

Postpartum Depression: Racial Differences and Ethnic Disparities in a Tri-racial and Bi-ethnic Population

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Abstract *Objectives* This research investigated the differences and disparities of postpartum depression in a sample of African American, Hispanic, Native American, and White women. *Methods* A sample of 586 women were administered the Beck-Gable PDSS at 6-weeks postpartum. Factor analysis was applied to analyze the similarities among African American, Hispanic, Native American, and White participants. Confidence intervals of the rates of depression by group were estimated, followed by statistical tests to determine the differences among these rates. Risk assessment was performed with factor analysis and correlation methods. *Results* Hispanic women had a remarkably lower depression rate (2.5%) than other groups (P -values < 0.05). Significant differences for major depression were not found among African American, Native American, and White women; but Whites had higher minor

depression (P -values < 0.05). Native American women had the highest rate of major depression (18.7%) and an average minor depression (10.5%). Although Whites had the second highest major depression (17.6%) and the highest minor depression (19.6%), their average full score (76.1) was noticeably lower than that of Native Americans (82.9) and slightly lower than that of African Americans (78.9; major and minor depression rates: 14.8% and 9.9%). The sample also demonstrated strong associations of depression with depression history and breastfeeding. *Conclusion* Statistically, postpartum depression can be ranked from high to low as Native Americans, Whites, African Americans and Hispanics (Hispanics have remarkably lower depression rates). This information is critically important to clinicians, researchers, agency administrators and social workers who work with these populations.

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Keywords Postpartum depression · Racial-ethnic prevalence and disparities · Factor analysis · Correlation

Introduction

Postpartum depression threatens the health of a new mother and her infant immediately after delivery [1–4]. After giving birth, most new mothers experience mood swings and mild depression. This condition usually peaks in a few days after delivery or may extend to the end of the second week. During the postpartum period, the body returns to a state of equilibrium as a response to changes in postpartum hormone levels. However, many women, particularly those with a history of depression, may not successfully return to the state of equilibrium, resulting in a lasting postpartum

depression which usually peaks 3–6 months following delivery and requires clinical treatment.

Prevalence estimates for perinatal depression were not significantly different from that among similarly aged nonchildbearing women [5–7]. Gaynes et al. [7] concluded that the estimates for major depression alone range between 3.1% and 4.9% at different times during pregnancy and between 1.0% and 5.9% at different times during the first postpartum year; for major and minor depression together, range between 8.5% and 11.0% at different times during pregnancy and between 6.5% and 12.9% at different times during the first year postpartum.

Cox et al. [3], however, found that in the first 5-weeks postpartum, the odds of a new episode of major depression are three times that of a comparison group, suggesting that after an event as psychologically and physiologically stressful as labor and delivery, the likelihood of depression is substantially higher.

The precise level of the prevalence and incidence of postpartum (and prenatal) depression is uncertain. Published estimates of the rate of major and minor depression in the postpartum period range widely, from 5% to more than 25%, depending on the assessment method, the timing of the assessment, and population characteristics [8–10].

Postpartum depression in White and African American women has been studied in the general population by many researchers [11–13]. The absence of information on other populations was striking [7]. In particular, the depressive status of Native American and Hispanic women is essentially unknown; a direct comparison among African American, Hispanics, Native American, and White women remains a gap in the literature.

This research addressed such a gap by using data obtained from Robeson County, North Carolina. Table 1 summarizes the racial and ethnic distributions of the sample, along with comparisons to the racial and ethnic distributions of relevant populations (2000 US Census). Native American and Hispanic women were oversampled; White women were undersampled.

A previous study for the combined prevalence of postpartum depression for Robeson County was conducted in 2005 based on a smaller sample of 151 postpartum women [14].

The goal of this research was to estimate the prevalence of postpartum depression for African American, Hispanic, Native American, and White women, and determine any presence of racial or ethnic differences and disparities.

Methods

Screening Tool: Postpartum Depression Screening Scale (PDSS)

The PDSS, constructed by Beck and Gable, is designed to identify women who are at risk of developing postpartum depression [15]. This self-report instrument has 35 items measuring depression and 10 demographic characteristics; the 35 items are also grouped into seven symptom subscales, Sleeping or Eating Disturbances, Anxiety/Insecurity, Emotional Lability, Mental Confusion, Loss of Self, Guilt/Shame, and Suicidal Thoughts.

