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Perinatal mental health and inequality

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Perinatal mental health and inequality

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Living With Parents-In-Law Increased the Risk of Postpartum Depression in Chinese Women

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Background: A variety of psychological and socioeconomic factors contribute to the development of postpartum depression (PPD). However, the relationship between maternal living arrangements and PPD is unclear.

Objective: To assess the relationship between maternal living arrangements and PPD in Chinese population.

Methods: A cross-sectional survey was conducted among puerperal women delivered in Baoan Maternal and Child Health Hospital in Shenzhen, China. The Edinburgh Postnatal Depression Scale (EPDS) was used to assess PPD. A score of ≥10 was used as the threshold for postpartum depression.

Results: A total of 4,813 women were recruited, of whom 2,535 (52.7%) lived only with their husbands, 664 (13.8%) lived with their parents, and 1,614 (33.5%) lived with their parents-in-law. Compared with women who lived with husbands, puerperal women who lived with their parents-in-law were more likely to be positive for PPD screening (14.1 vs. 10.5%, $P < 0.001$). After adjusting for other influencing factors, living with parents-in-law was significantly associated with the risk of PPD (OR = 1.38, 95% CI, 1.12–1.70). Additionally, stratification analyses showed that the association between living with parents-in-law and the presence of PPD was more significant in women with anxiety during pregnancy (P for interaction <0.05).

Conclusions and Relevance: Our data confirms that the maternal living arrangements affect the risk of PPD, especially among women with anxiety during pregnancy. Therefore, more targeted preventive measures should be taken for postpartum depression in women who live with their parents-in-law.

Keywords: postpartum depression, living arrangements, interaction, parents-in-law, risk

INTRODUCTION

Postpartum depression (PPD) is a common perinatal complication, affecting 0.5–60% of women worldwide (1, 2). A recent systematic review reported that pooled prevalence of PPD in China was 15% (3). There is accumulating evidence that PPD increases the risk of death for mothers and children (4). Mothers with PPD tend to have a poor marital relationship and impaired social function (5, 6). Previous studies have shown that maternal PPD can impair the cognitive, emotional, and physical development of offspring in infancy, childhood and even adolescence (7–9). Findings from published studies have identified several risk factors associated with PPD, including lack of social support, adverse childhood experiences, stressful life events, unsatisfactory marital relationship, and fetal or neonatal health problems (10–14). It has been hypothesized that there may be underlying biological mechanisms behind these associations.

Personal living arrangements are viewed as an important factor affecting health (15–17). However, previous studies mainly focused on the health problems of the elderly (18, 19). Among older adults, living together is a protective factor for physical and mental health due to daily care and emotional support, which may have the same effect in maternal groups. But few studies have focused with interest on the relationship between living arrangements and the health of puerperal women. In China, multi-generation families used to be the main living arrangement, and puerperal women were usually looked after by their parents-in-law (20). As a result, puerperal women may obtain more family support, which may buffer the risk of PPD. In Chinese traditional culture, offspring are expected to obey their parents, and daughter-in-law are even expected to be submissive in a shared living environment (21–23). However, with economic development and alterations in social factors including the increase in the level of education and the spread of scientific knowledge of parenting, significant changes have taken place among women in the puerperium (24). Hence, living together can easily lead to family conflicts and adversely affect maternal mental health due to the differences in thinking and parenting concepts between older parents and younger mothers. It is therefore a key question as to whether such living arrangements may exacerbate or buffer the risk of PPD in these puerperal women.

A preliminary investigation by Honjo et al. (25) used a national cohort study database to assess the association between co-resident family members and PPD risk and ultimately reported a positive association between living with parents-in-law and PPD risk. However, this study failed to adjust for prenatal emotional factors known to influence PPD, including depression and anxiety during pregnancy. Another cross-sectional study from China found that living with in-laws was associated with an increased risk of PPD (20). However, this study did not explore whether this association was modified by other factors. Furthermore, a Pakistani study yielded inconsistent results with a reduced risk of PPD among women in the puerperium who lived with their in-laws (26). Therefore, this association between maternal living arrangements and PPD remains to be verified.

As China's two-child policy opens up and more mothers begin to have children, they may face cohabitation between mothers-in-law and daughters-in-law. Hence, understanding this relationship is essential for targeting interventions that will reach the most vulnerable in China and other Asian countries where most puerperal women live in multi-generational families. Therefore, we performed this cross-sectional survey to investigate the relationship between maternal living arrangements and the risk of PPD among Chinese women, and explore whether this association was modified by other factors.

METHODS

Study Design and Participants

This cross-sectional survey was conducted at Baoan Maternity and Child Health Hospital in Shenzhen, China from January 1, 2016 to December 31, 2016. The Edinburgh Postpartum Depression Scale (EPDS) was used to screen all women who gave birth in this hospital and returned to the hospital for routine follow-up 6 weeks after delivery. A total of 5,756 women were invited to participate in this study. Of them, 5,043 (87.6%) women agreed to fill out the questionnaire through face-to-face interviews. Subsequently, 230 participants were excluded due to incomplete data on living conditions or PPD. Finally, this study included 4,813 participants.

The study protocol was approved by the Institutional Review Committee of Baoan Maternity and Child Health Hospital, Jinan University. The methodology followed the principles of the Declaration of Helsinki. All subjects provided written informed consent forms for participation.

Measures

Maternal Living Arrangement

Information about the maternal living arrangements was obtained by asking the following question: Who did you live with after childbirth? In the current study, the living arrangements were divided into three categories: living only with husband, living with parents, and living with parents-in-law.

Screening for Postpartum Depression

The Edinburgh Postpartum Depression Scale (EPDS) was used to assess postpartum depression. EPDS consists of 10 items, each with a score of 0–3. The total score ranges from 0 to 30, the higher the score, the greater the risk of PPD. The EPDS has been translated and validated in many countries, with various cut-off points during the postnatal period, such as Turkey (12.5) (27), Malta (11.5) (28), Spain (10.5) (29), and India (8.5) (30). In 1998, Lee et al. translated and validated the Chinese version of the EPDS and identified 9/10 as the optimal cut-off for the study population. Using this cut-off value, the sensitivity of the scale was 82% and the specificity was 86% (31). In this study, a score $\geq$10 was considered an indicator of PPD, which was consistent with previous study (32). The Cronbach's alpha value of this study was 0.826.

Assessment of Covariates

A self-designed questionnaire was used to collect sociodemographic data such as age, education level, employment status, and reproductive history, as well as psychiatric history.

Also, we collected pregnancy-related data including gestational diabetes mellitus (GDM), depression and anxiety during pregnancy, pregnancy-induced hypertension (PIH), stressful life events, mode of delivery, gestational age, birth weight, fetal sex, malformation, and feeding pattern. We then checked the accuracy of these data based on the participants' medical records.

Statistical Analysis

The continuous variables were expressed as means ± standard deviations (SDs), and the categorical data was present as numbers and proportion (%). Analysis of variance (ANOVA) was used to examine the differences between continuous variables, and chi-squared tests were used to compare the categorical data. PPD was considered a dependent variable (dummy code, 0 = no, 1 = yes), and several logistic regression models were used to estimate the odds ratios (ORs) with 95% confidence intervals (95% CIs) between maternal living arrangements and PPD risk. Subgroup analyses were performed stratified by age (<35, ≥35 years), education level (junior or below, senior middle school, college, or university), employment status (full-time, self-employed, housewife, other), primipara (yes, no), GDM (yes, no), depression during pregnancy (yes, no), anxiety during pregnancy (yes, no), stressful life events (yes, no), male infant (yes, no), cesarean delivery (yes, no), preterm birth (yes, no), low birth weight (yes, no), and feeding pattern at 6 weeks (exclusive, partial, formula only). The multiplicative interaction was tested by a likelihood ratio test in logistic regression model to assess the interaction between other variables and living arrangements. The statistical significance was evaluated at the level of 5% (two-tailed test). Statistical analyses were performed using SPSS 18.0 software (SPSS, Chicago, IL, USA).

RESULTS

Sociodemographic and Pregnancy-Related Characteristics of Participants

Of the 4,813 puerperal women enrolled in this study, 559 (11.6%) were considered to have PPD. The average age of the participants was 29 years, with an interquartile range from 27 to 32 years old. According to the puerperal women's living arrangements, we divided these women into three groups: (1) living only with their husband; (2) living with their parents; and (3) living with their parents-in-law. The numbers of women in these three groups were 2,535 (52.7%), 664 (13.8%), and 1,614 (33.5%), respectively, and the corresponding prevalence of PPD was 10.5, 9.8, and 14.1%, respectively (shown in **Figure 1**). The prevalence of PPD was significantly different between women living only with husbands and women living with parents-in-law ($P < 0.001$). However, there was no significant difference in the prevalence of PPD between women living with parents and women living only with husbands ($P > 0.05$).

Table 1 shows the demographic characteristics and pregnancy-related factors of the three groups. Women living with their parents-in-law were younger and had lower rates of primipara and cesarean section than women in the other two groups. In addition, there were significant differences in education level, employment status, and breastfeeding status at 6 weeks among the three groups. However, other demographic characteristics or pregnancy-related factors did not show significant differences among the groups, in terms of past psychiatric history, family history of mental illness, GDM, PIH, depression, and anxiety during pregnancy, stressful life events, male infant, preterm birth, low birth weight, and malformation.

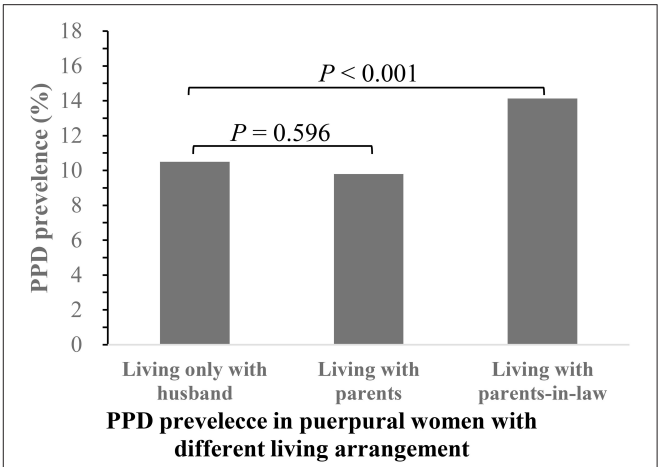

FIGURE 1 | The PPD prevalence in puerpural women with different living arrangement.

Living Arrangement and PPD Risk

The results of the unadjusted and adjusted logistic regression analyses are listed in **Table 2**. We used four logistic regression models to control for the confounders of PPD. Model 1 (the unadjusted model) showed that women who lived with their parents-in-law (OR = 1.40; 95% CI, 1.16–1.70) had a higher risk of developing PPD than women who lived only with their husbands. Model 2 indicated that women living with their parents-in-law (OR = 1.38; 95% CI, 1.14–1.67) had an increased risk of developing PPD after adjusting for age, education, employment status, past, and family history of mental illness. In previous studies (33, 34), these covariates have been reported to be associated with the PPD risk. In Model 3, we adjusted for the effects of parity, GDM, PIH, depression and anxiety during pregnancy, and stressful life events on outcome variable, and we observed that women who lived with their parents-in-law had a significantly higher risk of developing PPD (OR = 1.40; 95% CI, 1.14–1.72) than those who only lived with their husbands. Finally, in Model 4, we made additional adjustments for the infant sex, mode of delivery, preterm birth, low birth weight, malformation, and feeding pattern at 6 weeks, which were also risk factors for PPD. The ORs remained statistically significant, with a value of 1.38 (95% CI, 1.12–1.70) for women who lived with parents-in-law compared with women who only lived with their husbands. However, in the 4 models, there was no significant difference in the risk of PPD between women who lived with their parents and those who lived only with husbands.

TABLE 1 | Social-demographic characteristics according to PPD status of women.

Characteristics	Living only with husband (*n* = 2,535)	Living with parents (*n* = 664)	Living with parents-in-law (*n* = 1,614)	*P*-value
Age at birth (years)	29.78 ± 4.29	29.88 ± 4.30	28.65 ± 4.06	<0.001
Education age	13.61 ±2.70	14.16 ± 2.56	14.01 ± 2.51	<0.001
Education level				<0.001
Junior middle school or less	313 (12.3%)	62 (9.3%)	154 (9.5%)	
Senior middle school	782 (30.8%)	161 (24.2%)	426 (26.4%)	
College or university	1,440 (56.8%)	441 (66.4%)	1,034 (64.1%)	
Employment status				0.001
Full-time employed	1,437 (56.7%)	385 (58.0%)	976 (60.5%)	
Self-employed	399 (15.7%)	111 (16.7%)	196 (12.1%)	
Housewife	263 (10.4%)	47 (7.1%)	140 (8.7%)	
Other	436 (17.2%)	121 (18.2%)	302 (18.2%)	
Past psychiatric history	24 (0.9%)	7 (1.1%)	7 (0.4%)	0.135
Family history of mental illness	37 (1.5%)	5 (0.8%)	27 (1.7%)	0.242
Primipara	1,167 (46.0%)	292 (44.0%)	637 (39.5%)	<0.001
Gestational diabetes mellitus	185 (7.3%)	44 (6.6%)	117 (7.2%)	0.832
Pregnancy-induced hypertension	105 (4.1%)	20 (3.0%)	47 (2.9%)	0.081
Depression during pregnancy	178 (7.0%)	46 (6.9%)	135 (8.4%)	0.236
Anxiety during pregnancy	420 (16.6%)	107 (16.1%)	284 (17.6%)	0.594
Stressful life events	97 (3.8%)	28 (4.2%)	72 (4.5%)	0.594
Male infant	1,342 (52.9%)	352 (53.0%)	854 (52.9%)	0.999
Cesarean delivery	884 (34.9%)	232 (34.9%)	489 (30.3%)	0.006
Gestational weeks	38.87 ±1.59	38.79 ± 1.82	38.88 ± 1.63	0.456
Preterm birth	145 (5.7%)	43 (6.5%)	86 (5.3%)	0.560
Birth weight	3219.02 ±467.26	3215.21 ± 492.76	3208.20 ± 464.89	0.770
Low birth weight	125 (4.9%)	38 (5.7%)	78 (4.8%)	0.655
Malformation	56 (2.2%)	10 (1.5%)	31 (1.9%)	0.490
Breastfeeding status at 6 weeks				<0.001
Exclusive	1,640 (64.7%)	368 (55.4%)	938 (58.1%)	
Partial	773 (30.5%)	252 (38.0%)	571 (35.4%)	
Formula only	122 (4.8%)	44 (6.6%)	105 (6.5%)	

TABLE 2 | OR (95% CI) of postpartum depression according to puerperal women's living situation.

Characteristics	Living only with husband	Living with parents	*P*-value	Living with parents-in-law	*P*-value
No. of participants	2,535	664	–	1,614	–
Model 1	Ref.	0.93 (0.70–1.23)	0.596	1.40 (1.16–1.70)	<0.001
Model 2	Ref.	0.96 (0.72–1.28)	0.763	1.38 (1.14–1.67)	0.001
Model 3	Ref.	0.97 (0.72–1.32)	0.868	1.40 (1.14–1.72)	0.001
Model 4	Ref.	0.95 (0.70–1.29)	0.739	1.38 (1.12–1.70)	0.002

OR, odds ratio; CI, confidence interval.

Model 1: unadjusted.

Model 2: adjusted for age, education level, employment status, past psychiatric history, family history of mental illness.

Model 3: adjusted for covariates in model 2 and parity, GDM, PIH, depression during pregnancy, anxiety during pregnancy, stressful life events.

Model 4: adjusted for covariates in model 3 and infant gender, mode of delivery, preterm birth, low birth weight, malformation, feeding method at 6 weeks.

Interaction of Other Variables and Living Arrangement

Stratification analyses revealed that the association between living with parents-in-law and the presence of PPD was more significant in women with anxiety during pregnancy (P for interaction <0.05). No interaction was observed between livingwith parents-in-law and the presence of PPD in women with any other variables (P for interaction >0.05) (**Figure 2**).

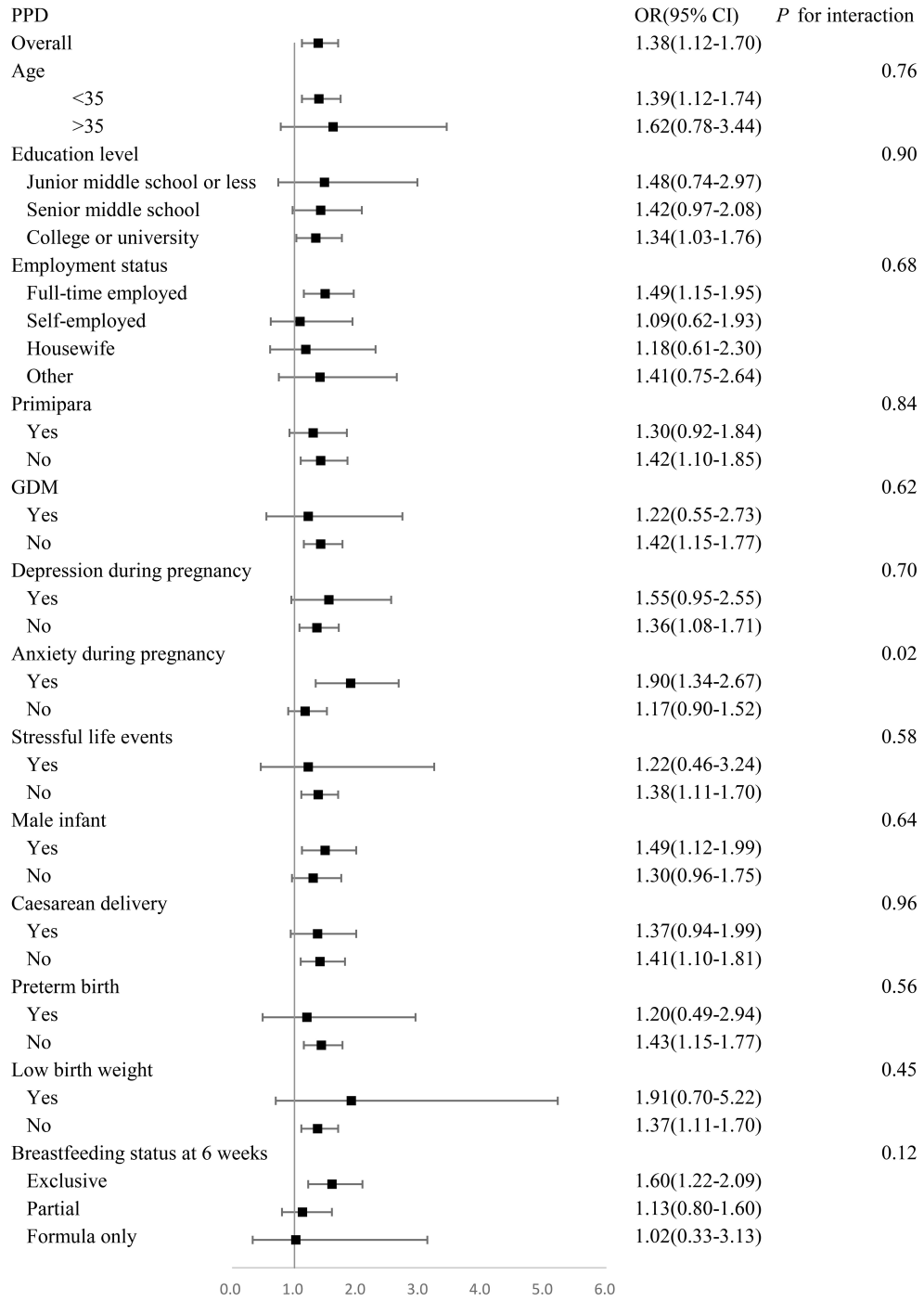

FIGURE 2 | Adjusted odds ratios for prevalence of PPD stratified by age, education, employment, parity, GDM, depression during pregnancy, anxiety during pregnancy, stressful life events, infant gender, mode of delivery, preterm birth, low birth weight, feeding method at 6 weeks. Analyses are adjusted for age, education, employment, past psychiatric history, family history of mental illness, parity, GDM, PIH, depression during pregnancy, anxiety during pregnancy, stressful life events, infant gender, mode of delivery, preterm birth, low birth weight, malformation, feeding method at 6 weeks.

DISCUSSION

This study showed that women living with their parents-in-law were younger, and had fewer childbirth experiences, lower cesarean section rate, a higher education level, employment rate, and formula feeding rate. In addition, our study suggested that maternal living arrangements were associated with the risk of PPD. Women who lived with

their parents-in-law had an increased risk of developing PPD, independent of other PPD risk factors. However, these women living with their parents did not show an increased risk of PPD.

Our study showed that living with parents-in-law was associated with a higher risk of PPD in puerperal women, which is consistent with previous studies (20, 25). The preliminary investigation conducted by Wang et al. indicated that mothers living with their parents-in-law had an additional risk for PPD in the Chinese population, with an OR value of 2.48 (95% CI: 1.20, 5.15) (20). Additionally, a large-scale cohort study in Japan found that puerperal women who did not live with their parents-in-law had a lower risk of PPD compared with those who lived with these family members (25), suggesting that co-residency with parents-in-law may damage postpartum mental status. However, a study in Nepal focused on similar areas reported that postpartum depression was associated with living in nuclear families, and puerperal women living in nuclear families had an increased risk of PPD than women living in extended families (OR 48.5) (35). However, the reliability of their results is limited due to the small sample size.

Previous surveys have shown that disharmony between mothers-in-law and daughters-in-law increases the risk of PPD among Chinese women (32, 36). In China, the contradiction between mothers-in-law and daughters-in-law is very common, especially those who live together. In the traditional concept, daughters-in-law should respect their elders and obey the wills of the elders. However, the new generation of women have received more education and have different thoughts and concepts. For those who take care of their children, new mothers may stand up for what they believe is right, which may be against the wills of their elders. Traditional concepts are challenged by modern thinking patterns, which leads to intense in-law conflicts within the families, partly explaining why living with parents-in-law increases the risk of PPD risk in puerperal women.

We observed an interaction between living with parents-in-law and anxiety during pregnancy in the presence of PPD. The relationship between living with their parents-in-law and the presence of PPD was more obvious among anxious mothers. To the best of our knowledge, no evidence is available for the interaction between living with parents-in-law and anxiety during pregnancy on the risk of PPD. However, it has been noticed that anxiety during pregnancy is associated with a poor marital relationship (37), which is identified to be a typical risk factor for PPD. Additionally, anxiety can easily lead to tension and irritability (38), which can lead to bad interpersonal relationships among women. Therefore, we speculate that women who experience anxiety during pregnancy are more likely to have poor family relationships, including marital relationships and in-law relationships, resulting in a higher risk of PPD for women who live with their parents-in-law.

LIMITATIONS

There is no doubt that this study has several limitations. First, our study was cross-sectional in design, and we could not infer the causal relationship between living with parents-in-law and the risk of PPD. Therefore, a cohort study is needed to verify this causal relationship. Second, we did not collect data on the relationship between mothers-in-law and daughters-in-law, which prevents us from exploring whether living with parents-in-law affects the risk of PPD in puerperal women because of an unsatisfactory relationship between mothers-in-law and daughters-in-law. Third, EPDS is only a tool for screening PPD, not a diagnostic tool. Further diagnosis requires the professional judgment by a psychiatrist.

CONCLUSIONS

In summary, our study demonstrated that living with their parents-in-law was associated with the risk of PPD among Chinese puerperal women. Furthermore, anxiety during pregnancy may mediate the relationship between living with parents-in-law and PPD. The effect of maternal living arrangements on PPD should be taken into consideration to prevent PPD. Further studies are needed to explore specific mechanisms underlying this association.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Committee of Baoan Maternity and Child Health Hospital. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

SP did the statistical analysis and drafted the initial manuscript. XL, JQ, and YD contributed to assist with data collection and revised the manuscript. JY, YB, and YJ took part in the sample collection. LM, KW, and XZ contributed to the critical revision of the article. All authors contributed significantly to this work and have approved the final manuscript.

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Scaling Up Patient-Centered Psychological Treatments for Perinatal Depression in the Wake of a Global Pandemic

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There is a call to action to reduce the public health burden of perinatal depression worldwide. The COVID-19 pandemic has further highlighted significant gaps in perinatal mental health care, especially among women who identify as Black, Indigenous, People of Color (BIPOC). While psychotherapeutic (cognitive, behavioral and interpersonal) interventions are endorsed for perinatal mood disorders, barriers to access and uptake contribute to inequitable access to treatment at the population level. To effectively address these barriers and increase the scalability of psychotherapy among perinatal women, we suggest four pragmatic questions to be answered from a patient-centered lens; namely, "who," "what," "how," and "when." Promising avenues include task-sharing among mental health non-specialists, an emphasis on culturally sensitive care, web-based delivery of psychotherapy with some caveats, and a lifespan approach to perinatal mental health. Innovative research efforts are seeking to validate these approaches in diverse contexts across North America and the UK, lending optimism toward scalable and long-term solutions for equitable perinatal mental health care.

Keywords: task sharing, perinatal depression, health equity, telemedicine, psychotherapy

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INTRODUCTION

The past 2 years have highlighted that barriers and mental health problems are exacerbated for perinatal populations during COVID (1, 2), and even more so for women of color (3, 4). Perinatal (pregnant and postpartum) women face major psychological stressors that put them at higher risk of developing common mental health disorders, such as depression and anxiety (5). Yet limited access to and uptake of traditional mental healthcare has resulted in inequitable access to treatment, especially given the COVID-19 pandemic.

Cognitive, behavioral and interpersonal therapies are all effective in addressing perinatal depression and comorbid anxiety. The US Preventive Services Task Force (UTPSTF) made headlines in 2019 by endorsing evidence-based psychotherapy as a preventative strategy for women at-risk for perinatal mood disorders (6). While the UTPSTF endorsement of psychotherapies for perinatal mood disorders was a welcome public health development, adoption of this recommendation poses significant challenges to our current models for delivering these

interventions at the population level. In the USA and Canada, as few as 20% of women have access to minimally-adequate treatments for depression including psychotherapy (6), and other substantive barriers to treatment include transportation, childcare obligations, and mental health stigma. Proven treatment strategies that are available are currently compromised by a critical shortage of mental health professionals and a lack of patient-centered, culturally-sensitive care. Furthermore, there is a substantial gap in the existing literature on delivery of psychotherapies, including a dearth of large-scale studies, limited evaluation of the implementation of proven technological innovations and a lack of individually-tailored intervention trials (7).

Overcoming this dilemma requires innovative solutions to address four salient questions; namely, "who," "what," "how," and "when" evidence-based psychotherapies can be delivered from a patient-centered lens. Answers to these questions will go a long way toward a solution to this pressing public health issue that has been made worse by the pandemic.

Who

There will never be enough specialist providers to address the treatment gap for perinatal depression and anxiety. One innovation to improve access to care is task sharing—the rational redistribution of tasks (8) to train non (mental health) specialist providers (NSPs) to deliver psychotherapy with appropriate levels of supervision. NSPs are individuals with no specialized degree in mental health and range from community health workers, peers and lay counselors, to midwives, teachers, and nurses. The specific type of NSP depends on the context. In the past three decades, task sharing has gained a growing popularity worldwide with applications for perinatal mental health specifically in low- and middle-income countries (9), as well as high-income countries, such as the USA and Canada (10). NSP-delivered mental health interventions were shown to be effective across the globe, targeting primary care attendees, with a range of depressive symptoms, including those at high-risk based on self-report measures. Notably, these populations were ethnically diverse, including low-income and minority groups as well as urban populations. Further research is required to test models including other key family members, including partners and children. Both have been successfully integrated within NSP-delivered interventions in low-resource settings in India (11), Pakistan (12), and Uganda (13).

A key question is overcoming professional guilds to best address how to implement this model within pragmatic contexts and whether they are sustainable (14). Evidence is also lacking as to whether specialists and non-specialists are comparable in resolving perinatal depressive symptoms when delivering *identical* treatment. The opportunity to train and leverage a cadre of capable paraprofessionals, some of whom are already embedded in the existing obstetrical care team, has significant implications for access, feasibility and cost of treatment.

What

While psychotherapies are generally effective across cultural groups and problem areas (15), engagement remains significantly lower among BIPOC (Black, Indigenous, Persons of Color) perinatal women compared to their white counterparts (16). BIPOC women are less likely to access and continue mental health services (17, 18) due to racialized barriers that include experiences of discrimination and racial micro-aggression, mistrust of healthcare providers, and reduced quality of services (18–20). In a recent study of 30 perinatal women from the United States, greater attention to cultural factors and social determinants of health was highly recommended (21). An explicit focus on culturally-sensitive and patient-centered care for BIPOC perinatal women is needed.

One solution that some evidence-based psychotherapies offer is to facilitate an idiosyncratic and process-oriented model. By idiosyncratic, the therapy provider collaboratively explores and often maps the patient's individual context, individual values as well as goals and behaviors to guide the content of the conversation while expressing a supportive and empathic stance (22). Furthermore, and to better understand the context in which the patient's symptoms occur, providers are encouraged to explicitly ask their patients whether background or identity make a difference to or intersect with their problem. This individualized approach is ultimately guided by a patient-centered approach that promotes partnership between patient and provider, rather than hierarchy. In addition, process oriented models emphasize the dynamics of the interaction occurring between the provider and the patient (15). These models take into account how cultural meaning is ascribed to treatment contexts rather than how culture matters for different groups (23, 24). For example, in his "shifting cultural lens" model, Lopez et al. (23) suggests that cultural competency involves the ability of the provider to move between two cultural perspectives in understanding the culturally-based meaning of clients from diverse cultural backgrounds (24). Promoting a process-based approach to culturally-sensitive psychotherapy may be key to facilitating a health equity model.

How

Until recently, mental healthcare was typically delivered face-to-face and at a time and place that were most suitable for the provider. These delivery formats pose particular challenges to people from lower social classes and ethnic minorities (25), and perinatal BIPOC women are no exception. An emphasis on digital platforms to increase access to care is common, was raised by USPSTF, and has arguably revolutionized mental healthcare over the past 2 years of the pandemic.

The COVID-19 crisis has highlighted the essential and revolutionized role of telehealth and digital tools to offer direct-to-patient care that minimizes barriers (26). Evolving evidence that has grown over the pandemic due to widespread adoption of telepsychiatry, has shown that delivery of the same treatment through a digital platform can be as effective as in-person treatment, but preferred by patients and with more durable outcomes (27). Telemedicine and web-based interventions may offer a promising alternative for perinatal patients in terms of flexibility, efficiency, and cost, potentially increasing the accessibility and scalability of treatment (28). Remote psychotherapy can also be offered in patient-centered

settings and schedules (i.e., at home and during weekends), while practical barriers (i.e., wait times and costs for parking or transportation) can be minimized, including for perinatal populations (29). There nonetheless remain questions that are critical to examine from a health equity lens. For instance, there may be some perinatal patients who may prefer or benefit more from in-person care because their home situation does not offer the needed privacy or safety to attend psychotherapy sessions. These potential barriers may be amplified for those who have multiple children, spouses working from home during the pandemic, or who are subject to intimate partner violence. Given the need for equitable care for perinatal populations, it is critical, ethical and timely to examine who may benefit more from in-person treatment compared to telemedicine.

When

Although the USPSTF pointed out that the majority of effective psychotherapies were provided to women across the perinatal timeframe, a question remains as to whether the beneficial effects of delivering counseling to mothers during pregnancy are durable in the same women after delivery. This question takes on additional relevance since depressive symptoms that begin antenatally may worsen postpartum if left untreated (30). It has been demonstrated that when patients are screened serially, women who screen positive for depression during pregnancy are not the same women who subsequently screen positive after delivery. One interpretation is that antenatal interventions may have a lasting effect (31), such that effective interventions during pregnancy could impact postpartum depression, achieving a "multiplier effect" toward symptom resolution. Furthermore, there remain questions about considering perinatal mental health from a lifespan approach, including from a preconception conceptual framework. There is growing evidence to suggest that perinatal mental disorders are often preceded by mental health problems that begin before pregnancy, including in adolescence or young adulthood, and these maternal preconception disorders are associated with adverse effects for the mother, infant and child (32, 33). Likewise, equipping adolescents and youth—arguably the most vulnerable with long-term consequences (34)—with the needed tools may help facilitate a preventive approach to best cope with common symptoms of depression, anxiety and distress (35). A strong emphasis in this movement is self-care, including the application of evidence-based techniques such as relaxation and mindfulness, activity scheduling and structuring, and socially connecting to promote psychological wellbeing.

DISCUSSION

Research Applications

Answers to these pragmatic questions may be on the horizon. Responsive to the call for creative solutions, relevant research is just now being undertaken to address the who, what, how, and when. Many of these elements of care form the aims of a recently funded Patient Centered Outcomes Research Institute study—a large-scale, non-inferiority randomized controlled trial[1] (RCT) of both pregnant and postpartum women, comparing two delivery modes of a brief, evidence-based, behavioral activation intervention for depressive symptoms (telemedicine vs. in-person) provided by two different delivery agents (mental health specialists vs. trained non-mental health professionals). This study is exploring "what works for whom," by examining who may benefit more from in-person psychotherapy compared to telemedicine. This multi-site, pragmatic trial is being implemented across real-world, primary care settings in Toronto, Canada; Chapel Hill, North Carolina; and Chicago, Illinois (36).

In addition, a National Institute of Mental Health (NIMH) funded trial is exploring the how and who with technology; in fact, this study's intervention is administered without direct involvement of any mental health professionals. This web-delivered product called MomMoodBooster (MMB)[2], employs cognitive behavioral therapy-guided multimedia modeling and engaging activities and has already demonstrated efficacy in postpartum women (37). Using MMB adapted for delivery to the patients' smart phone, an RCT is being conducted to compare MMB to usual care during pregnancy and in the postpartum period, with specific content tailored to each timeframe. In essence, this is a sophisticated self-help program designed to enable depressed women to identify patterns in their thoughts in order to develop personal action plans that lead to helpful changes and reduced symptoms. This study responds to the "how" with technology and the "who," by empowering patients themselves as the treating agents.

Another NIMH-funded RCT[3] (35) is designed to examine the effectiveness of a group telehealth counseling intervention to reduce depressive symptoms among diverse ethnic groups of pregnant and postpartum women. Peer-supported group care has been determined to be effective more generally during pregnancy, especially among women with limited social and economic resources. Finally, a large trial focused on BIPOC women will be implemented across the USA to compare the effects of one psychotherapeutic intervention delivered through self-help, by a nurse, and treatment as usual (38). The study will include pregnant women and will examine the potential comparable effects of these groups to both prevent and potentially reduce perinatal depressive symptoms over time.

Examining these questions hold the promise for new models of care. If effective, these innovations could be highly scalable and incorporated into larger, stepped care systems to improve access to "personalized" counseling interventions.

Clinical Applications

While we await the completion of the aforementioned trials, we must also implement existing evidence-based care more effectively and comprehensively at the regional level, as has

[1]https://www.pcori.org/research-results/2018/scaling-psychological-treatments-perinatal-depression-and-anxiety-symptoms

[2]https://projectreporter.nih.gov/project_info_description.cfm?aid=9622062&icde=43391628&ddparam=&ddvalue=&ddsub=&cr=2&csb=default&cs=ASC&pball=

[3]https://projectreporter.nih.gov/project_info_description.cfm?aid=9660031&icde=43398087&ddparam=&ddvalue=&ddsub=&cr=1&csb=FY&cs=DESC&pball

been accomplished clinically in the UK (39). The Improving Access to Psychological Treatments (IAPT) program in the UK is a scalable model of evidence-based psychological treatments for depression and anxiety. Annually, over 1 million patients are provided for, 98% of whom are monitored in terms of a rigorous and automated monitoring system. Further, the program has demonstrated rigorous cost-effectiveness across the country (39). Within IAPT, there has been a focus on scaling up treatments for patients with perinatal depression. Specific efforts have demonstrated promising results for the effectiveness of partnerships to ultimately facilitate access to psychological interventions (40). Strategies included developing an integrated pathway from the antenatal clinic to IAPT, increasing public and healthcare professionals' awareness about the interventions, and providing training to Health Visitors (community public health nurses, registered midwives or nurses). What was most notable was the increase in self-referrals from perinatal women following partnerships, suggesting women were better able and empowered to access the needed support.

SUMMARY

As the COVID-19 pandemic highlights the gaps in our healthcare systems and transitions mental health care delivery into a virtual reality, ongoing research is needed to inform key users on what works among pregnant and postpartum women. More research is required to incorporate significant others, determine what works for whom, whether there are certain subgroups who benefit more from digital interventions and how they can be scaled from a health equity perspective. There is a clarion call to action to reduce the public health burden of perinatal depression throughout North America. We are encouraged by innovations for delivering psychological treatment to perinatal women and we are optimistic that scalable and long-term solutions may be just around the corner.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary materials, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

DS drafted the initial version of this manuscript with significant contributions from SM-B, KS, and RS. All authors have critically reviewed this manuscript and provided consent for publication. The authors read and approved the final manuscript.

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Quality of Life in Mothers With Perinatal Depression: A Systematic Review and Meta-Analysis

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Background: The prevalence of perinatal depression is high and its adverse effects on mothers and infants are extensive. Several studies have explored the relationship between perinatal depression and health-related quality of life (HRQoL), but little is known about the nature and magnitude of this effect. The objectives of this study were to evaluate the HRQoL of mothers with perinatal depression and compare the HRQoL of depressed mothers with that of non-depressed mothers.

Methods: A systematic review was performed according to the PRISMA guidelines. PubMed, EMBASE, Scopus, PsycINFO, Web of Science, Cochrane Central Register, the China National Knowledge Infrastructure, the VIP Database, and the Wan Fang Database were searched. The retrieval time was from the establishment of the database to July 2020. A series of meta-analyses were run for each outcome pertaining to HRQoL sub-measures. Subgroup analyses were conducted based on country income category and time period.

Results: Of 7,945 studies identified, 12 articles were included in the meta-analysis, providing HRQoL data for 4,392 mothers. Compared with non-depressed mothers, mothers with perinatal depression reported significantly poor scores across all the quality-of-life domains. Mixed-effects analysis showed that there was no difference in the HRQoL scores of mothers with antepartum and postpartum depression. Mothers with perinatal depression in higher-income countries reported higher disability on role-physical ($p = 0.02$) and social functioning domains ($p = 0.001$) than those from lower-income countries.

