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The Effect of Postpartum Depressive Symptoms (PDS) on Maternal Health Practices After Childbirth, Texas Pregnancy Risk Assessment Monitoring System, 2012–2015

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Abstract

Objectives This study examined the contribution of postpartum depressive symptoms (PDS) on select maternal health practices among Texas women, using 2012–2015 survey data from the Pregnancy Risk Assessment Monitoring System.

Methods Multiple logistic regression was used to assess the effect of PDS on postpartum checkups, postpartum dental visits, and use of postpartum birth control. Covariates included maternal age, race/ethnicity, marital status, education, and depression before birth.

Results Data from 4679 respondents were used in analyses, and the prevalence of women reporting PDS was 13.8 percent. Women without PDS were more likely to attend a postpartum checkup (adjusted OR = 1.5; 95% CI 1.1–2.1) or have a postpartum dental visit (adjusted OR = 1.4, 95% CI 1.0–1.8) than women with PDS. There was insufficient evidence to conclude any association between PDS and use of postpartum birth control.

Conclusions These findings highlight adverse effects of PDS on maternal health practices not previously studied. Results stress the importance of healthcare professionals monitoring the moods and actions of women of childbearing age to provide early interventions for women experiencing PDS, and of emphasizing positive maternal health practices after childbirth.

Keywords Postpartum depressive symptoms · PDS · Maternal health practices · Postpartum · Texas PRAMS

Significance Statement

What is already known on this subject? Adverse effects of postpartum depressive symptoms (PDS) on infant health have been well-documented. However, only a few studies have examined relationships between PDS and maternal health outcomes or health practices. *What this study adds?* This study evaluated relationships between PDS and three maternal health practices not previously studied—attending a postpartum checkup, having a postpartum dental visit, and birth control use after childbirth. PDS appeared to negatively influence maternal health practices in women after childbirth, which could adversely affect the health of postpartum women. Findings underscore the importance of healthcare providers identifying, monitoring, and providing early interventions for women at risk of depression.

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Introduction

Postpartum depression (PPD) is a mood disorder that occurs after childbirth, with symptoms usually manifesting within the first month after delivery (Abbasi et al., 2013). Clinical signs and symptoms include sadness or hopelessness, lack of concentration, and decreased energy and motivation. The symptoms of PPD are the same as for major depression. Indeed, diagnosis of PPD is based on the same criteria as major depressive disorder, with the additional specifier that symptom onset must occur during pregnancy or in the 4 weeks following delivery (American Psychiatric Association, 2013). Prevalence of PPD varies greatly by country, likely due to differences in study design, definition of the disorder, and diagnostic tools

used (Slomian et al., 2019). In the United States, the prevalence of depression during pregnancy has risen in recent years (Haight et al., 2019) and experiencing depressive symptoms after pregnancy is relatively common; an estimated 11.5 percent of women who have recently given birth (recent mothers) in the United States were affected by postpartum depressive symptoms in 2012 (Ko et al., 2017). Experiencing signs and symptoms of PPD (called postpartum depressive symptoms or PDS), whether or not a woman has been officially diagnosed or meets all criteria for a PPD diagnosis, can have adverse long-term effects for women, infants, and families if left untreated (Moehler et al., 2007; McManus et al., 2012; O'Higgins et al., 2013; Slomian et al., 2019).

PPD/PDS and negative infant health effects have been extensively studied; some examples include increased risk of delayed social, cognitive, and language development, and also behavioral and emotional issues, such as hyperactivity, opposition, and anxiety (Moehler et al., 2007; Feldman et al., 2009; McManus et al., 2012; Walker et al., 2013; Kaplan et al., 2015). Several studies have also observed harmful effects on mother–child interactions (such as mother-infant bonding and breastfeeding) and on maternal psychological health and quality of life (Hasselmann et al., 2008; Gigliardi et al., 2012; O'Higgins et al., 2013). However, only a handful of studies have examined effects of PDS on maternal physical health (Da Costa et al., 2006; Herring et al., 2008; Biesmans et al., 2013). Moreover, very few studies have assessed the relationship between PDS and positive maternal health practices, such as postpartum health care utilization (Eilat-Tsanani et al., 2006; McCallum et al., 2011). Postnatal doctor visits are critically important in order to screen for and treat serious physical and mental postpartum health conditions. Dental health is a vital component of overall physical health and well-being (U.S. Department of Health and Human Services, 2000; American College of Obstetricians & Gynecologists, 2013); therefore, postpartum dental visits are also important to ensure good health after giving birth.

