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ORIGINAL ARTICLE

Postpartum depression and social support in a racially and ethnically diverse population of women

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Abstract

Lack of social support is an important risk factor for postpartum depression (PPD), whereas the presence of social support can buffer against PPD. However, the relationship between social support and PPD in racial/ethnic minority women is still largely unknown. Our purpose was to examine the role of social support in a large, diverse population of PPD cases and controls. Participants ($N = 1517$) were recruited at the routine 6-week postpartum visit (± 1–2 weeks) from four different outpatient clinics in North Carolina. Case status was determined using the MINI International Neuropsychiatric Interview. Social support was measured using the Medical Outcomes Social (MOS) Support survey and the Baby's Father Support Scale (DAD). We found that higher levels of social support had a strong protective association against PPD (MOS total score OR, 0.23; 95% CI, 0.19–0.27; $p = 6.92E\text{-}90$; DAD total score OR, 0.89; 95% CI, 0.88–0.92; $p = 1.69E\text{-}29$), and the effects of social support did not differ when accounting for race/ethnicity. Additionally, PPD symptom severity is significantly and negatively correlated with the degree of social support. Our findings suggest that multi-dimensional aspects of social support may be protective for racial/ethnic minority women. We believe this study is currently the largest and most robust characterizing PPD case status and its association with social support in a diverse cohort of mothers. Future work is required to understand how best to implement culturally sensitive interventions to increase social support in minority perinatal women.

Keywords Postpartum depression · Social support · Paternal support · Race · Ethnicity

Introduction

Postpartum depression (PPD) is the most common perinatal mental health complication for women (Gavin et al. 2005; Gaynes et al. 2005). In the USA, Black and Latina women have a disproportionately higher prevalence of PPD of 35–67%, compared to 10–15% in the general population, largely based on women of European decent (Boury et al. 2004; Lucero et al. 2012; O'Hara and McCabe 2013; Ramos-Marcuse et al. 2010; Serati et al. 2016). If untreated, PPD can result in adverse consequences for the mother and the health and safety of her children. PPD is the leading cause of maternal suicide (Orsolini et al. 2016), and suicide attempts during this time period have a higher proportion of attempts using lethal means compared to those utilized outside of the postpartum period (Lindahl et al. 2005; Orsolini et al. 2016). Furthermore, PPD is associated with substantial impairment of mother–infant attachment and infant development (Beck 1998; Britton 2007; Flynn et al. 2004; Junge et al. 2017; Lovejoy et al. 2000; Murray and Cooper 2009; Paulson et al. 2006; Stein et al. 2014).

Successful prevention and prediction of PPD in women has been limited due to its complex and not yet fully understood etiology (Santos Jr. et al. 2017; Schiller et al. 2015). Epidemiological studies have identified several risk factors that contribute to vulnerability for PPD, including history of major depressive disorder, depression or anxiety during pregnancy, stressful life events, and socioeconomic and socio-

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cultural factors (Beck 2001; Meltzer-Brody et al. 2013; O'Hara and McCabe, 2013; Robertson et al. 2004).

The disproportionately higher exposure to psychosocial stressors (e.g., low social support, trauma exposure) experienced by Black and Latina women has been implicated in their increased vulnerability for PPD (Norhayati et al. 2015; Yim et al. 2015). Although the risk factors for PPD are considered multifactorial, current literature has consistently identified the significant role of social support. Many studies suggest that lack of social support is an important risk factor for PPD, whereas the presence of social support can protect against PPD (Beck 2001; Brown et al. 2012; Kim et al. 2014; Leahy-Warren et al. 2011; Leung et al. 2017; Logsdon and Usui 2001; McCall-Hosenfeld et al. 2016). Biological studies provide evidence that social support exerts a stress-buffering effect via downregulation of stress responses, including dampened sympathetic, hypothalamic-pituitary-adrenal (HPA) axis and inflammatory reactivity to stressors (Dickerson et al. 2009; Uchino et al. 1996).

In previous studies examining psychosocial factors, postpartum social support has been shown to have a stronger negative association with PPD than prenatal support (Xie et al. 2009). Objective social support, or the degree of practical support the social network is able to provide (e.g., monetary or assistance caring for the infant), and support from the romantic partner appear to have the largest effects on PPD (Stuchbery et al. 1998; Westdahl et al. 2007; Xie et al. 2010). Rich-Edwards et al. (2006) studied 1662 postpartum women and showed that although partnership status (e.g., married, co-habitating, or unpartnered) did not seem to be associated with PPD, social support from a partner, family, and friends had a strong protective association with lower levels of PPD symptoms (Rich-Edwards et al. 2006). Additionally, lower positive social interaction and affectionate support have been associated with a higher likelihood of PPD (Chojenta et al. 2012). Taken together, there is strong evidence for the protective effect of social support on PPD.

