteria, resulting in 16 articles that will be reviewed next.
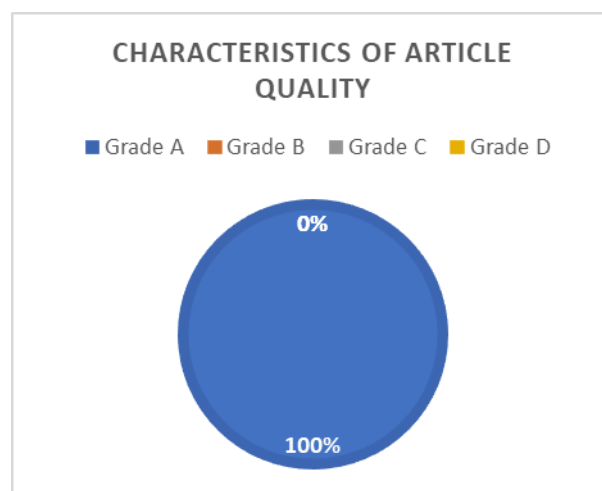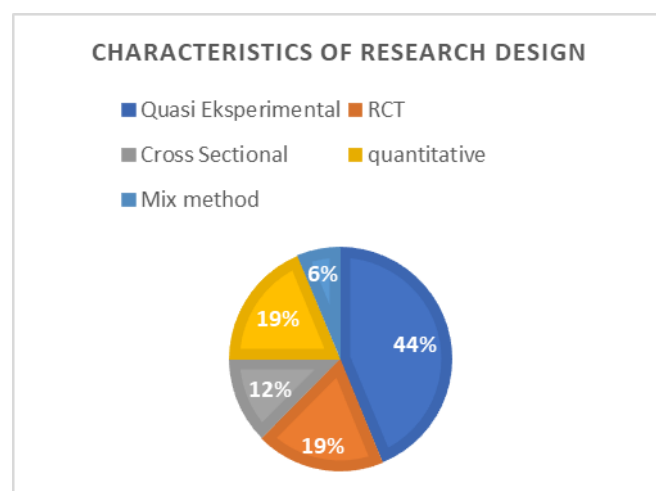
Study characteristics

Based on the review of 16 articles, the characteristics of the articles include the country of origin, the quality characteristics of the articles, and the characteristics of the research design. (Figure 2)
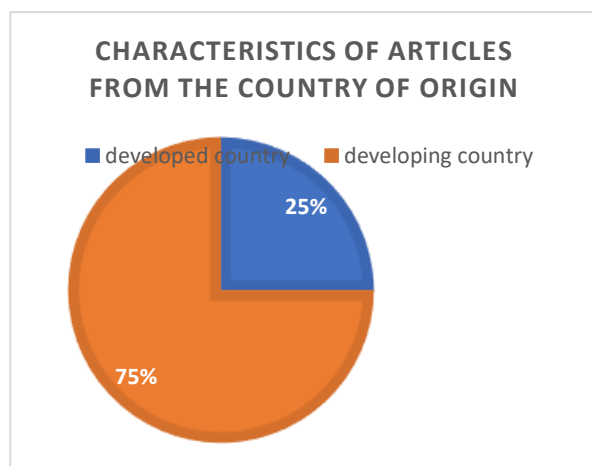
Figure 2. Characteristics of articles from the country of origin

Of the 16 articles, the origins of the articles were from developed and developing countries, with developed countries being more dominant compared to developing countries. The articles from developed countries amount to

4 articles, which come from Italy (A1), the United States (A2), Poland (A4), and Spain (A12). Then, the articles from developing countries are Indonesian (A5, A6), Saudi Arabia (A7), Brazil (A9), and Iran (A10, A13, A14, A15, A16). (Figure 3)

Figure 3. Characteristics of article quality

Figure 4. Characteristics of research design

Based on the assessment results of the article, a critical appraisal was conducted using the JBI (Joanna Briggs Institute) checklist for each type of research design. Out of 16 articles, all received an A grade, which is classified as a good category. (Figure 4)

From the search results, there are 16 articles with different research designs, namely Quasi-Experimental with 7 articles (A1, A7, A9, A13, A14, A15, A16), Randomized Controlled Trial (RCT) with 3 articles (A2, A5, A8), Cross Sectional with 2 articles (A10, A11), Quantitative (Pre-experimental, Comparative, survey) with 3 articles (A3, A4, A6), and Mixed method with 1 article (A12).

