
Racism, Discrimination and Hypertension: Evidence and Needed Research

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This paper reviews the available scientific evidence that relates racism to the elevated rates of hypertension for African Americans. Societal racism can indirectly affect the risk of hypertension by limiting socioeconomic opportunities and mobility for African Americans. Racism can also affect hypertension by 1) restricting access to desirable goods and services in society, including medical care; and 2) creating a stigma of inferiority and experiences of discrimination. This paper evaluates the available evidence for perceptions of discrimination. African Americans frequently experience discrimination and these experiences are perceived as stressful. Several lines of evidence suggest that stressors are positively related to hypertension risk. Exposure to racial stressors under laboratory conditions reliably predicts cardiovascular reactivity and such responses have been associated with longer-term cardiovascular risk. Few population-based studies have examined the association between exposure to racial discrimination and hypertension, and the findings, though suggestive of a positive association between racial bias and blood pressure, are neither consistent nor clear. However, the existing literature identifies important new directions for the comprehensive measurement of discrimination and the design of rigorous empirical studies that can evaluate theoretically derived ideas about the association between discrimination and hypertension. (*Ethn Dis.* 2001;11:800–816)

Key Words: Race, Racism, Racial Discrimination, Blood Pressure

Introduction

Hypertension is one of the most common chronic illnesses in the United States, with one in four of all adults and almost two out of three persons over the age of 65 having this condition.¹ As a major risk factor for coronary heart disease and the major risk factor for cardiovascular disease, hypertension is a key contributor to morbidity, dis-

ability, and premature mortality in the United States. Racial differences in hypertension are marked and, although the rates of hypertension have declined over the past 40 years for both African Americans (or Blacks) and Whites, the relative difference between the groups has become larger. Data from the National Health and Nutrition Examination Survey (NHANES) reveal that Black men had a rate of hypertension that was 1.2 times higher than that of Whites in 1960–62 but 1.4 times higher in 1988–1994.¹ Similarly, the prevalence of hypertension was 1.6 times higher for Black than White women in 1960–1962 but 1.8 times higher in the 1988–1994 period. Despite decades of research, the reasons for these large and persistent racial differences in hypertension are not well understood.²

Some have suggested that racism is one

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component of the larger social environment of the United States that is a contributing factor to the elevated rates of hypertension among African Americans.^{3,4} Racism refers to an organized system, based on an ideology of inferiority, that disadvantages groups designated to be inferior compared to those presumed to be superior.^{5,6} Central to the operation of racism is the exercise of power by the dominant group against the group defined as inferior.^{6,7} Negative attitudes and beliefs toward racial out-groups (prejudice) and differential treatment of members of these groups by individuals and social institutions (discrimination) often ensue. Discrimination can be a *behavioral* manifestation of prejudice, but prejudice and discrimination are distinct and one may be evident without the other.^{6,8} Moreover, as discussed later, discrimination is not always overt, nor does it always entail intentional actions. Discriminatory acts differ in form and degree varying from the use of derogatory terms, to “micro-insults” and “micro-aggressions,” all the way to acts of aggression and violence.^{8,9} In contemporary society, racism often exists in routine institutional policies and procedures in the absence of overt prejudice and conscious bias from the perpetrator’s perspective. In fact, emotional warmth and positive feelings rooted in paternalism can co-exist with an adherence to an ideology of inferiority and the practice of systemic discrimination.¹⁰

Racism and Hypertension

Racism can affect hypertension in multiple ways. Arguably, its most powerful effects are exerted through mechanisms of institutional discrimination that often operate so routinely that they are not readily apparent to many persons in society. First, and probably most importantly, by restricting the socioeconomic attainment of African Americans, institutional discrimination can lead to group differences in SES and thus, indirectly, affect health. In the United States, for example, racial residential seg-

regation has been a central mechanism that has determined the access of African Americans to educational and employment opportunities and is thus a primary determinant of Black-White differences in education, income, occupational status, and wealth.^{11,12} In turn, SES is one of the strongest known determinants of variations in health¹³⁻¹⁵ and makes a substantial contribution to observed Black-White differences for a broad range of outcomes, including hypertension.^{16,17} However, racial differences in cardiovascular health persist after adjustments for SES. In fact, many studies have found that controlling for SES reduces, but does not eliminate, Black-White differences in hypertension.¹⁷⁻¹⁹ For example, data from the NHANES show that African-American men and women have higher overall rates of hypertension than White men at all levels of family income.²⁰ Such results underscore the view that race is *more than* SES and that renewed efforts are needed to identify those factors linked to race that affect health. Second, discrimination in the provision of desirable goods and services can also adversely affect the health of subordinate group members. For example, in addition to having lower levels of access to medical care, African Americans are less likely than Whites to receive the appropriate diagnosis and treatment for cardiovascular disease and a broad range of other conditions.²¹ These racial disparities in diagnosis and treatment persist even when adjusted for SES, health insurance, stage and severity of disease, and the type of medical facility.

