Psychosocial Factors and Preterm Birth Among African American and White Women in Central North Carolina

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Objectives. We assessed associations between psychosocial factors and preterm birth, stratified by race in a prospective cohort study.

Methods. We surveyed 1898 women who used university and public health prenatal clinics regarding various psychosocial factors.

Results. African Americans were at higher risk of preterm birth if they used distancing from problems as a coping mechanism or reported racial discrimination. Whites were at higher risk if they had high counts of negative life events or were not living with a partner. The association of pregnancy-related anxiety with preterm birth weakened when medical comorbidities were taken into account. No association with preterm birth was found for depression, general social support, or church attendance.

Conclusions. Some associations between psychosocial variables and preterm birth differed by race. (*Am J Public Health.* 2004;94:1358–1365)

In the United States, African American women experience a higher level of preterm singleton birth compared with White women.[1] In perinatal research, race is often included in explanatory models, even though no known or postulated genetic or physiological factors linked to skin color have been identified that increase risk for preterm birth. Furthermore, racial groups in the United States tend to contain a highly heterogeneous mix of genetic traits,[2] which suggests that socioeconomic, environmental, and behavioral factors underlie racial disparities. Studies that have examined racial differences in low birthweight or in preterm birth often have focused on differences in income, education, health behaviors, and access to prenatal care as possible explanatory mechanisms[3–11]; however, these models have not completely explained the higher risk experienced by African Americans.

Some researchers have postulated that increased risk for preterm birth among African American women may be attributable to psychosocial or environmental stressors that are specific to race or that differ in prevalence by race.[3,5,10–16] Only a few studies have examined levels of stress, social support, or racial discrimination or other psychosocial factors as potential influences on preterm birth among African American and White women.

To test the hypotheses that the effect of psychosocial factors might vary by race, we examined the association between an array of psychosocial factors and preterm birth in a cohort of pregnant women in central North Carolina. We considered both differing levels of stress and differing associations between stress and preterm birth across racial groups.

METHODS

The Pregnancy, Infection, and Nutrition (PIN) Study was conducted in central North Carolina at 2 prenatal care sites. Clinics at the Wake County Department of Human Services and the Wake Area Health Education Center in Raleigh primarily serve low-income women who are eligible for publicly subsidized prenatal care. The University of North Carolina Hospital clinics serve both women eligible for publicly subsidized services and privately insured patients. We recruited a cohort of women prospectively between gestational weeks 24 and 29 (the recruitment method is described in Savitz et al.[17] and Dole et al.[18]). Women were excluded if they did not speak English, were younger than 16 years of age, were pregnant with multiples, did not plan to continue prenatal care or to deliver at the study site, or lacked access to a telephone for interviews. To be included in the PIN Study, women were required to provide genital tract specimens (swabs of vaginal and cervical fluids and cells). They were also asked to provide blood and urine samples; to participate in a telephone interview assessing sociodemographic characteristics, health behaviors, and reproductive history; and to complete a self-administered questionnaire assessing several psychosocial factors.

To be included in this analysis, a woman had to complete the psychosocial instrument, be self-described as White or African American, have a known delivery date, and have a pregnancy that began between April 1996 and August 2000. During that period, 3962 women were eligible to be recruited; of the 2444 (62%) women recruited, 2029 (83%) completed the psychosocial questionnaire (75% of African Americans and 89% of Whites). Limitation of this group to African American and White women with delivery information resulted in 1898 pregnancies available for analysis, including 8 stillbirth deliveries.

Preterm birth was defined as delivery before 37 weeks of completed gestation, with gestational age determined by an algorithm that used last menstrual period and the earliest ultrasound assessment before 20 weeks. Last menstrual period was used if the discrepancy in the estimated date of delivery involved 14 or fewer days; otherwise, ultrasound was used. In this sample, 82% of the women had both last menstrual period and ultrasound data, with 80% of these pregnancies dated by last menstrual period and 20% by ultrasound. Ultrasound dating was slightly more common among African Americans (24%) than among Whites (18%). Among African American women, 12.0% delivered preterm, whereas 11.5% of

White women delivered preterm. Delivery date information was missing for 1% of women.

