

Racial Discrimination and Blood Pressure: The CARDIA Study of Young Black and White Adults

ABSTRACT

Objectives. This study examined associations between blood pressure and self-reported experiences of racial discrimination and responses to unfair treatment.

Methods. Survey data were collected in year 7 (1992/93) of the Coronary Artery Risk Development in Young Adults (CARDIA) study, a prospective multisite community-based investigation. Participants included 831 Black men, 1143 Black women, 1006 White men, and 1106 White women 25 to 37 years old.

Results. Systolic blood pressure among working-class Black adults reporting that they typically accepted unfair treatment and had experienced racial discrimination in none of seven situations was about 7 mm Hg higher than among those reporting that they challenged unfair treatment and experienced racial discrimination in one or two of the situations. Among professional Black adults, systolic blood pressure was 9 to 10 mm Hg lower among those reporting that they typically challenged unfair treatment and had not experienced racial discrimination. Black-White differences in blood pressure were substantially reduced by taking into account reported experiences of racial discrimination and responses to unfair treatment.

Conclusions. Research on racial/ethnic distributions of blood pressure should take into account how discrimination may harm health. (*Am J Public Health.* 1996;86:1370-1378)

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Introduction

Only within the past decade have researchers begun to examine whether experiences of racial discrimination—above and beyond their economic manifestations¹⁻³—may be injurious to somatic health.⁴⁻⁶ Studies typically have concerned Black-White differences in medical care and have suggested that racial discrimination by health care providers may adversely affect treatment and recovery.⁴⁻¹³ These investigations, however, have lacked data on observed actions and attitudes of health care providers and on treatment decisions of patients.

Much less research has examined whether racial discrimination may contribute to somatic disease. To date, only four relatively small cross-sectional studies, all focused on blood pressure among the US Black population,¹⁴⁻¹⁷ have investigated links between health status and self-reported experiences of and reactions to racial discrimination. Results suggested that elevated blood pressure was associated with racial discrimination at work,^{14,15} exposure to movie scenes depicting angry and racist confrontations,¹⁶ and an internalized response to racial discrimination and unfair treatment.¹⁷

In conceptualizing how racial discrimination might contribute to the unexplained twofold greater prevalence of hypertension among the US Black population than among the US White population,¹⁸⁻²⁰ we drew on (1) evidence that blood pressure among the US Black population may be highest among those who actively try to overcome adversity but have limited socioeconomic resources (the "John Henryism" hypothesis)^{14,21-23}; (2) studies suggesting that suppressed anger may be a risk factor for hypertension^{16,19,20,24-28}; (3) research reporting elevated blood pressure among persons

employed in stressful occupations who nonetheless report low job stressor scores²⁹; and (4) analyses of "internalized oppression"^{19,20,24,30-33} referring to how people belonging to social groups historically and adversely defined, in part, by discrimination may internalize these negative views and consider their subordinate status to be evidence of their own deficiencies rather than discrimination.

Despite the plausibility of the hypothesis that racial discrimination may harm somatic health, limited empirical data have addressed this concern.^{4,5,34} The purpose of our study, accordingly, was to assess the relationship between self-reported experiences of racial discrimination and blood pressure and the contribution of racial discrimination to explaining Black-White disparities in elevated blood pressure.

Methods

Study Population

Our study population consisted of a large and well-defined cohort of 4086 Black and White women and men 25 to 37 years old. These individuals were enrolled in the Coronary Artery Risk Development in Young Adults (CARDIA) study, which was designed to investigate the

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evolution of cardiovascular risk factors. Characteristics of the cohort and the study design have been described in previous publications.^{35,36}

At baseline (1985/86), the study enrolled 5115 young adults, 18 to 30 years old, recruited by community-based sampling from three cities (Birmingham, Ala; Chicago, Ill; and Minneapolis, Minn) and from the membership of a large prepaid health plan in Oakland, Calif. The study targeted recruitment to 16 groups defined by race/ethnicity (Black, White), gender, age (18 to 24 years old, 25 to 30 years old), and education (completed 12 or less, or more than 12, years of education); 51% of eligible persons contacted enrolled. The baseline cohort included 1480 Black women, 1157 Black men, 1307 White women, and 1171 White men, of whom 48%, 56%, 27%, and 27%, respectively, had completed at most a high school education. Participants returned for follow-up exams conducted at year 2 (1987/88; 91% retention), year 5 (1990/91; 86% cumulative retention), and year 7 (1992/93; 80% cumulative retention). All examinations were approved by institutional review boards at each institution, and informed consent was obtained at each examination from each study participant. The present study included all persons who participated in the year 7 examination.

Data Collection

Interviewers collected data on participants' race/ethnicity, gender, and date of birth at the baseline examination and verified these data at each subsequent examination. All other data analyzed in this study were obtained at the year 7 exam in self- or interviewer-administered questionnaires or by physical examination.

A self-administered questionnaire, based on a previously developed instrument,¹⁷ asked about experiences of racial discrimination and unfair treatment. The first two questions concerned typical responses to unfair treatment; choices were (1) "accept it as a fact of life" vs "try to do something about it" and (2) "talk to other people about it" vs "keep it to yourself." Five sets of questions then addressed, in the following order, whether participants had ever experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior in several situations based on gender, race or color, socioeconomic position or social class, sexual preference (heterosexual, bisexual, homosexual), and religion. The situations

listed for racial discrimination were "at school," "getting a job," "at work," "getting housing," "getting medical care," "on the street or in a public setting," and "from the police or in the courts." For each type of discrimination, the situations listed varied slightly, reflecting circumstances in which people have typically reported encountering diverse forms of discrimination.^{4,30-32,37-46}

Trained and certified technicians used a random zero sphygmomanometer to record participants' resting 30-second pulse, followed by three systolic and fifth-phase diastolic blood pressures (measured at 1-minute intervals). In our analyses, we used an average of the second and third blood pressure measurements.