If the score for the first seven items (short score) is less than 14, a full screening is not administered and the client is classified as Normal Adjustment. If a score of 14 or higher is identified, the client completes the remaining 28 items in the same day. If the full score is between 60 and 79, the client is classified as Minor Depression; if 80 or higher, the client is classified as Major Depression. In either case, the client is referred for appropriate intervention or treatment. The reliability and validity of PDSS are provided in the Discussion section.

The Sample Design

Postpartum depressive episodes are consequences of complex causes including perinatal conditions, socio-

Table 1 Racial-ethnic distributions of the sample and population

Group	Sample		Robeson County (%)	North Carolina (%)	USA (%)
	No.	%			
Non-Hispanic Native	305	52.0	37.7 (Lumbee Tribe)	1.2	0.7
Non-Hispanic African	142	24.2	25.0	21.4	12.1
Non-Hispanic White	51	8.7	30.8	70.2	69.1
Hispanic	81	13.8	4.9	4.7	12.5
Other ^a	7	1.2	1.6	2.5	5.6
Total	586	100	100	100	100

^a Non-Hispanic individuals of other races and non-Hispanic individuals of two or more races

economic status, and other demographic characteristics. The sample design controlled for alternative causes by including women who share socio-economic status and other demographic characteristics. The sample was drawn from an area with similar socio-economic conditions and with adequate numbers in each racial and ethnic group under study.

Between September 2002 and December 2005, the Healthy Start CORPS (HSC) project and its clinical partner Robeson Healthcare Corporation (RHCC) recruited approximately one-sixth (1,145) of the total 6,975 postpartum clients in Robeson County, North Carolina for treatment. It should be emphasized that the women administered PDSS were not randomly selected for two reasons: (1) the RHCC serves primarily socio-economically underrepresented population in Robeson County; (2) the policies for this project require services be provided for low income Native American, African American, Hispanic and other women. As a result, 51% (586) of the 1,145 postpartum clients received the PDSS screenings during the early postpartum period to detect postpartum depression, with subsequent clinical referral as warranted.

This sample had higher ratios for Native American and Hispanic women and a lower ratio for White women than that for the entire population of Robeson County (Table 1). Noting the sample sizes for African American, Hispanic, Native American, and White women, this sample was statistically meaningful for screening the following demographic characteristics: maternal age, education level, marital status, history of depression, history of treatment, gravidity, number of biological children, delivery method, and feeding method by individual racial and ethnic groups. Characteristics of this sample were further analyzed using factor analysis.

The PDSS screenings were administered by the team supervisor, nurses, social workers, outreach workers, and case managers trained in data collection and handling client confidential information. In summary, all the 586 clients were first administered the PDSS short scale screening to determine the need for completing the full scale screening. The PDSS full scale screening for identifying major and minor postpartum depression was then administered to 209 of the 586 women based upon their short scores.

Statistical Analysis Methods

Statistical analysis methods employed in this research included factor analysis, confidence interval estimation, *z*-test, *F*-test, *t*-test and correlation.

Factor analysis is a statistical method by which the regularity and order in phenomena can be discerned. It is a data reduction method, but different from principal

component analysis, for investigating interdependencies between variables in an effort to explore a new set of variables, fewer in number than the original set of variables, which express commonality among the original variables [16]. For example, the common underlying dimension of social class may account for the strong positive correlations frequently found between income, education and occupation [17–19].

Factor analysis was first applied to analyze the similarities and dissimilarities of the characteristics of all 586 postpartum women between the racial and ethnic groups. The number of factors was selected according to Henry Kaiser's Eigenvalue-Based Rule: Choose factors with eigenvalues of correlation matrix larger than 1 [20].

Interval estimation was employed to estimate the 95% confidence intervals of the percentages of major and minor depression for the racial and ethnic groups. A further *z*-test was conducted to determine the significance of differences among these percentages.

The *F*-test and *t*-test were conducted separately to determine the differences in variations of PDSS full scores and differences in mean PDSS full scores between these groups (209 women who completed PDSS Full Scale screenings).