In this study, Pregnancy Risk Assessment Monitoring System (PRAMS) survey data were used to examine associations between PDS and three maternal health practices: attending a postpartum checkup, having a postpartum dental visit, and use of birth control after childbirth. These practices are vitally important in order to monitor women's physical and mental health after childbirth, to ensure postpartum women get the care they need, and to ensure desired birth spacing.

Methods

Study Design and Sample

This study was conducted using a cross-sectional observational study design, and data from the Texas PRAMS survey were used. PRAMS is an ongoing state-specific, population-based surveillance system of the Centers for Disease Control and Prevention (CDC) and state health departments. PRAMS collects information on maternal attitudes, behaviors, and experiences occurring before, throughout, and shortly after pregnancy. A systematic sample of approximately 200 recent mothers is chosen from Texas birth certificates to participate in the Texas PRAMS survey each month. Selected women receive a survey within three to 6 months after delivery. Further details about PRAMS survey methodology have been described elsewhere (Shulman et al., 2018).

This study used Texas PRAMS data from Phase 7, collected during 2012–2015. Since these data were sampled from a complete file of recent births for all women who were residents of Texas, results should be generalizable to the entire population of recent mothers during this timeframe. The annual PRAMS survey response rate for Texas during this time ranged from 53 to 59 percent.

All PRAMS data are self-reported, and all participating women provide informed consent to be included in the survey. All research was conducted in accordance with prevailing ethical standards. The Texas Department of State Health Services Institutional Review Board (IRB #01-040) has approved Texas PRAMS data collection. Since our analyses used no personal identifiers and only aggregate data are reported, no additional IRB approval was necessary.

Measures

Three discrete postpartum maternal health practices were used as outcomes in our analyses. These outcomes included attending a regular postpartum checkup, having a dental visit since the infant's birth, and use of birth control after childbirth. Each of these outcome variable responses was dichotomized as 'yes/no'. PDS, the predictor of interest, was assessed using two PRAMS questions. Both questions were adapted from the Patient Health Questionnaire-2 (PHQ-2), a validated instrument to determine depression (Kroenke et al., 2003). In the first question, women were asked, "Since your new baby was born, how often have you felt down, depressed, or hopeless?" In the second question, women were asked, "Since your new baby was born, how often have you had little interest or little pleasure in doing things?" Responses to each of these questions used a 5-point Likert scale (1 = never, 5 = always). Women who responded "always" or "often" to either question were classified as experiencing PDS. Covariates in analyses included maternal age (≤ 19, 20–24, 25–34, or ≥ 35 years), race/ethnicity (white/other, Black, or Hispanic), educational attainment (less than high school completion, high school diploma, or more than a high school diploma), marital status (married or not married), and depression before pregnancy (yes or no).

Statistical Analyses

Spearman correlation coefficients were used to check for collinearity among covariates, and Rao-Scott chi-square tests were conducted to compare baseline characteristics of women with and without PDS. The association between PDS and each maternal health practice was examined using a separate logistic regression model for each outcome. Crude odd ratios (ORs) were calculated to examine the unadjusted effect of PDS on each dependent variable. Next, adjusted odds ratios (aORs) and corresponding 95 percent confidence intervals were calculated while controlling for the covariates mentioned above. Goodness-of-fit was assessed for each final model using the Wald statistic and C-statistic. All analyses were conducted using complex survey procedures in Statistical Analysis System (SAS) software (version 9.4) to account for appropriate survey design and sampling weights.

Results

Descriptive Analysis

A total of 4695 completed surveys were available for analysis. Sixteen women whose infants had died were excluded to avoid any potential confounding effect. The final sample of 4679 women represented 1,520,594 Texas women who gave birth to a live infant between 2012 and 2015. Overall, 13.8 percent of Texas PRAMS respondents indicated that they experienced PDS (95% CI 10.7–13.0). This rate did not significantly differ across survey years, ranging from 12.4 to 14.7 percent (data not shown). When asked about health conditions before pregnancy, 7.2 percent stated they had been diagnosed with depression (95% CI 6.3–8.0). Over 85 percent of respondents had a postpartum checkup (95% CI 84.0–86.7), but only 18.5 percent had a dental visit (95% CI 17.1–19.9). Almost 80 percent of PRAMS respondents (95% CI 76.7–79.7) used postpartum birth control. These rates did not differ across survey years.