To evaluate modification of discrimination effects by socioeconomic position, we used available data on occupation, annual family income, home ownership, educational level, and marital or partner status. On the basis of the occupational data (coded according to 1980 US standard occupational codes⁴⁷), we characterized social class as either "working class" or "executive, professional, and/or supervisory." We designated as working class those occupations in which employees typically do not own their workplace, are not self-employed, and generally occupy subordinate positions at work. These included all occupations (except supervisory positions) in the following census-defined occupational categories: clerical and administrative support; sales; private household and other service occupations; craft and precision production; machine operators; transportation; laborers; and farm, forestry, and fishing occupations.⁴⁷⁻⁴⁹ We defined executive, professional, and/or supervisory occupations as including all supervisory occupations in the working class occupational groups and all remaining census-defined occupational groups: executive, administrative, and managerial; professional specialty; technicians and related support; and protective services.

We also obtained data on potential confounders, including body mass index (weight in kilograms divided by height in meters squared), waist-to-hip ratio, physical fitness (defined as number of seconds required to reach a heart rate of 130 beats per minute during a symptom-limited graded treadmill exercise test⁵⁰); these data were not available for one site [Minneapolis], skin color (based on readings taken from the medial aspect of the upper arm by means of amber, blue, and

green filters of a Photovolt 577 reflectance meter^{51,52}), cigarette smoking status, alcohol consumption, and current use of hypertension medications.

Statistical Analyses

Our analyses sought to describe the Black participants' self-reported experiences of racial discrimination and responses to unfair treatment. We used multivariate linear regression analyses^{53,54} to evaluate the associations of these experiences and responses with systolic and diastolic blood pressure and their contribution to Black-White differences in blood pressure, taking into account relevant socioeconomic and anthropometric cardiovascular risk factors.

To determine which covariates modified or confounded⁵³ associations of blood pressure (both systolic and diastolic) with racial discrimination and with race/ethnicity, we evaluated univariate associations between blood pressure and potential covariates within each of the four racial/ethnic-gender groups, overall and among subgroups defined by their reported experiences of discrimination. These analyses indicated that social class and gender were important effect modifiers and that the following covariates should be included in the multivariate analyses: age, education, marital or partner status, body mass index, waist-to-hip ratio, alcohol consumption, study center, use of hypertension medication, and physical fitness. Other variables, such as income, smoking status, and skin color, did not act as confounders or effect modifiers in our data set.

Evaluation of confounding by current use of hypertension medication and by physical fitness (data were available for only 56% of participants) indicated little effect on coefficients for reported discrimination and response to unfair treatment. In our analyses, we accordingly included all CARDIA study participants not currently taking hypertension medications (used only by 3% of the Black women and men and by 1% of the White women and men) and not missing data for any of the selected covariates. Persons missing data on one or more of the covariates closely resembled those not missing this information (data are available on request). The final models included, respectively, 80% and 87% of the Black women and men and 85% and 92% of the White women and men, together representing 86% of the total study population.

For analyses examining blood pressure among Black participants, we mod-

TABLE 1—Sociodemographic Profile of the 4086 Black and White Women and Men: CARDIA Year 7 Examination, 1992/93

Characteristic	Black Women (n = 1143), %	Black Men (n = 831), %	White Women (n = 1106), %	White Men (n = 1006), %
Age, y				
25–30	41	43	27	29
31–37	59	57	73	71
Social class				
Working class	68	63	44	37
Executive, professional, and/or supervisory	32	37	56	63
Annual family income, \$				
< 12 000	21	20	7	6
12 000–24 999	25	26	15	16
25 000–49 999	36	35	39	35
> 50 000	18	19	40	43
Rents or does not own home	58	58	38	40
Education				
< high school	5	8	2	2
> high school, < 4 y college	71	72	40	43
≥ 4 y college	21	20	58	54
Marital/partner status				
Married/living as married	46	52	69	62
Previously married/lived as married	19	12	8	6
Never married/lived as married	35	36	23	32

Note. The number of subjects missing data varied by characteristic and was small (between 1% and 5% of the cohort).

this response and were 1.9 times (95% CI = 1.4, 2.5) and 2.6 times (95% CI = 1.9, 3.5) more likely to do so, respectively, than their female counterparts.

Overall, 77% of Black women and 84% of Black men reported experiencing racial discrimination in at least one of the seven specified situations, and nearly 50% and 60%, respectively, reported experiencing racial discrimination in three or more situations. Among both women and men, the most commonly reported situation was on the street or in a public setting (59% and 66%, respectively). Next for the women was at work (52%), and next for the men was from the police or in the courts (58%). Black women and men were equally likely to report discrimination in four of the seven situations (at school, at work, getting housing, and getting medical care). In the remaining three situations, Black men reported experiencing racial discrimination between 1.2 and 2.1 times more than Black women on the street or in a public setting (relative risk [RR] = 1.1, 95% CI = 1.0, 1.2), getting a job (RR = 1.2, 95% CI = 1.1, 1.3), and from the police or in the courts (RR = 2.1, 95% CI = 1.9, 2.4).

Black Participants' Blood Pressure in Relation to Racial Discrimination and Response to Unfair Treatment

Overall, mean systolic and diastolic blood pressure levels among Black women were, respectively, 108.8 mm Hg (SD = 13.2) and 67.7 mm Hg (SD = 11.1). Among Black men, the corresponding mean values were 114.7 mm Hg (SD = 12.0) and 72.3 mm Hg (SD = 10.7).

Associations of systolic and diastolic blood pressure with self-reported experiences of racial discrimination and response to unfair treatment, adjusted for relevant covariates, were stratified by class (see Table 3). For reported experiences of racial discrimination, we compared the extremes (in none or three or more of the specified situations) with moderate experience (in one or two situations). For responses to unfair treatment, we set as the referent group those who typically tried to do something about it and talked to others. In all models, effects of reported racial discrimination and response to unfair treatment were independent of each other. Patterns of association were similar for systolic and diastolic blood pressure.