Nonetheless, information is limited regarding the effects of social support on racial/ethnic minority women in the USA, who are at high risk for experiencing socioeconomic disadvantage and stressful life events. In a cohort of Mexican-American women, moderate to high levels of social support attenuated risk for PPD (Coburn et al. 2016), and partner support protected against the negative effect of prenatal stress on infant cortisol reactivity (Luecken et al. 2013). For Black mothers, supportive relationships with the father of the baby and the mother's parent were related to lower levels of depressive symptoms (Edwards et al. 2012; Westdahl et al. 2007). Depressive symptoms were significantly associated with inadequate social support in low-income African-American adolescent mothers (Campbell-Grossman et al. 2016); however, in a different cohort of African-American women followed during pregnancy, the association between social support and depressive symptoms was negligible (Giurgescu et al. 2015).

In summary, research on social support and PPD in racial/ethnic minority women in the USA is largely limited by relatively small sample sizes and lack of comparison analysis between minority groups with and without PPD (Coburn et al. 2016; Gray et al. 2000; Martinez-Schallmoser et al. 2003; Ugarriza 2006). We address this fundamental gap in knowledge of the relationship between social support and PPD in a large and diverse cross-sectional cohort study of PPD cases and controls. For the purpose of this study, we operationalize social support as dimensions of postpartum support, including emotional, tangible, affectionate, positive social interaction, and paternal support. We hypothesized that PPD cases would experience less social support, and that minority women would benefit less (measured as increased risk for PPD) from increased social support compared to White women. This hypothesis is based on the restrictive social-environmental context to which minority are often exposed.

Methods

Setting and participants

Participants were postpartum women with ages ranging from 17 to 45 years old. For this cross-sectional cohort, women were recruited at the routine 6-week postpartum visit (± 1–2 weeks) from four different outpatient obstetrical clinic sites in North Carolina (University of North Carolina Women's Hospital, Wake County Health Department, Alamance County Health Department, and Eastern Carolina University School of Medicine).This was a convenience sample collection. Recruitment took place from September 2012 through June 2016. We utilized the 2010 US Census terms for describing the self-reported "race" and "ethnicity" of subjects; participants could endorse both ethnicity as Hispanic ("of Latino/Hispanic descent") or non-Hispanic, and race as Black (African-American) or White (i.e., European descent). We intentionally recruited self-reported Black and Latina participants for an enriched sample of these particular minority groups. White women were recruited as a comparison group.

Inclusion criteria included no major depression disorder (MDD) during the first or second trimesters, singleton pregnancy, and live birth (≥ 34 weeks gestation). Subjects were excluded if they had a lifetime mood disorder apart from MDD, lifetime psychotic disorder, lifetime alcohol or illicit substance dependence, current significant alcohol or illicit drug use, current primary anxiety disorder, any major medical illness, any serious adverse birth outcome, clinically significant anemia, or evidence of untreated significant thyroid disease or infection. Current antidepressant use was not exclusionary. All subjects were surveyed with the 10-item Edinburgh Postnatal

Depression Scale (EPDS) (Cox et al. 1987) at their 6-week postpartum visit. The EPDS is one of the most frequently used PPD screening tools and has been well-validated across many socioeconomic and ethnic groups (Gibson et al. 2009). EPDS scores ≥ 13 are consistent with PPD diagnosed by a structured clinical interview (Cox et al. 1987). Women who met preliminary case inclusion criteria (EPDS score ≥ 11) or control inclusion criteria (EPDS ≤ 7) were asked to participate in the study, and informed consent was obtained. We used these thresholds based on strict cutoff values for PPD in the literature (EPDS > 12) (Wisner et al. 2002). Scores of 11 and 12, which may be considered minor depression, were included because they are nonetheless associated with considerable morbidity and, hence, are clinically relevant (Wisner et al. 2002). The University of North Carolina Institutional Review Board Committee for the Protection of Human Subjects approved this study. Detailed information about the study can be found elsewhere (Guintivano et al. 2017).