Limitations: Due to insufficient data, no regression analysis was performed. The inability to accurately determine the difference in HRQoL between antepartum and postpartum depression was because of the restriction of the included studies. Moreover, most of the included studies were conducted in middle-income countries and may have an impact on the applicability of the results. Subgroup analyses are observational and not based on random comparisons. The results of subgroup analyses should be interpreted with caution.

Conclusion: HRQoL is compromised in mothers with perinatal depression. Continuous efforts are required to improve the HRQoL of perinatal depressed mothers.

Systematic Review Registration: CRD42020199488.

Keywords: health-related quality of life, quality of life, perinatal depression, postpartum depression, antepartum depression

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INTRODUCTION

Perinatal depression occurs during pregnancy or within 1 year after delivery (1) with its prevalence estimated at 10–15% in high-income countries (HIC) and 15–25% in low and middle-income countries (LMICs) (2–4). During the perinatal period, many biochemical, physiological and anatomical changes occur in the mother's body (5). These changes lead to depression and other negative emotions, which are harmful to the physical and mental health of perinatal mothers (6), thus affecting their health-related quality of life (HRQoL). Therefore, HRQoL has become an important indicator of perinatal health evaluation (7).

Perinatal depression is associated with an array of adverse effects both in mothers and children. Among pregnant and postpartum mothers, perinatal depression is related to reduced social support and self-care, increased substance use, work-related dysfunction, malnutrition, and other obstetric complications (8–10). Among children born to perinatal depressed mothers, there is a higher likelihood of developing physical development problems, including premature birth and low birth weight, low immunization rates, high incidence of infectious diseases (e.g., diarrhea), as well as cognitive and socioemotional development problems, such as cognitive delay, negative child temperament, oppositional behavior, and attention deficit symptoms (11–14).

Previous literature has shown an indirect relationship between quality of life and perinatal depression. However, there is a paucity of literature on different constructs and domains of quality of life that are the most adversely affected. Therefore, the aims of this systematic review were to evaluate the HRQoL of mothers with perinatal depression and compare the HRQoL of depressed mothers with that of non-depressed mothers. This review is intended to fill the gap of previous studies, clarify and quantify the impact of perinatal depression on quality of life.

METHODS

This systematic review used PRISMA guidelines for conducting and reporting systematic reviews (15), and the protocol for this review was prospectively registered on PROSPERO (CRD42020199488, 17 August 2020). We systematically searched nine international and Chinese electronic databases to retrieve relevant articles: PubMed, EMBASE, Scopus, PsycINFO, Web of Science, Cochrane Central Register, the China National Knowledge Infrastructure, the VIP Database for Chinese Technical Periodicals, and the Wan Fang Database for Chinese Periodicals, key search terms included "Perinatal," "Depression" and "Health-related quality of life," from the inception of databases through July 2020. The complete search strategy was shown in **Appendix 1**.

The most commonly used HRQoL scales during the perinatal period include the Medical Outcomes Study Short Form 36-Item / 12-Item Health Survey (SF-36 and SF-12) and the World Health Organization Quality of Life assessment-bref (WHOQOL-BREF). SF-36 has 36 items, measuring eight domains of health concepts, namely physical functioning, role-physical, bodily pain, general health, vitality, role-emotional, social functioning and mental health. The scores of the above eight subscales are further classified into two categories: physical component score (PCS) and mental component score (MCS). The higher the score (from 0 to 100), the better the HRQoL (16). SF-12 is a validated abbreviated version of the 36-item Survey. WHOQOL-BREF produces scores in four domains pertaining to HRQoL: physical health, psychological, social relationships and environment. The potential range of scores for all domains is 4–20, higher scores indicate better quality of life (17).

For review, we included cross-sectional and longitudinal (retrospective and prospective) studies which reported on different aspects of quality of life among mothers with perinatal depression. We defined the perinatal period as starting from pregnancy to 1 year after delivery and perinatal depression was defined according to diagnostic interview based on clinical criteria (e.g., DSM-5 or ICD-11), or as a score above a cut-off on a self-rating depression scale (e.g., PHQ-9, SDS, HAMD, etc.). For measurement of quality-of-life outcomes, we considered all those studies that used a validated self-report scale such as but not limited to SF-36 and WHOQOL-BREF. The exclusion criteria included studies focusing on participants with comorbid physical diseases or medical conditions (e.g., gestational diabetes mellitus, hypertension, etc.). We also excluded those studies that report only a part or subscale score of a validated measure of HRQoL. We also excluded articles published in languages other than English or Chinese; Books, book sections, patents, qualitative studies, review articles, conference abstracts and protocol.

After removing duplicate articles using EndNote, two reviewers (MC and YG) independently screened the titles and abstracts for eligibility, followed by the full-text screening. Finally, the list of articles for inclusion was cross-checked between authors, and any discrepancies were resolved by a senior reviewer (JL).

DATA EXTRACTION AND META-ANALYSIS

Two authors extracted the data from studies, using a piloted excel sheet, working independently from each other. General information of publications and research design were extracted, including study design, country of study, geographical scope (urban, rural or semi-urban), setting of study (hospital, community, etc.), comparison groups (if any), year of publication, and the outcome measures including the type of diagnostic or screening instruments utilized to ascertain perinatal depression and measures for HRQoL. Quantitative data for meta-analysis to evaluate and compare HRQoL such as sample size, scores of depression in each group, each and total

Abbreviations: HRQoL, health-related quality of life; HIC, high-income countries; LMICs, low and middle-income countries; MIC, middle-income countries; SF-36/12, The Medical Outcomes Study Short Form 36/12-Item Health Survey; WHOQOL-BREF, World Health Organization Quality of Life assessment-bref; PCS, physical component score; MCS, mental component score; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, fifth edition; ICD-11, International Classification of Diseases-11; SDS, Self-Rating Depression Scale; HAMD, Hamilton Depression Scale; PHQ-9, The Patient Health Questionnaire.

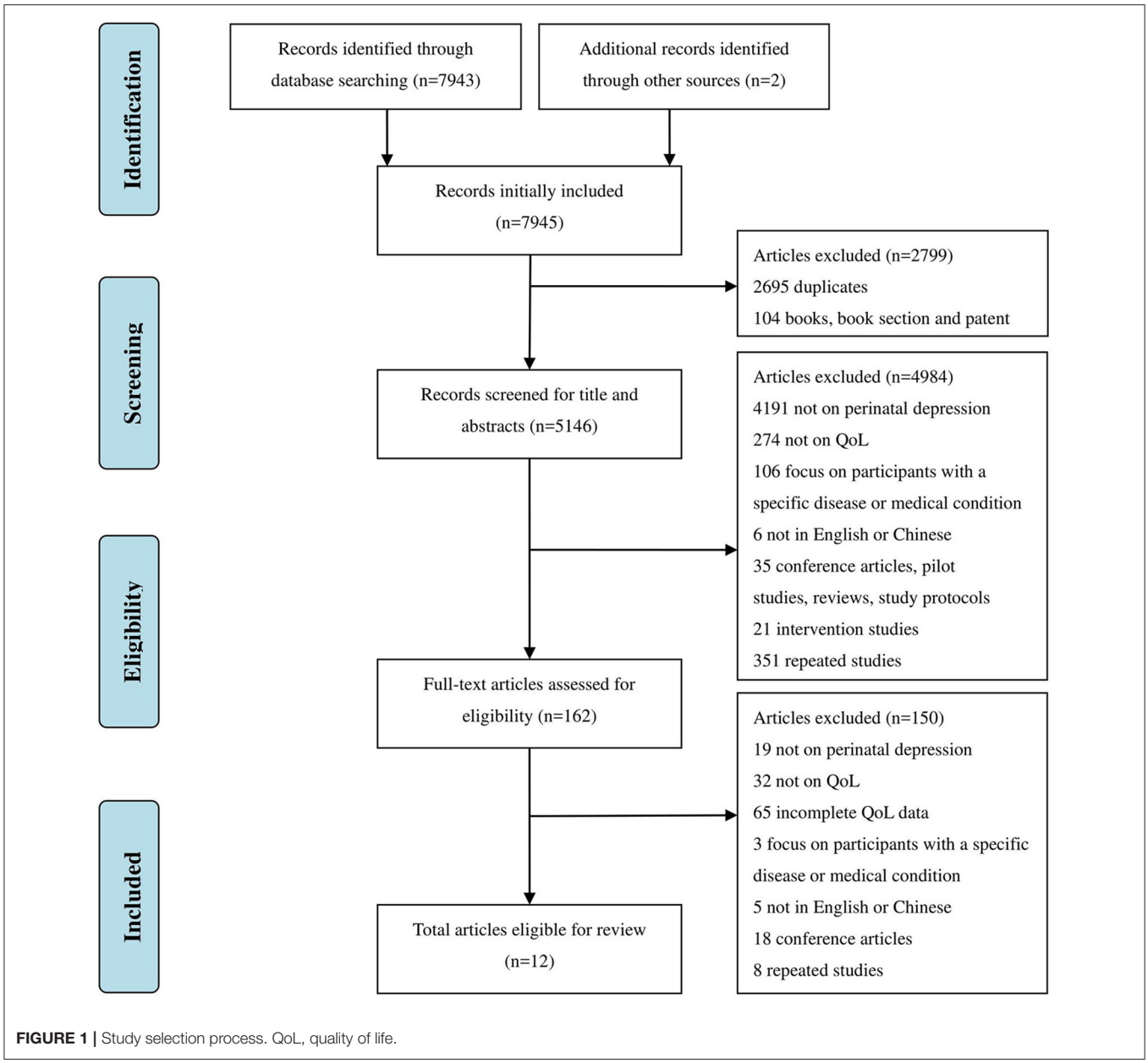

FIGURE 1 | Study selection process. QoL, quality of life.

HRQoL scores of each group at different periods. The data were cross-checked between the two authors (JL and HZ) and any inconsistencies were resolved through discussion with a third author (JY).

The methodological quality of each article was evaluated independently by two reviewers (JL and ZH) and any discrepancies were resolved by a third reviewer (JY). Based on the types of included studies, different quality assessment tools were selected. For cohort and case-control studies, the risk of bias was assessed using the Newcastle-Ottawa quality assessment scale (18). Studies with scores of five points or more were considered to be of moderate to good study quality (19). For cross-sectional studies, the quality was assessed using a checklist from the Joanna Briggs Institute (20).

A series of meta-analyses were run for each outcome pertaining to the quality-of-life sub-measures. Mean (SD) related to the quality-of-life sub-measures were extracted for healthy mothers and mothers with perinatal depression. These quantitative data were used to calculate correlation coefficients and their 95% confidence intervals and then pooled using the random effects with DerSimonian & Laird method. Random effects were employed throughout the analyses due to expected clinical and statistical heterogeneity. This inconsistency across studies was quantified using the I^2 statistic considered significant at 40%. Sensitivity analyses using the knockout approach were performed to check the contribution of individual studies to the pooled effect size. Publication bias was assessed by visualizing Begg's funnel plot and statistically using Egger's

regression statistic considered significant at $p > 0.1$. If significant publication was evident, Duval & Tweedie's trim and fill method was used to impute studies to yield effect sizes adjusted for the publication bias.

Subgroup differences based on country income category and time period (antepartum vs. postpartum) were run using mixed-effects analyses. Meta-regression analyses were not run due to a lack of statistical power, owing to the fewer number of studies reporting each outcome.

RESULT

A total of 7,943 articles were identified after systematically searching 9 databases. Another 2 articles met the inclusion criteria through the screening of bibliography from included articles. After removal of books, book sections, patents (104) and duplicate articles (2,695), a further 4,984 articles were excluded through screening of title and abstract. This led to 162 articles entering the full-text search stage. At this stage, a further 150 articles were excluded. Finally, 12 articles were included in this review (**Figure 1**).

For quality assessment, after preliminary assessment by two independent reviewers, the agreement between items was 97.3%, all differences were resolved in the consensus meeting with the senior author (**Appendix 2**). The scores of the three case-control and cohort studies were all 8, indicating a low risk of bias (21–23). When assessing cross-sectional studies, three items were ignored by more than two studies: the clear definition of inclusion criteria and the identification/treatment of confounding factors, which may lead to research bias in these aspects.

Quality of life was assessed in a total of 4,392 perinatal mothers, including 1,151 pregnant or postpartum mothers with depression and 3,241 healthy controls. Of the 12 studies included, 9 were cross-sectional studies, while the rests were case-control and cohort studies. The included studies were carried out in six countries, including China, Iran, America, France, Nigeria and Canada. Among these, 5 studies were conducted antenatally and 7 in the postpartum period. Among the 12 studies examining HRQoL, 11 studies used SF-36 and only 1 study utilized WHOQOL-BREF (**Table 1**).

The outcomes pertaining to bodily pain, general health, mental health, physical functioning, role emotional and role physical and vitality were reported as an outcome in ten studies with a cumulative sample size of 3,686 mothers. The outcomes pertaining to social functioning were reported in 11 studies ($n = 4217$) and physical component score (PCS) and mental component score (MCS) in six studies each ($n = 2063$).

All outcomes revealed substantial heterogeneity except bodily pain, general health and physical functioning. Mothers with perinatal depression reported significantly poor scores across all the quality-of-life outcomes (**Figure 2**). Mothers with depression reported greater problems with MCS ($r = -0.60$, $p < 0.001$); mental health ($r = -0.42$, $p < 0.001$); social functioning ($r = -0.30$, $p < 0.001$) and vitality ($r = -0.34$, $P < 0.001$) and role-emotional ($r = -0.31$, $p < 0.001$). These correlations suggested moderate strength of effect sizes. While outcomes related to physical health yielded weaker associations including bodily pain ($r = -0.18$, $p = 0.006$); general health ($r = -0.29$, $p < 0.001$); PCS ($r = -0.22$, $p = 0.009$); physical functioning ($r = -0.15$, $p = 0.024$), role-physical ($r = -0.22$, $p = 0.001$).

Publication bias was noted only in reporting of general health ($p = 0.07$), physical functioning ($p = 0.01$), role-physical ($p = 0.07$) and social functioning ($p = 0.02$). Funnel plots for all domains of quality of life can be seen in **Appendix 3**. Duval and Tweedie's trim and fill method yielded an adjusted correlation of −0.12 for physical functioning and −0.31 for social functioning.

According to different time periods, mixed-effects analyses showed no statistically significant subgroup differences in effect sizes on the different quality of life domains. Several statistical subgroup differences were noted based on income groups of countries. Mothers with perinatal depression in higher-income countries reported higher disability on role-physical and social functioning domains than their counterparts (**Tables 2**, **3**).

For case-control and cohort studies, Abbaszadeh et al. (23) and Sadat et al. (21) gained full scores (9). Qiu et al. (22) yielded a score of 8, bias was observed to be due to the representativeness of the cases. For cross-sectional studies, biases mainly stemmed from the unspecific description of inclusion criteria, study subjects and the setting, and the improper identification and handling of confounding factors.

In total, 3 studies described factors associated with depressed mothers' HRQoL (24–26). Two studies assessed whether the gender of the child had an impact on HRQoL scores. Tychey et al. found that the baby's gender (having a boy) significantly reduced the quality of life. While Tungchama et al. found that that the baby's gender and spouse's expected gender of the infant were not associated with HRQoL scores.

Two studies investigated the impact of complications and mode of delivery on HRQoL. The results of one study showed that complications during pregnancy and delivery by cesarean were related to worse mental health status (24). Another study found that these two variables can reduce scores for social relationships and physical health domains, respectively (26). Costa et al. reported an association between greater cardiovascular fitness and better physical health status. The study also found lower physical health scores in multiparous mothers. As for the age of the study participants, one study found worse mental health scores in mothers younger than 35 (26). One study reported that poor sleep quality, poor social support and life stress can damage mental health (24).

DISCUSSION

This systematic review indicates that compared with non-depressed mothers, pregnant and postpartum mothers with perinatal depression have lower HRQoL scores, highlighting the profound impact of perinatal depression on their quality of life. This negative impact of depressive symptoms stays consistent across the antepartum or postpartum period. Mothers from the Western nations show more impairment in social functioning and role-physical domains of HRQoL than their counterparts.

TABLE 1 | Studies characteristics ($N = 12$).

References	Design	Subject	Sample size	Age (Mean ± SD) years	Time	Country	Scale	Sampling method
Li et al. (44)	CS	Depressed (EPDS≥9.5); Non-depressed (EPDS<9.5)	181; 273	28.5	Antepartum	China	SF-36	Non-randomized
Chen (45)	CS	Depressed (EPDS>9.5); Non-depressed (EPD≤9.5)	119; 181	18–40	Antepartum	China	SF-36	Non-randomized
Da Costa et al. (24)	CS	Depressed (EPDS≥10); Canadian norm	78; 198	19–43 (33.17 ± 4.56); 25–34	Postpartum	Canada	SF-36	Non-randomized
de Tychey et al. (25)	CS	Severe depressed (EPDS≥12); Mild depressed (8≤EPDS<12); Non-depressed (EPDS<8)	17; 40; 124	19–40 (29 ± 5)	Postpartum	France	SF-36	Non-randomized
Sadat et al. (21)	Cohort	Depressed (EPDS≥13); Non-depressed (EPDS<13)	75; 246	NR	Postpartum	Iran	SF-36	Randomized
Nicholson et al. (46)	CS	Depressed (CES-D≥16); Non-depressed (CES-D <16)	27; 148	27.3 ± 6.4; 28.8 ± 6.5	Antepartum	America	SF-36	Non-randomized
Abbaszadeh et al. (23)	Case-control	Depressed (BDI>9); Non-depressed (BDI ≤16)	112; 353	25.40 ± 4.63; 25.32 ± 4.41	Antepartum	Iran	SF-36	Non-randomized
Qiu (22)	Case-control	Depressed (EPDS>12); Non-depressed (EPDS≤12)	70; 70	20–41 (25.1 ± 8.3); 20–40 (25.3 ± 8.5)	Postpartum	China	SF-36	Non-randomized
Hu and Lu (47)	CS	Depressed (EPDS≥13); Non-depressed (EPDS<13)	126; 851	17–42(28.32 ± 4.37)	Postpartum	China	SF-36	Non-randomized
Zhang et al. (48)	CS	Depressed (EPDS>12); Non-depressed (EPD≤12)	169; 250	20–44 (29.9 ± 3.9)	Postpartum	China	SF-36	Non-randomized
Tsai (49)	CS	Depressed (EPDS≥13); Non-depressed (EPDS<13)	21; 132	32.6 ± 3.18	Antepartum	China Taiwan	SF-36	Non-randomized
Tungchama et al. (26)	CS	Depressed (EPDS≥12 and diagnosed by DSM-IV); Non-depressed (EPDS<12)	116; 415	18–45 (26.84 ± 5.6)	Postpartum	Nigeria	WHOQOL-BREF	Non-randomized

CS, Cross-sectional; EPDS, The Edinburgh Postnatal Depression Scale; CES-D, The Center for Epidemiologic Studies Depression Scale; BDI, Beck Depression Inventory; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, fourth edition; NR, Not reported; SF-36, The Medical Outcomes Study Short Form 36-Item Health Survey; WHOQOL-BREF, World Health Organization Quality of Life assessment-bref.

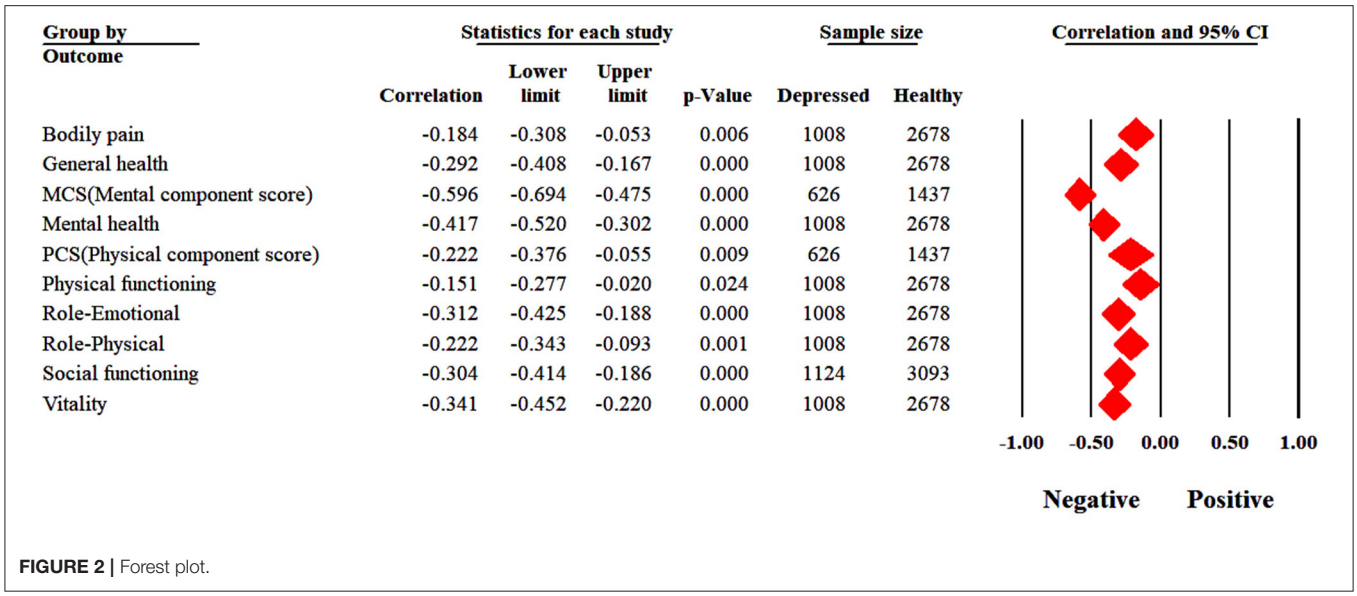

FIGURE 2 | Forest plot.

TABLE 2 | Subgroup analyses using mixed-effects according to time period ($N = 11$).

Domain	Subcategory	Number of studies	Effect size (95% CI)	I^2	Q value (p)
Bodily pain	Antepartum	4	−0.21 (−0.26 −0.16)	90.5%	1.8 (0.18)
	Postpartum	6	−0.16 (−0.20 −0.12)	73.3%	
General health	Antepartum	4	−0.28 (−0.32 −0.23)	0%	0.18 (0.67)
	Postpartum	6	−0.30 (−0.37 −0.22)	72.29%	
MCS	Antepartum	2	−0.84 (−0.98–0.003)	99.73%	1.65 (0.20)
	Postpartum	4	−0.39 (−0.47 −0.31)	66.51%	
Mental health	Antepartum	4	−0.48 (−0.54 −0.42)	51.69%	3.93 (0.05)
	Postpartum	6	−0.37 (−0.46 −0.27)	85.59%	
PCS	Antepartum	2	−0.18 (−0.25 −0.12)	0%	0.43 (0.52)
	Postpartum	4	−0.24 (−0.39 −0.08)	89.53%	
Physical health	Antepartum	4	−0.14 (−0.20 −0.09)	0%	0.03 (0.86)
	Postpartum	6	−0.14 (−0.18 −0.09)	12.87%	
Role-emotional	Antepartum	4	−0.31 (−0.44 −0.17)	87.87%	0.001 (0.98)
	Postpartum	5	−0.31 (−0.40 −0.21)	83.29%	
Role-physical	Antepartum	4	−0.23 (−0.35 −0.12)	80.58%	0.13 (0.72)
	Postpartum	6	−0.21 (−0.29 −0.12)	78.27%	
Social functioning	Antepartum	4	−0.28 (−0.33 −0.24)	0%	0.26 (0.61)
	Postpartum	7	−0.31 (−0.38 −0.23)	77.59%	
Vitality	Antepartum	4	−0.33 (−0.38 −0.29)	2.86%	0.03 (0.87)
	Postpartum	6	−0.34 (−0.44 −0.24)	86.82%	

MCS, Mental component score; PCS, Physical component score.

There are several reasons for mothers with perinatal depression to have a poor HRQoL. First of all, Studies have found that there are abnormalities in the Hypothalamic-pituitary-adrenal (HPA) axis in patients with depression (27, 28). The activated HPA axis can not only regulate the body's peripheral functions such as metabolism and immunity but also play a linking role between stress and brain function (29, 30). Similarly, perinatal depression is also related to the excessive activation of the HPA axis, which may lead to alterations in the mother's physical and psychological functions, thereby affecting the quality of life (31, 32). Another possible explanation for the lower quality of life scores in mothers with perinatal depression may be the chronic nature of the disease. In most poor-resource settings, due to human resource constraints and ill-equipped medical systems, perinatal depression is largely undiagnosed and untreated, and as many as 90% of mothers with perinatal depression are not treated (33). Untreated depression usually

TABLE 3 | Subgroup analyses using mixed-effects according to income group of countries ($N = 11$).

Domain	Subcategory	Number of studies	Effect size (95% CI)	I^2	Q value (*p*)
Bodily pain	HIC	2	−0.18 (−0.30 −0.06)	43.90%	0 (0.10)
	MIC	8	−0.18 (−0.21 −0.15)	0%	
General health	HIC	2	−0.29 (−0.43 −0.15)	64.24%	0.01 (0.91)
	MIC	8	−0.28 (−0.33 −0.23)		
MCS	HIC	2	−0.46 (−0.53 −0.39)	0	0.43 (0.51)
	MIC	4	−0.65 (−0.92–0.03)	99.7%	
Mental health	HIC	2	−0.47 (−0.54 −0.40)	0%	1.71 (0.19)
	MIC	8	−0.41 (−0.48 −0.32)	86.88%	
PCS	HIC	2	−0.15 (−0.23 −0.05)	0%	1.84 (0.17)
	MIC	4	−0.26 (−0.25 −0.10)	89.05%	
Physical health	HIC	2	−0.19 (−028 −0.10)	0%	1.68 (0.20)
	MIC	8	−0.13 (−016 −0.10)	0%	
Role-emotional	HIC	2	−0.33 (−0.44 −0.21)	51.79%	0.14 (0.71)
	MIC	8	−0.31 (−0.39 −0.22)	86.48%	
Role-physical	HIC	2	−0.32 (−0.40 −0.24)	0%	5.07 (0.02)*
	MIC	8	−0.19 (−0.26 −0.12)	76.68%	
Social functioning	HIC	2	−0.42(−0.49 −0.34)	0%	11.35 (0.001)*
	MIC	9	−0.27 (−0.31 −0.23)	41.64%	
Vitality	HIC	2	−0.45 (−0.58 −0.29)	76.07%	2.76 (0.10)
	MIC	8	−0.31 (−0.37 −0.25)	67.28%	

**Significantly difference, MCS, Mental component score; PCS, Physical component score; HIC, High-income countries; MIC, Middle-income countries.*

becomes chronic and has a negative impact on the quality of life (34, 35).

Although mothers with perinatal depression reported significantly poor scores across all the quality-of-life outcomes, mental health appeared to be more affected by depression. For the MCS domain, a much lower score is indicative of frequent mental distress, as well as social and role disabilities due to emotional problems (36). It reminds family members and medical staff to provide mothers with more spiritual and life support, to help mothers recognize and overcome their unhealthy emotions, so as to improve the quality of life (37).

We found that there are differences in role-physical and social functioning between HIC and middle-income countries (MIC), with the lower scores reported in HIC. This result is inconsistent with the research result done by Lagadec et al., whose research believes that the absence of economic problems is strongly related to a better quality of life (38). However, in addition to economic reasons, the family system may also have an impact. Mothers in Eastern cultures tend to have tighter family connections, and most mothers and young children live in multi-generational family systems. Other family members (such as experienced grandmothers) are often involved in maternal care as well as infant feeding (39). Senior and more experienced women often play a vigorous role in caring for mothers, enabling them to be in better physical condition to perform work and other daily activities, that is, to function in better physical roles. Moreover, mothers generally report that when they are doing housework, taking care of their children, being physically and mentally unwell, grandmothers will participate and support them, alleviate their physical and emotional problems, which enable them to perform better social functions (40). Apart from the explanations above, these differences may also be explained by regional differences in living conditions, public health systems and perceptions of depression (41).

STRENGTHS AND LIMITATIONS AND FUTURE DIRECTIONS

To the best of our knowledge, this is the first systematic review to investigate HRQoL in mothers with perinatal depression. Through the inclusion of various types of research, sufficient data has been obtained for meta-analysis. However, our research has some limitations. Due to the small number and high heterogeneity of included studies, no regression analyses were carried out. And there was no longitudinal study continuously investigating the postpartum condition of mothers with antepartum depression. Therefore, we could not draw an accurate conclusion about the difference in the quality of life of depressed mothers before and after childbirth. In addition, most of the included studies were conducted in MIC, and economic level affects the quality of life (38), so the applicability of the results needs to be considered. Finally, the insights from the subgroup analyses should be interpreted with caution, due to the observational nature of this evidence.

Owing to the significant adverse effects of perinatal depression on mother's quality of life, it is necessary to improve the screening and treatment capabilities for perinatal depression. We, therefore, recommend the use of depression screening and HRQoL instruments in both research and clinical settings to

detect perinatal depression and assess the HRQoL of mothers with perinatal depression. Besides, antepartum depression is a key risk factor for postpartum depression, leading to the persistence of depressive symptoms during the perinatal period (42, 43). So, studies are needed to continuously and actively assess depression and HRQoL before and after childbirth. Ultimately, findings pertaining to cultural differences in exhibiting different impairments in quality of life can also help in the design of more targeted and personalized interventions.

CONCLUSION

This systematic review and meta-analysis reveal poorer HRQoL of mothers with perinatal depression as compared with non-depressed mothers, suggesting that perinatal depression has a significant adverse effect on HRQoL.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

JL, JY, LY, AR, and XL: conception and design. JL, ZH, HZ, MC, and YG: collection and assembly of data. AW, JL, and JY: data analysis and interpretation. JL: substantial contributions to the first draft of the article. JL, AW, XL, and JY: work on the revised version of the manuscript. All authors approved the final manuscript.

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SUPPLEMENTARY MATERIAL

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BRIEF RESEARCH REPORT
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Cultural Adaptation of the Mothers and Babies Intervention for Use in Tribal Communities

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Objective: While one in five women may experience mood and anxiety disorders during pregnancy and postpartum, Indigenous identity increases that risk by 62%, especially among younger Indigenous women. The need for evidence-based perinatal mental health interventions that provide culturally relevant well-being perspectives and practices is critical to improving maternal, child, and community outcomes for Indigenous peoples, and reducing health inequities.

Methods: Through a collaboration between community maternal and child health professionals, intervention researchers, and a cultural consultant, our workgroup developed cultural adaptations to Mothers and Babies, an evidence-based perinatal depression prevention intervention. Applying a cultural interface model, the workgroup identified existing intervention content for surface adaptations, as well as deep, conceptual adaptations to incorporate traditional teachings into this evidence-based intervention.

Results: This collaboration developed a culturally adapted facilitator manual for intervention providers, including guidance for implementation and further adaptation to represent local tribal culture, and a culturally adapted participant workbook for Indigenous perinatal women that reflects cultural teachings and traditional practices to promote well-being for mother and baby.

Implications: Committing to a culturally respectful process to adapt Mothers and Babies is likely to increase the reach of the intervention into Indigenous communities, reengage communities with cultural practice, improve health outcomes among parents, children, and the next generation's elders, and reduce disparities among Indigenous groups. Replication of this community-engaged process can further the science and understanding of cultural adaptations to evidence-based interventions, while also further reducing health inequities. Future steps include evaluating implementation of the culturally adapted intervention among tribal home visiting organizations.

Keywords: pregnancy, postpartum, mental health, depression, indigenous communities, mental health intervention, cultural adaptation, Lakota

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INTRODUCTION

A collaborative group of stakeholders including a Lakota elder cultural consultant, maternal and child health professionals in Tribal communities, and perinatal mental health intervention researchers, developed a cultural adaptation of an evidence-based perinatal depression prevention intervention for use in Tribal communities. This adaptation aims to support intergenerational mental health by building resilience through cultural restoration, to better address health disparities experienced by American Indian families and communities.

BACKGROUND

Across the United States (US), 573 federally recognized Tribes represent diverse American Indian communities in urban settings and on designated reservations that are typically rural (Bureau of Indian Affairs) (1). Indigenous peoples in the US carry historical traumas and face ongoing current-day stressors. The collective history of forced displacement, attempted genocide, colonization, and dismantling of traditional family structures and cultural foundation, or "cultural assault," has left multi-dimensional and generational lasting effects (1–3). Ongoing systemic oppression, high rates of intimate partner violence, poverty, lack of resources, and substance use create an environment ripe for increased and disproportionate risk of mental illness (4). A systematic review demonstrated that Indigenous people are at increased risk for depression, anxiety, and substance use disorders during the perinatal period, in comparison to other racial and ethnic groups (5). Moreover, intergenerational transmission of toxic stress resulting from historical trauma can perpetuate trauma reactions and further disrupt healthy bonding and parenting (2).

The effects from historical trauma contribute to contemporary traumatic experiences and exposures (6, 7). Whitbeck et al. (8) identified that anger and depression among American Indian parents was linked to experiences of multigenerational loss. This historical loss is compounded by contemporary loss that American Indians suffer (9), including having the third highest infant mortality rate in the US of any racial group (10). These risk factors are further exacerbated by under-resourced health care in American Indian communities, wherein the per person patient care allocation *via* the Indian Health Service (IHS) is approximately one-third of per person spending, nationally, among all other communities (1, 11). Moreover, while numerous validation studies have been conducted in other cultures, further work remains in developing efficacious culturally relevant perinatal depression screening tools and methods for American Indian people (4, 5, 12, 13).

Numerous barriers to accessing care include: stigma and fear of being perceived as incapable, concerns about privacy, mistrust of service providers, and lack of transportation, financial resources, and social support (1, 14, 15). Mental health care providers of Indigenous identities are underrepresented in the field, disallowing cultural congruency between provider and patient which is of known benefit (1, 16). Untreated perinatal depression can lead to adverse outcomes for parent and child. Parents who are depressed are more likely to engage in high-risk behaviors like substance use, are less likely to attend prenatal or well child visits and are more likely to suffer from future depressive episodes (17). Children of parents with depression may experience a range of negative outcomes including developmental delays, cognitive impairments, and attachment insecurity, along with increased risk for developing mental health issues (4, 18, 19).

A study of 30 American Indian teen mothers (20) found that all the women reported childhoods filled with stress which led to increased chaos in their lives. In other studies, maternal stress and risk factors including adverse experiences has shown a deleterious impact on children's social-emotional well-being (21–23). Additionally, American Indian women suffer risk factors including diabetes, tobacco use, low socioeconomic status, childhood physical abuse, rape, domestic violence, and low maternal age which contribute to preterm birth, with potential damaging consequences for child development (24). Disparities persist in the areas of health, economic, social, and education for American Indians and the intergenerational impact of historical trauma and systemic oppression as a contributing factor is an ongoing research agenda (25). The forced removal of American Indian children into boarding schools systematically stripped parents' rights to parent, a message that their families are not appropriate to raise children, with far-reaching effects on subsequent generations (2). Furthermore, American Indians have a disproportionately rate of abused children-−14.8%—while accounting for 2% of the US population (26). The Child Welfare League of America (27) reported that 46% of the children in out-of-home care in South Dakota were American Indian children.

Despite the massive historical traumatic events and current challenges experienced by American Indians, the dynamic of resilience cannot be ignored. Elders in one study identified individual, family, and community constructs that promote resilience as connectedness, culture, and spirituality (28); furthermore, as Tolliver-Lynn et al. (29) relate, "many protective characteristics that promote resilience are deeply embedded in traditional AI/AN culture" (29). Elders in another study asserted that healing from said historical traumas involves reclamation of one's culture (9, 30). In this paper, we will describe the process of culturally adapting an evidence-based perinatal depression prevention intervention, to begin to address some of these inequities through the reclamation of cultural and spiritual wellness practices within the context of parenting.

Opportunity for Community Impact

The Great Plains Tribal Leaders' Health Board—who serve 18 Great Plains Tribal communities—received funding to support the maternal and child health of families living on or near the Rosebud Indian Reservation, South Dakota (Project LAUNCH: Linking Actions for Unmet Needs in Children's Health). A core strategy included professional development for maternal and child health outreach workers. Mothers and Babies (MB), an evidence-based perinatal depression prevention intervention frequently used in home visiting, was selected for provider training and implementation in the Great Plains Tribal communities.

About Mothers and Babies

MB is an evidence-based perinatal depression prevention intervention, based on foundations of cognitive-behavioral therapy (CBT) and attachment theory, that provides a toolkit of cognitive, behavioral, social, and mindfulness approaches to effectively respond to stress while pregnant, preparing for, and parenting a baby or young child (31, 32). MB uses a psychoeducational approach to increase engagement in pleasant activities, promote helpful thoughts and reduce unhelpful thoughts, and strengthen social support and communication with one's social network and community. MB can be implemented as a group intervention (33–37) or individually (38, 39). Each core module (Pleasant Activities, Thoughts, and Contact with Others) is introduced by a character vignette with two pregnant/postpartum people, illustrating the connection with their mood (see **Table 1**). MB can be implemented by providers from various educational and professional backgrounds, in settings where pregnant people and new parents access services and has been recommended by the US Preventive Services Task Force (40, 41). MB is being scaled across the US in home visiting and other maternal and child health settings, using a four-stage process including pre-training conversations, training, implementation consultation, followed by implementation evaluation and maintenance.

Impetus for Cultural Adaptation

The inception of this cultural adaptation began during a live-virtual MB intervention training. Training participants included Great Plains maternal and child health leadership and supervisors, infant mental health consultant, and direct service staff. During the training, several examples within the MB manuals were identified as incongruous with typical resources and experiences among reservation communities; participants discussed benefits of incorporating traditional teachings and culturally appropriate images and examples into the MB intervention to support Native American families. An interdisciplinary team was later engaged to conduct the process of cultural adaptations to the MB intervention manuals.

TABLE 1 | Mothers and babies intervention content.