Among working-class Black women, systolic blood pressure tended to be 4 mm Hg higher among those reporting that they typically responded to unfair treat-

eled data on reported experiences of discrimination and response to unfair treatment in two ways: as two distinct indicator variables and as a single combined indicator variable. For analyses comparing Black-White differences in blood pressure, we first estimated (in model 1) risk differences adjusted for selected covariates and then estimated risk differences (in model 2) using an indicator variable for reported experiences of racial discrimination, adjusting for the same covariates with the addition of an indicator variable for response to unfair treatment. We performed all statistical analyses using SAS Version 6.04 for personal computers.⁵⁵

Results

Population Characteristics

Participants, on average, were slightly more than 31 years old, and they spanned a broad socioeconomic spectrum (Table 1). Black participants were, on average, 1 year younger than White participants and between 1.5 and 3.3 times more likely to be working class, have a lower annual

family income, rent their home, and have less than a high school education. Patterns of Black-White differences for anthropometric and other selected covariates varied by gender (data are available on request).

Self-Reported Responses to Unfair Treatment and Experiences of Racial Discrimination

With respect to responses to unfair treatment, between 70% and 80% of the Black and White men and women reported that they typically tried to do something about being treated unfairly and talked to others about it (Table 2). Approximately 18% reported that they typically accepted such treatment as a fact of life but nonetheless talked to others about it, and 2% to 8% reported that they kept it to themselves and either tried to do something about it or accepted it as a fact of life. Black women, however, were 1.5 times (95% confidence interval [CI] = 1.0, 2.1) more likely than White women to report that they responded by keeping it to themselves. By contrast, Black and White men were equally likely to report

ment by accepting it as a fact of life and keeping it to themselves, as compared with those who tried to do something about it and talked to others. It was also nearly 4 mm Hg higher among those saying that they had experienced racial discrimination in none, as compared with one or two, of the seven specified situations. These effects were additive: when the combined indicator variable was used, systolic blood pressure was 7.4 mm Hg higher (95% CI = -0.6, 15.5) among women who reported no racial discrimination and responded to unfair treatment by accepting it and keeping it to themselves than among women who reported racial discrimination in one or two situations and both tried to do something about unfair treatment and talked to others about it.

Among working-class Black men, systolic blood pressure was nearly 4 mm Hg higher among those reporting that they typically accepted unfair treatment as a fact of life but talked to others about it than among those who tried to do something and talked to others. It also was, respectively, 3 mm and slightly more than 4 mm higher among men reporting racial discrimination in three or more and in none, as compared with one or two, of the situations. These effects again were additive: when the combined indicator variable was used, systolic blood pressure was 7.4 mm Hg higher (95% CI = 3.3, 11.4) among men who reported no discrimination and both accepted unfair treatment and talked to others about it than among men who reported discrimination in one or two situations and both tried to do something about unfair treatment and talked to others about it.

The patterns of association differed by class among both the Black women and the Black men. Among professional women, with the same referent groups, systolic blood pressure was 7 mm Hg lower among those who reported that they tried to do something about unfair treatment and kept it to themselves. It was slightly more than 2 mm Hg higher among those reporting experiencing racial discrimination in three or more situations. Evidence for an additive effect was again provided by the model using the combined indicator variable, in which systolic blood pressure was 9.4 mm Hg lower (95% CI = -24.1, 5.2) among women in the lowest vs highest risk groups.

Among the professional men, systolic blood pressure was about 5 mm Hg lower among men who reported that they tried to do something about unfair treatment

TABLE 2—Reported Response to Unfair Treatment and Reported Racial Discrimination among 4086 Black and White Women and Men: CARDIA Year 7 Examination, 1992/93

	Black Women (n = 1143), %	Black Men (n = 831), %	White Women (n = 1106), %	White Men (n = 1006), %
Response to unfair treatment				
Do something and talk to others	75	69	78	70
Do something and keep to self	3	5	2	4
Accept as fact of life and talk to others	19	18	17	18
Accept as fact of life and keep to self	4	8	3	7
Racial discrimination, % yes				
At school	32	33	10	8
Getting a job	45	53	5	8
At work	52	55	8	6
Getting housing	30	32	2	1
Getting medical care	14	13	1	1
On the street or in a public setting	59	66	23	21
From the police or in the courts	27	58	2	4
Distribution of yes replies				
0	23	16	69	70
1-2	29	27	26	25
≥ 3	48	57	5	4

Note. The number of subjects missing data varied by characteristic and was small (less than 3% of the total cohort).

but kept it to themselves. It was also nearly 6 mm Hg lower among those reporting racial discrimination in none of the situations. When the combined indicator variable was used, the net difference between those in the least and most elevated categories was -10.4 mm Hg (95% CI -23.8, 2.9).

Black-White Differences in Blood Pressure

Overall Black-White differences in systolic blood pressure, adjusted for relevant covariates, were evident in each class stratum for both women and men and were greatest among those categorized as working class (model 1) (Table 4). Taking into account both reported racial discrimination and response to unfair treatment (model 2), systolic blood pressure, as compared with that among working-class White women, was nearly 7 mm Hg higher among working-class Black women who reported experiencing racial discrimination in none of the specified situations, 4 mm Hg higher among those reporting this discrimination in three or more situations, and slightly less than 3

mm Hg higher among those reporting racial discrimination in one or two situations. Corresponding figures for comparisons of working-class Black and White men were 6.0, 4.7, and 1.1 mm Hg.

Among professional women, no differences in systolic blood pressure were evident between Black women reporting racial discrimination in one or two situations and their White counterparts. Among professional men, systolic blood pressure of Black men reporting no racial discrimination was comparable to that of White men and diastolic blood pressure of these Black men was, in fact, 4.5 mm Hg lower (95% CI = -7.7, -1.3) than that of their White counterparts.

