



# Racial Discrimination and the Incidence of Hypertension in US Black Women

YVETTE COZIER, DSc, JULIE R. PALMER, ScD, NICHOLAS J. HORTON, ScD, LISA FREDMAN, PhD, LAUREN A. WISE, ScD, AND LYNN ROSENBERG, ScD

**PURPOSE:** Unique experiences associated with “race,” such as racism, may adversely affect health. Our goal is to assess whether racism is associated with the occurrence of hypertension in African-American women.

**METHODS:** In the first prospective examination of perceived experiences of racism in relation to the incidence of hypertension, we used data from the Black Women’s Health Study, a follow-up study of US black women that began in 1995. The 1997 follow-up questionnaire contained eight questions designed to measure personally mediated racism and institutionalized racism. Cox proportional hazard models were used to estimate incidence rate ratios (IRRs), with control for age, body mass index, and questionnaire period.

**RESULTS:** There were 2316 incident cases of hypertension reported during 104,574 person-years of observation from 1997 to 2001. Most women reported experiences of racism. In the total sample, IRRs for the association of racism with incident hypertension were close to the null. However, some positive associations were observed for personally mediated racism in women born outside the United States.

**CONCLUSIONS:** There may be an increase in hypertension associated with experiences of racism in certain subgroups of African-American women.

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**KEY WORDS:** Racism, Racial Discrimination, Hypertension, Black Women, African American, Health.

## INTRODUCTION

African-American women have greater morbidity and mortality rates than white women for nearly every major illness (1, 2). Hypertension is a key contributor to this excess (2). The rate of hypertension in black women is two to three times that of white women, and age-specific rates for black women are similar to those of the next age decade of white women. As a result, black women have a substantially greater prevalence of such hypertension-related illness as cardiovascular disease and end-stage renal disease (3, 4). Established risk factors, including family history, cigarette smoking, sedentary lifestyle, and obesity, do not adequately explain the observed differences in hypertension between black and white women (2, 5).

Several emerging hypotheses to explain the excess burden of hypertension in black women concern psychosocial and environmental factors. Recently, there has been

recognition that “race” is a social construct, rather than a biologic concept (6, 7), and investigators are seeking to understand the ways in which unique experiences associated with race, such as racism, may adversely affect health. Several studies suggested there may be increases in blood pressure associated with experiences of racism (8–13). Two of these studies assessed the relation of racism to hypertension, and results are conflicting (12, 13).

Previous studies of racism and hypertension were small, and analyses were cross-sectional. The goal of the present study is to prospectively examine the influence of perceptions of racism and discrimination on risk for hypertension in a large cohort of US black women enrolled in the Black Women’s Health Study (BWHS). Specifically, we examined whether perceptions and experiences of racism are associated positively with increased risk for hypertension in black women and whether associations were modified by other characteristics, such as place of birth and neighborhood racial composition.

## METHODS

### Establishment of the Cohort and Follow-up

The human subjects protocol for this study was approved by the Boston University Medical Center and the Howard University Cancer Center Institutional Review Boards. The BWHS is a follow-up study of US black women that

From Slone Epidemiology Center, Boston University (Y.C., J.R.P., L.A.W., L.R.); Department of Epidemiology, Boston University School of Public Health, Boston (L.F.); and Department of Mathematics, Smith College, Northampton, MA (N.J.H.).

Address correspondence to: Yvette Cozier, DSc, Slone Epidemiology Center, 1010 Commonwealth Avenue, Boston, MA 02215. Tel.: (617) 734-6006; fax: (617) 738-5119. E-mail: ycozier@slone.bu.edu.

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**Selected Abbreviations and Acronyms**

BMI = body mass index  
 BWHS = Black Women's Health Study  
 CI = confidence interval  
 IRR = incidence rate ratio

began in 1995 when 64,500 women aged 21 to 69 years enrolled through postal health questionnaires, which were sent mainly to subscribers of *Essence* magazine, members of selected black women's professional organizations, and friends and relatives of early respondents. The 59,000 women whose addresses were considered to be valid a year later comprise the cohort. Participants indicated their informed consent by completing the questionnaires. At baseline, subjects were 21 to 69 years of age (median, 38 years), 97% had completed high school, and 44% had completed college. More than 80% were from California, Georgia, Illinois, Indiana, Louisiana, Maryland, Massachusetts, Michigan, New Jersey, New York, South Carolina, Virginia, and the District of Columbia. To update subjects' health information, participants are followed up through mailed questionnaires every 2 years. In each follow-up cycle, 80% or more of the cohort have completed a questionnaire.