The results of this scoping review indicate that participation in prenatal classes has a significant impact on reducing anxiety in pregnant women. Prenatal education provides information that enhances mothers' understanding of pregnancy and childbirth, as well as builds confidence in facing the childbirth process. The studies analyzed in this review show that prenatal classes can help reduce levels of anxiety and stress, especially for mothers experiencing their first pregnancy (primigravida). This is consistent with other research that shows that prenatal classes are effective in increasing pregnant women's knowledge about the warning signs of pregnancy and childbirth. Studies show that participation in this class significantly increases mothers' knowledge about pregnancy and childbirth.(16)

In addition, prenatal classes have also been proven to benefit delivery outcomes and the health of newborns. Participation in this class is associated with an increased likelihood of normal deliveries, a reduction in preterm births, and higher Apgar scores for babies. Theory-based educational models such as the Roy Adaptation Model and Bandura's Self-Efficacy Theory have become effective approaches in prenatal classes programs, which not only reduce anxiety but also enhance maternal mental readiness. This shows that women who regularly attend childbirth preparation classes report more positive childbirth experiences and lower levels of postpartum depression compared to those who do not attend or attend irregularly.(17)

The implementation of technology-based prenatal classes has also become an increasingly used alternative, especially since the COVID-19 pandemic. Studies show that although face-to-face classes are more effective in reducing anxiety, online classes still provide significant benefits for mothers who cannot attend classes in person. Online-based prenatal education allows pregnant women to continue receiving information and psychosocial support without being limited by distance and time.

The Role of Prenatal Classes in Reducing Anxiety

From the identification of the article's findings, it shows that prenatal classes has a significant effect in reducing anxiety in pregnant women, especially for those facing their first pregnancy (primigravida). A1 highlights that psychoeducational interventions in prenatal classes not only reduce anxiety but also enhance self-efficacy and the mother's confidence in facing childbirth.(18) A2 shows that interactive educational platforms help reduce pregnancy-related anxiety, especially for high-risk mother groups.(19) A5 uses the Roy Adaptation Model to show that a structured childbirth education program is effective in reducing maternal anxiety during pregnancy.(20) A6 found that participation in prenatal classes has a direct effect in reducing anxiety in primigravida mothers facing their first childbirth.(21) A10 compared anxiety and depression between women who regularly attended childbirth preparation classes and those who did not, showing that regular attendance in classes significantly reduced anxiety.(22) A13 and A16 support these results by showing that structured prenatal education can reduce health anxiety in pregnant women and improve their mental readiness.(23)

The Impact of Prenatal Classes on Delivery Outcomes and Maternal-Infant Health

Prenatal education in maternity classes not only reduces anxiety but also positively impacts delivery outcomes and the health of newborns. A5, A14, and A15 show that theory-based prenatal education interventions (such as the Roy Adaptation Model and Bandura's Self-Efficacy Theory) can enhance mothers' readiness for childbirth, reduce anxiety, and even influence the type of delivery (more mothers giving birth normally compared to cesarean sections). A16 found that prenatal classes given from the second trimester of pregnancy can reduce labor time, increase newborn birth weight, and reduce complications during delivery. A14 shows that self-efficacy theory-based programs not only reduce anxiety but also decrease the rate of premature births and improve the Apgar scores of newborns.(24)

Prenatal Classes based on Technology and Online

The COVID-19 pandemic caused significant changes in the methods of delivering prenatal education, with an increased use of online platforms. A3 shows that the use of online prenatal classes increased significantly during the pandemic, with pregnant women being more likely to take courses online compared to before.(25) A4 compares the effectiveness of online and face-to-face prenatal classes, showing that although face-to-face classes are more effective in reducing anxiety, online classes still

provide benefits for mothers who cannot attend in person.(3) A9 examined the effectiveness of short online educational interventions for mothers with high-risk pregnancies and found that online education was still able to reduce anxiety, although not as effectively as face-to-face classes.(26) A12 discusses the importance of prenatal online fitness classes provide benefits not only in increasing the physical activity of pregnant women but also in improving mental health through virtual social interactions.(10)

Mother's Mental Health During Pregnancy and Postpartum

In addition to reducing anxiety, prenatal classes also plays a role in improving the overall mental health of mothers. A1 and A11 highlight that psychoeducational interventions in prenatal classes can reduce stress and anxiety in mothers before childbirth.(27) A4 and A10 found that mothers who do not receive prenatal education tend to experience higher levels of depression and fear regarding childbirth.(18) A15 shows that the Bandura theory-based pregnancy training program can reduce postpartum depression, which is one of the common mental complications that occur after childbirth.(19)