Risk assessments were performed with factor analysis and correlation methods to explore major risk factors by using the full scores of (1) all 209 women, (2) 61 women ranged in Normal Adjustment, (3) 58 women ranged in Minor Depression and (4) 90 women ranged in Major Depression respectively.

Results

Characteristics of the Postpartum Women

Table 2 illustrates the group means and percentages by each individual characteristic. A review of these means and percentages found (a) similarities between these groups for age, history of depression, treatment history, gravidity, number of biological children and delivery method, and (b) some differences for the remaining characteristics: White women received more education while Hispanic women received less; Hispanic and White women had higher marriage percentages while African American women had the lowest; African American women had the highest cesarean section rate while Hispanic and Native American women had the lowest; Hispanic women had the highest breastfeeding rate.

Within the 209 women who completed the full scale, there were no significant differences associated with maternal age and education level. Unmarried mothers had slightly higher major and minor postpartum depression

Table 2 Characteristics of Postpartum Women by Race and Ethnicity

Characteristic	Mean or Percent White (N = 51)					Mean or Percent Native (N = 305)				
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Age	23.6	0.5870	0.1247	0.5709	0.1121	0.1953	-0.1441	-0.1318	0.4987	0.1755
Education level (<12, = 12, >12 years)	28, 56, 16%	-0.1825	0.0665	0.1952	0.8844	0.0284	0.1229	0.1350	0.8833	0.0033
Marital status (married, single, all others)	36, 36, 28%	0.4451	-0.1162	-0.5651	0.3839	-0.0288	0.0347	0.6334	-0.1687	0.3410
History of depression	1.7	0.0067	0.9895	-0.0654	0.0730	-0.0812	0.9222	-0.0114	0.0559	-0.0769
Treatment history	1.7	-0.0114	0.9802	-0.0384	-0.0016	0.0267	0.8938	-0.0415	0.0505	0.0969
Gravidity	2.1	0.9574	-0.0253	-0.0181	-0.0714	0.0086	0.0104	0.0466	-0.0766	-0.1089
Number of children	1.8	0.9790	-0.0059	0.0418	-0.1915	-0.0903	0.0775	0.0089	-0.0440	-0.1306
Delivery (cesarean)	39%	-0.0491	-0.0516	-0.0878	0.0177	0.9906	0.0127	-0.0208	0.0378	0.9393
Feeding method (bottle, breast, combination)	80%,10%,10%	0.0084	-0.1547	0.8218	0.2816	-0.1534	-0.1441	-0.1318	0.4987	0.1755
Variance explained by factor		2.2147	1.6739	1.1669	1.0522	1.0056	2.2331	1.6418	1.0990	1.0639
Hispanic (N = 81)										
Characteristic	African (N = 142)									
Age	23.9	0.6972	0.0100	0.4053	0.1473	0.0260	0.2697	-0.3998	0.0629	-0.0297
Education level (<12, = 12, >12 years)	42, 39, 19%	-0.0917	0.1824	0.8607	0.0915	0.1742	-0.0617	-0.0839	0.9786	-0.0420
Marital status (married, single, all others)	8, 88, 4%	0.0501	-0.0893	0.0425	-0.0744	0.9671	0.1648	0.3771	0.2065	0.1216
History of depression	1.9	-0.0669	0.8993	-0.0298	-0.0751	0.0360	-0.0466	0.9413	-0.0747	-0.0766
Treatment history	1.9	0.1079	0.8618	0.0756	-0.0176	-0.1537	0	0	0	0
Gravidity	2.3	0.9382	-0.0188	-0.0997	0.0170	0.0388	0.9855	-0.0897	0.0107	-0.0335
Number of children	2.0	0.9647	0.0402	-0.1183	-0.1031	-0.0060	0.9593	-0.0521	0.0145	0.0087
Delivery (cesarean)	43%	0.0014	-0.0758	-0.0258	0.9997	-0.0734	-0.0360	-0.0226	-0.0711	1.0000
Feeding method (bottle, breast, combination)	87, 4, 9%	0.0319	-0.2758	0.6945	-0.2336	-0.2185	-0.1575	-0.1476	-0.1566	-0.0817
Variance explained by factor		2.1553	1.5261	1.3964	1.0134	0.9755	2.0728	1.1082	0.9556	0.9846