**Variables**

The 1997 follow-up questionnaire contained eight questions designed to measure perceptions and experiences of racism in the study population. These questions were adapted from an instrument developed by Williams et al. (14). Five questions were intended to measure personally mediated racism (15) in that they asked about the frequency in daily life of other people's behavior toward the BWHS participant: receive poorer service than other people in restaurants or stores, people act as if they think she is not intelligent, people act as if they are afraid of her, people act as if they think she is dishonest, and people act as if they are better than her. Response categories for these questions were: never, a few times a year, once a month, once a week, and almost every day. Three questions asked about institutionalized racism (15) or unfair treatment in three domains: on the job, in housing, and by the police. Response categories were yes and no.

We collected information on education and height on the 1995 baseline questionnaire. Racial composition of the neighborhood in which the subject lived up to the age of 18 years, neighborhood setting, and country in which the subject was born were collected on the 1997 follow-up survey. We collected information on weight, current smoking status, alcohol consumption, vigorous activity, and geographic area of residence on each follow-up questionnaire.

Principal components factor analysis using an orthogonal rotation (16) showed two factor patterns, which confirmed

the predetermined domains of the racism questions (Table 1). The first factor, which included questions assessing personally mediated racism, had factor loadings ranging from 0.66 to 0.81. The second factor, which included questions assessing institutionalized racism, had loadings that ranged from 0.61 to 0.77. Based on these results, two summary variables were created. Summary variable 1 averaged subjects' responses to the five personally mediated racism questions. Summary variable 2 categorized responses to the three questions on institutionalized racism according to the number of positive responses (none to all, yes to one, yes to two, and yes to all).

We assessed the reproducibility over time of the racism questions in a sample of BWHS participants. Because we asked the racism questions within our cohort only once, on the 1997 questionnaire, we do not have formal test-retest data. However, during each follow-up cycle, we mail multiple waves of questionnaires to women who have not yet responded. During the 1997 follow-up cycle, 1172 women returned duplicate questionnaires. Weighted  $\kappa$  values (17) for agreement between questionnaires for responses to racism questions indicated adequate reproducibility of responses, with  $\kappa$  ranging from 0.54 to 0.73 (Table 2);  $\kappa$  values did not differ according to the interval between the two questionnaires.

**Incident Hypertension**

For the present study, we define an incident case of hypertension as self-report on the 1999 or 2001 questionnaire of antihypertensive use or of hypertension with use of a diuretic (18). We assessed the accuracy of self-reported hypertension in a random sample of all incident cases reported to the BWHS between 1997 and 2001 that met our definition. Medical records were obtained for 139 of 185 women (70%) who gave us permission, and self-report was

**TABLE 1.** Principal components factor analysis: rotated (orthogonal) factor pattern of items measuring perceptions of racism and discrimination (n = 30,330)

	Item loading	
	Factor 1	Factor 2
Personally mediated racism		
Poorer service	0.657	-0.240
Not intelligent	0.806	-0.133
Afraid	0.731	-0.082
Dishonest	0.774	-0.131
Better than	0.770	-0.137
Institutionalized racism		
On the job	-0.175	0.679
Housing	-0.081	0.767
By police	-0.123	0.608
Variance explained by each factor	2.862	1.537

**TABLE 2.** Weighted  $\kappa$  for agreement between responses on duplicate 1997 questionnaires completed by 1172 Black Women's Health Study participants

Question	Overall	Interval between questionnaires	
		<45 days	≥45 days
<b>Personally mediated racism</b>			
Received poorer service	0.54	0.49	0.58
Treated as not intelligent	0.59	0.51	0.63
People act afraid	0.61	0.63	0.62
Treated as dishonest	0.63	0.58	0.65
People act as if better than	0.58	0.55	0.62
Summary variable 1	0.73	0.69	0.76
<b>Institutionalized racism</b>			
Unfair treatment on the job	0.68	0.74	0.63
Unfair treatment in housing	0.64	0.70	0.59
Unfair treatment by police	0.62	0.67	0.59
Summary variable 2	0.67	0.72	0.63

confirmed in 99%, with all systolic pressures 140 mm Hg or greater and/or diastolic pressures 90 mm Hg or greater (18). Participants who gave us permission to review their medical records differed from those who did not by education (median, 16 versus 14 years), but did not differ by age (median, 45 years for both) and body mass index (BMI; median, 30 kg/m<sup>2</sup> for both).