Discussion

Our study found that experiences of racial discrimination were reported by 80% of the 1974 Black women and men, 25 to 37 years old, enrolled in the CARDIA study, and that these reported experiences of racial discrimination, along with self-reported responses to unfair

TABLE 3—Adjusted Differences in Blood Pressure (mm Hg) as Estimates of the Association of Systolic and Diastolic Blood Pressure with Reported Racial Discrimination and Response to Unfair Treatment among 1638 Black Men and Women, by Social Class: CARDIA Year 7 Examination, 1992/93

Outcome	Social Class	No.	Racial Discrimination (Referent: 1 or 2 of the Situations)		Response to Unfair Treatment (Referent: Do Something/Talk to Others)		
			None of the Situations, RD (95% CI)	3+ of the Situations, RD (95% CI)	Do Something/Keep to Self, RD (95% CI)	Accept as Fact/Talk to Others, RD (95% CI)	Accept as Fact/Keep to Self, RD (95% CI)
Black Women							
Systolic blood pressure	Working class	621	3.6 (1.1, 6.2)	1.2 (-1.1, 3.4)	-0.6 (-6.0, 4.7)	0.9 (-1.6, 3.3)	4.3 (-0.3, 8.9)
	Executive, professional, and/or supervisory	292	1.7 (-1.7, 5.1)	2.3 (-0.3, 4.9)	-7.2 (-15.8, 1.4)	0.9 (-2.3, 4.0)	1.3 (-4.9, 7.6)
Diastolic blood pressure	Working class	621	1.4 (-0.7, 3.6)	0.7 (-1.2, 2.5)	0.1 (-4.3, 4.6)	-0.2 (-2.2, 1.8)	0.4 (-3.4, 4.3)
	Executive, professional, and/or supervisory	292	1.4 (-1.4, 4.2)	1.4 (-0.8, 3.6)	-6.2 (-13.3, 1.0)	-0.0 (-2.7, 2.6)	4.2 (-1.0, 9.4)
Black Men							
Systolic blood pressure	Working class	458	4.1 (0.7, 7.4)	3.0 (0.4, 5.5)	1.6 (-3.2, 6.5)	3.6 (0.8, 6.4)	-0.8 (-4.5, 2.8)
	Executive, professional, and/or supervisory	267	-4.5 (-9.2, 0.3)	-1.9 (-5.0, 1.3)	-5.4 (-13.2, 2.4)	-0.9 (-3.0, 4.7)	-0.9 (-7.3, 5.4)
Diastolic blood pressure	Working class	458	2.5 (-0.5, 5.4)	2.4 (0.3, 4.6)	4.7 (0.5, 8.9)	2.7 (0.2, 5.1)	0.5 (-2.6, 3.6)
	Executive, professional, and/or supervisory	267	-6.1 (-10.0, -2.2)	-1.4 (-4.0, 1.2)	-2.2 (-8.7, 4.2)	1.0 (-2.2, 4.2)	-0.5 (-5.7, 4.8)

Note. Covariates were age, education, marital or partner status, body mass index, waist-to-hip ratio, alcohol consumption, and study center. For reported racial discrimination, the referent group comprised those reporting having experienced racial discrimination in 1 or 2 of the 7 specified situations, and comparison groups were those reporting having experienced racial discrimination in either none or 3 or more of these situations. For response to unfair treatment, the referent group comprised those reporting that they typically try to do something about it and talk to others, and comparison groups were those reporting that they try to do something and keep it to themselves, they accept the unfair treatment as a fact of life and talk to others, or they accept it as a fact of life and keep it to themselves. RD = risk difference; CI = confidence interval.

treatment, were associated with blood pressure. Additional analyses involving the 2112 White study participants illustrated how variation in blood pressure among Black women and men related to reported experiences of racial discrimination could contribute to Black-White differences in blood pressure among young adults. To our knowledge, analyses of the effects of racial discrimination on blood pressure within class and gender strata among the US Black population and the contribution of racial discrimination to explaining Black-White disparities in blood pressure have not previously been reported.

Methodologic Considerations

Our findings about blood pressure in relation to racial discrimination and response to unfair treatment are unlikely to be due to biases in measuring blood pressure or covariates included in our models. Data on the CARDIA study participants' self-identified race/ethnicity, gender, and age were validated at each examination, and data on their blood pressure and anthropometric characteristics were obtained by physical examination following standardized protocols, thereby ensuring consistent measurement among all study subjects. Data on sociode-

mographic characteristics were obtained through questions comparable to those used in other studies.^{48,56} Black-White differences in blood pressure might have been further reduced, however, if more refined measures of socioeconomic position had been available from the year 7 exam (e.g., data on wealth, poverty level, and occupation of participants' partners or other heads of household, permitting classification of household social class).^{48,57,58}

Evaluating the validity of our data on racial discrimination and response to unfair treatment is more complex. Much of the limited research on this topic has asked people about the level of discrimina-

tion they think is experienced by their own (or another) group rather than about their own individual experiences.^{30,31(pp2-10),59-61} Notably, patterns and prevalences of racial discrimination reported in our study are virtually identical to those previously documented by Krieger¹⁷ using the same questions. Moreover, among the handful of recent national surveys designed to explore views on racial inequality among the US Black population, a 1986 poll of 1022 Black men and women found similar levels of self-reported experiences of racial discrimination: 25% for obtaining a "quality education," 25% for "getting decent housing," 39% for "getting a job," and 41% for "getting equal wages." Most respondents reported discrimination in one or two, but not all, areas of their life.^{31(pp55,168),61} Other research has reported a range of situational strategies used by people who are discriminated against,^{30-32,37,40,44} spanning from "careful assessment to withdrawal, resigned acceptance, verbal confrontation, physical confrontation, or legal action."^{30(p274)} Thus, occurrences of racial discrimination as reported by the Black CARDIA participants, and their usual responses to unfair treatment, are neither unique nor unusual.

