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Perceptions of Race/Ethnic Discrimination in Relation to Mortality Among Black Women:

Results From the Black Women's Health Study

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Abstract

Background—Because racial discrimination is a form of chronic psychological stress that might unfavorably affect health, we examined whether perceived experiences of racism among black women are associated with mortality.

Methods—We followed 48 924 participants in the Black Women's Health Study (mean age, 40.5 years) for 8 years to assess the risk of all-cause mortality associated with perceived experiences of racism. Subanalyses of cancer and cardiovascular mortality were also conducted. Perceived racism was evaluated by 8 questions about institutionalized racism (unfair treatment on the job, in housing, or by the police) and everyday experiences of racism (eg, others acting as if the woman was not intelligent). We estimated the relative risk of death with Cox proportional hazard models, adjusting for traditional and socioenvironmental risk factors.

Results—During 412 224 person years of follow-up from 1997 to 2005, there were 920 deaths, including 277 due to cancer and 195 due to cardiovascular causes. All-cause mortality was not associated with institutionalized racism (relative risk, 1.0; 95% confidence interval, 0.8-1.2) for the highest category vs the lowest or with everyday racism (relative risk, 0.9; 95% confidence interval, 0.8-1.2) for the highest quartile compared with the lowest. Risk estimates for the highest categories of perceived racism relative to the lowest were greater than 1.0 for cancer deaths and less than 1.0 for cardiovascular disease death but were not statistically significant.

Conclusions—In this large prospective study of black women, reported experiences of racism were not significantly related to mortality. Longer follow-up of this relatively young cohort and further work is warranted in this complex area of research because continued race/ethnic disparities in mortality are not entirely explained by traditional risk factors.

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The life expectancy of black Americans is, on average, 5.0 years less than that of other Americans.[1] Black Americans have higher death rates from cancer and cardiovascular disease (CVD) than other Americans,[2-4] and black women experience their first myocardial infarction at an earlier age than women of other race/ethnic groups and have the highest age-adjusted CVD mortality irrespective of socioeconomic status (SES).[2] Prior work evaluating the determinants of differences in morbidity and mortality between race/ethnic groups has largely focused on differences in health conditions, health behaviors, and health care access.[5] However, data evaluating within-group effects of specific exposures remain scarce. Research related to the causes of diseases that might result in heightened mortality in blacks has been deemed a national priority.[5]

Because discrimination on the basis of race represents a form of chronic psychological stress that historically has disproportionately affected blacks, it is possible that racial discrimination might contribute to the high mortality statistics of blacks. Physiologically, chronic stress due to race/ethnic discrimination might result in heightened vascular inflammation, endothelial dysfunction, and hyperstimulation of the hypothalamic-pituitary-adrenal axis,[6-8] processes that can lead to atherosclerotic heart disease and stimulate the development of certain malignant conditions.

Researchers have examined the association of racism with hypertension, which disproportionately affects blacks and is a leading cause of CVD mortality. Findings have been mixed.[9] While some studies indicated no association, others found perceived racism to be associated with lower blood pressure[10-14] or higher blood pressure.[12] In the Black Women's Health Study (BWHS), which is the basis of the analyses reported herein, experiences of racism were not associated with an increased risk of hypertension overall but were associated with increases in some subgroups.[15] In the only published findings related to cancer outcomes, there was a positive association of perceived racism with breast cancer incidence in the BWHS.[16] To our knowledge, no study has examined whether an association exists between perceived racism and mortality in a large national sample. In the present study based on 920 deaths, our primary goal was to prospectively examine reported experiences of racism in relation to subsequent all-cause mortality among black women from across the United States. In secondary analyses, we assessed cancer and cardiovascular mortality.

Methods

Study Population

The BWHS is an ongoing prospective cohort study of 59 000 black women residing in the United States, designed to examine risk factors for cancer and other chronic diseases.[15,17] In 1995, letters of invitation and questionnaires were mailed to subscribers of *Essence* magazine, a popular magazine that targets black women, members of several professional organizations, and friends and relatives of early respondents. The cohort that has been followed comprises 59 000 black women aged between 21 and 69 years at baseline, whose addresses were valid a year after study entry. Participants originate from across the United States, with approximately 80% from California, Louisiana, Indiana, Georgia, Illinois, Maryland, Massachusetts, Michigan, New Jersey, New York, South Carolina, Virginia, and the District of Columbia. Follow-up questionnaires have been sent biennially, with follow-up averaging more than 80% of the original cohort through 2003. Demographic characteristics and information about medical history, behavioral habits, diet, medication use, physical activity, socioeconomic parameters, and reproductive history have been obtained. In 1995, 6.0% of the women reported a history of myocardial infarction, stroke, or angina, and 2.0% reported a history of cancer. The study was approved by the institutional review board of Boston University, Boston, Massachusetts.