MB module	MB session	Participant worksheet
Introductory	Session 1: Introduction to mothers and babies	1.1 *Stressors that can affect the mother–baby relationship*
		1.2 *How the Mothers and Babies course can help you*
		1.3 *What is mindfulness and breath awareness*
		1.4 *Your mood and your personal reality*
		1.5 *Quick mood scale*
Pleasant activities	Session 2: Pleasant activities and mood	2.1 *Violet and Mary's days*
		2.2 *Pleasant activities list*
		2.3 *Mindfulness practice—Body scan*
		2.4 *What do you like to do?*
	Session 3: Pleasant activities with baby	3.1 *Overcoming obstacles*
		3.2 *Make a personal commitment*
		3.3 *Personal commitment calendar*
		3.4 *How do babies learn?*
		3.5 *From birth to 1: Some things babies like to do*
		3.6 *Mindfulness practice—Walking meditation*
		3.7 *Quick mood scale and pleasant activities*
Thoughts	Session 4: Thoughts and how they affect mood	4.1 *What are thoughts?*
		4.2 *Violet and Mary's days*
		4.3 *Mindfulness practice—Leaves on a Stream*
		4.4 *Helpful thoughts and unhelpful thoughts*
	Session 5: Identifying and modifying unhelpful thoughts	5.1 *Unhelpful thought patterns and challenging them*
		5.2 *Ways to change unhelpful thoughts*
		5.3 *Stopping unhelpful thoughts*
	Session 6: Relationship between mood, thoughts, and the future	6.1 *Thoughts about being a mother*
		6.2 *Thinking about your baby's future*
		6.3 *Thinking about your future*
		6.4 *Quick Mood Scale and Thoughts*
Contact with others	Session 7: Contact with other people and mood	7.1 *Relationship between mood and contact with others*
		7.2 *Violet and Mary's days*
		7.3 *Mindfulness practice—Web of life*
		7.4 *Quick mood scale and contact with people*
	Session 8: Social support for parent and child	8.1 *The people in my life*
		8.2 *People in my life and the ways they support me*
		8.3 *Role changes and disagreements*
		8.4 *People who provide support for me and my baby*
	Session 9: Communication style and mood	9.1 *Communication styles and your mood*
		9.2 *Getting your needs met*

METHODS

Science of Adaptation

Evidence Based Interventions (EBI) are often designed and scaled to reduce health disparities, but tend to be tested within one community, precipitating the need for improved contextual, and cultural fit as they are replicated and scaled (42). MB is an example of an EBI that has demonstrated effectiveness in reducing depressive symptoms and major depressive episodes among perinatal people and has been tested in diverse racial and ethnic populations. However, its reach within Indigenous communities has been limited, due in part to the need for culturally appropriate adaptations to ensure fit, acceptability, adoption, and positive impact.

Cultural adaptation is "the systematic modification of an evidence-based treatment (EBT) or intervention protocol to consider language, culture, and context in such a way that it is compatible with the client's cultural patterns, meanings, and values" (43). EBIs serve diverse populations in ever-changing contexts, with adaptation allowing service providers greater ownership over the content and bringing families' culture and expertise to the forefront. Adapting an intervention with community members promotes likelihood that its implementation will be sustained (44).

There are key elements of an EBI that should be maintained, including the pedagogy of the intervention (45, 46). MB's

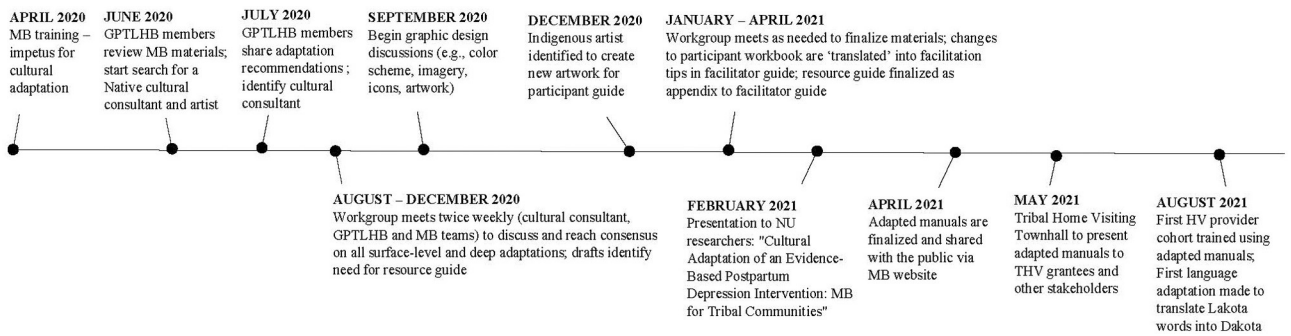

FIGURE 1 | Timeline of cultural adaptation workgroup process and dissemination to date.

core components are CBT and attachment theory: regardless of adaptation, participants should receive and emerge with the same skills and knowledge (47). Participant responsiveness is another a key component of fidelity, making adaptations crucial to maintaining participant engagement (47). Making "fidelity-consistent" adaptations while maintaining these core elements can ultimately impact the reach and effectiveness of the intervention across settings, changing contexts, and over time (48).

There are various types of adaptations that fall into "surface level" or "deep" adaptations (49). Surface level adaptations attempt to match intervention materials to the observable characteristics of a population, like ensuring the people in images represent those being served and incorporating elements of music, language, food, and clothing into materials. Deep adaptations incorporate cultural, social, historical, environmental, psychological, and spiritual factors that can influence the health of the population (50, 51). Our work included both surface-level and deep adaptations to MB.

Process of Development and Workgroup Structure

The cultural adaptation process was conducted by a collaborative group of key stakeholders representing maternal and child health service providers, Lakota cultural expertise, and MB intervention researchers. Workgroup participants from the maternal and child health team included a program director, manager, supervisor, and staff member, all of whom had attended MB training, and some of whom were implementing MB or supervising implementation. An elder of the Oglala Sioux Tribe with expertise providing cultural consultation and training in areas of mental health and youth and family well-being, guided the process to incorporate traditional teachings into the MB intervention and manuals. Several members of the MB team with expertise in MB intervention development, implementation, and effectiveness research participated in the adaptation process.

Program managers and staff from GPTLHB reviewed the MB participant and facilitator manuals to identify areas where cultural adaptation was needed, including artwork, images, design elements, and cultural and spiritually grounded content. Family-facing materials were prioritized to ground the adaptations within the participant experience. The next phase of adaptations was guided by the cultural consultant, who shared traditional teachings with the group as we learned and discussed how to integrate core concepts and practices to promote connectedness with Lakota culture (see **Figure 1** for timeline). Throughout the collaborative process we discussed ways to incorporate cultural components into the cognitive, behavioral, and attachment foundations of the MB intervention.

Adaptations were focused on representation of the Lakota people, who are part of the Oceti Sakowin (Seven Council Fires). The workgroup allowed space and time to process the intersection of scientific knowledge with Indigenous knowledge in determining how best to integrate the two for optimal fit and impact, navigating through a "cultural interface" (52). The workgroup attended to the challenges of creating cultural congruence by reflecting the core values we promote in the intervention. Our process reflected *humility* among those who were learning about Lakota beliefs and traditions, *respect and honor* for elders and service providers who shared traditional knowledge and experiences, *wisdom* guiding preservation of the core MB intervention to maintain its fidelity as well as relatability for both providers and participants, *compassion* for American Indian children, families and communities, *generosity* of time, effort, and expertise, and openness throughout the iterative process to reach consensus on every adaptation.

Cultural Context Informing Adaptation

Traditionally and historically, Lakota people believe in the sacredness of life. A prime example of this was how Lakota children were viewed—as gifts from the Creator and as the life blood of the future of the people. Thus, every opportunity to enhance their growth—physically, mentally, emotionally, and spiritually—was taken as a responsibility to support them in reaching their full potential and fulfill their purpose in life. Lakota people refer to the unborn child as "*hoksi nagi*" (spirit infant) because it is believed that the child exists as a spirit being prior to being born to the earth. The mother was protected by the extended family thereby protecting the hoksi nagi. Once the hoksi nagi came to the physical realm of the earth, then they traveled through four stages of life called "Oinajin Topa" and

within those four stages there were seven transitions that each individual made.

Each of the seven transitions had teachings, protocols, and ceremonies that corresponded to the age range within each stage. For example, the *Hoksicila* (infant) stage began with a grandmother welcoming the infant to the world, bestowing a blessing on the infant, giving thanks to the Creator for the gift, and making a prediction for the life of the infant as they make the journey through each stage. The *Wakanyeja* (as a sacred being or child) was treated as sacred, never being hit and always spoken to gently, which was a reflection of the belief of their sacredness. Conduct toward the child was governed by the belief that the child's spirit could turn around and return to the spirit world at any time. The epistemology, or ways of knowing, of the Lakota people included great reverence for "allegiance to higher spiritual powers" (53). The belief that those higher spiritual powers could influence the journey of the child on earth or contribute to an untimely return to the spirit world was given great credence. Unfortunately, the disconnection of many Lakota people from their cultural and spiritual lifeways has resulted in some children no longer being treated as sacred beings. The disproportionately high rates of abuse and family separation among American Indian children illustrate the glaring departure from the concept of children as gifts from the Creator to be treated as sacred and shows the need to reconnect to that concept (10).

How do we reconnect to the conceptual understanding that children are sacred and the relationship between the mother and her baby requires ongoing support? The cultural adaptation of MB aimed to underscore the need for that reconnection. While it was the Lakota worldview, belief system and ancestral teachings that informed the cultural adaptation, it was understood there is a great diversity among American Indians so key constructs that spoke to universally held beliefs were highlighted; first and foremost, "children are sacred" has been a common belief among many, if not all, American Indian tribal nations. Warne (54) posits that strengthening cultural values is an important strategy to reducing health disparities, while highlighting the critical factor of the impact that family health has on child health. The cultural adaptation of MB weaves activities throughout that strengthen the bond between the mother and her culture, thereby strengthening the bond between the mother and her baby. The cultural adaptation of MB was a deliberate and thoughtful effort toward cultural grounding of the material, always with the sacredness of children in the forefront and Lakota cultural ancestral teachings as the foundation.

RESULTS

Description of Adaptations

After thorough review of the participant and facilitator manuals by the entire workgroup, various changes were made to both manuals, inclusive of surface- and deep-level adaptations. Adaptations began with the participant manual given that these materials are family-facing. Adaptations were then made to the facilitator guide to reflect changes in the participant guide, and to provide further resources and support for service providers when delivering the adapted curriculum (see **Table 2** for description).

Surface-level adaptations consisted of revised color scheme, cover artwork depicting a star quilt, photos, and illustrations depicting Indigenous peoples, clothing, activities, and culture, and Lakota language for key concepts (e.g., sacred laws, kinship terms). For example, in the original MB participant manual, a seesaw depicts the imbalance that stress causes in our lives, vs. the balance that is created when we utilize the cognitive-behavioral skills learned in MB. This seesaw was replaced with a tipping and then balanced canoe. Three vignettes introduce each core CBT module through the stories of Violet and Mary's days. These were reimagined as Dawn and Sunset—names reflecting the connection with the natural world common among Lakota people. We worked with an artist of Colombian and Honduran native descent, to create appropriate illustrations. Pleasant activity examples were changed to be more culturally appropriate, such as attending a pow wow, harvesting herbs, and beading. Each of these elements were selected after deliberation and consensus among workgroup members, using an iterative process.

Deep-level adaptations incorporated important spiritual elements, ancestral teachings, and cultural values. In the first MB session, as participants are introduced to stressors that can affect the mother–baby relationship, they are also introduced to the Lakota worldview of governance of self, family, and community referred to as Woop'e Sakowin (Seven Sacred Laws)—compassion, generosity, humility, fortitude, respect and honor, bravery, and wisdom. An additional worksheet addressing strengths that can affect the mother–baby relationship encourages participants to identify strengths they already have. Examples such as "wocekiye" (sending voice to Creator) and "wotakuye" (strong kinship system) are included to support the process of identifying with culturally-based strengths and values. As participants are introduced to their personal reality—a term used to encompass both inner and outer experiences in relation to cognitive-behavioral theory—a lens toward the Lakota worldview "woiwanke" is used to frame concepts. A medicine wheel or sacred circle is used to depict the relationship between our inner and outer realities, and our mood. The Lakota worldview includes "nagi" or spirit within one's inner reality, encouraging participants to strengthen the core part of their being—their spirit. Each of these elements are revisited throughout the curriculum to reinforce that spirituality and the seven sacred laws are fundamental elements of reducing stress, improving mental health, and building a healthy mother–baby relationship.

A small medicine wheel icon is used throughout the facilitator manual to indicate where adaptations have been made and places that further adaptations can be made to meet the needs of a particular community. Several appendices were added to the facilitator guide with further cultural teachings and practices such as "How to Make a Wokpan" (spirit toolkit), a kinship chart, and a spiritual calendar.

Description of Products

Fully adapted participant and facilitator MB manuals for use in tribal communities are available for access *via* the MB website[1]. Adaptation guidance is provided through facilitation

[1] mothersandbabiesprogram.org

TABLE 2 | Adaptations.

Manual	Section	Type of adaptation	Adaptation description
Both	Throughout	Surface-level:	**Color scheme** changed throughout entire participant and facilitator manual, beading motif added throughout
			Language—Lakota words included *throughout* both manuals (i.e., Ina Na Hoksicila Woonspe = The Mothers and Babies Course) (those that have deep spirit and cultural roots have been included below, all language changes have not been listed due to sheer amount)
			Culturally appropriate illustrations: imagery changed throughout manuals to be representative of native peoples (individual changes of this type are not all listed below due to sheer amount)
Both	Cover	Surface-level and Deep:	**Culturally appropriate illustration—cover art** changed to artwork of a Lakota star quilt on both manuals
Participant	Introduction, Session 1	Surface-level:	**1.1: tailoring content**—"too much work" changed to "employment issues; and "household chores" changed to, "lack of safe, adequate, and stable housing," "problems with your partner or others" changed to 'relationship issues"
			1.4: culturally appropriate illustration—seesaw changed to tipping canoe
			1.5: tailoring content—slight modification to streamline "what is mindfulness?" content
		Deep:	**1.2: new worksheet added**—"Strengths that can affect the mother–baby relationship"
			1.3: new worksheet added—"Woope Sakowin—Seven Sacred Laws"
			1.5: tailoring content—cultural references added linking mindfulness to seven sacred laws (i.e., "inila"-being still, calm, quiet; "ksapa" being aware/alert)
			1.6: tailoring content—Lakota worldview and medicine wheel included to incorporate spirit into inner reality
Participant	Pleasant Activities, Session 2	Surface-level:	**2.1: culturally appropriate illustration, tailoring content—**Dawn and Sunset vignette, pleasant activity = making wojapi
			2.2: culturally appropriate illustration, tailoring content—pleasant activities list changed to include culturally appropriate activities, illustration of native family added
			2.3: illustration—illustration changed to tree local to Lakota region
		Deep:	**2.3: culturally appropriate illustration**—tree has been adorned with prayer tobacco tie offerings (used during Sun Dance)
Participant	Pleasant Activities, Session 3	Surface-level:	**3.1: culturally appropriate illustration, tailoring content—**"obstacles" changed to "challenges," illustration of woman climbing stairs changed to person at fork in road in nature
Participant	Thoughts, Session 4	Deep:	**4.1: tailoring content—**Thought bubble changed from "Pregnancy and having a new baby are special times in my life..." to "A new baby is a blessing from the Creator"
			4.3: tailoring content—instructions changed to "Use the mind's eye"
		Surface-level:	**4.2: culturally appropriate illustration**—Dawn and Sunset vignette
			4.3: photograph—photograph of maple leaves (local to Lakota region)
Participant	Thoughts, Session 5	Surface level:	**5.3: illustration**—illustration changed to tree local to Lakota region
		Deep:	**5.3: culturally appropriate illustration**—tree has been adorned with prayer ties (used during Sun Dance)
Participant	Thoughts, Session 6	Deep:	**6.2: tailoring content and imagery—**Thinking about baby's future reimagined as concentric circles and a progression over the first 5 years of child's life
Participant	Session 6	Surface-level:	**6.3: culturally appropriate illustration and tailoring content:** Example and corresponding illustrations changed to "I want to have my own home" and "I will connect with housing resources in my community"
Participant	Contact With Others, Session 7	Surface-level:	**7.2: culturally appropriate illustration and tailoring content—**Dawn and sunset vignette, activity changed from shopping to taking a walk
Participant	Session 7	Deep:	**7.3: tailoring content—**spirit and cultural elements incorporated into mindfulness practice (i.e., "Reach up to ANPE WI (Sun). Envision the WICAHPI OYATE (the Star Nation) and UNCI MAKA (Grandmother Earth). Remember you are a part of the MAKA SITOMNI (Universe) and were sent from the NAGI YATA (Spirit World) as a blessing to the people and this earth")
Participant	Contact With Others, Session 8	Deep:	**8.1: tailoring content and imagery—**"The People In My Life" graphic reimagined as a circle of kinship incorporating visual elements from the seven sacred laws
Facilitator	Throughout		**Instructions** changed to incorporate Seven Sacred Laws, Sacred Circle Within Me and all other new additions
			Medicine wheel icon used throughout to demonstrate when an adaptation was made and/or where a facilitator can make further adaptations to meet the needs of their community
Facilitator	Appendices		**Appendices** added at end of facilitator manual including: (a) Cultural Adaptation Process and Workgroup Members, (b) Glossary, (c) Seven Sacred Laws (extra worksheet for printing), (d) Sacred Circle Within Me (extra worksheet for printing), (e) How To Make A Wokpan (Spirit Toolkit), (f) Kinship Chart, (g) Oglala Lakota Spirit Calendar, (h) Adaptation Guidance, and (i) Additional Resources

tips within MB sessions referencing cultural resources and approaches, as well as an adaptation guide in the appendix to provide context and guidance for making further fidelity-consistent cultural adaptations. The adaptation guide includes: (1) "green light" adaptations—safe, encouraged, and fidelity consistent, to fit the culture and context; (2) "yellow light" adaptations—changes that should be made with caution, consulting an expert is encouraged; and (3) "red light" adaptations—fidelity inconsistent changes that would weaken or remove key components of the intervention and would therefore compromise intervention fidelity and efficacy. While this adaptation was developed with and for members of the Lakota Tribe, we believe that these culturally adapted MB manuals will be useful in other tribal communities as well, with further adaptation encouraged to ensure cultural fit, acceptability, and sustainable implementation.

Dissemination

Since the completing this cultural adaptation, we have co-facilitated a presentation with the US Health Resources and Services Administration, to which Tribal Maternal, Infant and Early Childhood Home Visiting Program grantees were invited, sharing background on MB, the cultural adaptation process, and examples of adapted content. We then facilitated a MB training for a group of service providers from organizations serving Indigenous populations in North Dakota, South Dakota and Michigan. A home visiting program in South Dakota translated the Lakota language into Dakota, to fit their community. Maternal and child health leadership in Vermont are discussing next steps in adapting MB for the Abenaki families they serve, and other home visiting networks serving American Indian families and communities have expressed interest in being trained in the culturally adapted manuals. This early interest and uptake is a testament to the purpose and the process for which our workgroup advocated.

DISCUSSION

If successful, adapted EBIs can have profound impact by improving reach, effectiveness, and health equity for marginalized populations. This cultural adaptation of MB has the potential for significant impact and is well-positioned to improve access to mental health resources as it can be implemented by paraprofessionals (39, 41). Moving tasks, as appropriate, to staff with lesser training, ("task-shifting") (55), can empower Indigenous paraprofessionals who are familiar with the spirituality, kinship patterns, language, and historical collective trauma to provide their participants with tools and skills to address their mental health. This adapted version of MB has the potential to reduce depressive symptoms, improve mother–baby attachment, reinvigorate engagement with spirit and cultural practices, and promote overall well-being of Indigenous families.

This adaptation process, grounded in humility and compassion, may be replicated by future scholars in collaboration with community members as they wish to adapt EBIs for varying populations and contexts. To prepare for these adaptations, researchers and intervention developers can proactively identify thematic elements in an EBI that must remain in order to maintain fidelity. Cultural adaptations must be led by members of the community. We encourage scholars and researchers engaging in this process to do so with intention, openness, compassion, and a focus on health equity.

Evaluation

This work is intended to enhance the acceptability, reach, and uptake of the MB intervention, to improve mental health outcomes of parents and children through an adapted EBI that prioritizes cultural restoration alongside cognitive-behavioral skills. The use of hybrid effectiveness-implementation research designs (56) can guide aspects of both intervention implementation and effectiveness evaluation. We will evaluate the acceptability, feasibility, and fidelity of the adapted manuals through yearly implementation surveys, developed to guide scaling among tribal communities and through tribal home visiting. Additional implementation metrics include qualitative research with service providers and participants, to learn more about intervention and adaptation acceptability, skill utilization, participant responsiveness, and provider recommendations. We will collaborate with Indigenous communities to develop culturally relevant measures and acceptable methods to evaluate the implementation and impact of the culturally adapted intervention, to promote acceptability and effectiveness of the research process as well (57).

Future Directions

There is need for further funding for development and evaluation of culturally-normed EBIs in Tribal communities, further cultural adaptation of EBIs, as well as development of EBIs specifically for and with Indigenous populations across healthcare and service systems.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Contributions of COVID-19 Pandemic-Related Stressors to Racial and Ethnic Disparities in Mental Health During Pregnancy

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Background: This study aimed to identify racial and ethnic disparities in prenatal mental health and identify COVID-19 pandemic-related health/healthcare and economic contributors to these disparities, using an established framework for disparity investigation.

Methods: This cross-sectional study includes 10,930 pregnant people at Kaiser Permanente Northern California who completed an online survey between June 22, 2020 and April 28, 2021 on COVID-19 pandemic-related health/healthcare and economic stressors, depression, and anxiety. Self-reported race and ethnicity were extracted from electronic health records. Weighted analyses were used to evaluate the association between racial and ethnic category and prenatal depression and anxiety; the prevalence of each stressor by race and ethnicity; and the relationship between each stressor and prenatal depression and anxiety in each racial and ethnic category.

Results: The sample was 22% Asian, 3% Black, 20% Hispanic, 5% Other/Multiracial/Unknown, and 49% White. Compared to White people, Black and Hispanic people had a higher prevalence of prenatal depression (aPR: 1.85, 95% CI: 1.45, 2.35 and aPR: 1.17, 95% CI: 1.00, 1.37, respectively) and anxiety (aPR: 1.71, 95% CI: 1.34, 2.18 and aPR: 1.10, 95% CI: 0.94, 1.29, respectively). Compared to White people, Black and Hispanic people had a higher prevalence of moderate/severe distress due to changes in prenatal care (24 vs. 34 and 31%), and food insecurity (9 vs. 31 and 24%). Among Black and Hispanic people, distress due to changes in prenatal care was associated with a greater prevalence of prenatal depression (aPR: 2.27, 95% CI: 1.41, 3.64 and aPR: 2.76, 95% CI: 2.12, 3.58, respectively) and prenatal anxiety (aPR: 3.00, 95% CI: 1.85, 4.84 and aPR: 2.82, 95% CI: 2.15, 3.71, respectively). Additionally, among Hispanic people, high-risk employment and food insecurity were associated with a greater prevalence of prenatal depression and anxiety.

Conclusions: This study identified racial and ethnic disparities in mental health for pregnant Black and Hispanic people. Distress due to prenatal care changes contributed to the observed disparities in prenatal depression and anxiety for Black and Hispanic people and food insecurity additionally contributed to the observed disparities for

Hispanic people. Addressing distress due to changes to prenatal care and food insecurity specifically in Black and Hispanic people may help reduce the high burden of poor mental health and reduce observed disparities in these communities.

Keywords: COVID-19, prenatal depression, prenatal anxiety, antenatal depression, antenatal anxiety, stressors, social determinants of health

INTRODUCTION

The COVID-19 pandemic in the U.S. has disproportionately impacted communities of color with substantially higher rates of infection, hospitalization, and death documented in Asian, Black, and Hispanic people compared to White people (1). In addition, the pandemic has exacerbated deep-seated social and economic disparities related to living conditions and work environments (2) putting communities of color at heightened risk of COVID-19-related stressors and adverse mental heath outcomes.

Pregnant people in particular, have been acutely impacted by the COVID-19 pandemic. Compared to White people, pregnant people of color are at greater risk of severe COVID-19 illness with Black and Hispanic people at highest risk (3). Changes to prenatal care, concerns about the heightened risks of SARS-CoV-2 infection for themselves and their fetus, and school closures and loss of childcare (4) have increased stress in pregnant people. Several COVID-19-related health and health care stressors (e.g., a job with increased risk of SARS-CoV-2 infection, distress over changes to prenatal care) as well as economic stressors (e.g., childcare challenges) have been reported to be associated with prenatal psychological distress (depression, anxiety) (5–9). Given the disproportionate impact of the pandemic on communities of color, pregnant Asian, Black, and Hispanic people may experience higher rates of COVID-19-related stressors as well as depression and anxiety, compared to pregnant White people.

While disparities in prenatal mental health have been documented prior to the pandemic with higher rates of depression and anxiety among pregnant Black and Hispanic people compared to White people (10, 11), little research on prenatal mental health disparities has been conducted during the pandemic (12). With the goal of identifying racial and ethnic disparities in mental health among pregnant people during the COVID-19 pandemic and COVID-19 pandemic-related contributors to these disparities, we followed the framework for disparity investigation described by Ward et al. (13) This framework shifts away from the sole use of interaction terms to assess health disparities and instead promotes a more comprehensive approach through a combination of racial and ethnic group-specific estimates in each of the following: (1) the prevalence of the outcome, (2) the prevalence of the exposure, and (3) the relationship between the exposure and outcome. Ward et al. demonstrate that an exposure associated with an outcome in the disadvantaged group can contribute to a disparity regardless of whether the relationship differs between racial and ethnic groups if differences in prevalence of the exposure are also taken into account. The contribution of this exposure to the disparity would be overlooked when relying only on significance testing of interaction terms without considering prevalence of the exposure. Thus, this framework allows for a more comprehensive and informative understanding of contributors to health disparities than that from use of interaction terms only. We hypothesized COVID-19-related stressors will contribute to racial and ethnic disparities in prenatal depression and anxiety.

METHODS

Setting

This study was conducted in Kaiser Permanente Northern California (KPNC), a large integrated health care delivery system that provides comprehensive medical care to over 4.5 million members. All 15 regional service centers (with 48 associated office facilities) have Obstetrics and Gynecology and Behavioral Medicine/Psychiatry Departments. KPNC members include people covered by employee-sponsored insurance plans, the insurance exchange and Medicaid. Coverage is provided for ∼40% of the northern California population. KPNC members are socio-demographically similar to the population living in the geographic area served by the health plan (14). KNPC maintains comprehensive electronic health records (EHR) for all members.

Study Design

This cross-sectional analysis was conducted using data from the ongoing KPNC COVID-19 Pregnancy Study (15). This analysis includes data collected from pregnant KPNC members between June 22, 2020 and April 28, 2021. Detailed information on the study design and cohort has been published previously (15). Briefly, pregnant KPNC members at least 12 weeks of gestation, 18 years of age or older and English-speaking were identified from the EHR every 2 weeks and invited to complete a brief, web-based survey.

The Institutional Review Board of KPNC approved all study procedures and participants indicated informed consent by completing the survey after reviewing the consent information in the recruitment email.

Measures

Race and ethnicity categories were ascertained from self-reported race and ethnicity in KPNC's electronic health records (EHR) and defined as Asian, Black, Hispanic, Other, and White. The Other category included racial and ethnic categories for which there were a small number of participants (Native American, Pacific Islander, Multiracial) as well as Unknown.

Prenatal mental health outcomes were captured in the survey. **Depression**. The 8-item, Patient Health Questionnaire (PHQ-8) depression screener has been validated for use in perinatal populations (16, 17) and was used to assess depression symptoms in the past 2 weeks. The PHQ-8 is similar to the PHQ-9 which has

been validated for use across diverse racial and ethnic patients (18), with the exception that it excludes the question regarding suicide ideation. Scores range from 0 to 24 and scores of 10–24 were categorized as clinically significant depressive symptoms. **Anxiety**. The General Anxiety Disorder Scale (GAD-7) (19) has been validated in prenatal (20) and racially diverse populations (21, 22), and was used to measure anxiety symptoms in the past two weeks. Scores range from 0 to 21 and scores of 10–21 were categorized as clinically significant anxiety symptoms.

Several COVID-19 pandemic-related stressors were also captured in the survey. **Health and healthcare stressors**: Participants were asked if a healthcare provider had told them that they had or likely had COVID-19 (COVID-19 in pregnancy; y/n); if a member of their household had or probably had COVID-19 (Household member had COVID-19; y/n); whether their job put them at increased risk of COVID-19 (high-risk employment; y/n); and how distressed they were about changes to their prenatal care due to the COVID-19 pandemic (moderately/extremely vs. not at all/mildly). **Economic stressors**: All questions referred to the time frame of "since becoming aware of the COVID-19 pandemic." Participants were asked if they lost their job permanently, temporarily or reduced their work hours (Lost job or reduced hours; y/n), if their spouse/partner lost their job permanently, temporarily or reduced their work hours (Partner lost job or reduced hours; y/n), and if their childcare was impacted such that they had difficulty arranging childcare or had to pay more for childcare (Childcare challenges; y/n). The validated 2-item Hunger Vital Sign screener was used to assess food insecurity (23). Food insecurity (y/n) was defined as responding often true or sometimes true (vs. never true) to either statement: (1) you worried that your food would run out before getting money to buy more or (2) the food you bought did not last and you did not have enough money to get more.

Demographic and Health Characteristics

The following data were ascertained from the EHR: maternal age at delivery (continuous in years), insurance type (commercial, government/public), trimester at survey completion (trimester one/trimester two, trimester three) and parity (zero, one, or 2+ previous births).

Statistical Analysis

Inverse probability weights were created to account for survey non-response (20% response rate in the eligible sample; **Supplementary Table 1**). Inverse probability weights for survey response were calculated using predicted probabilities from a logistic regression model including variables expected to be associated with survey response (race and ethnicity category, insurance type, parity, trimester of pregnancy at the start of the COVID-19 pandemic), additional factors strongly associated with depression or anxiety symptoms (maternal age), and all interaction terms. Weights ranged from 1.56 to 59.19 in participants who completed the survey. To limit the influence from observations with extreme weights, weights were truncated at 20 for the 20 participants with weights >20 (24).

Multiple imputation by chained equations (MICE) (25) was used to address potential bias from excluding participants with missing data (complete case analysis) since data were not missing completely at random (26). We performed 100 imputations to impute missing values for people with missing data for covariates included in the regression models (14% missing parity, 1% missing insurance type). After imputation, we excluded participants with missing data for outcomes ($n = 876$) (27). The final analytic sample included participants with non-missing outcome information ($n = 10{,}930$).

The Ward et al. (13) framework for disparity investigation outlines three steps for identifying contributors to racial health disparities: (1) assess if there are differences in outcome prevalence (e.g., prenatal depression and anxiety) between racial and ethnic groups; (2) assess if there are differences in exposure prevalence (e.g., COVID-19-related health/healthcare and economic stressors) between racial and ethnic groups, and (3) evaluate whether the relationship between the exposure (COVID-19-related stressors) and outcome (prenatal depression and anxiety) differs between racial and ethnic groups. Conclusions about COVID-19-related stressors that contributed to racial and ethnic prenatal mental health disparities were based on the results from the analyses in accordance with the Ward et al. guidelines. Below we outline the methods used for each of these steps.

We first assessed racial and ethnic differences in the prevalence of prenatal depression and anxiety. According to the framework, establishment of a difference in the prevalence of the outcome is fundamental to the definition of a racial and ethnic health disparity. If there is no difference in the prevalence, then a disparity does not exist. We used weighted modified Poisson regression models (28) to estimate prevalence ratios and 95% confidence intervals for prenatal depression and anxiety associated with racial and ethnic group, with and without adjusting for potential confounders (maternal age, parity, insurance type, calendar month of survey completion, and trimester at survey completion) for each imputed dataset. Results were combined using Rubin's rules (29). The final point estimate was calculated as the average of the point estimate distribution across regression model results from each imputed dataset; the variance was calculated using both within- and between-imputation variances.

Second, we evaluated racial and ethnic differences in prevalence of COVID-19-related health/healthcare and economic stressors. Weighted percentages and chi square statistics were calculated for each COVID-19-related stressor by racial and ethnic group for each imputed dataset and combined across imputed datasets (30).

Third, we assessed whether the relationship between COVID-19-related stressors and prenatal depression and anxiety differed by racial and ethnic group. An association between the exposure and the outcome in the disadvantaged group was in some cases sufficient to conclude the stressor contributed to the disparity, depending on the prevalence of the exposure in the racial and ethnic groups (13). We used weighted modified Poisson regression models (28) to estimate prevalence ratios and 95% confidence intervals for prenatal depression and anxiety associated with each COVID-19-related stressor stratified by racial and ethnic category. Models were mutually adjusted for

all COVID-19-related health/healthcare and economic stressors and potential confounders (maternal age, parity, insurance type, calendar month of survey completion, and trimester at survey completion). To test statistical differences in associations by racial and ethnic groups, we included a cross-product term between race and ethnicity category and each stressor in separate weighted modified Poisson regression models (28) for each stressor and prenatal depression and anxiety, adjusted for all COVID-19-related health/healthcare and economic stressors and potential confounders mentioned above. Tests for interaction generally have less power to assess statistical significance and thus a $p < 0.10$ is accepted as the cutoff for statistical significance for interaction terms (31). Models were run for each imputed dataset. Results were combined using Rubin's rules (29).

Analyses were conducted in SAS version 9.4 (SAS Institute INC., Cary, NC, USA) and R (version 4.1.2) (32).

RESULTS

The sample of 10,930 pregnant participants was 22% Asian, 3% Black, 20% Hispanic, 5% Other/Multiracial/Unknown, and 49% White (**Table 1**). Overall, a majority of the participants had private insurance (88%), completed the survey in the first or second trimester of pregnancy (79%), were an average 33 years of age, and had <2 previous births (67%). Black and Hispanic participants were more likely than Asian and White participants to have 2 or more previous births (24 and 23 vs. 11 and 12%, respectively) and have government/public insurance (23 and 13 vs. 5 and 7%, respectively).

Racial and Ethnic Differences in Prenatal Depression and Anxiety

Prenatal Depression

The overall prevalence of prenatal depression was 11%. There was considerable variation in prevalence of prenatal depression across the racial and ethnic groups, with the highest prevalence among Black and Hispanic participants (**Table 2**). Compared to White participants, Black participants had an 85% greater prevalence of prenatal depression [adjusted Prevalence Ratio (aPR): 1.85, 95% CI: 1.45, 2.35] after adjusting for potential confounders and Hispanic participants had a 17% greater prevalence of depression although only marginally statistically significant (aPR:

TABLE 1 | Demographic characteristics overall and by racial and ethnic category of 10,930 pregnant people seeking prenatal care at Kaiser Permanente Northern California during the COVID-19 pandemic between June 2020 and April 2021.

	Overall (*n*, wtd %)	**Asian**	**Black**	**Hispanic**	**Other/Unknown**	**White**	***p*-value**
n	**10,930**	**2,495**	**372**	**2,174**	**497**	**5,392**	
Age (mean, SE)	33 (0.04)	33 (0.1)	31 (0.3)	30 (0.1)	32 (0.2)	32 (0.1)	<0.001
Parity							<0.001
0	4,005 (31)	930 (32)	132 (28)	678 (26)	185 (30)	2,080 (34)	
1	3,755 (36)	903 (38)	98 (31)	694 (35)	130 (32)	1,930 (37)	
2+	1,626 (16)	267 (11)	84 (24)	510 (23)	50 (12)	715 (14)	
Missing	1,544 (17)	395 (18)	58 (17)	292 (16)	132 (26)	667 (15)	
Insurance type							<0.001
Government	559 (9)	75 (5)	60 (23)	207 (13)	29 (8)	188 (7)	
Commercial	10,214 (88)	2,394 (94)	306 (74)	1,930 (85)	445 (80)	5,139 (92)	
Missing	157 (2)	26 (1)	6 (3)	37 (2)	23 (12)	65 (2)	
Gestational age at survey							<0.001
1st/2nd trimester	8,328 (79)	1,916 (80)	264 (79)	1,603 (78)	386 (80)	4,149 (80)	
3rd trimester	2,602 (21)	579 (20)	98 (21)	571 (22)	111 (20)	1,243 (20)	

TABLE 2 | Prevalence, crude prevalence ratios (cPRs) and adjusted prevalence ratios (aPR) evaluating the relationship between racial and ethnic category and prenatal depression and anxiety.

	Prenatal depression			**Prenatal anxiety**		
	Prevalence *n* (wtd %)	**cPR (95% CI)**	**aPR* (95% CI)**	**Prevalence *n* (%)**	**cPR (95% CI)**	**aPR* (95% CI)**
Asian ($n = 2,495$)	202 (8)	0.88 (0.75, 1.04)	0.94 (0.80, 1.11)	179 (7)	0.88 (0.75, 1.04)	0.79 (0.67, 0.94)
Black ($n = 372$)	72 (21)	**2.23 (1.76, 2.83)**	**1.85 (1.45, 2.35)**	66 (20)	**2.01 (1.57, 2.58)**	**1.71 (1.34, 2.18)**
Hispanic ($n = 2,174$)	263 (13)	**1.39 (1.20, 1.62)**	**1.17 (1.00, 1.37)**	265 (13)	**1.30 (1.12, 1.51)**	1.10 (0.94, 1.29)
Other/unknown ($n = 497$)	48 (10)	1.07 (0.79, 1.45)	1.02 (0.75, 1.38)	43 (9)	0.88 (0.63, 1.21)	0.84 (0.61, 1.17)
White ($n = 5,392$)	466 (10)	Ref	Ref	487 (10)	Ref	Ref

**Adjusted for age (continuous), month of survey (continuous), trimester of survey, parity, insurance.*
The bold values indicate statistically significant relationship.

