



Depression In Reproductive And Pregnant Women: A systematic review

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Abstract

This study conducted a systematic review of depression in reproductive and pregnant women.

Articles were searched on PubMed using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), while manual searches were done in Google Scholar. Fourteen articles published between 2013 and 2021 were included in this review. Articles included were written in English, and focused on depression in reproductive and pregnant women and were available as full publications.

Mental health outcomes were specifically improved by Tai Chi and yoga, mindfulness programs, and interpersonal therapy. Protective factors against depression in postpartum women were identified to include employment and mobile applications. Black women are at higher risk of depression than non-black women. Marital status, having a medical condition, going through life-threatening situations, and food insufficiency in the home all contributed to increased anxiety and sadness among women. Early diagnosis and intervention for mental health issues are very important in pregnant and postpartum women, and there is a need for personalized intervention approaches with careful considerations of social, environmental, cultural, and health-related factors.

Keywords: Anxiety, depression, mental health, pregnant women, reproductive women, women psychology

Introduction

In poor nations, depression is the most frequent mental ailment, and the less privileged women are the most vulnerable (Albert, 2015) ^[1]. Depression is a prevalent sickness associated with constant melancholic feelings and loss of interest. Compared to men, women have twice the tendency to develop depression, with peaks around a woman's reproductive years. More than 13% of pregnant women suffer from depression, which is the most frequent mental illness (Biaggi *et al.*, 2016) ^[6]. Smith-Nielsen *et al.* (2018) ^[25] stated that the Edinburgh Postnatal Depression Scale and other validated instruments are used to make the diagnosis, which is based on DSM-5 criteria. However, there are still errors and omissions that are made by healthcare providers when assessing, making a diagnosis, and treating depression during pregnancy, and this results in consequent effects and ramifications for the pregnancy or the fetus. In such circumstances such as having depressive symptoms during pregnancy, formal mental health treatments are uncommon (Albert, 2015) ^[1]. Women should be tested for depression during pregnancy, according to the American College of Obstetricians and Gynecologists. According to the Royal College of Obstetricians and Gynecologists (RCOG), during a pregnant woman's initial experience with prenatal care services, healthcare practitioners should question her mood to identify potential indicators of depression. This will aid healthcare practitioners in delivering all-around and necessary care for pregnant women. Statistics show that over 10% of pregnant women suffer from major depression. This condition is associated with a host of serious health problems for both the mother and her unborn child, including suicidal thoughts or acts, stunted fetal growth, premature birth, low birth weight babies, impaired maternal functioning, inadequate mother-child bonding, and poor developmental outcomes in later years (Grote *et al.*, 2010) ^[17]. It is also important to

examine possible risk factors associated with depression during pregnancy in order to identify pregnant women who are at risk of experiencing depression throughout this period of their lives. Risk factors are defined as "aspects of individual behavior or lifestyle, environmental exposure, or inherited or congenital features that, based on epidemiological research, are known to be associated with a health-related illness that should be avoided." Older age, less education, being unmarried, incapacity to work or being jobless, and lower income are all risk factors for severe depression in non-pregnant women aged 18 to 44 (Meng *et al.*, 2017) ^[20]. Some women have lesser chances of being diagnosed, and these are categorized as younger women (65%), African Americans (73%), Hispanic women (68%), other non-whiten ethnic and racial groupings (68%), and uninsured women (66%) (Meng *et al.*, 2017) ^[20]. Depression is usually symptomatic or unspectacular; thus, often, the disorder is not detected. Information on clearly recognized correlates of depression is necessary to improve depression prevention and treatments since more than the average of women with prenatal depression suffer from pregnancy depression.

Justification

Amongst reproductive and pregnant women, depression has been identified as a very crucial public health problem that needs urgent and specific attention from patients, practitioners, and policymakers. This systematic review of the literature is based on the following

- 1. High prevalence and adverse Outcomes:** Depression amongst reproductive and pregnant women is a global occurrence affecting women of races, colors, and origins. Prevalence rates differ from continent to continent and country to country as well as race to race however, the adverse effects of this clinical problem

may be debilitating to maternal health and the well-being of the fetus. Research indicates that untreated or poorly managed depression may result in low birth weight, pre-term labor as well as poor bonding between mother and child.