Even though our data on prevalence of reported experiences of racial discrimination may be comparable to those documented in prior studies, their meaning may be debatable. This is especially true for Black CARDIA study participants reporting no experiences of racial discrimination. One possibility is that this response is true. Another is that some people who experience discrimination may not acknowledge or report it as such. Supporting the latter interpretation, research indicates that individuals belonging to groups that experience discrimination are more likely to state that members of their group, rather than they themselves, have experienced discrimination.^{4,30-32,37,38,62,63} This phenomenon may reflect what some have referred to as "internalized oppression,"^{4,30,32,33} whereby unfair treatment is perceived by members of stigmatized groups as "deserved" and nondiscriminatory. By contrast, individuals who belong to stigmatized groups but who refuse to accept a stigmatized status may be more able and willing to report discriminatory treatment.

Additional theoretical and empirical work, primarily on racial discrimination, suggests that individuals who have experienced but feel unable to challenge discrimination may find it painful to admit that they have experienced discrimination, either to

TABLE 4—Adjusted Differences in Blood Pressure (mm Hg) as Estimates of Black–White Differences in Systolic Blood Pressure, Overall and by Reported Racial Discrimination, among 3504 Participants, by Gender and Class: CARDIA Year 7 Examination, 1992/93

Group	Model 1: Overall Black–White Difference, RD (95% CI)	Model 2: Reported Racial Discrimination by Black Participants (Referent: White Participants)		
		None of the Situations, RD (95% CI)	1 or 2 of the Situations, RD (95% CI)	3+ of the Situations RD (95% CI)
Women				
Working class	4.2 (2.7, 5.7)	6.7 (4.5, 8.8)	2.8 (0.7, 4.8)	4.0 (2.3, 5.7)
Executive, profes- sional, and/or supervisory	2.8 (1.4, 4.3)	2.9 (0.3, 5.6)	1.1 (–1.2, 3.3)	3.5 (1.9, 5.1)
Men				
Working class	4.1 (2.4, 5.8)	6.0 (3.2, 8.9)	1.8 (–0.6, 4.2)	4.7 (2.8, 6.5)
Executive, profes- sional, and/or supervisory	2.2 (0.6, 3.9)	–0.5 (–4.3, 3.3)	3.8 (1.3, 6.4)	2.0 (0.0, 3.9)

Note. Covariates were age, education, marital or partner status, body mass index, waist-to-hip ratio, alcohol consumption, and study center. In the working-class strata, there were 621 Black women, 458 Black men, 412 White women, and 336 White men. In the executive, professional, and/or supervisory strata, there were 292 Black women, 267 Black men, 525 White women, and 593 White men. Model 1 presents overall adjusted risk differences comparing Black and White participants (adjusted for all covariates). Model 2 presents adjusted risk differences comparing Black with White participants, using a four-level indicator variable in which all White participants were grouped together as the reference category (regardless of their individual replies to the question about racial discrimination) and Black participants were divided into the three groups reporting racial discrimination in none, 1 or 2, or 3 or more of the 7 specified situations. This model was adjusted for all covariates and included an indicator variable for response to unfair treatment. RD = risk difference; CI = confidence interval.

themselves or another person.* Supporting this interpretation, preliminary research involving in-depth interviews of Black women and men in the United Kingdom revealed that individuals who initially reported not having experienced racial discrimination, on being asked more probing questions, acknowledged having experienced discrimination but found it hard to talk about.⁶³ Other work has suggested that Black women and men often feel compelled not to display their anger and hurt so as to shield their vulnerability and protect against both recrimination and playing into derogatory stereotypes about Blacks being "too emotional."⁶⁴ If the group of Black CARDIA participants reporting no experiences of racial discrimination did chiefly consist of or include persons who have experienced but do not report racial discrimination as such, the net effect on our study would be to underestimate the prevalence of racial discrimination and its effects on health status.

One final methodologic caveat is that our data were obtained during the course of one CARDIA examination. The limitations of inferring causality from cross-sectional data are well known.⁵³ Even so, cardiovascular risk factors identified in

cross-sectional studies (e.g., body mass index, lack of exercise, high-salt diet) have been shown to be predictive when studied longitudinally.⁶⁴⁻⁶⁸ Keeping in mind the methodologic concerns that we have delineated, we believe our findings to be sufficiently sound—and provocative—to warrant considering their broader significance.

Interpretation

Taken together, our results indicate that racial discrimination shapes patterns of blood pressure among the US Black population and Black–White differences in blood pressure. Lending support to the view that internalized responses to racial discrimination may be associated with elevated blood pressure,^{16,17,19,24,25,34} we found that, at least among working-class Black women and men in their mid-20s to mid-30s, blood pressure was highest among those reporting having experienced no racial discrimination and lowest among

*References 4, 17, 30 (pp 25, 276), 31 (pp 96, 112, 168), 32 (pp 77–79), 33 (pp 21–30, 133–145), 63.

**References 30 (pp 64, 221, 305), 31 (pp 59, 168), 32, 33 (pp 21–30, 133–145).

those reporting discrimination in one or two of the specified situations.

It is unlikely that these results mean that experiencing moderate discrimination is desirable; more plausibly, individuals belonging to groups subjected to discrimination may be at lower risk of elevated blood pressure if they are able to articulate, rather than internalize, their experiences of discrimination. Notably, the blood pressure differences we observed associated with reported experiences of racial discrimination, in conjunction with response to unfair treatment, are on par with or exceed those associated with other cardiovascular risk factors targeted for nonpharmacologic interventions (e.g., lack of exercise, smoking, and unhealthy high-fat, high-salt diets).^{64,66-72}

Our data also suggest that gender-mediated responses to unfair treatment may influence blood pressure. Blood pressure was most elevated among working-class Black women who accepted unfair treatment as a fact of life and kept it to themselves and among working-class Black men who accepted such treatment but talked to others. Blood pressure was also elevated among working-class Black men, but not women, reporting having experienced racial discrimination in three or more situations. These patterns may reflect gender differences in how working-class Black women and men respond to and talk about discrimination. Some evidence, for example, suggests that women may feel more free to share their feelings in a way that provides validation, whereas men may talk about what happened in a more resigned manner and consider it unsafe to express their actual feelings of hurt and anger.^{30(pp64,221,305),73,74}