Measures

Diagnostic assessment

All women who screened positively on the EPDS were administered the MINI International Neuropsychiatric Interview (MINI-Plus, version 6.0). The MINI-Plus is a structured clinical interview used to assess psychiatric disorders (Otsubo et al. 2005; Sheehan et al. 1998). Experienced and certified (to $\kappa > 0.8$ with gold standard ratings) psychiatric research nurses conducted the MINI-Plus. Case status was determined using the MINI-Plus (current episode of MDD). For Spanish-speaking participants, a Spanish-speaking research assistant or research nurse administered the MINI-Plus in Spanish.

Social Support Rating Scales

Routine demographic information was obtained on all subjects. Subjects also completed two self-report instruments regarding social support. All questionnaires were available in Spanish for Spanish-speaking participants. The Medical Outcomes Study (MOS) survey, 19 questions, was used to assess various dimensions of social support, including emotional, tangible, affectionate, and positive social interaction (Robitaille et al. 2011; Sherbourne and Stewart 1991). Each item was rated on a five-point scale, which ranged from "none of the time" to "all of the time." Higher scores indicate greater social support. The Baby's Father Support scale (DAD), an eight-question validated instrument, was used to assess paternal support based on material support (i.e., financial) and assistance with caretaking (i.e., helping with errands, listening to concerns, help with problem-solving) (Collins et al. 1993). Each item was rated on a four-point scale with higher scores indicating greater paternal support.

Statistical analyses

Analyses were conducted using SAS (v9.3, Cary, NC). Using a Shapiro-Wilk test, all distributions of data that rejected the null hypothesis of normality were subsequently evaluated with non-parametric tests. Descriptive statistics are reported using percentages for categorical variables and medians with interquartile ranges (IQR) for continuous variables. Bivariate analyses were conducted using χ^2 statistics for categorical variables and analysis of variance for continuous variables. Univariate and multivariate logistic regression was performed to identify association with PPD case status. Binary indicators for race (Black/White) and ethnicity (Hispanic/non-Hispanic) were used as covariates in multivariate logistical regression models for all analyses denoted as "multivariate." Spearman's Rho (ρ) was used for correlational analyses of continuous measures. A stringent significance threshold of $p < 0.001$ was used to account for multiple testing throughout the study.

Results

Demographic characteristics

There were 1517 women in this study cohort. Participants reported their race/ethnicity as 68.05% Black (67.04% non-Hispanic and 1.00% Hispanic) and 31.95% White (57.62% non-Hispanic and 42.48% Hispanic). There was a significant difference between PPD cases and controls in terms of self-reported race/ethnicity (Table 1; $\chi^2 = 43.39$; $p = 2.03\text{E-}09$). Depressed women self-reported their race/ethnicity as 59.33% Black (58.04% Non-Hispanic and 1.29% Hispanic) and 40.66% White (26.8% non-Hispanic and 13.86% Hispanic), while their non-depressed counterparts self-reported as 72.97% Black (72.13% non-Hispanic and 0.84% Hispanic) and 27.03% White (13.67% non-Hispanic and 13.36% Hispanic). To identify the role race and ethnicity play in association with social support factors for PPD, we used binary indicators for race (Black/White) and ethnicity (Hispanic/non-Hispanic) as covariates in multivariate logistical regression models for all subsequent analyses (denoted as "multivariate") in addition to univariate logistic regression models.

Among all participants, 36.2% were characterized as having current PPD based on the MINI-Plus and 63.8% as non-depressed, or controls. On average, participants were 26.7 years of age, 46.5% were married, and 96.4% were multiparous (Table 2). In terms of socioeconomic status indicators, we found that a majority of participants (69.7%) were on government-sponsored insurance, had high school level education (median = 12; IQR, 12–14), and were overweight (median BMI = 30.7; IQR, 25.8–36). Comparing PPD cases and controls, we found a statistically significant difference in level of education (multivariate OR, 0.91; 95% CI, 0.86–0.96; $p =$

Table 1 Race/ethnicity distribution of the sample

		Total ($n = 1517$)	Cases ($n = 549$)	Controls ($n = 968$)	Statistic	p value
Black	Hispanic, (%)	1.00	1.29	0.84	$\chi^2 = 43.39$	2.03E-09
	Non-Hispanic, (%)	67.04	58.04	72.13		
White	Hispanic, (%)	13.54	13.86	13.36		
	Non-Hispanic, (%)	18.41	26.8	13.67		

2.70E-04). On average, depressed women had slightly lower mean years of education ($\Delta = -0.41$) as compared to their non-depressed counterparts. There was no statistical difference between PPD cases and controls in the remaining demographic variables, including insurance status, BMI, marital status, parity, number of people living in the household, and total dependents.