2. **Gaps in knowledge and existence of inconsistencies:** There are quite several literatures on depression in reproductive and pregnant women however, there is no consistency in their findings of factors predisposing women to depression, effects, and intervention strategies for depression in pregnant women. This review aims to identify research gaps and inform clinical practice through the synthesis of existing evidence.
3. **Policy implications and clinical significance:** Prevention of adverse outcomes of depression in reproductive and pregnant women is influenced by accurate diagnosis and management. The results of this review will serve as pertinent information for researchers, policymakers, and healthcare professionals. They will also help improve patient mental health outcomes, produce evidence-based policies and guidelines, develop focused treatment plans and interventions, and eventually improve fetal development and postpartum mental health outcomes.
4. **Essence of a comprehensive synthesis:** Based on the foregoing, it is thus necessary to conduct a literature review to integrate existing evidence from various studies, identify areas for further studies, inform policy development and clinical decision-making as well as provide a background for future research focus.

This systematic literature review will, therefore, address the essential need for an intensive understanding of depression in reproductive and pregnant women, with the ultimate result being improved maternal mental health and fetal health outcomes.

Objectives of the study

The objectives of this study are to

1. Review relevant literature and extract data on depression in adult women who are either pregnant or not.
2. Determine from the literature some risk factors, effects, and management/intervention strategies for those who are either pregnant or not.
3. Conduct a methodological quality evaluation of included studies.
4. Suggest likely recommendations for future studies, clinical practice, as well as policy development.

Literature review

Everyone's experience of depression is unique. The rate at which symptoms of depression appear (duration and severity) varies from one individual to another. Manifestation of depression may include melancholy, apprehensiveness, or persistent "empty" emotion; pessimism or a sense of despair; guilt, a sense of worthlessness, or a sense of powerlessness; irritability or a restless feeling; loss of enthusiasm for hobbies and pastimes; loss of energy; difficulties focusing, remembering facts, and making

judgments; having trouble getting asleep or sleeping excessively; appetite loss or overeating; Suicide attempts or thoughts of suicide; aches and pains that don't seem to go away after therapy. Depression can strike even women who have had a good pregnancy and delivery, and the occurrence of severe depressive symptoms can happen either during late pregnancy or postpartum. Women's and babies' health is in danger if depression is left untreated throughout pregnancy and postpartum, and these depressive symptoms can also be a result of past and/or present domestic abuse exposure (Gentile, 2017) ^[14]. Despite the catastrophic effects on mothers, babies, and families, most pregnant women with depression do not undergo comprehensive therapy, which includes assessing risks and benefits. According to a comprehensive review published in 2015, untreated depression can have severe repercussions on the growing infant, such as hyperactivity or irregular fetal heart rate, as well as greater chances of early death and neonatal intensive care hospitalizations (Gentile, 2017; Field, 2017) ^[13, 14]. Antidepressants have been connected to the occurrence of relapse for women who stop taking the medications during pregnancy than women who continue to take them. Yonkers *et al.* (2009) ^[35] explained that the antidepressant medication effect declines from 70% to 27% throughout pregnancy, according to previous studies, and most women don't get any further therapy beyond 6 weeks of pregnancy. Pregnant women with serious depression disorders require medical treatment and psychotherapy. The risk factors for depression include stressful life events, which might put certain women at a higher risk for depression, poor social support, and a history of depression (family and personal). Depression is curable, with the majority of people diagnosed with the illness improving with treatment. In case of personal suspicions of depressive symptoms, consulting the doctor is the next step to take. There have been researches on depression prevalence in people of different ages (Talukder *et al.*, 2014; Ashley *et al.*, 2016; World Health Organization, 2017; Ettman *et al.*, 2020) ^[3, 29, 33], and studies like (Benute *et al.*, 2010; Sūdžiūtė *et al.*, 2020) ^[4, 11, 28] have also explored depression in pregnant women with pre-existing medical conditions. According to McMahon *et al.* (2017) ^[19], the prevalence of mild depression in pregnant women is substantially lower level than that of non-pregnant women. Pregnant women had fewer emotional symptoms, such as depression and failure, as compared to non-pregnant women. In women with and without a depressing condition during pregnancy, Stone *et al.* (2017) ^[26] reported that pregnant women having a depressive illness without antidepressants had a higher variable depressant severity over the period with a 6-month postpartum increase in depression severity. The depression intensity of their treated peers has been persistent and high by comparison. The quality of sleep for pregnant women without depression was poorer than for those on antidepressants. In women suffering from prenatally depressed diseases, the use of antidepressants has significantly increased the effect of sleep quality on depression. Sleep interruptions are larger than when women with prenatal depression use antidepressants. These ladies or their remitted counterparts are not adequately treated for sleep disturbances and are prone to significant harmful impacts on mental and physical health. Also, Ashley (2017) reported that pregnant and non-pregnant US women exhibited identical rates of depression, according to

