

## Examination of a Behavioral Health Initiative for Women Hospitalized Due to Obstetric Risk

Dr. Kimberly Hart, Dr. Emily B.K. Thomas, Dr. Andrea Greiner, Kristen Eastlund NP, Dr. Stacey Pawlak

**Abstract:** The childbearing years represent a period of high risk for mood and anxiety disorders. Pregnancy complications, especially those leading to antepartum hospitalization, increase the risk of mental health concerns. In this quality improvement project, we describe a newly developed behavioral health service designed to increase inpatient antepartum women's access to mental health care. Of the women seen for behavioral health intervention, 29.5% of the women reported elevated symptoms of depression and 47.7% reported elevated symptoms of anxiety. Results represent a call to action to intervene with hospitalized antepartum women with elevated depressive or anxiety symptoms.

**Keywords:** pregnancy; high-risk, hospitalization, depression, anxiety

### Introduction

Maternal mental health conditions are the most common complications of pregnancy and childbirth, affecting 1 in 5, or 800,000 pregnant patients each year in the United States (Maternal Mental Health Leadership Alliance, 2020). Up to 12.7% of pregnant patients experience an episode of Major Depressive Disorder during pregnancy, exceeding 18% if minor depressive episodes are included (Gavin et al., 2005). Antenatal anxiety is also common. A 2019 meta-analysis of 26 studies found that women's risk

---

**Dr. Kimberly Hart** is a Clinical Associate Professor of Psychiatry and member of the Women's Wellness and Counseling Service (WWC) at The University of Iowa Hospitals and Clinics. **Dr. Emily B.K. Thomas** is a Clinical Assistant Professor in the Department of Psychological and Brain Sciences. **Dr. Andrea Greiner** is a Clinical Professor and Vice Chair of Obstetrics in the Department of Obstetrics and Gynecology. **Kristen Eastlund**, ARNP, is a nurse practitioner and hospitalist in the Department of Obstetrics and Gynecology. Directed by **Dr. Stacey Pawlak**, a Clinical Assistant Professor of Psychiatry, WWC provides evidence-based treatments for women experiencing mental health concerns in the perinatal period.

---

of experiencing anxiety during pregnancy is 21.1% (Fawcett et al., 2019). Certain situational factors and stressors increase the risk for antepartum mood issues. Lancaster et al. (2010) conducted a systematic review of research from 1980-2008 and found that maternal anxiety, life stress, history of depression, lack of social support, unintended pregnancy, Medicaid insurance, domestic violence, lower income, lower education, smoking, single relationship status, and poor relationship quality were associated with a greater likelihood of antepartum depressive symptoms in bivariate analyses. Life stress, lack of social support, and domestic violence demonstrated a significant association using multivariate analyses (Lancaster et al., 2010).

Antenatal mental health issues are associated with pregnancy complications and adverse fetal and maternal outcomes. Studies have linked maternal depression and anxiety during pregnancy to preterm delivery (Staneva et al., 2015), decreased birth weight (Uguz et al., 2019), preeclampsia (Kurki et al., 2000), a lower rate of breastfeeding initiation (Ritchie-Ewing et al., 2019), or early cessation (Ystrom, 2012), increased length of labor, greater use of analgesics and decreased Apgar scores (Smorti et al., 2019), and increased NICU admissions (Misri et al., 2004). Grigoriadis et al. (2013) conducted a systematic review and meta-analysis and found that maternal depression is linked to premature delivery and a lower likelihood of breastfeeding initiation.

While mood issues during pregnancy have been associated with maternal and fetal complications, the converse may also be true. A medically high-risk pregnancy may contribute to the onset of exacerbate mood problems. Women with high-risk pregnancies also appear to be at higher risk for developing posttraumatic stress disorder (PTSD; Schlomi Polachek et al., 2015). Pregnancy conditions such as preterm premature rupture of membranes (PPROM), intrauterine growth restriction (IUGR), preeclampsia, complications due to multiple gestation, or placental problems may necessitate antenatal hospitalization, which may stretch from days to months prior to delivery. In addition to concerns about the health of the fetus and self, hospitalized pregnant women may experience negative emotions related to perceived situational loss of control, distance between hospital and home, isolation/loss of access to supports, changes to employment with resulting financial implications, sleep disruption, and boredom (Spehar et al., 2018; Waldron & Asayama, 1985; White & Ritchie, 1984). Treatment of antenatal mood concerns is vital due to potential impacts on maternal and fetal health, especially during hospitalization for high-risk pregnancies.