According to a conceptual model, this analysis focused on 7 psychosocial areas: external stressors, measured by number of life events the woman had experienced since she became pregnant that she rated as negative as defined by the Life Experiences Survey[19]; enhancers of stress, with the focus on depression as defined by the CES-D scale[20]; buffers of stress, which included social support as defined by the MOS Social Support Survey,[21] living with the baby's father, and religiosity; coping styles, including use of strategies involving distancing or detaching from a problem and escape–avoidance of a problem as defined by the Ways of Coping Questionaire (only 2 of 8 subscales were presented in this article because the other 6 showed no association with preterm birth in either race)[22] and characteristic modes of reaction to unfair treatment as defined by Krieger and Sidney's work[23,24]; perceived stress from racial and gender discrimination, modified slightly from the original scales developed by Krieger and Sidney[23,24] (some questions were modified to focus on discrimination in getting medical care *for this pregnancy* and others were dropped because of space limitations); perceived neighborhood safety[25]; and perceived stressors, including the negative impact of adverse life events as defined by the Life Experiences Survey[19] and the negative impact of pregnancy-related anxiety (based on a subset of the Orr et al. Prenatal Social Inventory Scale[26]). In the perceived stressors category, negative impact was assessed according to a woman's assignment of a rating of −1 to −3 to the life events or anxiety. Life events as defined by the Life Experience Survey[19] were scaled 2 different ways—as external stressors indicated by the count of the events the woman experienced, and as perceived stressors indicated by the impact the woman assigned to those events she experienced.

Ninety-four percent of the women self-reported race during the telephone interview; race was abstracted from the self-reported section of the medical charts for the 6% of women for whom no telephone interview was available.

A variety of potential confounders were assessed, including participant's age, parity, education, marital status, economic status (i.e., annual household income as a percentage of the federal poverty threshold, taking into consideration the number of adults and children in the household), prepregnancy body mass index, and prenatal care site; also assessed was the presence of bacterial vaginosis at 24–29 weeks of gestation. Adjustment was made when the crude risk ratio differed from the adjusted risk ratio for each confounder by 10% or more.[27] Log-linear modeling, by means of the SAS GENMOD procedure,[28] was used for stratified analyses by race to generate adjusted risk ratios.

RESULTS

In comparison with White women in this sample, African American women were somewhat less educated, younger, much less likely to be married, more likely to be obese, and more likely to be living in poverty (Table 1). African American women had a slightly higher risk for preterm birth than White women when their prenatal care was provided at the university care site but had no difference in risk when care was provided at a public health clinic. Few women of either race reported heavy alcohol use during pregnancy, but White women were more likely to smoke, although the smoking-related risk for preterm birth was modest (Table 1). Notable associations between psychosocial measures and bacterial vaginosis were found among White women who had low social support, who used escape–avoidance as a coping mechanism, or who perceived their neighborhoods as unsafe, and among African American women who did not find religion important or who used escape–avoidance as a coping mechanism.

African American women reported a greater number of negative life events, had slightly higher levels of depression, and were less likely to be living with a partner compared with White women (Table 2). They also had higher levels of acceptance of unfair treatment, perceived racial discrimination, and perceptions that their neighborhood was unsafe. White women were less likely than African American women to rate religion as very important in their lives and to use an escape–avoidance coping style to deal with problems.

To examine the associations between psychosocial factors and preterm birth, we evaluated the variables listed in Table 1 as confounders and made adjustments as needed. Among African American women, little difference in risk of preterm birth was associated with the count of negative life events, whereas among White women, we found almost a 2-fold increased risk for preterm birth among women with high levels of stress (Table 3).

In the examination of factors that might enhance or buffer stress, neither depression nor general social support showed an association with preterm birth in either race. African American women were much less likely than White women to be living with a partner, although they did not appear to be at increased risk for preterm birth compared with women living with a partner (relative risk [RR]=1.2; 95% confidence interval [CI]=0.8, 1.8). White women had a greater risk of preterm birth if they were not living with a partner (RR=1.8; 95% CI=1.2, 2.7). There was virtually no difference between races in the risk of preterm birth when stratified by level of importance of religion as measured by frequency of church attendance.

We found little evidence of an association between coping style and preterm birth (data not shown); however, African American women who reported high use of distancing from problems as a coping strategy had a risk ratio of 1.8 (95% CI=1.0, 3.2) for preterm birth compared with women with low use of this strategy; this association did not hold for White women. White women had an increased risk for preterm birth when they were either moderately or very likely to cope with problems through escape or avoidance (RR=1.5, 95% CI=1.0, 2.2).

A substantial proportion of women of both races reported that they did not feel that they had been subjected to unfair treatment (36% of African Americans and 32% of Whites). Among White women who did report experiencing unfair treatment, the association with preterm birth was highest for women who reacted not by talking to others about the expe-

TABLE 1—Characteristics of African American and White Women and Risk Ratios (RRs) for Preterm Birth: Women With Pregnancies Initiated April 1996–August 2000