We also assessed degree of underreporting of hypertension with data from a study of 115 BWHS participants residing in the Washington, DC, metropolitan area. These subjects participated in a validation study of physical activity among BWHS participants conducted at Howard University Cancer Center. Three blood pressure measurements were obtained by trained clinical staff by using a standard mercury sphygmomanometer. Averages of each subject's systolic and diastolic blood pressure readings were compared with established blood pressure guidelines (18). Systolic pressures that were 140 mm Hg or greater and/or diastolic pressures that were 90 mm Hg or greater were classified as hypertensive. Women's questionnaire data from all years were examined for self-reported hypertension and/or use of antihypertensive medication, and women were classified as having ever reported hypertension or never reported hypertension. Fifteen percent of women who had never reported a diagnosis of high blood pressure were classified as hypertensive according to their blood pressure readings. Subjects who participated in the validation were older than the overall BWHS population (median age, 44 versus 40 years), but did not differ by BMI (median, 27 kg/m<sup>2</sup> for both) or education (median, 16 versus 15 years).

**Data Analysis**

Follow-up for the current analysis began in 1997 because racism data were provided in that questionnaire. The

analysis was restricted to the 30,330 women who completed the 1997 questionnaire and one or both of the 1999 and 2001 follow-up questionnaires and were at risk for incident hypertension. Thus, women who reported a diagnosis of hypertension on the 1995 baseline survey ( $n = 11,000$ ) or 1997 follow-up survey ( $n = 1983$ ) were excluded because they were considered to be prevalent cases. In addition, we excluded women who reported that their blood pressure had not been measured during the interval between the baseline and 1997 follow-up surveys ( $n = 1531$ ) and women who had missing values for at least one racism question ( $n = 3411$ ) or BMI ( $n = 185$ ).

Incidence rate ratios (IRRs) and 95% confidence intervals (CIs) were estimated by using Cox proportional hazard models in SAS, version 8.02 (PHREG; SAS Institute, Cary, NC). Responses to the personally mediated racism questions were considered as three categories: never/a few times a year, once a month, and at least once a week. IRRs were adjusted for age, BMI, and questionnaire cycle. Age and BMI were treated as time-varying covariates. Adjustment for years of education (<12, 12, 13, 14, 15, 16, and 17 years or greater), current alcohol consumption (yes and no), current smoking (yes and no), hours of vigorous activity per week (none, <5, and 5 or more hours), and geographic area of residence did not materially change IRRs.

In subgroup analyses, we assessed racism in relation to hypertension within categories of age (<45 and 45 or more years), education (<12, 13 to 15, and 16 or more years), geographic area of residence (Northeast, South, Midwest, and West), racial composition of the neighborhood in which the subject lived up to the age of 18 years (predominantly black, predominantly white, and mixed), neighborhood setting (urban, suburban, rural, and combination), where the subject was born (United States and other country), and questionnaire cycle (1997 to 1999 and 1999 to 2001).

**RESULTS**

Characteristics of study participants in 1997 are listed in Table 3. Median age was 37 years and 60% had a BMI of 25 kg/m<sup>2</sup> or greater. Personally mediated racism was related inversely to age, and the prevalence was slightly greater in women with a BMI 30 kg/m<sup>2</sup> or higher, women who were born in the United States, and those who grew up in predominantly white neighborhoods. Institutionalized racism was greater among the most well-educated women, women born in the United States, and women who grew up in predominantly white neighborhoods.