Contrasting patterns among professional Black women and men may speak to their greater social and economic resources and, thus, perhaps greater willingness to name and challenge discriminatory treatment.* This could perhaps explain why, among these men, systolic and diastolic blood pressure levels were notably lower among those reporting having experienced racial discrimination in none vs one or two of the specified situations; this pattern, however, was not apparent among the women. The comparatively low blood pressure levels among professional Black women and men who reported that they typically responded to unfair treatment by doing something about it but kept it to themselves may

likewise signal—in a group with enhanced resources to redress discrimination—a distinction between those who feel they can address discrimination on their own and those for whom talking may compound, rather than alleviate, the situation.^{31(pp64)} These interpretations are tentative pending more in-depth data and theoretical analyses of how Black women and men, both professional and working class, are subjected to, perceive, and respond to racial discrimination.

Finally, our data speak to the possibility of markedly reducing Black-White differences in blood pressure. The data in Table 4 provide evidence that Black-White differences in systolic blood pressure would be reduced by 33% among working-class women (i.e., [4.2 – 2.8]/4.2) and by 56% among working-class men (i.e., [4.1 – 1.8]/4.1) if these Black women and men had the blood pressure of those reporting racial discrimination in one or two situations. The same analyses for diastolic blood pressure (data are available on request) indicated that working-class Black-White differences in diastolic blood pressure would be reduced by 28% among women and eliminated among men. Similarly, analyses of systolic and diastolic blood pressure for the professional Black women and men demonstrated no Black-White differences in two groups: women reporting racial discrimination in one or two situations and men reporting no racial discrimination.

Implications

Despite the preliminary nature of our findings, one clear implication is that analyses of “Black-White” differences in blood pressure should take into account social meanings of race/ethnicity, as embodied in experiences of racial discrimination. They should also consider how social class and gender affect exposure to and embodiment of racial discrimination.

That discrimination hurts may be self-evident. Yet, the long-standing conceptualization of racial/ethnic disparities in health as having a biologic basis testifies to a lack of understanding of what “race” means.^{1,4,5} This study offers an approach to documenting how discrimination can harm health that is potentially useful for addressing not only elevated blood pressure among the US Black population but also other expressions of social inequalities in health. □

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References

- DuBois WEB, ed. *The Health and Physique of the Negro American*. Atlanta, Ga: Atlanta University Press; 1906.
- Tibbitts C. The socio-economic background of Negro health status. *J Negro Educ*. 1937;6:413-428.
- Haan M, Kaplan GA. The contribution of socioeconomic position to minority health. In: *Report of the Secretary's Task Force on Black & Minority Health, Vol. II: Crosscutting Issues in Minority Health*. Washington, DC: US Dept of Health and Human Services; 1985:67-103.
- Krieger N, Rowley DL, Herman AA, Avery B, Phillips MT. Racism, sexism, and social class: implications for studies of health, disease, and well-being. *Am J Prev Med*. 1993;9(suppl 2):82-122.
- Williams DR, Collins C. US socioeconomic and racial differences in health: patterns and explanations. *Annu Rev Sociol*. 1995;21:349-389.
- Council of Ethical and Judicial Affairs, American Medical Association. Black-white disparities in health care. *JAMA*. 1990;263:845-850.
- Wenneker MB, Epstein AM. Racial inequalities in the use of procedures for patients with ischemic heart disease in Massachusetts. *JAMA*. 1989;261:253-257.
- Ford RE, Cooper R, Castaner A, Simmons B, Mar M. Coronary arteriography and coronary bypass surgery among White and other racial groups relative to hospital-based incidence rates for coronary artery disease: findings from NHDS. *Am J Public Health*. 1989;79:437-440.
- Escarce JJ, Epstein KR, Colby DC, Schwartz JS. Racial differences in the elderly's use of medical procedures and diagnostic tests. *Am J Public Health*. 1993;83:948-954.
- Mayer WH, McWhorter WP. Black/white differences in non-treatment of bladder cancer and implications for survival. *Am J Public Health*. 1989;79:772-774.
- Yergan J, Flood AB, LoGerfo JP, Diehr P. Relationship between patient race and intensity of hospital services. *Med Care*. 1987;25:592-603.
- Kjellstrand CM. Age, sex, and race inequality in renal transplantation. *Arch Intern Med*. 1988;148:1305-1309.
- Kahn KL, Pearson ML, Harrison ER, et al. Health care for black and poor hospitalized Medicare patients. *JAMA*. 1994;271:1169-1174.
- James SA, LaCroix AZ, Kleinbaum DG,

*References 30 (pp 274, 291), 31 (pp 71-74), 33 (pp 21-30).