	African American Women (n = 724)			White Women (n = 1174)		
	No.	% Preterm	RR (95% CI)	No.	% Preterm	RR (95% CI)
Mother's education, y						
<12	176	8.0	0.6 (0.3, 1.1)	166	14.5	1.0 (0.6, 1.6)
12[a]	277	13.4	1.0	276	14.9	1.0
>12	271	13.3	1.0 (0.6, 1.5)	732	9.6	0.6 (0.4, 0.9)
Mother's age at 24 weeks' gestation, y						
16–19	149	8.1	0.7 (0.4, 1.3)	112	11.6	1.0 (0.5, 1.7)
20–29[a]	434	11.1	1.0	568	12.5	1.0
≥30	141	19.2	1.7 (1.1, 2.7)	494	10.7	0.9 (0.6, 1.2)
Parity						
0[a]	328	10.1	1.0	562	9.1	1.0
1	213	13.2	1.3 (0.8, 2.1)	359	14.8	1.6 (1.1, 2.3)
≥2	178	14.0	1.4 (0.9, 2.3)	248	12.5	1.4 (0.9, 2.1)
Missing information	5			5		
Marital status						
Not married[a]	535	11.0	1.0	314	12.4	1.0
Married	186	14.5	1.3 (0.9, 2.0)	860	11.2	0.9 (0.6, 1.3)
Missing information	3			0		
Height, inches						
<62	71	14.1	1.2 (0.7, 2.3)	107	15.0	1.2 (0.8, 2.0)
62 to <68[a]	512	11.5	1.0	872	12.0	1.0
≥68	113	13.3	1.2 (0.7, 2.0)	172	7.6	0.6 (0.4, 1.1)
Missing information	28			23		
Prepregnancy BMI						
Underweight (<19.8)	90	8.9	0.8 (0.4, 1.7)	190	11.1	1.0 (0.6, 1.5)
Normal weight (19.8–26.0)[a]	280	11.1	1.0	622	11.4	1.0
Overweight (>26.0–29.0)	80	8.8	0.8 (0.4, 1.7)	115	11.3	1.0 (0.6, 1.7)
Obese (>29.0)	229	14.9	1.3 (0.9, 2.1)	205	12.7	1.1 (0.7, 1.7)
Missing information	45			42		
Poverty index, % of federal poverty threshold						
<50	93	11.8	1.0 (0.5, 2.0)	33	12.1	1.1 (0.4, 2.8)
50 to <100	170	15.9	1.3 (0.7, 2.3)	137	13.9	1.2 (0.8, 2.0)
100 to <200	202	10.4	0.9 (0.5, 1.6)	235	11.5	1.0 (0.7, 1.5)
≥200[a]	141	12.1	1.0	678	11.2	1.0
Missing information	118			91		
BV						
No BV[a]	554	12.3	1.0	1026	11.3	1.0
BV detected	141	11.4	0.9 (0.6, 1.5)	87	11.5	1.0 (0.6, 1.9)
Missing information	29			61		
Clinic site						
University care site	335	16.4	2.0 (1.3, 3.0)	900	12.6	1.6 (1.0, 2.4)
Public health department[a]	389	8.2	1.0	274	8.0	1.0
Alcohol use during pregnancy, drinks/week						
<5 drinks/week[a]	660	11.7	1.0	1111	11.5	1.0
≥5 drinks/week	5	40.0	3.4 (1.1, 10.2)	11	0	. . .[b]
Missing information	59			52		

Continued

rience but by attempting to do something about it (RR=1.9; 95% CI=0.9, 3.7). Among African American women who reported experiencing higher levels of racial discrimination versus those reporting lower levels, there was an increased risk for preterm birth (RR=1.8; 95% CI=1.1, 2.9). The African American women surveyed had a risk ratio of 1.6 (95% CI=0.9, 2.6) for a high level of gender discrimination, whereas White women showed no association. Whereas African Americans were more likely than Whites to report low perceived neighborhood safety, they had no increased risk associated with this exposure. White women who reported living in a neighborhood perceived as unsafe were at a slightly increased risk compared with White women who did not report this perception for preterm birth (RR=1.4; 95% CI=0.9, 2.3).

White women with high perceived stress from the negative impact of adverse life events had a risk ratio of 2.2 (95% CI= 1.3, 3.5) for preterm birth; there was no association present among African Americans.

Among women who reported high pregnancy-related anxiety levels, we found an increased risk of preterm birth for African American women (RR=2.0; 95% CI=1.3, 3.2) and a somewhat lower risk for White women (RR=1.6; 95% CI=1.1, 2.3). Because the observed association between pregnancy-related anxiety and preterm birth may reflect increased medical risks that induce anxiety rather than a causal link between anxiety and preterm birth, we reran this model, restricting it to the 699 White and 390 African American women who experienced no bleeding during the pregnancy and were not put on bed rest. The risk ratios were reduced to 1.3 (95% CI=0.6, 2.6) among African Americans and 1.2 (95% CI=0.7, 1.9) among Whites, which suggests that at least some of this association may have resulted from underlying medical conditions that contribute to the woman's anxiety.