the binary logistic regression. Pregnant women had a greater incidence of moderate depression, but the study also found no correlation between pregnancy and the development of severe depression. In a report by Gomà *et al.* (2020) [16], prenatal risk factors such as child abuse, living in a rented room, and history of violence were shown to be related to the incidence of mental illness. In populations with a significant socio-economic disadvantage, anxiety-depressive symptomatology levels were observed to double. Accumulated Associated Factors (AAF) were found in the populations at risk of anxiety and depression, therefore necessitating the need to identify and avoid resources during pregnancy. According to Dama *et al.* (2018) [8], maternal depression can influence both the expecting mother and family during pregnancy. They also reported that iron deficiency in the general population was connected with depression, although they did not consider it correlated during the prenatal period. Thus, iron deficiency was identified as an essential maternal depression risk factor during pregnancy. According to Vameghi *et al.* (2018) [31], socioeconomic position had a direct and indirect impact on depression, while perceived stress had a direct impact, and social support had a direct impact. In their study, El Kissi *et al.* (2013) [10] found that women reported higher levels of psychological discomfort than males in a variety of symptom categories, such as low self-esteem, anxiety, general psychopathology, and depression. Wu *et al.* (2014) [34] reported that, among Chinese women in couples undergoing *In vitro* fertilization (IVF), depression was shown to be more common in women who had been married for more than eight years, women who had been infertile for more than six years, and women whose family income was less than 3000 CNY a month. Increased risk of depression was linked to lower oocyte number, higher levels of basal follicle-stimulating hormone (FSH), and denial score. High levels of oestradiol (base and peak), as well as drug use and humor, were linked to a decreased risk of depression. Several women in IVF-treated couples were diagnosed with depression. The study advised that women with risk factors for depression should take preventive measures. Glowinska *et al.* (2020) [15] showed that anxiety and symptoms of depression were more prevalent in women with polycystic ovarian syndrome.

Depression in reproductive and pregnant women is a multifaceted phenomenon; this research, therefore, aims to critically review some studies on depression in reproductive women (pregnant and non-pregnant).

Methods

Research design

In this research, the association between depression and the mental health of pregnant and reproductive women is examined using a systematic review methodology. Any research topic requires a thorough examination of the body of literature that has been written about it. This analysis synthesizes a variety of viewpoints and evidence from the field. The process of identification, selection, and evaluation of selected studies gives room for thoroughness and transparency in the findings of systematic review. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol recommendations were used in the development of the review's procedure (Page *et al.*, 2021).

Search Strategy and Data Collection

Articles were searched on the PubMed database using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), while manual searches were done in Google Scholar (Appendix I). These databases were selected because they are accessible and convenient. Key search terms used were "Reproductive women," "Pregnant women," "Prenatal depression," "Antenatal depression," "Non-reproductive women," "Women not diagnosed with depression," "Depression," and "Maternal mental health outcomes." Boolean operators (OR/AND) were used in combination with the main search terms for improved relevance and search results. Abstracts and titles were thoroughly examined to decide whether they satisfied the review's inclusion requirements (Appendix II). Included studies were independently screened by all authors of the review to ensure the quality of each study included in the final synthesis. The quality of each included article was assessed using the CASP checklist (appendix III).