Medical Outcomes Study and DAD surveys

Using the MOS survey, we measured the degree of various forms of social support, including emotional, tangible, affectionate, and positive social interaction subscales (Sherbourne and Stewart 1991). Using MOS total scores as an indicator of overall support, PPD cases were more likely to have lower perceived social support compared to controls (univariate OR, 0.26; 95% CI, 0.23–0.31; $p = 1.21E-87$; multivariate OR, 0.23; 95% CI, 0.19–0.27; $p = 6.92E-90$). We observed that decreased social support, regardless of type, was significantly associated with PPD (Table 3). The complete list of MOS items and responses can be viewed on Supplemental Table 1. Univariate and multivariate models had similar odds ratios and were both statistically significant. This indicates that the addition of race/ethnicity as a covariate into the logistic regression did not alter the results; therefore, race did not significantly influence any perceived social support differences between PPD cases and controls.

To further illustrate the role of race in social support, we performed logistic regression stratified by race (Table 4). Just as in the previous analysis, there is a significant reduction in the odds for PPD with increasing levels of social support regardless of race. In this cohort, White women appear to benefit the most from overall social support (OR, 0.06; 95% CI, 0.03–0.12; $p = 1.95E-27$) followed by Black (OR, 0.22; 95% CI, 0.18–0.27; $p = 6.82E-68$) and Latina women (OR, 0.41; 95% CI, 0.30–0.57; $p = 1.48E-09$). This trend continues across all MOS domain scores (Table 4).

Using the DAD, we assessed maternal perception of paternal support. Women with PPD were significantly more likely to have lower perceived paternal support compared to controls (univariate OR, 0.91; 95% CI, 0.90–0.92; $p = 2.79E-24$; multivariate OR, 0.89; 95% CI, 0.88–0.92; $p = 1.69E-29$). Just as with the MOS, odds ratios for the DAD were similar for both univariate and multivariate models (Table 3), indicating that the addition of race/ethnicity to our association model did not influence any perceived social support differences between PPD cases and controls. The complete list of DAD items and responses can be viewed on Supplemental Table 2.

Just as with the MOS, we show that paternal support is negatively associated with PPD when we stratify by race. White women in this sample benefit the most from paternal support (OR, 0.79; 95% CI, 0.73–0.86; $p = 8.25E-15$) followed by Latina (OR, 0.83; 95% CI, 0.77–0.88; $p = 1.23E-10$) and Black women (OR, 0.93; 95% CI, 0.91–0.95; $p = 5.18E-13$) (Table 4).

Table 2 Demographics of the study participants

	Cases	Controls	Univariate model		Multivariate model	
			OR (95% CI)	p value	OR (95% CI)	p value
Age at enrollment (year)			1.01 (0.99–1.03)	0.20	1.01 (0.99–1.03)	0.54
Median (IQR)	27 (23–30)	26 (22–30)				
Range	17–45	17–43				
Insurance status, (%) Government	70.63	69.16	1.07 (0.83–1.35)	0.55	1.28 (1.00–1.65)	0.05
Education, (year)	12 (12–14)	13 (12–14)	0.93 (0.89–0.97)	0.002	0.91 (0.87–0.96)	0.0002
BMI	30.7 (25.8–36)	30.3 (25.6–36.2)	1.00 (1.00–1.00)	0.49	1.00 (1.00–1.00)	0.72
Marital status, % Married	45.05	47.31	0.91 (0.74–1.13)	0.40	0.68 (0.54–0.87)	0.002
Parity, (%) primiparous	3.25	3.8	1.18 (0.66–2.18)	0.59	1.11 (0.60–2.05)	0.74
Total in household	4 (3–5)	4 (3–5)	1.02 (0.95–1.10)	0.62	1.02 (0.95–1.10)	0.62
Total dependents	2 (1–3)	2 (1–2)	1.09 (0.99–1.19)	0.09	1.10 (1.00–1.21)	0.05