To examine whether the associations between the psychosocial variables and preterm birth held for women who had spontaneous preterm deliveries, we reran all models, this time excluding women who underwent medically indicated preterm deliveries as assessed by study obstetricians, and

TABLE 1—*Continued*

Smoked during months 1–6 of pregnancy, cigarettes/day						
None[a]	541	11.5	1.0	807	10.8	1.0
1–9 cigarettes/day	86	14.0	1.2 (0.7, 2.2)	147	13.6	1.3 (0.8, 2.0)
10–19 cigarettes/day	19	15.8	1.4 (0.5, 4.0)	99	16.2	1.5 (0.9, 2.4)
≥20 cigarettes/day	7	14.3	1.2 (0.2, 7.8)	43	11.6	1.1 (0.5, 2.5)
Missing information	71			78		

Notes. CI = confidence interval; BMI = body mass index; BV = bacterial vaginosis.
[a]Reference category.
[b]Too few cases to calculate risk ratio.

examined the 108 spontaneous preterm cases and 1676 term births. Among African American women with a spontaneous preterm birth, several psychosocial variables were associated with higher risk ratios for preterm birth. These variables included women who reported: the highest number of negative life events experienced (RR changed from 1.3 to 1.6 [95% CI=0.8, 3.5]); the highest level of perceived gender discrimination (RR changed from 1.6 to 2.1 [95% CI: 1.0, 4.3]); the highest life events sum of negative impacts (RR changed from 1.4 to 1.9 [95% CI: 0.8, 4.7]); and high pregnancy-related anxiety (RR changed from 2.0 to 3.0 [95% CI: 1.5, 6.2]). Among White women, risk ratios changed only minimally (data not shown).

DISCUSSION

In this prospective cohort study, the prevalence of several psychosocial variables differed by race. The associations between stratum-specific psychosocial variables and preterm birth were also different for African American and White women for several variables, although not all. Because our sample had sufficient numbers of African American and White women, we were able to examine some factors that have been postulated to be differentially distributed or associated with preterm birth by race: measures of discrimination, reaction to unfair treatment, perception of neighborhood safety, and potential benefits from living with a partner or involvement with religion.

African American women who reported high levels of perceived racial or gender discrimination were more likely than those who reported lower levels to deliver preterm. Neither of these discrimination measures was associated with increased risk among White women. Whereas a number of researchers have developed extensive historical bases and theoretical models supporting an association between racism or other forms of discrimination and adverse birth outcomes,[2,12,13,16] only a few studies have examined the association of discrimination with pregnancy outcomes. In an analysis of 147 African American women, no association with birthweight or gestational age was found for stress, self-esteem, or racism, although higher perceived racism was associated with a higher level of stress, and higher self-esteem was associated with decreased levels of stress.[29] An exploratory study of 94 African American women found that neither life events nor perception of living in an unsafe neighborhood was associated with perceived stress; however, racial discrimination was related to perceived stress.[25] Our findings provide support for an association between racial discrimination and preterm birth; further empirical exploration is warranted.

In developing the John Henryism scale, James[30] began with the hypothesis that African Americans of lower socioeconomic status were exposed to psychosocial stressors. These stressors induced different coping responses that in turn are predictors for hypertension. Our examination of several coping subscales indicated a modestly increased risk for preterm birth among African American women when their coping style involved distancing from problems, but no such association was seen among White women. Among African American women, those whose coping styles involved a high level of escape–avoidance showed modest increases in the risk of preterm birth compared with women reporting low levels of escape–avoidance coping. Among White women, there was also a modest increased risk among those who reported medium or high levels of escape–avoidance coping.

Previous research has examined community and neighborhood factors as a possible explanation for racial differences in birth outcomes.[31,32] Collins et al.[33] asked 80 African American women to rate their residential environments and 24 stressful life events to assess any association with very low birthweight (<1500 g). The investigators reported an odds ratio of 3.2 (95% CI=1.2, 8.8) for the overall rating of the neighborhood and an odds ratio of 3.1 (95% CI=1.2, 8.2) for 3 or more stressful events during pregnancy, which indicated that women who lived in unfavorable neighborhoods or who experienced more stress in their lives were more likely to deliver low birthweight infants. (The variables Collins et al. used to define an unfavorable neighborhood included: police protection, protection of property, personal safety, friendliness, delivery of municipal services, cleanliness, quietness, and schools.) The data from our survey, in which women were asked to assess neighborhood safety, do not support an association of adverse residential environments with preterm birth among African Americans; however, among White women who rated their neighborhoods as unsafe, an increased risk for preterm birth was found.