The literature examining the mental health status of women hospitalized prior to delivery has grown over the last decade, with a

recent meta-analysis reporting that the prevalence of anxiety and depressive symptoms among women hospitalized during pregnancy is twice that of the general obstetric population (Toscano et al., 2021). Moreover, women who experience depression or anxiety symptoms during pregnancy may lack access to mental health care and may be at high risk for adverse outcomes. A 2008 study that used the self-report Edinburgh Postnatal Depression Scale (EPDS) and more rigorous assessment via the Structured Clinical Interview for DSM (SCID) found that 44.2% of pregnant women hospitalized during pregnancy screened positive for depression, and at least 19.4% met criteria for Major Depressive Disorder (Brandon et al., 2008). Additional findings from this study indicated that depressive symptoms were unrelated to the severity of obstetric risk. A 2014 study found similar results (Byatt et al., 2014), highlighting that perinatal mood disorders often go untreated, even during hospitalization. Subjects completed the EPDS and Generalized Anxiety Disorder-7 (GAD-7) weekly until delivery/discharge and once postpartum, with 27% meeting the criteria for depression and 13% for anxiety. Of note, past mental health diagnoses predicted depression and anxiety symptoms at the initial survey, though 21% of the women with increased depression during antenatal hospitalization reported no diagnostic history. Though 77% of the women in the study indicated that they would likely benefit from psychotherapeutic treatment, only 5% received mental health care during their pregnancy (Byatt et al., 2014). The impact of antenatal depression during hospitalization was further investigated in a 2019 study of hospitalized high-risk obstetric patients (Hermon et al., 2019). Among the 279 participants, 28.3% screened positive for depression on the EPDS. Maternal antenatal depression during hospitalization was noted as an independent risk factor for preterm delivery when controlling for maternal age, ethnicity, gestational diabetes mellitus, preeclampsia, past preterm delivery, and gestational age upon admission.

### **Development of a Behavioral Health Intervention**

For women struggling with symptoms of perinatal depression or anxiety, evidence-based treatment options include psychotherapy, medication, or a combination (Cohen, 2006; Pearlstein, 2015; Sockol, 2015; Spinelli et al., 2016; Spinelli & Endicott, 2003). Despite the efficacy associated with psychopharmacotherapy, many women prefer to avoid medication during pregnancy due to concerns about potential fetal impacts (Dimidjian & Goodman, 2014). Existing studies of psychotherapy targeting mood and anxiety symptoms during pregnancy have typically focused on treatment delivered in an outpatient setting.

Studies focusing on intervention during hospitalization have tended to focus on complementary/alternative treatments, such as pet therapy (Lynch et al., 2014), music therapy (Yang et al., 2009), or relaxation/mind-body interventions (Jallo et al., 2017; Kao et al., 2019). To our knowledge, there are no randomized controlled trials examining the efficacy evidence-based psychotherapy for hospitalized women with a high-risk pregnancy. However, a small pilot study investigated the feasibility and acceptability of brief (7-day) acceptance-based therapy for five women hospitalized for PPRM. Tunnell et al. (2019) speculated that acceptance-based treatment would benefit women hospitalized for obstetric risk, as it may help them learn skills to respond flexibly, often with acceptance and compassion, to emotional and physical discomfort, as well as the uncertainty that is inherent in high-risk pregnancy. The authors found that the brief treatment was well-accepted but that attrition was unexpectedly high due to spontaneous delivery. Results on symptom improvement were mixed, given the short-term nature of the intervention, but investigators observed an increase in positive affect post-intervention (Tunnell et al., 2019).

Given the increased risk of depression and anxiety symptoms and the lack of accessible psychological treatments for women hospitalized during pregnancy, a care enhancement initiative was developed and implemented at a major U.S. academic medical center. The initiative was developed by a Department of Psychiatry psychologist employed at the hospital's outpatient perinatal mental health clinic in collaboration with the Department of Obstetrics and Gynecology, which reported over 400 antepartum admissions in 2020. This collaboration aimed to improve care for women coping with distress or experiencing mental health symptoms during antepartum hospitalization.

## Methods

At the time of development, no formal mental health screening protocol was in place in the antepartum unit. Thus, we relied on OB providers to identify and refer women who might benefit from mental health care. Before implementation, the team agreed to focus on women likely to be hospitalized for a prolonged time instead of women admitted for potentially brief monitoring or likely to deliver soon. It was felt that a relatively longer stay would allow for better application of targeted mental health care interventions and increase the potential for improved outcomes.