Racism Data

On the 1997 follow-up questionnaire, participants were asked 8 questions regarding race discrimination adapted from questions by Williams et al,[18] which were found to be associated with self-reported mental and physical health problems. Three questions about "institutionalized racism" asked if they were ever treated unfairly (1) on the job (hiring, promotion, and firing); (2) in housing (renting, buying, and mortgage); and (3) by the police (stopped, searched, and threatened) because of their race. Response categories were "yes" and "no." Another 5 questions inquired about the frequency of other people's behavior toward them, including (1) receiving poorer service in restaurants or stores; (2) people acting as if they think that the participant is not intelligent; (3) people acting as if they are afraid of her; (4) people acting as if they think that she is dishonest; and (5) people acting as if they are better than her. The response categories were "never," "a few times a year," "once a month," "once a week," and "almost every day." Although the everyday questions did not explicitly inquire about race, they were grouped with other questions that inquired about race to stimulate respondent thinking about "everyday racism." Principal components factor analysis using an orthogonal rotation[15] revealed 2 factor patterns, which confirmed the predetermined domains of the racism variables. The institutionalized racism questions had factor loadings ranging from 0.61 to 0.77, and the everyday racism questions had loadings from 0.66 to 0.81. We created 2 summary variables, one for institutionalized and the other for everyday racism. For institutionalized racism, we categorized women as having 0, 1, 2, or 3 positive responses to the 3 questions. For everyday racism, we assigned values of 1 to 5 for the 5 response categories, averaged the responses for each participant, and then divided the summary variable responses according to quartiles.

Responses to the everyday and institutional racism questions were reproducible in the BWHS. The weighted κ values for agreement of responses to the racism questions for BWHS participants who returned duplicate questionnaires during the 1997 mailing (n=1172) were 0.73 for the everyday racism summary variable and 0.67 for the institutionalized racism summary variable. Reported experiences of racism have been positively associated with uterine leiomyomata,[19] breast cancer,[16] preterm birth,[20] and weight gain in the BWHS[21] and with health outcomes in other investigations.[18,22]

Follow-Up

After excluding women with a history of CVD or cancer at baseline, the 48 924 women who completed the 1997 questionnaire (which contained the racism questions) were followed from 1997 to 2005 (a maximum of 8.5 years) for the end point of death. Deaths in the BWHS are identified by searching the National Death Index database[23] for participants who do not respond to mailed questionnaires or who are deemed lost to follow-up. Reports of deaths are also obtained from next of kin, the Social Security Death Master File, and the post office. State authorization was obtained for confidential death reports from New York and Florida because in these states death information remains nonaccessible to the public. We matched participant information to National Death Index Plus information using full name, date of birth, maiden name, and Social Security number if available. Once a match was determined, coded causes of death were appended to a specific participant. Death reports were reviewed by 2 physicians in a blinded fashion and were coded as follows:

- Cancer death
    1. The "immediate cause of death" or the "major underlying cause of death within the same organ system" was cancer (eg, lung cancer with postobstructive pneumonia).
    2. The immediate cause of death was disseminated intravascular coagulation or neutropenia and the underlying cause of death was recorded as cancer.

- Death from cardiovascular causes

    1. Both the “immediate cause of death” and “major underlying cause of death” were recorded as cardiovascular. For example, cardiovascular death was coded if the “immediate cause of death” was listed as “cardiac arrest nonspecific” and the corresponding “major underlying cause of death” was listed as “hypertension or cerebral infarction/hemorrhage or atherosclerotic heart disease.” However, if the underlying cause of death was listed as, for example, “bronchial asthma, renal disease, HIV/AIDS, diabetes or obesity,” cardiovascular death was not coded in order to be as conservative as possible, since we did not have access to medical records. For example, renal disease can result in cardiovascular arrhythmias due to electrolyte abnormalities.
    2. Either the “immediate cause of death” or the “major underlying cause of death” was listed as myocardial infarction or cerebral infarction/ hemorrhage unless the corresponding major underlying illness was listed as HIV/AIDS or a hematologic condition.
    3. Arrhythmic and diabetic deaths were only coded as cardiovascular if the corresponding “immediate” or “major” underlying cause of death was listed as cardiogenic.
    4. The “immediate cause of death” was listed as “ hypertension.” Venous thromboembolic deaths were not classified as cardiovascular deaths.

Because we have conservatively classified cardiovascular deaths, the overall number is likely to be an underestimate. Therefore, we also performed a second cardiovascular death analysis in which we included all possible cardiovascular deaths.