Although the psychosocial measures just mentioned were of particular interest for examining racial differences in risk, we also looked at psychosocial factors that have been examined in other studies that did not examine race. Although African American women in our sample reported more depressive symptoms, we found no association between depression and preterm birth among either African American or White women and no benefit for general social support, although White women who lacked the support presumably derived from living with a partner were at increased risk for preterm birth. These findings are somewhat consistent with those of other studies.[34–36]

In our cohort, pregnancy-related anxiety was associated with the highest risk for pre-

TABLE 2—Distribution of Psychosocial Factors Among African American and White Women: Women With Pregnancies Initiated April 1996–August 2000

Model	African American Women Mean (SD) or %	African American Women Range from 10th to 90th percentile	White Women Mean (SD) or %	White Women Range from 10th to 90th percentile
External stressors: life events, sum of negative count [0–41][a]	4.2 (3.3)	0–9	3.4 (3.0)	0–8
Enhancers of stress: depression [0–60][b]	19.8 (11.8)	6–37	14.8 (11.1)	4–32
Buffers of stress				
Social support, sum of scale [19–95][c]	72.9 (18.4)	44–94	78.2 (15.3)	57–95
Living with a partner	48.3		87.8	
Religion very important	64.8		46.2	
Church attendance, times per year [0–365]	30.7 (40.5)	0–52	22.2 (32.0)	0–52
Coping style				
Coping, distancing from problem [0–100][d,e]	11.7 (4.5)	6.3–16.6	10.3 (4.7)	4.6–16.0
Coping, escape–avoidance [0–100][d,f]	11.3 (4.9)	5.6–16.9	8.6 (5.1)	2.5–14.8
Accept unfair treatment (vs do something)[g]	30.8		22.3	
Talk about unfair treatment (vs keep it to self)[g]	79.9		89.4	
Discrimination				
Perceived racial discrimination [0–6][h]	1.1 (1.4)	0–3	0.2 (0.6)	0–1
Perceived gender discrimination [0–4][i]	0.6 (0.9)	0–2	0.5 (0.8)	0–2
Perceived neighborhood safety [7–33][j]	13.2 (5.8)	7–22	10.1 (3.6)	7–15
Perceived stress from life events and pregnancy anxiety				
Life events, sum of negative impact [–123–0][k]	–8.3 (7.9)	–19–0	–6.1 (6.5)	–15–0
Pregnancy anxiety, sum of negative impact [–18–0][l]	–3.8 (3.8)	–9–0	–3.9 (3.2)	–8–0

[a]The external stressors scale summed 39 life events from the Life Experiences Survey[19] that the woman indicated she had experienced since she got pregnant and considered to have had a negative impact on her life. Cutpoints of 0–2, 3–5, 6–8, and >8 events were used.
[b]The Center for Epidemiologic Studies Depression Scale[20] was used to assess depression symptoms using a 20-item scale with Likert response categories about feelings and activities the respondent experienced during the past week. A sum was calculated and cutpoints of 0–16, 17–24, >24 were used.
[c]The MOS Social Support Scale[21] assessed the participant's perception of the availability of social support using a five-category Likert response for 19 items. Responses were summed and cutpoints of >89, 79–88, 65–78, and 19–64 were used.
[d]The 66-item Ways of Coping Questionnaire[22] uses four-point Likert response categories. Participants were asked to indicate, since they got pregnant, how often they used each coping approach when they "had a problem."
[e]The distancing from a problem subscale included six items to assess cognitive efforts to be detached or minimize the significance of a situation. Quartile cutpoints for the entire cohort were used.
[f]The escape-avoidance subscale used eight items that assess wishful thinking and behaviors to escape or avoid a problem. Quartile cutpoints for the entire cohort were used.
[g]Questions developed by Krieger and Sidney[23,24] assessed whether individuals felt they had been treated unfairly, and if so, their responses to that treatment.
[h]Based on discrimination questions developed by Krieger and Sidney[23,24] each participant was asked whether she felt she had been discriminated against because of her race or color at school, when trying to get a job, at home, when trying to get medical care for this pregnancy, when she tried to get housing, or in her dealings with the police or in a court. Sums of yes responses were calculated and cutpoints of 0, 1, or >1 were used.
[i]Based on discrimination questions developed by Krieger and Sidney[23,24] each participant was asked whether she felt she had been discriminated against because she was women at school, when trying to get a job, at home, or when trying to get medical care for this pregnancy. Sums of yes responses were calculated and cutpoints of 0, 1, or >1 were used.
[j]Participants were asked about perceived safety of the neighborhood at night, during the day, frequency of property crimes, personal crimes, shootings, police arrests, and drug dealing. These items were used to assess how stressful they perceived their contextual environment to be.[25]
[k]Life events from the Life Experiences Survey[19] allowed women to assign any of the 39 events an impact level from –3 to +3. A sum of the negative impacts (–1 to –3) was calculated and used to measure perceived stress from life events. Cutpoints of absolute values were 0–4, 5–8, 9–15, and >15.
[l]Six items from the Prenatal Social Environment Inventory[26] were used to assess the participant's anxiety about the pregnancy and becoming a parent. A sum of the negative impacts (–1 to –3) was calculated and used to measure perceived stress from pregnancy-related anxiety. Cutpoints of absolute values were 0–2 and >2.

