

Adding perinatal anxiety screening to depression screening: is it worth it?



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BACKGROUND: Screening for peripartum depression is widely recommended and should now be the standard of care. However, little research exists on peripartum anxiety screening.

OBJECTIVE: The purpose of this study was to assess whether adding perinatal anxiety screening would increase the identification of women who would benefit from mental health support.

STUDY DESIGN: The existing practice at our clinic was depression screening via the Patient Health Questionnaire-2 at all prenatal visits; screenings were prospectively tracked for 3 months in women presenting for visit at 24–28 weeks gestation (Patient Health Questionnaire-2–only group). We then added Generalized Anxiety Disorder 2-item validated anxiety scale assessment to prenatal visits at 24–28 weeks gestation (Patient Health Questionnaire-2+Generalized Anxiety Disorder 2-item group). Our primary study outcome was the rate of positive depression and anxiety screens during pregnancy; secondary outcomes included referral rates to mental health services and obstetric and medical outcomes.

RESULTS: A total of 100 women with visits at 24–28 weeks gestation were eligible to be screened during the Patient Health Questionnaire-2–only period; 125 women were eligible for screening during the Patient Health Questionnaire-2+Generalized Anxiety Disorder 2-item period. In

the Patient Health Questionnaire-2–only group, 51 women were screened, with 2 positive depression screens. In the Patient Health Questionnaire-2+Generalized Anxiety Disorder 2-item group, 40 women were screened, with 5 positive screens for depression and 4 for anxiety. Three women who were anxiety-positive had been negative via depression screening. Mental health referral was not different between the 2 groups (odds ratio, 1.75; 95% confidence interval, 0.76–4.97), but a significant increase in referral was noted for Patient Health Questionnaire-2+Generalized Anxiety Disorder 2-item subgroups with a history of mental health diagnosis (odds ratio, 14.9; 95% confidence interval, 5.6–39.7) or substance abuse (odds ratio, 26.7; 95% confidence interval, 4.6–155.0).

CONCLUSION: Screening for perinatal anxiety may increase referral rates to mental health professionals who can then diagnose and treat women who experience mood and anxiety disorders. Anxiety screening may be particularly useful in populations with a history of mental health diagnoses or substance abuse. Further research is necessary to understand how perinatal anxiety screening should be best implemented.

Key words: anxiety, depression, mental health, screening

Perinatal mood and anxiety disorders are an important public health problem. Much attention has been paid to depression during and after pregnancy; however, other mood disorders in the peripartum period have been demonstrated to be important contributors to maternal and child health.¹ Until now, recommendations for routine screening for mental health disorders in pregnancy have focused almost entirely on depression.

Maternal depression is now known to be 1 of the most common complications of pregnancy.² Estimates of prevalence are approximately 13% in the general population but are known to be higher in some populations, such as low-

income women or those with a history of depression.³ Perinatal depression can be devastating for both mental health and obstetric outcomes. Women are less likely to engage in prenatal care and more likely to engage in unsafe behaviors during pregnancy, such as substance use.⁴ Perinatal depression has been linked to many obstetric morbidities, including preterm birth and small-for-gestational age babies.⁵ Perinatal mood and anxiety disorders are risk factors for impaired maternal-infant bonding,⁶ internalizing and externalizing behavior in the offspring,⁷ and possible negative consequences for infant cognitive, language, and motor development.⁸ Because of its importance to the health of women and of newborn infants, both the American College of Obstetrics and Gynecology and the United States Preventive Services Task Force now recommend screening during the perinatal period for depression.^{2,9}

However, perinatal anxiety disorders are also quite common; prevalence is estimated at 13–40% postpartum.¹⁰

Anxiety may be a more common problem than depression for pregnant and postpartum women. The assessment of anxiety in pregnant women and new mothers is particularly important because perinatal anxiety has been linked to both poor obstetric and postnatal outcomes, such as low birthweight, preterm birth, and increased risk of mental health disorders in the child.¹¹ In addition to the poor effects of anxiety on its own, it has an important relationship with maternal depression; anxiety is associated strongly with depressive symptoms at 5 days and 6 weeks postpartum.¹² Anxiety symptoms that are specific to the perinatal period, such as increased tension and fear about the health of the fetus or newborn infant, will not be captured by many commonly used depression screening tool, such as the commonly used Patient Health Questionnaire-2 (PHQ2), that is endorsed by the American College of Obstetricians and Gynecologists² and United States Preventive Services Task Force,⁹ which assesses only depressed

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AJOG MFM at a Glance

Why was this study conducted?