Statistical Analysis

We used Cox proportional hazard models to compute the hazard ratio (HR) and 95% confidence interval (CI) of all-cause mortality for various categories of perceived racism relative to the lowest category. Cox proportional hazard models were adjusted for age only; for age and education level only; and fully for age, education level, body mass index, family history of myocardial infarction at age younger than 50 years, physical activity, smoking status, neighborhood racial composition (eg, mainly black, mainly white, or mixed prior to age 18 years), level of urbanization (eg, urban, suburban, rural, combination prior to age 18 years), marital status, occupation, health insurance status, and histories of hypertension, diabetes, and hyperlipidemia. In secondary analyses, we assessed the relationship between perceived racism and cancer and cardiovascular mortality.

We also assessed associations within strata of neighborhood SES. For this purpose, we linked the women's addresses to census block group data from the 2000 US census on 29 variables representing wealth, income, and educational level; based on factor analysis, we selected 6 variables (eg, median housing value) from which we created a neighborhood SES score using regression coefficients from the factor analysis to weight the variables.[24,25] We then assessed racism in relation to mortality within quartiles of neighborhood SES score. In addition, to test for interaction of a particular variable with racism, we conducted likelihood ratio tests that compared models assessing racism in relation to mortality with and without cross-product terms between the racism summary variables and the variable of interest.

Results

Baseline Characteristics

The mean age of the 48 924 BWHS participants in 1997 was 40.5 years; 47% were graduates of college or professional school, 93% were born in the United States, and 93% were medically insured.

Of the institutionalized racism questions, unfair treatment on the job was most frequently reported by participants (58%). As given in Table 1, women who answered “yes” to all 3 questions about institutionalized racism were more likely than women who reported “no” to all questions to be older, have married, have higher body mass index, be current smokers, drink alcoholic beverages, be physically active, be US born, report a history of hypertension or high cholesterol, have professional/managerial jobs, have graduated college, or hold second jobs, and were less likely to report diabetes.

With respect to the everyday racism variables, 25.7% of BWHS participants reported that others acted as if they were better than the BWHS participant at least once a week. The corresponding percentages were 18.6% for others acting as if the BWHS participant was not intelligent; 10.6% for others acting afraid of the participant; 9.5% for receiving poorer service; and 8.6% for being treated as if they were dishonest. As given in Table 2, the relation of everyday racism to baseline characteristics differed from that of institutionalized racism in that reported everyday racism decreased with age and was associated with less hypertension, less high cholesterol level, and less likelihood of having married.

Mortality

During 412 224 person-years of follow-up, there were 920 deaths among women who were free of cancer or CVD at baseline, of which 277 were due to cancer and 195 were due to cardiovascular causes. Other common causes of death included human immunodeficiency virus, accidents/injury, and pulmonary disease. Regarding the end point of all-cause mortality (Table 3), the fully adjusted HR associated with unfair treatment on the job was 1.0 (95% CI, 0.9-1.1). The overall risk of death also was not associated with unfair treatment in housing (HR, 1.0), by the police (HR, 1.0), or with unfair treatment in all 3 of these realms (HR, 1.0). We observed no association between everyday racism and all-cause death: the HR estimate comparing quartile 4 (most frequent experiences of racism) with quartile 1 (lowest) of the racism summary variable was 0.9 (95% CI, 0.8-1.2). In addition, when we separately assessed each of the 5 individual racism questions that contributed to the everyday racism summary variable, none was significantly associated with all-cause mortality.

Women who reported higher levels of everyday racism also tended to report higher levels of institutional racism (Spearman r, 0.38; $P<.001$). We conducted an analysis in which we compared women with higher levels of both racism variables to women with lower levels of both variables. The HR was 0.9 (95% CI, 0.7-1.2) for the comparison of women who were in the highest quartile of everyday racism score and answered yes to 2 or more of the 3 institutionalized racism questions to women in the lowest quartile of everyday racism score who responded no to at least 2 of the 3 institutional racism questions.

Table 4 gives all-cause mortality according to education categories. Institutionalized racism was not associated with all-cause mortality in any category of education. Everyday racism was associated with reduced all-cause mortality among the small number of women with less than a high school education, but there was no association among women with more education; the P value for interaction was not statistically significant ($P=.37$).

Because neighborhood SES could have modified associations of racism with mortality, we assessed institutionalized racism and everyday racism in relation to mortality within strata of neighborhood SES score. There were no significant associations and no evidence of interaction (*P*=.69 for institutionalized racism and *P*=.37 for everyday racism).

We also assessed possible modification of associations of perceived racism with mortality by health status and health behaviors. We found no evidence of associations of institutionalized racism or everyday racism with mortality among women who had hypertension or among women who were sedentary, smokers, or obese.