There were 2316 incident cases of hypertension reported during 104,574 person-years of observation. Forty-eight percent of women reported at least one experience of personally

**TABLE 3.** Selected characteristics of Black Women's Health Study participants in 1997 for the total sample and by the racism summary variables

	No. of included subjects (n = 30,330)	Summary variable 1 (quartile 4) (%) (n = 7665)	Summary variable 2 (yes to all 3) (%) (n = 3330)
Age (years)			
<30	5841	32	7
30-39	11,627	27	10
40-49	8955	23	14
50-59	3050	18	13
≥60	857	8	9
Body mass index (kg/m <sup>2</sup> )			
<20.0	1686	24	10
20.0-24.9	10,553	23	10
25.0-29.9	9930	24	11
≥30.0	8161	29	12
Education (years)			
≤12	3879	24	8
13-15	10,792	27	11
16	7832	25	10
≥17	7467	25	14
Place of birth			
United States	28,538	25	11
Foreign	1601	22	9
Type of neighborhood up to age 18			
Predominantly Black	18,421	25	11
Predominantly White	2381	30	13
Mixed	9202	25	11

mediated racism occurring at least once a month, and 70% reported one or more situations of institutional racism. Rate ratios for each of the racism questions were close to the null in the total sample (Table 4).

We assessed the associations of racism with hypertension in several subgroups of women. Within subgroups categorized by age, years of education, geographic region, neighborhood setting, and questionnaire period, results were null. However, in women born outside the United States and women who grew up in predominantly white neighborhoods, positive associations were observed.

There were 1601 women born outside the United States; most (73%) were from the Caribbean and Central and South America. Within this subgroup, there were elevated rate ratios for most of the individual racism questions. For example, the rate ratio was 1.7 (95% CI, 1.0-3.1) for those who experienced people acting as if they were not intelligent at least once a week relative to never/a few times a year, and the IRR was 1.8 (95% CI, 1.0-3.1) for those who reported that people act as if they were better than them for the same comparison. IRRs for the variable summarizing personally mediated racism were 1.6 (95% CI, 0.7-3.3) for the highest quartile relative to the lowest quartile and 2.0 (95% CI, 1.0-4.0) for the second highest quartile. For the variable that summarized institutionalized racism, rate ratio was 1.8 (95% CI, 0.8-3.4) for those who reported

"Yes" to all three questions relative to those who reported "No" to all three.

For women who grew up in predominantly white neighborhoods ( $N = 2381$ ), there were elevated IRRs for a few of the individual personally mediated racism questions, and the summary IRR was 1.7 (95% CI, 0.9-3.4) for the highest quartile relative to the lowest quartile. No association was observed for the institutionalized racism questions.

Results were similar within categories of age, years of education, geographic region, neighborhood setting, and questionnaire period (data not shown).

## DISCUSSION

Several studies examined whether exposure to racist or discriminatory incidents may be an important risk factor for elevated blood pressure in African Americans (8-13). The findings are mixed. Results in a group of African-American college students indicated greater increases in resting blood pressure in response to racist stimuli than in response to either anger or neutral stimuli (8). A subsequent analysis of black and white adults enrolled in the Coronary Artery Risk Development in Young Adults Study suggested that level of exposure to racism influenced black-white differences in blood pressure levels (9). The investigators also observed that in working-class African-American men and women, passive acceptance of racism was associated with increases in resting blood pressure levels (9). Results suggested that the experiences of unfair treatment plus style of coping had an additive effect. Another study, involving mostly Latino and black employees, used a psychometrically established questionnaire to show a small positive correlation between perceived exposure to discrimination and blood pressure levels ( $r = 0.20$ ;  $p < 0.05$ ) (10). Conversely, a study of black male workers in North Carolina found no main effect of perceived racism on blood pressure (11). Rather, the investigators observed significant interactions between racism experienced on the job and individual coping style, measured by using the John Henryism Scale (11).

Two small studies examined the relationship between racism and self-reported hypertension. In a sample of 101 black and white women residing in Alameda County, CA (12), black women who reported "never" experiencing discrimination were more likely to report hypertension than black women who reported experiencing one or more events. In addition, black women who responded to unfair treatment by accepting it and keeping it to themselves were 4.4 times more likely to self-report hypertension than black women who actively responded by talking about the incident or taking action. Conversely, no association between perceived racism and self-reported hypertension was observed in a sample of 312 mostly middle-class

**TABLE 4.** Hypertension in relation to perceived racism: multivariate rate ratios adjusted for age, body mass index, and questionnaire cycle