Models and Approaches in Prenatal Classes

From the reviewed article, it was found that it examines the models and theories used in prenatal classes to improve its effectiveness. A5 uses the Roy Adaptation Model, which focuses on how mothers can adapt to changes during pregnancy through structured education.(20) A7 researched the use of a mindfulness approach in prenatal classes, which has proven effective in reducing anxiety by enhancing self-awareness.(28) A14 uses Self-Efficacy Theory, which helps mothers build confidence in facing the process of pregnancy and childbirth.(24) A15 applies Bandura's Self-Efficacy Theory, which found that mothers who undergo self-efficacy-based training are more capable of coping.(25)

The results of this scoping review indicate that prenatal classes consistently contribute to reducing anxiety during pregnancy. Several studies indicate that theory-based approaches such as the Roy Adaptation Model, mindfulness, and self-efficacy theory have a more significant impact on improving the mental readiness of pregnant women compared to general approaches. However, so far, there have not been many studies that directly compare the effectiveness of different prenatal education models.

Furthermore, most of the studies analyzed in this review focused on primigravida mothers or mothers with low-risk pregnancies, so the effectiveness of prenatal classes for mothers with high-risk pregnancies or multipara still needs further investigation. Some studies in this review do show the benefits of prenatal classes for high-risk groups (such as mothers with certain medical conditions), but there are still differences in research design that hinder stronger conclusions.

The shift towards technology-based prenatal education is also one of the important aspects explored in this review. Studies show that technology-based classes have benefits in increasing access to information and social support for pregnant women who cannot attend face-to-face classes. However, its effectiveness in reducing anxiety still varies, with some studies showing that face-to-face classes remain superior in terms of interaction and emotional support.

This scoping review study has several advantages, including a systematic and transparent approach using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) Flowchart and JBI (Joanna Briggs Institute) Critical Appraisal, identification of research gaps related to the effectiveness of prenatal classes in reducing anxiety, and a combination of various data sources from reputable databases. Additionally, this study links its findings to Roy's adaptation theory and Bandura's self-efficacy theory, providing a strong theoretical foundation, and explores the role of technology in prenatal education to enhance information accessibility. However, there are several shortcomings, such as the variation in study designs used, which leads to data heterogeneity, the imbalance in country representation with a dominance of research from developing countries, and the limitation in the evaluation period, which mostly focuses on anxiety during pregnancy without examining its impact on the postpartum period. Moreover, the variety of anxiety measurement instruments used can complicate data interpretation, and the lack of discussion on external factors such as family support and socioeconomic conditions can affect the effectiveness of prenatal classes. Nevertheless, this study still makes an important contribution to understanding the role of prenatal classes in maternal mental health and offers recommendations for the development of more effective and evidence-based prenatal education programs.

In the preparation of the scoping review, there is a limitation that only English-language articles are reviewed, there are no articles in other languages. Relevant non-English articles have already undergone the JBI (Joanna Briggs Institute) critical appraisal process, so non-English articles will not be detected. The authors do not differentiate between classes of pregnant women during the Covid-19 period, as long as the publication span is within the last 5 years (2020-2025). The author does not

differentiate articles based on the characteristics of the population of all pregnant women, even those who are in labor, as they are still included in the topic of the reviewed articles.

This scoping review study has several limitations that are a concern. One of them is the variation in research designs, such as quasi-experimental, RCT, cross-sectional, and mixed methods, which can affect the consistency of the results. In addition, the generalization of findings is still limited because most studies are conducted in developing countries with small sample sizes, making it difficult to apply them on a global scale. Differences in intervention methods and educational approaches also pose a challenge, as prenatal classes are conducted in various formats, whether face-to-face, online, or based on specific theories, making it difficult to compare their effectiveness. Not only that, the diverse measurement of anxiety using instruments such as STAI, EPDS, and HAM-A can yield varying results. Most studies also only measure anxiety in the short term without examining its impact on postpartum anxiety, thus not providing a long-term picture. In addition, limitations in data reporting also pose a challenge, as some studies do not include participant compliance rates or external factors such as family support that can affect maternal anxiety. Lastly, the effectiveness of face-to-face and online classes is still a matter of debate, especially due to technical barriers and low participant engagement in online classes, even though these methods have been increasingly used during the COVID-19 pandemic.