Table 5 gives the relationship between cancer deaths and reports of perceived racism. Cancer mortality was not associated with reports of unfair treatment on the job (HR, 1.0; 95% CI, 0.8-1.3), in housing (HR, 1.2; 95% CI, 0.9-1.5), or by the police (HR, 1.0; 95% CI, 0.7-1.4). Likewise, there was no relationship between cancer death and everyday racism (HR for category 4 relative to category 1, 1.2; 95% CI, 0.8-1.7).

For death from cardiovascular causes (Table 5), the HR estimates were less than 1.0 for women who reported unfair treatment on the job (HR, 0.9; 95% CI, 0.6-1.1) or by the police (HR, 0.6; 95% CI, 0.4-0.9). For women who reported unfair treatment in all 3 realms, the HR for cardiovascular death was 0.6 (95% CI, 0.4-1.2). There was no statistically significant association between reports of everyday racism and cardiovascular death among BWHS participants (HR for quartile 4 relative to quartile 1, 0.7; 95% CI, 0.5-1.1). In analyses that were less conservative in the coding of cardiovascular deaths, there were 238 cardiovascular deaths and results were essentially unchanged (data not shown).

Comment

In this large prospective cohort study of black women residing in the United States, we found no association between reports of perceived racism and all-cause mortality. The risk estimates for women who reported the highest levels of perceived racism relative to those who reported the lowest were below 1.0 for cardiovascular mortality and greater than 1.0 for cancer mortality but not statistically significant.

Our finding of a lack of association of perceived experiences of racism and mortality is inconsistent with our a priori hypothesis that stress related to racism would result in higher death rates. Mortality is a crude measure of multiple processes, and our findings require consideration within the context of the multifactorial and complex nature of racism's potential effect on health. The experiences and effects of racism on health are likely to be cumulative and begin early in the lifespan with potential varied health outcomes over time. In the short term, racism could affect health behavior and habits, access to goods and services, quality of life, an individual's response to other stressors, and incident disease such as cancer and myocardial infarction. For example, BWHS participants who reported more perceived racism had higher body mass index and were more likely to be current smokers and drinkers compared with women who reported no perceived racism. Long-term effects, such as on mortality, may take appreciably longer to manifest.

Second, behavioral modifications might have influenced the results. Our cohort has an appreciable proportion of well-educated women who might be better able to access resources to deal with health concerns. Our subanalyses of the racism-mortality association did not show differential results according to level of education, which does not support our supposition that more educated women might have been more likely to better access resources. It is as likely that more educated women might encounter more isolated work and housing environments with less social support but nonetheless high levels of perceived racism. For cardiovascular diagnoses, behavioral modifications related to diagnoses such as

hypertension, dyslipidemia, diabetes, and obesity could theoretically result in reductions in mortality in the short and long term. Our results provide some support for racism being related to health behaviors. On the one hand, we observed that women who reported more everyday racism and more institutionalized racism exercised more than women who reported less racism. On the other hand, women who reported more experiences of racism were heavier and more likely to have smoked. The risk estimate for cancer mortality of 1.3 suggests that behavioral modifications that could result in improved CVD risk might not extend to cancer, for which environmental influences that are beyond individual control might predominate. For example, among similarly educated black and white women, black women tend to live in less-advantaged neighborhoods and have significantly poorer health outcomes.[26] Within this context, it is interesting to note that despite being relatively well-educated, 30% of BWHS participants live in impoverished neighborhoods and the likelihood of having a second job increased with more education.

Third, previous work also suggests the importance of coping strategies in response to stress. In the Coronary Artery Risk Development in Young Adults (CARDIA) study, Krieger and colleagues[10,11] found that black women who accepted unfair treatment and reported infrequent or no experiences of racism were more likely to have hypertension than women who reported discrimination and challenged their experience. One interpretation of these data would be that individuals who are passive, ie, those persons who do not report experiencing racism, perhaps because of an inability to recognize racism or denial of their experiences, still develop negative health consequences owing to the internalization of chronic stress that activates neurohormonal, immune, and hemodynamic pathways. By contrast, those persons who actively respond to perceived experiences of racism (eg, with anger, with confrontation of the perpetrator[s], or with the development of social networks to deal with the related issues) might have better health outcomes resulting from less sustained or cumulative physiologic and social stress over time. We had no information on coping strategies or detailed social support besides marital status in the present study. In addition, it is unclear if coping strategies would affect specific causes of death differentially.

To our knowledge, the present study is the largest national prospective study of racism and mortality in black women to date. Our results are consistent with recent findings from Barnes et al[27]: in an elderly group of 4101 black and white Chicago residents, there was a marginal association between perceived discrimination and mortality, with an HR of 1.05 (95% CI, 1.01-1.09) for the overall relationship. The association was significant in whites (HR, 1.12; 95% CI, 1.04-1.20) but not in blacks (HR, 1.03; 95% CI, 0.99-1.07). While the authors did not explicitly report the number of deaths, we estimate that there were approximately 450 deaths among black women. The authors did not assess cause-specific discrimination and included as potential confounders a limited number of the risk factors for disease that might be prevalent among elderly individuals.