	Total sample n = 2316 cases 104,574 person-years		Born outside the United States n = 78 cases 5442 person-years		Grew up in a predominantly white neighborhood n = 113 cases 8421 person-years	
	n	IRR (95% CI)	n	IRR (95% CI)	n	IRR (95% CI)
<b>Personally mediated racism</b>						
Received poorer service than others?						
Never/a few times a year	1944	Reference	65	Reference	91	Reference
Once a month	173	0.9 (0.8-1.1)	4	0.7 (0.3-2.1)	8	0.7 (0.3-1.5)
At least once a week	199	1.0 (0.9-1.2)	9	1.5 (0.7-3.0)	14	1.0 (0.6-1.8)
People act as if you are not intelligent?						
Never/a few times a year	1727	Reference	51	Reference	77	Reference
Once a month	144	0.8 (0.7-0.9)	8	2.1 (1.0-4.5)	7	0.6 (0.3-1.4)
At least once a week	445	1.1 (1.0-1.2)	19	1.7 (1.0-3.1)	29	1.2 (0.8-1.9)
People act as if they are afraid of you?						
Never/a few times a year	1946	Reference	61	Reference	93	Reference
Once a month	114	1.0 (0.8-1.2)	8	3.3 (1.5-7.0)	4	0.5 (0.2-1.4)
At least once a week	256	1.2 (1.0-1.3)	9	1.5 (0.7-3.1)	16	1.3 (0.7-2.2)
People act as if you are dishonest?						
Never/a few times a year	2043	Reference	65	Reference	93	Reference
Once a month	91	0.9 (0.7-1.1)	6	2.2 (0.9-5.4)	8	1.5 (0.7-3.1)
At least once a week	182	1.1 (0.9-1.3)	7	1.5 (0.7-3.3)	12	1.2 (0.6-2.2)
People act as if they are better than you?						
Never/a few times a year	1571	Reference	48	Reference	72	Reference
Once a month	185	0.9 (0.8-1.0)	9	1.9 (0.9-3.9)	9	0.6 (0.3-1.3)
At least once a week	560	1.0 (0.9-1.1)	21	1.8 (1.0-3.1)	32	1.0 (0.6-1.5)
Summary variable of personally mediated racism						
Quartile 1	406	Reference	14	Reference	11	Reference
Quartile 2	691	1.1 (1.0-1.3)	17	0.9 (0.4-1.9)	34	2.0 (1.0-4.0)
Quartile 3	662	1.1 (1.0-1.3)	28	2.0 (1.0-4.0)	32	1.5 (0.7-3.1)
Quartile 4	557	1.1 (1.0-1.3)	19	1.6 (0.7-3.3)	36	1.7 (0.8-3.4)
<b>Institutionalized racism</b>						
Treated unfairly due to your race?						
On the job						
No	891	Reference	31	Reference	37	Reference
Yes	1425	1.0 (1.0-1.1)	47	1.5 (0.9-2.4)	76	1.1 (0.8-1.7)
Housing						
No	1466	Reference	55	Reference	61	Reference
Yes	850	0.9 (0.8-1.0)	23	1.0 (0.6-1.7)	52	1.0 (0.7-1.4)
Police						
No	1783	Reference	59	Reference	87	Reference
Yes	533	1.0 (0.9-1.0)	19	1.3 (0.8-2.2)	26	0.8 (0.5-1.2)
Summary variable of institutionalized racism						
No to all	654	Reference	26	Reference	23	Reference
Yes to 1	774	1.0 (0.9-1.1)	25	1.2 (0.7-2.2)	40	1.2 (0.7-2.0)
Yes to 2	630	1.0 (0.9-1.1)	17	1.2 (0.6-2.3)	36	1.2 (0.7-2.1)
Yes to 3	258	0.9 (0.8-1.0)	10	1.8 (0.8-3.8)	14	0.8 (0.4-1.7)

IRR = incidence rate ratio; CI = confidence interval.

African-American adults residing in Detroit, MI (13). Thus, although some studies suggested that racism causes increases in blood pressure, there is limited support for a measurable effect on risk for hypertension.

The overall results of the present study of incident hypertension were largely null. However, modest positive associations were noted for two subgroups; women born outside the United States and women who grew up in predominantly

white neighborhoods. The associations were most evident in foreign-born women.