CONCLUSION

Based on the results of the scoping review, it can be concluded that prenatal classes are an effective intervention in reducing maternal anxiety during pregnancy. Prenatal education not only enhances the mother's readiness for childbirth but also positively impacts the health of both the mother and the newborn. The use of various educational models, whether face-to-face or technology-based, can provide significant benefits, although they need to be tailored to the needs and conditions of individual pregnant women.

From this scoping review, various good recommendations have also emerged for the implementation of the prenatal classes program, namely the enhancement of evidence-based prenatal education programs using adaptation theory, mindfulness, and self-efficacy for better outcomes. Integration of prenatal classes into routine healthcare services means providing classes to all pregnant women as part of standard pregnancy care. The development of a more effective online platform, which provides broader access for pregnant women who cannot attend face-to-face classes. Focus on maternal mental health by incorporating psychological interventions in prenatal classes to prevent postpartum anxiety and depression.

To enhance the effectiveness of prenatal classes in reducing anxiety and supporting maternal health, several health promotion-based strategies are needed. These include integrating prenatal classes into primary healthcare services by mandating participation as part of antenatal care (ANC) and involving midwives, doctors, and psychologists in mental health education. Additionally, developing a holistic class model based on Bandura's Self-Efficacy Theory and the Roy Adaptation Model can help integrate physical, psychological, social, and nutritional aspects into the program. Mental health campaigns for pregnant women and families through social media, webinars, and training for husbands and families can further enhance social support. The optimization of technology, such as educational applications, online classes, virtual discussion groups, and video-based materials, can improve information accessibility. Furthermore, evaluating and strengthening maternal health policies through ongoing research, incentives for active participants, and evidence-based policies will help increase pregnant women's engagement in health programs. With this comprehensive approach, prenatal classes can become a more effective, inclusive, and sustainable intervention to reduce anxiety and improve childbirth readiness.

Acknowledgment

Conflict of Interest

The authors declare that there's no conflict of interest.

REFERENCES

1. Kartika ML. Maternity Class as an Effort to Reduce Anxiety in Pregnancy. EMBRIO J Kebidanan [Internet]. 2021;13:148–55. Available from: doi:10.36456/embrio.v13i2.3495.
2. Hassanzadeh R, Abbas-alizadeh F, Meedya S, Mohammad-alizadeh-charandabi S. Fear of childbirth, anxiety and depression in three groups of primiparous pregnant women not attending, irregularly attending and regularly attending

childbirth preparation classes. BMC Womens Health [Internet]. 2020;1–8. Available from: https://doi.org/10.1186/s12905-020-01048-9

3. Aleksandra Ciochoń, Anna Apanasewicz, Dariusz P. Danel, Andrzej Galbarczyk, Magdalena Klimek, Anna Ziomkiewicz UM. Antenatal Classes in the Context of Prenatal Anxiety and Depression during the COVID-19 Pandemic. Int J Environ Res Public Health [Internet]. 2022;19(9):5073. Available from: doi:10.3390/ijerph19095073

4. Tenenbaum Annabelle ALS. Oral Health Knowledge, Attitudes, Practices, and Literacy of Pregnant Women : A Scoping Review. Oral Health Prev Dent. 2023;21:185–98.

5. Winter K, Niemann J, Jepsen D, Brzank PJ. Experiences and life circumstances of unintentionally pregnant women affected by intimate partner violence — stress factors, resources, healthcare structures and needs : a scoping review protocol. Front Public Heal. 2024;12(October):1–6.

6. Zinsser LA, Stoll K, Wieber F, Pehlke-milde J, Gross MM. Changing behaviour in pregnant women : A scoping review. Midwifery. 2020;85:102680.

7. Connolly N, Kelly D, Donnell PO, Hyde S. Effectiveness of smoking cessation interventions in pregnant women attending primary care : a scoping review. BJGP Open. 2024;(Cdc):1–8.

8. Rahmannia S, Murray K, Arena G, Hickling S. Dietary guidelines for pregnant and lactating women, adherence levels and associated factors : a scoping review. Nutr Res Rev. 2024;1.

9. Lambert K. Nutritional Recommendations for Pregnant Women Receiving Dialysis : A Scoping Review. Kidney Dial. 2024;4(1):46–77.

10. Henrique C, Silva M, Pinheiro WF, Soares C, Melo B De, Campos VDO, et al. Pregnant women autonomy when choosing their method of childbirth : Scoping review. PLoS One. 2024;19(7):1–15.