term birth out of all psychosocial measures for African American women, with an increased risk among White women who reported pregnancy-related anxiety that was not as strong as that for African American women. This finding was consistent with previous research involving anxiety and pregnancy outcomes,[37,38] although not all previous research found an association between trait anxiety and preterm birth.[34] However, the etiological importance of anxiety in the context of actual pregnancy problems is difficult to ascertain; anxiety may well result from concern about medical problems and reflect a form of confounding by indication. ("Confounding by indication is a term used when a variable is a risk factor for a disease among nonexposed persons and is associated with the exposure of interest in the population from which the cases derive, without being an intermediate step in the causal pathway between the exposure and the disease."[39]) When we restricted the analysis to women with no bleeding or prescribed bed rest, the association weakened considerably. Pregnancy-related anxiety may act through a causal pathway linking anxiety with a stress-hormone response to preterm birth; however, our data indicate that the role of anxiety may not be substantial in the absence of medical complications. Further explorations of self-reported anxiety or stress, measures of stress hormones, and measures of potential causes of anxiety, including medical comorbidities, are required to elucidate this relationship.

Measurement of psychosocial factors involves asking respondents to report perceptions of the existence of stressors and their positive or negative impact on the respondents' lives. Prevalence of some of these stressors differed by race, as did association with preterm birth. Additionally, when the association between specific strata of the psychosocial measures and preterm birth was examined, we saw an increased risk for preterm birth for African American women but not White women for certain psychosocial measures (e.g., distancing from a problem, racial discrimination), and an increased risk for Whites only for different measures (e.g., life-events counts and impacts, living with a partner). Within racial groups, there may be a difference in how the questions concerning

TABLE 3—Psychosocial Factors and Preterm Births Among African American and White Women: Women With Pregnancies Initiated April 1996–August 2000

Model	African American Women			White Women		
	No. Term	No. Preterm	Adjusted RR (95% CI)	No. Term	No. Preterm	Adjusted RR (95% CI)
External stressors: life events, sum of negative count[a,b]						
Low stress[c]	152	17	1.0	338	36	1.0
Medium-low stress	164	20	1.1 (0.6, 2.0)	273	33	1.3 (0.8, 2.0)
Medium-high stress	116	17	1.3 (0.7, 2.4)	201	26	1.3 (0.8, 2.1)
High stress	188	29	1.3 (0.8, 2.3)	219	39	1.8 (1.2, 2.8)
Enhancers of stress: depression[b,d]						
Low level of symptoms[c]	298	41	1.0	669	84	1.0
Medium level of symptoms	137	16	0.9 (0.5, 1.5)	172	23	1.1 (0.7, 1.6)
High level of symptoms	196	29	1.1 (0.7, 1.7)	191	28	1.1 (0.8, 1.7)
Buffers of stress						
Social support, sum of scale[b,e]						
High[c]	138	27	1.0	320	49	1.0
Medium-high	166	17	0.6 (0.3, 1.1)	257	36	0.9 (0.6, 1.4)
Medium-low	145	15	0.7 (0.4, 1.2)	277	28	0.7 (0.4, 1.1)
Low	183	28	0.8 (0.5, 1.4)	180	22	0.8 (0.5, 1.3)
Living with a partner[b,f]						
Yes[c]	284	37	1.0	874	105	1.0
No	301	42	1.2 (0.8, 1.8)	113	23	1.8 (1.2, 2.7)
Importance of religion[b,g]						
Very important[c]	378	52	1.0	455	63	1.0
Fairly important	89	15	1.2 (0.7, 2.1)	296	34	0.9 (0.6, 1.3)
Fairly unimportant	8	2	. . .[h]	75	12	1.3 (0.7, 2.2)
Not at all important	110	10	0.8 (0.4, 1.5)	165	20	0.9 (0.6, 1.5)
Church attendance[b,i]						
≥49 times/year[c]	172	26	1.0	228	32	1.0
13–48 times/year	144	24	1.1 (0.6, 1.8)	158	27	1.2 (0.8, 2.0)
1–12 times/year	120	13	0.7 (0.4, 1.4)	274	32	0.9 (0.6, 1.5)
None	151	16	0.7 (0.4, 1.3)	333	38	0.9 (0.6, 1.5)
Coping style						
Distancing from a problem[b,j]						
Low[c]	153	15	1.0	411	51	1.0
Medium	224	28	1.3 (0.7, 2.3)	318	42	1.1 (0.7, 1.6)
High	248	42	1.8 (1.0, 3.2)	297	41	1.1 (0.7, 1.6)
Escape–avoidance of a problem[b,k]						
Low[c]	131	15	1.0	478	48	1.0
Medium	224	29	1.2 (0.6, 2.1)	306	49	1.5 (1.0, 2.2)
High	270	41	1.4 (0.8, 2.5)	242	37	1.5 (1.0, 2.2)
Response to unfair treatment[b,l]						
Talk about it, act on it[c]	226	35	1.0	512	57	1.0
Talk about it, accept it	72	12	1.0 (0.6, 1.9)	109	14	1.0 (0.5, 1.7)
Don't talk about it, act on it	30	7	1.2 (0.5, 2.6)	27	7	1.9 (0.9, 3.7)
Don't talk about it, accept it	47	3	. . .[h]	41	8	1.6 (0.8, 3.1)
Discrimination						
Perceived racial discrimination[b,m]						
None[c]	310	33	1.0	880	119	1.0
Some	133	15	1.1 (0.6, 2.1)	98	10	0.8 (0.4, 1.4)
High	181	35	1.8 (1.1, 2.9)	51	4	. . .[h]