The major strengths of our study are its prospective design, national sampling, classification of cancer and cardiovascular mortality, adjustment for multiple traditional and socioenvironmental risk factors for chronic disease, and the assessment of several types of perceived racism. However, several limitations merit consideration. Experiences of racism were measured only at baseline, and we are unable to evaluate the impact of multiple longitudinal measurements of the exposure over time. The BWHS cohort is relatively young and follow-up was relatively short. Thus, the number of deaths, and of cardiovascular deaths in particular, is relatively small. However, black women have their first myocardial infarction at an earlier age and die from myocardial infarction at substantially higher rates than women of other race/ethnic groups,[2,28] so it is important to study mortality at young ages. There was likely some misclassification of deaths, since we relied on National Death Index death codes rather than participant medical records. Our questions on discrimination

may have captured only certain aspects of experiences of racism; self-reports of perceived racism do not directly assess actual racist experiences. Furthermore, we had no data on a woman's coping response to the experiences of racism, the interaction of racism with other stressors, remote vs recent perceived racism experiences, or the effect of repeated administration of the perceived racism questions. Because our cohort contains very few women who have not graduated from high school, findings might not extend to less-educated women who might have less access to health care and resources.

In conclusion, these results suggest that frequent reports of perceived racism among black women residing in the United States are not associated with a significant increase in all-cause mortality. In secondary analyses, we also found no significant relationships with cancer or cardiovascular mortality. However, longer follow-up and larger numbers are needed. It is important to note that regardless of any effect on mortality, racism has been documented to have multiple negative effects on the health of black women including relations to preterm birth, weight gain, hypertension, and physical and mental health.[18-21] Since our data demonstrate that a high proportion of black women experience perceived racism, and because perceived racism has been associated with adverse health outcomes, continued work is needed to informatively assess the effect of different types of racism on mortality overall and by disease cause. In addition, further study is also necessary to understand how other socioenvironmental factors might affect mortality among black women.

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Table 1
Baseline Characteristics According to Institutionalized Racism Summary Variable[a]

Variable	Institutionalized Racism Summary Variable[b]			
	Category 1 (n=14 123)	Category 2 (n=15 521)	Category 3 (n=11 373)	Category 4 (n=5104)
Age, mean (SD), y	39.8 (10.9)	39.6 (10.2)	41.0 (10.1)	41.4 (9.4)
BMI, mean (SD)	28.2 (6.7)	28.3 (6.7)	28.4 (6.7)	28.7 (6.9)
Hypertension	16.7	17.3	19.0	19.4
Diabetes mellitus	3.5	3.5	3.4	2.9
Hypercholesterolemia	14.6	15.1	16.6	16.5
Smoking				
Nonsmoker	68.7	66.5	62.9	59.3
Past smoker	16.8	18.2	21.7	23.5
Current	14.5	15.4	15.4	17.2
Vigorous physical activity, h/wk				
None	46.3	43.7	41.4	39.5
<1	15.3	16.4	17.2	17.9
<3	17.6	19.5	19.5	19.9
≥3	18.2	18.8	20.3	20.3
Alcohol use, drink/wk				
<1	74.3	73.2	72.0	71.3
1-6	22.6	23.1	24.0	23.9
≥7	3.1	3.7	4.0	4.8
Birthplace, United States	93.2	94.4	94.6	95.2
Level of urbanization, up to age 18 y				
Urban	46.7	46.9	46.7	47.2
Suburban	17.3	17.7	16.9	15.4
Rural	20.5	20.0	20.0	19.6
Combination	13.3	13.7	14.7	16.3
Neighborhood composition, up to age 18 y				
Mainly black	61.5	61.8	60.9	59.1
Mainly white	6.6	7.3	7.4	8.6
Mixed/other	30.6	29.8	30.3	31.0
Marital status				
Married/living as married	41.2	41.5	43.0	41.6
Separated/divorced/widowed	25.0	25.3	27.8	31.5
Single, never married	33.3	32.8	28.8	26.2
Education				
≤High school	20.1	14.0	11.9	11.3
Some college	35.8	36.5	35.5	35.5
College graduate	42.9	48.3	51.6	51.6
Occupation				

Variable	Institutionalized Racism Summary Variable[b]			
	Category 1 (n=14 123)	Category 2 (n=15 521)	Category 3 (n=11 373)	Category 4 (n=5104)
Professional/manager	53.0	57.3	61.7	63.3
Sales/clerical	25.2	26.3	23.8	20.3
Service/craft/operative/farmer	12.0	9.0	8.2	9.0
Never employed	0.9	0.4	0.3	0.4
Second job	16.2	17.6	19.7	22.8

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

[a] Data are given as percentage of participants unless otherwise specified.