Women referred to our service were all offered meetings with a provider (opt-in) and were also given the option to decline any aspect of the meeting (opt-out), maximizing patient autonomy. Interpreter

services and questionnaires in their preferred language were available for women who did not speak English but wished to access care. Following referral, women who chose to engage in our service met with the perinatal psychologist, who provided bedside care on the antepartum unit. Care included brief assessment and intervention. The assessment included a semi-structured clinical interview and completion of self-report measures of depressive and anxiety symptoms. The Patient Health Questionnaire –9 (PHQ-9; Kroenke et al., 2001) is a nine-item measure of depressive symptoms experienced in the past two weeks. Items are rated on a four-point scale (0-3) corresponding to frequency/duration of symptoms, including *not at all*, *several days*, *more than half the days*, and *nearly every day*. Total scores across all nine items range from 0 –27, and scores  $\geq 10$  are typically used to identify patients with probable depression. The PHQ-9 is available in several languages and has been validated in obstetric populations (Flynn et al., 2011). The Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006) is a seven-item self-report measure of anxiety symptoms that are most characteristic of generalized anxiety disorder. Like the PHQ-9, items are rated on a four-point scale (0-3) corresponding to frequency/duration of symptoms, including *not at all*, *several days*, *more than half the days*, and *nearly every day*. Severity of symptoms is determined by summing the total of responses, with total scores ranging from 0-21. Scores  $\geq 10$  typically identify patients who meet diagnostic criteria for clinical anxiety.

While traditional psychotherapy often involves multiple sessions lasting 45-60 minutes, delivered over a period of several weeks to months, interventions in this program were designed to be relatively brief, often delivered in 1-3 sessions, each lasting approximately 30 minutes. Therapeutic care included strategies and skills-building based upon evidence-based psychotherapeutic treatments (e.g., Interpersonal Psychotherapy, Cognitive Behavioral Therapy, Acceptance and Commitment Therapy). Strategies included normalization and validation, focusing on elements under personal control, accepting vs. reducing distress through mindfulness and present-moment focus, increasing values-based actions, and communicating needs to interpersonal supports. Basic behavioral strategies were integrated to improve mood and coping related to prolonged hospitalization. These included activity scheduling (e.g., engaging in pleasant events, taking brief walks unless activity was restricted), developing a routine, improving sleep hygiene, increasing light exposure, and bringing in comfort items from home. Information about outpatient clinic services and potential referrals were provided when relevant.

Our goals in evaluating this initiative included enhancing or optimizing future behavioral health care initiatives by reviewing strategies that worked well in the development and application of the intervention, examining relevant patient clinical and demographic characteristics, utilization of follow-up care after the initial health and behavior consult, and use of services throughout the duration of hospitalization and pregnancy. To this end, we conducted a retrospective medical chart review of women who participated in the intervention. The following variables were thought to be most pertinent to our quality improvement goals: age, ethnicity, marital status, distance between residence and hospital, parity, gravidity, weeks gestation at admission, gestational status (i.e., singleton vs. multiple), BMI at admission, reason for admission, length of stay, number of visits with the behavioral health team, substance use during pregnancy, history of mental health diagnosis and treatment, and scores on PHQ-9 and GAD-7.

### **Analyses**

All statistical analyses were conducted in SPSS, version 27. Continuous variables were examined for normality, skewness, and kurtosis. Outliers were examined further to ensure data validity, and after verification, outliers were retained. Missing data were due to incomplete records in the electronic medical record, so we did not impute item-level missing data. First, descriptive characteristics of the sample were examined, including frequencies and metrics of central tendency. Second, we examined variables associated with clinic development, including prevalence of mental health concerns, time between admission and behavioral health intake, and the number of visits with the behavioral health provider.

A description of the project was submitted to the university Institutional Review Board, which determined that the project did not meet human subjects research criteria because it was designed as a quality improvement project to enhance patient care in a specific patient population and a specific unit.

### **Results**

Descriptive characteristics of the sample were examined using frequencies, means, and standard deviations. See Table 1 for additional information regarding the sample's age, race, marital status, and obstetric characteristics. All women reported abstaining from alcohol during their pregnancy, though 25% reported using tobacco products, and approximately 15% reported drug use.

Though multiple presenting concerns may have contributed to admission, common physician-identified reasons for admission were preterm premature rupture of the membranes (PPROM; 36.4%), vaginal bleeding (13.6%), and hypertension or preeclampsia (18.2%). To further characterize the psychiatric history of the sample, frequencies of mental health diagnosis, counseling, medication, and hospitalization history are reported (see Table 2). In addition, depressive and anxiety symptom severity measures were completed during the hospitalization, and means are reported in Table 2. Most participants reported a mental health history, and though not all reported specific past diagnoses, the most common histories were mood and anxiety disorders. Frequencies of substance use in pregnancy are also reported in Table 2.