- Strogatz DS. John Henryism and blood pressure differences among black men. II. The role of occupational stressors. *J Behav Med.* 1984;7:259-275.
15. Dressler WW. Lifestyle, stress, and blood pressure in a southern black community. *Psychosom Med.* 1990;52:182-198.
 16. Armstead CA, Lawler KA, Gordon G, Cross J, Gibbons J. Relationship of racial stressors to blood pressure and anger expression in black college students. *Health Psychol.* 1989;8:541-556.
 17. Krieger N. Racial and gender discrimination: risk factors for high blood pressure? *Soc Sci Med.* 1990;30:1273-1281.
 18. Drizd T, Dannenberg AL, Engel A. Blood pressure levels in persons 18-74 years of age in 1976-80, and trends in blood pressure from 1960 to 1980 in the United States. *Vital Health Stat [11]*. 1986;234, DHHS publication PHS 86-1684.
 19. Anderson NB, Myers HF, Pickering T, Jackson JS. Hypertension in blacks: psychological and biological perspectives. *J Hypertens.* 1989;7:161-172.
 20. Williams DR. Black-white differences in blood pressure: the role of social factors. *Ethnicity Dis.* 1992;2:126-141.
 21. James SA, Hartnett SA, Kalsbeek WD. John Henryism and blood pressure differences among black men. *J Behav Med.* 1983;6:259-278.
 22. James SA, Strogatz DS, Wing SB, Ramsey DL. Socioeconomic status, John Henryism, and hypertension in blacks and whites. *Am J Epidemiol.* 1987;126:664-673.
 23. James SA. John Henryism and the health of African-Americans. *Cult Med Psychiatry.* 1994;18:163-182.
 24. Gentry WD. Relationship of anger-coping styles and blood pressure among black Americans. In: Chesney MA, Rosenman RH, eds. *Anger and Hostility in Cardiovascular and Behavioral Disorders*. Washington, DC: Hemisphere Publishing Co; 1985:139-147.
 25. Harburg E, Blakelock EH Jr, Roepert PJ. Resentful and reflective coping with arbitrary authority and blood pressure: Detroit. *Psychosom Med.* 1979;3:189-202.
 26. Johnson EH. The role of the experience and expression of anger and anxiety in elevated blood pressure among black and white adolescents. *J Natl Med Assoc.* 1989;81:573-584.
 27. Johnson EH, Schork NJ, Spielberger CD. Emotional and familial determinants of elevated blood pressure in black and white adolescent females. *J Psychosom Med.* 1987;31:731-741.
 28. Durel LA, Carver CS, Spitzer SB, et al. Associations of blood pressure with self-reported measures of anger and hostility among black and white men and women. *Health Psychol.* 1989;8:557-575.
 29. Winkleby M, Ragland DR, Syme SL. Self-reported stressors and hypertension: evidence of an inverse association. *Am J Epidemiol.* 1988;127:124-134.
 30. Feagin J, Sikes MP. *Living with Racism: The Black Middle-Class Experience*. Boston, Mass: Beacon Press; 1994.
 31. Sigelman L, Welch S. *Black Americans' Views of Racial Inequality: The Dream Deferred*. Cambridge, England: Cambridge University Press; 1991.
 32. Essed P. *Understanding Everyday Racism*. Newbury Park, Calif: Sage Publications; 1991.
 33. Hooks B. *Killing Rage: Ending Racism*. New York, NY: Henry Holt; 1995.
 34. Krieger N. The influence of social class, race, and gender on the etiology of hypertension among women in the United States. In: Czajowski SM, Hill DR, Clarkson TB, eds. *Women, Behavior, and Cardiovascular Disease: Proceedings of a Conference Sponsored by the National Heart, Lung, and Blood Institute*. Washington, DC: U.S. Government Printing Office; 1994:191-206. NIH publication 94-3309.
 35. Cutter GR, Burke GL, Dyer AL, et al. Cardiovascular risk factors in young adults: the CARDIA baseline monograph. *Controlled Clin Trials.* 1991;12:1S-77S.
 36. Friedman G, Cutter GR, Donahue RP, et al. Study design, recruitment, and some characteristics of the examined subjects. *J Clin Epidemiol.* 1988;41:1105-1116.
 37. Benokraitis NV, Feagin JR. *Modern Sexism: Blatant, Subtle, and Covert Discrimination*. Englewood Cliffs, NJ: Prentice Hall; 1986.
 38. Gardner CB. Passing by: street remarks, address rights, and the urban female. *Social Inquiry.* 1980;50:328-356.
 39. Campbell A, Schuman H. *Racial Attitudes in Fifteen American Cities*. Ann Arbor, Mich: Survey Research Center, University of Michigan; 1969.
 40. Sennett R, Cobb J. *The Hidden Injuries of Class*. New York, NY: Alfred A. Knopf; 1972.
 41. Coleman RP, Rainwater L. *Social Standing in America: New Dimensions of Class*. New York, NY: Basic Books; 1979.
 42. Faderman L. *Odd Girls and Twilight Lovers: A History of Lesbian Life in Twentieth-Century America*. New York, NY: Penguin Books; 1991.
 43. Katz JN. *Gay American History: Lesbians and Gay Men in the U.S.A., a Documentary History*. Rev. ed. New York, NY: Meridian; 1992.
 44. Galloway G, ed. *Prejudice and Pride: Discrimination against Gay People in Modern Britain*. London, England: Routledge & Kegan Paul; 1983.
 45. *Facts about Religious Discrimination*. Washington, DC: US Equal Employment Opportunity Commission; 1992.
 46. *Religious Discrimination: A Neglected Issue*. Washington, DC: US Commission on Civil Rights; 1980.
 47. Census of Population and Housing, 1980. *Summary Tape File 3 Technical Documentation, Prepared by the Data User Services Division, Bureau of the Census*. Washington, DC: US Bureau of the Census; 1982:421-436.
 48. Krieger N. Women and social class: a methodological study comparing individual, household, and census measures as predictors of black/white differences in reproductive history. *J Epidemiol Community Health.* 1991;45:35-42.
 49. Wright EO, Costello C, Hacken D, Sprague J. The American class structure. *Am Sociol Rev.* 1982;47:709-726.
 50. Sidney S, Haskell WL, Crow R, et al. Symptom-limited graded treadmill exercise testing in young adults in the CARDIA study. *Med Sci Sports Exerc.* 1992;24:177-183.
 51. *CARDIA Protocol, Year 7 Exam (1992-1993)*. Birmingham, Ala: CARDIA Coordinating Center, University of Alabama, Birmingham; 1992.
 52. Keil JE, Sandifer SH, Loadholt B, Boyle E Jr. Skin color and education effects on blood pressure. *Am J Public Health.* 1981;71:532-534.
 53. Kelsey JL, Thompson WD, Evans AS. *Methods in Observational Epidemiology*. New York, NY: Oxford University Press Inc; 1986.
 54. Kleinbaum DG, Kupper LL, Muller KE. *Applied Regression Analysis and Other Multivariate Methods*. 2nd ed. Boston, Mass: PWS-Kent Publishing Co; 1988.
 55. *SAS Language Guide for Personal Computers, Release 6.04 Edition*. Cary, NC: SAS Institute Inc; 1990.
 56. Liberatos P, Link BG, Kelsey JL. The measurement of social class in epidemiology. *Epidemiol Rev.* 1988;10:87-121.
 57. Dale A, Gilbert GN, Arber S. Integrating women into class theory. *Sociology.* 1985;19:384-409.
 58. Arber S. Revealing women's health: re-analysing the General Household Survey. In: Roberts H, ed. *Women's Health Counts*. London, England: Routledge; 1990:63-92.
 59. Shuman H, Steeh C, Bobo L. *Racial Attitudes in America: Trends and Interpretations*. Cambridge, Mass: Harvard University Press; 1985.
 60. *Taking America's Pulse: The National Conference Survey on Inter-Group Relations*. New York, NY: National Conference of Christians and Jews; 1994.
 61. *Black Poll*. Washington, DC: ABC News/Washington Post; January 1986.
 62. Mays V. The impact of perceived discrimination on the health and well-being of African Americans. Presented at the 122nd Annual Meeting of the American Public Health Association; October 29-November 4, 1994; Washington, DC.
 63. Parker H, Botha JL, Haslam C. "Racism" as a variable in health research—can it be measured? Presented at the 38th annual scientific meeting of the UK Society for Social Medicine; September 14-16, 1994; Leeds, England.
 64. National High Blood Pressure Education Program. *The Fifth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure*. Washington, DC: National Heart, Lung and Blood Institute, National Institutes of Health; 1993:11-14. NIH publication 932-1088.
 65. Horan MJ, Lenfant C. Epidemiology of blood pressure and predictors of hypertension. *Hypertension.* 1990;15(suppl 1):120-124.
 66. The Trials of Hypertension Prevention Collaborative Research Group. The effect of nonpharmacologic interventions on blood pressure with high normal levels: results of the Trials of Hypertension Prevention, phase I. *JAMA.* 1992;267:1213-1220.
 67. Cutler JA, Follmann D, Elliott P, Suh I. An overview of randomized trials of sodium reduction and blood pressure. *Hypertension.* 1991;17(suppl 1):127-133.
 68. Law MR, Frost CD, Wald NJ. By how much does dietary salt reduction lower blood pressure? III. Analysis of data from