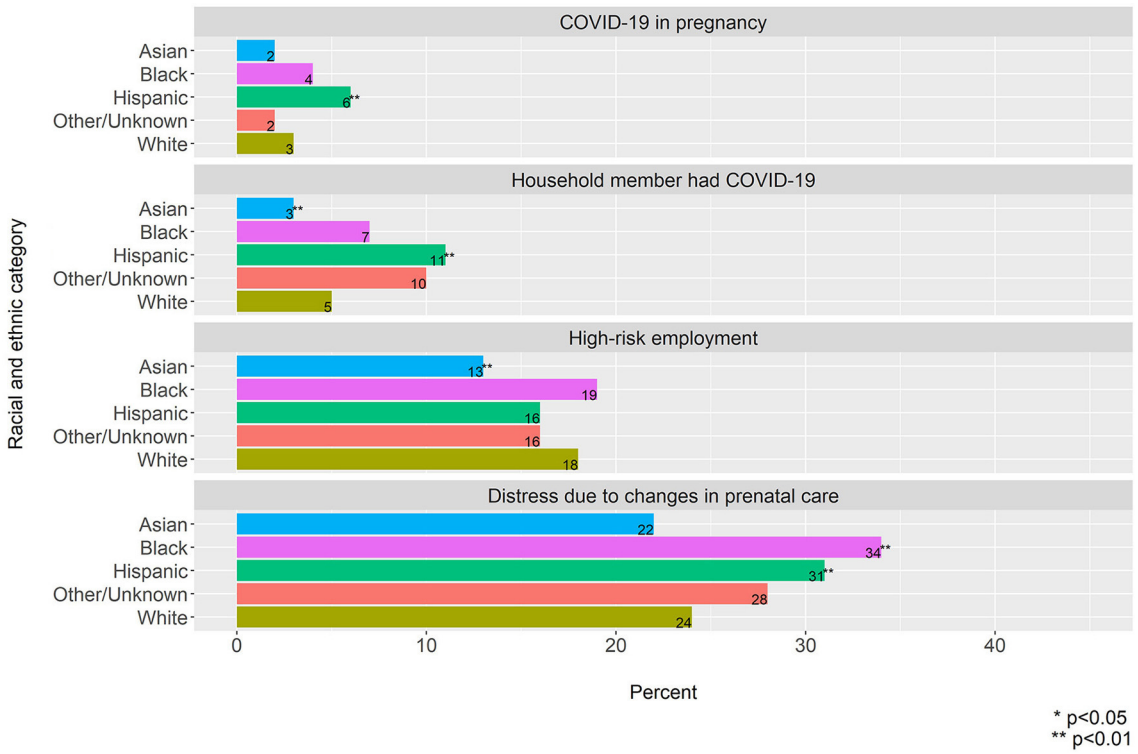

FIGURE 1 | Prevalence of health and healthcare stressors by racial and ethnic category.

1.17, 95% CI: 1.00, 1.37). Additionally, prevalence of prenatal depression in Asian participants did not differ compared to White participants after adjusting for potential confounders (aPR: 0.94, 95% CI: 0.80, 1.11).

Prenatal Anxiety

The overall prevalence of prenatal anxiety was 11%. Black participants had a 71% greater prevalence of prenatal anxiety compared to White participants after adjusting for potential confounders (aPR: 1.71, 95% CI: 1.34, 2.18) (**Table 2**). Hispanic participants had a 10% greater prevalence of prenatal anxiety compared to White participants; however, the results did not reach statistical significance after adjusting for potential confounders (aPR: 1.10, 95% CI: 0.94, 1.29). In contrast, Asian participants had a lower prevalence of prenatal anxiety (aPR: 0.79, 95% CI: 0.67, 0.94) compared to White participants after adjusting for potential confounders.

Racial and Ethnic Differences in COVID-19-Related Stressors

Overall, there were significant racial and ethnic differences in the prevalence of all health/healthcare and economic stressors ($p < 0.001$ for both). For the purpose of identifying COVID-19-related stressors that contribute to racial and ethnic disparities in prenatal mental health, we focus the text of this section on the racial and ethnic groups (Black and Hispanic) with a higher prevalence of prenatal depression or anxiety compared to White participants.

Health and Healthcare Stressors

Black and Hispanic participants had a higher prevalence of distress due to changes in prenatal care compared to White participants (Black: 34 vs. 24%, $p < 0.001$ and Hispanic: 31 vs. 24%, $p < 0.001$) (**Figure 1**). Additionally, Hispanic participants had a higher prevalence of COVID-19 during pregnancy and a household member with COVID-19 compared to White participants (COVID-19 during pregnancy: 6 vs. 3%, $p < 0.001$, household member with COVID-19 11 vs. 5%, $p < 0.001$).

Economic Stressors

Black participants had a significantly higher prevalence of job loss compared to White participants (26 vs. 20%, $p = 0.048$) and although the prevalence for Hispanic participants was elevated compared to White participants it did not reach statistical significance (22 vs. 20%, $p = 0.05$) (**Figure 2**). On the other hand, Hispanic participants had a higher prevalence of having a partner lose their job compared to White participants (26 vs. 20%, $p < 0.001$) and while the prevalence was also elevated for Black participants it did not reach statistical significance when compared to White participants (25 vs. 20%, $p = 0.08$). Compared to White participants (9%), Black and Hispanic participants had a higher prevalence of food insecurity (Black: 31%, $p < 0.001$, and Hispanic: 24%, $p < 0.001$). There were no differences in childcare challenges across racial and ethnic groups.

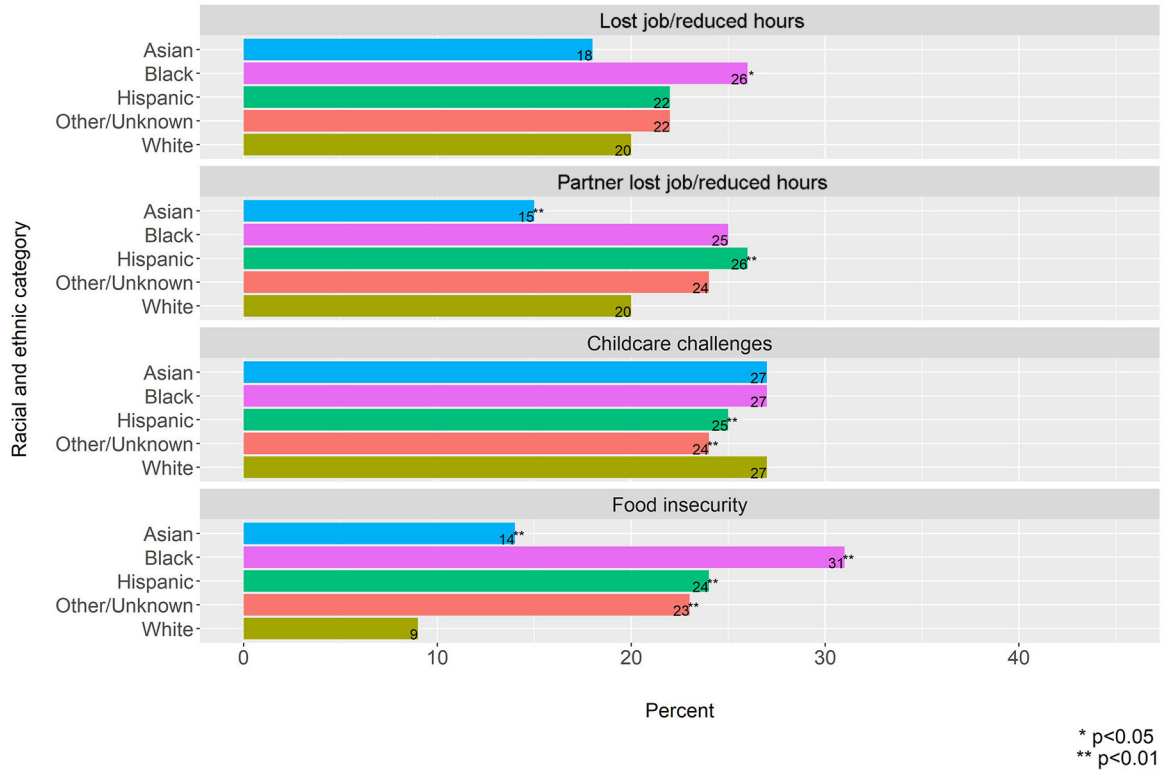

FIGURE 2 | Prevalence of economic stressors by racial and ethnic category.

Associations of COVID-19-Related Stressors and Prenatal Depression and Anxiety by Racial and Ethnic Group

Similar to above, we focus the text of this section on racial and ethnic groups (Black and Hispanic) with a higher prevalence of prenatal depression and anxiety compared the White group.

Among Black participants, distress due to changes in prenatal care was the only stressor statistically significantly associated with prenatal depression (aPR: 2.27, 95% CI: 1.41, 3.64) (**Table 3A**). This association was similar to that in White participants (aPR: 2.41, 95% CI: 1.98, 2.92). Among Hispanic participants, high-risk employment (aPR: 1.32, 95% CI: 1.01, 1.71), distress due to changes in prenatal care (aPR: 2.76, 95% CI: 2.12, 3.58), and food insecurity (aPR: 1.70, 95% CI: 1.31, 2.19) were statistically significantly associated with prenatal depression. Associations of high-risk employment and distress due to prenatal care changes with prenatal depression were similar to those among White participants (high-risk employment aPR: 1.34, 95% CI: 1.09, 1.64; distress due to changes in prenatal care aPR: 2.41, 95% CI: 1.98, 2.92). The association of food insecurity with prenatal depression in White participants was stronger than that in Hispanic participants (aPR: 2.35, 95% CI: 1.83, 3.00).

Among Black participants, distress due to changes in prenatal care was the only stressor statistically significantly associated with prenatal anxiety (aPR: 3.00, 95% CI: 1.85, 4.84) (**Table 3B**). This association was similar to that in White participants (aPR: 2.89, 95% CI: 2.38, 3.50). Among Hispanic participants, high-risk employment (aPR: 1.56, 95% CI: 1.20, 2.02), distress due to changes in prenatal care (aPR: 2.82, 95% CI: 2.15, 3.71), and food insecurity (aPR: 1.66, 95% CI: 1.28, 2.15) were statistically significantly associated with prenatal anxiety. Associations of high-risk employment, distress due to prenatal care changes and food insecurity with prenatal anxiety were similar to those among White participants (high-risk employment aPR: 1.32, 95% CI: 1.08, 1.62; distress due to changes in prenatal care aPR: 2.89, 95% CI: 2.38, 3.50; food insecurity aPR: 1.84, 95% CI: 1.43, 2.36).

DISCUSSION

This study documented racial and ethnic disparities in prenatal depression and anxiety during the COVID-19 pandemic with a higher prevalence of both mental health outcomes in Black and Hispanic people compared to White people. Black and Hispanic people experienced a higher burden of COVID-19-related health/healthcare and economic stressors including distress due to changes in prenatal care, job loss, partner's job loss, and food insecurity compared to White people. Hispanic people additionally were disproportionately impacted by COVID-19 in pregnancy and having a household member with COVID-19, compared to White people.

While the increased risk of prenatal depression for pregnant Black people during the COVID-19 pandemic has been

TABLE 3A | Adjusted prevalence ratio (aPR) for the relationship between COVID-19-related health/healthcare and economic stressors and prenatal depression, stratified by racial and ethnic category.

	Asian *n* = 2,495 aPR* (95% CI)	Black *n* = 372 aPR* (95% CI)	Hispanic *n* = 2,174 aPR* (95% CI)	Other/unknown *n* = 497 aPR* (95% CI)	White *n* = 5,392 aPR* (95% CI)
Health and healthcare stressors					
COVID-19 in pregnancy	2.11 (1.21, 3.69)	1.88 (0.74, 4.75)	1.35 (0.78, 2.31)	1.28 (0.24, 6.72)	1.12 (0.67, 1.87)
Household member had COVID-19	1.02 (0.58, 1.79)	1.02 (0.40, 2.60)	**0.87 (0.55, 1.37)****	0.91 (0.28, 3.01)	**1.41 (0.99, 2.00)**
High-risk employment	1.41 (1.02, 1.94)	0.86 (0.50, 1.46)	1.32 (1.01, 1.71)	0.97 (0.48, 1.97)	1.34 (1.09, 1.64)
Distress due to prenatal care changes	2.51 (1.88, 3.34)	2.27 (1.41, 3.64)	2.76 (2.12, 3.58)	1.67 (0.85, 3.27)	2.41 (1.98, 2.92)
Economic stressors					
Lost job	0.98 (0.69, 1.40)	1.17 (0.72, 1.90)	**1.00 (0.77, 1.30)****	**3.35 (1.87, 5.99)****	**1.30 (1.05, 1.60)**
Partner lost job	1.29 (0.92, 1.81)	1.44 (0.90, 2.29)	1.15 (0.89, 1.48)	0.77 (0.38, 1.55)	0.91 (0.73, 1.14)
Childcare challenges	1.16 (0.80, 1.68)	**0.97 (0.50, 1.86)****	1.24 (0.92, 1.67)	1.50 (0.71, 3.17)	**1.35 (1.06, 1.72)**
Food insecurity	2.30 (1.68, 3.15)	**1.48 (0.92, 2.37)****	**1.70 (1.31, 2.19)****	1.80 (0.90, 3.59)	**2.35 (1.83, 3.00)**

*Additionally adjusted for age (continuous), month of survey (continuous), trimester of survey, parity, insurance.
**$p < 0.10$ for the cross-product term compared to the White racial category for the model that included all racial and ethnic groups.
The bold values indicate statistically significant relationship.

TABLE 3B | Adjusted prevalence ratio (aPR) for the relationship between COVID-19-related health/healthcare and economic stressors and prenatal anxiety, stratified by racial and ethnic category.

	Asian *n* = 2,495 aPR* (95% CI)	Black *n* = 372 aPR* (95% CI)	Hispanic *n* = 2,174 aPR* (95% CI)	Other/unknown *n* = 497 aPR* (95% CI)	White *n* = 5,392 aPR* (95% CI)
Health and healthcare stressors					
COVID-19 in pregnancy	1.48 (0.71, 3.08)	1.57 (0.56, 4.39)	1.07 (0.61, 1.88)	**2.23 (0.68, 7.31)****	**0.84 (0.45, 1.57)**
Household member had COVID-19	0.70 (0.32, 1.57)	1.39 (0.57, 3.36)	0.97 (0.62, 1.52)	1.97 (0.66, 5.88)	1.27 (0.86, 1.88)
High-risk employment	**1.81 (1.30, 2.50)****	1.28 (0.79, 2.07)	1.56 (1.20, 2.02)	1.32 (0.67, 2.62)	**1.32 (1.08, 1.62)**
Distress due to prenatal care changes	3.69 (2.68, 5.09)	3.00 (1.85, 4.84)	2.82 (2.15, 3.71)	4.39 (2.28, 8.47)	2.89 (2.38, 3.50)
Economic stressors					
Lost job	0.86 (0.58, 1.27)	1.57 (0.99, 2.49)	1.05 (0.80, 1.37)	1.87 (0.90, 3.87)	1.10 (0.89, 1.37)
Partner lost job	1.04 (0.73, 1.51)	1.41 (0.90, 2.22)	1.12 (0.87, 1.44)	0.43 (0.17, 1.11)	0.97 (0.78, 1.21)
Childcare challenges	1.58 (1.03, 2.43)	1.18 (0.61, 2.27)	1.28 (0.94, 1.74)	1.64 (0.59, 4.57)	1.34 (1.05, 1.70)
Food insecurity	2.19 (1.59, 3.02)	1.47 (0.90, 2.38)	1.66 (1.28, 2.15)	1.50 (0.75, 3.01)	1.84 (1.43, 2.36)

*Additionally adjusted for age (continuous), month of survey (continuous), trimester of survey, parity, insurance.
**$p < 0.10$ for the cross-product term compared to the White racial category for the model that included all racial and ethnic groups.
The bold values indicate statistically significant relationship.

demonstrated previously (12), this study is the among the first to report an increased prevalence of prenatal anxiety among this group during the pandemic and an increased prevalence of prenatal depression and anxiety among Hispanic people. The higher rates of poor prenatal mental health among pregnant Black and Hispanic people compared to White people during the pandemic mirrors what has been documented prior to the COVID-19 pandemic (10). The consistently high burden of poor prenatal mental health in Black and Hispanic people documented in previous research and in our findings and the detrimental impacts of prenatal depression and anxiety on both mother and child, including greater risk of postpartum depression, (33, 34), preterm birth, small-for-gestational age (SGA) birth (35–37), and emotional and behavioral problems in the offspring (38, 39), highlight the importance of culturally appropriate, acceptable, and accessible interventions for prevention and treatment of prenatal depression and anxiety.

Contribution of COVID-19-Related Stressors to Racial and Ethnic Disparities in Prenatal Depression and Anxiety

Applying the Ward et al. framework (13), one scenario where a stressor contributes to a disparity in a mental health outcome is when: (1) there is a disparity in the mental health outcome, (2) the stressor is more prevalent in the more disadvantaged racial and ethnic group compared to the White group, and (3) the

TABLE 4 | Summary of approach for identifying contributors to observed racial and ethnic disparities in mental health outcomes in pregnant people during the COVID-19 pandemic.

Mental health outcome	Observed disparity	COVID-19-related stressor associated with mental health outcome	Is there a difference in prevalence of the stressor by group?	Is there a difference in association of stressor and mental health outcome by group?	Stressor contributes to disparity
Depression	Greater prevalence in Black people vs. White people	Distress due to prenatal care changes	Yes, higher prevalence in Black people	No, similar association in both groups	Yes
Depression	Greater prevalence in Hispanic people vs. White people	High risk employment	No, similar prevalence in both groups	No, similar association in both groups	No
		Distress due to prenatal care changes	Yes, higher prevalence in Hispanic people	No, similar association in both groups	Yes
		Food insecurity	Yes, higher prevalence in Hispanic people	Yes, stronger association in white people	Yes
Anxiety	Greater prevalence in Black people vs. White people	Distress due to prenatal care changes	Yes, higher prevalence in Black people	No, similar association in both groups	Yes
Anxiety	Greater prevalence in Hispanic people vs. White people	High risk employment	No, similar prevalence in both groups	No, similar association in both groups	No
		Distress due to prenatal care changes	Yes, higher prevalence in Hispanic people	No, similar association in both groups	Yes
		Food insecurity	Yes, higher prevalence in Hispanic people	No, similar association in both groups	Yes

stressor is associated with the mental health outcome in the more disadvantaged racial and ethnic group (regardless of whether that relationship is different from that in the White group). Thus, our findings suggest distress due to prenatal care changes contributed to the observed disparities in prenatal depression and anxiety for Black and Hispanic people and food insecurity additionally contributed to the observed disparities in prenatal depression and anxiety for Hispanic people. We note that if we had relied solely on the results from the interaction model, both distress due to changes to prenatal care and food insecurity would not have been identified as contributors to these disparities in prenatal mental health.

Although high-risk employment was also associated with greater prevalence of prenatal depression and anxiety in Hispanic people, the prevalence of high-risk employment and its association with prenatal depression and anxiety were similar in Hispanic and White people (**Table 4**). Thus, this indicates that high-risk employment is not a contributor to the observed disparities in prenatal depression and anxiety for Hispanic people. However, while it may not contribute to the noted disparity, employment with high-risk of exposure to COVID-19 has been associated with psychological distress in other studies in pregnant people (5) and other non-pregnant populations (7, 40). Fatigue, health worries, and fear have all been reported by people with high-risk employment even previous infectious disease outbreaks (41). Consideration of high-risk employment as a risk factor for psychological distress in pregnancy, especially during infectious disease outbreaks, should be considered in prenatal depression and anxiety screening strategies.

The COVID-19 pandemic forced rapid implementation of hybrid models of care including both in-person and virtual prenatal care visits. Previous research has documented a significant relationship between COVID-19-related changes in prenatal care and greater psychological distress during pregnancy (6–9). In our study, Black and Hispanic people in particular experienced distress due to the changes in prenatal care which contributed to the higher burden of poor prenatal mental health in these groups. Previous research has found some people of color report negative interactions with the healthcare system during pregnancy, including experiences of racism, unmet information needs, and stressful interactions with all levels of staff (42–44). Thus, there is a need for better communication and careful listening during prenatal visits in pregnant people of color. During the COVID-19 pandemic, Black people reported worrying more than White people about having a good birthing experience and receiving good prenatal care (12), suggesting that COVID-19-related changes in prenatal care may have created challenges for patient-provider communication that further exacerbated existing disparities in quality of prenatal care between Black and White people. As healthcare systems continue to make changes to prenatal care and evaluate which care-delivery modifications to implement as standard prenatal care, providers and healthcare system leaders must remain focused on quality of patient-provider communication and must work with Black and Hispanic communities to identify ways to address stressful aspects of changes in prenatal care.

Similar to previous research during the pandemic in pregnant (12) and non-pregnant populations (45), Black and Hispanic

people experienced the highest prevalence of food insecurity. Food insecurity is strongly associated with prenatal depression (46, 47) as well as long-term maternal and child health. (48) Our study demonstrated food insecurity contributed to disparities in prenatal depression and anxiety for Hispanic people. However, the association of food insecurity with prenatal depression did not reach statistical significance among Black people, which may be due to the small sample size. Regardless, these findings highlight the high burden of food insecurity and its contributions to poor maternal mental health during pregnancy in populations of color.

This is among the first studies that we are aware of that has evaluated the contribution of food insecurity to racial and ethnic disparities in prenatal mental health. Research prior to the COVID-19 pandemic has documented income and employment status as a contributor to these disparities (10). Yet in our study job loss or reduced work hours by the participant or their partner was not a contributor. It is possible that food insecurity is a greater contributor to these disparities and an important area for future research especially given the potential policy and clinical implications if so. Addressing food insecurity in pregnant people may have a significant impact on both their nutritional and mental health. The high prevalence of food insecurity for Black and Hispanic people during pregnancy highlights the importance of implementing universal screening for food insecurity in prenatal care and systems to connect people identified as food insecure with available federal and community resources.

COVID-19-Related Stressors and Mental Health Outcomes in Pregnant Asian People

Although we did not identify a disparity in mental health outcomes for Asian people compared to White people, several COVID-19-related stressors, including high-risk employment, distress due to prenatal care changes, and food insecurity, were strongly related to prenatal depression and anxiety in Asian people. The prevalence of COVID-19-related stressors tended to be lowest among Asian people, which may explain why prevalence of depression and anxiety was also lowest in this group, even though there were strong associations of COVID-19-related stressors and mental health in Asian people. Future research should look at potential protective factors against poor prenatal mental health in Asian people, given the observed lower prevalence of depression and anxiety.

LIMITATIONS AND STRENGTHS

Our study had some limitations that should be considered. Depression and anxiety outcomes were based on symptoms in the past two weeks at the time of survey completion and thus may not have captured people who completed the survey later in pregnancy but had high depression or anxiety symptoms earlier in pregnancy that resolved. Additionally, selection bias due to survey non-response is of concern given the low survey response rate. However, our analyses accounted for survey non-response by weighting analyses to account for differences between those who responded to the survey and non-responders. Current psychological distress may influence participation in the study; we were not able to directly compare mental health symptoms between those who participated in the study and those who did not. However, we found a similar prevalence of a history of an anxiety or mood disorder for people who did and did not complete the survey. We also accounted for potential bias due to missing data not at random by using multiple imputation. Although this study included more Black people than other studies assessing racial and ethnic differences in COVID-19-related stressors and prenatal mental health during the COVID-19 pandemic, the prevalence ratio estimates for associations of COVID-19-related stressors with prenatal depression and anxiety in Black people had wide confidence intervals, resulting in less precise estimates compared to the Hispanic and White people in this study. This limited the stressors we were able to investigate as potential contributors to observed prenatal mental health disparities in Black people. The relatively small sample of Black people who completed our study survey highlights the need for cohorts solely focused on Black individuals and oversampling of Black people in population-based studies to better understand contributors to prenatal mental health in this population. This also applies to the Native American, Pacific Islander, and Multiracial racial and ethnic categories that were combined due to small sample size within groups. We did not have information on cultural factors such as immigration status, social support or non-pandemic related socioeconomic factors beyond insurance type (such as education, income or marital status) that may be potential confounders. The study was limited to English-speaking people. The cross-sectional study design limits the ability to make causal conclusions and it is possible that prenatal psychological distress had an impact on COVID-19-related stressors. However, the mental health scales asked about symptoms in the past 2 weeks while the time frame for the COVID-19-related stressors reflected anytime since the start of the pandemic, diminishing the potential for reverse causation. While the study population from which this sample was drawn is socio-economically representative of the Northern California population living in the same geographic area served by Kaiser Permanente, generalizability to other populations may be limited.

Our study also has several strengths. This study addresses an important gap in the current literature, as research on racial and ethnic differences in COVID-19-related stressors and mental health in pregnant people has been limited. Additionally, a majority of previous research has been limited to data spanning the beginning of the COVID-19 pandemic, while this study covers almost 12 months of the COVID-19 pandemic. Finally, this study's representativeness of the entire KPNC population of pregnant people during the study period, and diversity across sociodemographic characteristics and stages in pregnancy at survey completion are further strengths of this study.

CONCLUSION

This study highlights racial and ethnic disparities in mental health for pregnant Black and Hispanic people and identifies

COVID-19-related health/healthcare and economic stressors contributing to these disparities. Continued screening for poor mental health coupled with appropriate interventions for all pregnant people during the COVID-19 pandemic is warranted, but addressing distress due to changes to prenatal care and food insecurity specifically in Black and Hispanic people may help reduce the high burden of poor mental health and reduce observed disparities in these communities.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

KPNC's Institutional Review Board approved all study procedures and women indicated informed consent prior to participation in the survey.

AUTHOR CONTRIBUTIONS

LA: concept and design and administrative, technical or material support. LA, NN, SB, KY-W, JA, YZ, MH, AF, OZ, and LC: acquisition, analysis and interpretation of data, and critical revision of manuscript for important intellectual content. LA, NN, and SB: drafting of manuscript. NN: statistical analysis. LC and AF: obtained funding. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2022.837659/full#supplementary-material

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Psychological Interventions for Prenatal Anxiety in Latinas and Black Women: A Scoping Review and Recommendations

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Anxiety symptoms are common among pregnant women worldwide. In the United States, prenatal anxiety symptoms tend to be elevated among Black and Latin American women as compared to non-Latina White women. Despite the high prevalence of anxiety and associations with adverse maternal and offspring outcomes, interventions have not been developed or tailored sufficiently to Black women or Latinas who need efficacious treatment. This article provides a scoping review of articles published since 2017 that test the effects of randomized and non-randomized psychological interventions designed to reduce prenatal anxiety in samples comprised primarily of ethnic/racial minority women. We also review published protocols of planned psychological interventions to reduce prenatal anxiety in order to highlight novel approaches. In addition to summarizing intervention efficacy and participant acceptability, we highlight gaps in the literature which, if addressed, could improve perinatal mental health equity. Finally, we discuss future directions in prenatal anxiety intervention science beginning preconception including intervention design and prevention models.

Keywords: prenatal mental health, anxiety, intervention, Black/African American Latinx/Latina, scoping review

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Anxiety is the most prevalent psychological disorder and it disproportionately affects women. The lifetime prevalence of anxiety disorders in adult women residing in the United States is 40% (1). During pregnancy, pooled prevalence rates indicate that about 15% of women will meet diagnostic criteria for an anxiety disorder (2). Self-reported prenatal anxiety symptoms differ by race and ethnicity. In particular, approximately one third of Black women and Latinas in the U.S. experience elevated anxiety symptoms (3) due in part to structural oppression, which increases financial, relationship, and discrimination related stress in general and during pregnancy (4, 5).

Functional impairment resulting from prenatal anxiety can manifest in ways that adversely affect a woman and her pregnancy. For example, pregnant women with anxiety are less likely to adhere to prenatal care recommendations such as abstaining from substance use or engaging in positive health behaviors (6, 7). They may also avoid prenatal healthcare because it can trigger health-related worries (8). Additionally, prenatal anxiety has been associated with adverse health outcomes for mothers and their infants—specifically postpartum depression, shorter gestation, low birthweight, impaired infant neurodevelopment, and behavioral problems later in

childhood (9–11). Given its high prevalence and associated long-term health risks for mothers and their children, prenatal anxiety screening and interventions are urgently needed.

Treatments for anxiety in adults include psychotherapy and medication. However, the safety of psychotropic medications in pregnancy continues to be debated. While medications such as benzodiazepines and serotonin reuptake inhibitors have been reliably linked to adverse infant outcomes (e.g., low birth weight, pre-term birth), the magnitude of these risks is not yet established (12, 13). Additionally, in cases where anxiety is severely impairing, providers must weigh whether abstaining from medication might result in symptom exacerbation (14) with negative consequences for mothers and offspring. Thus, while the American College of Obstetricians and Gynecologists (15) maintains that the cost-benefit analysis for medication ought to be made on a case-by-case basis, psychotherapy is widely considered as a first line intervention to reduce prenatal anxiety.

Nonetheless, referrals to psychotherapeutic services in obstetric settings are infrequent (16). Among low-income and ethnic and racial minority women, structural barriers including lack of insurance and discrimination in prenatal health care settings (17) reduce regular attendance at prenatal health appointments (18, 19). Less frequent interactions with prenatal health care providers along with stigma surrounding disclosure of mental health concerns (20) also limit the likelihood of coordinated mental health care among pregnant ethnic and racial minority women. Survey data substantiate disparities in service utilization by women of color. In a representative sample of over 2,100 women who gave birth in California in 2016, Black women and Latinas utilized perinatal mental health services at significantly lower rates than their non-Latina counterparts despite having more internalizing symptoms (21). Thus, for a variety of reasons, psychotherapy is underutilized during pregnancy and particularly among Black women and Latinas.

Compounding barriers to obtaining mental health services in pregnancy is the need for more evidence regarding which interventions are most likely to be effective. For example, Cognitive Behavioral Therapy (CBT) is considered a gold-standard intervention for anxiety in the general population (22), but is infrequently tested in pregnant samples. Results from intervention studies with small sample sizes (most n's < 15) have shown mixed effects of CBT on prenatal anxiety. That is, some studies show CBT to be beneficial in reducing prenatal anxiety symptoms (23–25), whereas others show no intervention effects (26, 27).

In RCTs that enroll a significant number of ethnic and racial minorities, investigators infrequently report results by race and ethnicity (28), masking whether existing prenatal interventions are equally effective for Black women and Latinas. In general, testing the relative efficacy of evidence-based psychotherapies across racial/ethnic groups is much needed. Research to date suggests that ethnic and racial minorities show better psychological outcomes when treated with culturally adapted intervention protocols as compared to standard protocols (29). Thus, assessing whether prenatal intervention effects are generalizable to Black women and Latinas is critical, and can help identify particular psychotherapy modalities or styles of delivery in need of cultural tailoring (30). For example, intervention protocols that standardize clinical consultation with case managers to address system-level factors like housing insecurity that contribute to women's prenatal anxiety may enhance the efficacy of prenatal interventions among at-risk populations.

A recent systematic review evaluated the treatment outcome literature among Black or Latina pregnant women who received a psychological intervention to reduce symptoms of depression or anxiety (31). For inclusion in the review at least 75% of the treatment sample had to identify as Black or Latina. The authors found that that only two published studies—both testing interpersonal therapy—have sought to reduce anxious symptoms during pregnancy (31). In both studies, women who were randomized to the intervention group did not fare better than women in the control condition with respect to a reduction in anxiety symptoms. Therefore, results of the review found that none of the delivered psychotherapies for prenatal anxiety met the criteria to be considered evidence-based among Black women or Latinas.

Data from Ponting et al. (31) show that the last identified anxiety intervention tested with a majority Black and Latina sample was published in 2017. In the present article, we provide an update to the Ponting et al. (31) review by searching for psychological interventions reporting on prenatal anxiety efficacy in studies enrolling at least 50% Black women and Latinas from 2017 through 2021. We also review published protocols for prenatal anxiety reduction during this same time to describe recent patterns in intervention science for prenatal anxiety.

We take a scoping review approach that is appropriate for identifying themes and discussing gaps within a content area (32). This method may be especially helpful when the content area has a limited evidence base, as is the case for anxiety interventions in pregnancy. Based on our review, we suggest several directions to improve efficacy and equity in psychotherapy research for prenatal anxiety as yet.

METHOD

Eligibility Criteria

We utilized a scoping review methodology (32) to search for psychological interventions published during the last 5 years (2017–2021) to treat prenatal anxiety in ethnic and racial minorities. The written protocol for this scoping review was adapted from a previously registered protocol of the authors (see: Prospective Register of Ongoing Systematic Reviews ID: CRD42018106228) in three ways. First, only studies treating anxiety were included. Second a smaller proportion of the treatment sample had to identify as Black or Latina (i.e., >50 vs. >75%). Third, published protocols with anxiety outcome measures were included even if they did not yet have efficacy data.

Thus, studies were included if they tested a psychological intervention delivered during pregnancy, and if they reported on a standardized instrument to measure anxiety (e.g., GAD-7; STAI) at pre and post treatment. Samples had to be comprised of at least 50% Black or Latina participants, a standard used in prior perinatal intervention reviews with ethnic and racial minority

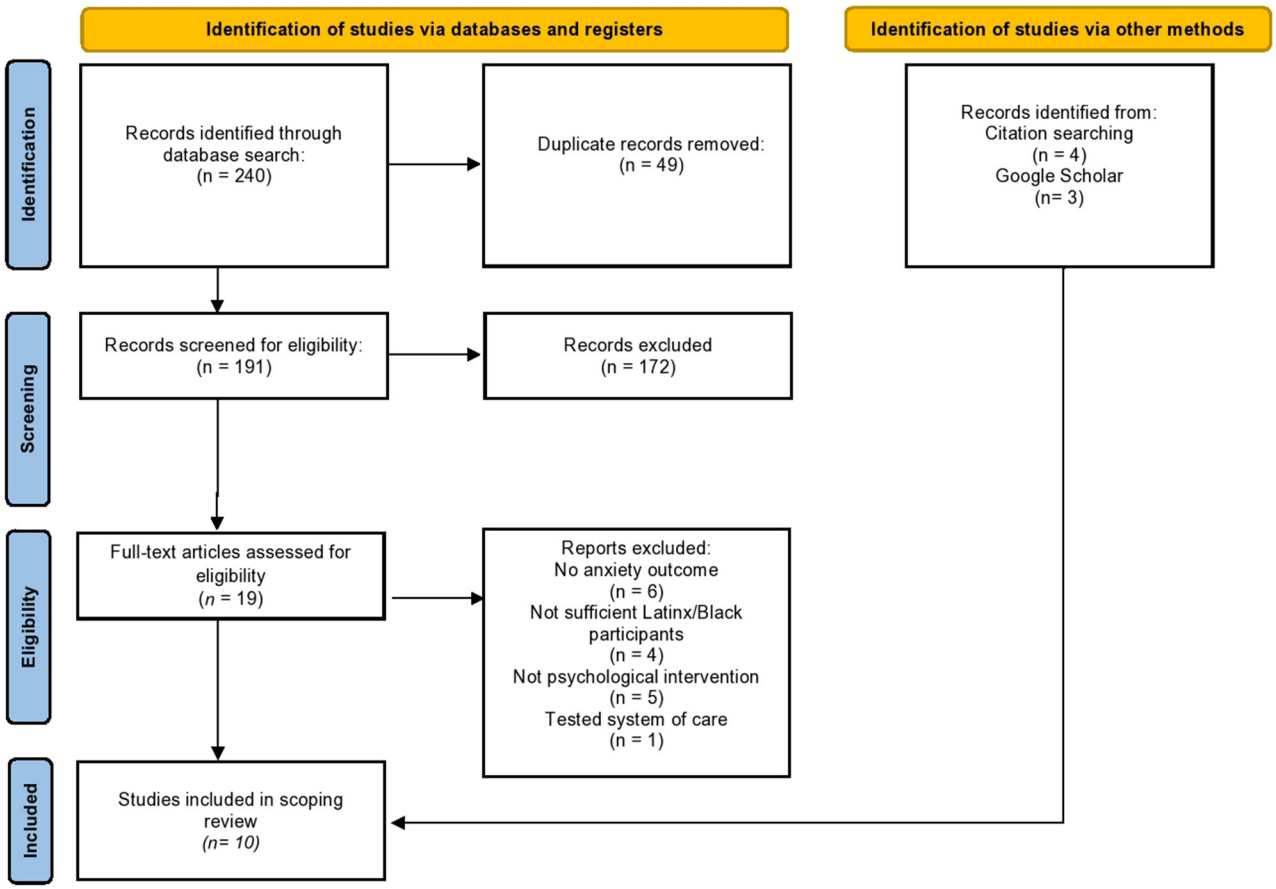

FIGURE 1 | PRISMA scoping review flow diagram for study inclusion.

women (33). Given the dearth of efficacy studies for prenatal anxiety, we also included published intervention protocols for treating anxiety in pregnancy. Intervention protocols describe RCTs currently in progress. Although we cannot yet report on their efficacy, they reflect upcoming advances in prenatal anxiety treatment modality and delivery. Studies on psychopharmacology or complementary and alternative therapies (e.g., massage, yoga) were excluded.

Search Strategy

The research team consulted with an experienced research librarian to develop search terms for the scoping review (all search syntax is available in **Supplement**). Five databases were searched: PubMed©, CINAHL©, PsycINFO©, ProQuest Dissertation and Theses AI©, and Web of Science Articles published from January 2017 through September 2021. In total, searches produced 240 studies. Duplicates were identified using Rayaan (34), an online tool, and confirmed by a member of the review team, leaving 191 unique articles.

The methods sections of the 191 articles were examined next. One reviewer screened study abstracts for eligibility based on inclusion/exclusion criteria and consulted with the research team to reach consensus if unsure about inclusion (see **Figure 1** for detailed information about exclusion). At this stage, a total of 172 articles were excluded, in most cases because studies did not test a psychological intervention, and instead were observational studies of mental health during pregnancy ($n = 130$). Rayaan (34) was used to store all article abstracts and catalog the reason for inclusion or exclusion. The remaining 19 articles underwent full-text review, during which 16 articles were excluded. Scanning reference sections (e.g., snowball approach), and searching Google Scholar (35) increased search comprehensiveness and led to the addition of seven articles. Thus, a total of seven studies met all inclusion criteria for this scoping review—two were intervention efficacy studies and five were registered intervention protocols for prenatal anxiety.

Data Extraction

The following were extracted from the two intervention efficacy studies: (1) intervention characteristics (intervention format, treatment modality, provider type, number of sessions, setting); (2) participant demographics (race/ethnicity), (3) U.S. vs. foreign born, and indicators of income); (4) the perinatal period during which the intervention was delivered; (5) type of study design (e.g., RCT, pre-post design); (6) outcomes pertaining to anxiety; (7) the use of cultural adaptations; and (8) intervention

TABLE 1 | Design, measurement, hypotheses and results of reviewed studies.

