Prepregnancy Depressive Mood and Preterm Birth in Black and White Women: Findings from the CARDIA Study

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Abstract

Objectives: We examine associations among race, prepregnancy depressive mood, and preterm birth (<37 weeks gestation) in a cohort study of black and white women.

Methods: We tested for mediation of the association between race and preterm birth by prepregnancy depressive mood among 555 women enrolled in the Coronary Artery Risk Development in Young Adults (CARDIA) Study.

Results: Black women had significantly higher levels of prepregnancy depressive mood (modified CES-D score 13.0 vs. 9.5, $t = -4.64$, $p < 0.001$). After adjustment for covariates, black women had 2.70 times the odds of preterm birth as white women (95% confidence interval [CI] 1.41, 5.17). When adding prepregnancy depressive mood to this model, higher depressive mood was associated with greater odds of preterm birth (odds ratio [OR] 1.04; 95% CI 1.01, 1.07), and the effect of black race was attenuated (OR 2.47, 95% CI 1.28, 4.77).

Conclusions: Our data suggest that prepregnancy depressive mood may be a risk factor for preterm birth among black and white women.

Introduction

PRETERM BIRTH IS ONE OF THE MOST persistent and least understood public health concerns in the United States.¹ Although the overall infant mortality rate has been declining since 1933, in each year, black women were significantly more likely than white women to deliver preterm infants. In 2005, 18.4% of black singletons compared with 11.7% of white singletons were born before 37 completed weeks of gestation.² Furthermore, as gestational age decreases, this racial disparity increases. Black infants are almost three times as likely as non-Hispanic white infants to be born before 32 weeks of gestation.³ Disorders related to preterm birth are leading causes of black infant mortality and pose a serious public health concern.⁴

Possible explanations for black-white differences in preterm birth include racial differences in socioeconomic position, health behaviors, and medical risk factors; however, none of these explanations completely explains the racial difference in preterm birth. For example, studies show that the risk of preterm birth among black women exceeds that of white women with similar educational and social backgrounds, suggesting that socioeconomic position does not

entirely account for racial disparities in preterm birth.⁵ Along these lines, studies also have shown that after controlling for the independent effects of maternal behaviors, such as smoking and substance use, and known medical risk factors, including intrauterine infections and cervical incompetence, race remains a significant predictor of preterm birth.^{6–9}

An additional factor that may in part explain black-white differences in preterm birth is stress. Stress can refer to both the occurrence of stressful life events or chronic stressors and the subjective response to those stressors by individuals (emotional distress).^{9,10} Norbeck and Tilden¹¹ posit that emotional distress is meant to capture “negative self-pre-occupying thoughts” and is closely related to and sometimes defined by the better known psychological concepts of anxiety and depression. Stress has been a frequently studied psychological risk factor for preterm birth in general because conditions of the maternal environment have the potential to adversely affect the uterine environment.^{10,12–18} However, research findings are inconclusive about whether prenatal stress contributes to the higher prevalence of preterm birth among black women.^{19–23}

Another promising explanation for black-white differences in preterm birth is depressive mood. In the United States,

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14.5% of women have a new episode of major depression during pregnancy, and nearly one half of those cases are due to minor depression, a less severe constellation of depressive symptoms.²⁴ With approximately 4 million births per year in the United States, nearly 580,000 women experience depression during pregnancy. Diagnosis and treatment of depression in pregnancy are vital because of sequelae of untreated antenatal depression, which may include adverse consequences well beyond the perinatal period. Despite the prevalence of depression during pregnancy, it is not known if depressive mood has any adverse effect on preterm birth.²⁵ Studies have shown that black women report higher levels of depressive mood compared with non-Hispanic white women.^{26–30} Although findings from a handful of research studies suggest that depressive mood during the prenatal period may be associated with preterm birth,^{31–33} a growing number of studies found no association between antenatal depressive mood and preterm birth.^{13,19,25,27,34–37}

Traditional prenatal care has come under scrutiny as an effective means to address maternal conditions.³⁸ This limited period may not offer sufficient time to effectively address the health of women at greatest risk for adverse birth outcomes. In comparison, a life-course perspective suggests that adverse maternal health reflects the childhood origins of morbidity and mortality.³⁹ To date, there are no empirical studies that examine the consequences of depressive mood during the prepregnancy period and its subsequent effect on preterm birth. To address this limitation, we examined the association between prepregnancy depressive mood and preterm birth in a cohort of black and white women. First, we evaluated whether prepregnancy depressive mood has an independent effect on preterm birth among women in the sample. Second, we examined whether prepregnancy depressive mood mediates the association between race and preterm birth.