Program development information is particularly important to quality improvement efforts as the program is modified over time. An important contextual variable is that 70.5% of the sample was admitted after restrictions related to the COVID-19 pandemic were implemented. Restrictions varied over time, but examples include required face coverings, limited visitors, or required viral testing prior to admission. On average, there were 8.79 days ( $SD = 9.50$ ) between date of admission and first consult. The median number of behavioral health visits was 1, with 52.4% of the sample being seen once, 28.6% being seen twice, and 19% being seen three or more times. Further, the average length of hospitalization was 24.19 days ( $SD = 16.15$ ). Ten (22.8%) of the patients were readmitted during pregnancy. The average days between admission and delivery date was 85.44 ( $SD = 33.72$ ).

## **Discussion**

This innovative behavioral health intervention was designed to better identify and increase treatment access for women at high risk of developing depression and anxiety during antenatal hospitalization or following delivery/discharge. Based on this initiative, we conclude that a brief behavioral health assessment and intervention is a feasible approach to identify and intervene with hospitalized women at high risk for mood and anxiety symptoms. However, significant investment from various stakeholders was required to successfully launch the program. This endeavor began with an informal needs assessment led by an OB/GYN hospitalist who reviewed census numbers and clinical data to determine whether a need for the intervention existed. Departmental administration approved the psychologist's request to devote time to initiative development, hospital information technology personnel created protocols in the electronic health record system to manage triage and care documentation, and clinic and unit leaders advocated and

supported the implementation of the service. Once the service was available, clear communication between all involved parties was vital, including the psychologist, OB care team (the referring OB hospitalist or resident physicians), and patients. Communication typically involved discussing patient needs, coordinating visit timing to accommodate patient monitoring and care, optimizing the psychologist's outpatient schedule, and more.

Basic demographic characteristics of women referred to the intervention were not remarkable given that this sample was collected from a large academic medical center in a largely rural midwestern state with limited racial diversity (approximately 90% White, based on 2021 US Census Bureau data: [www.census.gov/quickfacts/IA](http://www.census.gov/quickfacts/IA)). Rates of substance use in our sample were slightly higher than average national usage rates: approximately 5% of pregnant women reported using one or more addictive substances, including tobacco, alcohol, or illicit substances (NIDA, 2021). On average, women who participated in the intervention and completed self-report questionnaires experienced mildly or moderately elevated symptoms of depression and anxiety at the time of assessment; nearly one-third (29.5%) reported elevated depression, and nearly half (47.7%) reported elevated anxiety. Although these data were collected in a clinical context and not as part of a screening study, they align with the existing literature. Other studies have reported rates of depressive symptoms ranging from 12.5-44.2% (Brandon et al., 2008; Byatt et al., 2014; Hermon et al., 2019; Tsakiridis et al., 2019) and rates of elevated anxiety symptoms ranging from 13-66% (Barber & Starkey, 2015; Byatt et al., 2014; Nagle-Yang et al., 2019) among women hospitalized during pregnancy.

Several factors may have contributed to the prevalence of depressive and anxiety symptoms observed in this sample. Over two-thirds (68.3%) of women referred to the behavioral health intervention had a prior mental health history (diagnosis and treatment), and a quarter had a history of psychiatric hospitalization. Given that women with a history of mood symptoms are at high risk for elevated symptoms during pregnancy (Lancaster et al., 2010), we expect symptoms to be high in this group of women. Byatt et al. (2014) reported similar findings, in which past mental health diagnoses predicted depression and anxiety symptoms at the initial survey (Byatt et al., 2014). Prior studies have also demonstrated that women experience significant stress related to hospitalization (Waldron & Asayama, 1985; White & Ritchie, 1984), likely further increasing the risk of depressive and anxiety symptoms. Isolation/loss of access to social support was likely a significant factor in this sample, with women's places of residence being, on average, over 60 miles from the hospital. The ongoing COVID-19 pandemic may have



further exacerbated this loss of support. Over 70% of the sample was hospitalized following the start of the pandemic, during which visitor restrictions further prevented or restricted access to support persons.

### **Limitations and Future Directions**

The extent to which brief behavioral health or psychotherapeutic intervention may buffer pregnant women from potential adverse outcomes remains an understudied area. This care initiative illuminates the importance of this work and leads to several questions and areas for further investigation. Several limitations are also worth noting.