Table 3 Medical Outcomes Study Social and DAD Support surveys

	Cases	Controls	Univariate model OR (95% CI)	Multivariate model *p* value	OR (95% CI)	*p* value
MOS Social Support						
Total Score	2.5 (1.8–3.3)	3.8 (3.3–4.0)	0.26 (0.23–0.31)	1.21E-87	0.24 (0.20–0.28)	5.03E-92
Emotional/informational support	2.5 (1.6–3.4)	3.9 (3.3–4.0)	0.30 (0.26–0.35)	1.76E-85	0.28 (0.24–0.32)	1.43E-88
Tangible support	2.5 (1.8–3.3)	3.8 (3.0–4.0)	0.38 (0.34–0.43)	1.38E-64	0.35 (0.31–0.40)	1.10E-67
Affectionate support	3.0 (2.0–4.0)	4.0 (3.7–4.0)	0.35 (0.30–0.40)	1.47E-67	0.32 (0.27–0.37)	9.54E-72
Positive social interaction	2.3 (1.7–3.3)	4.0 (3.3–4.0)	0.32 (0.28–0.37)	1.39E-84	0.30 (0.26–0.35)	3.01E-86
DAD Social Support						
Total score	31 (24–36)	37 (32–38)	0.91 (0.90–0.93)	2.79E-24	0.90 (0.89–0.92)	3.64E-28

Social support and PPD severity

Cases and controls had significant differences in PPD symptom severity (by definition) as well as social support. Among all participants, there were significant negative correlations between EPDS score and MOS total score (Spearman's $\rho = -0.54$; $p = 3.00\text{E-}107$) and DAD total score (Spearman's $\rho = -0.37$; $p = 6.00\text{E-}40$). There was also a significant positive correlation between MOS and DAD total scores (Spearman's $\rho = 0.50$; $p = 2.00\text{E-}72$) (Table 5). These significant associations also remained when stratifying based on race (Table 5).

These trends continue when examining PPD severity among cases and controls separately. There was a significant negative correlation between EPDS total score and MOS total score in cases (Spearman's $\rho = -0.23$; $p = 1.60\text{E-}07$) and a significant positive association among cases MOS and DAD total scores (Spearman's $\rho = 0.47$; $p = 1.00\text{E-}21$). EPDS and DAD scores among cases showed negative correlations; however, these associations did not meet our stringent significance threshold of $p < 0.001$ (Spearman's $\rho = -0.12$; $p = 0.02$) (Table 5). When we stratify cases by race, different associations are significant among different racial groups. Black

Table 4 Social support summary scores by self-reported race

	Cases	Controls	OR (95% CI)	*p* value
MOS total score	2.5 (1.8–3.3)	3.8 (3.3–4.0)	0.26 (0.23–0.31)	1.21E-87
Black	2.4 (1.7–3.3)	3.8 (3.4–4.0)	0.22 (0.18–0.27)	6.82E-68
Latina	2.2 (1.4–2.9)	3.4 (2.6–3.9)	0.41 (0.30–0.57)	1.48E-09
White	3.0 (2.2–3.5)	3.9 (3.6–4.0)	0.06 (0.03–0.12)	1.95E-27
MOS: emotional/informational support	2.5 (1.6–3.4)	3.9 (3.3–4.0)	0.30 (0.26–0.35)	1.76E-85
Black	2.4 (1.6–3.3)	3.9 (3.3–4.0)	0.26 (0.22–0.31)	2.15E-64
Latina	2.3 (1.1–2.9)	3.4 (2.5–4.0)	0.47 (0.36–0.62)	4.96E-09
White	3.0 (2.0–3.5)	4.0 (3.8–4.0)	0.09 (0.05–0.16)	1.89E-28
MOS: tangible support	2.5 (1.8–3.3)	3.8 (3.0–4.0)	0.38 (0.34–0.43)	1.38E-64
Black	2.5 (1.8–3.3)	3.8 (3.3–4.0)	0.34 (0.29–0.40)	1.41E-48
Latina	1.8 (1.0–2.8)	3.0 (2.0–3.8)	0.49 (0.37–0.64)	1.80E-08
White	2.8 (2.3–3.5)	4.0 (3.3–4.0)	0.18 (0.11–0.28)	9.30E-20
MOS: affectionate support	3.0 (2.0–4.0)	4.0 (3.7–4.0)	0.34 (0.30–0.40)	1.47E-67
Black	2.7 (1.7–3.7)	4.0 (3.7–4.0)	0.30 (0.26–0.36)	7.38E-55
Latina	2.7 (1.3–3.3)	4.0 (3.0–4.0)	0.45 (0.34–0.60)	2.81E-09
White	3.3 (3.0–4.0)	4.0 (4.0–4.0)	0.10 (0.05–0.21)	1.10E-17
MOS: positive social interaction	2.3 (1.7–3.3)	4.0 (3.3–4.0)	0.32 (0.28–0.37)	1.39E-84
Black	2.3 (1.7–3.3)	4.0 (3.3–4.0)	0.30 (0.26–0.36)	1.66E-61
Latina	2.0 (1.3–3.0)	3.3 (3.0–4.0)	0.39 (0.29–0.53)	2.08E-11
White	3.0 (2.0–3.7)	4.0 (3.6–4.0)	0.18 (0.11–0.28)	3.01E-21
DAD total score	31 (24–36)	37 (32–38)	0.91 (0.90–0.93)	2.79E-24
Black	30 (23–35)	36 (30.3–38)	0.93 (0.91–0.95)	5.18E-13
Latina	29 (25–35.8)	37 (34–38)	0.83 (0.77–0.88)	1.23E-10
White	33 (27–37)	37 (36–39)	0.79 (0.73–0.86)	8.25E-15