[b] Institutionalized racism summary variable: category 1, responded “no” to all questions; category 2, responded “yes” to 1 question; category 3, responded “yes” to 2 questions; and category 4, responded “yes” to 3 questions.

Table 2
Baseline Characteristics According to Everyday Racism Summary Variable[a]

Variable	Everyday Racism Summary Variable[b]			
	Quartile 1 (n=8797)	Quartile 2 (n=13 339)	Quartile 3 (n=13 406)	Quartile 4 (n=11 530)
Age, mean (SD), y	43.7 (11.6)	41.3 (10.5)	39.5 (9.9)	38.0 (9.3)
BMI, mean (SD)	27.9 (6.4)	28.1 (6.6)	28.4 (6.8)	29.0 (7.1)
Hypertension	19.7	18.6	17.2	17.0
Diabetes mellitus	4.1	4.0	2.8	3.1
Hypercholesterolemia	17.0	15.9	15.3	14.7
Smoking				
Nonsmoker	64.2	65.3	65.9	64.7
Past smoker	20.3	17.8	19.2	18.7
Current	15.5	14.9	14.9	16.6
Vigorous physical activity, h/wk				
None	49.6	44.2	40.9	41.5
<1	13.8	16.1	17.8	16.8
<3	16.1	18.6	19.9	19.8
≥3	16.9	18.9	19.6	19.6
Alcohol use, drink/wk				
<1	74.2	73.1	73.0	74.6
1-6	21.9	23.5	23.3	21.4
≥7	3.9	3.5	3.7	4.0
Birthplace, United States	92.8	94.1	94.3	94.7
Level of urbanization, up to age 18 y				
Urban	46.6	47.3	46.5	45.4
Suburban	16.9	16.4	17.2	17.4
Rural	21.2	20.5	20.2	20.2
Combination	13.0	13.9	14.3	15.2
Neighborhood composition, up to age18 y				
Mainly black	60.4	62.2	61.5	60.3
Mainly white	6.2	6.3	7.5	8.5
Mixed/other	31.9	30.3	29.7	30.0
Marital status				
Married/living as married	44.3	43.9	41.8	37.9
Separated/divorced/widowed	29.7	27.7	25.3	24.6
Single, never married	25.6	27.9	32.3	36.9
Education				
≤High school	21.1	15.2	13.6	14.3
Some college	35.3	35.4	35.0	37.7
College graduate	42.3	48.1	50.2	46.8
Occupation				

Variable	Everyday Racism Summary Variable[b]			
	Quartile 1 (n=8797)	Quartile 2 (n=13 339)	Quartile 3 (n=13 406)	Quartile 4 (n=11 530)
Professional/manager	54.8	58.6	59.6	55.5
Sales/clerical	25.3	24.5	23.9	25.3
Service/craft/operative/farmer	11.7	9.5	9.0	10.4
Never employed	0.9	0.5	0.5	0.5
Second job	14.9	16.6	19.1	21.5

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

[a] Data are given as percentage of participants unless otherwise specified.

[b] Everyday racism summary variable: represents summary variable created from 5 questions related to personally mediated racism questions (ie, treated as not intelligent, afraid of you, dishonest, better than you, poorer service): quartile 1, score lower than 1.6; quartile 2, score 1.6 to 1.9; quartile 3, score 2.0 to 2.4; and quartile 4, score higher than 2.5.

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Table 3

Perceived Racism and All-Cause Mortality

Variable	No. of Deaths (n=920)	Person-Years	HR (95% CI)		
			Age Adjusted	Age and Education Adjusted	Fully Adjusted
Institutionalized racism					
Job unfair					
Yes	517	236 216	0.9 (0.8-1.1)	1.0 (0.9-1.1)	1.0 (0.9-1.1)
No	370	165 925	1 [Reference]	1 [Reference]	1 [Reference]
Home unfair					
Yes	318	140 898	0.9 (0.8-1.1)	1.0 (0.9-1.1)	1.0 (0.9-1.2)
No	536	254 309	1 [Reference]	1 [Reference]	1 [Reference]
Police unfair					
Yes	178	94 763	1.0 (0.8-1.1)	1.0 (0.8-1.2)	1.0 (0.8-1.2)
No	668	300 533	1 [Reference]	1 [Reference]	1 [Reference]
Summary institutional racism variable[a]					
Category 1	277	118 930	1 [Reference]	1 [Reference]	1 [Reference]
Category 2	267	130 942	0.9 (0.7-1.0)	1.0 (0.8-1.2)	1.0 (0.8-1.2)
Category 3	197	95 906	0.9 (0.7-1.0)	0.9 (0.8-1.1)	0.9 (0.8-1.1)
Category 4	90	42 999	0.9 (0.7-1.1)	1.0 (0.8-1.3)	1.0 (0.8-1.2)
P value for trend			.13	.61	.65
Summary everyday racism variable[a]					
Quartile 1	250	73 757	1 [Reference]	1 [Reference]	1 [Reference]
Quartile 2	245	112 548	0.8 (0.7-1.0)	0.8 (0.7-1.0)	0.8 (0.7-1.0)
Quartile 3	193	113 211	0.8 (0.6-0.9)	0.8 (0.7-1.0)	0.8 (0.7-1.0)
Quartile 4	181	97 293	1.0 (0.8-1.2)	1.0 (0.8-1.2)	0.9 (0.8-1.2)
P value for trend			.35	.62	.36