Third, the ideology of racism frequently permeates the entire culture and some members of subordinate groups accept or internalize the larger society’s negative characterization of their group.⁶ The acceptance of these beliefs can adversely affect health. One recent study found that internalized racism was associated with increased risk of overweight and abdominal obesity among Afro-Caribbean women.²²

Fourth, racism can create and structure exposure to a broad range of psychosocial stressors, which in turn can lead to sustained elevation of blood pressure. Accordingly, racial differences in traditional measures of stress can also reflect the impact of racism. In addition, there is growing attention within the scientific community to the role that subjective experiences of discrimination can play as an added source of stress that negatively impacts health, including hypertension. The remainder of this paper will focus on this aspect of racism and will evaluate the evidence and promise of its role in the elevated rates of hypertension among African Americans.

Stress, Discrimination and Hypertension

Both laboratory and population-based epidemiologic studies have examined the health consequences of exposure to stress. This literature suggests that exposure to stress can lead to chronic elevations of blood pressure. We review this evidence and suggest that in racially stratified societies, perceptions of discrimination are important stressors in lives of minority group members. These race-related stressors have been neglected in the traditional assessment of stress.

Stress and hypertension

Group differences in blood pressure are multi-factorial in causation, with the physical environment, aspects of the social environment, health practices, psychological, genetic, and other individual characteristics playing a role.^{2,23-25} Several lines of evidence suggest that stress is one aspect of psychosocial environments that may be predictive of elevated hypertension risk. The majority of research examining the association between stress and hypertension has utilized a laboratory paradigm in which subjects are exposed to various types of artificially induced stressful situations after which their reactions are assessed. These

studies consistently find a positive association between stress and the elevation of blood pressure.²⁶⁻²⁸ Constant, chronic mental stress has also been empirically linked to the risk of hypertension.²⁹

There are several excellent reviews of laboratory-based studies of cardiovascular reactivity in African Americans.^{4,30-31} This research reveals that there is considerable variation in reactivity within the African-American population. Most studies document that either baseline cardiovascular reactivity and/or cardiovascular reactivity to stress was elevated in African Americans compared to Whites. Most of these studies focused on reactivity to typical laboratory stressors, such as mental arithmetic tests and response to a cold pressor. Instructively, while a family history of hypertension tends to be related to cardiovascular reactivity for Whites, it was unrelated to reactivity for African Americans.^{4,31} Moreover, these studies found that the mechanism responsible for the differences in reactivity was the greater constriction of peripheral blood vessels, leading to elevated blood pressure for African Americans compared to Whites.

However there are questions about the generalizability of these findings to "real world," settings. Results from such laboratory studies have also been criticized for viewing reactivity as a stable individual trait where responses are assumed to be consistent across a broad range of stressful stimuli.²⁶ More recently, the stress-hypertension field has argued that, rather than viewing reactivity as a stable individual trait, research should focus on how individual predispositions (eg, cynicism, suspicion, mistrust, Type A, John Henryism, anger expression) *interact* with different social situations to produce hypertensive reactivity. From this perspective, an individual possessing certain predispositions *and* exposed to particular types of challenging social situations is at greater risk of hypertension.²⁶

Studies of residential environments and

occupational conditions suggest that exposure to psychosocial stressors and coping strategies in response to them can lead to increased levels of hypertension.^{24,32} Some stress reduction techniques have also been shown to be effective in lowering hypertension.^{24,32} However, community epidemiologic studies that have examined the relationship of stress to hypertension are surprisingly scarce. In a classic study in the city of Detroit, Harburg and colleagues^{33,34} showed that levels of hypertension, for both African Americans and Whites, were higher among persons residing in high stress residential areas (defined in terms of socioeconomic status [SES], marital instability, and crime) as compared to persons residing in low stress areas. More recently, in a community sample from Pitt County North Carolina, Strogatz and colleagues³⁵ assessed stress with eight items that measured the degree to which life is dominated by worries, aggravation and uncontrollable events. They found that perceived stress was positively related to diastolic and systolic blood pressure.

Modernization, a combination of social change and economic development, is one type of stressful environment that has been studied.²³ These studies have found that, when communities are ranked on a continuum of modernization, the most traditional communities have lower blood pressure readings than the intermediate and modern ones.^{23,36} Dressler has also studied status incongruity (in which people attempt to maintain a lifestyle that is beyond their economic means), which he links to the modernization process. His research finds a positive association between status incongruity and high blood pressure in multiple societies.³⁷⁻³⁹ Recently, a landmark study of hypertension in populations of African ancestry in Africa, the Caribbean, and the United States, documented a strong graded relationship between the prevalence of hypertension and the level of economic development of particular societies.⁴⁰ In fact, the observed lev-

els of hypertension among Blacks in Africa were lower than those of Whites in the United States.