- trials of salt reduction. *BMJ*. 1991;302:819-824.
69. Wassertheil-Smolter S, Blafox MD, Oberman AS, Longford HG, Davis BP, Wylie-Rosett J. The Trials of Antihypertensive Interventions and Management (TAIM) study: adequate weight loss, alone and combined with drug therapy in the treatment of mild hypertension. *Arch Intern Med*. 1992;152:131-136.
70. Kottke TE, Puska P, Salonen JT, Tuomilehto J, Nissinen A. Projected effects of high-risk versus population-based prevention strategies in coronary heart disease. *Am J Epidemiol*. 1985;121:697-704.
71. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. Washington, DC: US Dept of Health and Human Services; 1991:112-114. DHHS publication PHS 91-50213.
72. Working Group on Management of Patients with Hypertension and High Blood Cholesterol. National education programs working group report on the management of patients with hypertension and high blood cholesterol. *Ann Intern Med*. 1991; 114:224-237.
73. Pierce CM, Profit WE. Racial group dynamics: implications for rearing black males. In: Majors RG, Gordon JU, eds. *The American Black Male: His Present Status and His Future*. Chicago, Ill: Nelson-Hall; 1994:167-177.
74. Gibbs JT. Anger in young black males: victims or victimizers. In: Majors RG, Gordon JU, eds. *The American Black Male: His Present Status and His Future*. Chicago, Ill: Nelson-Hall; 1994:127-143.

Search Committee Seeks New Editor for *Medical Care*

An Editor Search Committee has begun a national search for a new editor of *Medical Care*. The seven-member search committee welcomes and solicits nominations and recommendations from the APHA membership and the readers of *Medical Care* to assist them in identifying the best available individual for this important editorship. The journal, which is sponsored by the Medical Care Section of the American Public Health Association and published by Lippincott-Raven, receives the support of a paid staff person who administrates the review process and fulfills other duties the editor may choose to assign.

The following criteria will be considered by the search committee in selecting the editor for *Medical Care*:

- An advanced degree in an area related to the field of medical care and the evaluation of human health and health care, e. g., in public health, medicine, the allied health disciplines, or health services research.
- Comprehensive knowledge of the broad field of medical care, with an appreciation of its many disciplines, and a solid grounding in the scientific methods used in the evaluation of human health and health care, i.e., qualitative or quantitative analysis of health services, policy analysis, use of large data sets, epidemiology, statistics, and clinical trials.
- Demonstrated research skills, with evidence (through publication in peer-reviewed journals) of a firm grounding in areas of scientific inquiry related to medical care, e.g., research, planning, organization, financing, provision, and the evaluation of health services.
- Demonstrated writing, reviewing, and editing skills, enabling the following: authoritative advice to authors on the suitability of manuscripts, the informed consideration of reviewer assessments, guidance to authors during the revision process, and the preparation of editorials.
- Freedom to devote sufficient time to assure a high-quality journal. (The possibility of co-editorship is open.)
- Membership in the Medical Care Section of APHA, a working knowledge of the association and the section, including their respective missions, and a commitment to foster the advocacy goals of the association and the section.
- An institutional base is deemed highly desirable, preferably in an academic health science center, a school of public health, or a public health agency.

APHA supports equal opportunity and affirmative action in employment.

Self-nominations are welcome. The Search Committee will begin to review applications November 1, 1996.

Send names of potential candidates along with letters of endorsement and other support matter, to the following address:

Medical Care Search Committee
c/o Director of Human Resources
American Public Health Association
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Washington, DC 20005-2605