Note: Other (N = 6). Missing race (N = 1). Hispanic women are not included in racial groups (unduplicated counts for racial/ethnic groups)

History of depression: Number of times of previous diagnosed depression; Treatment history: Number of times of previous treatments

Factor 1: Number of children and maternal age (for Native women, including Feeding method also)

Factor 2: History of depression (for racial groups); Feeding method and Marital status (for Hispanic women)

(Factor loadings larger than or equal to 0.5 are bolded. Components of the other three factors vary by racial and ethnic groups)

rates than married mothers. There was no significant difference between the two delivery methods. The major depression rate for mothers with a history of postpartum depression or a treatment history was 3.6 times of the rate for those without a depression history. Mothers who bottle-fed their infants had significantly higher incidences of major and minor depression (27.4%) than mothers who breastfed their infants (17.7%), and the latter had slightly higher rates of depression than mothers who fed with combination (14.8%). This may explain why Hispanic women, who breastfed at higher rates, have lower rates of depression. Hence, there were strong associations between symptoms of postpartum depression and (1) history of depression, (2) history of treatment and (3) breastfeeding.

Table 2 also summarizes the factor loadings calculated with the oblique rotation “Promax”. For an interpretation of these factors, please refer to the footnote of Table 2 and [16–20]. Using factor analysis, major similarities and some dissimilarities in the variations of characteristics of women between the racial and ethnic groups were identified. Though there were some differences, the three racial groups (African American, Native American, White) shared similar depression status. Major dissimilarities existed between the Hispanic group and the three racial groups (Table 2).

Statistical Results of Postpartum Women

Table 3 summarizes the racial and ethnic profiles based on the PDSS Short Scale for the 586 women and the PDSS Full Scale for the selected 209 women, respectively. The full scale screening determined that 90 women had major postpartum depression and 57 women had minor

postpartum depression. Notice that the percentages in Table 3 are calculated on the basis of the whole sample (586 women). The first column from the left under PDSS Full Scale indicates the numbers of women who completed the full scale screening in relevant racial and ethnic categories.

The incidence of major and minor postpartum depression in the whole sample of 586 women is 25.3% (Table 3), which is higher than the various estimated national rates indicated in the literature section. Native American women had the highest incidence of major postpartum depression (18.7%), followed by White women (17.6%), then African American women (14.8%), and Hispanic women had the least (2.5%). White women were most likely to have minor postpartum depression (19.6%), Native American women second (10.5), African American women third (9.9%) and Hispanic women the least (0.0%).

95% Confidence Intervals (CIs) for Major and Minor Depression

Table 3 shows 95% CIs of the percentages of major and minor depression respectively, by total and by racial and ethnic groups. The CIs given in Table 3 demonstrate that the sample had significantly higher postpartum depression when compared to national averages [3, 7].

Between the Hispanic group and the three racial groups (African American, Native American, White), the CIs did not overlap, indicating that Hispanic women were significantly less likely to experience major and minor depression than African American, Native American and White women. Hispanic women had the highest breastfeeding rate, which explained the ethnic disparity.

Table 3 Racial and ethnic prevalence of postpartum depression

Racial and ethnic group ^a	PDSS short scale (Total score of first seven items)					PDSS full scale (Total score of all 35 items)								
	No.	≥14	%	Major depression (% in all 586 women)		Minor depression (% in all 586 women)								
				Lower 95% CI	Upper 95% CI	No.	≥80	%	Lower 95% CI	Upper 95% CI	60–79	%	Lower 95% CI	Upper 95% CI
White	51	23	45.1	31.4	58.8	24	9	17.6	7.2	28.1	10	19.6	8.7	30.5
African	142	47	33.1	25.4	40.8	48	21	14.8	9.0	20.6	14	9.9	5.0	14.8
Native	305	126	41.3	35.8	46.8	128	57	18.7	14.3	23.1	32	10.5	7.1	13.9
Hispanic ^b	81	5	6.2	0.95	11.5	4	2	2.5	−0.9	5.9	0	0.0	0.0	0.0
Other ^c	6	2	33.3	−4.41	71	4	1	16.7	−13.1	46.5	1	16.7	−13.1	46.5
Total	586	203	34.6	30.7	38.5	209	90	15.4	12.5	18.3	58	9.9	7.5	12.3