The Plausibility of Exposure to Discrimination

Before we consider the evidence linking perceptions of discrimination to hypertension, we must first establish that it is reasonable for contemporary minority group members to report experiences of discrimination. Some who believe that racism is a relic of a bygone era are skeptical about the reality of discrimination in contemporary society.⁴¹⁻⁴³ Exhaustive analyses of changes in racial attitudes in the United States during the last 60 years clearly document that there has been a dramatic change in racial attitudes, with the overwhelming majority of White Americans manifesting support for virtually every attitudinal item dealing with the endorsement of the principle of equality.⁴⁴ In many cases, this reflects a shift of 50 percentage points or more in the decline of the expression of negative racial attitudes. However, close inspection of these data reveals that there is considerably less support for policies that would implement these principles.⁴⁴ Moreover, other public opinion data reveal that Americans continue to hold high levels of negative stereotypes of African Americans and other minorities.⁴⁵ For example, in a 1990 national survey, 4% of Whites reported that Whites preferred to live off welfare and 16% reported that Whites were prone to violence. In contrast, 56% of Whites reported that Blacks prefer to live off welfare and 51% indicated that Blacks were prone to violence.⁴⁶ In these data, Whites viewed all racial/ethnic minority populations more negatively than themselves, with Hispanics viewed twice as negatively as Asians, and Blacks being the most stigmatized.

Such a high level of negative stereotyping of African Americans and other minorities suggests that there is likely to be a high level of discrimination against those

groups. Research reveals that negative stereotypes are often activated among persons who hold them via an automatic process such that these individuals will discriminate against an out-group member fitting the stereotype without their conscious awareness.⁴⁷⁻⁴⁹ Moreover, most Americans acknowledge that there is a high level of discrimination in American society, with Blacks being the most discriminated against group, followed by Hispanics, American Indians, Asians, and Jews.⁴⁵ For example, 66% of Americans believe that Blacks face “a lot” or “a tremendous amount” of discrimination and 88% of Americans believe that Blacks experience at least “some” discrimination.⁴⁵ In addition, Americans perceive little improvement over time. A 1995 survey found that more than 40% of Americans believe that discrimination against Blacks, Hispanics, and Asians was unchanged in the prior 10 years, and at least a quarter believed that it had worsened.⁴⁵ Population-based studies also revealed that Blacks and other minorities report higher levels of perceived discrimination than Whites.⁵⁰⁻⁵² Some of the best evidence for the existence of discrimination comes from audit studies in which trained Black and White testers with identical qualifications submit an application for employment or housing. These data reveal that Blacks experience unfavorable treatment in employment applications 20% of the time⁵³ and in housing at least 60% of the time.⁵⁴

The Plausibility of Discrimination Adversely Affecting Hypertension

The stress process framework^{31,55} would predict that if there were differential exposure by race to the chronic strain of perceived discrimination, this could contribute to the excess rates of hypertension among African Americans. That is, if exposure to chronic stress increases blood pressure, and perceived discrimination is a chronic stressor to which African Americans are exposed to much more often than European Ameri-

cans, then discrimination would not only be positively related to blood pressure but would also play a role in explaining racial differences in hypertension. The social context of race and inter-racial interactions suggest that these processes operate. More specifically, discrimination is likely to play a role in hypertension for African Americans because African Americans are both predisposed to view interracial interpersonal events as potential stressors and they are continually exposed to such challenges.

The term psychological stress attempts to capture this *subjective appraisal* of harm, loss, threat, or challenge.^{56,57} Stress is not necessarily an objective characteristic of the environment. It “lies in the eye of the beholder”^{29,58-60} and the appraisal process significantly affects or modifies the impact of an event. Dressler²³ noted, “an event is stressful only if it is actively perceived as so by the individual experiencing it.” Studies of subjective experiences of discrimination in both the laboratory and community settings suggest that they are a type of stressful experience that evoke considerable emotional distress and physiological responses.^{4,61-63}

Stress appraisal can be an active coping response or it can be a predisposition to vulnerability because there is an element of volition in how the individual perceives or interprets an event.²⁹ There is also likely to be variability in how salient race is in explaining events and in how interracial interactions are appraised by African Americans. Many African Americans, because of their perceived *necessity* of actively coping with their unique social history in this country, have developed a psychological predisposition that both guards against placing themselves in uncomfortable or dangerous social situations and increases vulnerability to hypertension. Quite simply, African Americans may be at increased risk of hypertension due to the adoption of coping and survival strategies that increase the likelihood that most interracial events, be-

nign, ambiguous, or negative, will be viewed through a racialized appraisal perspective.⁶⁴ For example, John Henryism, a strong predisposition to confront adversity with determined effort, is linked fundamentally with notions of race-based blocked opportunities and discrimination and is accompanied by strong activation of the sympathetic nervous system.⁶⁵⁻⁶⁶