Researchers have tended to treat African Americans as an undifferentiated group, rather than as a heterogeneous group with ethnic and class divisions (19). Prenatal nutrition, birth outcomes, and cancer rates have differed between foreign- and US-born black women (20, 21). The associations that we observed in the present study for

foreign-born women may reflect cultural differences in encountering and responding to white racism. The associations also may reflect responses to discrimination from American-born blacks because of differences in culture and language (22-24).

A limitation of the current study and the two previous studies of hypertension (12, 13) is that hypertension was self-reported. However, the method literature indicates a high degree of recall accuracy (25, 26), and our validation of subject self-report also indicated a high level of accuracy. Some underreporting of hypertension was likely. The American Heart Association estimates that as many as 32% of hypertensive Americans are unaware of their condition (18, 27). However, in a sample of BWHS participants, we found that only 15% of those who had never reported hypertension had a systolic pressure reading of 140 mm Hg or greater or a diastolic reading of 90 mm Hg or greater. Moreover, we performed additional analyses in which we changed the case definition to be more inclusive, including as cases subjects who reported hypertension without the use of antihypertensives or diuretics and those reporting diuretic use without a diagnosis of hypertension. Results were essentially unchanged.

Racial discrimination affects people on many levels. In the current analysis, the subset of questions taken from a previously used instrument may have failed to include experiences. This could have led to an underestimation of exposure to discrimination and therefore failure to detect a true association between the perceived discrimination and health outcomes.

Consistent with findings of previous studies, there is a high prevalence of exposure to racism in our cohort (9-14). Most women reported experiences of racism, either personally mediated or institutionalized. With this high background level of experiencing racism, it is possible that the current instrument may not have been adequately sensitive to assess within-group and individual differences in exposure (28). This, in turn, may have led to underestimation of an association.

With the exception of the study by James et al. (10), psychometric properties of the racism variables used in previous studies, including the present one, have not been fully established. We performed exploratory factor analysis, which confirmed the preconceptualized domains of personally mediated racism and institutionalized racism. We also assessed the reproducibility over time of the racism questions in a sample of BWHS participants. We hypothesized that if racism is a chronic stressor, responses to questions about racism should be adequately reproducible. Overall  $\kappa$  values indicated fair to good agreement (17) and did not differ by interval between questionnaires, suggesting that questions measured chronic, rather than acute, stress.

It was suggested that individual evaluation and coping in response to an event is what determines whether a psychological stress response follows the event (29). In previous studies of racism and high blood pressure, coping, in addition to the racist experience itself, was associated with increases in blood pressure (9, 11, 12). Coping mechanisms, such as speaking out in response to racist experiences, rather than internalizing one's feelings, appeared to mitigate the effects of racism on blood pressure (9, 11, 12). The BWHS did not collect information on the reactions of participants.

It is possible that infrequent unpredictable exposure to racism could have the most adverse effect on hypertension because the recipient cannot anticipate its occurrence, and this might reduce her ability to develop coping skills. Our failure to observe an increasing risk for hypertension with increasing exposure to racism is compatible with this possibility. Also compatible with this possibility is our observation of an effect of racism among foreign-born women who may have experienced less racism in their native countries and may be more susceptible to even infrequent encounters.

A strength of the present study is the prospective design. Experiences of racism were reported before the occurrence of hypertension, thus eliminating reporting bias, which was a possibility in previous studies (12, 13). To assess whether the prospective design might explain why our results differed from those of a previous cross-sectional study (12), we also performed a cross-sectional analysis using the 1535 cases of hypertension that were reported on the 1997 survey and met our case definition. Results did not differ from the current analysis.

An additional strength of the present study is the large sample size, which provided high statistical power. While 2316 cases were studied among 30,330 women, previous studies of hypertension included 101 (12) and 312 (13) subjects in total. Confounding is unlikely to explain the positive associations observed in our study. We controlled for two major risk factors for hypertension, age and BMI. Control for additional risk factors, such as education and physical activity, did not change the observed associations. The proportion of women successfully followed up in the BWHS was high, which lessened the possibility of selective losses.

In conclusion, the present study adds mixed results to the limited body of data examining whether experiences of racism are an important contributor to the excess burden of hypertension in African-American women. To better understand the association between racism and incidence of hypertension, as well as other health outcomes, future research should focus on the development of questions that adequately measure the stress and coping related to experiences of racism.

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