^a Missing race = 1

^b Hispanic women are not included in the racial groups

^c Results for the group “Other” are not statistically meaningful as the sample size for this group is too small

z-test for Racial Differences

The comparisons among these confidence intervals for major and minor depression were analyzed and determined to be insufficient to determine racial differences. To resolve this problem, *z*-tests among the racial percentages of major and minor depression were conducted. The African American and Native American groups were compared with the White group respectively. For the major depression, the null hypothesis states that the percentage of major depression in the Native American group was NOT significantly higher than the White group or the percentage of major depression in the African American group was NOT significantly lower than the White group. The *P*-values were 0.423 and 0.316 respectively. Hence, the major depression of Native American women was not statistically higher than that of White women at a test level $\alpha < 0.423$; the major depression of African American women was not statistically lower than that of White women at a test level $\alpha < 0.316$.

For the minor depression, the null hypothesis states that the percentage of minor depression in the Native American (respectively, African American) group was NOT significantly lower than the White group. The *P*-values were 0.031 and 0.035 respectively. Hence, the minor depression of Native American (respectively, African American) women remained statistically lower than that of White women at a test level $\alpha = 0.05$. For both major depression and minor depression, the *P*-values of the *z*-tests between the Hispanic group and each of the three racial groups were below 0.05, which indicated that the depression of Hispanic women was statistically lower than Non-Hispanic women.

Mean Full Scores and 95% Confidence Intervals

The mean full scores, standard errors and 95% confidence intervals were: White (24 women), 76.1, 4.6 and [66.6, 85.6]; African American (48 women), 78.9, 3.7 and [71.4, 86.5]; Native American (128 women), 82.9, 3.1 and [76.8, 88.9]; Hispanic (4 women, small sample for full scale), 86.2, 22.0 and [16.1, 156.4]. Hence, on average, Native American women were more likely to have postpartum depression than African American women and African American women had a likelihood similar to White women. The sample size of Hispanic women who were required to complete the full screening was too small to make a statistical inference. However, the previous analyses of confidence intervals and *z* tests demonstrated that Hispanic women manifested less postpartum depression.

F-test and t-test Results on Variances and Means of Full Scores

The Null hypothesis for the *F*-test states that the two groups had an equal variance, and the result determined which *t*-test should be used to verify the difference between the group means. The Null hypothesis for the *t*-test states that the two groups had an equal mean.

Between Native American and White: Mean Difference = 6.75, Folded *F* value = 2.36, *P* = 0.02 (unequal variance); Satterthwaite *t*-value = 1.23, *P* = 0.23. Hence, there was no significant difference between the means of Native American and White at significance level $\alpha = 0.05$. However, the *P* value (0.23) was smallest among all *P* values obtained from comparisons between racial and ethnic groups (given at below). The mean difference between Native American and White remained the largest.

Between African American and White: Mean Difference = 2.81, Folded *F* value = 1.33, *P* = 0.47 (equal variance); Pooled *t*-value = 0.45, *P* = 0.65. Hence, there was no significant difference between the means of African American and White at $\alpha = 0.05$.

Between African American and Native American: Mean Difference = -3.94, Folded *F* value = 1.78, *P* = 0.03 (unequal variance); Satterthwaite *t*-value = -0.82, *P* = 0.42. Hence, there was no significant difference between the means of African American and Native American at $\alpha = 0.05$. This *P* value was the second smallest implying that the mean difference between African American and Native American was the second largest.

Risk Factors

With three exceptional risk factors (Roller Emotion, Not Love Baby, and Felt Baby Better Without Me), the PDSS Full Scale Score for women with major postpartum depression had significantly higher correlations (0.32 or higher, most around 0.50) with the remaining 32 risk factors than for women without postpartum depression (Table 4, under columns ≥ 80 and < 60); and for women with minor postpartum depression, the PDSS Full Scale Score was only correlated with some of the 32 risk factors (Table 4, under column 60–79). For additional methods to interpret these correlation coefficients, please refer to [16, 20, 21]. For previous assessments of risk factors using other methods, please refer to [22, 23].