Materials and Methods

Sample

We used data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study. The design and procedures of the CARDIA Study have been described previously.⁴⁰ CARDIA began in 1985 as a prospective cohort study designed to examine the factors associated with the development of coronary artery disease (CAD) risk factors among young adults. In 1985–1986, the CARDIA Study used a stratified random sampling procedure designed to recruit, at each of four sites, equal numbers of black and white adults, women and men, aged 18–25 and 25–30 years, and those with less and more than 12 years of education. A total of 5115 participants were recruited in 1985 (1480 black women and 1307 white women) from four metropolitan areas. Because items assessing depressive mood were first administered in 1990, the analyses are limited to women who participated in year 0 (1985–1986), year 5 (1990–1991), year 7 (1992–1993), and year 10 (1995–1996) and reported 1 or more singleton births delivered between the year 5 and year 10 examinations.

Measures

Preterm birth. An eligible birth was defined using the following criteria: reporting a live singleton birth at the year 7 or year 10 examination (birth after the examination in year 5

and before the examination in year 10); gestational duration of at least 20 weeks; no presence of maternal toxemia, high blood pressure, or diabetes prior to pregnancy. A total of 555 women had at least 1 eligible birth. Preterm delivery was defined as <37 completed weeks of gestation.

Prepregnancy depressive mood. The 20-item Center for Epidemiologic Studies Depression (CES-D) Scale was administered during the year 5 examination (1990–1991). The CES-D is used to assess the overall level of depressive mood experienced during the past week.⁴¹ We used a modified version of the CES-D scale to assess depressive mood. Previously, researchers have used a modified version of this scale to assess maternal depressive mood during pregnancy.²⁵ Because some symptoms of pregnancy may be indistinguishable from somatic manifestations of depression⁴² and standard scores for pregnant women were unavailable, four items from the scale (two items that assess fatigue, one that assesses loss of appetite, and one that assesses difficulty sleeping) were excluded. These modified scores (Cronbach's $\alpha = 0.87$) were proportionally inflated using the equation:

$$[\text{Original CES-D score} - 40] \times 1.25 = \text{new CES-D score}$$

so that the scores ranged from 0 to 20.²⁵ In the present study, CES-D scores were modeled as a continuous variable. Our decision to model CES-D scores as continuous seemed warranted because greater statistical power is generated when CES-D scores are operationalized as a continuous variable. Also, depressive mood can be transient or chronic in nature, and the biological mechanisms associated with prepregnancy depressive mood and preterm birth are speculative, and the critical periods of risk also are uncertain. Thus, a continuous assessment of CES-D scores may capture distinct features that are relevant to preterm birth.

Maternal anthropometric characteristics. Respondents were asked at each examination whether they were currently pregnant or breastfeeding; number of pregnancies, including abortions, miscarriages, and live or stillbirths, since the previous examination; duration of each gestation; and dates of deliveries. Based on the data collected, we defined parity groups in the following manner. Number of previous births (parity) at baseline (year 5) was defined as those who reported none, those who reported 1 birth and those who reported ≥ 2 births before year 0 (1985–1986) as well as births that occurred between examination year 0 (1985–1986) and examination year 5 (1990–1991). To assess number of births during this period following the assessment of depression, we classified women as uniparous (1 live birth) and multiparous (≥ 2 live births).

Weight and height measurements were assessed at each examination according to a standardized protocol described previously.⁴³ Prepregnancy weight and height were obtained from measurements reported in examination year 5 (1990–1991). Prepregnancy body mass index (BMI) was computed as weight in kilograms divided by height in square meters.⁴⁴

Sociodemographic factors. To maximize the number of participants in the sample with complete data on educational attainment and family income, we implemented the following procedure. For participants who reported births in only one

wave of the study, measures of family income and education reported in the prior wave were used. If that information was not available, measures from the concurrent or following wave were used. For example, when the births were reported in year 7 and socioeconomic data from year 5 were not available, educational attainment and family income reported in year 7 were used; if still not available, those reported in year 10 were used. Educational attainment was categorized as ≤ 12 years vs. ≥ 13 years, and family income was categorized as $< \$25,000$, $\$25,000$ – $\$49,999$, and $\geq \$50,000$.