This study was conducted to assess the utility of adding perinatal anxiety screening to current perinatal depression screening.

Key findings

Screening for perinatal anxiety may increase referrals to mental health professionals for the diagnosis and treatment of women who experience mood and anxiety disorders and may be particularly useful in populations with a history of mental health diagnoses or substance abuse.

What does this add to what is known?

This finding supports the consideration of a wider view of perinatal mood and anxiety disorders to best serve this population and to reduce morbidity from these common conditions.

mood and anhedonia.¹³ The Edinburgh Postnatal Depression Scale, a 10-item self-report scale that is validated for use during pregnancy and postpartum, does capture general symptoms of anxiety, fear, and panic but is not used generally to screen for anxiety disorders.¹⁴ Our study was designed to assess the value of adding anxiety screening to the perinatal depression screening in an urban prenatal care clinic with the goal of detecting more women with mental health symptoms and referring them for diagnosis and treatment. Our primary study outcome was the rate of positive depression and anxiety screens during pregnancy, including how many women who were screened positive when anxiety screening was added who would otherwise not have screened positive based on depression screening alone. Secondary outcomes included the referral rate to mental health professionals, maternal and neonatal obstetric and medical outcomes, and rates of positive postpartum depression screens.

Materials and Methods

This study was approved by the Medical Center Institutional Review Board.

Study population

The study was performed at 1 of the largest obstetrics and gynecology clinics in the area, which is a practice that is situated at a Federally Qualified Health Center and serves a large urban population. The population cared for in this practice primarily uses government-

supported insurance for their care and have low socioeconomic status; our clinic serves some of the poorest zip codes within the United States.

PHQ2-only group

Before the initiation of the study, clinic practice was to screen for maternal depressive symptoms via a written PHQ2 screen at all prenatal and postpartum visits. This form was handed out by front desk staff as the woman presented to check in for the appointment and was self-administered by the woman. The paper PHQ2 was then collected by nursing staff and entered into the electronic health record. Data were collected prospectively on women for 3 months during the period in which self-administered PHQ2 screening was offered. These women comprised the “PHQ2-only” group. Referral to the clinic’s social worker was generated for women who scored ≥ 3 .

Because many guidelines recommend that depression screening be performed early in the third trimester, data were for women who presented for any prenatal appointment between 24 weeks and 0 days and 28 weeks and 6 days of gestation; this visit is considered the “index” prenatal visit.

PHQ2 + GAD2 group

After this 3-month period, we added a GAD2 anxiety screen to the PHQ2 screen. Data were again collected for 3 months on women who presented for an “index” prenatal appointment between

24 weeks and 0 days and 28 weeks and 6 days of gestation. Women who underwent their index prenatal visit during this period comprised the “PHQ2+GAD2” group. Referral to the clinic’s social worker was generated for women who scored ≥ 3 on either the PHQ2 or GAD2. Any woman referred to a social worker for a positive PHQ2 or GAD2 underwent more extensive depression and anxiety screening, which including PHQ7 and GAD7 assessments.

Data collection

Data were collected through a review of charts of all women from both groups. Demographic data, mental health screening and outcome data, pregnancy and delivery data were abstracted manually from the medical records. High-risk pregnancy status was classified by the woman being seen for ≥ 2 visits by a Maternal-Fetal Medicine provider. A score of ≥ 3 on the PHQ2¹³ and/or a score of ≥ 3 on the GAD2¹⁵ was considered a positive screen, as is customary for these tools.

Rates of referral data to a social worker working within the clinic and to mental health professionals (social workers, psychiatrists, and psychologists) outside the clinic were recorded.

Of note, in addition to social work referrals for positive scores on mental health screening (PHQ2 and/or GAD2), clinic practice also mandated social worker referrals for other psycho-social indications, such as unstable housing, food insecurity, positive screens for domestic violence, or a positive history of current illicit drug use. Adolescents and those with a history of depression also are often referred to the in-clinic social worker, regardless of PHQ2 or GAD2 results.