References	Intervention (a) format, (b) treatment modality, (c) # sessions, attendance, (d) provider (and provider education), (e) setting	Study design	Results main effects	Cultural factors	Acceptability
Efficacy studies					
Lenz and Potts (36)	(a) individual (b) IPT (c) 9 sessions (one ethnographic introductory session + 8 IPT sessions); plus maintenance treatment session if participant finish all nine sessions (d) Clinical Psychologists, master's level clinicians (e) research clinic, participant homes, or other community locations	RCT	Women in both the intervention and enhanced prenatal care groups did not show significant reductions in anxiety symptoms (STAI-Brief).	Not reported	Participants assigned to brief-IPT reported high scores on the Client Satisfaction Questionnaire at the 37–39 weeks assessment (IPT M = 30.60, SD = 1.89, range 25–32)
Ruiz et al. (37)	(a) individual (b) ACT and Problem-Solving Therapy (c) six sessions (d) Nurse practitioners (NPs) or certified nurse midwives (e) primary clinic, OBGYN office	Pilot Pre-Post design	Women in the intervention group showed significant reductions in anxiety symptoms (BAI) between baseline and post-intervention (d = 0.31, small to medium effect).	Yes: "considerations for family roles and hierarchies, culturally relevant metaphors/mindfulness exercise"	High satisfaction ratings (M = 7 out of 7) for satisfaction, relevance and recommendation to other pregnant people.
Randomized controlled trial study protocols					
Atif et al. (38)	(a) individual OR group (b) CBT (c) six sessions, time client dependent ∼1 h, option for up to six booster sessions (d) Para-professionals (bachelor's level volunteers with no prior mental health training with nursing backgrounds) (e) hospital	RCT	Primary hypothesis: The intervention will address symptoms of anxiety as measured by the HADS before these become chronic, severe, and debilitating, and therefore will be preventative, allowing women to learn strategies for stress management and problem solving before the symptoms become ingrained.	Yes: "The intervention used culturally appropriate illustrations and examples of healthy activities to set tasks in collaboration with women to encourage engaging unhelpful behaviors"	An initial sample of five women rated the intervention as helpful and acceptable to them and their family members; resulting in greater awareness of their feelings, stress management and strategies to improve wellbeing.
Bright et al. (39)	(a) individual (b) online IPT (c) six 30-min sessions (d) none, self -guided (e) online	RCT	Primary hypothesis: Participants randomized to the intervention will have clinical levels of anxiety at lower percentages post-treatment than women randomized to routine care as measured by the DASS-21.	None stated.	Planned assessment of percentage of participants who report the modules and activities in the intervention as easily understood and navigated to measure acceptability.
Challacombe et al. (40)	(a) individual (b) CBT (c) Fout to five 2-h sessions vs. 8–10 1-h sessions (d) "experienced therapists" (e) national publicly funded healthcare setting	RCT	Primary hypothesis: Participants with clinical diagnoses of OCD, PTSD, Social Anxiety or Panic Disorder randomized to time intensive or standard weekly intervention will show reductions in anxiety as measured by the GAD-7 or disorder specific measures (e.g., OCI for OCD, MI for Panic Disorder, IES for PTSF, SPIN for Social Anxiety).	None stated.	Planned qualitative interviews to assess acceptability of recruitment methods, assessment measures, intervention mode, and delivery.

(Continued)

TABLE 1 | Continued

References	Intervention (a) format, (b) treatment modality, (c) # sessions, attendance, (d) provider (and provider education), (e) setting	Study design	Results main effects	Cultural factors	Acceptability
Jackson et al. (41)	(a) individual (b) CBT (c) eight sessions (d) Perinatal clinical nurse specialist (e) hospital-based perinatal outpatient program	RCT	Primary hypothesis: Participants randomized to the intervention will show less anxiety than those in the control condition, as measured by the STAI. We also hypothesize this study will be feasible in terms of fidelity and deliverability, as well as be highly acceptable to participants.	None stated.	Four open-ended qualitative questions planned to assess acceptability.
Loughnan et al. (42)	(a) individual (b) iCBT (c) three sessions, time client dependent ∼1 h (d) None- self-guided (e) client's choice (remote, online)	RCT	Primary hypothesis: Participants randomized to the intervention will show significantly fewer symptoms of anxiety compared to those in usual care, as measured by the GAD-7.	None stated.	–
Melnyk et al. (43)	(a) group (b) CBT + positive parenting (c) six 2-h sessions (d) advanced practice nurses (e) prenatal clinic	RCT	Primary Hypothesis: Participants randomized to the intervention will show significantly less anxiety at 4–6 weeks postpartum (3months post-intervention), and at 6 moths postpartum (8 months post-intervention) than will participants in the attentional control condition as measured by the GAD-7.	Yes: "sessions that are culturally sensitive, readable at the sixth grade reading level and focused on empowering pregnant minority women to engage in healthy lifestyle behaviors". Prior delivery with ethnic/racial minority women.	–
O'Brien et al. (44)	(a) group (b) Enhanced Triple P for Baby (positive parenting program); Mellow Bumps (reflective functioning, self-care, parenting) (c) four 2-h sessions (ETPB); six 2-h sessions (MB) (d) facilitators with health visiting or midwifery backgrounds (e) multiple	RCT	Primary Hypothesis: Women randomized to either intervention will show reduced anxiety as compared to women receiving usual care.	Yes: Planned interviews with the Heads of Midwifery planned delivery settings to gain further insights into the ways in which the local context and organizational culture might have impacted recruitment	Documented acceptability in high deprivation contexts in prior research studies.

(Continued)

TABLE 1 | Continued

References	Intervention (a) format, (b) treatment modality, (c) # sessions, attendance, (d) provider (and provider education), (e) setting	Study design	Results main effects	Cultural factors	Acceptability
Zuccolo et al. (45)	(a) individual (b) Motherly app (behavioral activation) plus brief online CBT (c) four sessions (d) Psychologists certified in CBT (e) online	RCT	Primary Hypothesis: Participants receiving the Motherly app plus brief online CBT will show significantly greater reduction in symptoms of anxiety (secondary outcome) as compared with participants who receive only psychoeducation in addition to brief online CBT as measured by the GAD-7.	Yes: Treatment targets (e.g., physical activity, nutrition) were specifically selected based on research findings regarding risk factors for individuals from low-income countries. Intervention uses recommendations based on those from Brazilian Ministry of Health. Online delivery of CBT selected due to dearth of human and financial resources in Brazil.	–

ACT, Acceptance and Commitment Therapy; CBT, Cognitive Behavioral Therapy; iCBT, internet-delivered Cognitive Behavioral Therapy; EIPB, Enhanced Triple P for Baby; IPT, Interpersonal Therapy; MB, Mellow Bumps; RCT, Randomized Control Trail; BAI, Beck Anxiety Inventory; GAD-7, Generalized Anxiety Disorder- 7item; HADS, Hospital Anxiety and Depression Scale; STAI, State-Trait Anxiety Inventory; DASS-21, Depression, Anxiety and Stress Scale-21; OCI, Obsessive Compulsive Inventory-Revised; MI, Mobility Inventory; IES, Impact of Events Scale; SPIN, The Social Phobia Inventory.

acceptability data. The same variables were extracted for studies reporting on intervention protocols ($n = 5$), except for treatment response data given that efficacy data was not yet available. The first author extracted these data and charted them independently using a table approved and tested by the research team; data validity and accuracy were checked by a research assistant.

Data Quality Assessment

The methodological biases of the empirical treatment studies in this review were assessed using the Cochrane risk of bias assessment. Specifically, six categories of bias are assessed: (a) selection bias, (b) performance bias, (c) detection bias, (d) attrition bias, (e) reporting bias, and (f) baseline imbalance. The protocols for RCTs that are included were not subjected to a data quality assessment for two reasons. First, the randomized nature of the proposed studies indicated low overall biases, and second, outcome data were not yet reported, meaning that bias categories like attrition bias, reporting bias, and baseline imbalances were not able to be assessed. Bias ratings can be found in **Table A1**.

RESULTS

Prenatal Anxiety Intervention Efficacy

Two studies provided data on initial clinical efficacy for prenatal anxiety among Latinas and Black women. Lenze and Potts (36) tested an RCT ($n = 42$) with a majority low-income Black (79%) sample enrolled during their first trimester of pregnancy. The authors reported that women randomized to nine sessions of individual interpersonal psychotherapy for depression delivered by mental health professionals, did not show significant reductions in anxiety symptoms (a secondary outcome). This study was considered to have low methodological bias.

The second study authored by Ruiz et al. (37) used a non-randomized pre-post intervention design ($n = 15$) with a low-income Latina-only sample (31% were foreign born) enrolled during their first trimester of pregnancy. Authors reported that following the receipt of a six-session culturally-adapted combined Acceptance and Commitment Therapy (ACT) and Problem Solving Therapy (PST; delivered by nurse practitioners and midwives), women showed significant reductions in their prenatal anxiety symptoms from baseline to post-intervention. Participants in both studies provided quantitative data about the acceptability of the interventions; scores revealed high levels of satisfaction. This study was considered to have high methodological bias (see **Table A1** for bias ratings).

Registered Protocols for Treating Prenatal Anxiety

For full information on protocol characteristics see **Table 1**. We identified eight intervention protocols for prenatal anxiety published since 2017. Most protocols ($n = 6$) were RCTs proposing to test the efficacy of CBT. These protocols involved delivery of CBT face-to-face (38, 40, 41, 43), online (42, 45), or in combination with a positive parenting intervention (43). One protocol compared an enhanced *Prenatal Positive Parenting Program with Mellow Bumps*, an intervention focused on promoting antenatal health and mother-infant attachment (44).

Face-to-face interventions planned to use hospital or prenatal clinic dissemination settings (38, 40, 41, 43) and delivery models reliant on prenatal nursing professionals (38, 40, 41, 44). Six studies planned to deliver their interventions individually (38, 41, 42), and the other two planned to deliver them in a group setting (43, 44). Three of the five protocols made explicit reference to techniques under consideration to improve cultural fit of their interventions with historically excluded groups of pregnant women (38–40, 43–45), and five planned to collect acceptability data from enrolled women (38–41, 44).

DISCUSSION

This scoping review sought to update current knowledge in the last 5 years (2017–2021) on psychological intervention efficacy for prenatal anxiety in samples comprised of at least 50% Latinas or Black women. Only two completed and published studies met criteria for inclusion; of those, a non-randomized trial testing an intervention integrating ACT and problem-solving therapy in a small Latina sample ($n = 15$) showed beneficial effects for prenatal anxiety. A prior systematic review without any date restrictions and a higher threshold for ethnic/racial minority inclusion (i.e., 75%) also identified only two trials seeking to reduce prenatal anxiety (31). The present review, using a less stringent inclusion criteria for proportion of Latinas or Black women enrolled, found just one new published intervention trial since Ponting et al. (31). Thus, to date there are a total of three published studies (*total* $n = 101$)—two in primarily Black samples, one in a Latina only sample—that have sought to treat prenatal anxiety in Latinas or Black women. Meta-analytic data indicate that there are nine additional published RCTs comprised of primarily white women (*total* $n = 443$), most testing CBT, that show medium effect sizes of psychotherapy on prenatal anxiety (46). Thus, although there are relatively few prenatal anxiety interventions overall, there is evidence of symptom improvement for non-Latina white women, but not as yet for Latinas or Black women. This gap in the literature requires attention by researchers and clinicians.

We also reviewed published protocols for RCTs testing interventions for prenatal anxiety. Despite the identified disparity in efficacious anxiety interventions for Black women and Latinas, the eight protocols identified are encouraging for at least two reasons. First, four of the eight protocols planned to train nurses and midwives who are perinatal health professionals without a mental health background. This is likely to be a promising approach. The feasibility of this delivery model is supported by nurses and midwives' frequent contact with pregnant women and extensive training in pregnancy-specific health information (47). In conjunction with increased funding for home visiting programs for pregnant women under the Affordable Care Act, this workforce is well-positioned to address common pregnancy-specific worries and concerns. Recent meta-analyses find that midwife-delivered psychological interventions are efficacious for reducing perinatal anxiety and depression (48, 49).

Second, three of the protocols (38, 43, 44) identify theoretical mechanisms of treatment change, which can serve as psychosocial targets across psychotherapeutic modalities. For example, the O'Brien et al. (44) protocol stands out because the proposed mediators of change are situated within the developmental context of pregnancy. The enhanced *Triple P for Parenting and Mellow Bumps* protocol is teaching pregnant women and their partners about infant and child development and will test whether improvements in knowledge around infant development will lead to maternal anxiety symptoms. Though psychologists have urged for better measurement of potential mechanisms of intervention that are related to symptom change [e.g., (50)], prenatal intervention work has lagged in this domain. Identifying the psychosocial targets most likely to lead to improved anxiety profiles during pregnancy is a worthy avenue for future investigation.

FUTURE CONSIDERATIONS TO IMPROVE EQUITY IN PRENATAL ANXIETY INTERVENTION

The disproportionate impact of socio-political stressors on Black women and Latinas in the United States adversely impacts anxiety symptoms among these groups (51), and we lack evidence-based psychotherapies to intervene at the individual level in pregnancy. In this context of high unmet need, we argue that increased attention to family involvement, pregnancy-specific anxiety, and prevention efforts during preconception (52) are likely to improve engagement and clinical outcomes among ethnic and racial minority pregnant women.

Our recommendation is to include a woman's family members as part of perinatal anxiety interventions to increase her comfort and involvement with treatment. We know that pregnant women have significant interest in receiving family support during their prenatal health care (53), yet no published intervention identified in the present systematic review or in past reviews (31, 54) have involved partner or extended family participation. Public health programs have increasingly sought to involve partners in perinatal care given that couples' anxiety symptoms have bidirectional effects in pregnancy (55) and influence early parenting behaviors (30). There is emerging evidence among samples of primarily white women that brief psychological interventions for pregnant women at risk for anxiety incorporating partners or family can successfully reduce symptoms in both women and their family members (56). The benefits of family engagement may be even greater for pregnant Latinas and Black women whose valuing of close family relationships (e.g., familism) is an important cultural source of resilience during pregnancy (51, 57).

Further, it is possible that familial participation may reduce concerns as reported by the pregnant women in several qualitative studies—that seeking help for anxiety might be negatively perceived as prioritizing themselves over their families (53). However, interventions that consider including partners or family members should take into account history of family violence and prioritize safety as well as ensure that women feel comfortable including their family in such interventions.

Recent research draws attention to a range of pregnancy-specific worries that should be addressed in prenatal anxiety interventions (9). Pregnancy-specific anxiety—or concerns specific to a woman's pregnancy, labor and delivery, and future parenting—is estimated to occur in 29% of women in high income countries (58). Yet, intervention protocols for prenatal anxiety often leave out content about labor and delivery, or about common prenatal medical conditions in pregnancy (e.g., gestational diabetes, preeclampsia). In fact, fear of childbirth and pregnancy-specific anxiety have largely been treated separately from other anxiety symptoms or disorders, and are frequently addressed using only standard prenatal health education (59). Integrating prenatal health education and psychotherapy may increase intervention relevance and improve birth and child outcomes, improving care for pregnant women with anxiety.

MUMentum (25) is an internet delivered CBT protocol for perinatal depression and anxiety and a good example of integrating psychotherapy and prenatal education. *MUMentum* supplies prenatal education resources for women, including topics like attachment during pregnancy and intrusive thoughts about childbirth. Efficacy data among Australian women show that randomization to the *MUMentum* intervention resulted in medium to large reductions in anxiety (25). Examining how *MUMentum* and other interventions might impact pregnancy-specific anxiety is a worthy next step, as pregnancy-specific anxiety has been linked to length of gestation, low-birthweight, and adverse physical and mental health outcomes for offspring (60). Psychological intervention trials that can better tailor their content to fit specific and prevalent pregnancy-related worries stand to have particular impact on ethnic and racial minority women who are disproportionately likely to report high pregnancy-specific anxiety (6, 61, 62) and encounter adverse birth outcomes (63).

Finally, the preconception period—before a person is pregnant— is increasingly a window of interest for psychological interventions seeking to improve the overall health of women during pregnancy. Addressing preconception anxiety merits consideration, as symptoms have been associated with postpartum anxiety and later mother-infant bonding problems (64). Thus, providing health promotion information and screening for anxiety symptoms during preventive visits might be worthwhile, especially if women are of reproductive age and are seeking to be pregnant. This same strategy can be applied to interconception periods and appears to be an indicated and low burden form of prevention for women with a prior adverse pregnancy outcome [e.g., traumatic delivery, fetal loss; (65)]. Though referral and treatment may improve women's health broadly and set the stage for a healthier pregnancy in the future, equitable outcomes will require that screening and education is culturally responsive, treatment is disseminated outside of health care settings, and that providers acknowledge historical and current reproductive oppression (66).

In conclusion, this scoping review provides a strong basis for empirically testing and culturally tailoring prenatal anxiety interventions to optimize the health of racial and ethnic minority mothers and their infants. Given longstanding disparities between Black and Latina and non-Latina white women in pre- and postnatal health outcomes and in access to preventive interventions, policy changes are a pre-requisite for prenatal mental health equity. Still, at the individual level, community-based psychological intervention studies for Black women and Latinas can help to identify particular skills, knowledge, and connections to community support best suited for regulating prenatal anxiety. The success of these endeavors will depend on researchers' ability to engage with community stakeholders to appropriately address mistrust of intervention research given historical abuses and current inequities in care in minority communities (67). Researchers can assess intervention acceptability among Latinas and Black women and address pregnancy-specific worries or basic needs to increase the relevance of available treatments for prenatal anxiety. Health promotion programs that can build on the strengths of Latinx and Black communities in the preconception period are also warranted to improve intergenerational outcomes.

AUTHOR CONTRIBUTIONS

CP conducted the analyses, visualized the results, conceptualized the aims of the review, and wrote the first draft the review. GU contributed to the writing of the article (introduction, discussion) and provided feedback on several drafts. CD assisted with conceptualization of the aims, contributed to the writing, oversaw research administration, and contributed to the framing of the introduction and discussion. All authors contributed to the article and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2022.820343/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

APPENDIX

TABLE A1 | Assessment of study bias.

	Random on sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Baseline imbalance	Overall Bias
Lenze and Potts (36)	⊕	⊕	⊕	∅	⊕	⊕	⊕	Low
Ruiz et al. (37)	⊗	⊗	⊗	⊗	∅	⊕	⊕	High

⊕Indicates low risk of bias, ∅indicates unclear risk of bias, and ⊗indicates high risk of bias. Studies rated as "low risk of bias" on four of the six categories were considered to have an overall low risk of bias; studies with two or three categories rated as "low risk of bias" were considered to have an overall medium risk of bias; and studies with one or fewer categories rated as "low risk of bias" were considered to have an overall high risk of bias.

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REVIEW
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Home Visiting as an Equitable Intervention for Perinatal Depression: A Scoping Review

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Objective: Maternal mental health disorders are a leading complication of childbirth. While few systems are adequately able to identify and treat depression, people experiencing perinatal depression may benefit from the intervention of home visiting. The intent of home visiting interventions is to alleviate stressors of parenthood for people facing additional risk factors. The aim of this scoping review is to investigate the effect of home visiting on perinatal depression grounded in published studies.

Methods: We conducted a scoping review of the existing literature of studies relevant to perinatal depression and home visiting. We entered keywords in five search databases: MEDLINE, PsycInfo, CINAHL, Social Work Abstracts, and Google Scholar. All relevant literature published between January 1999–December 2019 was reviewed. Duplicates, books, and errata were excluded from the study. As a scoping review, we included all studies published in English describing the inclusion of maternal depression in home visits. We hypothesize birthing people with perinatal depression will benefit from home visiting interventions.

Results: The results from the scoping review and describe the use of home visiting to improve perinatal mental health. An initial 12,652 records were identified in the search. After duplicates were removed, the titles of 2,140 articles were assessed for applicability, however 29 identified for full-text eligibility and were included in this analysis. The majority of the studies included in this review were quantitative ($n = 23$), followed by qualitative ($n = 3$), and mixed methods ($n = 3$). Nearly all studies ($n = 28$) using validated instruments such as the Edinburgh Postnatal Depression Scale to determine depressive symptoms.

Discussion: This review offers preliminary qualitative insights on the efficacy of home visiting for administrating perinatal depression care. Studies show that home visiting programs can provide treatment for perinatal depression and reduce the effects of depression for birthing people. Our review suggests that the efficacy of home visiting programs beginning in the postpartum period are less predictable than prenatal home visiting intervention among various populations, including people experiencing both high-risk and low-risk situations.

Keywords: home visiting, depression, perinatal, postpartum, depressive symptoms

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INTRODUCTION

Transitioning into the role of parenthood is a complex period underscored by a range of physical, lifestyle, and emotional changes, resulting in increased needs for support for birthing people and their families (1). Due to these immense transitions, emotional distress, psychological distress, anxiety, and depression are commonly experienced among during the perinatal period (from pregnancy up to 12 months postpartum) and are often left untreated. The prevalence of clinically significant depressive symptoms ranges from 12 to 23.1% (2, 3) in most studies. Depressive symptoms, independent of maternal stress, can occur at any time during the perinatal period. Maternal distress is associated with adverse maternal, child, and family outcomes including maternal substance abuse, a heightened risk of child maltreatment, and increased challenges for parents (2–4). Social support is one of several protective factors for maternal distress and depression (5). It is possible that social support can mitigate the impacts of untreated mental health of mothers during the perinatal period through early detection and intervention efforts including depression screening. In parallel, addressing the aforementioned challenges faced by parents through supportive programming, such as home visiting or case management, can promote the well-being of the entire family by potentially helping to reduce perinatal depression and creating long-lasting positive outcomes for both parents and children.

Home visiting programs are a globally implemented approach aimed at increasing positive health outcomes through providing parents with mental health screenings, psychoeducation, case management, and social support within each parent's home environment (6, 7). Home visitors may voluntarily engage families at intentional time points throughout the perinatal period, including pregnancy, birth, and postpartum, with routine visits occurring on a weekly to monthly basis. The exact structure of home visiting program models varies, however there are recognized programs such as Nurse-Family Partnership, Healthy Families, and Parents as Teachers. These models utilize standard assessment, education, and screening tools to inform Home Visitors' tailored responses to families' needs. Home visiting programs typically engage nurses, social workers, paraprofessionals, or trained volunteers in the delivery of services (6, 8). Home visiting is a practical approach to ensure the health and well-being of perinatal women and infants. Although prior studies have demonstrated the positive effects of home visiting on child development and healthy parental practices, Perry et al. (9) assert mothers experiencing depressive symptoms may have limited engagement in home-based services, prompting an increased need for home visiting programs to specifically address maternal depression as an aspect of the intervention (9). While there are several models to address perinatal depression, within home visiting there still remain uncertainties on the effectiveness of this approach.

Home visiting programs are an avenue to address maternal mental health inequality during the perinatal period. Home visiting programs often aim to achieve maternal health equity for populations at risk for poor outcomes. Birthing people with increased risk factors for postpartum depression including elevated depressive symptoms during pregnancy, personal or family history of depression, and low levels of social support are often enrolled into home visiting programs, yet there is limited research examining depression within the context of home visitation (8, 9). The aim of this scoping review is to investigate the existing literature of home visiting and its effects on perinatal depression, in an attempt to explore the relationship between these two factors grounded in published studies. Findings from this study may inform the applicability of home visiting as a supplementary approach to increase the positive mental health outcomes of women and infants enrolled in home visiting programs. Specifically, this scoping review addresses the question, "*How do home visiting programs address and/or treat the adverse symptoms of perinatal (antenatal or postpartum) depression (PPD)?*"

METHODS

In order to determine the capacity of home visiting as a sound intervention for PPD, a scoping review was performed by synthesizing data within a relevant timeframe. Studies were identified through a systematic search of relevant literature in five search databases, published between January 1, 1999 and December 31, 2019, a twenty-year period of reference. No review protocol for this study exists.

Identifying Relevant Studies

We searched MEDLINE, PsycInfo, CINAHL, Social Work Abstracts, and Google Scholar to gather literature. Keywords searched include 51 combinations of the terms "*perinatal*", "*pregnancy*", "*postpartum*", "*antenatal*", "*maternal*", "*depression*", "*depressive symptoms*", "*depressive mood*", "*mood*", "*mental health*", "*home visiting*", and "*home visitation*" thus constructing a comprehensive search which reflects the prevalence of our topic. Our findings excluded duplicate studies, books, errata, and/or studies with insufficient relevance to the research question. Our findings included studies published in English language, that utilized a home visiting sample and included perinatal depression in any capacity. Non-English language papers were not included. The date range of this study includes data published from 1999 to 2019. Authors, KT, BB, and MPL independently charted the data from each eligible article and met weekly to continuously update the data-charting form in an iterative process.

Literature Selection

Initially, 12,652 records were identified. After duplicate records were discarded, 2,140 articles remained. Following title search, 37 articles remained for abstract review. Abstracts were reviewed by authors KT, BB and KR and assessed for inclusion eligibility. Articles that did not include depression as an outcome within the context of home visiting were excluded. A total of 29 studies were included in this scoping review (see **Figure 1**).

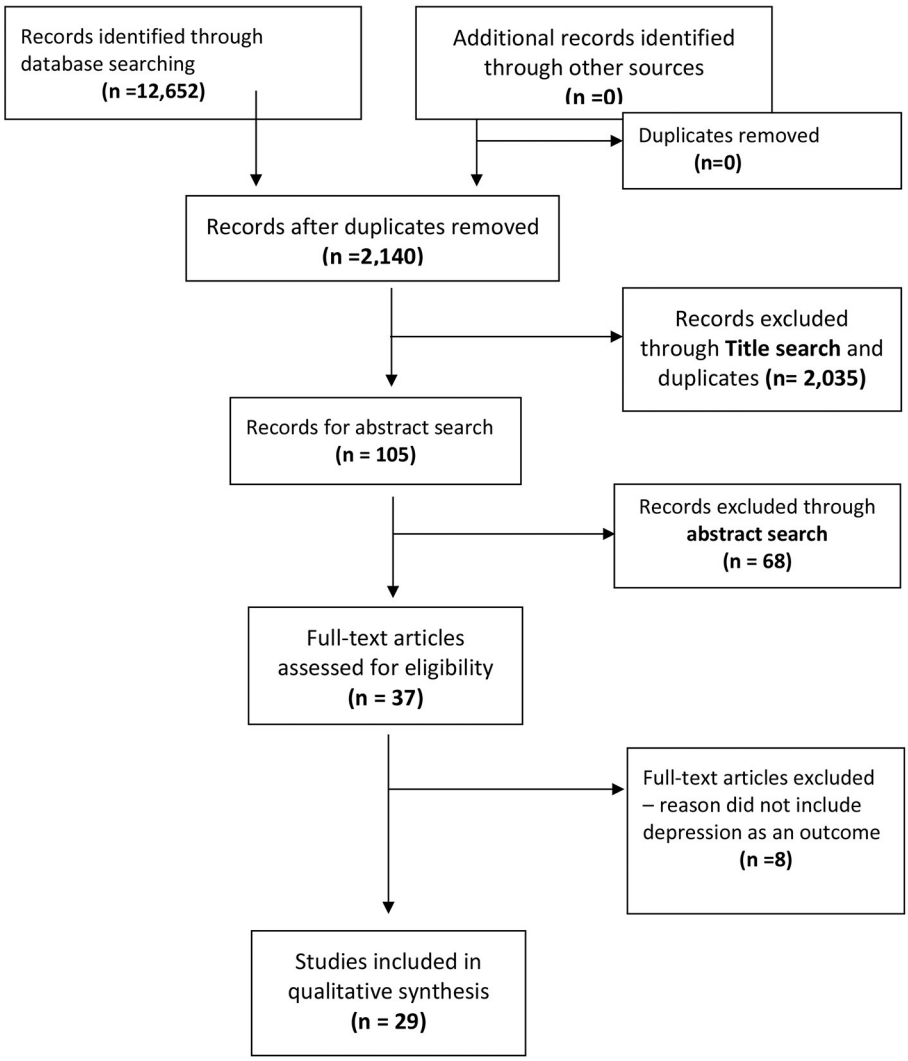

FIGURE 1 | Flow diagram of scoping review search and inclusion.

RESULTS

The results are organized and presented by the timing of the intervention; perinatal or postpartum in **Supplementary Table 1**, which also summarizes the country, study design, sample population, type, duration and frequency of home visits, type of education provided, assessment of depression, and lastly study outcomes and effect sizes. The majority of the studies included in this review were conducted in the United States ($n = 16$), followed by Australia ($n = 4$). The majority of the studies included in this review were quantitative ($n = 23$). An additional three studies were qualitative, and three were mixed methods. The studies included in this review used different tools to assess depression ranging from qualitative interviews to diagnostic interviews. However, most studies ($n = 28$) included in this review assessed depression using questionnaires. The questionnaire that was most often used in the studies included in this review to assess depressive symptomology was the Edinburgh Postnatal Depression Screening (EPDS, $n = 16$).

Interventions Initiated During the Perinatal Period

In this scoping review of 29 studies, only 12 studies were conducted during the perinatal period, meaning the study started during pregnancy and extended into the postpartum period. These findings of these 12 studies during the perinatal period describe the long-lasting effects of home visiting programs on improving PPD for a variety of high-risk low-income populations. Most importantly, the majority of studies that including both pregnancy and postpartum periods presented the element of time in their analysis. Description of the key study findings and their relevance to the effectiveness of home

visiting to address perinatal depression from pregnancy through postpartum is provided as follows:

Ammerman et al. (8) analyzed data from 806 women who were enrolled in Every Child Succeeds (ECS). Women in this program were high-risk mothers who were enrolled in the program beginning as early as 20 weeks gestation. The majority of providers in the intervention were social workers or had similar professions. The home visiting interventions were delivered over a 2.5–3-year period, with increased contact at the beginning of the intervention. Depressive symptomology was assessed using the Beck Depression Inventory-II (BDI-II) at enrollment and again 9 months after the first visit. At enrollment, mean depressive scores were 12.29, and at 9 months they had dropped to 10.12 ($p < 0.001$). Further analysis demonstrated that 56.5% of mothers who had elevated depressive symptoms at enrollment were no longer depressed at the 9-month assessment (8).

Brock et al. (10) reported findings from a randomized controlled trial that was implemented spanning from the perinatal period from pregnancy through 24 months postpartum. All participants enrolled in the study had elevated depressive symptoms. Fifty-four women were randomized into immediate ($n = 36$) and delayed listening ($n = 18$) visits and completed a 16-week assessment. The researchers used multiple measures to assess depressive symptoms including the Inventory of Depression and Anxiety Symptoms- General Depression, the EPDS, and the Hamilton Rating Scale for Depression to assess depression severity. The results of this intervention demonstrated that both groups, the immediate and the delayed, experienced significant reduction in depressive symptoms. Furthermore, the improvement in depressive symptoms was maintained over time (10).

Dugravier et al. (11) reported the results of a randomized controlled trial conducted during the perinatal period with 440 first-time mothers who were recruited during their 7th month of pregnancy. The participants were high-risk mothers with at least one psychosocial risk factor (e.g., low-income). The intervention consisted of 14 home visits that were delivered by trained psychologists between the 7th month of pregnancy and 3 months postpartum. Participants were randomized into the intervention or the usual care group. Depressive symptoms were assessed using the EPDS at baseline and again at 3 months postpartum, the end of the intervention. The results demonstrated that in the overall sample there was not a statistically significant difference in depressive symptoms between the intervention and the control group. However, *post-hoc* analysis demonstrated that the intervention was more effective for women with certain psychosocial characteristics, including among those planning to raise their children without a father, those whom had low depressive symptoms at baseline, and among women who had more than 9 years of education (11).

Similarly, Hadley et al. (12) reported the findings of a home visiting intervention with 513 participants who enrolled during the prenatal period. Women who participated in this study were mostly high-risk with the majority of participants unmarried and low-income. The intervention duration was 9 months, during which participants received at least three visits and monthly phone calls, all delivered by community health workers. Depressive symptoms were assessed using the EPDS. The results demonstrated that after participating in the intervention, elevated depressive symptoms were present on 13.31% of women; a reduction from 29.28% at baseline ($p < 0.001$).

One study implemented during the perinatal period investigated the effectiveness of a home visitation program on maternal psychological functioning (13). All participants in the study were eligible for Medicaid; with 198 participants of the home visiting program compared to 221 who did not participate. Depressive symptoms were assessed using the CESD before birth and at 1 year postpartum. The intervention was delivered by trained community health paraprofessionals. The intervention consisted of providing participants with parenting skills and improving psychological well-being. The intervention was delivered from before 28 weeks of gestation through the first year postpartum on a monthly basis. The results showed that, at baseline, those who did not participate in the program had significantly higher depressive symptoms, compared to those who participated in the home visiting program ($p = 0.007$). At 1 year, there were no significant differences in depressive symptoms between the intervention and control groups. However, average depressive scores increased more at 1 year postpartum among the non-participants than they did among the home visiting participants ($p = 0.012$).

A study by Price et al. (14) investigated the effectiveness of a home visiting program among 25 participants who were assigned to either usual care or the intervention group. All the participants were high-risk; under 100% of the poverty line. The intervention consisted of 12 weeks of home visiting delivered by mental health professionals. Depressive symptoms were assessed at baseline and after 12 weeks using the Patient Health Questionnaire- 9 items (PHQ-9). The results demonstrated that there was a significant reduction in depressive symptoms in the intervention group, but not in the usual care group (14).

In a randomized control study conducted over the perinatal period, Samankasikorn et al. (15) randomized 150 teenage pregnant people into a control and an intervention group. All the participants were high-risk; all were teenagers, and most were unmarried. Community health workers delivered the intervention twice per month during pregnancy and once per month during the postpartum period. Depressive symptoms were assessed at baseline, 3 months, and 12 months postpartum using the EPDS. Overall, the results demonstrated that there was no significant difference between the groups on depressive symptom reduction at 3 months. However, *post-hoc* analysis demonstrated that there was a significant difference between intervention and control groups among Latina participants, with significant reduction in depressive symptoms from baseline to 3 months postpartum (15).

Tandon et al. (16, 17) investigated the efficacy of a cognitive behavioral group therapy intervention in reducing depressive symptoms. A total of 78 women were randomized into an intervention and a control group. All women had elevated depressive symptoms and were at-risk for postpartum depression. The intervention was delivered by licensed social workers or clinical psychologists and consisted of standard home

visits plus six 2-hour sessions delivered every week in a group. The intervention group also received booster sessions at 3 and 6-months post-intervention. Depressive symptoms were assessed at baseline, 1-week, 3-months (16), and 6-months (17) using the BDI-II. Major depressive episodes were assessed using the Maternal Mood Screener. At 3-months post intervention, the results demonstrated that women in the intervention group had significantly lower levels of depressive symptoms compared to those in the intervention group ($p < 0.05$) (16). The results from the 6-month post-intervention demonstrated that women who received the intervention still had lower depressive symptoms, compared to the control group ($p < 0.001$).

Interventions Initiated During the Postpartum Period

In our review, 17 studies were conducted during the postpartum period only. Our review suggests that the efficacy of home visiting programs beginning in the postpartum period are less predictable than perinatal home visiting intervention from pregnancy through postpartum, among various populations, including high- and low-risk participants. Armstrong et al. (18) conducted a randomized controlled trial to determine the effectiveness of weekly home visits. All participants were high-risk; with some form of physically abusive relationship with their partners or children in addition to low income status and/or a history of a mental health disorder (18). The intervention delivered by nurses consisted of weekly visits for the first 6 weeks, then every other week through 3 months, and then monthly visits until the child turned 6 months. The EPDS was used to assess maternal depressive symptoms at baseline and then again at 6 weeks. The results indicated that the EPDS scores from the intervention had improved significantly, compared to the scores from the control group ($p < 0.05$). Moreover, the results demonstrated that the intervention had been more effective for primiparous women than for multiparous women (18).

A study by Ahn and Kim (19) investigated the effectiveness of a home visiting discharge education intervention on postpartum depression among birthing participants who had their children in neonatal intensive care units (19). A total of 35 participants were enrolled into the intervention ($n = 23$) and control ($n = 12$) groups. The intervention consisted of a 1-h home visit provided within one-week of hospital discharge. The intervention was delivered by a registered nurse. Depressive symptoms were assessed at baseline and again after the intervention, using the EPDS. The post-intervention results demonstrated statistically significant reduction in EPDS scores in the intervention group but not in the control group ($p = 0.001$).

A postpartum period study tested an informal home visiting support program using a cluster randomized design (20). All participants were living in socially disadvantaged situations. The intervention was delivered by trained community volunteers. The number of visits varied depending on the needs of the participants. Depressive symptoms were measured using the EPDS at 2 and 12 months. Minor and major depression were assessed using a clinical interview. The results indicated that there were no differences in depressive symptoms among the participants in the intervention group, those in the matched-control group, or the unsupported group at 12 months postpartum (20).

Beeber et al. (21) tested the effectiveness of an intervention with participants who were part of an Early Head Start program. A total of 16 participants were randomized into an intervention and a usual care group. All participants included in the study had elevated depressive symptoms, which were assessed using the CESD. The intervention consisted of 8 face-to-face sessions and a booster of weekly telephone sessions delivered by nurses. Depressive symptoms were assessed at baseline, 8 weeks, and 16 weeks in the treatment and control groups. The results demonstrated that the intervention group had significantly lower scores of depressive symptoms at 8 and 16 weeks (21). Depressive symptoms in the control group did not change across time.

A study by Christie et al. (1) investigated the effectiveness of the frequency of home visits using a randomized controlled trial. All participants were primiparous and considered low-risk. The intervention was delivered by health home visitors and consisted of six home visits delivered between 10 and 14 days to 2 months postpartum. Depressive symptoms were assessed at 2 and 7 months postpartum using the EPDS. The results demonstrated that at 2 months, the intervention group had significantly higher mean depressive symptom scores ($p = 0.02$), compared to the control group. It was also found that at 7 months there was no significant difference in depressive symptoms between the intervention and control groups.

Cust (22) conducted a pilot study to determine whether peer support would aid in reducing postpartum depressive symptoms. Peers had first-hand experience with a history of mild to moderate postpartum depression but had recovered by the time they delivered the intervention. A total of 30 participants were allocated to the control ($n = 15$) and intervention groups ($n = 15$). The intervention consisted of six visits delivered every week. Depressive symptoms were assessed using the EPDS at baseline, after the intervention (or when the child was 3 months), and when the child was 6 months. The results showed that after the intervention, the EPDS scores of the participants in the intervention group were lower than those in the control group. These results were maintained at 6 months (22).

Flemington et al. (23) used a retrospective design to assess the effectiveness of a nurse home visiting program. All participants were high-risk; they had a history of mental illness, or had a drug or alcohol issue, among others. The intervention was delivered from the time the baby was born through 12 months. Maternal depressive symptoms were assessed at enrollment, when the child was 6 weeks, 12 weeks, and 6 months using the EPDS (23). Overall, the results demonstrated that depressive symptoms increased over time.