Abbreviations: CI, confidence interval; HR, hazard ratio.

[a]For a description of institutionalized and everyday racism summary variable categories and quartiles, see footnote b in Table 1 and Table 2, respectively.

Table 4
Institutionalized and Everyday Racism and All-Cause Mortality by Education

Variable	No. of Deaths	Person-Years	HR (95% CI)	
			Age Adjusted	Fully Adjusted
Institutional Racism Summary Variable (n=920)[a]				
<High school				
Category 1	27	3111	1 [Reference]	1 [Reference]
Category 2	4	1444	0.4 (0.1-1.1)	0.3 (0.1-1.0)
Category 3	4	1161	0.5 (0.2-1.4)	0.4 (0.1-1.4)
Category 4	4	538	1.2 (0.4-3.4)	1.0 (0.3-3.2)
P value for trend			.47	.50
High school graduate				
Category 1	83	20 593	1 [Reference]	1 [Reference]
Category 2	62	16 734	1.0 (0.7-1.4)	1.1 (0.8-1.5)
Category 3	34	10 186	0.9 (0.6-1.3)	0.9 (0.6-1.4)
Category 4	12	4317	0.8 (0.4-1.5)	0.8 (0.5-1.6)
P value for trend			.41	.69
Some college				
Category 1	78	42 680	1 [Reference]	1 [Reference]
Category 2	100	47 757	1.2 (0.9-1.5)	1.1 (0.8-1.5)
Category 3	68	34 069	1.0 (0.7-1.4)	1.0 (0.7-1.4)
Category 4	40	15 215	1.4 (0.9-2.0)	1.3 (0.9-1.9)
P value for trend			.26	.40
College graduate				
Category 1	87	51 138	1 [Reference]	1 [Reference]
Category 2	99	63 303	1.0 (0.7-1.3)	0.9 (0.7-1.2)
Category 3	89	49 505	0.9 (0.7-1.3)	1.0 (0.7-1.3)
Category 4	31	22 258	0.7 (0.5-1.1)	0.8 (0.5-1.1)
P value for trend			.21	.30
Everyday Racism Summary Variable (n=920)[a]				
<High school				
Quartile 1	17	2175	1 [Reference]	1 [Reference]
Quartile 2	13	1781	1.0 (0.5-2.1)	1.1 (0.5-2.5)
Quartile 3	7	1539	0.8 (0.3-1.9)	0.8 (0.3-2.1)
Quartile 4	14	1595	1.9 (0.9-4.0)	0.3 (0.1-0.5)
P value for trend			.23	.11
High school graduate				
Quartile 1	87	13 169	1 [Reference]	1 [Reference]
Quartile 2	58	15 178	0.7 (0.5-1.0)	0.7 (0.5-1.0)
Quartile 3	32	13 847	0.5 (0.3-0.8)	0.5 (0.4-0.8)
Quartile 4	31	12 267	0.7 (0.4-1.0)	0.7 (0.4-1.0)

Variable	No. of Deaths	Person-Years	HR (95% CI)	
			Age Adjusted	Fully Adjusted
P value for trend			.005	.01
Some college				
Quartile 1	80	26 075	1 [Reference]	1 [Reference]
Quartile 2	83	39 810	0.8 (0.6-1.1)	0.8 (0.6-1.1)
Quartile 3	70	39 642	0.8 (0.6-1.1)	0.8 (0.6-1.1)
Quartile 4	62	36 749	0.9 (0.7-1.3)	0.9 (0.6-1.2)
P value for trend			.63	.35
College graduate				
Quartile 1	62	31 335	1 [Reference]	1 [Reference]
Quartile 2	86	54 248	1.0 (0.7-1.4)	1.0 (0.7-1.4)
Quartile 3	83	56 919	1.1 (0.8-1.5)	1.1 (0.8-1.5)
Quartile 4	74	45 569	1.4 (1.0-1.9)	1.3 (0.9-1.8)
P value for trend			.07	.15

Abbreviations: CI, confidence interval; HR, hazard ratio.