Among participants who reported eligible births in just one wave of the study, marital status during that wave was used. If marital status was not available from the same wave where the birth occurred, we assumed marital status remained unchanged. Therefore, we used information on marital status from either the wave prior to the birth or the wave after the birth. Among participants who reported singleton births at both year 7 and year 10 examinations, marital status during year 7 was used, and if not available, year 10 was used. Smoking was measured using the same scheme as marital status. Smoking status was coded in the following manner: nonsmoker, ex-smoker, and current smoker. Additional covariates included age at time of initial examination and race.

Analyses

Univariate analyses revealed that 3 participants had missing data on depressive mood and 1 participant had missing data on smoking status. Participants with missing data on these variables were excluded from all analyses, resulting in a final sample of 555 women.

The unit of analysis was the woman, not the birth. We conducted bivariate tests of association between our predictors and preterm birth using chi-square tests for categorical variables and *t* tests for continuous variables. We examined whether racial differences in preterm birth could be accounted for by prepregnancy depressive mood using steps outlined by Sobel.⁴⁵ Logistic regression models were first specified to examine the main effect of race unadjusted and adjusted for sociodemographic covariates. To determine if the association between race and preterm birth was mediated by differences in levels of prepregnancy depressive mood between black and white women, we examined the relation between race and prepregnancy depressive mood. Lastly, we examined if the effect estimate of race when including prepregnancy depressive mood in the model attenuated. We did not include income in multivariate models because of collinearity with education. Adverse health behaviors (e.g., smoking and alcohol use) were also excluded from the final multivariate models to create a parsimonious model.

Results

Black women in our sample had a prevalence of preterm birth that was more than twice that of white women (18.1% vs. 8.5%, $\chi^2 = 11.28$, 1 *df*, $p < 0.001$). In addition, black women had higher levels of prepregnancy depressive mood compared with white women, as assessed using our modified version of the CES-D (means 13.0 vs. 9.5, $t = -4.64$, $p < 0.001$). Additional descriptive characteristics of our sample by race are presented in Table 1.

In Table 2, we present results of bivariate tests between our predictors and preterm birth. In addition to the significant

association between race and preterm birth, we found that participants who delivered preterm had higher levels of prepregnancy depressive mood compared with those who did not deliver preterm (mean modified CES-D scores: 12.0 vs. 9.8, $t = -2.98$, $p = 0.004$). Women ($p < 0.001$) who reported ≥ 2 live births between examination years 5 and 10 were also more likely to deliver preterm compared with women who reported 1 birth only during that period. As expected, we also found that participants with lower levels of educational attainment were disproportionately more likely to have preterm births compared with those with higher educational levels ($p = 0.002$).

Table 3 presents results from models examining mediation of the relation between race and preterm birth by prepregnancy depressive mood. In logistic regression models examining the unadjusted relation between race and preterm birth (Model 1), we found that black women had more than twice the odds of having a preterm birth compared with white women (odds ratio [OR] 2.38, 95% confidence interval [CI] 1.41, 3.98). In a linear regression model predicting prepregnancy depressive mood (Model 2), we found that black women had levels of depressive mood that were 3.46 points higher compared with white women ($SE = 0.49$, $p = 0.001$). In order to examine if differences in preterm birth could be accounted for by levels of prepregnancy depressive mood, we examined the relation between race and preterm birth, including prepregnancy depressive mood (Model 3). We found that prepregnancy depressive mood was significantly associated with preterm birth (OR 1.04, 95% CI 1.02, 1.07). In addition, although race was still significantly associated with preterm birth, the OR was attenuated from Model 1 to 2.05 (95% CI 1.21, 3.48). Using Sobel's test of mediation, we found evidence that prepregnancy depressive mood partially mediated the association between race and preterm birth (Sobel test statistic = 2.64, $p = 0.008$).