At the core of racial discrimination is the experience of social rejection. Rejection, no matter what the basis, is personally and psychologically painful. Thus it makes perfect sense that a group, which has suffered historically from acts of racism and discrimination, would be suspicious, reluctant, cautious, and maybe even a bit "paranoid" in its willingness to approach and interact with members of the very group that has historically been the source of that painful rejection.⁶⁴ In short, in order to cope with the threat of racial rejection, most African Americans have developed racially colored lenses through which the majority of interracial transactions are viewed.⁴ Resulting from this racially learned perspective is the natural wariness, discomfort, and mistrust that most African Americans hold for interracial settings.

From this perspective, it is not hard to visualize why so many African Americans are at risk for the development of hypertension. It is this interaction between individual predispositions (eg, African-American heightened environmental vigilance and surveillance) and repeated interracial situational exposures, coupled with what is often the inability to respond directly, that may importantly contribute to elevated rates of hypertension. The pervasiveness of racial incidents contributes to the development of perceptual predispositions, which in turn increase reactivity to both major, and in some cases seemingly benign, cross-race interpersonal transactions. What might seem to the average White person as an innocent, even trivial comment or gesture, will probably be experienced and interpreted as pro-

foundly racial by many African Americans.⁶⁷ Sometimes it is an innocent use of a word or phrase (eg, "lynch"), while at other times it is a more obvious slight or insult. Either way, these daily, pervasive, major and minor occurrences are usually enough to evoke an identifiable physical reaction (increased heart rate, gastrointestinal upset, feelings of anxiety, anger, etc) in most African Americans. Thus, the racialized nature of our society and the history of racial antagonism places many African Americans at risk for increased reactivity and hypertension.

In sum, many contextual factors place African Americans at increased risk for hypertension. First, the long history of racism and discrimination against Blacks in this country forms the context within which interracial interactions are perceived. Second, heightened environmental surveillance and sensitivity to interracial events is an anticipatory coping mechanism by many African Americans that can lead to tentativeness, suspicion, or mistrust of Whites, which may result in a tendency to interpret the majority of ambiguous and/or negative events as racially motivated. Third, such appraisals may lead to emotional responses known to be associated with hypertension risk. There could be a response of anger expression in reaction to perceived racially motivated slights or anger suppression in cases of power differentials between Blacks and Whites. There may even be delayed anger (or guilt) in response to the inability to quickly respond to unanticipated racial insults ("being caught off-guard"). Fourth, many African Americans carry with them a general discomfort of interracial situations, for example being the "only one" in a social situation where there is anxiety about the possibility of social rejection. This can also lead to elevated cardiovascular activity. Finally, there is the performance anxiety many Blacks experience while at work or in educational settings where African Americans may feel the pressure of having

to prove repeatedly that they belong and are indeed “qualified” and competent.^{68,69}

All of the factors described above provide fertile ground for triggering the kinds of physiological responses that can lead to regular elevated blood pressure readings. The body perceives a threat and makes the inevitable elaborate physiological preparations. Each heartbeat at elevated blood pressure can take a toll on the arteries. As James and Thomas⁶⁶ noted, “If these hemodynamic processes are evoked repeatedly in response to daily stressors, over many years, a structural remodeling of the peripheral vascular bed and a related permanent increase in resting blood pressure could result.”

Discrimination and Hypertension: The Evidence

The association between discrimination and hypertension has been examined in both laboratory studies and epidemiological studies using community samples. We provide a brief overview of both types of evidence.

Laboratory studies of reactivity

Several studies have examined cardiovascular responses to racist stressors in the laboratory setting. These studies typically use mental imagery or film portrayals of racial discrimination. These studies find increased cardiovascular reactivity when African Americans are exposed to racist material compared to when they are exposed to neutral material.^{4,70-71} Most of the laboratory-based studies that assess cardiovascular reactivity to racist situations have used samples only of African Americans. One recent study used a sample of African-American and White men.⁷² This study found that both Black and White men exhibited greater blood pressure reactivity to anger-provoking and racist stimuli than to neutral stimuli. In contrast to some prior research,^{70,73} this study did not find that exposure to racist situations produced greater

reactivity than other anger-provoking stressors. The authors, nonetheless, note that although the effect of exposure to stressors may not vary by race, given that African Americans have higher exposure to both racial and non-racial stress, they may carry a heavier burden in terms of cardiovascular reactivity and its consequences in cardiovascular disease.