Results and Discussion

A total of 14 papers (appendix I) were found using the systematic literature search, from which information was taken (Appendix IV). Field *et al.* (2013) [12] explored the potential advantages of combining yoga and tai chi for the treatment of perinatal depression. 92 participants participated in the randomized clinical trial, which assessed sleep disturbances, depression (as measured by the Center for Epidemiological Studies-depression scale), and anxiety symptoms using the State Anxiety Inventory (STAI) and the findings suggest that a combination of yoga and tai chi led to more significant reductions in sadness, anxiety, and sleep disruption scores during the course of therapy. The purpose of Zlotnick *et al.*'s study (2016) [36] was to find out how well interpersonal therapy works to lower pregnant women's risk of postpartum depression (PPD). Twenty-five at-risk pregnant women (18 years of age and older) receiving public assistance participated in the randomized control experiment. The population was randomized to either the treatment as usual control (TAU) program or the IPT group intervention; 23% of the participants were Black, and 38% were Hispanic. Following a 6-month trial period, the overall depression rate in the intervention group was lower than that of the control group (16% vs. 31%), and the effect of the intervention was statistically significant ($p < 0.05$).

The benefits of a nursing intervention called the Benson relaxation method on depression levels in hospitalized women with high-risk pregnancies were examined by Araujo *et al.* (2016). 50 women participated in the five-day randomized clinical trial, split into two groups (control-25 and intervention-25). The Edinburgh Postnatal Depression Scale (EPDS) was used to measure depressive symptoms and indicators. The results demonstrated that the intervention group's depression levels declined during the course of the trial as compared to the initial time point leading to the conclusion that the Benson relaxation

technique was a successful nursing intervention for treating depressive symptoms in hospitalized women who were carrying high-risk pregnancies. Lewis *et al.* (2017) ^[18] examined the association between depressive symptomatology and work status in women at risk for PPD by conducting a randomized experiment with 124 participants (18-42 years of age). EPDS was used to assess depression symptomatology. Findings showed that being employed 7-months postpartum resulted in lower depression symptomatology. In women who had jobs outside their homes, working full-time or part-time did not show any significant effect on depression symptomatology. Consequently, employment was identified as a protective factor for postpartum depression symptomatology.

In pregnant women, Truijens *et al.* (2017) ^[30] studied depressed symptoms to see if women with different depression patterns had distinct characteristics. In 10-15% of pregnant women, depending on the quarter, higher scores of depression were seen. Up to 4% of women reported being depressed at some time during pregnancy, and in different patterns, depressive symptoms were identified, with persistent symptoms associated accidentally with causes other than increased symptoms. In addition to the past, important life events were related to greater levels of depression as the biggest predictor in all mental health difficulties. A study conducted by Coelho *et al.* (2019) ^[7] examined the efficacy of a control application and a well-being mobile application in managing depression among working women. Six hundred and fifty-three people were randomly assigned to the intervention and control groups. While both groups shown a substantial improvement in overall well-being over time, the study's results revealed that only the intervention group had a significant rise in work-related well-being and a significant decrease in overall and work-related stress. A study by Pan *et al.* (2019) ^[21] examined the impact of mindfulness-based training on the mental health of pregnant and postpartum women. Seventy-four women were split into intervention groups and comparison groups in this single-blinded randomized control experiment. The intervention group's participants underwent silent meditation for seven hours every day in addition to eight sessions of three-hour courses that were given once a week. Psychological health was evaluated both at baseline and three months after giving birth. The two groups' levels of stress and depression differed significantly, however at three months after giving birth, the intervention group's ratings were higher than those of the comparison group. Three months after giving birth, it was found that there was no discernible change in the two groups' mindfulness ratings. Thus, the study came to the conclusion that teaching and practicing mindfulness meditation and parenting education during pregnancy may assist pregnant women who are transitioning to motherhood feel less stressed and depressed.

The goal of Patten *et al.* (2020) ^[22] was to look at the relationship between American Indian or Alaska Native