We ran parallel models testing mediation of race by prepregnancy depressive mood, controlling for sociodemographic characteristics (Table 4, Models 4–6). Results remained substantively similar. Black women had 2.70 times the odds of having a preterm birth compared with white women (Model 4, 95% CI 1.41, 5.71), and black women had levels of prepregnancy depressive mood that were higher compared with white women (Model 5, beta coefficient (b) = 1.66, $SE = 0.88$, $p = 0.061$). When including both race and prepregnancy depressive mood while simultaneously controlling for sociodemographic and anthropometric variables (Model 6), we found that prepregnancy depressive mood was significantly associated with preterm birth (OR 1.04, 95% CI 1.01, 1.07). In addition, race continued to be associated with preterm birth, but the OR was attenuated to 2.47 (95% CI 1.28, 4.77). Using Sobel's test of mediation, however, there was not statistically significant evidence that prepregnancy depressive mood mediated the association between race and preterm birth (Sobel test statistic = 1.51, $p = 0.131$).

Despite sample size concerns, we conducted analyses stratified by race, and the analysis revealed (data not shown) that prepregnancy depressive mood was predictive of preterm birth among black women (OR 1.05, 95% CI 1.02, 1.12) but not white women (OR 1.00, 95% CI 0.95, 1.06). However the interaction term between prepregnancy depressive mood and race was not significant ($b = 0.047$, $\chi^2 = 2.20$, 1 *df*, $p = 0.138$).

TABLE 1. DEMOGRAPHIC, BEHAVIORAL, AND CLINICAL CHARACTERISTICS OF BLACK AND WHITE WOMEN WHO HAD AN ELIGIBLE BIRTH: THE CARDIA STUDY (1990–1996)

	Total (n = 555)	Black Women (n = 249)	White women (n = 306)	
Preterm birth, <i>n</i> (%)				
No	484 (87.2)	204 (81.9)	280 (91.5)	
Yes	71 (12.8)	45 (18.1)	26 (8.5)	$\chi^2_{(1)} = 11.28^{***}$
Prepregnancy depressive mood, mean (SD)	11.3 (8.7)	13.0 (9.4)	9.5 (7.2)	$t = -4.64^{***}$
Number of interim births between examination years 5 and 10, <i>n</i> (%)				
1	269 (48.5)	136 (54.6)	133 (43.5)	
≥ 2	286 (51.5)	113 (45.4)	173 (56.5)	$\chi^2_{(1)} = 6.84^{**}$
Number of previous births, baseline (year 5)				
None	161 (29.0)	52 (20.9)	109 (35.6)	
1 pregnancy	149 (26.9)	56 (22.4)	93 (30.4)	
≥ 2 pregnancies	245 (44.1)	141 (56.6)	104 (34.0)	$\chi^2_{(1)} = 29.41^{***}$
Prepregnancy BMI, mean (SD)	24.9 (5.2)	26.8 (6.8)	23.1 (3.6)	$t = -7.79^{***}$
Age, mean (SD)	24.1 (3.5)	22.8 (3.4)	24.9 (3.3)	$t = 7.24^{***}$
Marital status, <i>n</i> (%)				
Married	390 (70.3)	124 (22.3)	266 (47.9)	
Not married	165 (29.7)	125 (22.5)	40 (7.21)	$\chi^2_{(1)} = 90.5^{***}$
Education, <i>n</i> (%)				
≤ 12 years	282 (50.8)	185 (33.3)	97 (17.5)	
≥ 13 years	273 (49.2)	64 (11.5)	209 (37.7)	$\chi^2_{(1)} = 99.7^{***}$
Family income, <i>n</i> (%)				
<\$25,000	174 (31.4)	131 (23.6)	43 (7.8)	
\$25,000–\$49,999	179 (32.3)	70 (12.6)	109 (19.6)	
$\geq$ \$50,000	202 (36.4)	48 (8.7)	154 (27.8)	$\chi^2_{(2)} = 103.87^{***}$
Smoking status, <i>n</i> (%)				
Nonsmoker	337 (60.7)	158 (28.5)	179 (32.3)	
Former smoker	113 (20.4)	25 (4.5)	88 (15.9)	
Smoker	105 (18.9)	66 (11.9)	39 (7.0)	$\chi^2_{(2)} = 37.92^{***}$

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Because the elapsed time between depression assessment and date of delivery differs across respondents and it is unclear how transient the measure of depression is in the study, we constructed a time elapsed variable (measured in years) to account for the time variability inherent in these measures. The models were reran with the time elapsed variable included, and the results of the analyses were unchanged (data not shown but available on request).