To obtain postpartum data, we evaluated the PHQ2 administered to women at their postpartum visit, generally 2–6 weeks after delivery.

Statistics

From the literature, we anticipated a screen positive rate in our population of 20% with the use of the PHQ2 alone.¹⁶ To power our study adequately to detect an increase in positive screens of 75% when using the PHQ2+GAD2,

TABLE 1
Multivariable logistic regression models

Outcome	Variable	Odds ratio	95% Confidence interval		Pvalue
			Lower control limit	Upper control limit	
Patient Health Questionnaire-2 score >3	Method ^a				
	Depression screening alone (reference)	1			
	Depression+anxiety screening	3.24	0.39	26.88	.28
	History of mental health diagnosis				
	No (reference)	1			
Action taken during pregnancy (0 = no, 1 = any action taken during pregnancy)	Yes	44.77	4.16	481.58	.002
	Method ^a				
	Depression screening alone (reference)	1			
	Depression+anxiety screening	1.95	0.76	4.97	.16
	History of mental health diagnosis				
	No (reference)	1			
	Yes	14.90	5.59	39.70	<.0001
	History of substance abuse				
	No (reference)	1			
	Yes	26.69	4.60	155.01	.0003
	Parity group				
	0 (reference)	1			
	>=1	0.32	0.13	0.79	.01
	Baby with neonatal intensive care unit stay				
	No (reference)	1			
	Yes	0.19	0.04	0.83	.03
	Body mass index	1.07	1.01	1.14	.02
Positive depression screening at postpartum visit	Method ^a				
	Depression screening alone (reference)	1			
	Depression+anxiety screening	0.25	0.05	1.33	.10
	Gestational age at visit	2.13	1.11	4.10	.02
Generalized Anxiety Disorder 2-item score >3	History of substance abuse				
	No (reference)	1			
	Yes	43.00	2.65	698.51	.01

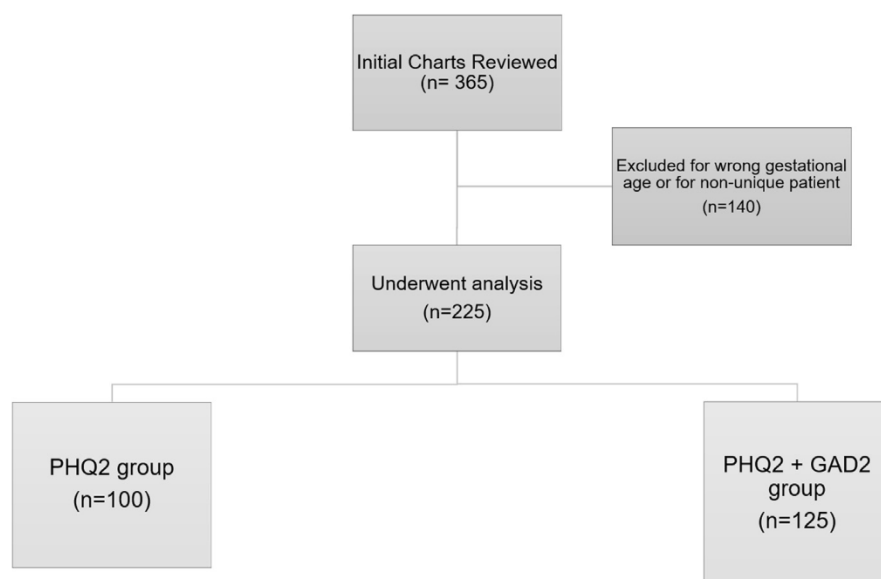
^a Always kept in the stepwise model selection, with the exception on Generalized Anxiety Disorder 2-item score >3; the variables are ordered in the order they enter into the selected model for each outcome.

Lieb et al. Adding perinatal anxiety screening: is it worth it? *AJOG MFM* 2020.

assuming an 80% power and a type 1 error rate of 5%, a total of 270 women (135 women in each group) would be required.