Another study conducted by Horowitz et al. (24) tested the effectiveness of a behavioral coaching intervention, aimed to improve the mother-child relationship, using a randomized controlled trial. A total of 134 women with elevated depressive symptoms were recruited to participate in the study. Elevated depressive symptoms were assessed at 6 weeks, 3, 6, and 9 months after the baby's birth using the EPDS and the Postpartum Depression Screening Scale (PDSS) (24). The intervention was

delivered by nurses and consisted of home visits at 6 weeks, and at 2, 3, 4, 6, and 9 months postpartum. The results demonstrated that although depressive symptoms went down significantly over time, there were no significant differences between the intervention and the control group.

Letourneau et al. (25) assessed the effectiveness of a home-based peer support program among participants who had elevated postpartum depressive symptoms. A total of 33 participants were assigned to the control group and 27 to the intervention group. The intervention consisted of peer support provided over 12 weeks of home visits and contacts over the phone. Peers who delivered the intervention had a history of recovery from postpartum depressive symptoms and received training on providing different types of support. Depressive symptoms were assessed using the EPDS at baseline, 6 weeks and 12 weeks after participants were randomized to the groups (25). The results demonstrated that depressive symptoms were reduced in both the intervention and control groups; however, the intervention effects were not significant.

Milani et al. (26, 27) described the effectiveness of a home visiting program in Iran to address common postpartum issues, including postpartum depression. A total of 92 participants were assigned to the intervention group and 184 to the control group. Depressive symptoms were assessed using the EPDS at 2 months postpartum. The intervention was delivered by midwives and consisted of home visits provided in the first and second weeks postpartum (26, 27). The intervention effects resulted in a lower rate of elevated symptoms among intervention participants (7.6%), compared to those in the control group [19.0%; $p < 0.05$; (26, 27)].

Nugent et al. (28) randomized 106 postpartum women into an intervention ($n = 57$) and control ($n = 55$) group to determine the effectiveness of an intervention to reduce postpartum depressive symptoms. The intervention consisted of routine care at the hospital plus a bedside visit within 2 days postpartum and also a home visit at 1 month postpartum (28). The intervention was delivered by trained psychologists or nurses. Depressive symptoms were assessed using the EPDS at one-month postpartum. The results demonstrated that fewer participants in the intervention group had elevated depressive symptoms (EPDS $>$ 12) compared to the control group. However, the results did not reach statistical significance ($p = 0.05$, CI = [0.02, 1.11]).

Finally, a study conducted by Paris et al. (29) aimed to identify the effectiveness of an intervention to address maternal mood. A total of 25 mostly primipara participants were enrolled in the study. The intervention consisted of 12 to 16 weekly home visits delivered by trained clinicians from mental health disciplines (29). Maternal depressive symptoms were assessed using the Postpartum Depression Screening Scale (PPDS) and the Beck Stress Inventory (BSI) before and after the intervention. The results demonstrated a statistically significant decrease in total postpartum depressive symptoms ($p < 0.001$). A significant decrease was also observed on the depression sub-scale of the BSI ($p \leq 0.05$).

Rossiter et al. (30) qualitatively examined the experiences of 111 participants who received home visiting services until their children turned 1 year. Depressive symptoms were measured using the EPDS (30). Only women with elevated depressive symptoms were included in the intervention. Thematic content analysis identified that the most valued aspects of the home visits included the quality of the home visitors (who were nurses); the consistency and continuity of the home visits; the increased parenting confidence; and the increased understanding and bonding that was created between the parent and the infant. Overall, the participants were satisfied with their participation in the home visiting program.

There were a limited number of studies with qualitative data to report. Cust (22) conducted in-depth interviews with participants from their study's intervention and control groups and found that having the support of a peer made the participants feel understood. Horowitz et al. (24) also assessed qualitative information from their participants and found that participants enjoyed the support provided by the home visits. The participants described that they felt validated and became more aware of their emotions and how these could affect their children.

DISCUSSION

This scoping review describes the summative results of 29 home visiting intervention studies designed to address depression during the perinatal period. This scoping review revealed clear discrepancies between the timing of initiating home visiting and intervention effectiveness for people experiencing depressive symptoms during the perinatal period. Synthesizing the results of these 29 interventions, it is clear that perinatal home visiting programs that begin during pregnancy and continue through the postpartum period report more consistent and favorable outcomes related to reduction in depressive symptoms among childbearing people than home visiting interventions which do not begin until the postpartum period. The discrepancies in the consistency of each intervention included in this scoping review, to a large extent, may be grounded research design factors in which home visiting interventions have been utilized to address perinatal mental health concerns in largely high-risk populations with very limited resources as exemplified in the 12 perinatal studies included in this scoping review. While these studies attempt to achieve health equity and reduce disparities in the burden of perinatal depression among high-risk populations, the research teams often faced additional challenges and barriers that limited the full potential of the intervention. The 17 postpartum studies, however, were derived from both low-risk and high-risk populations. We speculate that the wide range in participants' demographic characteristics might have contributed to the inconsistent predictability of home visiting program outcomes, particularly among the postpartum studies.

Home visiting is one equitable intervention to improve the quality of mental health and access to care for mothers experiencing PPD. Portela et al. (31) note the increasing need to improve interventions aimed to secure positive change in healthcare industries; given most healthcare interventions are complex in nature, require multiple sources of input, and rely upon longitudinal monitoring to understand standards

of quality (31). Portela et al. (31) identified four types of improvement intervention studies: effectiveness studies (e.g., quasi-experimental, observational, and systematic review studies), process evaluations, qualitative studies, and economic evaluations. In this scoping review, effectiveness studies represented the majority of data sources, which has somewhat limited our understanding of the holistic efficacy of home visiting programs. Only two qualitative studies presented here aimed to investigate the experiences of mothers receiving home visiting interventions to address depressive symptoms (30, 32) and only three studies (14, 22, 24) employed mixed-methodological approaches. We contend that multiple perspectives of study design would improve the outcome of home visiting interventions necessary to broaden our understanding of how to optimize home visiting programs' design and implementation for various patient populations.

This scoping review has a number of strengths. For example, by searching a 20-year period we found that the number of home visits was not substantially linked to any pattern of improvement in maternal mental health outcomes. This is important for future program decisions to determine the fidelity of the intervention and required number of sessions to improve maternal mental health outcomes. While seven studies derived results using the number of home visits, 17 studies utilized time span, the period between which home visits began and came to an end. Assessing the seven studies which utilized the number of home visits to determine the efficacy of the intervention, it is found that the number of home visits varied greatly with a median number of visits of eight (range 15). In establishing best practice guidelines in the implementation of home visit interventions as a strategy for maternal mental health, the number or duration of visits was not found to be particularly relevant. Despite the strengths, this scoping review is not withstanding limitations. For example, 23 out of 29 studies were based on statistical analyses of quantitative questionnaire where the instruments' reliabilities may vary from population to population. While we recognize the value and feasibility of quantitative measures in clinical settings, sources of quantitative data do pose certain threats to their reliability that researchers must acknowledge. An additional limitation is that the home visiting programs' design and implementations vary greatly from study to study. Such variation has demonstrated the effectiveness of a diverse variety of home visiting programs, with regard to both design and implementation due to clinical feasibility, which nevertheless, could contribute to inconsistent empirical findings.

CONCLUSION

Home visiting programs are an opportunity to detect and treat women for depression around the time of giving birth in their own environments. The approach of home visiting can reduce a number of barriers to mental health support, such as travel or childcare, for parents with infants. Home visiting programs beginning during pregnancy and extending into the postpartum period appear to have greater impacts; however, the effectiveness of these programs remains mixed. Overall, home visiting programs have tremendous potential to add structural support and achieve health equity at the system level by prioritizing the utilization of social support. Across many studies in this review, higher levels of supportive reassurance and reliable assistance, offered with added social support, are associated with lower levels of perinatal depression and anxiety. These aspects of social support can bolster parents' self-confidence and sense of community, helping them face the uncertainties of new parenthood. Lastly, the majority of studies included in this review were quantitative designs and thus lack the description of the views and experiences of home visitors and their participants. Future studies are needed to gain participants' perspectives of home visiting and factors for participation in home visiting while experiencing perinatal depression.

AUTHOR CONTRIBUTIONS

KT, BB, WHH, and HH designed the search protocol and study questions. KT, BB, and MP independently charted the data from each eligible article and met weekly to continuously update the data-charting form in an iterative process. All authors reviewed the final manuscripts, wrote, and edited the current draft.

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Prevalence and Associated Risk Factors of Suicidal Ideation Among Brazilian Pregnant Women: A Population-Based Study

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Background: Suicide is a leading cause of death during the perinatal period in high-income countries (HIC). There remains a lack of population-based studies about suicidal ideation (SI) during pregnancy among low and middle income countries (LMIC).

Objective(s): Using the case of Brazil, we aim to estimate the prevalence of SI during pregnancy and its association with antenatal depression (AD) and sociodemographic factors in a LMIC.

Method: We used data from the Brazilian National Survey (PNS-2019), a population-based study, with a complex and probabilistic sampling method. Of the 27,136 women of reproductive age (15 to 49 years old) who participated in the PNS, a total of 769 women reported being pregnant at the time of the interview. All PNS participants answered the Patient Health Questionnaire-9 (PHQ-9) and a questionnaire with sociodemographic data. SI was defined as any answer to the PHQ-9 item 9 other than 0 (not at all). Logistic regression models were performed to obtain crude and adjusted odds ratios (aOR) and 95% confidence intervals (95% CI) for the association between explanatory variables and SI during pregnancy.

Results: Among 769 women, 33 (3.9%, 95% CI: 3.0–5.1%) reported SI during pregnancy. In the adjusted analysis, higher odds of SI were associated with being 20 to 34 years old (aOR:0.24, 95% CI: 0.08–0.74) or 35 to 49 years old (aOR:0.15; 95% CI: 0.04–0.50), having 9 to 11 years of education (aOR 0.23, 95% CI: 0.61–0.86), acheiving the highest family income category (aOR:0.08, 95% CI: 0.01–0.58), not living in the South/Southeast regions of Brazil (aOR:5.52, 95% CI: 2.36–12.9), and having probable mild AD (aOR:10.5 95% CI: 2.3–47.9) or moderate AD (aOR:241.3, 95% CI: 58.4–996.7).

Conclusion(s): In Brazil, SI affects almost 4% of pregnant women and is associated with sociodemographic vulnerability. Clinically, women with mild symptoms of depression may also experience SI during pregnancy. These findings are important for designing effective perinatal mental health interventions in LMICs.

Keywords: antenatal depression, minority ethnic women, prenatal care, screening, suicidal ideation

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INTRODUCTION

Suicide is a leading cause of death during the perinatal period worldwide, and there is much variation among countries (1). In high-income countries suicide accounts for 5% to 20% of maternal deaths (1). In comparison, among low- and middle-income countries the pooled prevalence of pregnancy-related deaths attributed to suicide is 1.7% (2). Suicidal ideation (SI), often a precursor to suicide, commonly called suicidal ideas or thoughts, is a broad term used to describe non-active suicidality including preoccupations, contemplations, or wishes of death. Sometimes SI, combined with suicide plans, attempts, or self-harming such as cutting, is assessed as suicidal behavior. Nevertheless, there is no universally accepted definition of SI, which creates an increased challenge for health providers and researchers. SI with high intent is an important distal predictor of later suicide death (3). A review of SI in people in 17 countries reported that 60% of transitions, from ideation to planning and attempting suicide, occur within the first year after SI onset (4). Another study of suicide, conducted in the US, also found rapid transition from onset of ideation to planning or attempting suicide (5). Accordingly, suicidal ideation is an important and often overlooked possible antecedent for mortality among high-risk populations such as pregnant people.

The reported prevalence of antenatal SI or thoughts has varied widely between studies depending on the SI definition, methods of evaluation, and sample characteristics, and ranges from 5 to 14% of women surveyed (6). In particular, pregnant adolescents (7, 8) and patients with psychiatric disorders are at greater risk of SI during pregnancy (6). A review of 17 studies in high- and low-income countries found a SI prevalence among pregnant and postpartum women ranges from 5 to 18% (9). Studies performed in LMICs such as India and South Africa found a SI prevalence of 7.6 and 18%, respectively (10, 11). There are several risk factors for SI during pregnancy. The characteristics of SI can be individual such as having personal and/or family history of psychiatric disorders and/or history of suicidal attempts, being unmarried, beign of younger age, or experiencing intimate partner violence (11–13). The characteristics of SI can also be related to socioeconomic situations such as living in poverty, having a lack of social support, experiencing social and/or racial inequalities, living in a rural area, having lower educational attainment (11–13). Lastly, characteristics of SI can be obstetric related factors such as unplanned pregnancy, nulliparity, or experiencing a complicated delivery (12–14). Examining risk factors that can be addressed or treated is an important step for suicide prevention.

Depression is one of the most important ameriolable risk factors for SI that can be treated if detected early (5, 9, 15, 16). Antenatal depressive (AD) symptoms have been associated with a 13- to 17-fold increase in odds of SI even after adjusting for covariates (15, 17). Nevertheless, not all women with SI report elevated depressive symptoms. For example, Zhong et al. (18) ADDIN EN.CITE (18) evaluated SI among 1,519 pregnant women attending prenatal care clinics in Lima, Peru, and found that 49% of participants who screened positive for SI screened negative for depressive symptoms. Moreover, participants with low scores for probable depression according to the Patient Health Questionnaire (PHQ-9) still endorsed SI. Despite the fact that depressive symptoms are highly associated with SI, only a portion of pregnant women presenting SI experience the co-occurrence of depression. Garman et al. (19) assessed depressive symptoms and suicidality among 384 pregnant women in South Africa and concluded that depression and suicide are overlapping but independent phenomena, especially among older and more chronically depressed perinatal women. These findings highlight the importance of paying special attention to SI during pregnancy and suggest that SI screening should be recommended for pregnant women both with and without depression (9). The frequent contact between pregnant women and providers makes prenatal appointments a unique opportunity for the diagnosis and intervention of this serious public health problem. The primary aim of the present study was to estimate the prevalence of SI among a population-based sample of pregnant women in Brazil, and the secondary aim was to assess any association between AD and sociodemographic risk factors with SI during pregnancy.

MATERIALS AND METHODS

Design and Sample

The present study is a secondary analysis from the Brazilian National Health Survey (PNS- 2019), which was carried out from August 2019 to March 2020. Authors from the current study were not involved in the original data creation. PNS-2019 uses a multi-stage clustered sample. The expected sample size was 108,255 households, considering a 20% non-response rate, this number guaranteed a statistical power of 80%, and thus a sufficient estimate of health indicators. Data collection was performed through interviews conducted by trained field workers using a questionnaire format with a mobile data collection device. Further details of PNS-2019 are available elsewhere (20). The questionnaire solicited three types of information, which covered (i) characteristics of the household; (ii) all residents of the household, focusing on socioeconomic and health information; and (iii) the selected resident for whom lifestyle, chronic disease, violence, sexual behavior, and infectious diseases were investigated. For our analyses, we selected 27,249 women of reproductive age (15–49 years old) with 769 reporting being pregnant at the time of the interview (**Figure 1**).

Main Outcome (Suicidal Ideation)

Suicidal ideation during pregnancy was assessed using item 9 from the Patient Health Questionnaire (PHQ-9). The PHQ-9 is a version of the PRIME-MD diagnostic instrument for common mental disorders (namely depression and anxiety). The PHQ-9 is the depression module, which scores each of the 9 DSM-IV criteria (20). The presence and intensity of each of the 9 items in the 2 weeks preceding the interview was determined. PNS-2019 did not provide information about trimesters or gestational period. The scores range from 0 ("not once") to 3 ("almost every day"), and the total score can range from 0 to 27. Regarding PHQ-9 item 9 ("Thoughts that you would be better off dead, or of hurting yourself in some way"), there are four possible answers:

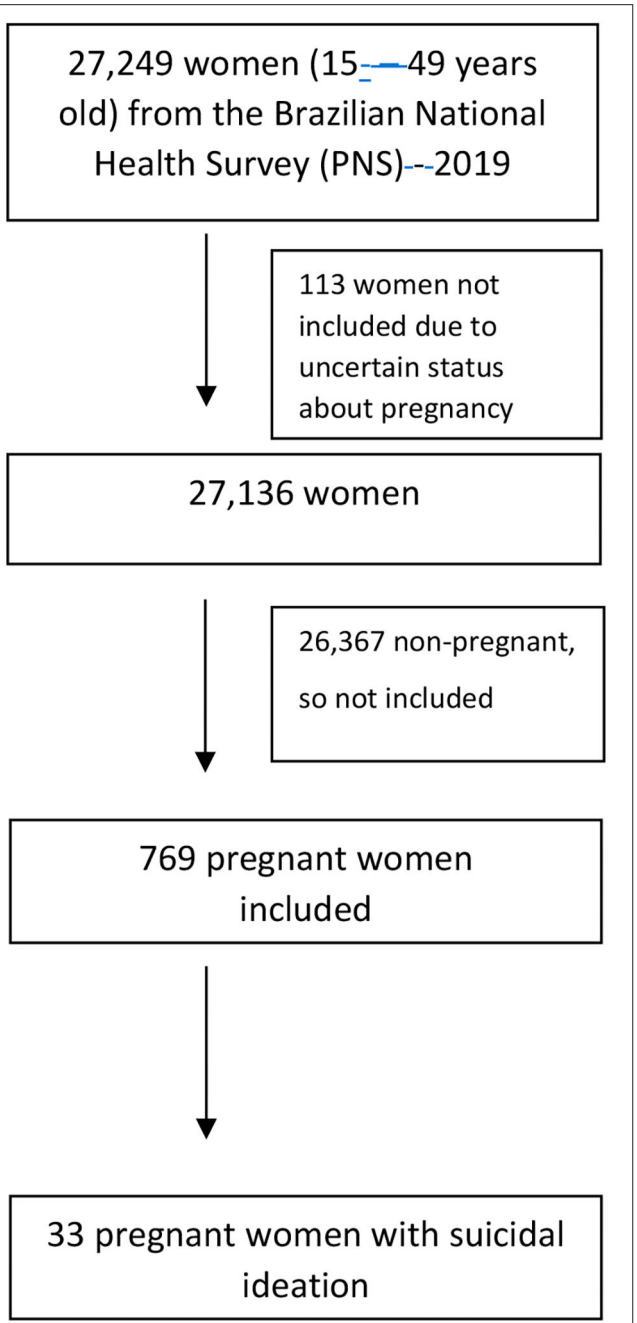

FIGURE 1 | Participant flowchart.

0 (not at all); 1 (several days); 2 (more than half the days); and 3 (nearly every day). Suicidal ideation was defined exclusively as any answer other than 0 (not at all). The PHQ-9 was validated in Brazil using a structured interview based on the DSM-IV (the gold standard) and can differentiate between probable cases and non-cases of depression (21). The specificity of the PHQ-9 suicide screening item was found to be 0.84 and the sensitivity 0.69 in a previous study (22). The reliability coefficient, Cronbach's alpha, for the PHQ-9 total score was 0.84 (23). The PHQ-9 was also used for classification of AD. We used three categories of probable depression: no depression (score <5), mild depression (score 5–9), and moderate depression (score >9). A PHQ-9 score >9 had a sensitivity of 88 and a specificity of 88% for major depression (24).

Covariates

On the basis of the PNS-2019 questionnaire data, the following sociodemographic factors were assessed: participant's age (15–19, 20–34, 35–49 years of age); self-reported skin color (non-White or White); partner status (yes or no); place of residence (urban or rural); schooling in years (0–8, 9–11, >11); country region according to economic development (more developed: South/Southeast or less developed: North/Northeast/Midwest); having a private medical plan (no or yes); and family monthly per capita income according to the Brazilian minimum wage ($1 minimum wage = $USD242.20) (0-½; ½-1; >1). Family monthly income per capita was estimated by dividing family income by the number of persons living in the household. Self-perception of health status was also collected and was classified as very good/good, regular, or poor/very poor.

Statistical Analysis

Descriptive analysis was performed. All variables were categorized. Logistic regression models were performed to obtain crude and adjusted odds ratios (OR) and 95% confidence intervals (CI) for the association between explanatory variables and SI. Aiming to control the possible effects of confounders, we examined the associated factors on SI using a stepwise backward procedure where, first, all exposure variables that had p-values $\leq$0.20 in the bivariate analysis were entered simultaneously into the model, and then those with p-values $>$ 0.05 were progressively withdrawn from the model, until only those with p-values $<$ 0.05 were kept in a final model. Statistical analysis was performed using STATA 16 software. All analyses were performed considering the weighting for the complex sample structure, in order to represent the Brazilian population, according to the research sample (SVY command in STATA).

Ethical Approval

The Brazilian National Survey of Health (PNS-2019) was approved by the National Health Ethics Committee (process 3.529.376) in August 2019. Participation was voluntary and participants signed a consent form. The questionnaire could be completed in whole or in part. The PNS dataset is publicly available on the Brazilian Institute of Geography and Statistics website without information that could identify individuals.

RESULTS

Of the 27,249 women of reproductive age (15 to 49 years old) in the PNS-2019 data set, we excluded 113 women with uncertain pregnancy status and 26,367 non-pregnant women, leaving a total of 769 pregnant women for the present analysis (**Figure 1**).

Of the 769 pregnant women included in the present analysis, 36.1% were White, 79.1% lived with a partner, 55.2% lived in the South/Southeast regions of the country, and 44.5% were between

TABLE 1 | Characteristics of suicidal ideation among pregnant women in the Brazilian National Survey of Health, 2019.

Variable	*N*	Prevalence % (95% CI)**	*N*	Suicidal Ideation % (95% CI)**	*P* level*
Age (mean years)					0.001
15–19	88	10.0 (9.2–10.8)	6	8.6 (5.9–12.3)	
20–34	529	45.5 (42.4–48.5)	20	3.1 (1.7–5.6)	
35–49	152	44.5 (41.5–47.4)	7	3.7 (2.6 – 5.2)	
Race/color					0.49
White	226	36.1 (30.2–42.4)	7	4.4 (3.0–6.4)	
Other	543	63.9 (57.5–69.7)	26	3.6 (2.4–5.4)	
Schooling					<0.001
0–8 years	244	32.5 (26.2–39.4)	18	8.9 (6.2–12.8)	
9–11	357	41.7 (35.3–48.4)	13	2.3 (1.2–4.1)	
>11	168	25.7 (23.1–28.5)	2	0.2 (0.07–0.8)	
Monthly income per capita (minimum wage – Reais)					0.001
Up to ½	320	31.5 (27.4–35.8)	22	8.2 (6.0–10.9)	
½ to 1	212	28.3 (23.4–33.9)	8	4.0 (2.0–7.7)	
> 1	236	40.1 (35.8–44.6)	3	0.6 (0.1–0.6)	
Lives with partner					<0.001
Yes	593	79.1 (76.0- 81.9)	21	2.3 (1.4–3.6)	
No	176	20.9 (18.0- 23.9)	12	10.1 (7.0–14.2)	
Urban area					0.86
Yes	580	84.1 (81.0–86.7)	23	3.9 (2.8–5.3)	
No (rural)	189	15.9 (13.2–18.9)	10	4.1 (2.2–7.7)	
Country region					0.003
South/Southeast	218	55.2 (49. –60.9)	6	2.1 (1.0–4.2)	
Other	551	44.8 (39.0–50.7)	27	6.4 (5.0–8.1)	
Private health insurance					0.03
No	619	74.2 (70.1–77.8)	31	5.0 (3.8–6.6)	
Yes	150	25.8 (22.1–29.9)	2	0.8 (0.1–4.3)	
Perception of health status					0.02
Very good/good	601	74.2 (70.7–77.3)	18	2.5 (1.6–3.9)	
Regular	157	24.9 (21.7–28.2)	14	7.5 (5.4–10.2)	
Poor/very poor	11	0.9 (0.4–1.6)	1	23.4 (3.8–70.0)	
Antenatal depression (PHQ-9 score)					<0.001
0–4	480	58.6 (53.7–63.3)	4	0.2 (0.07–0.62)	
5–9	186	20.3 (16.9–24.1)	9	2.2 (1.0–4.8)	
10-max	103	21.1 (16.4–26.6)	20	16.0 (11.3–22.1)	

**P level < 0.05 (bold) entered into the multivariate analysis.*

***Estimated with Stata svy command (to take into account the sample weighting).*

35 and 49 years old. Approximately a quarter of participants (25.8%) had private health insurance, and 40.1% reported a monthly income per capita of more than $1 minimum wage. (Minimum wage in Brazil is the lowest monthly payment for an employee permitted by law. MW = R$ 1.000,00 which was equivalent to $USD250.) These socioeconomic and demographic data are representative of the Brazilian population. Almost three-quarters of participants reported having a very good or good health status (**Table 1**). The range of the PHQ-9 scores was 0 to 24, the mean score for the PHQ-9 was 4.2 (95% CI: 3.9–4.5), and the mean score for PHQ-9 item 9 was 0.06 (95% CI: 0.03–0.08, range 0 to 3). In relation to AD, 58.6% had a score below 5 (no depression) while 21.1% scored 10 or more (moderate depression). The prevalence of SI was 3.9% (95% CI: 3.0–5.1), including the 33 pregnant women in the sample that reported SI. The proportion of women with SI varied according to the PHQ-9 score: among the 480 non-depressed participants (score <5), the proportion of pregnant women with SI was 0.1% (95% CI: 0.05–0.48); among the 186 pregnant women with mild depression (score 5–9), the proportion of SI was 2.6% (95% CI: 1.5–4.4),

TABLE 2 | Associations between suicidal ideation, sociodemographic factors, and obstetric risk factors in the Brazilian National Survey of Health, 2019.

Variables	Suicidal	Ideation		
	Crude OR (95% CI)	*P* level	Adjusted * OR (95% CI)	*P* level
Age (years)		0.001		0.013
15/19	1			
20/34	0.34 (0.16–0.70)		0.24 (0.08–0.74)	
35/49	0.41 (0.24–0.70)		0.15 (0.04–0.50)	
Race/color		0.49		
White	1			
Other	0.81 (0.44–1.46)			
Schooling		<0.001		0.03
0–8 years	1		1	
9–11	0.24 (0.11–0.52)		0.23 (0.61–0.86)	
>11	0.02 (0.007–0.09)		0.15 (0.02–1.17)	
Monthly income per capita (minimum wage – Reais)		0.001		0.013
Up to ½	1		1	
½ to 1	0.46 (0.21–1.01)		0.46 (0.15–1.41)	
> 1	0.06 (0.13–0.31)		0.08 (0.01–0.58)	
Live with partner		<0.001		
Yes	1			
No	4.73 (2.56–8.72)			
Urban area		0.86		
Yes	1			
No (rural)	1.06 (0.51–2.23)			
Country region		0.003		<0.001
South/Southeast	1		1	
Other	3.13 (1.48–6.58)		5.52 (2.36–12.9)	
Private health insurance		0.03		
No	1			
Yes	0.15 (0.02–0.88)			
Perception of health status		0.02		
Very good/good	1			
Regular	3.13 (1.78–5.51)			
Poor/Very poor	11.7 (1.47–94.1)			
Antenatal depression (PHQ-9 score)		<0.001		<0.001
0/4	1		1	
5/9	10.8 (2.72: 42.9)		10.5 (2.3–47.9)	
10/max	89.4 (27.8–287.0)		241.3 (58.4–996.7)	

**Adjusted by mother's age, schooling, country region, and antenatal depression.*

and among the 103 pregnant women with moderate depression (score >9), the proportion of women with SI was 17.5% (95% CI: 13.9–21.9).

A higher frequency of SI was found among pregnant women who were 15 to 19 years old (8.6%), with less then 8 years of education (8.9%), among the poorest (8.2%), not living with a partner (10.1%), not living in the South/Southeast regions (6.4%), and without private health insurance (5.0%). Additionally, a higher frequency of SI was seen among participants who reported a poor/very poor health status (23.4%) and moderate depression (16.0%) (**Table 2**).

In the bivariate analysis, the following variables were associated with an increased risk of SI: not having a partner (OR = 4.73; 95% CI: 2.56–8.72), not living in the South/Southeast regions (OR = 3.13; 95% CI: 1.48–6.58), reporting a regular health status (OR = 3.13; 95% CI: 1.78–5.51) or a poor/very poor health status (OR = 11.7; 95% CI: 1.47–94.1), and having mild (OR = 10.8; 95% CI: 2.72–42.9) or moderate AD (OR = 89.4; 95%

CI: 27.8–287.0). The following variables were associated with a decreased risk of SI: being 20 to 34 years old (OR = 0.34; 95% CI: 0.16–0.70) or 35 to 49 years old (OR = 0.41; 95% CI: 0.24–0.70), having 9 to 11 years of schooling (OR = 0.24; 95% CI: 0.11–0.52) or > 11 years of schooling (OR = 0.02; 95% CI: 0.007–0.09), and having the achieved the highest family income category (OR = 0.06; 95% CI: 0.13–0.31) (**Table 2**).

In the adjusted analysis, women had lower odds of SI if they were 20 to 34 years old (adjusted OR = 0.24; 95% CI: 0.08–0.74) or 35 to 49 years old (adjusted OR = 0.15; 95% CI: 0.04–0.50), had 9 to 11 years of schooling (adjusted OR = 0.23, 95% CI: 0.061–0.86), and had achieved the highest family income category (adjusted OR = 0.08; 95% CI: 0.01–0.58). In contrast, pregnant women had higher odds of SI if they did not live in the South/Southeast regions (adjusted OR = 5.52; 95% CI: 2.36–12.9) or had probable mild AD (adjusted OR = 10.5; 95% CI: 2.3-47.9) or probable moderate AD (adjusted OR = 241.3; 95% CI: 58.4–996.7) (**Table 2**).

DISCUSSION

The results of our study of a nationally representative sample of women of reproductive age may have public health implications to reduce the burden of SI during pregnancy in LMICs. This study found that SI is prevalent (3.9%) and is strongly associated with depression scores during pregnancy in Brazil. The risk of SI during pregnancy increased in tandem with elevated scores for depression on the PHQ-9. Nevertheless, 0.1% of pregnant women without depression and 2.6% of pregnant women with mild depression also reported SI. Therefore, screening for SI is recommended for pregnant women both with and without depression. Even though there is no commonly used screening tool for SI, a recent study found that screening for multiple psychosocial vulnerabilities can be effective (25). An early identification of SI with screening tools (such as the Edinburgh Postnatal Depression Scale [EPDS] and PHQ-9) should be followed by an appropriate psychiatric assessment. Pregnancy an opportune time to screen for SI as well as depression given the frequent and close contact between women and health providers during antenatal appointments. Further psychological assessments and psychiatric referral would be applied to pregnant women who screened positive for SI. Unfortunately, we believe that factors associated with lower perinatal depression screening by health care providers—such as insufficient training, lack of time during prenatal appointments, competing demands, and difficulties referring the more complex cases (26)—are also obstacles for suicidal ideation screening. Future studies should develop new strategies to assess suicide risk focusing on identifying the risk factors and protective factors for any given individual. At institutional level, public policies should prioritize a more comprehensive assessment of women's psychosocial vulnerabilities in pregnancy, tackling the limited resources of the health system and different levels of barriers to antenatal care (27).

Our findings from Brazil, a LMIC, align with previous studies on the prevalence of SI in high-income countries. For example, a number of investigations in the US have aimed to estimate SI using different methodologies. Gavin et al. (28) studied 2,159 women receiving prenatal care at a university obstetric clinic to identify the prevalence of and factors associated with antenatal SI as measured by the PHQ-9. Overall, 2.7% of the sample reported antenatal SI. Tabb et al. (17) used EPDS and found a prevalence of SI of 4.6% among a sample of 736 low-income US pregnant women. Kim et al. (29) evaluated 22,118 pregnant women from two US hospital of suburban integrated health systems with the EPDS and found an overall prevalence of SI of 3.8% during the perinatal period (4.1% antepartum and 3.5% postpartum). They also also reported that most women with SI were not acutely suicidal according to structured phone interviews performed by trained mental health professionals. All of these estimates are lower than the finding in a study performed in Lima, Peru. Zhong et al. (18) performed a cross-sectional study with 1,517 pregnant women who were assessed for SI using two screening tools: PHQ-9 item 9 and EPDS item 10. They found that 15.8 and 8.8% of participants screened positive for SI with the PHQ-9 and the EPDS, respectively. Of note, both the EPDS and the PHQ-9 are valid tools for assessing depressive symptoms but are not designed to evaluate the full spectrum of suicidality (plans, behaviors, or actions). A limitation of the EPDS is that the scale cannot assume suicidal intent (25).

The SI prevalence found in the present study is similar to both gravid and non-gradid populations in Brazil. For instance, our study is near the results found in a Brazilian prospective study with adults that described the pattern of comorbidity between mental disorders and their association with suicidality (30). In 1982, all hospital deliveries in Pelotas (Southern Brazil) were identified ($n = 5914$) and newborns were followed prospectively. The presence of common mental disorders at the ages of 18–19, 23, and 30 years were evaluated. In 2012–13 (30 years of age), trained psychologists evaluated 3,657 individuals for disorders using the Mini International Neuropsychiatric Interview finding a prevalence of suicidal ideation of 4.9%. Our SI prevalence rate is even higher than the one observerd in a large cross-sectional of Brazilian civil servants (ELSA-Brasil, the Brazilian Health Longitudinal Study, $n = 15{,}105$). They found that 101 (0.67%) participants presented suicidal thoughts in the 7 days prior to the interview (31). The sample size sociodemographic profile and method of SI assessment may explain the lower rates found in this study in comparions with our results.

Our findings also reaffirm some cross-sectional studies in Brazil also have assessed SI. Huang et al. (16) used the Self-Report Questionnaire 20 (SRQ-20) to evaluate 831 low-income women at 20 to 30 weeks of pregnancy. The prevalence of SI was 6.3%. In comparison with our results, the use of SRQ and the use of a convenience sample from public antenantal care clinics may contribute to a slightly higher prevalence of SI. Da Silva et al. (32) ADDIN EN.CITE evaluated SI during pregnancy among women who had attended public health services between 2006 and 2008 with the question 10 from EPDS. They found that 8.1% of pregnant women reported SI from item 10 of the EPDS (32). Our population-based sample included pregnant women from public and private health services, and lower prevalence of depression and SI is expected among women from

the private sector in previous studies. Some of the mechanisms related to lower prevalence of untreated depression captured on screens is from the greater access to mental health care through private insurance for those with higher socioeconomic status. In contrast, Pinheiro et al. (33) evaluated 871 pregnant teenagers receiving prenatal care from the national public health system. They assessed suicidal behavior (and psychiatric disorders) using the Mini International Neuropsychiatric Interview and found a 13.3% prevalence of some form of suicide risk behavior. Possible explantions for higher rates of suicidal behavior in their study are the lower socioeconomic characteristics of the sample and the higher frequency of lifetime history of emotional or physical abuse. The same instrument was used to assess current suicide risk among 225 pregnant women. It found that lifetime suicide attempt rate was 12.55% (34). It is possible that some of the variation in rates in related to the type of scales used.

The large variation in SI seen among studies may be explained by the different methodologies used, including the use of a single item from a depression screening tool and the characteristics of the sample populations. Higher rates of SI are expected among women who report antenatal treatment for neuropsychiatric, epileptic, or mental health conditions (6, 35); who report illicit drug use (36); or who present specific risk factors such as intimate partner violence (15). Finally, pregnant women with lower socioeconomic status experience higher the risk of SI (35). Despite wide variations in past studies, our study confirms the importance of examining a number of psychosocial factors to detect risks for SI.

In the present study we found that younger women experience an increased risk of SI. This is consistent with studies from the US (13), (17) and Brazil (32). Moreover, a UK study evaluated 4,785 women aged 16 to 50 years who died by suicide (2% of whom were in the perinatal period) and found that compared to non-perinatal women, women who died by suicide in the perinatal period were more likely to be younger (37). Younger age also has been associated with SI in studies among the general population. Nock et al. (4) assessed 17 countries to estimate the cross-national lifetime prevalence of SI and reported that age is inversely related to risk for each suicidal behavior, while Borges et al. (38) used data from adults in 21 countries ($N = 108{,}705$) interviewed with the WHO Composite International Diagnostic Interview to report that younger age is a predictor of suicide attempt. Physical abuse and unplanned pregnancy, which are factors commonly associated with pregnancy during adolescence in Brazil (8, 39), may explain the higher risk of SI among younger women. Additionally, it has been shown that younger women and women who are members of racial/ethnic minority groups are the least likely to receive a diagnosis of depression (40), the most important predictor of SI.

In the present study of a national sample, race/skin color was not associated with SI in the bivariate analysis. This is not an unexpected finding considering that results of published studies from high-income countries have been inconsistent. Some US studies reported a higher risk of suicide attempt among non-Hispanic Whites in comparison with other ethnic groups, while other studies could not find any significant association between race/ethnicity and suicide ideation or attempts (41). In Brazil, a population-based study with 1,295 individuals (18 years or more), living in a Southern city, collected suicidal thoughts using item 9 from the PHQ-9. They did not find a significant association betweem suicidal thoughts (6.6% of participants) and race (42). Because of sample size limitations, this study was unable to examine the many categories by skin color and this could be an area for future research. In the future studies could explore the experience of SI during pregnancy and if skin color or region shapes the experiences of the individuals.

We also found an association between fewer years of schooling and lower family income with SI. These findings have been shown in several studies among pregnant (8, 15, 32, 43) and non-pregnant women in the general population (31, 44, 45). Two studies reported that fewer years of schooling almost tripled the risk of SI during pregnancy (32, 46). Social disadvantage is associated with less access to health care and higher risk of psychiatric conditions, which are related to suicidal behavior. Access to mental health care is one important structural barrier. In South/Southern regions of the country, there is greater availability of mental health care in comparison with other less developed regions. One example is the higher number of psychiatrists in the Southern states (4.55 psychiatrists per 100,000 inhabitants) than in the Northern states (>1 psychiatrist per 100,000 inhabitants). Attaining higher education may help women identify resources to mental health care and improve their outcomes (13).

Our data confirmed results from several studies that have depicted the importance of AD as one of the highest risk factors for SI (8, 13, 15–17, 35, 47). Moreover, the higher the score for depression, the higher the risk for SI. As a matter of fact, other comorbid psychiatric disorders, such as anxiety, panic, substance use, and post-traumatic stress, have been associated with SI (35). Nevertheless, our data also revealed that a small proportion of women without depression or with mild depression reported SI. A similar finding has been reported in different studies. Zhong et al. found that 49% of pregnant women with SI had no depression, with a score of 10 or lower on the PHQ-9. They also found that some participants with a lower PHQ-9 score (>6) still endorsed SI (18). Tabb et al. found that among a sample of low-income pregnant women with SI, 35% did not meet the criteria for elevated depressive symptoms (17). Overall, our results are consistent with data from a study of the general population in Brazil that showed that the prevalence of suicidal thinking is low among mentally healthy individuals and is higher in persons with psychiatric disorders, suggesting that SI is an indirect marker of mental disorders (31).