Discussion

In our prospective cohort study, we confirmed that black women had significantly more than 2-fold higher odds of delivering prematurely compared with white women. We now add to this knowledge by showing that prepregnancy depressive mood is a risk factor for preterm birth and by showing that higher prepregnancy depressive mood among black women compared with white women may indirectly contribute to the greater odds of preterm birth found among black women. In the unadjusted mediation analyses, we found evidence suggesting that prepregnancy depressive mood mediated the relation between race and preterm birth. Although when adjusting for covariates, we did not find statistical evidence for mediation by prepregnancy depressive mood, we did find that the higher odds of preterm birth among black women were somewhat attenuated by including prepregnancy depressive mood as a covariate. At a minimum, these findings suggest a modest and significant association

between prepregnancy depressive mood and preterm birth; however, there is little evidence to suggest that black-white differences in prepregnancy depressive mood may directly contribute to explanations of black-white differences in preterm birth. Given the length of time between assessment of prepregnancy depressive mood and preterm birth, however, any significant effects are of great interest.

A novelty of our study was the use of longitudinal data and the availability of measures of depressive mood prior to the prenatal period, helping to protect against arguments that our findings are artifacts of reverse causality. Although previous research has focused on birth outcome disparities as functions of differential exposures to protective and risk factors during pregnancy, our findings suggest that the disparity in preterm birth may be in part a consequence of differential exposure to depressive mood prior to pregnancy.³⁹ Our findings differ from the results of a previous study in which depressive mood prior to the antenatal period was found not to be associated with preterm birth.⁴⁶ Our findings may be different because the study relied on retrospective reports of depressive mood. Retrospective reports of depressive mood may not accurately assess mood status because current mood status may affect reporting of mood status in previous or subsequent periods.⁴⁷

Support for our finding that prepregnancy depressive mood may affect the duration of the gestational period is based on biological evidence involving neuroendocrine, immune/inflammatory, and vascular processes. The dysregulation of the hypothalamic-pituitary-adrenocortical (HPA)

TABLE 2. DEMOGRAPHIC, BEHAVIORAL, AND CLINICAL CHARACTERISTICS BY PRETERM DELIVERY: THE CARDIA STUDY (1990–1996)

	Preterm birth (n = 71)	No preterm birth (n = 484)	
Race, <i>n</i> (%)			
Black	45 (63.4)	148 (42.1)	
White	26 (36.6)	236 (57.9)	$\chi^2_{(1)} = 11.28^{***}$
Prepregnancy depressive mood, mean (SD)	12.0 (11.9)	9.8 (8.0)	$t = -2.98^{**}$
Number of interim births, <i>n</i> (%)			
1	19 (26.8)	250 (51.7)	
≥ 2	52 (73.2)	234 (48.4)	$\chi^2_{(1)} = 15.36^{***}$
Number of previous births, baseline (year 5)			
None	142 (29.3)	19 (26.8)	
1	134 (27.7)	15 (21.1)	
≥ 2	208 (43.0)	37 (52.1)	$\chi^2_{(1)} = 2.30$
Prepregnancy BMI, mean (SD)	25.1 (5.7)	24.8 (5.5)	$t = -0.48$
Age, mean (SD)	23.2 (3.5)	23.6 (3.5)	$t = -0.38$
Marital status, <i>n</i> (%)			
Married	48 (67.6)	342 (70.7)	
Not married	23 (32.4)	142 (29.3)	$\chi^2_{(1)} = 0.28$
Education, <i>n</i> (%)			
≤ 12 years	48 (67.6)	234 (48.3)	
≥ 13 years	23 (32.4)	250 (51.7)	$\chi^2_{(1)} = 9.18^{**}$
Family income, <i>n</i> (%)			
<\$25,000	29 (40.9)	145 (30.0)	
\$25,000–\$49,999	24 (33.8)	155 (32.0)	
$\geq$ \$50,000	18 (25.4)	184 (38.0)	$\chi^2_{(2)} = 5.13$
Smoking status, <i>n</i> (%)			
Nonsmoker	39 (54.9)	289 (61.6)	
Former smoker	15 (21.7)	98 (20.3)	
Smoker	17 (23.9)	59 (18.8)	$\chi^2_{(2)} = 1.56$