Results were analyzed individually via parametric and nonparametric tests as appropriate. Analysis was then performed via a multivariate logistic

regression model (Table 1). This model was created with the use of the stepwise model in which further variables are added if they satisfy an entry probability

FIGURE
Study design

This study design flow chart shows the total charts reviewed and stratified into PHQ2 and PHQ2 + GAD2 groups.

GAD2, Generalized Anxiety Disorder 2-item; PHQ2, Patient Health Questionnaire-2.

Lieb et al. Adding perinatal anxiety screening: is it worth it? *AJOG MFM* 2020.

value criterion of .35. Once a new variable was integrated, all the variables in the model were then assessed to find which variable can be removed, based on a second prespecified probability value of $>.05$. This process of adding/removing variables was iterated until no more variables could be added or removed, at which point the model was considered saturated or optimal.

Results

Study population

Figure 1 shows the flow of enrollment and exclusion for the study. A total of 365 charts were reviewed. Women were excluded from the study if, after review, it was clear that their index prenatal visit did not occur during the 24 weeks and 0 days to 28 weeks and 6 days period of their pregnancy. Ultimately, 225 unique women were included in the study, 100 in the PHQ2-only group and 125 in the PHQ2+GAD2 group; thus, the study did not achieve power as calculated in the previous section.

Table 2 shows the demographics and the stratification by method, PHQ2-only

vs PHQ2+GAD2. The groups were not significantly different, except for an increased number of multiparous women in the PHQ2-only group (76% vs 39%; $P<.001$). Of note, racial demographics are not reported because more than one-half of these values were reported.

Rate of screening

Of the women enrolled, 51 of the women (51%) in the PHQ2-only group completed screening at the index visit. In the PHQ2+GAD2 screening group, 40 of the women (32%) completed depression screening, and 47 of the women (38%) completed anxiety screening, although both screenings were on the same page that had been handed out. Twenty-three women (18%) completed both the depression and the anxiety screening. The rate of depression screening was significantly higher in the PHQ2-only group (51% vs 32%; $P<.05$).

Positive screening results

Adding the anxiety screening did not increase the overall rate of positive screens (odds ratio [OR], 3.24; 95% confidence interval [CI] 0.39–26.88); however, 3

women were detected during combined PHQ2+GAD2 screening who would have otherwise not been detected by PHQ2 screening alone.

Two women (0.04%) screened positive in the PHQ2-only group; both were referred to social work, and 1 woman was referred additionally to an outside psychiatrist. In the PHQ2+GAD2 group, 9 women screened positive: 4 women (0.1%) screened positive for PHQ2; 4 women (0.085%) screened positive for GAD2, and 1 woman screened positive for both. The actions taken for these women is shown in Table 3.

History of mental health diagnosis was associated with a higher risk of positive PHQ2 screen during the index prenatal visit (OR, 44.77; 95% CI, 4.16–481.58), regardless of which screening method the woman underwent.

There was no significant difference between groups in rates of positive postpartum depression screens.

Rate of referrals

Rate of referral to social work and other mental healthcare actions that were taken during pregnancy was not significantly different between groups (OR, 1.95; 95% CI, 0.76–4.97). However, during the PHQ2+GAD2 period, more social work referrals and mental healthcare actions were generated for women with a history of mental health diagnosis (OR, 14.90; 95% CI, 5.59–39.70; $P<.0001$), a history of substance abuse (OR, 26.69; 95% CI, 4.60–155.01; $P<.0003$), or a higher body mass index (OR, 1.07; 95% CI, 1.01–1.14; $P<.02$).

Women in the PHQ2+GAD2 group who had higher parity (OR, 0.32; 95% CI, 0.13–0.79; $P<.01$) or who had delivered a baby who had been admitted to the neonatal intensive care unit (NICU; OR, 0.19; 95% CI, 0.04–0.83; $P<.03$) were less likely to undergo social work referral during the study period than those who underwent PHQ2-only screening.

Anxiety and substance abuse

Positive GAD-2 screens were significantly more common in women with a history of substance abuse (OR, 43; 95% CI, 2.65–698; $P<.01$).