Two recent studies have combined the assessment of real life perceptions of discrimination with reactivity to stress in a laboratory setting. In a study of 39 African-American females, Clark⁷⁴ found that women who scored high on the Perceived Racism Scale⁷⁵ had greater diastolic blood pressure response to a neutral speech task both during the speech and in the early and late recovery periods. Similarly, a study of 363 Black and White women from the Study of Women’s Health Across the Nation (SWAN) found a positive association between scores on the Everyday Discrimination Scale⁷⁶ and diastolic reactivity in response to a speech task for African-American but not European-American women.⁷⁷ This speech task could be interpreted as an incident of racial bias. Some evidence suggests that the type of cardiovascular reactivity to stress observed in laboratory studies is predictive of future hypertension.⁷⁸⁻⁸⁰ Thus, the consistent evidence of cardiovascular reactivity in response to racial stressors in the laboratory studies is indirect support for an association between exposure to discrimination and the chronic elevation of blood pressure.

Community-based studies of discrimination and hypertension

A few studies have examined the association between perceptions of discrimination and hypertension in population-based samples. The evidence from these studies is not overwhelming but suggests that discrimination may be positively associated with blood pressure under some circumstances. In a study of 112 Black men in

rural North Carolina, James and colleagues⁸¹ found a positive relationship between blood pressure and discrimination (feeling that being Black had hindered their chances of success) among men who scored high on John Henryism (an active predisposition to copy and overcome adversity). In a sample of 186 25- to 55-year-old African Americans in a southern Black community, Dressler⁸² utilized a scale of chronic stressors and found a positive association between chronic stress and systolic, but not diastolic, blood pressure. Four of the 16 items of the chronic-stress scale captured perceptions of discrimination.

Krieger⁸³ examined the association between perceptions of racial and gender discrimination with self-reported hypertension in a study of 51 Black and 50 White women from northern California interviewed by telephone. The women in this study were asked if they had "ever experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior" in any of six situations (at school, getting a job, at work, getting housing, getting medical care, or from the police or in the courts) because of their race or color and because of being a woman. Krieger⁸³ found that although gender discrimination was unrelated to hypertension, there was a complex relationship between racial discrimination and hypertension. Black women who responded passively to racial discrimination (accepted and kept quiet in the face of unfair treatment) were four times more likely to have high blood pressure than those who responded actively to unfair treatment. Although the findings were not statistically significant, Krieger⁸³ also reported that Black women who reported no experiences of race or gender discrimination were almost three times more likely to report hypertension than those who reported one or more such experiences.

In a larger sample of about 2,000 African-American men and women from the CARDIA study and who were between the

ages of 25 to 37, Krieger and Sidney⁸⁴ added one additional item to the Krieger⁸³ discrimination scale (unfair treatment in public places) and examined its association with systolic and diastolic blood pressure. About 80% of the sample reported having experienced racial discrimination in at least one of the seven situations. This study found complex interactions between gender and social class in the association between discrimination and hypertension. Among working class men and women, there was a tendency (not always significant) for systolic and diastolic blood pressure to be higher among both those who reported none and those who reported three or more experiences of discrimination, compared to those who reported one or two experiences of discrimination. A similar "U" shaped pattern existed among professional women for both systolic and diastolic blood pressure, although it was less marked. In contrast, among professional men, the lowest level of hypertension was among those who reported no discrimination. Among the White sample of the CARDIA study, Krieger and Sidney⁸⁵ also found that perceptions of discrimination based on sexual orientation were associated with lower levels of blood pressure compared to persons who reported no discrimination. This finding was not significant and the sample size was small. In a study of 312 Black adults in Detroit, Broman⁸⁶ found that perceived racial discrimination during the three previous years, as measured by the Krieger⁸³ discrimination scale, was unrelated to self-reports of hypertension.

Dressler⁸⁷⁻⁸⁸ has also used skin color as a marker for exposure to the stress of discrimination and thus increased difficulty in the struggle for upward social mobility. Using data from a southern US city and Brazil, Dressler⁸⁷ found that darker-skinned individuals experienced more frequent rejection in social interactions. In Brazil, for example, higher SES darker-skinned men had the highest blood pressure levels and were

three times more likely to be hypertensive. In virtually every culture darker skin color was associated with negative characteristics⁸⁹ and across multiple societies darker skin color was associated with exposure to discrimination.⁷⁶ Krieger⁷ reviewed 17 studies of African Americans that have related skin color to hypertension or some other health outcome. These studies tend to find that skin color was often predictive of poorer health and higher discrimination (when examined) but there was also confounding between skin color and SES.