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

axis, commonly caused by hypersecretion of corticotropin-releasing hormone (CRH), is routinely observed in those with major depression.^{48,49} CRH, a 41-amino acid neuropeptide, is a major hypothalamic regulator of human responses to stress.^{50,51} CRH is also present in the human placenta and plays a central role in initiating and coordinating fetal and maternal endocrine events involved in parturition.^{52,53} Placental CRH is sensitive to stress, and studies suggest that the release of placental CRH is triggered by stress hormones.^{54–56} In addition, elevated levels of placental CRH have been shown to be an independent predictor of preterm birth.^{57–60} Another potential etiological pathway that may explain the link between prepregnancy depressive mood and preterm birth is the strong association between intrauterine infection and preterm labor and birth.^{61–63} By altering immune functioning, depression may alter host susceptibility to maternal tract infections, resulting in increased risk of preterm labor and birth.³²

Although the interaction between race and prepregnancy depressive mood was not significant, we speculate that prepregnancy depressive mood may be a particularly salient risk factor for preterm birth among black women because of the experience of cumulative health disadvantages, or weathering. Lu and Haflon³⁹ argue that black-white differences in preterm birth are related not only to stress exposure during pregnancy but also to the stress response that has been patterned by exposures to chronic and repeated stress across the life-course. One conceptual model that has been put forward is allostatic load. Allostatic load emphasizes the cumulative health risk associated with the wear and tear that occurs across neural, neuroendocrine, and immune systems as a result of chronic exposure to stressors that influence health outcomes over the life-course.⁶⁴ A complementary framework on cumulative health risk among black women is weathering, which suggests that black women experience accelerated declines in health because of the cumulative effect of repeated

TABLE 3. UNADJUSTED LOGISTIC AND LINEAR REGRESSIONS PREDICTING PRETERM BIRTH AND PREPREGNANCY DEPRESSIVE MOOD AMONG BLACK AND WHITE WOMEN WHO REPORTED AN ELIGIBLE BIRTH IN THE CARDIA STUDY (1990–1996)

	Model 1 Preterm birth OR (95% CI)	Model 2 Prepregnancy depressive mood <i>b</i> (SE) ^a	Model 3 Preterm birth OR (95% CI)
Black vs. white	2.38 (1.41, 3.98)**	3.46 (0.49)***	2.05 (1.21, 3.48)**
Prepregnancy depressive mood			1.04 (1.02, 1.07)**

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

^aBeta coefficient from the linear regression model.

TABLE 4. LOGISTIC AND LINEAR REGRESSIONS, CONTROLLING FOR SOCIODEMOGRAPHIC CHARACTERISTICS PREDICTING PRETERM BIRTH AND PREPREGNANCY DEPRESSIVE MOOD AMONG BLACK AND WHITE WOMEN WHO REPORTED AN ELIGIBLE BIRTH IN THE CARDIA STUDY (1990–1996)

	Model 4 Preterm birth OR (95% CI)	Model 5 Prepregnancy depressive mood b (SE)	Model 6 Preterm birth OR (95% CI)
Black vs. white	2.70 (1.41, 5.17)**	1.66 (0.88)	2.47 (1.28, 4.77)**
Prepregnancy depressive mood			1.04 (1.01, 1.07)**
Number of interim births: ≥ 2 vs. 1	3.56 (1.99, 6.35)***	1.76 (0.73)*	3.24 (1.80, 5.84)***
Number of previous births, baseline (year 5)	1.02 (0.86, 1.21)	0.19 (0.25)	1.01 (0.85, 1.20)
Prepregnancy BMI	0.98 (0.94, 1.03)	−0.04 (0.07)	0.98 (0.94, 1.03)
Married vs. not married	0.79 (0.43, 1.48)	1.74 (0.89)	0.77 (0.41, 1.44)
Age, years	1.09 (0.99, 1.81)	−0.20 (0.11)	1.09 (1.00, 1.88)
Education: ≤ 12 vs. ≥ 13 years	2.22 (1.16, 4.25)*	2.21 (0.87)*	2.02 (1.05, 3.91)*