TABLE 2
Demographic table and stratification by method

Variable	Method		Pvalue
	Depression screening alone (n=100)	Depression+anxiety screening (n=125)	
Age, y ^a	29.3±6.0	29.2±6.3	.95
Body mass index, kg/m ^{2a}	31.4±7.6	30.4±6.2	.32
Gestational age at visit, wk ^b	26.3 (25.3–27.2)	26.1 (25.0–27.0)	.30
Ethnicity, n (%)			.39
Not Hispanic	33 (33)	41 (33)	
Hispanic	34 (34)	52 (42)	
Unknown	33 (33)	32 (26)	
Insurance, n (%)			.06
Public	72 (72)	103 (82)	
Private	28 (28)	22 (18)	
History of mental health diagnosis, n (%)			.55
No	81 (81)	105 (84)	
Yes	19 (19)	20 (16)	
High risk pregnancy, n (%)			.85
No	66 (66)	84 (67)	
Yes	34 (34)	41 (33)	
Mode of delivery, n (%)			.96
Vaginal	53 (58)	67 (57)	
Cesarean section	39 (42)	50 (43)	
Complication during pregnancy, n (%)			.62
Hypertension	8 (8)	10 (8)	
Diabetes mellitus	8 (8)	13 (11)	
Other	16 (16)	13 (11)	
Hypertension+diabetes mellitus	3 (3)	6 (5)	
Hypertension+other	1 (1)	2 (2)	
Diabetes mellitus+other	5 (5)	2 (2)	
Hypertension+diabetes mellitus+other	0	2 (2)	
None	58 (59)	73 (60)	
Complication during delivery, n (%)			.36
Hypertension	5 (5)	4 (3)	
Hemorrhage	4 (4)	1 (1)	
Shoulder dystocia	2 (2)	2 (2)	
Other	9 (10)	7 (6)	
Hypertension+other	0	1 (1)	
None	72 (78)	102 (87)	
Parity group, n (%)			<.0001
0	24 (24)	76 (61)	
≥1	76 (76)	49 (39)	

Lieb et al. Adding perinatal anxiety screening: is it worth it? *AJOG MFM* 2020.

(continued)

TABLE 2

Demographic table and stratification by method (continued)

Variable	Method		Pvalue
	Depression screening alone (n=100)	Depression+anxiety screening (n=125)	
History of substance abuse, n (%)			.12
No	98 (98)	116 (93)	
Yes	2 (2)	9 (7)	
Baby with neonatal intensive care unit stay, n (%)			.06
No	84 (91)	97 (82)	
Yes	8 (9)	21 (18)	

^a Data are given as mean±standard deviation; ^b Data are given as median (interquartile range).
 Lieb et al. Adding perinatal anxiety screening: is it worth it? AJOG MFM 2020.

Medical outcomes

There was no significant difference between groups in medical complications during pregnancy or delivery or in the rates of neonates admitted to the NICU.

Comment

In this study, we looked at differences in screening and referrals to mental health professionals when a depression screen was used at 24–29 weeks of pregnancy compared with a combined depression and anxiety screen. Our study did not reach the power to distinguish the primary outcomes between these 2 groups, given that a larger than anticipated number of women were excluded for being outside our gestational age criteria or who represented repeat visits by the same woman. However, even in this underpowered study, combined depression and anxiety screening did detect women who would have been missed by depression screening alone, although this difference did not reach statistical significance.

Importantly, however, for the subgroups of women with a history of mental health diagnosis or a history of substance abuse and for those women with higher body mass index, combined depression and anxiety screening did lead to increased referrals. Interestingly, referrals were decreased for women with other significant stressors: those who had a baby in the NICU, who had higher parity (thus likely to have more children at home).

Our study supports the use of a GAD2 screen for maternal anxiety, in addition to the widely used depression screens. We found the highest utility in adding anxiety screening in women with mental health diagnoses and those with a history of substance abuse.

In terms of women with a history of mental health diagnoses and substance abuse, it seems feasible that both these populations would benefit from additional screening for anxiety. In the case of women with mental health disorders, it is plausible that widening the screen for mental health disorders to include symptoms that are not covered by a depression screen would helpfully detect a wider array of women who would benefit from further therapeutic intervention.