Due to reliance on OB providers to identify and refer women to the intervention, our sample may reflect a subgroup experiencing particularly high distress. Because there was no screening protocol guiding referral, there are no comparative data regarding general symptom prevalence rates for the antepartum unit. Nonetheless, whether the sample is representative of all pregnant women hospitalized on the unit or merely represents a highly selected segment of patients, the results point to prenatal hospitalization as an opportunity to screen women for depressive or anxiety symptoms that may otherwise go undetected.

Similarly, because this intervention was a quality improvement initiative delivered in a clinical context, there are no data comparing number of women offered to those who accepted a referral to the service. Moving forward, additional data pertaining to feasibility, acceptability, and engagement will be important components of program development and evaluation. Over 75% of the sample received only one or two behavioral health visits, either because women declined additional follow-up (often because they felt better as a result of the first or second meeting) or because they were discharged or delivered before the next scheduled visit. As a result, no quantitative data are available to determine the extent to which the intervention resulted in a reduction in symptoms or what the natural course of symptoms might be during hospitalization, with or without intervention. As has been observed in other studies (Tunnell et al., 2019), natural attrition due to delivery and discharge will likely continue to complicate the collection of follow-up data in this population, making it more challenging to determine the efficacy and effectiveness of treatments.

Behavioral health resources are often limited in the inpatient setting due to the availability of providers, time, or cost of services. In these circumstances, it may be ideal to target a specific subset of hospitalized women such as those with anticipated extended stays, elevated scores on screening tools, or a history of mental health concerns. The personnel

cost may also need to be subsidized by the department and grant funding. Additionally, because a single perinatal psychologist delivered the behavioral health intervention, absences due to illness, holidays, or external clinic needs often caused a delay or pause in service availability. If the volume of the service were to increase substantially, further development of a team/alternate coverage would likely be needed, along with funding for such expansion.

Likewise, whether this specific intervention is best suited for the target population remains unclear. The intervention described in this paper was delivered in a naturalistic setting. It was not manualized but drawn from therapies previously shown to be efficacious for perinatal mood or anxiety symptoms. Although it could likely be further specified/operationalized, the point was to be flexible and match treatment to patient needs. Given that only one psychologist provided treatment, the perceived helpfulness of the intervention may have been related to therapist factors or characteristics. As such, including multiple therapists/providers in future investigations would be important. Other interventions showing initial effectiveness, such as relaxation or mind-body interventions (Jallo et al., 2017; Kao et al., 2019), pet therapy (Lynch et al., 2014), peer support, or internet- or application-based interventions (Goetz et al., 2020; Jallo et al., 2017) may be preferred and used on a wider scale.

## Conclusion

The childbearing years represent a period of high risk for mood and anxiety disorders (Fawcett et al., 2019; Gavin et al., 2005; Maternal Mental Health Leadership Alliance, 2020). Women with medically high-risk pregnancies may be at even greater risk for depression and anxiety symptoms (Brandon et al., 2008; Byatt et al., 2014; Tsakiridis et al., 2019), and in turn, patients who experience depression or anxiety during pregnancy are at increased risk for pregnancy complications and adverse birth outcomes (Grigoriadis et al., 2013; Kurki et al., 2000; Misri et al., 2004; Ritchie-Ewing et al., 2019; Smorti et al., 2019; Staneva et al., 2015; Uguz et al., 2019; Ystrom, 2012). Women hospitalized during pregnancy are under high stress yet are frequently unable to access mental health care. Women with a prior history of mental health concerns likely face an increased risk for recurrence during this stressful time. Early identification and treatment of mood symptoms in women hospitalized before delivery is vital. Although outcome data are not available, this initiative demonstrated that brief behavioral health assessment and intervention are feasible when flexibly applied, even by a single clinician, in an inpatient setting. Data from this care enhancement

initiative also represent a call to action, encouraging providers to identify and intervene (when appropriate treatment is available) with hospitalized women who are likely to be experiencing elevated depressive or anxiety symptoms during pregnancy. Although further data on feasibility, acceptability, and efficacy is needed, offering on-site, brief evidence-based interventions such as the one described in this paper may ultimately reduce the burden of mood symptoms for hospitalized pregnant patients.