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

experience with socioeconomic and political marginalization and exclusion.⁶⁵ Empirical evidence supporting the weathering framework showed that an increase in the risk of delivering low and very low birth weight infants was accompanied by increasing age among black women and particularly among those living in low-income communities.⁶⁶ Additional evidence comes from research on intergenerational birth weight patterns among U.S.-born and foreign-born white and black women. Among descendants of foreign-born white women, there is an intergenerational improvement in birth weights, whereas among descendants of foreign-born black women, the intergenerational trend in birth weights shifts downward. These findings suggest that maternal lifelong minority status or cumulative health risk among black women is associated with infant birth weight.⁶⁷

Our results must be viewed in the light of several limitations. First, we relied on mothers' reports of gestational age at birth. Verification from clinical records was not available. In epidemiological studies, however, it has been shown that the use of maternal recollection of gestational age is a valid method of obtaining data when clinical verification is unavailable.⁶⁸ Second, we used a modified version of the CES-D scale to assess prepregnancy depressive mood. Although there is a relatively high prevalence of depressive mood among women of childbearing age, the validity of this 16-item modified CES-D scale, as well as the 20-item CES-D scale, needs further study.³² Third, our assessment of covariates, such as marital status, may limit the generalizability of the findings. Another limitation of this study is the exclusion of potential confounding factors, including rates and frequency of daily exercise, chronic medical conditions, antidepressant use, and racial discrimination. Previous studies have documented the association between these factors and either depression or preterm birth.^{27,69–76} Given these documented associations, future studies should account for these factors when examining the association between prepregnancy depression and preterm birth. An additional line of inquiry may include replication of our study with the inclusion of pregnancy depressive mood to determine if pregnancy depressive mood mediates the association between prepregnancy depressive mood and preterm birth. In addition, our study is observational; therefore, causal inferences may be suggested but not established with the data at hand. Finally, in light of

our small sample size, we may not have been able to detect meaningful effects of some of our predictors. For example, our analyses examining the interaction between race and prepregnancy depressive mood may have been insufficiently powered. Future studies may examine moderated effects of depressive mood by race using larger sample sizes.

Despite these caveats, our study has a number of strengths. To our knowledge, this is the first study that examined the association of prospective reports of prepregnancy depressive mood and preterm birth. This approach may have allowed us to obtain a clearer picture of the role of depressive mood separate from the stress associated with pregnancy. Second, our sample is drawn from a community-based sample of black and white women rather than from the population of women attending prenatal clinics associated with delivery hospitals. It has been suggested that adopting a cohort study design reduces the bias that can occur in samples drawn from clinics at teaching or referral hospitals.⁷⁷ Third, we assessed depressive mood prospectively, eliminating problems of recall bias.

Conclusions

Our study highlights the importance of examining prepregnancy depression status with respect to the risk of delivering preterm infants. These findings suggest that although race and prepregnancy depressive mood both independently and negatively affect preterm birth, there is minimum evidence to suggest from these findings that black-white differences in prepregnancy mood in part explain the black-white difference in preterm birth. Future research is needed to determine what other risk factors over the life-course are important in understanding the etiology of preterm birth as well as black-white differences in preterm birth.

Acknowledgments

The CARDIA Study is supported by contracts N01-HC-48047, N01-HC-48048, N01-HC-48049, N01-HC-48050, and N01-HC-95095 from the National Heart, Lung, and Blood Institute.

This publication was made possible by grant 1KL2RR025015-01 from the National Center for Research Resources (NCRR), a component of the National Institutes of

Health (NIH), and NIH Roadmap for Medical Research. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of NCRR or NIH. Information on NCRR is available at www.ncrr.nih.gov/. Information on Re-engineering the Clinical Research Enterprise can be obtained from nihroadmap.nih.gov/clinicalresearch/overview-translational.asp. During manuscript preparation, D.H.C. was supported by the Robert Wood Johnson Health and Society Scholars program and was also supported by the W.K. Kellogg Doctoral Fellowship in Health Policy.

Disclosure Statement

No competing financial interests exist.

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