In the case of women with a history of substance abuse, there is a well-documented association between anxiety disorders and substance abuse.¹⁷ Therefore, it is extremely plausible that anxiety screening would be useful in this population. The pregnant and postpartum population is a large and important population to address from a public health perspective: substance use disorders are common for women during their reproductive years.¹⁸ There are several proposed pathways for this, 1 being that anxiety symptoms may be relieved by the use of substances as a form of self-medication.¹⁹ Regardless of mechanism, our study strongly suggests that this population would benefit from

targeted anxiety screening during prenatal and postpartum care.

Obesity has a complicated relationship with multiple medical problems and with social stress.²⁰ In this population, higher body mass index may reflect a population with increasing medical and social needs. In addition, chronic inflammation caused by a high fat diet likely plays a role in increased risk for depression and anxiety.²¹ Our study showed that these women may also benefit from additional anxiety screening in the perinatal period. Although women with an infant who was admitted to the NICU or with higher parity might be experiencing more stress and anxiety, our study suggests that, in the group that was given both the depression and anxiety screen, they were actually referred less to mental health providers. As we know the rates of depression and anxiety in NICU moms are higher than the general maternity population,²² it is probable that these women were already in communication with mental health professionals in other contexts (for example, our NICU has an active social work department with a protocol to evaluate the family of every admitted neonate); this type of mental health care access was not measured in our study.

Strengths, limitations, and future directions

Our study was limited by a small enrollment and did not achieve power to

TABLE 3
Actions taken for women who screen positive

Group	Positive Patient Health Questionnaire-2	Positive Generalized Anxiety Disorder 2-item	Action taken for positive Patient Health Questionnaire-2	Action taken for positive Generalized Anxiety Disorder 2-item screen
Patient Health Questionnaire-2	2	N/A	Referred to social work	N/A
Patient Health Questionnaire-2 + Generalized Anxiety Disorder 2-item	5 (1 woman also with positive Generalized Anxiety Disorder 2-item)	4 (1 woman also with positive Patient Health Questionnaire-2)	Referred to social work and outside psychiatrist	
			Referred to social work	Referred to social work
			Referred to social work	Referred to social work
			Referred to social work	Referred to social work and had outside psychiatrist
			Not referred to social work	
			1 Woman who was positive for Patient Health Questionnaire-2 and Generalized Anxiety Disorder 2-item was referred to social work	

N/A, not available.

Lieb et al. Adding perinatal anxiety screening: is it worth it? *AJOG MFM* 2020.

assess significant differences in primary outcome because of a higher-than-expected exclusion of women. Because this was a real-world study that involved a change in clinic practice, it was unfortunately not logistically possible to extend the study periods. Thus, although we found no difference for our primary outcome, it is possible that a larger study would find an increased referral rate and positive screening rate.

Other limitations included the lower than anticipated screening rate (between 32–51%), which is far lower than most recommendations that recommend universal screening. Our screening rate varied between groups, with significantly more women completing PHQ2 screening compared with PHQ2+GAD2 screening, likely because of the burden of time that a GAD2 adds to the clinic visit. During a portion of the screening time, there was an unexpected reduction in social work staffing, which may have disincentivized staff to perform regular screenings because of limited ability to refer for positive screens. Although the intention was to screen every woman in the PHQ-2+GAD-2 group with each screening at every prenatal visit, this was difficult to facilitate in real practice. More often women received only 1 of the 2 screens at each visit, with a minority of people receiving both screens during the 24- to 29-week prenatal visits. This reinforces the importance of having support and nursing staff ensure that screens are completed, and, if possible, an embedded mental health provider who is able to monitor and follow up on positive mental health screens. In addition, we were limited in our ability to report on demographics and racial disparities, because data on race were not available for more than one-half of the women.

Overall, our study showed promising results for adding anxiety screening to depression screening during the perinatal period. Doing so, did detect women who would otherwise have screened negative, although this was not statistically significant in this study that was underpowered for that outcome. However, adding anxiety screening did increase referral rates for at-risk populations such as those with previous

mental health diagnoses and a history of substance abuse. Because women with comorbid substance use and mental health disorders are high users of the healthcare system and are at increased risk for adverse maternal and infant outcomes,²³ they are a very important group to consider for increased mental health screening.