[a]For a description of institutionalized and everyday racism summary variable categories and quartiles, see footnote b in Table 1 and Table 2, respectively.

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Table 5

Perceived Racism and Cancer Mortality and Cardiovascular Mortality

Variable	No. of Deaths	Person-Years	HR (95% CI)		
			Age Adjusted	Age and Education Adjusted	Fully Adjusted
Cancer Mortality (n=277)					
Institutionalized racism					
Job unfair					
Yes	465	236 216	1.0 (0.8-1.3)	1.0 (0.8-1.3)	1.0 (0.8-1.3)
No	109	165 925	1 [Reference]	1 [Reference]	1 [Reference]
Home unfair					
Yes	111	140 988	1.1 (0.9-1.4)	1.2 (0.9-1.5)	1.2 (0.9-1.5)
No	153	254 309	1 [Reference]	1 [Reference]	1 [Reference]
Police unfair					
Yes	53	94 763	1.0 (0.7-1.3)	1.0 (0.7-1.4)	1.0 (0.7-1.4)
No	205	300 533	1 [Reference]	1 [Reference]	1 [Reference]
Institutional racism summary variable[a]					
Category 1	80	118 930	1 [Reference]	1 [Reference]	1 [Reference]
Category 2	83	130 942	1.0 (0.8-1.4)	1.1 (0.8-1.5)	1.1 (0.8-1.4)
Category 3	59	95 906	0.9 (0.6-1.3)	1.0 (0.7-1.3)	1.0 (0.7-1.3)
Category 4	35	42 999	1.6 (0.8-1.9)	1.4 (0.9-2.0)	1.3 (0.9-2.0)
P value for trend			.65	.40	.45
Everyday racism summary variable[a]					
Quartile 1	70	73 757	1 [Reference]	1 [Reference]	1 [Reference]
Quartile 2	80	112 458	1.0 (0.7-1.4)	1.0 (0.8-1.4)	1.0 (0.7-1.4)
Quartile 3	63	113 211	1.0 (0.7-1.4)	1.0 (0.7-1.5)	1.0 (0.7-1.4)
Quartile 4	53	97 293	1.2 (0.8-1.7)	1.2 (0.9-1.8)	1.2 (0.8-1.7)
P value for trend			.42	.33	.48
Cardiovascular Mortality (n=195)					
Institutionalized racism					
Job unfair					

Variable	No. of Deaths	Person-Years	HR (95% CI)		
			Age Adjusted	Age and Education Adjusted	Fully Adjusted
Yes	106	236 216.2	0.9 (0.6-1.2)	0.9 (0.7-1.2)	0.9 (0.6-1.1)
No	82	165 924.8	1 [Reference]	1 [Reference]	1 [Reference]
Home unfair					
Yes	68	140 897.6	0.9 (0.7-1.3)	1.0 (0.7-1.3)	1.0 (0.7-1.4)
No	115	254 308.9	1 [Reference]	1 [Reference]	1 [Reference]
Police unfair					
Yes	25	94 762.9	0.6 (0.4-0.9)	0.6 (0.4-0.9)	0.6 (0.4-0.9)
No	154	300 533.1	1 [Reference]	1 [Reference]	1 [Reference]
Institutionalized racism summary variable[a]					
Category 1	63	118 930.1	1 [Reference]	1 [Reference]	1 [Reference]
Category 2	62	130 942.4	1.0 (0.7-1.4)	1.0 (0.7-1.4)	1.0 (0.7-1.4)
Category 3	37	95 906.0	0.7 (0.5-1.1)	0.8 (0.5-1.1)	0.7 (0.5-1.1)
Category 4	14	42 999.2	0.6 (0.4-1.1)	0.7 (0.4-1.2)	0.6 (0.4-1.2)
P value for trend			.03	.08	.06
Everyday racism summary variable[a]					
Quartile 1	59	73 756.7	1 [Reference]	1 [Reference]	1 [Reference]
Quartile 2	47	112 457.6	0.7 (0.5-1.0)	0.7 (0.5-1.0)	0.7 (0.5-1.0)
Quartile 3	41	113 211.4	0.7 (0.5-1.0)	0.7 (0.5-1.1)	0.7 (0.5-1.0)
Quartile 4	35	97 293.3	0.8 (0.5-1.3)	0.8 (0.5-1.3)	0.7 (0.5-1.1)
P value for trend			.31	.39	.15

Abbreviations: CI, confidence interval; HR, hazard ratio.

[a]For a description of institutionalized and everyday racism summary variable categories and quartiles, see footnote b in Table 1 and Table 2, respectively.