Discrimination and Hypertension: A Research Agenda

A review of the evidence linking discrimination to hypertension clearly indicates that this field is in its infancy and that our ability to come to a definitive conclusion reflects, in large part, the limitations of the study of this phenomenon to date. There is clearly a need for greater clarity in the conceptualization and measurement of discrimination and the research methods used to identify the nature and extent of the association.^{7,67} Also required is greater attention to the theoretical identification and the empirical verification of the plausible pathways that would link perceptions of discrimination to health.

Measurement of Discrimination

First, researchers need to give greater attention to the conceptualization and measurement of acute experiences of discrimination. Studies to date have not given sufficient attention to capturing exposure to discrimination comprehensively and to assessing the cumulative burden of such exposure over the life course. Some studies have relied on single-item indicators of discrimination. Such approaches understate the actual level of discrimination.⁵⁰ Research efforts are needed that would comprehensively characterize discrimination in multiple domains. The measure developed by Krieger⁸³⁻⁸⁴ is an important step in this di-

rection and several scales now exist that capture exposure to discrimination in multiple domains of life.^{51,90-91} However, for each domain of experience, future research should gather information on the age of first onset and the number of times this experience has occurred in the respondent's lifetime, as well as in the past year. To reduce some of the problems caused by impaired memory recall, approaches using a life history calendar might be very useful.⁹²

In addition, there is growing recognition that racial discrimination consists not only of major acute stressful life experiences but also of persistent and recurring, every day, chronic minor experiences. The everyday discrimination scale developed by Williams and colleagues⁷⁶ attempts to capture these chronic irritations and hassles. However, that scale is generic and it is important to capture measures of chronic discrimination in multiple domains, such as employment educational and public settings, as in the measure developed by McNeilly and colleagues.⁹³

In addition to discrete, acute and chronic experiences of discrimination, the structure and culture of racism can also create hostile environments in which the ever-present threat of discrimination can lead to heightened physiological arousal that can adversely affect health. It has been suggested that the combination of the threat of exposure to violence in economically marginalized segregated areas and the threat of discrimination can lead many African Americans to maintain a constant psychological vigil and heightened physiological arousal that may have long-term consequences for elevated rates of hypertension and other cardiovascular problems.⁹⁴ Consistent with this hypothesis, studies of ambulatory blood pressure among normotensive adults revealed that although mean daytime blood pressure measures did not differ by race, African Americans experienced a lower nocturnal decline in blood pressure than Whites, so that they maintained higher lev-

els of blood pressure even while they were asleep.⁹⁵⁻⁹⁷ Qualitative descriptions of individuals dealing with discrimination reveal that many persons engage in anticipatory-coping behavior in response to the potential threat of discrimination.⁶¹⁻⁶² Assessing the full impact of racism will require measures of vigilance that capture both the perceptions of danger in one's environment and the psychological and behavioral efforts to remain vigilant.

The Subjective Nature of Reports of Discrimination

Race is salient in the lives of minority group members. It is what sociologists call a master status—a central determinant of individual and social identity and of access to desirable resources and rewards in society. As noted earlier, many African Americans are thus *psychologically predisposed* to interpret most interracial interactions from a socially constructed racialized perspective. This racial lens shapes the stress appraisal process in such a way as to sharpen sensitivity to those interracial events that are indeed acts of discrimination.^{4,98} Many observers worry that the salience of race can lead to some minority group members perceiving as race-related incidents that may not be, or worse, developing a paranoid mind set in which they perceive incidents of racism that do not exist in reality. The available evidence suggests that these fears are not warranted. First, respondents appear to interpret discrimination as intended by researchers and self-reports of discrimination are consistent with objective experiences.⁹⁹⁻¹⁰⁰ Second, using multiple waves of data from the National Study of Black Americans, Brown and colleagues¹⁰¹ documented that being psychologically distressed and/or meeting criteria for major depression at Wave Two was unrelated to reports of racial discrimination at Wave Three. Third, because reporting discrimination appears to adversely impact self-esteem and perceptions of control, minority

group members, especially those of low status, are likely to minimize and deny experiences of discrimination.¹⁰²⁻¹⁰⁴ Thus under-reporting rather than over-reporting appears to be the more serious threat to the validity of self-reports of discrimination. Nevertheless, there is still the need for future research to adjust reports of discrimination for social desirability and neuroticism.