The major factors (and their components, i.e., the original 35 factors of the PDSS with loadings larger than 0.70; factor loadings less than 0.40 dropped; standard regression coefficients used) were identified according to the order of significance where italic (component) factors had average

Table 4 Correlation coefficients between PDSS full score and risk factors

Risk factor	PDSS full scale score				Note
	All (209)	<60 (61)	60–79 (58)	≥80 (90)	
Trouble sleep	0.41	0.21	0.16	0.46	
Anxiety	0.37	0.28	0.04	0.36	
Roller emotion	0.47	0.40	-0.20	0.26	Exception
Lost mind	0.67	0.31	-0.02	0.55	
Felt never Normal	0.61	0.26	0.04	0.47	
Not the mother wanted to be	0.57	0.29	-0.03	0.39	
Death seemed to be only way	0.58	0.10	0.03	0.54	
Lost appetite	0.55	0.33	-0.08	0.48	
Overwhelmed	0.55	0.31	0.04	0.32	
Never happy	0.71	0.37	0.21	0.57	
Not concentrated	0.74	0.47	0.36	0.55	
Stranger to self	0.71	0.30	0.27	0.51	
Felt others better	0.69	0.35	-0.22	0.44	
Better off dead	0.56	0.19	-0.05	0.47	
Hard back sleep	0.59	0.24	0.28	0.42	
Jump out of skin	0.69	0.06	0.18	0.53	
Cried a lot	0.60	0.32	0.17	0.46	
Crazy	0.77	0.05	0.26	0.65	
Does not know self	0.74	0.29	-0.08	0.67	
Not Love Baby	0.50	0.40	-0.29	0.29	Exception
Want to hurt self	0.53	0.28	-0.13	0.40	
Tossed to fall asleep	0.67	0.39	0.24	0.51	
Feel alone	0.70	0.43	-0.18	0.53	
Very irritable	0.69	0.35	0.14	0.53	
Hard to make decision	0.76	0.21	0.27	0.61	
Felt not normal	0.79	0.40	0.29	0.58	
Hide feeling	0.68	0.22	-0.44	0.46	
Felt baby better without me	0.45	0.24	-0.14	0.23	Exception
Should but not eat	0.57	0.21	-0.14	0.34	
Had to moving or pacing	0.68	0.23	0.15	0.47	
Felt anger	0.77	0.27	0.13	0.58	
Difficulty Focusing on task	0.77	0.27	0.05	0.58	
Not feel real	0.68	0.19	-0.04	0.49	
Felt failure as mother	0.67	0.31	0.01	0.56	
Wanted to leave world	0.68	0.24	0.07	0.53	

ratings of “agree” or “strongly agree” from the 90 likely major depressive participants:

- Mental Confusion (moving or pacing, *anxiety*, difficulty focusing on task, hard to make decision, *anger*, *crazy*, *irritable*),
- Suicidal Thoughts (better off dead, seemed death, want to hurt self, want to leave the world, not normal),
- Trouble Sleeping and Imaginary Feeling (feeling not real, trouble sleeping, stranger to self, *hard back sleep*, *tossed and turned to sleep*, jump out of skin, *feel alone*),

- Guilty or Shame (not loving baby, felt baby better without me, felt failure as mother, hide thinking and feeling, not mother wanted to be, felt others better),
- Loss of Self (felt never be normal, *lost mind*, never happy),
- Emotional Lability (*overwhelmed*, *roller emotion*) and
- Eating Disturbance (should but not eat, lost appetite).

Demographic characteristics in the PDSS were originally normed with a sample ($n = 525$) of White (79%), African American (11%), Hispanic (7%) and Asian American (>1%). No norms were established for Native Americans

[15]. The above seven uncovered major risk factors are consistent with the seven subscale systems of the PDSS (first paragraph of Methods section) and thus the sample provided additional evidence for the reliability of the PDSS when applied to a predominately Native American population.

Discussion

Understanding differences in postpartum depression is critically important for service delivery.