Continued

psychosocial factors are interpreted. Also, women may be responding to these measures from different perspectives according to lifelong cultural and environmental exposures that influence their interpretation of longstanding background stress that may or may not result in an increased risk for adverse birth outcome.

The African American women in this study who reported being subjected to racism had an increased risk for preterm birth. Development of new methods for measuring these underlying stressors may improve our understanding of the role of stress in pregnancy outcomes among African American women.

Study Limitations

Limitations in our data must temper any conclusions. Because our study population was recruited at a small number of clinical settings that included a university hospital—which had both an above-average number of women at high risk for preterm births and publicly funded prenatal care—the generalizability of our results is limited. This limitation is illustrated by the unusually high risk of preterm birth among Whites and the low risk among African Americans in our study. The psychosocial profiles of women in this sample may have differed in important ways from those of women in the general population, especially with regard to previous medical problems with their pregnancies or medical comorbidities and associated stressors. The requirement that the women be in prenatal care by early in the third trimester of pregnancy resulted in exclusion of women who received no prenatal care or received it very late. However, North Carolina vital records for 1998 births in the 3 counties in which most study participants lived indicate that only 2% of the women initiated prenatal care after the sixth month of pregnancy. Because of the extensive protocols of the PIN Study, refusal rates were not trivial.

Nonresponse to the self-administered psychosocial questionnaire was also a concern, especially among African American women. An examination of the women who participated in the PIN Study but who did not return the psychosocial instrument showed that the nonrespondents among both racial groups were at increased risk for preterm birth (19.0% among Whites, 17.3% among African

TABLE 3—*Continued*

Perceived gender discrimination[b,m]						
None[c]	396	48	1.0	661	93	1.0
Some	139	16	1.0 (0.5, 1.7)	231	26	0.8 (0.5, 1.2)
High	92	19	1.6 (0.9, 2.6)	139	15	0.8 (0.5, 1.3)
Perceived neighborhood safety[b,n]						
Safe[c]	154	23	1.0	470	60	1.0
Medium safe	120	16	0.9 (0.5, 1.6)	228	24	0.8 (0.5, 1.3)
Unsafe	176	22	0.9 (0.5, 1.5)	105	20	1.4 (0.9, 2.3)
Perceived stress from life events and pregnancy anxiety						
Life events, sum of negative impact[b,o]						
Low stress[c]	123	12	1.0	284	27	1.0
Medium-low stress	144	20	1.4 (0.7, 2.7)	271	36	1.5 (0.9, 2.5)
Medium-high stress	171	25	1.4 (0.7, 2.8)	281	34	1.5 (0.9, 2.4)
High stress	182	26	1.4 (0.7, 2.7)	195	37	2.2 (1.3, 3.5)
Pregnancy-related anxiety, sum of negative impact[b,p]						
Low anxiety[c]	273	23	1.0	393	37	1.0
High anxiety	293	55	2.0 (1.3, 3.2)	578	90	1.6 (1.1, 2.3)

Notes. BMI = body mass index; CI = confidence interval; RR = relative risk.

[a]African Americans: *none;* Whites: *prenatal care site, BMI.* The external stressors scale summed 39 life events from the Life Experiences Survey[19] that the woman indicated she had experienced since she got pregnant and considered to have had a negative impact on her life. Cutpoints of 0–2, 3–5, 6–8, and > 8 events were used.

[b]Confounder for the model. See other footnote for factors (in italics).

[c]Referent.

[d]African Americans: *none;* Whites: *none.* The Center for Epidemiologic Studies Depression Scale[20] was used to assess depression symptoms using a 20-item scale with Likert response categories about feelings and activities the respondent experienced during the past week. A sum was calculated and cutpoints of 0–16, 17–24, > 24 were used.

[e]African Americans: *BMI;* Whites: *none.* The MOS Social Support Scale[21] assessed the participant's perception of the availability of social support using a five-category Likert response for 19 items. Responses were summed and cutpoints of > 89, 79–88, 65–78, and 19–64 were used.

[f]African Americans: *maternal age;* Whites: *parity, BMI.*

[g]African Americans: *maternal education;* Whites: *BMI.*

[h]There were too few cases to calculate a risk ratio.