Table 1 shows baseline sociodemographic characteristics for respondents with and without PDS. A higher proportion of women with PDS were younger in age ($p = 0.02$), did not complete high school ($p = 0.01$), and were unmarried ($p < 0.001$), compared to women without PDS. In addition, 31.6 percent of women with depression prior to pregnancy had PDS, compared with only 12.4 percent of women who did not indicate having depression before pregnancy ($p < 0.0001$) (data not shown).

Table 1 Sociodemographic characteristics of 2012–2015 Texas PRAMS respondents, by whether they experienced postpartum depressive symptoms (PDS)

	Respondents without PDS %[a] (95% CI)[b] N = 3921[c]	Respondents with PDS % (95% CI) N = 679[c]
Race/Ethnicity		
White/Other	41.5 (40.7–42.2)	36.7 (32.5–41.0)
Black	10.5 (10.2–10.9)	15.7 (13.6–17.7)
Hispanic	48.0 (47.2–48.8)	47.6 (43.0–52.2)
Age group (years)		
≤ 19	8.1 (7.0–9.2)	12.0 (8.7–15.3)
20–24	24.6 (22.8–26.4)	27.6 (23.3–31.9)
25–34	52.6 (50.6–54.6)	46.0 (41.2–50.9)
≥ 35	14.7 (13.4–16.0)	14.4 (10.9–17.8)
Educational attainment		
Less than HS	21.2 (19.5–22.9)	26.6 (22.1–31.1)
High school (HS)	27.1 (25.3–29.0)	29.4 (24.9–33.9)
Greater than HS	51.7 (49.8–53.5)	44.0 (39.3–48.8)
Marital status		
Married	60.9 (59.0–62.8)	45.0 (40.2–49.9)
Unmarried	39.1 (37.2–41.0)	55.0 (50.1–59.8)
Depression before pregnancy		
No	94.4 (93.6–95.3)	83.8 (80.4–87.3)
Yes	5.6 (4.7–6.4)	16.2 (12.7–19.6)

[a]All percentages (%) are weighted, but counts (N) are not weighted

[b]95% CI represents a 95 percent confidence interval around the prevalence point

[c]Only 4600 of the 4679 total respondents answered PRAMS questions regarding PDS. 79 respondents had missing information for these questions and are not included in this table

Logistic Regression Analyses

Crude regression analysis showed the unadjusted odds of having a postpartum physician checkup were increased by 70 percent among women without PDS, compared to women with PDS (OR = 1.7, p < 0.01). Women without PDS were also significantly more likely to have a postpartum dental visit compared to women with PDS (OR = 1.4, p = 0.02). The odds of using birth control after childbirth were increased by 20 percent in women without PDS compared to women with PDS; however, results were not statistically significant (OR = 1.2, p = 0.14) (data not shown). After adjusting for covariates, similar associations and estimates were observed (Table 2). Adjusted models also showed that women without PDS had significantly higher odds of having a postpartum checkup (aOR = 1.5, 95% CI 1.1–2.1, p ≤ 0.005) or dental visit after childbirth (aOR = 1.4; 95% CI 1.0–1.8, p ≤ 0.05), compared to women with PDS, while no significant association was observed for postpartum birth control use (aOR = 1.2; 95% CI 0.9–1.5; p = 0.26).

Several covariates in the adjusted model were significantly associated with the maternal health practices studied (Table 2). Women ages 35 years or older had lower odds of postpartum birth control use, compared to women 19 or younger (p < 0.01). Women with a high school education or more had higher odds of using birth control after childbirth, compared to women without a high school diploma (p < 0.001). Black and Hispanic women had lower odds of having a postpartum checkup compared to white/other women (p < 0.001). Unmarried women and women ages 20 and over had lower odds of a postpartum dental visit compared to women who were married or younger than 20 (p ≤ 0.05 for both).

Discussion

Study findings indicated that women with PDS were less likely to have a postpartum checkup compared to women without PDS. This result is inconsistent with findings reported in two other studies assessing health care utilization among women with PDS (Eilat-Tsanani et al., 2006; McCallum et al., 2011). McCallum et al. (2011) found that women with higher scores on the Edinburgh Postnatal

Table 2 Adjusted odds ratios (aORs) for the association between postpartum depressive symptoms (PDS) and maternal health practices, Texas PRAMS, 2012–2015