Practitioners and agency administrators can apply this knowledge for more efficient and effective intervention strategies.

Although Hispanic women in this study had a remarkably lower depression rate, the Hispanic population is generally in poorer health, though some of their health indicators, e.g., infant mortality and low birth weight, are “better than expected”, which is known as the Epidemiological Paradox or Latino Paradox or Hispanic Paradox in the literature [24].

Limitations of this research include (1) Lack of information about diagnosed major and minor postpartum depression (thus a comparison between the PDSS screening results and actual depression can not be conducted), (2) Lack of additional participant health risk information such as prenatal health and substance use, (3) Though the original sample size for Hispanic women was 81, the number of Hispanic women who were required to complete PDSS full screening was too small (increase sample size and oversample Hispanics), and (4) More complete socio-economic information of participants such as family income, employment status and smoking, should be added to the PDSS.

For the reliability of the Beck-Gable PDSS, two recent reviews in *The Sixteen Mental Measurements Yearbook* cited one outstanding rating [25, 26]. Such consistent positive commentary is uncommon within this volume. Both reviews noted that the alpha reliability coefficients fall within a consistently respectable range of .8–.91. The scale was assessed for content, criterion and construct validity. As part of the assessment of construct validity, confirmatory factor analysis was employed. All items molded into the hypothesized model. All critiques of the standards for validity were applauded by both reviewers. Overall both reviewers assessed the PDSS as an impressive clinical instrument. The Beck-Gable PDSS provides a clinically useful screening instrument for early identification of depressive episodes.

However, a (any) depression screening instrument is not a diagnostic tool and its purpose is to alert clinicians that a woman is experiencing a high level of distressing

symptoms that may develop into major or minor depression. Also, the reliability of an instrument used in different areas with varying ratios of depression changes as derived from the Bayes Theorem [27]: the correctness is higher (lower) in an area where the ratio is higher (lower). To address this problem, a head-to-head comparison using different screening instruments is suggested to enhance the accuracy of the instruments and determine which instrument is more appropriate for a particular population. Current available screening instruments include, but not limited to, PDSS, PDIS, BDI, BDI II and EPDS [7].

Postpartum depression is considerably under-diagnosed and thus many women with such symptoms are untreated. This may have serious adverse effects on the mothers and their relationship with families and others close to them, and on the child’s emotional and psychological development of the child. For diagnosis and treatment of postpartum depression, please refer to [28, 29].

Conclusion

The incidence of major and minor postpartum depression at 6-weeks postpartum was 25.3% for the tri-racial and bi-ethnic population in Robeson County, North Carolina. This is significantly higher than the estimated national rates from 6.5% to 12.9% at different times during the first year postpartum by Gaynes et al. [7], yet similar to the result by Cox et al. [3] (i.e., at 5-weeks postpartum, three times that of a comparison group). Particularly, the Native American and Hispanic populations are highlighted in this study: the former had the highest rate of major postpartum depression (18.7%), an average rate of minor postpartum depression (10.5%) and the highest average full score, while the latter had the lowest major and minor depression (2.5%). The Results section concluded that postpartum depression ranked from high to low as (1) Native Americans, (2) Whites, (3) African Americans and (4) Hispanics (significantly lower). Thus, ethnic disparity of postpartum depression exists. While racial differences of major postpartum depression were present among Native American (high), White, and African American (low), the differences were not significant. For minor postpartum depression, the racial differences were significant (White high, African American low).

The sample demonstrated strong associations between symptoms of postpartum depression and (1) history of depression, (2) history of treatment, (3) breastfeeding.

Greater understanding of racial and ethnic variations can help clinicians improve screening programs and screening instruments, and enhance the design and analysis of more representative depression samples.

Acknowledgments This research was approved and supported by the University of North Carolina at Pembroke and the Healthy Start Corps Project “Eliminating Disparities in Perinatal Health”. The Healthy Start Corps project is funded by the Maternal and Child Health Bureau, Health Resources and Services Administration, U.S. Department of Health and Human Services (Grant Number: H49MC00068-05-00). The authors state that this paper represents original work that has not been published elsewhere. In particular, the authors thank all the three reviewers for their valuable comments and detailed suggestions that help us achieve this significantly improved paper.

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