women's prenatal tobacco use, stress, and depression. In order to reduce tobacco use among Alaskan Native women in 16 communities during pregnancy and after giving birth, a community-level intervention was compared to standard care in a cluster-randomized experiment. Depression was measured using the Perceived Stress Scale (PSS), the Centre for Epidemiological Studies-Depression (CES-D), point-prevalence current use of any tobacco, and 7-day baseline measures of self-reported depression. The results demonstrated that tobacco users had lower PSS scores and less clinical depression than nonusers. Thus, the study demonstrated that smoking reduced the clinical symptoms of depression in this study population. A cross-sectional and case-control survey was created by Sinaci *et al.* (2020) ^[24]. Permission to administer the Spielberger Spielberger State-Trait Anxiety Scope Framework (STAI-T) and Beck Anxiety Inventory (BAIs) in Turkish was granted to ambulatory women with high-risk pregnancies as the study group and normal pregnancy as a control group. For the research, a total of 446 women were recruited. High-risk pregnant women have been shown to have a greater incidence of COVID-19 anxiety than pregnant women without any risk factors. There was a statistically significant difference in anxiety among high-risk pregnant women, whereas high school graduates had greater levels of Beck's anxiety. Threatened preterm labor had the lowest levels of thrombophilia, whereas individuals at high risk of preterm and early membrane rupture had the greatest levels of trait anxiety at the pandemic level. The COVID-19 pandemic emphasized the benefits of routine psychosocial, anxiety, and depression screening for high-risk pregnant women. Most high-risk patients have co-morbid conditions as a result of the stress caused by the COVID-19 pandemic. They have higher anxiety levels but are thus more prone to get the infection.

Bante *et al.* (2021) ^[5] investigated the incidence of comorbid anxiety and depression (CAD) and its contributing variables among pregnant women. 667 pregnant women participated in the community-based cross-sectional study, which used the 9-item Patient Health Questionnaire (PHQ-9) and the 7-item Generalized Anxiety Disorder (GAD-7) scale to measure anxiety and sadness. The prevalence of CAD was 10.04% in the entire study population. The following variables were shown to be linked to CAD: being married (the most common), having a health condition, seeing pregnancy warning symptoms, going through life-threatening situations, and food insecurity in the home. Prenatal mental health screening and treatments, prompt identification and treatment of medical issues, pregnancy-associated diseases, and dietary interventions are therefore necessary to reduce the risks of CAD in pregnant women.

Deligiannidis *et al.* (2021) ^[9] conducted a double-blind, randomized clinical trial with 153 postpartum women (6 months or less) with PPD who were between the ages of 18 and 45 to assess the impact of Zuranolone vs. placebo in the US. The Hamilton Rating Scale for Depression (HAM-D-17)

was used for the measurements; a score of 26 or more was considered depressive. For 14 days, 30 mg of the intervention placebo quinolone was administered orally every evening in a 1:1 randomized fashion. At day 15, the Zuranolone group's scores had significantly improved from the baseline when compared to the placebo group. At day 15, there were persistent differences favoring quinolone in the Hamilton Rating Scale for Anxiety score, Montgomery-Åsberg Depression Rating Scale score change from baseline, HAMD-17 response, and HAMD-17 score remission. These results suggest that quinolone is useful in treating women with PPD since it reduced the symptoms of depression.

Racial differences in mental health outcomes among women who experience early pregnancy loss were examined by Shorter *et al.* (2021) [23]. Three hundred people participated in the research. Thirty days following early pregnancy loss therapy, a score of 21 or higher on the CES-D (Centre for Epidemiological Studies-Depression) scale was considered to be at risk for serious depression. According to the findings, 24% of individuals had a severe depressive disorder risk, and Black participants were more likely to have this condition than non-Black participants. Accordingly, the study found that Black women were twice as likely as non-Black women to suffer from serious depression 30 days following treatment, and that one in four women who lose a pregnancy are at higher risk. 168 pregnant adult women who could be at risk for perinatal depression were split into two groups in a research by Sun *et al.* (2021) [27]: one group received mindfulness training via smartphone throughout pregnancy, while the other group received attention control. Online self-assessment was used to evaluate postpartum mental health indicators at five different time periods. Depression (as indicated by symptoms) was one of the primary outcomes; fear, stress, sleep, exhaustion, anxiety, affect, and memory were secondary outcomes. Results showed that there was significant depression improvement in the mindfulness training group as well as secondary outcomes compared to control groups. In addition, the mindfulness training group was less likely than the attention control group to have positive depression symptoms as measured by the Edinburgh Postnatal Depression Scale [EPDS]. With varying EPDS reduction scores from before to after the intervention, there was also a noticeably greater remission of depressive symptoms. Thus, mindfulness training on a smartphone is a useful way to treat mother perinatal depression in the early stages of pregnancy.