## References

- Barber, C. C., & Starkey, N. J. (2015). Predictors of anxiety among pregnant New Zealand women hospitalised for complications and a community comparison group. *Midwifery*, *31*(9), 888–896. <https://doi.org/10.1016/j.midw.2015.04.017>
- Brandon, A. R., Trivedi, M. H., Hynan, L. S., Miltenberger, P. D., Labat, D. B., Rifkin, J. B., & Stringer, C. A. (2008). Prenatal depression in women hospitalized for obstetric risk. *The Journal of Clinical Psychiatry*, *69*(4), 635–643. <https://doi.org/10.4088/JCP.v69n0417>
- Byatt, N., Hicks-Courant, K., Davidson, A., Levesque, R., Mick, E., Allison, J., & Moore Simas, T. A. (2014). Depression and anxiety among high-risk obstetric inpatients. *General Hospital Psychiatry*, *36*(6), 644–649. <https://doi.org/10.1016/j.genhosppsych.2014.07.011>
- Cohen, L. S. (2006). Relapse of major depression during pregnancy in women who maintain or discontinue antidepressant treatment. *JAMA*, *295*(5), 499. <https://doi.org/10.1001/jama.295.5.499>
- Dimidjian, S., & Goodman, S. H. (2014). Preferences and attitudes toward approaches to depression relapse/recurrence prevention among pregnant women. *Behaviour Research and Therapy*, *54*, 7–11. <https://doi.org/10.1016/j.brat.2013.11.008>
- Fawcett, E. J., Fairbrother, N., Cox, M. L., White, I. R., & Fawcett, J. M. (2019). The prevalence of anxiety disorders during pregnancy and the postpartum period. *The Journal of Clinical Psychiatry*, *80*(4). <https://doi.org/10.4088/JCP.18r12527>
- Flynn, H. A., Sexton, M., Ratliff, S., Porter, K., & Zivin, K. (2011). Comparative performance of the Edinburgh Postnatal Depression Scale and the Patient Health Questionnaire-9 in pregnant and postpartum women seeking psychiatric services. *Psychiatry Research*, *187*(1–2), 130–134. <https://doi.org/10.1016/j.psychres.2010.10.022>
- Gavin, N. I., Gaynes, B. N., Lohr, K. N., Meltzer-Brody, S., Gartlehner, G., & Swinson, T. (2005). Perinatal depression: a systematic review of prevalence and incidence. *Obstetrics and Gynecology*, *106*(5 Pt 1), 1071–1083. <https://doi.org/10.1097/01.AOG.0000183597.31630.db>
- Goetz, M., Schiele, C., Müller, M., Matthies, L. M., Deutsch, T. M., Spano, C., Graf, J., Zipfel, S., Bauer, A., Brucker, S. Y., Wallwiener, M., & Wallwiener, S. (2020). Effects of a brief electronic mindfulness-based intervention on relieving prenatal depression and anxiety in hospitalized high-risk pregnant women: Exploratory pilot study. *Journal of Medical Internet Research*, *22*(8), e17593. <https://doi.org/10.2196/17593>
- Grigoriadis, S., VonderPorten, E. H., Mamisashvili, L., Tomlinson, G., Dennis, C.-L., Koren, G., Steiner, M., Mousmanis, P., Cheung, A., Radford, K., Martinovic, J., & Ross, L. E. (2013). The impact of maternal depression during pregnancy on perinatal outcomes. *The Journal of Clinical Psychiatry*, *74*(04), e321–e341. <https://doi.org/10.4088/JCP.12r07968>
- Hermon, N., Wainstock, T., Sheiner, E., Golan, A., & Walfisch, A. (2019). Impact of maternal depression on perinatal outcomes in hospitalized women: A