Screening universally for SI is one approach to detect SI during pregnancy in LMICs. There is a new approach for SI screening recently developed in Sri Lanka. Palfreyman (25) screened 1,000 antenatal women from all trimesters of pregnancy in 2016 using a novel three-part instrument that included the Edinburgh Postnatal Depression Scale, a modified Columbia-Suicide Severity Rating Scale, and Life Circumstances questionnaire. Palfreyman found that one in four women reported a lifetime history of suicidal ideation and/or behaviors (SIB), while SIB during the current pregnancy was reported at

7.4% (25). A higher prevalence found in this study in comparison with our results could be explained by a higher frequency of intimate partner violence and a higher prevalence of depressive symptomology (∼one in every three women). Other cultural aspects such as intimate partner violence and child/teen marriage may also play a role.

Strengths and Limitations

Our study has several strengths. The data in our study were derived from a large population-based research survey that used a complex sampling method that included pregnant women from all socioeconomic statuses. Therefore, generalizability of our findings can be inferred. Moreover, the sampling method allowed the inclusion of populations at high risk for suicidality, such as women with mental disorders. The eventual exclusion of this group of women could contribute to lower prevalence of SI. Moreover, SI screening was assessed among all participants, including those with and those without depression.

Our study also has some limitations. First, the cross-sectional design did not allow us to establish temporal causality. Second, depression was evaluated with the PHQ-9 total score, while self-harming ideation was assessed with a single item from the same instrument. A single question may have different meanings for pregnant women (48). Psychiatric evaluation with the use of structured diagnostic criteria and assessments of other dimensions of suicidality would be very helpful. For example, item 9 of the PHQ-9 does not contain information on intensity or duration of SI, thus preventing a clear understanding of the severity of the suicidality. The PHQ-9 was not originally designed to evaluate risk of suicide (20). Moreover, item 9 from PHQ-9 cannot assess intention, which is a critical element of suicidal behavior and an affirmative answer in this item does not imply an imminent risk of suicide (49). Even though SI reported on the PHQ-9 was found to be a robust predictor of suicide attempts and deaths (50), item 9 covers only non-specific intent of death and self-harm. Nevertheless, the use of the PHQ-9 to measure depressive symptoms instead of depressive disorders, as well as SI, could be justified in population-based studies such as PNS-2019. Third, we also cannot rule out recall bias while using self-reporting to evaluate SI and depression. Therefore, one may expect that the true estimates of SI could be even higher. Finally, we did not assess data about covariates such as interpersonal violence, pregnancy planning, substance abuse, and more specific aspects of partner relationship variables that are commonly associated with SI. These variables may be closed related to pregnant women's suicidal risk and should be assessed in future studies.

CONCLUSIONS

Findings from our study showed that SI is common among 4% of Brazilian pregnant women. We found SI is associated with antenatal depression and a vulnerable psychosocial profile that includes lower socioeconomic status, lower amount of education, and pregnancy during adolescence. SI was also reported among a small group of pregnant women without depression or with mild depression, which is important for clinical approaches to detect SI during pregnancy.

From this national-derived sample, we confirmed findings from clinical samples, although at a lower prevalence, confirming SI is a common problem during pregnancy. In conclusion SI is strongly associated with depression and a vulnerable psychosocial profile in a LMIC and this should serve as a call to action. The correct identification of these risk factors through the use of screening practices may help us to develop preventive strategies for pregnant women at higher risk of SI during pregnancy.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found here: The Brazilian National Survey of Health (PNS-2019) was approved by the National Health Ethics Committee (process n° 3.529.376) in August 2019. Participation was voluntary and participants signed a consent form. The questionnaire could be completed in whole or in part. The PNS dataset is publicly available on the Brazilian Institute of Geography and Statistics website without information that could identify individuals. Further enquiries can be directed to the corresponding author.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Black Perinatal Mental Health: Prioritizing Maternal Mental Health to Optimize Infant Health and Wellness

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Infant mental health is interconnected with and affected by maternal mental health. A mother or birthing person's mental health before and during pregnancy and the postpartum period is essential for a child's development. During the first year of life, infants require emotional attachment and bonding to strive. Perinatal mood disorders are likely to hinder attachment and are associated with an increased risk of adverse mental health effects for children later in life. The Black community is faced with a crisis as Black mothers experience a higher prevalence of perinatal mood disorders, including postpartum depression and anxiety, compared to the United States national estimates. The aim of the research is to identify social, structural, and economic disparities of Black perinatal women and birthing people's experience to understand the impact of perinatal mental health on infants' mental health. Black mothers and birthing people may often face social and structural barriers that limit their opportunity to seek and engage with interventions and treatment that address the root causes of their perinatal mood disorder. To enhance understanding of racial disparities caused by social and structural determinants of health on Black mothers and birthing people's mental health and health care experiences that influence infant mental health, the study team conducted semi-structured interviews among self-identified cisgender Black women health professionals nationwide, who provide care to pregnant or postpartum Black women and birthing people. Our study attempted to identify themes, pathways, interventions, and strategies to promote equitable and anti-racist maternal and infant mental health care. Using a Rigorous and Accelerated Data Reduction (Radar) technique and a deductive qualitative analytic approach it was found that limited access to resources, lack of universal screening and mental health education, and the disjointed healthcare system serves as barriers, contribute to mental health issues, and put Black mothers and birthing people at a disadvantage in autonomous decision making. Our study concluded that instituting education on healthy and culturally appropriate ways to support infant development in parent education programs may support Black parents in establishing healthy attachment and bonds. Prioritizing strategies to improve maternal mental health and centering Black parents in developing these educational parenting programs may optimize parenting experiences.

Keywords: perinatal mental health, inequaities, Reproductive Justice (RJ), birth equity, infant mental health, inequities in health care

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INTRODUCTION

An estimated 10–20% of perinatal depressive episodes meet the full criteria for a major depressive episode (1). The prevalence of perinatal depression increases to 25–50% when minor bouts of depression or anxiety are included (2). Untreated perinatal depression and anxiety are associated with pregnancy complications and adverse outcomes during the perinatal period, including impaired lactation, suicide, and infanticide (3). Black mothers experience a higher prevalence of maternal mental health issues, including postpartum depression and anxiety, in comparison to the United States national estimates (4).

There is an interconnectedness between the mental and emotional health of the person giving birth and the developing fetus. A mother or birthing person's mental health before and during pregnancy and the postpartum period is essential for the development of a child (5). During the first year of life, infants require emotional attachment and bonding to thrive. The bond that is formed during this stage is the foundation on which young children develop self-awareness relative to others (6). Mothers who experience depression or anxiety and lack of social support may find it challenging to build a secure attachment, leading to an insecure attachment (3) that can impact an infant's capacity to regulate their emotions and behaviors, learning, and assessment of social cues (7). Maternal mental health disorders such as depression, anxiety and psychosis are also associated with an increased risk of adverse mental health effects for children later in life (8).

To understand the root causes of maternal and infant mental and emotional health, it is imperative to use the frameworks of social justice movements, like Reproductive Justice and birth equity, that use power analyses to contextualize the social and structural determinants of maternal, infant, and reproductive health. Loretta Ross, co-creator of the reproductive justice movement, defines reproductive justice as, "the human right to maintain personal bodily autonomy, have children, not have children, and parent the children we have in safe and sustainable communities" (9). The birth equity framework focuses on rectifying structural racism and social determinants through system-level change and initiatives to improve maternal and infant health (10).

Applying these frameworks helps address intersecting oppressions, and center marginalized populations in developing pathways to improve maternal mental health and its barriers to care and health equity. Specifically, intersecting social constructions such as gender and race and accompanying systems of oppression such as racism, misogyny and transphobia create barriers to pregnant and parenting families having what they need to thrive. To overcome the persistent racial inequities in perinatal mental health for better infant mental health outcomes, we must consider, in finding solutions, those who bear the greatest burden of structural racism and gender oppression – Black mothers and birthing people.

The experiences of Black mothers and birthing people is key to identifying viable solutions to improving maternal and infant mental health inequities. Limited access to resources, lack of universal screening and mental health education, lack of culturally congruent providers and fractured healthcare systems limit the ways Black mothers and birthing people often seek and receive health services (11). These social and structural barriers contribute to mental health issues and put Black mothers and birthing people at a disadvantage in autonomous decision making (11). To improve the awareness and understanding of the impacts of social and structural determinants of mental health for Black mothers, birthing people and their infants, we conducted semi-structured interviews with Black maternal and infant mental health stakeholders and experts.

This article reports pathways to address social and structural inequities that Black women and birthing people experience during the perinatal period, to identify pathways to equitable maternal mental healthcare to optimize infant health and cognitive development.

MATERIALS AND METHODS

Study Team

The study team comprised of three cisgender, Black women, public health professionals. Two of the team members hold masters-level training in public health and had experience conducting qualitative research and analysis using analytic software. One member of the team was a trained licensed clinical health worker, with a specialization in providing mental health counseling and care to Black women.

Study Setting

We conducted semi-structured interviews from February 16th, 2021, to March 10th, 2021, among self-identified cisgender Black women health professionals nationwide, who provide care to pregnant or postpartum Black women and birthing people.

Grounding Frameworks

In developing the interview guides, principles of reproductive justice and birth equity informed the questions, data collection and analysis, and interpretation. The interview guides included specific questions regarding the impact of the mother's (or birthing person's) health on their infant's health and mental well-being. The guide also contained questions regarding the effects of systems of oppression (e.g., racism, gender oppression) and social and structural determinants of health on Black mother's access to mental health services, treatment, and their overall mental health status.

The Reproductive Justice (RJ) movement began in 1994 by Black feminist advocates. The RJ movement declares an individual's rights to bodily autonomy not to have children, the right to have children, including all birthing options, and to parent their children in safe and supportive communities (9). The RJ movement proposes a theoretical framework that explains how intersecting systems of oppression create the conditions that most often impact Black birthing people and their experience with the mental health care system, including maternal mental health providers and practitioners. Inequities in mental health service utilization and provision stem from the lack of incorporation of the Reproductive Justice (RJ) Framework

into clinical practice. The RJ framework is a critical concept of reproductive autonomy that acknowledges how reproductive rights are adversely impacted by racism, paternalism, economic injustices, and other forms of oppression. At the intersection of mental health, education and autonomous rights, the availability for culturally congruent, unbiased, decolonized (10), trusted mental health providers is a useful quality indicator for pregnant and postpartum Black birthing people's use of mental health services. Further, RJ asserts that children deserve to be raised in safe and supportive communities, and that begins in the home and within the family unit.

Birth Equity is defined as "the assurance of the conditions of optimal births for all people with a willingness to address racial and social inequities in a sustained effort" (11). This framework explains how structural and social determinants impact perinatal health outcomes and the wellbeing of pregnant and postpartum populations.

The RJ and Birth Equity frameworks provide a lens of centering and valuing the autonomy and self-knowledge of people in marginalized communities within systems. These theoretical frameworks provide a basis for understanding not only how systems and structures impact perinatal mental health, but also the relationship between maternal mental health and infant mental health and wellbeing.

Participants and Recruitment

This study was approved by the Institutional Review Board of the Institute for Women and Ethnic Studies on December 18th, 2020. The interview guide comprised 21 questions, organized in six major sections: Framing, Barriers, Racism and Gender Oppression, Social Determinants of Health, Solutions and Strategies, and Infant Mental Health (Exhibit **Appendix 1**). The interview guide has been published previously (12). Of the six sections, five focused on maternal mental health, while one section focused exclusively on infant mental health. Results from the analysis of data on maternal mental health have been published previously (12). This article presents an analysis of the data specific to infant mental health and wellbeing.

The study team developed a preliminary list of 40 stakeholders with expertise in maternal or infant mental health. The final stakeholders prioritized Black women who had expertise in reproductive justice or birth equity and infant or maternal mental health. The stakeholders who provided counseling services had to serve predominantly Black women and birthing people, to be invited to the study. Stakeholders were invited via email to participate in one-on-one interviews with members of the study team. Of the 40 identified stake holders, ten stakeholders were invited and accepted the invitation to interview. The stakeholders were self-identified cis-gendered Black women, ranging reproductive age.

Stakeholder Interviews

We interviewed 10 perinatal mental health practitioners, researchers, and activists during February and March 2021. Qualitative interviews were conducted one-on-one with stakeholders to understand the impacts of structural and social determinants of health on Black birthing people's mental health and mental health care experiences to identify solutions that could advance maternal mental health care and infant mental health. The stakeholders interviewed had a wide range of training expertise that included perinatal social work, clinical psychology, social work, birth work, lactation support, marriage and family therapy, and health disparities research linking the mental health and wellbeing of infants. Several stakeholders provided services to pregnant and postpartum Black women and birthing people in hospital and outpatient settings. Stakeholders were asked a series of open-ended questions to determine the perceived barriers Black women and birthing people experience in maternal mental health systems of care.

All interviews were conducted virtually via Zoom Communications Technologies software. Interviews were video and audio recorded with the participant's consent. A second member of the study team participated in interviews as an observer to provide technical support, obtain verbal informed consent and take notes. Audio recordings of each interview were submitted to REV-a professional audio transcription service that uses humans to transcribe audio to limit inaccuracies of the interviews.

Qualitative Analysis

The study team conducted a rapid and in-depth analysis to identify significant themes from the stakeholder interviews. The team utilized an iterative process for the rapid analysis to arrive at final themes from February to March 2021. The rapid analysis was guided by the Rigorous and Accelerated Data Reduction (RADaR) technique characterized by using tables and spreadsheets in Microsoft Excel to develop an all-inclusive data set that underwent multiple revisions to synthesize common themes among the interviews (13). Two team members created an excel spreadsheet with the facilitator's questions in rows and responses from each stakeholder in the columns. One team member created a document with pseudonyms and scopes of practice for each participant. Preliminary themes were presented to 13 perinatal mental health stakeholders during two virtual webinars in March 2021 to obtain feedback on the identified themes from the rapid analysis and inform the development of equitable and antiracist maternal and infant mental healthcare pathways. A flyer for the virtual webinar sessions was shared via social media channels of the author's affiliated organizations and disseminated by email through an organizational newsletter of one author's community-based maternal mental health organization. We captured insights from webinar participants verbally and through Jamboard to determine if the preliminary results from the rapid analysis of the stakeholder interviews resonated with them based on their experience and expertise. The webinars were co-facilitated by the study team and two Black maternal mental health professionals who participated in the interview series.

An in-depth analysis was then conducted using a deductive qualitative analytic approach. The preliminary codebook (Exhibit **Appendix 2**) was curated based on the initial grounding literature review, the guiding frameworks (Reproductive Justice and Birth Equity), and team members with maternal and infant mental health expertise to construct a foundation for analysis.

Two team members independently coded two transcripts using the preliminary codebook and reviewed the coded themes for definition accuracy. The codebook was then revised to redefine and expand codes. The remainder of the transcripts were coded independently by two team members, then reviewed for accuracy and identification of themes. The themes were then discussed with the third team member who facilitated the stakeholder interviews to ensure that significant findings were consistent with interpretations of the webinar summaries and discussions.

RESULTS

Three themes specific to infant mental health were identified from interviews with the perinatal mental health stakeholders, including challenges conceptualizing and defining, relationship between maternal health and infant health and wellness, and strategies for nurturing infant health and wellness.

Challenges of Conceptualizing and Defining Infant Mental Health

Participants emphasized that infant mental health is challenging to conceptualize because it lacks an operational and cohesive definition. In describing how infant mental health is defined, one practitioner shared:

> "I got asked to be a speaker for an infant mental health organization, and I was like, can you describe to me what that means to you? I don't know exactly what that means... It's literally like a term that doesn't really have a full operational definition. I feel like, in the field, none of us are learning infant mental health, really. We might learn developmental health and then sort of the course of what infants might be doing in different stages, but not that there's a whole provider geared to work with zero to three in that way." - Felicia, Licensed Clinical Psychologist and Birth Doula.

This participant acknowledges that there are providers whose scope of practice is dedicated to infants from newborns to 3 years old. While their clinical training included content focused on infant developmental health, the specific terminology and focus on infant mental health was not addressed. Another participant also expressed difficulty in specifying what infant mental health encompasses:

> "[Infant mental health is] hard to capture, related to the environmental structure, but something that we can work on." - Alesia, Health Disparities Researcher.

While the operational and cohesive definitions of infant mental health were unclear, practitioners noted that the scope of infant mental health encompasses an infant's cognitive and emotional development. Mother-infant bonding and attachment were often referred to as indicators of an infant's mental health status:

> "Infant mental health to me means a provider that is aware of what the stages of the development should be, particularly in this early infant side, which is a lot about secure attachment." - Felicia, Licensed Clinical Psychologist and Birth Doula.

> "The first thing that comes to my mind is secure attachment, like are you doing what you need to do to provide a secure attachment with the parents and the child? Or even understanding the journey of your baby. Because people are like, 'Oh, that baby's this and that.' Just understanding what babies are going through or young toddlers are going through to really help with that bond between parent and child." Morgan, Licensed Mental Health Therapist.

One participant described the importance of acknowledging an infant as a separate being with their own needs and journeys. Related to understanding the spiritual journey of infants, one practitioner noted how our conceptualization of infant mental health has been medicalized:

> "When we think about infant mental health, we think about it from a clinical standpoint or a biological, neurological standpoint. But then there is a spiritual piece to this, where there are traditions that recognize that just because someone is a baby doesn't mean that they don't have wisdom or that they're not an old soul, or that they're not an ancestor returned." - Cassandra, Licensed Marriage and Family Therapist.

Relationship Between Maternal Health and Infant Health and Wellness

While several participants expressed a lack of clarity regarding how to define infant mental health, all acknowledged that the environment impacts infant health and wellness, including the effects of health of the pregnant or postpartum person-including mental health-on the attachment, bonding, development, and mental health of an infant, as stated:

> "What comes to mind, to me right away, is: What was going on while they were in the womb? And what was happening to their mom's body before she even conceived? What was being held up in her body, that is just going to pass right on to her little baby? So that's where infant mental health starts, not when [the infant is] born." - Yvette, Birth and Postpartum Doula.

> "Infant mental health is a conversation I feel like that should couple maternal health as well, because mothers need to know how their mental health stressors and the stressors of the environment may play a role in how that child develops in many different ways." - Monica, Perinatal Social Worker.

One practitioner emphasized how the mental health of a pregnant or postpartum person extends beyond the home to impact the community.

> "That whole thing is cyclical. If mama, parent's mental health isn't intact, that's going to have a manifestation into the children. That's going to have a manifestation into the community, that's full circle." – Tayler, Certified Breastfeeding Specialist and Parenting Support Coach.

However, several participants expressed concerns about the blame and shame that Black mothers and birthing people

experience related to perceptions about their parenting and the impact it has on the family dynamic, as stated by a licensed marriage and family therapist:

> "If that mother doesn't recognize early enough, well, one, if she's not valued. If she's not valued, if she's not centered, or if her needs aren't met, they may try to meet the needs of this child, and they may find it difficult to do so, and that can lead to worth feelings and feelings of hopelessness. But more than that, if they don't see this as a co-created relationship where I can impact this child, I have an impact. See, this is the thing about power, if I'm disempowering this mother in the doctor's office, I'm disempowering this birthing person, then when they go home, how are they supposed to feel empowered about the relationship they're establishing with this child? How isolating can that be for both?" Cassandra, Licensed Marriage, and Family Therapist.

> "So, at the same time with this research, a lot of it makes me sick to my stomach when reading the literature out there on infant mental health. A lot of it is mom shaming, mom blaming, fetal programming, the infant experience is destiny. You'll read articles on maternal depression and obesity, and maternal depression and offspring suicide. Like, 'Well, it was all her fault.' So, there's a lot of work to be done there." - Alesia, Health Disparities Researcher.

Similarly, one practitioner emphasized how Black mothers are central to Black family structures and described the added stressors that Black women experience in parenting with a mental health condition:

> "The Black mom is the one that's making sure everything is going and happening and moving and shaking. And pretty much the Black mom could be dripping blood and people are still like, are we going to eat? Can I get my medicine? I want to talk to you about my bad day at work. And I also want you to still be emotionally available for the meddling mother-in-law and all that stuff. Not getting treatment for maternal mental health, it can really break down the Black family, because of Black family is really relying on that Black mom to advance the family and keep a lot of things going. Whereas, I see with my white moms, they're just 'I'm crying',
> 'I'm sad' and people need to get it together." - Annette, Licensed Clinical Professional Counselor.

> "So, one of my favorite questions that I ask all the parents that I work with is like, 'How are you feeling about parenthood these days?' And that's just the opening question. It allows them the space to say like, 'I don't know what the heck I'm doing. This baby crys all the time. I don't know the expectations that this kid have on me.' So, I allow them to vent, and then I say, 'Okay, what are you able to do right now? Are you able to just play with that kid when they doing tummy time? Do you sing? Do you like to sing?' And I had one mom, she loved to sing, and she thought she couldn't sing to the child. I was like, Sing your gospel songs. Sing to the child. That's a connection, because the baby'll probably start singing back with you. And just helping parents use their strengths to connect with the child. You don't have to be this Instagram, Pinterest-worthy whatever. Use your strength. If you like to build, get some LEGOs for the kid, even if it's a baby. Just like, 'Hey, look at this. It's yellow. It's red.' Use your strengths to connect with the child so it feels accessible. They don't have to do anything extra. They're using what they already have. And so I turn it to that way. 'What do you already have in your house? I'm not saying you got to build something or spend money. Let's use what you already have to connect with the baby. The baby don't care. The baby just wants to spend time with you. The baby just wants to learn from you.' And just breaking it down that way so they feel like they do have the skills that they need to connect with their child." -Morgan, Licensed Mental Health Therapist.

Suggested Practical Interventions for Health Services and Healthcare Providers

Participants emphasized that Black mothers and birthing people should be prioritized, centered, and valued in the hospital setting and at home to provide a nurturing environment for their children.

> "So, I mean, it just shows you that all of this is happening in the womb while they're *in utero*. And so, that's why you want so much for a mom to be mentally well even in those preconception years so that, baby can be well. - Yvette, Birth and Postpartum Doula.

Several participants described the importance of examining root causes, and identifying social and structural factors that impact the experiences and care of Black pregnant and postpartum people and their families.

> "It's how we automatically believe folks are inadequate and disposable. It's so deeply rooted in our society."
> - Tayler, Certified Breastfeeding Specialist and Parenting Support Coach.

> "Diversifying [the workforce] is one thing, but the reality is, we've all been socialized to uphold harm and oppression. That cultivation and socialization, even a lot of birthworkers who got training from white-led organizations, there's a lot of work that has to be done to decolonize and deconstruct how they have been taught. Same thing within the social sector within mental health and therapist, where literally your licensing is depending on you being harmful, toxic and oppressive and not knowing because you're so deeply rooted to that…Dr. Dorothy Roberts does a phenomenal job of looking at the connection to Child Protective Services (CPS) and it's connection to taking away families. How do you defund the systems that are connected to incarceration, that are connected to hyper-policing? It's not just the diversifying piece, we also have to have folks who are accountable and who have gone through the training and understanding."
> - Tayler, Certified Breastfeeding Specialist and Parenting Support Coach.

> "There's this overuse of being trauma-informed. How are you trauma-informed and healed but just knowing that people have trauma, but not acknowledging where that trauma has come from and the root causes of that trauma? How can you still cast blame on individuals and not systems?" - Tayler, Certified Breastfeeding Specialist and Parenting Support Coach.

It was theorized by one practitioner that teaching all parents the signs and symptoms of mental distress and lack of maternal-infant bonding, and also equipping them with resources would help mitigate the lack of attachment and bonding for

parents who are faced with maternal or perinatal mental health issues:

> "I think if you are working with mothers and birthing people and helping them understand how to self-regulate their own emotions, they will be more capable and more responsive to respond to this infant's needs, because if you're working on your anxiety and you notice, okay, well, this is what I do when I get anxious so let me take some deep breaths, then when the baby comes and there's a whole bunch of stuff happening, and you feel anxious, you respond to yourself in a healthy way, and you take a deep breath, and the children learn that the infants see that. You're not going to be perfect, but you're going to teach resilience to an infant." - Yolanda, Licensed Clinical Psychologist.

Additionally, postpartum doulas and traditional healing practices were presented as potential solutions to support parents nurture healthy infant mental health by centering birthing people's healing postpartum:

> "I think another resource that will be great, and then this goes back to the healthcare and health systems is having... If someone can't afford to have a postpartum doula come in and helping if you don't have family around. There are some insurances that will pay for a visiting nurse. But you usually get like one visit, but what if that was part of health care that you were provided with like that after care, that you had someone that was able to come in and again, do all the things so that you could really just be in that restful period, we talk about the 40 days. And those African traditions of mom is literally just in her bed, and everyone is bringing food to her, warming foods to her so that her body can heal, so that she can feed her baby and be able to love on her baby, without the mundane tasks of life." - Yvette, Birth and Postpartum Doula.

Above all, all practitioners and participants identified addressing maternal mental health care as the number one solution to mitigate infant mental health distress and disorders. "In line with a focus on centering Black mothers and birthing people, practitioners identified five pathways to improve and access to equitable and antiracist mental health care".

Pathways Toward Equitable and Antiracist Maternal and Infant Mental Health Care

The five key pathways identified are (a) educating and training practitioners, (b) investing in Black women mental health workforce, (c) investing in Black women-led community-based organizations, (d) valuing, honoring, and investing in the community and, (e) promoting integrated care and shared decision making.

Practitioners emphasized these five pathways would equip both practitioners and Black mothers and birthing people with skills to adequately address social and structural challenges faced by the birthing woman or person, such as racism, medical mistrust, and race-based treatment plans. The impact of racism on the mental health workforce and access to pathways to mental health careers was an identified barrier. Racism was identified as the underlying cause of Black maternal health inequities, as Black women are underrepresented in the perinatal mental health workforce and among clients receiving mental health treatment. Additionally, to identify structural and social determinants of health areas of education and training, practitioners noted that mental health professionals training should address trauma across a life course, including during pregnancy and the postpartum periods. Practitioners also expressed the importance of services that are informed by cultural humility and holistic care. Holistic care was described to encompass dignity, bodily autonomy, respect, humanity, and empathic care. Creating safe spaces, appropriate client referrals, and dismantling a provider-patient power dynamic were identified as essential solutions and strategies for trust-building and responding to client's needs.

In providing culturally congruent care, practitioners noted that the mental health workforce needs acceptable and accessible decolonized practitioners, who are transparent about historical trauma, relations and their own professional and institutional impact on the population being served (10). Stakeholders indicated that their clients wanted to receive care from providers who looked like them and could relate to their lives. Cultural congruence enables patients to trust their provider's shared lived experience and allows the provider to pinpoint the important elements of the client's experience in life for better diagnosis and treatment. For this, stakeholders emphasized the importance of investing in Black women mental health professionals, including birth workers, social workers, psychologists, and therapists. In addition to investing in culturally congruent practitioners of the next generation, stakeholders also emphasized the importance of investing in Black-women-led organizations that serve Black communities. Practitioners identified that funding should be prioritized for those organizations that commit to advancing Black maternal health for their infrastructure and capacity-building. This shift in funding allocation would allow organizations to meet the needs of their communities.

Several practitioners described the need for both workers to improve Black women's experiences in seeking and receiving maternal and maternal mental health services in disjointed health care settings. Black women and birthing people successfully navigate the mental health care systems by having advocates such as doulas and midwives. Practitioners emphasized the need to strengthen mental health care providers, advocates, and birth worker's partnerships for more accessible health care services and shared decision making. These five pathways emphasize the importance of investing in equitable and antiracist maternal health care to to optimize infant health and wellness.

DISCUSSION

The results from this research are grounded in the belief that pregnant and parenting people's rights, safety, and dignity are deeply tied to the wellbeing of infants and children. The objective is to continue an interdisciplinary dialogue around the ways in which reproductive injustices harm infant mental health and to encourage further consideration of what this means for infant mental health clinical practices. Investing in maternal mental health could have a transformative impact on infant mental health as it emphasizes the importance of the

intersecting oppressions that shape the lives and wellbeing of infants for the rest of their lives. The results further suggest that clinicians should consider collective dialogue, organizing, and action between a multidisciplinary stakeholder group of maternal mental health and infant mental health practitioners, researchers, and individuals with lived experience.

Participants noted the importance of dismantling the false premise that Black women and birthing people are solely responsible and should bear the burden of adverse infant health outcomes and experiences. Social justice frameworks that situate inequities within social and structural systems of care help to reframe the narrative about how we collectively address maternal and infant mental health inequities.

Implications

Using Reproductive Justice and birth equity as theoretical frameworks and praxis to address perinatal mental health and wellness leads to a broadening of the scope of awareness, practice, and intervention for equitable antiracist mental healthcare for Black mothers, birthing people, and their families. To further unravel the complex challenges of Reproductive Justice and maternal mental health in infant mental health, case studies and cross-cultural comparative studies should be employed. Case studies in infant mental health would serve as a method to increase awareness and identify and address injustices and trauma. While cross-cultural studies would continue to direct the trajectory of developing services (14), including the lived experience of those most affected by trauma, gender oppression, sexism, and racism to be involved in program development and evaluation of the impact of services received, assures understanding and improvement of future practice (15, 16).

Five key pathways generated from this analysis included: (a) Educating and training practitioners, (b) Investing in Black women mental health workforce, (c) Investing in Black women-led community-based organizations, (d) Valuing, honoring, and investing in the community and, (e) Promoting integrated care and shared decision making. The five key pathways identified by Black women mental health stakeholders present key areas of focus to address barriers that impede access to maternal mental health care, but also strengthen community-systems of care and strategies that Black women and birthing people adopt to meet their mental health needs. Educating and training practitioners in how systems of oppression (e.g., racism, gender oppression, and classism) impact pregnant and postpartum people's perinatal experiences position them to be more effective in meeting their client's needs. Participants noted that Black women and birthing people often neglect their own needs to prioritize the needs of their families. These are the same systems that mental health practitioners are indoctrinated into which perpetuates the devaluation of Black women and Black bodies. Black women and birthing people want and deserve to see themselves reflected in the practitioners that care for them. Relatedly, Black women and birthing people are best equipped to fill in gaps that exist within their communities to prioritize healthy and fulfilling perinatal experiences. Sustainable investments in Black women mental health workforce and Black women-led community-based organizations is critical. Traditional healing practices and approaches that support community cohesion are foundational to effective strategies for improved health and wellness for Black people. Postpartum doulas were referenced as components of potential solutions to provide support during a period in which many women and birthing people are vulnerable to developing or exacerbating a mental health condition. Lastly, the fractures in health care systems create barriers for accessing care and lack of shared decision making disempowers birthing people from fully and authentically actualizing their needs and desires.

Limitations

This study had several limitations. First, the bulk of the interview questions in the facilitators guide focused on maternal mental health, consequently we obtained less insight and resolution specific to infant mental health. Second, the pathways identified centered Black mothers, not capturing the specific needs of non-binary Black birthing populations. Third, the practitioners interviewed identified as cisgender Black women, with a majority of their population served identifying as cisgender Black women, despite recruitment for participants that provided care to Black mothers and birthing people. Lastly, limitations occurred during the recruitment process and strategy. The bulk of our recruitment was based on personal reference, and meeting criteria.

CONCLUSION

Instituting education on healthy and culturally appropriate ways to support infant development in parent education programs may support Black parents in establishing healthy attachment and bonds. Prioritizing strategies to improve maternal mental health and centering Black parents in the development of these educational parenting programs may optimize parenting experiences and infant's health, development, and wellness.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because our IRB does not allow for data sharing with external researchers. Requests to access the datasets should be directed to IM, imorgan@birthequity.org.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board of the Institute for Women and Ethnic Studies. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

IM, TE, and KM conceived the idea for the study and conceptualized the pathways from the data of the key stakeholders. KM facilitated interviews with TE or IM present to take notes for each interview. TE and IM were responsible for conducting a rapid and in-depth analysis of the raw data from the interviews. TE drafted the manuscript. IM, KD, and JC revised the manuscript for important intellectual content. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

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Prevalence and Risk Factors Associated With Postpartum Depressive Symptoms Among Women in Vientiane Capital, Lao PDR

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Postpartum depression (PPD), the onset of depressive episodes after childbirth, is the most common psychological condition following childbirth, and a global public health concern. If undiagnosed and/or untreated, postpartum depression can have negative effects on maternal and child health, however, there are few studies on the prevalence of postpartum depression in low- and middle-income countries. To contribute to filling this gap, this study examined the prevalence and risk factors associated with postpartum depressive symptoms among women after delivery in Vientiane Capital, Lao PDR. The study was a cross-sectional design, with multistage sampling used to identify women between 4 and 24 weeks after giving birth ($N = 521$). The Edinburgh Postnatal Depression Scale was used to identify women with postpartum depressive symptoms. Univariate and multivariate logistic regressions identified risk factors associated with postpartum depressive symptoms. The prevalence of postpartum depressive symptoms among participants was 21.3%. Associated factors were having at least 2–3 living children (AOR: 1.9, 95% CI: 1.1–3.0), experiencing mental health problems during pregnancy (AOR: 3.3, 95% CI: 1.4–7.6), experiencing conflicts with family members (AOR: 2.5, 95% CI: 1.5–4.0), the experience of intimate partner violence (AOR: 2.6, 95% CI: 1.3–5.5), and receiving moderate social support (AOR: 5.6, 95% CI: 3.2–10.0). In contexts where access to mental health specialists has severely constrained maternal and child healthcare providers at primary health care must be supported to develop the necessary skills to identify risk factors and symptoms and offer basic essential services for postpartum depressive symptom (PDS). The study identified a high proportion of mothers with postnatal depressive symptoms, highlighting the need to screen and treat mothers who present with PDS, as not doing so exposes mother and their children to a range of negative health and social outcomes. Addressing the stigma associated with mental health illness and mental health illness and domestic violence that prevents women from seeking healthcare, must also be developed, implemented, and evaluated.

Keywords: prevalence, risk factors, postpartum depressive symptoms, Edinburgh Postnatal Depression Scale (EDPS), low-income country, Lao PDR

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INTRODUCTION

Postpartum depression (PPD), the onset of depressive episodes after childbirth, is the most common psychological condition following childbirth, and a global public health concern (1, 2). A recent review of 565 studies from 80 different countries or regions, estimated the global prevalence of PPD to be 17.22% (95% CI 16.00–18.51) (1). This estimate is higher than the often-cited prevalence rate of 13% (95% CI: 12.3–13.4%), derived from a meta-analysis of studies from higher-income countries (3), and lower than the 19% prevalence rate for PPD obtained from studies of low- and middle-income countries (4). The review also found significant differences between geographic regions and confirmed low- and lower-middle-income countries carry the greatest PPD burden (1). Within Asia, the study found that Southern Asia had the highest prevalence (22.32, 95% CI 18.48–26.70), followed by Western Asia (19.83, 95% CI 17.33–22.58), Eastern Asia (17.39, 95% CI 16.09–18.77), and South-East Asia (13.53, 95% CI 11.00–16.52) (1).

Postpartum depressive symptoms (PDS) may occur at any time up to a year after childbirth, often peaking 4–6 weeks postpartum and disappearing spontaneously 2–6 months after giving birth but can last longer (5). Symptoms can include sadness, nausea, anxiety, irritability, decreased libido, feelings of isolation, and disturbances in appetite, energy, and sleep (1, 6). Thoughts of hurting oneself and/or the infant, are also common symptoms of PPD, which can have negative impacts on family relationships (7–9). Negative long-term consequences to the infant can include delayed cognitive, social, emotional, and physical development with potentially long-term effects (10–14). PDS, however, are often overlooked, resulting in late diagnosis and increased chances of aggravating PPD.

A variety of factors, including demographic (4, 15, 16), obstetric (17), and environmental factors (18) and it is a complex interplay of these factors that create vulnerability to PPD. Socio-demographic factors associated with PPD include younger age of mothers (4, 15), low education (17), unemployment (19), low income (17, 20, 21), and previous experiences of mental health disorders (20, 22, 23). Obstetric risk factors include complications during labor, or immediately postpartum, such as obstetric hemorrhage (24), unplanned pregnancies (24), and having two or more children (25). The evidence related to a number of children and PPD, however, is mixed, and it is unlikely to be an independent factor for developing PPD. Regarding the social environment, poor social support including emotional support and empathetic relations with family and community members (26) and experience of violence (27) is associated with an increased risk of PPD.

Cultural and family factors may be risk or protective factors for PDD. Family support including from mothers and mothers-in-law where the support provided meets the needs and expectations of the mother can be protective (28). Family and social support can however be a source of conflict, especially where there are differences in thinking and parenting concepts between older and mothers of more influential family members (28). In some countries, women are expected to go through a period of confinement postpartum, usually for a period of about 4 weeks during which there are often behavioral and dietary restrictions (29). In Southeast Asia, after giving birth mothers may rest for up to 1 month on a "hot bed" –a bed with a fire lit beneath it, which is thought to strengthen the health and accelerate the contraction of the uterus of a woman. During this time care is often provided by female relatives including mothers or mothers-in-law, often including the preparation of special foods and herbal tonics (29). This increased support temporarily changes the mother's role from caregiver to one who is cared for (30). The extent to which cultural practices in different countries are associated with PDD, however, is not well understood, with evidence on the role of confinement practices complicated by the heterogeneity of these practices (1, 30, 31). These cultural practices are also dynamic and influenced by factors such as changing economic systems, industrialization, globalization, and immigration (30).

Despite concern about PPD, an understanding of its prevalence in the Lao PDR, a lower-middle-income in South-East Asia, with few mental health services, is scant. A 2018 report on psychiatric services revealed there were 2,421 patients with a mental health condition, of which around 10% (240 cases) were diagnosed with depression, of whom 64% were women. The number of women with PPD specifically however was not reported (32). The reported number of cases is also likely to be significantly lower than the true number of people experiencing mental health disorders due to low awareness of mental health disorders, low health-seeking behaviors, stigma related to mental health disorders, and few mental health specialists or services in the country (32). There are, for example, only two hospitals in Lao PDR, both in the capital city of Vientiane, that have psychiatry departments, but neither of these departments has psychiatric specialists (32). The only available information on PDD comes from an unpublished study in 2017 conducted among women 6 weeks after giving birth in Odoumxay Province which indicated a prevalence of 15.2% PPD (21). To build on this work, this study was conducted to determine the prevalence and risk factors associated with PPD among women in Vientiane Capital, Lao PDR.