In a research by Van Lieshout *et al.* (2021) [32], the impact of Usual Care Alone versus Online 1-Day Workshops Based on Cognitive Behavioural Therapy Plus Usual Care was assessed for Postpartum Depression. During the COVID-19 pandemic, 403 PPD-afflicted women from Ontario, Canada participated in the research. The Edinburgh Postnatal Depression Scale (EPDS) was used to measure depression; participants had to be at least 10 years old, 18 years of age

or older, and have a baby younger than 12 months old to be eligible for participation. In addition to treatment, women were randomized to attend a live, interactive, online one-day class based on cognitive behavioral therapy from a certified healthcare professional. EPDS scores decreased significantly on average, with individuals probably seeing the most changes. Positive affectivity/surgency in newborns, increases in social support, less infant-focused anxiety, and enhanced mother-child connection were also seen.

It is not uncommon for women of reproductive age to experience depression. Depression is the most prevalent mental disease among pregnant women, affecting almost 13% of them, according to Biaggi *et al.* (2016) [6]. Therefore, screening for pregnancy and postpartum depression symptoms is necessary for women. Preterm delivery or low birth weight neonates, fetal growth impairment, maternal self-harm or suicide, poor functioning, inadequate mother-child bonding, and adverse effects on later childhood development are only a few of the serious repercussions that depression has on women and their children (Grote *et al.*, 2010) [17]. Prevalence rates of depression in women, whether pregnant, not pregnant, or giving birth, are consistent with the results of this review (Truijens *et al.*, 2017; Coelhoso *et al.*, 2019; Bante *et al.*, 2021) [5, 7, 30].

Numerous researches have determined that low income, marriage, unemployment, being unmarried, and inadequate education are risk factors or predictors of depression in women who are pregnant or have just given birth (Meng *et al.*, 2017) [20]. Being single was not included as a contributing factor to the prevalence of depression among African women in the Bante *et al.* (2021) [5] research. According to the study's findings, women who lose a pregnancy too soon are more likely to suffer from depression (Sun *et al.*, 2021) [27]. The results of this review indicate that a quarter of African women experienced CAD related to factors such as marriage (being married), presence of medical illness, signs of pregnancy dangers, life-threatening events, and food insecurity within the home (Bante *et al.*, 2021) [5], despite other literature suggesting that younger women (65%), African Americans (73%), Hispanic women (68%), other non-white ethnic and racial groupings (68%) and uninsured women (66%) had a lower chance of receiving a depression diagnosis (Meng *et al.*, 2017) [20]. This research found that a number of therapies, including as tai chi/yoga (Field *et al.*, 2013) [12], mindfulness training (Pan *et al.*, 2019; Sun, *et al.*, 2021; Van Lieshout *et al.*, 2021) [21, 27, 32], IPT-based interventions (Zlotnick *et al.*, 2016) [36], relaxation techniques (Araújo *et al.*, 2016) [2], postpartum employment (Lewis *et al.*, 2017) [18], medicine (Deligiannidis *et al.*, 2021) [9], and relaxation techniques (Araújo *et al.*, 2016) [2], are useful in managing depression. For depressed reproductive women who were pregnant, not pregnant, or postpartum, a number of other non-generalized kinds of therapies had noteworthy results (Coelhoso *et al.*, 2019) [7].