11. Arksey H, Malley LO. Scoping studies: towards a methodological framework. Int J Soc Res Methodol. 2005;8(1):19–32.

12. Peters MDJ, Godfrey CM, Khalil H, McInerney P, Parker D SC. Guidance for conducting systematic scoping reviews. Int J Evid Based Heal. 2015;13(3):141–6.

13. Tricco AC, Lillie E, Zarin W, Brien KKO, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. 2018;169(7):467–73.

14. Aromataris E, Lockwood C, Porritt K, Pilla B, Jordan Z editors. JBI Manual for Evidence Synthesis. 2024; Available from: https://synthesismanual.jbi.global

15. Boehm D, Strantz C, Christoph J, Busch H. Data Visualization Support for Tumor Boards and Clinical Oncology : Protocol for a Scoping Review Corresponding. JMIR Res Protoc. 2024;13:1–7.

16. Kundaryanti R, Dinengsih S BN. Effectiveness of Maternal Class Programme on Knowledge of Pregnancy Danger Signs Efektifitas Program Kelas Ibu Terhadap. Midwiferia J Kebidanan. 2024;10(1):11–8.

17. Kucab A, Barna E. Assessment of the Postpartum Emotional Wellbeing among Women Participating and Not Participating in Antenatal Classes. Int J Env Res Public Heal. 2022;19(8):4476.

18. Focus T, Diotaiuti P, Valente G, Mancone S, Falese L, Corrado S. A Psychoeducational Intervention in Prenatal Classes : Positive Effects on A Psychoeducational Intervention in Prenatal Classes : Positive Effects on Anxiety, Self-Efficacy, and Temporal Focus in Birth Attendants. Int J Env Res Public Heal. 2022;19(13):7904.

19. Hamm RF. An interactive childbirth education platform to improve pregnancy-related anxiety: A randomized trial. Am J Obs Gynecol. 2023;229(1):1–14.

20. Koni E, Gau M ling, Kao C huei, Liu C yu. Effect of Childbirth Education Program on Maternal Anxiety : A Randomized Controlled Trial Using Roy's Adaptation Model. J Heal Technol Assess Midwifery. 2023;6(1):36–48.

21. Sumarni FS, Sulistyaningsih ES RL. The Effect Of Participation In Pregnant Women's Classes On Primigravida Anxiety Levels In Facing Childbirth At Pajarakan Health Center. Med Technol Public Heal J. 2022;6(2):139–47.

22. Pouryousef S, Kargar Jahromi M, Yeganeh S, Rouhandeh R, Paki S JM. The Effect of an Educational Intervention on Anxiety of Pregnant Women: A Quasi-Experimental Study. Invest Educ Enferm. 2022;40(2):e05.

23. Nikoozad S, Safdari-Dehcheshmeh F, Sharifi F GF. The effect of prenatal education on health anxiety of primigravid women. BMC Pregnancy Childbirth [Internet]. 2024;24(1):541. Available from: https://doi.org/10.1186/s12884-024-06718-2

24. Gandomi N, Sharifzadeh G, Torshizi M, Norozi E. The effect of educational intervention based on self - efficacy theory on pregnancy anxiety and childbirth outcomes among Iranian primiparous women. J Educ Heal Promot. 2022;11(14):1–8.

25. Chen XW, Jiang LY, Chen Y, Guo LF, Zhu XH. Analysis of online antenatal education class use via a mobile terminal app during the COVID - 19

pandemic. BMC Pregnancy Childbirth [Internet]. 2022;22:1–10. Available from: https://doi.org/10.1186/s12884-022-04745-5

26. Heim MA, Makuch MY. Evaluation of a short in-person and online antenatal educational intervention for high-risk pregnant women linked to antenatal consultation. Eur J Midwifery. 2024;8(3):1–7.

27. Ayraler A, Tosun ŞA, Özkök S. Pregnancy school education program in mother friendly training and

.

research hospital impact on stress and anxiety. Rev Assoc Med Bras [Internet]. 2023;69(8):1–6. Available from: https://doi.org/10.1186/s12905-020-01048-9

28. Innab A, Al-khunaizi A, Al-otaibi A, Moafa H. Acta Psychologica Effects of mindfulness-based childbirth education on prenatal anxiety : A quasi-experimental study. Acta Psychol. 2023;238(June 2022):103978.