	Postpartum checkup	Postpartum dental visit	Postpartum birth control use
	aOR (95%CI)[a]	aOR (95%CI)	aOR (95%CI)
PDS			
With PDS	–[b]	–	–
Without PDS	1.53 (1.1–2.1)	1.36 (1.0–1.8)	1.16 (0.9–1.5)
Age group (years)			
≤ 19	–	–	–
20–24	0.87 (0.6–1.3)	0.32 (0.2–0.5)	1.07 (0.7–1.6)
25–34	1.28 (0.8–1.9)	0.34 (0.2–0.5)	0.88 (0.6–1.3)
≥ 35	1.20 (0.7–1.9)	0.39 (0.3–0.6)	0.49 (0.3–0.7)
Race/Ethnicity			
White/Other	–	–	–
Black	0.68 (0.5–0.9)	1.05 (0.9–1.3)	1.03 (0.8–1.3)
Hispanic	0.58 (0.4–0.8)	0.94 (0.7–1.2)	1.11 (0.9–1.4)
Educational attainment			
Less than HS	–	–	–
High school (HS)	1.64 (1.2–2.2)	0.80 (0.6–1.1)	1.32 (1.0–1.7)
Greater than HS	2.63 (1.9–3.6)	1.73 (1.3–2.4)	1.72 (1.3–2.2)
Marital status			
Married	–	–	–
Unmarried	0.88 (0.7–1.1)	0.78 (0.6–1.0)	0.84 (0.7–1.1)
Depression before pregnancy			
No	–	–	–
Yes	1.01 (0.7–1.5)	1.16 (0.8–1.6)	1.09 (0.8–1.5)

[a]Adjusted odds ratio (aOR) and 95% confidence interval. Each variable was adjusted for all other variables listed in the table

[b]Indicates reference category

Depressive Scale (EPDS; scores ≥ 13 indicate PDS and the need to screen for PPD) were more likely to consult a general practitioner or mental health service after childbirth, compared to women with lower EPDS scores. Also, Eilat-Tsanani et al. (2006) observed that women with PDS consulted family physicians more often than non-depressed mothers. The specific health care utilization outcome assessed in this study (postpartum checkup) was different from those outcomes examined in previous studies, which may have contributed to different findings. Further, these other studies used the 10-item EPDS instrument to determine postpartum depressive symptoms, rather than the questions used in our study, which were adapted from the 2-item PHQ-2 instrument. However, Chae et al. (2012) found that results from the PHQ-2 instrument had a sensitivity of 100% and a specificity of 79% for screening for PPD, using EPDS results as the reference standard. Therefore, the two questions used in our study should screen for PPD nearly as effectively as EPDS and should yield similar determinations of PDS.

Postnatal visits are important to a woman's health because they offer critical opportunities to screen for and treat both physical and mental postpartum health issues, including untreated PDS. However, improvements are needed to more effectively address maternal concerns at these visits, especially for women with PDS (Tully et al., 2017). Beyond discussing physical concerns at a postpartum visit, common issues such as adjusting to the demands of motherhood and feeling unprepared for postpartum symptoms and challenges are often not addressed (Martin et al., 2014). Reasons for these items not being discussed may include timing constraints for the physician or discontinuity of care due to changes in insurance coverage, the risk status of the mother, or appointment barriers (Henderson et al., 2016). Ensuring that these issues and other concerns are talked about during a routine postpartum care visit could greatly enhance the health of postpartum women and may further aid in the discovery of PDS.

Study results further show women with PDS were less likely to have a postpartum dental visit than women with no PDS. To the best of the authors' knowledge, no previous studies have examined associations between PDS and dental care after pregnancy. However, a study by Villa et al. (2013) on oral health and diseases during pregnancy among postpartum Italian women found that pregnant women rarely got regular dental care, and often have dental care needs that are not adequately addressed. In addition, patients who reported visiting a dentist when in pain and patients with three or more dental caries were significantly more likely to have periodontal disease compared to their counterparts (Villa et al., 2013). Given these previous findings and the association between PDS and postpartum dental visits observed in this study, women experiencing PDS may be at greater risk for oral disease than women without PDS, due to lack of routine care.

Study results did not provide evidence to support PDS as a risk factor for postpartum birth control use. To the best of the authors' knowledge, no previous discussions on this topic have been published. Further studies are necessary to assess whether PDS affects the use of birth control after childbirth.