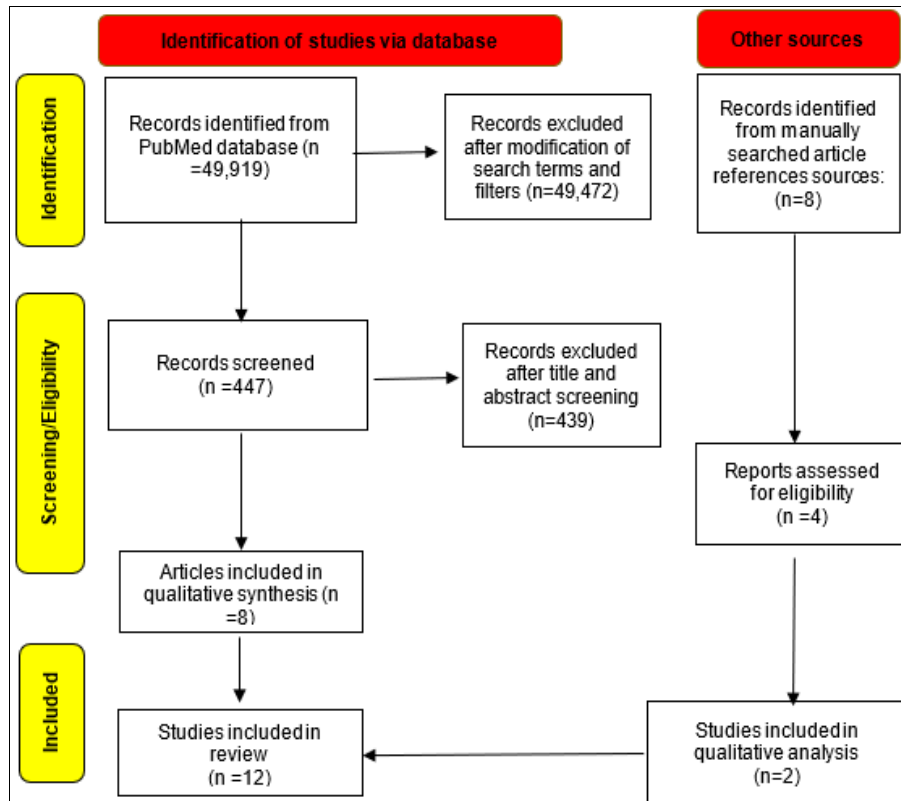


Fig 1: PRISMA flow diagram

Table 1: Selection criteria

Criteria	Included	Excluded
Language	English	Non-English
Timeline	20130101-20211231	Publications outside the chosen dates
Article type	Articles that focused on depression in reproductive and pregnant women and were available as full publications.	Articles that were not focused on depression in reproductive and pregnant women; articles that only mentioned depression in reproductive and pregnant women and/or only abstracts were available.
Study type	Clinical trials and primary randomized control trials (RCTs).	Secondary studies (such as reviews, systematic reviews)

Table 2: CASP scores for included articles

1 st author (year of study)	CASP criterion ^a										Total Score ^b
	1	2	3	4	5	6	7	8	9	10	
Field, et al. (2013)	2	2	2	2	2	1	0	2	2	2	17
Zlotnick, et al. (2016)	2	2	2	2	2	2	0	2	2	2	18
Araujo, et al. (2016)	2	2	2	2	2	2	2	1	2	2	19
Lewis, et al. (2017)	2	2	2	2	2	1	2	2	2	2	19
Truijens, et al. (2017)	2	2	2	2	2	0	2	2	2	2	18
Coelhoso, et al. (2019)	2	2	2	2	2	0	2	2	2	2	18
Pan, et al. (2019)	2	2	2	2	2	0	2	2	2	2	18
Patten, et al. (2020)	2	2	2	2	2	0	0	2	2	2	16
Sinaci, et al. (2020)	2	2	2	2	2	1	2	2	2	2	19
Bante, et al. (2021)	2	2	2	2	1	0	2	2	2	2	17
Deligiannidis, et al. (2021)	2	2	2	2	2	2	2	2	2	2	20
Shorter, et al. (2021)	2	2	2	2	2	0	0	2	2	2	16
Sun, et al. (2021)	2	2	2	2	2	2	2	2	1	2	19
Van Lieshout, et al (2021)	2	2	2	2	2	0	2	2	2	2	18