The addition of this screening during pregnancy will require more research to understand fully both its utility and cost, but screening for anxiety may well represent a worthwhile addition to mood disorder screening in pregnancy and may be an important tool in combating peripartum mental health disorders. ■

References

1. Fairbrother N, Janssen P, Antony MM, Tucker E, Young AH. Perinatal anxiety disorder prevalence and incidence. *J Affect Disord* 2016;200:148–55.
2. ACOG Committee on Obstetric Practice. ACOG Committee Opinion No. 757: screening for perinatal depression. *Obstet Gynecol* 2018;132:e208–12.
3. Gaynes BN, Gavin N, Meltzer-Brody S, et al. Perinatal depression: prevalence, screening accuracy, and screening outcomes. *Evid Rep Technol Assess (Summ)* 2005;119:1–8.
4. Meltzer-Brody S. The long-term psychiatric and medical prognosis of perinatal mental illness. *Best Pract Res Clin Obstet Gynaecol* 2014;28:49–60.
5. Szegda K, Markenson G, Bertone-Johnson E, et al. Depression during pregnancy: a risk factor for adverse neonatal outcomes? A critical review of the literature. *J Matern Fetal Neonatal Med* 2013;27:960–7.
6. Muzik M, Bocknek EL, Broderick A, et al. Mother-infant bonding impairment across the first six months postpartum: the primacy of psychopathology in women with childhood abuse and neglect histories. *Arch Womens Ment Health* 2013;16:29–38.
7. Tien J, Lewis GD, Liu J. Prenatal risk factors for internalizing and externalizing problems in childhood. *World J Pediatr* 2019. <https://doi.org/10.1007/s12519-019-00319-2> [Epub ahead of print].
8. O'Leary N, Jairaj C, Molloy EJ, McAuliffe FM, Nixon E, O'Keane V. Antenatal depression and the impact on infant cognitive, language, and motor development at six and twelve months postpartum. *Early Hum Dev* 2019;134:41–6.
9. Siu AL, the US Preventive Services Task Force (USPSTF), Bibbins-Domingo K, et al. Screening for depression in adults: US Preventive Services Task Force recommendation statement. *JAMA* 2016;315:380.
10. Field T. Postnatal anxiety prevalence, predictors and effects on development: a narrative review. *Infant Behav Dev* 2018;51:24–32.
11. Dunkel Schetter C, Tanner L. Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. *Curr Opin Psychiatry* 2012;25:141–8.
12. Sylvén SM, Thomopoulos TP, Kolia N, Jonsson M, Skalkidou A. Correlates of postpartum depression in first time mothers without previous psychiatric contact. *Eur Psychiatry* 2017;40:4–12.
13. Kroenke K, Spitzer RL, Williams JBW. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Med Care* 2003;41:1284–92.
14. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry* 1987;150:782–6.
15. Plummer F, Manea L, Trepel D, McMillan D. Screening for anxiety disorders with the GAD-7 and GAD-2: a systematic review and diagnostic meta analysis. *Gen Hosp Psychiatry* 2016;39:24–31.
16. Hobfoll SE, Ritter C, Lavin J, Hulsizer MR, Cameron RP. Depression prevalence and incidence among inner-city pregnant and postpartum women. *J Consult Clin Psychol* 1995;63:445–53.
17. Compton WM, Thomas YF, Stinson FS, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry* 2007;64:566–76.
18. McHugh RK, Wigderson S, Greenfield SF. Epidemiology of substance use in reproductive-age women. *Obstet Gynecol Clin* 2014;41:177–89.
19. Arunogiri S, Lubman DI. Anxiety and substance use disorders: a worrying combination. *Australas Psychiatry* 2015;23:382–7.
20. Jauch-Chara K, Oltmanns KM. Obesity: a neuropsychological disease? Systematic review and neuropsychological model. *Prog Neurobiol* 2014;114:84–101.
21. Schachter J, Martel J, Lin CS, et al. Effects of obesity on depression: a role for inflammation and the gut microbiota. *Brain Behav Immun* 2018;69:1–8.
22. Bogen DL, Fisher SD, Wisner KL. Identifying depression in neonatal intensive care unit parents: then what? *J Pediatr* 2016;179:13–5.
23. Forray A. Substance use during pregnancy. *F1000Res* 2016;5.

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