- prospective study. *Archives of Women's Mental Health*, 22(1), 85–91.  
<https://doi.org/10.1007/s00737-018-0883-5>
- Jallo, N., Thacker, L. R., 2nd, Menzies, V., Stojanovic, P., & Svikis, D. S. (2017). A stress coping app for hospitalized pregnant women at risk for preterm birth. *MCN. The American Journal of Maternal Child Nursing*, 42(5), 257–262. <https://doi.org/10.1097/NMC.0000000000000355>
- Kao, M. H., Hsu, P. F., Tien, S. F., & Chen, C. P. (2019). Effects of support interventions in women hospitalized with preterm labor. *Clinical Nursing Research*, 28(6), 726–743. <https://doi.org/10.1177/1054773817744323>
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9. *Journal of General Internal Medicine*, 16(9), 606–613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
- Kurki, T., Hiilesmaa, V., Raitasalo, R., Mattila, H., & Ylikorkala, O. (2000). Depression and anxiety in early pregnancy and risk for preeclampsia. *Obstetrics and Gynecology*, 95(4), 487–490. [https://doi.org/10.1016/s0029-7844\(99\)00602-x](https://doi.org/10.1016/s0029-7844(99)00602-x)
- Lancaster, C. A., Gold, K. J., Flynn, H. A., Yoo, H., Marcus, S. M., & Davis, M. M. (2010). Risk factors for depressive symptoms during pregnancy: A systematic review. *American Journal of Obstetrics and Gynecology*, 202(1), 5–14. <https://doi.org/10.1016/j.ajog.2009.09.007>
- Lynch, C. E., Magann, E. F., Barringer, S. N., Ounpraseuth, S. T., Eastham, D. G., Lewis, S. D., & Stowe, Z. N. (2014). Pet therapy program for antepartum high-risk pregnancies: A pilot study. *Journal of Perinatology: Official Journal of the California Perinatal Association*, 34(11), 816–818. <https://doi.org/10.1038/jp.2014.120>
- Maternal Mental Health Leadership Alliance. (July 2020). *Fact sheet: Maternal Mental Health (MMH)*. <https://www.mmhla.org/wp-content/uploads/2020/07/MMHLA-Main-Fact-Sheet.pdf>
- Misri, S., Oberlander, T. F., Fairbrother, N., Carter, D., Ryan, D., Kuan, A. J., & Reebye, P. (2004). Relation between prenatal maternal mood and anxiety and neonatal health. *The Canadian Journal of Psychiatry*, 49(10), 684–689. <https://doi.org/10.1177/070674370404901006>
- Nagle-Yang, S., Phillips, M., Albaugh, A., Zhao, L., Amin, J., Ahmad, E., & Hatters Friedman, S. (2019). Depression, anxiety, and attachment among women hospitalized on an antepartum unit. *The International Journal of Psychiatry in Medicine*, 54(6), 395–407. <https://doi.org/10.1177/0091217419837071>
- NIDA. 2021, June 22. *Substance use while pregnant and breastfeeding*. Retrieved from <https://nida.nih.gov/publications/research-reports/substance-use-in-women/substance-use-while-pregnant-breastfeeding> on 2022, March 27.
- Pearlstein, T. (2015). Depression during pregnancy. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 29(5), 754–764. <https://doi.org/10.1016/j.bpobgyn.2015.04.004>
- Ritchie-Ewing, G., Mitchell, A. M., & Christian, L. M. (2019). Associations of maternal beliefs and distress in pregnancy and postpartum with breastfeeding initiation and early cessation. *Journal of Human Lactation*, 35(1), 49–58. <https://doi.org/10.1177/0890334418767832>

- Shlomi Polachek, I., Dulitzky, M., Margolis-Dorfman, L., & Simchen, M. J. (2016). A simple model for prediction postpartum PTSD in high-risk pregnancies. *Archives of Women's Mental Health, 19*(3), 483–490. <https://doi.org/10.1007/s00737-015-0582-4>
- Smorti, M., Ponti, L., & Tani, F. (2019). The effect of maternal depression and anxiety on labour and the well-being of the newborn. *Journal of Obstetrics and Gynaecology, 39*(4), 492–497. <https://doi.org/10.1080/01443615.2018.1536697>
- Sockol, L. E. (2015). A systematic review of the efficacy of cognitive behavioral therapy for treating and preventing perinatal depression. *Journal of Affective Disorders, 177*, 7–21. <https://doi.org/10.1016/j.jad.2015.01.052>
- Spehar, S. M., Mission, J. F., Amanda Shupe, & Facco, F. L. (2018). Prolonged antepartum hospitalization: No time for rest. *Journal of Perinatology: Official Journal of the California Perinatal Association, 38*(9), 1151–1156. <https://doi.org/10.1038/s41372-018-0155-2>
- Spinelli, M. G., & Endicott, J. (2003). Controlled clinical trial of interpersonal psychotherapy versus parenting education program for depressed pregnant women. *American Journal of Psychiatry, 160*(3), 555–562. <https://doi.org/10.1176/appi.ajp.160.3.555>
- Spinelli, M. G., Endicott, J., Goetz, R. R., & Segre, L. S. (2016). Reanalysis of efficacy of interpersonal psychotherapy for antepartum depression versus parenting education program. *The Journal of Clinical Psychiatry, 77*(04), 535–540. <https://doi.org/10.4088/JCP.15m09787>
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder. *Archives of Internal Medicine, 166*(10), 1092. <https://doi.org/10.1001/archinte.166.10.1092>
- Staneva, A., Bogossian, F., Pritchard, M., & Wittkowski, A. (2015). The effects of maternal depression, anxiety, and perceived stress during pregnancy on preterm birth: A systematic review. *Women and Birth, 28*(3), 179–193. <https://doi.org/10.1016/j.wombi.2015.02.003>
- Toscano, M., Royzer, R., Castillo, D., Li, D., & Poleshuck, E. (2021). Prevalence of depression or anxiety during antepartum hospitalizations for obstetric complications: A systematic review and meta-analysis. *Obstetrics and Gynecology, 137*(5), 881–891. <https://doi.org/10.1097/AOG.0000000000004335>
- Tsakiridis, I., Bousi, V., Dagklis, T., Sardeli, C., Nikolopoulou, V., & Papazisis, G. (2019). Epidemiology of antenatal depression among women with high-risk pregnancies due to obstetric complications: a scoping review. *Archives of Gynecology and Obstetrics, 300*(4), 849–859. <https://doi.org/10.1007/s00404-019-05270-1>
- Tunnell, N. C., Suterwala, M., & Meuret, A. E. (2019). Brief acceptance-based therapy for women with high-risk pregnancies: Uncontrolled pilot of an intervention for inpatients. *Journal of Contextual Behavioral Science, 14*, 127–135. <https://doi.org/10.1016/j.jcbs.2019.10.004>
- Uguz, F., Yakut, E., Aydogan, S., Bayman, M. G., & Gezginc, K. (2019). The impact of maternal major depression, anxiety disorders and their comorbidities on gestational age, birth weight, preterm birth and low birth