MATERIALS

This study was an analytical, cross-sectional, quantitative design, conducted among 48 communities in urban and peri-urban areas within Vientiane Capital. The Capital consists of nine districts, only three of which are entirely urban. A total of 77.9% of the population live in these urban districts, among whom are 22 births and 4.9 deaths per 1,000 population (33).

Study Participants

The inclusion criteria for participants were mothers between 4- and 24-weeks postpartum and living in the selected communities at the time of the study. The sample size was calculated based on a single population formula, corresponding to a 95% confidence level at $Z = 1.96$, and an estimated prevalence of PDS from previous research of 15% ($p = 0.15$) (21). The absolute precision was $d = 0.04$, with 1.7 allowed for the design effect and 5% for the non-response rate, producing a sample size of 540 mothers.

Multistage sampling was used to identify potential participants and maximize opportunities to recruit women from different socio-demographic backgrounds. One urban (Sisattanak) and one peri-urban district (Hadsayfong) within Vientiane Capital were selected using simple random sampling. Simple random sampling was then applied to select villages in each district, with 18 villages selected from the Sisattanak district and 30 from the Hadsayfong district. A total of 260 mothers from the Sisattanak district and 261 mothers from the Hadsayfong district were enrolled in the survey, with all interviews being completed within 1 month.

Measurement of Variables

The independent variables consisted of socio-demographic characteristics, obstetric, pregnancy and pediatric health factors, and family relationship factors. Socio-demographic variables included maternal age, level of education, occupation, ethnicity, religion, marital status, and self-reported household financial status. The obstetric, pregnancy, and pediatric health variables included number of pregnancies, number of deliveries, number of abortions, number of living children, history of stillbirths, pregnancy planning, number of antenatal care visits, complications during pregnancy, complications during the postpartum period, mental health problems during pregnancy, mode of delivery, gestational age of birth, infant feeding, and newborn health status. Family relationship factors included living arrangements, conflicts with family members, social support, and intimate partner violence (IPV).

Perceived social support was measured by the Multidimensional Scale of Perceived Social Support (34). The scale consists of 12 questions, each with a 7-point Likert scale and questions related to family, friends, and significant other support. The overall average score for social support was determined as follows: <3 is low, 3–5 is moderate and > 5 is high social support (34). The Women Abuse Screening Tool (WAST) was used to assess IPV. The WAST includes 8 items, each scoring 1 for never or none, 2 for sometimes, and 3 for a lot or often. Total scores range from 08 to 24, with the recommended cut-off of 13 applied to indicate the presence of abuse (35).

The dependent variable was the occurrence of PPD derived using the Edinburgh Postpartum Depression Scale (EPDS). The EPDS is the most common measure used to screen for depression related to childbearing (1), it is not, however, a clinical diagnostic tool and should be complemented with clinical assessment. The EPDS consists of ten questions each with four choices, scoring 0, 1, 2, and 3 for questions 1, 2, and 4, and reverse scoring 3, 2, 1, and 0 for questions 3, 5–10. The total scores range from 0 to 30, with respondents scoring $\geq$ 10 considered as having depressive symptoms (36).

Statistical Analysis

This study used EpiData to enter the data and Stata 14 for analysis. Descriptive statistics were applied to analyze the frequency and percentage of the independent and outcome variables. Tests for significance were undertaken using univariate analysis, and the results of these with a $p < 0.2$ were included in the multivariate logistic regression. A backward stepwise selection was applied with the level of significance for variables to remain in the final model set at $p < 0.05$, a 95% confidence interval for estimating the precision of the odds ratio, and the respective variables with significant associations.

Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of the University of Health Sciences in Lao PDR (No 190/19), and the Ethical Review Board for Biomedical Research, Hanoi University of Public Health (No: 431/2019/YTCC-HD3). The research objectives, methodology, and potential risks were made known to each respondent and written consent was obtained before the interview. Participants were free to withdraw from the study at any time. To respect the confidentiality of participants, the names of respondents were not included in any results, and the data was securely maintained.

RESULTS

Socio-Demographic Profile of Participants

A total of 521 postpartum mothers completed the survey (50.1% from the peri-urban district and (49.9% from the urban district. Just over half of the participants (53.7%) were aged 21 to 30 years, with a mean age of 27.5 (SD = 5.8). Most participants (97.7%) were married, and over half (58.8%) were unemployed at the time of the study (**Table 1**).

Obstetric, Pregnancy, and Pediatric Health Factors

Around half of the participants (51.4%) had two-three living children. The minimum number of children was one and a maximum of six. A total of 56.3% of the participating mothers were between 13 and 24 weeks after childbirth when interviewed. Over half (54.1%) had planned their last pregnancy, 6% reported mental health problems during their last pregnancy, and most (80.4%) reported a normal vaginal delivery. Almost all (94%) had healthy babies, 9% had a preterm birth ($\leq$36 weeks), and 55% exclusively breastfed their babies.

Mothers' Relationships With Family Members

Nearly 40% of mothers reported sometimes having conflicts with family members. Over half (56.1%), reported receiving moderate social support, and just under 9% had experienced IPV (**Table 2**).

Prevalence of Postpartum Depressive Symptoms

Among the 521 mothers, 111 (21.3%) met the criteria of PDS as measured by an EPDS score of $\geq$10 (**Table 3**).

Risk Factors Associated With Postpartum Depressive Symptoms

The 18 independent variables that had a $p < 0.2$ in the univariate analysis—level of education, ethnicity, religion, financial status, planning of last pregnancy, number of antenatal care visits in recent pregnancy, complications during last pregnancy, mental health problems during last pregnancy, mode of delivery, number

TABLE 1 | Socio-demographic-economic profiles of the participants.

Characteristics (*n*: 521)	Frequency	Percentage
District		
Sisattanak (urban)	260	49.9
Hadsayfong (peri-urban)	261	50.1
Maternal age (Mean 27.5 years, SD 5.8 years, Min: 16, Max: 42)		
16–20	78	15
> 20–30	280	53.7
> 30–35	116	22.3
36–42	47	9
Level of education		
Never been in school/Primary school	128	24.6
Lower/ Upper secondary school	217	41.7
Vocational/Higher vocational certificate/Bachelor's degree or higher	176	33.7
Occupation		
Employed	215	41.2
Unemployed	306	58.8
Ethnicity		
Lao-Tai	443	85.2
Other ethnicity	78	14.8
Religion		
Buddhism	440	84.4
Other religion	81	15.6
Marital status		
Married	509	97.7
Other (single/divorced/separated/widow)	12	2.3
Financial status		
Enough with savings	198	38
Enough without savings	215	41.3
Not enough	108	20.7

TABLE 2 | Family relationship characteristics of participants.

Family relationship factors	Frequency	Percentage
Living arrangement		
Living apart from family of birth/in-laws	219	42.0
Living with family of birth	202	38.8
Living with family-in-law	100	19.2
Conflicts with family members		
Never	295	56.6
Sometimes	208	39.9
Often	18	3.5
Social support (Min: 3, Max: 6.83)		
High support (6–max)	229	43.9
Moderate support (3–5)	292	56.1
Low support (min−2.9)	0	0
Intimate partner violence WAST score (Min: 12, Max: 24)		
Non-present IPV < 13	477	91.5
Present IPV ≥ 13	44	8.5

of pregnancies, number of deliveries, number of abortions, number of living children, gestational age of birth, conflict with family members, living arrangement, intimate partner violence, and social support—were entered into the multivariate analysis. The variables significantly associated with depressive symptoms in the multivariate logistic regression were mothers who had 2–3 living children (AOR: 1.9, 95% CI: 1.1–3.0), mothers who had mental health problems during pregnancy (AOR: 3.3, 95% CI: 1.4–7.6), mothers who experienced family conflicts (AOR: 2.5, 95% CI: 1.5–4.0), women who received moderate social support (AOR: 5.6, 95% CI: 3.2–10.0), and women who had experienced IPV (AOR: 2.6, 95% CI: 1.3–5.5) (**Table 4**).

TABLE 3 | Prevalence of postpartum depressive symptoms.

	EPDS score < 10		EPDS scores ≥ 10	
	Frequency	Percentage	Frequency	Percentage
Postpartum depressive symptoms in two districts	410	78.7	111	21.3
Sisattanak district	202	77.7	58	22.3
Hadsayfong district	208	79.7	53	20.3

DISCUSSION

This study investigated the prevalence of PDS and associated risk factors among women in Vientiane Capital, Lao PDR. The study revealed that around one-fifth of participants had depressive symptoms during the postpartum period as measured by the EPDS. This figure is higher than that found in Odoumxay in the north of Lao PDR (15.2%) (21) and findings from neighboring Thailand where the prevalence of PPD was reported to be 8.4% (37). These differences may be due to differences in study designs (e.g., sample size, parity, socio-economic class), and in outcome measurement (e.g., screening questionnaires used and the timing). The study in northern Lao PDR, for example was conducted among women from 1 to 6 weeks after delivery, whereas the sample in this study was postpartum mothers between 4 and 24 weeks. The study in Thailand used an EPDS score of ≥ 13 as an indicator of having depressive symptoms, whereas in the present study we applied a score ≥ 10 (36). The prevalence of PPS in the present study is however comparable to a study in rural Bangladesh (22%) (38), studies in South Asia (39–41), although higher the those reported for South-East Asia reported in Wang et al. (1) global review (13.53, 95% CI 11.00–16.52) and in higher-income countries. Consistent with studies in higher-income countries and within Asia, postnatal depression was associated with antenatal experiences of poor mental health, family and marital disharmony, exposure to IPV, and not enough social support from partners, families, and friends (39–43). Having 2–3 living children was also associated with PDS which may be due to women with more children having many activities and financial concerns. This finding is contradicted in other research, however, including China (44) and Vietnam (45), and number of children may not be an independent factor for developing PDS and warrants further research.

TABLE 4 | Risk factors associated with PDS among participants.

Variables	EPDS < 10 F (%)	EPDS ≥ 10 F (%)	COR (95% CI)	*p*-value	AOR (95% CI)	*P*-value
Number of living children						
1 child	203 (83.5)	40 (16.5)	1		1	
2–3 children	200 (74.6)	68 (25.4)	1.7 (1.1–2.6)	0.014	1.9 (1.1–3.0)	0.009*
4–6 children	7 (70)	3 (30)	2.2 (0.5–8.7)	0.2	2.6 (0.5–12.1)	0.2
Mental health problems during pregnancy						
No	395 (80.9)	95 (19.4)	1		1	
Yes	15 (48.4)	16 (51.6)	4.4 (2.2–9.2)	0.000	3.3 (1.4–7.6)	0.005*
Conflicts with family members						
Never	152 (85.2)	43 (28.8)	1		1	
Sometimes/Often	158 (69.9)	68 (30.1)	2.5 (1.6–3.8)	0.000	2.5 (1.5–4.0)	0.000*
Social support						
High social support	212 (92.6)	17 (7.4)	1		1	
Moderate social support	198 (67.8)	94 (32.2)	5.9 (3.4–10.2)	0.000	5.6 (3.2–10)	0.000*
IPV						
Non-present IPV	389 (81.5)	88 (18.5)			1	
Present IPV	21 (47.7)	23 (52.3)	4.8 (2.5–9.1)	0.000	2.6 (1.3–5.5)	0.007*

*The symbol * indicates statistically significant values at $p < 0.005$.*

This study indicates mothers who experience mental health problems during pregnancy are more likely to experience PDS. Similar findings have been reported in studies in Vietnam (46), Thailand (47), and South Korea (48). This finding may be due to hormonal imbalance during pregnancy and the postpartum period contributing to a relapse of depression (27). While results are mixed, an increasing body of research suggests PPD with onset proximal to childbirth, is a discrete depressive disorder, highlighting the importance of integrating screening, and mental health support into routine maternal care (49, 50). Integrating mental health into perinatal care requires providers are empowered with the skills necessary for them to offer basic but essential services for PDS, especially in lower- and middle-income countries where there is often very limited access to mental health specialists. Research indicates non-physician primary care providers and midwives, can deliver basic evidence-based interventions for depression occurring in perinatal women in non-specialist settings, as described in the mental health Gap Action Programme Intervention Guide (46–48, 50).

Affirming other studies, lack of social support and experience of frequent conflicts with family members was a risk factors for PDD (26, 51–53). It is possible conflicts occur in societies such as Lao PDR where patriarchal cultural norms are predominant and mothers-in-law may have a significant influence on how the newborn and mother should be taken care of. In countries amid a demographic transition, such as Lao PPDR, there may also be conflicts related to more traditional and more contemporary infant care, such as the feeding of colostrum to the newborn (54). Patriarchal cultural norms may also contribute to IPV, and as elsewhere, IPV was associated with PDS (24, 55) and is likely to be explained by the social, emotional, and physical isolation often felt by women exposed to IPV and the unpredictability of the abuser (55–57). This underlines the need for healthcare providers to include discussion of social support and family context in their consults with perinatal women. Low public awareness and stigma about mental disorders, and availability and acceptability of health services are also salient and symptoms of PDS may go unrecognized or be attributed to non-medical causes (49).

This study has some limitations. The study was conducted in only two districts, one urban and one peri-urban, within Vientiane Capital and cannot be considered representative of all districts in Vientiane Capital. As a cross-sectional study, we could only examine factors associated with PDS and cannot make claims about causality. Further, the EPDS provides an indicator of symptoms and is not a clinical diagnosis of depression, nor has the Lao version of the EPDS version been validated in Lao PDR, although in this study good internal consistency was demonstrated (Cronbach's alpha 0.75). We also recognize the limitation of self-report measures which may be prone to social desirability bias, especially given the stigma associated with mental illness. We also cannot exclude the possibility of recall bias. Also of note, this study was conducted before the onset of the COVID-19 pandemic, and it is possible that since then rates of PDS are higher (58, 59), underscoring the need for early detection and support for those at risk of, or experiencing, PPD.

CONCLUSION

The study identified a high proportion of mothers with postnatal depressive symptoms in a context where there is limited support for mental health disorders. This highlights the need to screen and treat mothers who present with PDS, as not doing so exposes mother and their children to a range of negative health and social outcomes. In contexts where access to mental health specialists has severely constrained maternal and child healthcare providers at primary health care must be supported to develop the necessary skills to identify risk factors and symptoms and offer basic essential services for PDS. Addressing the stigma

associated with mental health illness and domestic violence that prevents women from seeking healthcare, must also be developed, implemented, and evaluated.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Research Ethic Committee of the University of Health Sciences, Lao PDR. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

AX developed the research proposal, designed the instrument, collected data in the field sites analyzed the data, and wrote the draft manuscript. VS, MT, BQ, and JD contributed to the statistical analysis, interpretation of results, and commented and made revisions to previous versions of the manuscript. All authors read and approved the final manuscript.

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REVIEW
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Faith Practices Reduce Perinatal Anxiety and Depression in Muslim Women: A Mixed-Methods Scoping Review

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Higher rates of depression and anxiety are reported among women who belong to racial and ethnic minority groups, contributing to adverse birth outcomes, and remains a taboo topic within the global Muslim community. Non-pharmacological coping mechanisms such as prayer may be employed to reduce perinatal depression and anxiety, however the literature is sparse on the use of this intervention among pregnant Muslim women. Therefore, we aimed to conduct a scoping review examining the use of Muslim faith practices on anxiety and depression in perinatal period. Nine studies were identified that demonstrate that Muslim faith practices reduce perinatal anxiety and depression symptoms. These studies demonstrate that prayers and other faith-based practices, including reciting parts of the Quran, saying a Dua, and listening to audio recordings of prayers are all effective in decreasing anxiety, depression, stress, pain and fear in Muslim women during pregnancy, during childbirth, during an unexpected cesarean section, and when experiencing infant loss. Despite the scoping review's small sample size, findings confirm that incorporation of faith practices effectively reduces perinatal depression and anxiety among Muslim women and should be utilized in clinical settings for non-pharmacological management of perinatal mood disorders.

Keywords: pregnancy, postpartum, mental health, faith, Muslim

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INTRODUCTION

Perinatal mental health disorders are experienced by 10% of pregnant women across the globe (1). Rates of both depression and anxiety are higher among pregnant women who belong to racial and ethnic minority groups, with 17% experiencing depression, and 19% experiencing anxiety, respectively (2). It is well-documented that depression and anxiety during the perinatal period are associated with an increased risk of adverse birth outcomes such as preterm birth and low birth weight, particularly among women from racial minority groups (3, 4). Risks for poor obstetric and neonatal health outcomes in perinatal populations with mental health concerns are exacerbated by "concomitant conditions" including substance use, poverty and domestic violence (5). Despite the significant personal and societal cost of perinatal mood disorders, identification and treatment of perinatal anxiety and depression remain sparse with less than half of women diagnosed with major depression receiving treatment (6).

Muslim women are part of the fastest-growing religious group in the world, with 24%, 1.8 billion people, identifying as Muslim (7). The mental health of Muslim women during the perinatal period is particularly important to address given the pervasive stigma surrounding mental health in this community which creates barriers to treatment (8). Muslim women may also be at increased risk for stress and anxiety during pregnancy by "easily being identified as different from others due to the observance of the hijab" (9). Muslims experience "ongoing discrimination and self-stigma" similar to that seen in other racial, ethnic and religious communities and report lower rates of accessing mental health services (10–12). The social stigma surrounding perinatal mental health in the Muslim community, paired with inequitable access to care, may further health disparities experienced by this community.

Islamic faith practices are impactful in the daily lives of the Muslim community and vary among individuals but are always performed with intention for Allah, the Arabic word for God. Common Islamic faith practices include structured prayers and rituals, reciting the Qur'an, remembrance of Allah referred to as dhikr, and saying a Dua in which individuals request guidance, make a personal appeal or invocation "either on behalf of another or for oneself" (13). In Islam, prayers and faith-based practices are used to help overcome difficult times, including times of pain and fear, and become closer to a higher power (14). While perinatal mental health may remain a taboo topic in the Muslim community, the use of Islamic faith practices to reduce anxiety and depression has been demonstrated in the general population studies and among cancer patients (15, 16). There has also been recent study of the relationship between perceived stress, religious coping and religiosity among migrant Muslim women (9). However, the relationship between Islamic faith practices and perinatal anxiety and depression has not been described to date. Therefore, the purpose of this scoping review was to examine and summarize the efficacy and utility of faith practices on perinatal anxiety and depression in Muslim women during the antenatal and postnatal periods.

MATERIALS AND METHODS

Study Design and Eligibility Criteria

This scoping review utilized Arksey and O'Malley's methodology to systematically review the literature pertinent to this topic (17). Eligibility criteria, databases, inclusion and exclusion criteria were developed with the full study team a priori. Measurement of utilization of Islamic faith practices and perinatal mood disorders including anxiety and depression directed our study design. The research question guiding our study was, "What effect do Islamic faith practices have on anxiety and depression in Muslim women during the perinatal period, including during pregnancy and the postpartum period?" For inclusivity in study design as the first scoping review to date on this emerging topic all published peer-review journal articles written in English were considered for inclusion in our scoping review. Measurement of Islamic faith practices was broad to capture all original research studies that focused on activities including both active and passive exposure to Qur'an recitation. Measurement of perinatal mood disorders included both formal assessment of anxiety or depression during pregnancy and postpartum via scale measures as well as self-report data.

Databases utilized for this scoping review included PubMed, and each of the five EBSCOhost databases: CINAHL Complete, Academic Search Complete, APA PsycInfo, Healthsource: Nursing/Academic Edition, and Women's Studies International. Search strategy in PubMed was completed using a combination of the following keywords: (mental health OR mental illness OR mentally ill OR depression OR depressive OR depressed OR anxiety) AND (pregnant OR pregnancy OR perinatal OR antepartum OR prepartum OR antenatal OR antenatally OR prenatal OR prenatally) AND [Muslim(my) OR Muslim(tiab) OR Islam(mh) OR islam (tiab) OR Islamic (tiab) OR Sunni (tiab) OR Shia (tiab) OR Quran (tiab)]. Search strategy in all other databases utilized a combination of the following keywords: (mental health OR mental illness OR mentally ill OR depression OR depressive OR depressed OR anxiety) AND (pregnant OR pregnancy OR perinatal OR antepartum OR prepartum OR antenatal* OR prenatal*) AND [TI (Muslim OR islam* OR Sunni OR Shia OR Quran) OR AB (Muslim OR Islam* OR Sunni OR Shia OR Quran) OR SU (Muslim OR islam* OR Sunni OR Shia OR Quran)]. Database searches were completed from July 2020 to September 2020. All peer-reviewed articles with publication dates through September 2020 were included for examination. The data collection and screening process began with a total of 249 abstracts and resulted in a total of 9 included peer-reviewed articles (**Figure 1**).

Literature Screening

Literature screening began with review of the abstracts, utilizing RAYYAN. Each abstract was reviewed independently by two content experts (NQ, ZKG) for the following inclusion criteria: (1) measurement of Islamic faith practices, (2) measurement of mood disorders, specifically anxiety and/or depression, including use of descriptive behaviors such as "anxious thoughts, worry, rumination, nerves" (3) population of pregnant women up until delivery, (4) original research study in peer-reviewed publication, (5) available in English. Discordant results for abstracts as well as "maybe" articles were reviewed in tandem by two perinatal mental health research scientists (SDS, KMT). For full text review, articles were obtained for all those which met the inclusion criteria. Full text reviews were conducted by SDS and KMT with no disagreements.

RESULTS

Following completion of the scoping review, nine articles were included for synthesis on this research topic. In sum, 6 articles were quantitative in methodology while three were qualitative. The results of this scoping review are organized by methodological approach, first broadly describing quantitative findings followed by qualitative. Among the quantitative studies included in this scoping review, results are discussed in sum based upon the Muslim faith practice utilized as the intervention in the study design.

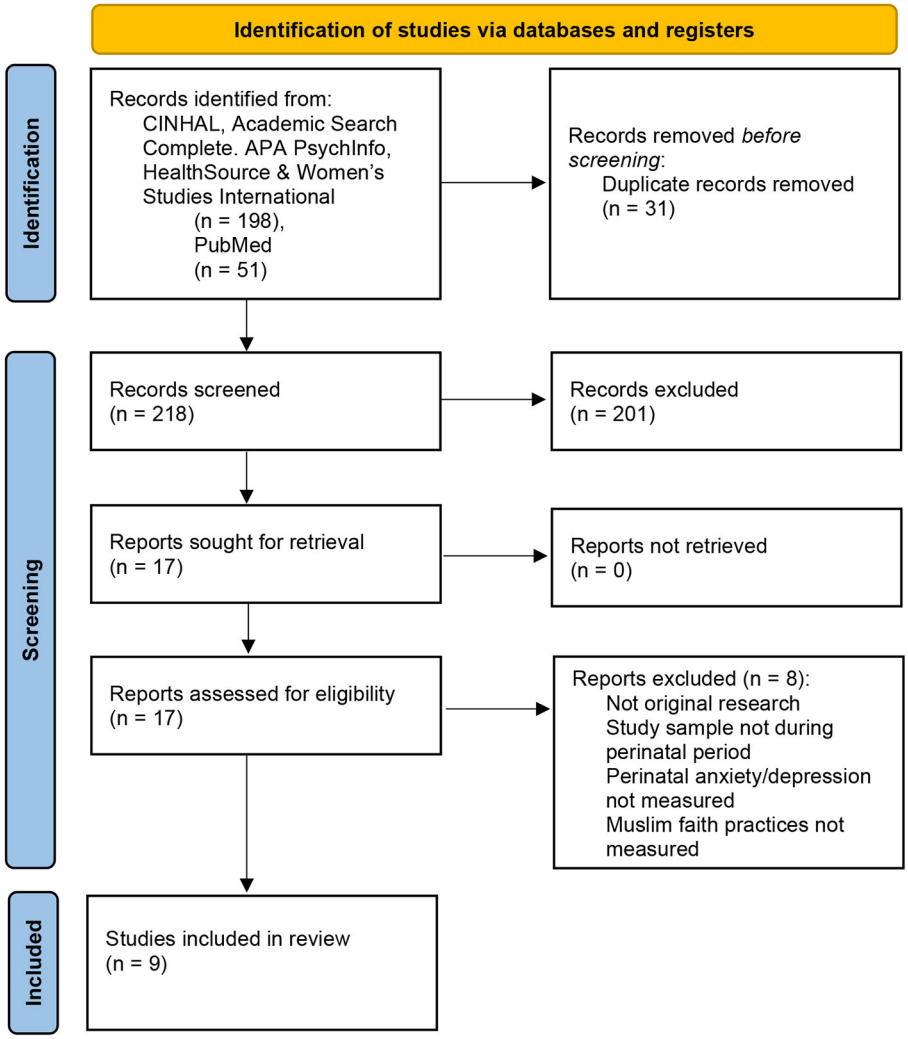

FIGURE 1 | Scoping Review Flowchart PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only. For more information, visit: http://www.prisma-statement.org/ (1).

Quantitative Studies Describing Islamic Faith Practices and Perinatal Mood

Across the six quantitative studies examined in this scoping review examining the relationship between perinatal anxiety and depression and Muslim faith practices as non-pharmacological interventions, four studies were completed in Iran, with the remaining 2 studies conducted in Indonesia from 2016 to 2020 (**Table 1**). All quantitative studies, 5 intervention-based and 1 cross-sectional design, were conducted during pregnancy.

Among the five intervention studies, including randomized control trials and quasi-experimental designs, various interventions were utilized including listening to Qur'an recitation recordings in three studies (19–21), and educational interventions around mindfulness, anxiety and Muslim faith in two studies (22, 23). Timing of interventions included 4 studies during the second and early third trimesters, ranging from 16 weeks gestation to 34 weeks gestation, and one study during the first state of labor (20).

There were various measures of anxiety, depression and stress present among these 6 studies including DASS-21, the Hamilton Anxiety Rating Scale, EPDS, STAI, PSS, the Beck anxiety and depression questionnaire, the Spielberger anxiety scale, and RAS-R. There were no two studies that utilized the same measure of mental health in pregnant women. Among the 5 intervention studies, all utilized pre-test post-test design with two or more measures for mental health throughout pregnancy. Across these 5 peer-reviewed intervention studies, results consistently reported significant reductions in mental health scores from the pre-intervention to post-intervention time points. Hamidiyanti and Pratiwi (19) intervention of listening to Qur'an recitation recordings from 28 to 34 weeks, 3 times a week for 4 weeks found that HARS anxiety scores significantly reduced post-intervention with HARS mean post-intervention

TABLE 1 | Characteristics of quantitative studies.

Author(s), year	Study location	Study design	Sample size	Perinatal mood outcome examined	Type of Muslim faith practice	Timing of intervention	Intervention frequency	Formal measures	Outcomes and effect size
Pakzad et al. (18)	Iran	Cross-sectional	300	Depression, anxiety, stress	Islamic Lifestyle Questionnaire	N/A	No intervention	Islamic lifestyle questionnaire and DASS-21	Significant inverse relationship between DASS-21 mental health scores and Islamic lifestyle questionnaire ($r = -0.31$); mean score of mental health measure decreases 0.09 per unit increase in Islamic lifestyle score.
Hamidiyanti and Pratiw (19)	Indonesia	Non-blind RCT	30	Anxiety	Listening to Qur'an recitation recording	28–34 weeks	15 min, three times per week for 4 consecutive weeks	Hamilton Anxiety Rating Scale (HARS)	Anxiety scores significantly reduced post-intervention. HARS mean post-intervention 12.88 (1.31) in intervention group vs. 15.06 (0.77) in control group ($p < 0.01$)
Irmawati et al. (20)	Indonesia	Quasi-experimental, pre-test post-test	40	Anxiety	Listening to Qur'an recitation recording	During first stage of labor	one time intervention, during labor	anxiety measure, also level of cortisol and time of labor	Friedman-test demonstrates significant reduction in level of anxiety ($p < 0.001$). Level of cortisol and time of labor were also significantly lower ($p < 0.001$).
Jabbari et al. (21)	Iran	RCT	168	Stress, anxiety, depression	Listening to Qur'an recitation recording	Second trimester	20 min sessions over 3 weeks	EPDS, STAI, PSS	After intervention, scores of perceived stress, anxiety and depression were significantly lower in both translation group and non-translation Qur'an group compared to control.
Aslami et al. (22)	Iran	Quasi-experimental, pre-test post-test	75	anxiety, depression	mindfulness protocol based on Islamic-Spiritual Schemes vs. cognitive behavioral therapy	16–32 weeks	8 weeks, maximum 2-hour session per week	Beck anxiety and depression questionnaire	Difference between average mindfulness group and CBT group in anxiety was −12.133 and in depression variable was −10.53 ($p = 0.001$).
Mokhtaryan et al. (23)	Iran	RCT	84	Anxiety	Religious teaching on anxiety	20–28 weeks	6 weekly 60–90 min sessions	Spielberger anxiety scale, RAS-R	Significant different between intervention and control groups both after the intervention and 2 months after the study ($P \leq 0.001$).

12.88 (1.31) in intervention group vs. 15.06 (0.77) in control group ($p < 0.01$). Jabbari et al.'s (21) intervention study of Qur'an recitation recordings during the second trimester, in 20-min sessions over 3 weeks, scores of perceived stress, anxiety and depression were significantly lower in comparison to the control group. In Irmawati et al. (20) intervention study of listening to Qur'an recitation recordings during the first state of labor, Friedman-test demonstrates significant reduction in level of anxiety ($p < 0.001$) with significant reduction in cortisol levels and time of labor as well ($p < 0.001$).

The two educational interventions around mindfulness, anxiety and Muslim faith reported similarly significant results. Aslami et al.'s (22) study of the impact of a "mindfulness protocol based on Islamic-Spiritual Schemes" in comparison to traditional cognitive behavioral therapy exposed pregnant women to 8 weeks of 2-h per week session from 16 to 32 weeks gestation, utilizing the Beck anxiety and depression questionnaire to assess perinatal mood. Study findings demonstrated statistically significant difference between average mindfulness group and CBT group in anxiety was −12.133 and in depression variable was −10.53 ($p = 0.001$). Mokhtaryan et al.'s (23) study of perinatal anxiety focused on religious teaching on anxiety based upon Islamic principles, with pregnant women from 20 to 28 weeks including 6 weekly sessions lasting 60–90 min each, utilizing the Spielberger anxiety scale and RAS-R as formal measures of mental health. Pre-intervention to post-intervention found statistically significant reductions in anxiety both directly after the intervention as well as 2 months after the study ($P \leq 0.001$).

One study included was cross-sectional in nature, with a sample size of 300, in which pregnant women completed the Islamic Lifestyle Questionnaire and DASS-21. Correlation analyses noted that a statistically significant inverse relationship between mental health scores and responses to the Islamic lifestyle questionnaire ($r = -0.31$) with regression analyses demonstrating that a "mean score of mental health measure decreases 0.09 per unit increase in Islamic lifestyle score" (18). This study finding indicates that there may be an overall correlation between lower mental health scores in Muslim women who self-report a higher rate of Islamic faith practices.

Qualitative Studies Describing Islamic Faith Practices and Perinatal Mood

Qualitative results of the scoping review include three original research articles examining the relationship between Muslim faith practices and perinatal mood during the postpartum period (**Table 2**). Mutmainnah et al.'s Indonesian study published in 2019 reported that "doing dhikr and reciting Al Qur'an" were utilized as effective coping mechanisms to reduce perinatal anxiety in pregnant Muslim women, promoting how women felt "calm and peaceful doing so." The remaining two qualitative studies examining Muslim faith practices and perinatal mood were completed with postpartum women who had experienced loss of their child (25, 26). While the two studies were completed in Somaliland and Malaysia, respectively, both studies consistently reported that Muslim faith practices including recitation of the Qur'an and reading Dua reduced perinatal anxiety, fear and worries supporting the women in processing their grief and easing sorrow around loss, noting that "they overcame the hardship by praying to Allah" (25) and "felt calm" during Muslim prayer recitation (26).

DISCUSSION

This scoping review included nine quantitative and qualitative studies which consistently described the utility of faith practices in reducing perinatal anxiety and depression symptoms in a global sample of Muslim women. Specifically, the studies in this review, found overwhelmingly that prayers and other faith-based practices, including but not limited to reciting parts of the Quran, saying a Dua, or just the simple act of listening to prayers on a smart phone, aided in decreasing stress, pain, and fear in Muslim women before and during childbirth, when experiencing perinatal loss, and during an unexpected cesarean section surgery (19, 23).

Prayer, as a healing practice for mood disorders, has been well-documented in many religious groups (Kirk) (27). Literature to date reports the utility of faith-based coping mechanisms in perinatal populations with Lara-Cinisomo and colleagues' work describing religiosity as protective postpartum against depression in Latina women (28). Furthermore, Keefe and colleagues' qualitative examination of the relationship between faith and spirituality among Black and Latina mothers reinforces that faith practices can be a source of peace for postpartum women who have a history of postpartum depression (29). While non-pharmacological coping mechanisms such as prayer have been demonstrated to reduce perinatal depression and anxiety in Christian childbearing individuals, this scoping review is the first known mixed methods publication of the utility and efficacy of faith practices in reducing perinatal mood symptoms among Muslim women.

Research to date highlights the importance of investment in public health interventions paired with additional perinatal mental health services, to reduce mental health related maternal child morbidity and mortality (5). Non-pharmacological interventions that rely upon individuals' existing values and coping mechanisms, such as faith practices, may be one free and effective public health intervention to reduce perinatal anxiety and depression across numerous religious groups. With perinatal mental health disorders rarely being discussed among the Muslim community and other religious groups, healthcare providers can educate patients and their families about the use of faith practices to reduce perinatal anxiety and depression symptoms at the time of screening. This non-pharmacological intervention should be made available to both antenatal and postpartum populations when faced with periods of stress or difficulty, particularly among women uninterested in pharmacological interventions for mental health symptoms.

Increased cultural awareness around faith practices for diverse populations should be included in training for patient-facing members of healthcare organizations and public health systems including obstetricians and gynecologists, certified nurse

TABLE 2 | Characteristics of qualitative studies.

Author(s), year	Study location	Study design	Sample size	Sample characteristics	Outcomes
Mutmainnah and Afiyanti (24)	Indonesia	One-on-one interview, single session	7	Postpartum women, youngest child 2 months to 1 year, age 24–31, self-identified as Muslim	5 of 7 participants reported that doing dhikr and reciting Al Qur'an as a coping mechanism for reducing perinatal anxiety.
Osman et al. (25)	Somaliland	One-on-one interview, single session	10	Postpartum women, within 6 months of birth experienced stillbirth at or after 28 weeks gestation, age 17–43, 5 primipara, 5 multipara	Participants reported Muslim prayer reduced anxiety, fear and worries around stillbirth and child loss.
Sutan and Miskam (26)	Malaysia	Multimethod: One sample completed series of one-on-one interviews, one sample completed a single focus group interview, a third sample completed an in-depth interview within a week following a perinatal loss	16 individual women, 5 women in focus group, 10 sets of parents	Postpartum women, within 6 to 12 months following perinatal loss, as well as couples within a week following a loss.	Religious practices of reciting the Qur'an and reading Dua described as notable aspect of support during grief to ease sorrow of perinatal loss.

midwives, nurses, social workers, public health providers and patient care support staff. Future research should consider testing the utility of audio or visual recordings of prayer, from different global faith traditions, in the reduction of perinatal anxiety and depression symptoms during in-patient hospital stays. Integration of faith practice recordings on hospital televisions would allow bedside clinicians and support staff to make this intervention readily available to those interested and enhance the utilization of this coping mechanism when preparing for birth or experiencing perinatal loss. Discussion of faith practices as public health screenings may increase a sense of community support around this issue, as faith-based multimedia is available for download directly onto individuals' personal mobile devices.

Limitations

Despite the number of strengths in this review, a potential limitation of this scoping review includes the limited number of studies to date, that discuss the correlation between perinatal mood disorders and faith-based practices used by Muslim women. Additionally, most studies included in this review paper take place in primarily Muslim countries. More research is needed to understand perinatal mood disorders in Muslim women who have moved and assimilated in new areas.

CONCLUSION

Consideration of this study's findings should also include creating in-patient hospital environments that are respectful of women and their families during prayer. Supporting the utilization of faith practices in Muslim women, and others, during the intrapartum period may include thoughtfully allowing privacy during prayer, temporary removal of continuous monitoring devices, and asking if patients would like to request religious service support from the hospital directory of faith leaders. Acknowledging to antenatal and postpartum individuals that their faith practices are available to them as a resource and may be helpful in relieving perinatal mood symptoms may create an opportunity building trust and rapport with pregnant patients and their families.

AUTHOR CONTRIBUTIONS

SDS, NQ, and KT conceived and designed the study. NQ and ZK performed the search strategy and abstract review process, with supervision by SDS and KT. SDS, NQ, ZK, and KT wrote the first draft and contributed to the final draft. SDS and NQ wrote the introduction and wrote the methods. SDS wrote the results. SDS, ZK, and KT wrote the discussion. All authors viewed and approved the final version.

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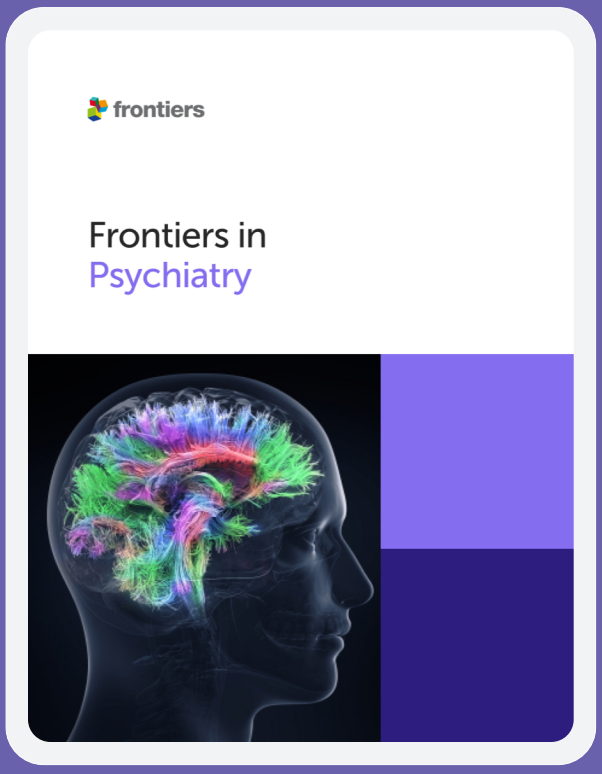

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