Williams and colleagues⁷⁶ have sought to reduce the salience of race in their approach to assessing discrimination. Asking repeated questions about "racial discrimination" or experiences "because of your race" could produce demand characteristics in which the respondent believes that it is desirable to the interviewer to report such experiences. This could lead to over-reporting of discrimination.¹⁰⁵ On the other hand, respondents may vary in their thresholds of what constitutes discrimination and fail to report incidents that were not perceived as very serious. Arguing that the perception of an experience as unfair is a critical factor that makes it stressful, Williams and colleagues^{51,76,91} first asked respondents if they have been treated "unfairly" in multiple domains of life. Only after respondents had endorsed an experience of unfair treatment were they subsequently asked to attribute a reason. Potential reasons included race and ethnicity, but also allowed for other factors such as gender, age, religion, sexual orientation, etc. This strategy is similar to that used by Neighbors and Sellers¹⁰⁶ in the measurement of goal-striving stress that asked for causal attributions (which included race) only after respondents identified discrepancies between aspirations and achievements. This approach enabled respondents to report on all instances of unfair treatment, but allowed the researcher to separate instances attributed to race from those linked to other reasons.

Research is needed that would consider the multiple bases of discrimination in society and examine the extent to which discrimination based on race has differential

effects on hypertension from that based on gender, age, physical appearance and other reasons. To date, the available data suggests that the generic perception of unfair treatment is pathogenic. Williams and colleagues⁹¹ found that for African Americans, reports of discrimination related to race and those attributed to other reasons were similarly related to chronic health problems. In a similar vein, Kessler and colleagues⁵¹ reported that the association between perceptions of unfair treatment and mental health status did not vary by attribution. In contrast, Gyll and colleagues⁷⁷ SWAN study found that Black women who attributed everyday discrimination to race demonstrated greater diastolic blood pressure reactivity than women who attributed these experiences to other reasons. Nonetheless, the approach of assessing racial discrimination with questions about unfair treatment is not without its critics. Brown¹⁰⁷ claims that the correlates of racial discrimination and its association with mental health status differ depending on whether they are explicitly framed about race or about the subset of unfair treatment experiences that are attributed to race. However, Brown¹⁰⁷ compared apples and oranges—questions about generic unfair treatment attributed to race in six specific areas with a single global item of racial discrimination because of race. The prevalence of discrimination is importantly affected by the number of questions used to assess it.^{50,108} Thus, this issue deserves careful, rigorous empirical evaluation in the future.

Understanding Denial

Self-reports of bias also understate the full extent of exposure to discrimination. Given the nature of social interactions, subordinate group members will often lack full knowledge regarding any specific interpersonal transaction.⁷ Secondly, and of greater challenge to measure, is the potential that some individuals cope with discrimination by minimizing or even denying its occur-

rence. Research reveals that at least some subordinate group members deny experiences of discrimination.¹⁰³ Moreover, there are clear psychological benefits for denying experiences of discrimination.^{102-104,109} However, operationalizing denial in epidemiologic research is a challenge.

Krieger⁷ has interpreted some of the paradoxical findings in her research on discrimination and hypertension in terms of denial. She has found in two studies that at least some African Americans who report no discrimination report higher levels of hypertension than those who report some discrimination.^{7,83-84} Her findings suggest that reports of no discrimination, among persons with relatively little power (women and low SES men), reflect denial and “internalized oppression,” while among more powerful, professional males, “no discrimination” may truly mean “no discrimination.” The contention that the meaning of “no” may vary by social position is an intriguing one, but interpreting all “no discrimination” responses as denial, even if conditioned on gender and social class, is unsatisfactory. Given the potential importance of the phenomenon of denial in research on discrimination and health, efforts to operationalize it in epidemiological research are a high priority for future research.

Attributional Ambiguity

Perceived discrimination is based fundamentally on the process of perception and as such, it places emphasis on the *attributions* made by the individual. The subjective nature of discrimination and the ambiguity inherent in much interpersonal interaction often lead to uncertainty regarding the attribution of significant incidents of unfair treatment. Some Whites, consciously and unconsciously, will exhibit negative, prejudicial attitudes and behaviors toward African Americans. However, not all slights or insults are racial.¹¹⁰ But given America’s painful history of race, if insults or slights

are presented by a White person toward an African American, there is a good chance that they will be interpreted as racial. Similarly, not all racial slights are intentional. Yet, if a White person “slips up” and says something insensitive, it may not matter if it were indeed unintentional (an “accident”), the damage has been done. African Americans are often placed in the position of trying to figure out, as best they can, the meaning of interracial interpersonal interactions in a racially complicated world.⁶

We think that the *necessity* of trying to make sense of interracial interactions can stimulate physiological reactivity among African Americans living and working in racially mixed settings. This ambiguity, worry, and rumination regarding the causes of experiences of unfair treatment are part of the added burden that Africans bear. Research also reveals that the under-report of discrimination is especially likely to occur in situations of attributional ambiguity.¹¹ Under these conditions, respondents are likely to accept personal blame for the possibility of a discriminatory experience. Future research should assess ambiguity in the perception of discrimination and examine potential consequences for health. The degree of self-blame in coping with discrimination is also worthy of empirical scrutiny.