weight in newborns. *Journal of Affective Disorders*, 259, 382–385.

<https://doi.org/10.1016/j.jad.2019.08.076>

Waldron, J. A., & Asayama, V. H. (1985). Stress, adaptation and coping in a maternal-fetal intensive care unit. *Social Work in Health Care*, 10(3), 75–89. [https://doi.org/10.1300/J010v10n03\\_05](https://doi.org/10.1300/J010v10n03_05)

White, M., & Ritchie, J. (1984). Psychological stressors in antepartum hospitalization: reports from pregnant women. *Maternal-Child Nursing Journal*, 13(1), 47–56.

Yang, M., Li, L., Zhu, H., Alexander, I. M., Liu, S., Zhou, W., & Ren, X. (2009). Music therapy to relieve anxiety in pregnant women on bedrest: a randomized, controlled trial. *MCN. The American Journal of Maternal Child Nursing*, 34(5), 316–323.

<https://doi.org/10.1097/01.NMC.0000360425.52228.95>

Ystrom, E. (2012). Breastfeeding cessation and symptoms of anxiety and depression: a longitudinal cohort study. *BMC Pregnancy and Childbirth*, 12(1), 36. <https://doi.org/10.1186/1471-2393-12-36>

Table 1

*Descriptive characteristics of the clinical sample*

Variable	M(SD)
Maternal age	29.52 (6.02)
Weeks gestation	27.32 (4.63)
Gravidity	3.23 (3.15)
Distance from <u>hospital</u> (miles)	66.09 (38.64)
BMI at admission	33.11 (9.48)
	N (%)
Race	
White	32 (72.7%)
Black	7 (15.9%)
Latinx	3 (6.8%)
Other	2 (4.5%)
Married or partnered	22 (50%)
Singleton pregnancy	35 (79.5%)
Obstetric Outcome	
Vaginal delivery	9 (20.5%)
Cesarean section delivery	33 (75%)
Unknown	2 (4.5%)

\*Note. BMI = Body mass index.



**Table 2**

*Mental health and substance use characteristics of the sample*

<b>Variable</b>	<b>n (%)</b>
Mental health history, n = 41	28 (68.3%)
Mood disorder history, n = 30	25 (83.3%)
Anxiety disorder history, n = 30	18 (60%)
Counseling history, n = 42	27 (64.3%)
Psychotropic medication history, n = 41	28 (68.3%)
Psychiatric hospitalization history, n = 36	11 (25%)
Perinatal alcohol use, n = 33	0 (0%)
Perinatal nicotine use, n = 35	11 (25%)
Perinatal illicit drug use, n = 33	5 (15.2%)
	<b>M(SD)</b>
Depressive symptoms	7.92 (4.38)
PHQ-9 Severity Range, <u>n</u> (%)	
None (0-4)	10 (22.7%)
Mild (5-9)	13 (29.5%)
Moderate (10-14)	11 (25%)
Moderately Severe (15-19)	2 (4.5%)
Severe (≥ 20)	0 (0%)
Missing PHQ-9	8 (18.2%)
Anxiety symptoms	10.89 (5.74)
GAD-7 Severity Range, <u>n</u> (%)	
None (0-4)	8 (22.2%)
Mild (5-9)	7 (15.9%)
Moderate (10-14)	7 (15.9%)
Severe (≥ 15)	14 (31.8%)
Missing GAD-7	8 (18.2%)

*\*Note.* Depressive symptoms were measured by the Patient Health Questionnaire – 9. Anxiety symptoms were measured by the Generalized Anxiety Disorder – 7.