cases show significant associations between PPD severity and both measure of overall (MOS) and paternal (DAD) support, though the measures of social support are not significantly correlated. In Latina cases, there is no significant association between social support (overall or paternal) and PPD symptoms. However, overall social support and paternal social support are significantly correlated among Latinas. Among White cases, overall social support is negatively associated with PPD severity and positively associated with paternal support, though there is no significant association between PPD severity and paternal support (Table 5).

For controls, EPDS score was negatively associated with both MOS and DAD scores. MOS and DAD scores were also significantly associated with one another among controls. These trends hold true when stratifying by race with two exceptions: Latina controls did not show significant association between EPDS and MOS total scores, and White controls did not show significant association between EPDS and DAD scores (Table 5).

Discussion

We set out to examine the association of social support with PPD status at 6 weeks postpartum while accounting for race/ethnicity. We found that women with PPD were significantly more likely to have lower perceived social support compared to their euthymic (control) counterparts. However, we did find that White women benefit more from social support compared to Black and Latina women (supporting our initial hypotheses). Additionally, we found that social support is significantly and negatively associated with PPD severity, suggesting social support may be protective against PPD symptoms regardless of race/ethnicity. We believe this study is currently the largest and most robustly phenotyped for PPD case status and its association with social support in a racially and ethnically diverse sample of mothers.

Our findings are largely consistent with the literature supporting the role of social support as a protective factor against PPD (Beck 2001; Brown et al. 2012; Kim et al. 2014; Leahy-Warren et al. 2011; Leung et al. 2017; Logsdon and Usui 2001; Stuchbery et al. 1998; Xie et al. 2010), across many subtypes of support (emotional, tangible, affectionate, positive social interaction, and paternal support). This suggests that multi-dimensional aspects of social support may be protective for women irrespective of their racial/ethnic background or that the women we assessed perceive social support as more beneficial. Differences in social support among various racial and ethnic groups do not appear to explain the increased prevalence of PPD among US minority populations. Perhaps a better explanation for these discrepancies, not addressed in this research, is the role of immigration (Almeida et al. 2016; Bandyopadhyay et al. 2010; Davey et al. 2011; Dennis et al. 2017b; Eastwood et al. 2011; Falah-Hassani et al. 2016; Gaillard et al. 2014; Martinez et al. 2017), discrimination (Bécares and Atatoa-Carr 2016; Beck 2006; Canady et al. 2008; Davila et al. 2009; Dennis et al. 2017a; Dennis et al. 2016; Martinez et al. 2017; Turan et al. 2014), and low socioeconomic status. We examined proxies for socioeconomic status here (government sponsored insurance status and level of education) but found they were not significantly associated with case status. Moreover, recent