Findings from this study for postpartum checkups and dental visits were consistent with findings observed among patients with non-postpartum clinical depression. In one study, among dentally anxious patients, depression was found to be a strong predictor for canceled or missed appointments (Lin, 2009). Previous studies have also suggested a link between depression and missed physician appointments (Ciechanowski et al., 2006; Cashman et al., 2004; Costas-Muniz et al., 2015). For example, Cashman et al. (2004) found having depression was significantly associated with missed appointments among low-income patients in a community health center. Although our study did not find strong evidence to support PDS as a significant risk factor for postpartum contraceptive use, Hall et al. (2013) found women with depression had a higher proportion of weeks in which no contraceptive was used. Additionally, among women who did use contraception, depression was associated with use of less effective contraceptive methods (Hall et al., 2013).

A greater proportion of PRAMS respondents who experienced prenatal depression reported having PDS, compared with respondents who did not have prenatal depression. These findings point to the need for primary care physicians and OB/GYNs to be aware of a woman's history of depression prior to pregnancy, to discuss methods to prevent or lessen depressive symptoms during and after pregnancy, and to refer women to appropriate behavioral health care as needed. We also found that younger and unmarried women were more likely to report PDS; recent mothers in these groups might additionally benefit from other support services (such as help finishing high school) that may be outside of health professionals' purview.

Although the current PRAMS survey does not ask whether a woman was receiving treatment for PDS, attention to these symptoms is important. Untreated, PDS can not only affect a woman's health, but her child's health as well; PDS can lead to poorer cognitive development, low social engagement, and less mature regulatory behaviors in offspring (Feldman et al., 2009; McManus et al., 2012). Positive parenting behaviors such as breastfeeding and ensuring timely well-child visits are also less likely to occur among women with PDS (Minkovitz et al., 2005; Hasselmann et al., 2008; Gigliardi et al., 2012; Slomian et al., 2019). Caught early, costs of treatment for PDS may be small compared to full-blown depression. For example, the Reach Out, Stand

strong, Essentials (ROSE) program, a group interpersonal therapy-based intervention, has been useful and cost-effective in reducing occurrence of postpartum depression among at-risk pregnant women (Zlotnik et al., 2016).

Our research had several strengths. Since the sample used was population-based, results should be generalizable to all women living in Texas who gave birth to a live infant during 2012–2015. Further, the study sample included a racially and ethnically diverse group of Texas women.

This study also had some limitations. Since data were self-reported, recall bias was possible. As with many surveys, Texas PRAMS response rates for the years analyzed were relatively low (53–59%), and results could be subject to non-response bias. However, PRAMS sample data were weighted to try to account for non-response, which should have helped to minimize this bias. Additionally, a clinical diagnosis of depression was not used. However, the PRAMS questions used in this study are able to detect depression fairly accurately, and PRAMS PDS estimates are thought to be a decent proxy for prevalence of postpartum depression (O'Hara et al., 2012; Fiorentini & Mullachery, 2017). Compared with clinical assessments of major depressive episodes, the two PRAMS questions used with our study's classification criteria (a response of "always" or "often" to either question) had sensitivity and specificity estimates of 62 percent and 83 percent, respectively (O'Hara et al., 2012). Further, many studies have observed associations between PDS and adverse effects on woman, infants, and children; therefore, we felt it important to examine effects of PDS on maternal postpartum health practices, whether a woman is officially diagnosed with PPD or not. Other limitations included that these results may not be generalizable to pregnancies without a live birth, and that interventions for women with PDS were not able to be assessed because PRAMS includes only limited information on mental health treatment.

Conclusions

This study examined relationships between PDS and maternal health practices not previously studied, and results contribute to the body of knowledge about adverse effects of PDS. Knowing that PDS may negatively influence maternal health practices in women after childbirth is crucial. Findings underscore the need for healthcare professionals to address moods and actions of women of childbearing age, and to provide early interventions for women at risk of depression, even before pregnancy. Physicians and behavioral health professionals should make it a priority to encourage positive maternal health practices and to discuss the importance of regular physician and dentist visits before, during, and after pregnancy.

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Authors Contributions DS—study design, development of analysis plan, data analysis, and manuscript preparation; NA—study design, development of analysis plan, review and discussion of data analysis, manuscript preparation, manuscript review and critique.

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Data Availability De-identified Texas PRAMS data can be requested from the Texas Department of State Health Services. Requests must go through appropriate review and approval for data release. No public use data file is available.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval The Texas Department of State Health Services Institutional Review Board (IRB #01-040) has approved Texas PRAMS data collection.

Consent to Participate Not applicable.

Consent for Publication Not applicable.

Code Availability Analyses were conducted using complex survey procedures in Statistical Analysis System (SAS) software, Version 9.4.

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