[i]African Americans: *none;* Whites: *BMI.*

[j]African Americans: *maternal education;* Whites: *none.* The 66-item Ways of Coping Questionnaire[22] uses four-point Likert response categories. Participants were asked to indicate, since they got pregnant, how often they used each coping approach when they "had a problem." The distancing from a problem subscale included six items to assess cognitive efforts to be detached or minimize the significance of a situation. Quartile cutpoints for the entire cohort were used.

[k]African Americans: *maternal age, parity;* Whites: *none.* The 66-item Ways of Coping Questionnaire[22] uses four-point Likert response categories. Participants were asked to indicate, since they got pregnant, how often they used each coping approach when they "had a problem." The escape-avoidance subscale used eight items that assess wishful thinking and behaviors to escape or avoid a problem. Quartile cutpoints for the entire cohort were used.

[l]African Americans: *height, parity, marital status;* Whites: *parity, BMI.* Asked only if respondent also said she felt she had been treated unfairly. Questions developed by Krieger and Sidney[23,24] assessed whether individuals felt they had been treated unfairly, and if so, their responses to that treatment.

[m]African Americans: *height, BMI;* Whites: *none.* Based on discrimination questions developed by Krieger and Sidney[23,24] each participant was asked whether she felt she had been discriminated against because of her race or color at school, when trying to get a job, at home, when trying to get medical care for this pregnancy, when she tried to get housing, or in her dealings with the police or in a court. Sums of yes responses were calculated and cutpoints of 0, 1, or > 1 were used. Additionally, each participant was asked whether she felt she had been discriminated against because she was women at school, when trying to get a job, at home, or when trying to get medical care for this pregnancy. Sums of yes responses were calculated and cutpoints of 0, 1, or > 1 were used.

[n]Participants were asked about perceived safety of the neighborhood at night, during the day, frequency of property crimes, personal crimes, shootings, police arrests, and drug dealing. These items were used to assess how stressful they perceived their contextual environment to be.

[o]African Americans: *none;* Whites: *prenatal care site, BMI.* Life events from the Life Experiences Survey[19] allowed women to assign any of the 39 events an impact level from –3 to +3. A sum of the negative impacts (–1 to –3) was calculated and used to measure perceived stress from life events. Cutpoints of absolute values were 0–4, 5–8, 9–15, and > 15.

[p]Six items from the Prenatal Social Environment Inventory[26] were used to assess the participant's anxiety about the pregnancy and becoming a parent. A sum of the negative impacts (–1 to –3) was calculated and used to measure perceived stress from pregnancy-related anxiety. Cutpoints of absolute values were 0–2 and > 2.

Americans). Because the psychosocial questionnaire was a self-administered, mail-back instrument, reduced response rates might be expected from women whose pregnancies ended early, since these women presumably had less time to return the instrument. Additionally, although we had substantial numbers of women of each race, racial differences in the association between psychosocial measures and preterm birth were assessed imprecisely (the numbers were not large enough to narrow the confidence intervals further).

Our sample of White women was at increased risk for preterm birth compared with the general population of White women in the geographic area of the study, which perhaps was a reflection of the greater number of medically high-risk White women recruited from the university referral hospital. However, we excluded women referred to the clinic who did not plan to continue their prenatal care or to deliver at the hospital, reducing the number of high-risk referrals who were in the study. By contrast, our sample of African American women had a lower risk of adverse pregnancy outcomes compared with the general population, despite a less favorable social and demographic profile. The African American women in our study had risks similar to those of the White women rather than the 2-fold increased risk seen in vital records data for the general African American population in the area. This unusual pattern was not a result of refusal to participate; in fact, it was apparent among all eligible women. A higher proportion of White women attended the university clinic where there was a higher rate of preterm birth, while a higher proportion of African American women attended the health department clinic. The differences in risk for preterm birth may reflect (1) higher-risk White women selecting the university clinic for their prenatal care and (2) a beneficial influence of the prenatal care at the health department lowering the risk of the African American women who attended. The small difference in preterm birth rates by race makes problematic any assessment of the causes of racial disparities in risk, but within each racial group, patterns of risk for preterm birth associated with different levels of psychosocial variables can be adequately assessed. Our study allowed examination of many factors that may be distributed differen-

tially by race, resulting in an increased ability to assess different explanations for racial differences and, ultimately, the targeted interventions that may be needed to lower the preterm birth rate. Our data lend support to the idea that the prevalence among populations and the impact on individuals of psychosocial factors differ by race. ■

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Contributors

N. Dole planned the study, analyzed the data, and wrote the article. D.A. Savitz oversaw the study on which this analysis was based. He, along with A.M. Siega-Riz, I. Hertz-Picciotto, M.J. McMahon, and P. Buekens, assisted with conceptualization of the study questions and analysis and contributed to the writing and editing of the article.

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Human Participant Protection

All study protocols were approved by the University of North Carolina at Chapel Hill School of Medicine and the WakeMed institutional review committee.

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