Table 3: Summary of findings of Included studies

Title	Author(s) /year	Method	Key findings
1. Tai chi/yoga reduces prenatal depression, anxiety and sleep disturbances	Field, et al. 2013	Randomized clinical trial	Prenatally depressed pregnant women who underwent tai chi/yoga experienced lower depression, lower negative affect and somatic/vegetative symptoms, lower anxiety and lower sleep disturbances.
2. Randomized controlled trial to prevent postpartum depression in mothers on public assistance	Zlotnick, et al. 2016	Randomized controlled trial	Interpersonal therapy (IPT) based intervention led to significantly lower levels of overall depression in the intervention group at 6 months than control group.
3. Effects of relaxation on depression levels in women with high-risk pregnancies: a randomised clinical trial	Araujo, et al. 2016	Randomized clinical trial	Relaxation technique effectively reduced symptoms of depression in women with high-risk pregnancies who have been admitted to hospital.
4. The relationship between employment status and depression symptomatology among women at risk for postpartum depression	Lewis, et al. 2017	Cross-sectional survey	Postpartum employment was associated with lower depression symptomatology. There was no significant difference in depression symptomatology between women who worked fulltime versus part-time.
5. Different patterns of depressive symptoms during pregnancy	Truijens et al. 2017	Survey	Depending on the trimester, elevated depression scores were reported in 10-15% of pregnant women with up to 4% of women admitted to feeling sad at some time throughout their pregnancy.
6. A new mental health mobile app for well-being and stress reduction in working women: randomized controlled trial.	Coelho, et al. 2019	Survey	Randomized and intervention groups showed that both groups showed a significant increase in general well-being as a function of time. However, only the intervention group presented a significant increase in work-related well-being as well as a significant reduction in work-related and overall stress
7. Assessing the effectiveness of mindfulness-based programs on mental health during pregnancy and early motherhood – a randomized control trial	Pan et al. 2019	Randomized clinical trial	A significant difference was observed in stress and depression in intervention and comparison group over time. Stress and depression scores were significantly better in the intervention group than in the comparison group. Mindfulness scores were not significantly difference between intervention and comparison groups at 3-months postpartum.

Conclusion

According to the results of this comprehensive review, depression is a common public health issue among women of reproductive age and pregnant women, and there is evidence that black women are more likely to experience it than non-black women. Numerous studies have demonstrated that a mix of work, mindfulness training, interpersonal therapy, relaxation methods, mind-body practices, and smartphone-based therapies are effective ways to treat and manage depression in pregnant and postpartum women. It has been demonstrated that these techniques greatly lessen anxiety and depressive symptoms both during and after pregnancy. Mental health outcomes were specifically improved by Tai Chi and yoga, mindfulness programs, and interpersonal therapy. Protective factors against depression in postpartum women were identified to include employment and mobile applications. Medication use such as quinolone was also efficacious in reducing symptoms of depression compared to women not taking the drug. Factors including tobacco use or non-use, the COVID-19 pandemic, and high-risk pregnancy have been found to exacerbate anxiety and sadness in sensitive groups. In particular, among African women, CAD was exacerbated by being married (the highest), having a medical condition, experiencing pregnancy risk signals, going through life-threatening situations, and suffering food hardship in the home.

Therefore, in light of the necessity for individualized intervention techniques that carefully take into account social, environmental, cultural, and health-related aspects, the review emphasizes the importance of early identification and intervention for mental health concerns in pregnant and postpartum women. Conclusively, the findings of this review provide further evidence that the inclusion of interventions in postpartum and prenatal care results in improved maternal mental health and overall well-being as well as baby health.

Future perspectives

- 1. Comparative studies:** Clear insights on treatment effects can be determined by conducting comparative research involving the different intervention methods enumerated in this review. This can result in personalized depression interventions that consider the individual's characteristics and specific needs.
- 2. Role of health:** Digital health has shown significant importance in the management of depression in women. The focus of future research should be on this topic and how the results might be used to the treatment of depression in pregnant and reproductive women.
- 3. Therapeutic mechanisms:** There is a need for further studies to understand how the interventions identified in this study improve symptoms of depression in women.
- 4. Multidisciplinary approaches:** A deeper knowledge of how to promote women's mental health requires collaborative research between social workers and healthcare practitioners that incorporates community-based, psychological, social, and medical treatments.
- 5. Prevention rather than treatment:** Instead than focusing on therapy, future research could identify risk groups (and causes) and symptoms early in order to avoid depression. This will no doubt lead to lower cases of occurrence and severity of depression in women.
- 6. Improvement of healthcare delivery:** Research should be conducted for proper integration of interventions for women's mental health into healthcare systems already in place at health facilities. This will aid policymakers to make the right decisions.

Appendices

Appendix I: PRISMA flow diagram

Appendix II: selection criteria

Appendix III: CASP scores for included articles

Appendix IV: Summary of findings of included studies

Disclosure of interest

The authors report no conflict of interest.

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