Table 5 Associations between degree of social support and PPD severity

		Cases only		Controls only		Cases + controls	
		Spearman's	*p* value	Spearman's	*p* value	Spearman's	*p* value
All samples							
EPDS	MOS	− 0.23	1.60E-07	− 0.24	3.00E-13	− 0.53	3.00E-107
EPDS	DAD	− 0.12	0.02	− 0.25	3.00E-12	− 0.37	6.00E-40
MOS	DAD	0.47	1.00E-21	0.40	1.00E-30	0.5	2.00E-72
Black							
EPDS	MOS	− 0.3	5.30E-08	− 0.27	1.00E-12	− 0.56	2.00E-81
EPDS	DAD	− 0.13	5.10E-02	− 0.27	3.00E-10	− 0.36	3.00E-24
MOS	DAD	0.51	0.05	0.41	4.00E-23	0.5	8.00E-49
Hispanic							
EPDS	MOS	− 0.09	0.44	− 0.15	0.10	− 0.43	2.00E-10
EPDS	DAD	− 0.13	0.29	− 0.31	8.50E-04	− 0.51	4.00E-13
MOS	DAD	0.5	8.40E-05	0.44	2.30E-06	0.56	4.00E-15
White							
EPDS	MOS	− 0.26	2.10E-03	− 0.30	7.30E-04	− 0.62	2.00E-28
EPDS	DAD	− 0.15	0.1	− 0.20	0.03	− 0.47	3.00E-14
MOS	DAD	0.3	1.50E-03	0.44	8.00E-07	0.55	1.00E-18

work by our team showed that genetic ancestry was not a significant biological risk factor for PPD, suggesting that there are other biological contributions, such as genetic or epigenetic factors, that may increase risk (Guintivano et al. 2017). Taken together, this suggests that neither race/ethnicity nor genetic ancestry accounts for the disparity seen in PPD prevalence, though other environmental factors such as immigration or discrimination may drive these differences across racial/ethnic groups.

Our findings underscore the clinical importance of examining social support and its role in onset of PPD. Health care providers should meaningfully assess the degree of social support during and after the pregnancy. If the patient reports poor social support, specific evidence-based care models (e.g., weekly telephone calls from nurses, home visits by nurses or social workers, informational meetings, and local support groups) should be employed to address this risk factor (Bullock et al. 2002; Matthey et al. 2004).

McLeish and Redshaw (2017) found that peer-support intervention may be particularly helpful for ethnic minority women, because these women are more likely to experience lack of social support and are unwilling to be open with health care professionals. Many perinatal women prefer receiving depression advice from informal sources (e.g., spouse, family, or friends) over professional help (Fonseca and Canavarro 2017; Scholle and Kelleher 2003). In this context, peer support might be especially beneficial for those women who have difficulty engaging with mental health professionals (McLeish and Redshaw 2017). However, it is important to note that peer support was not uniformly beneficial, namely, in those cases when the peer supporter minimized or belittled the subject's emotions in a possible effort to normalize the situation (McLeish and Redshaw 2017). Additionally, online peer support is another convenient and helpful resource that can be utilized to increase social support for women with PPD (Baumel and Schueller 2016; Evans et al. 2012). However, online support systems for perinatal women remain an understudied field. Outside of the aforementioned literature, there is no data to show online support is beneficial. Nonetheless, there is a wealth of research illustrating social support is beneficial in reducing PPD symptoms (Guintivano et al. 2018). Ultimately, enhancing peer support during the perinatal period could provide women additional means of preventing or reducing the symptoms of PPD.

Several limitations need to be taken into consideration while interpreting the results of this study. This was a cross-sectional study at 6 weeks postpartum; consequently, we cannot determine if perceived lack of social support was driving depression symptomology or if perceived lack of support was a symptom of PPD itself. Further, data on maternal country of birth, acculturation, or other social factors (e.g., perceived societal stress, discrimination) was not collected, which would allow us to account for the complexity of contextual factors among Latina and Black women. Specifically, acculturation and discrimination may influence the perception of social support and the prevalence of PPD. However, the effects of these social stressors may be attenuated because both cases and controls from the same racial/ethnic group would presumably experience similar levels of discrimination and acculturation. Further studies should take these additional social stressors into consideration. Our study, however, is the first to use a large cohort of well-characterized PPD cases and controls to examine the association of social support with PPD in a group of racially/ethnically diverse minority women.

Conclusions

We found that higher levels of social support, regardless of type, had a strong protective association against PPD, and the effects of social support did not differ when accounting for race/ethnicity. This suggests that while there may be differences in social support dynamics between racial/ethnic groups, having a support network in place appears critical in helping the reduction of PPD symptoms. Further, our work underscores the future need to determine whether the tailoring and implementation of culturally sensitive treatment models that increase social support will reduce the risk and increase prevalence of PPD in minority perinatal women.

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Compliance with ethical standards

Conflict of interest Author S.M.B. has received research support from Sage Therapeutics and Janssen. The other authors declare that they have no conflict of interest.

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