Models: Thinking More Carefully About Exposure and Pathways

In the growing literature on discrimination and health, mental health status is the most studied outcome.^{7,12} Here, the pattern of association is clearer than for hypertension, with reports of discrimination being more consistently associated with increased psychological distress or poorer psychiatric status. The reason for this stronger relationship is probably because of the fit that exists in the literature on discrimination and mental health between (recent) exposure to discrimination and (current) mental health status. Several comprehensive models have been proposed that describe the pathways

by which stress in general^{26,31} and race-related stress in particular^{4,67} may lead to an elevated risk of hypertension. We selectively highlight some issues that are especially relevant to population-based epidemiological studies.

Krieger⁷ notes that researchers have given inadequate attention to studying exposure to discrimination in relation to the hypothesized etiologic period. For example, Broman⁸⁶ assessed the association between racial discrimination in the prior three years to respondents' reports of physician-diagnosed hypertension. The date of the diagnosis of hypertension was not ascertained, so it is entirely possible that most cases of hypertension had occurred prior to the three-year window used to capture exposure to discrimination. Thus, the absence of an association between discrimination and hypertension reported in this study should be entirely expected. A measure of cumulative exposure to discrimination is most relevant for conditions such as hypertension that have a gradual onset.⁷ It is also possible that one of the pathways by which discrimination affects chronic health conditions, including hypertension, may be indirect through psychological distress. That is, discrimination may lead to elevated psychological distress, which, in turn, may lead to chronic physiological arousal of the cardiovascular system.^{11,3} Researchers should also give attention to assessing the contribution of discrimination not only to the onset of hypertension but also to its severity and course.

Research is also needed to more clearly understand the ways in which reports of discrimination and their effects on health are conditioned by a range of psychological attributes (anger, hostility, Type A behavior, hopelessness, self-esteem, neuroticism and racial identity) and social resources and risk factors (for example, social support and religious involvement). Discrimination may be health damaging because it is linked to responses, such as anger and hostility that

have been shown to be damaging to health.⁸⁶ Depending on the situation, many African Americans cannot express the anger they feel toward Whites. As a result, many Blacks have learned to suppress their anger, which can also lead to elevated blood pressure.¹¹⁴⁻¹¹⁵

Prior research reveals that hostility is associated with increased cardiovascular reactivity to stress.¹¹⁶⁻¹¹⁷ Thus, examining interactions between hostility and discrimination is an important direction for future research. Armstead and colleagues⁷⁰ found that trait anger was associated with increased blood pressure response as laboratory subjects were exposed to racist film clips. Similarly, Clark⁷⁴ found that the magnitude of reactivity was greatest when anger was used as the coping response to discrimination. More recently, Fang and Myers⁷² found that high hostility was associated with higher systolic and diastolic blood pressure levels but only during the recovery period. Long recovery may be indicative of allostatic load¹¹⁸ and predictive of increased risk of cardiovascular disease.⁷⁹

The consequences of racial discrimination for health may also be affected by the level of race consciousness of the individual. On the one hand, greater reaction to race-based incidents could lead experiences attributed to race to have a stronger negative effect. Jones and colleagues⁷¹ found that higher scores on an Afro-centrism scale were associated with stronger negative emotional reaction to racist events, but was unrelated to increased physiological changes. On the other hand, experiences of racial discrimination, although negative, could be perceived as normative and expected and this could lead them to have a weaker effect. In a community sample in the Detroit area, Williams and colleagues⁹¹ found that having a high sense of racial identity reduced the negative association between discrimination and self-reported measures of health status.

Discrimination may also adversely affect

hypertension indirectly through its impact on health practices. The stress induced by discrimination could lead individuals to eat more than they usually do or utilize substances, such as tobacco, alcohol, or illicit drugs, to cope with the negative feelings brought on by stressful life experiences. One recent study found higher levels of workplace discrimination were associated with an increased likelihood of problem drinking.¹¹⁹ Similarly, Landrine and Klonoff¹²⁰ found that exposure to racial discrimination was a strong predictor of cigarette smoking in two California samples of African-American adults. Health-related behaviors must be included in any comprehensive assessment of coping responses to discrimination.

Conclusion

Discrimination is an understudied pervasive stressor in contemporary society. Because of the unique history of race in the United States, this stressor is likely to be salient in the lives of African Americans and be an important determinant of repeated physiological arousal. Consistent with the larger literature on stress, laboratory studies find that exposure to acute racial stressors leads to psychological and physiological reactivity. There have been few population-based epidemiological studies of perceived discrimination and hypertension. These studies have limitations in the conceptualization and/or design that limit the quality of the available scientific evidence. However, the literature now provides the needed concepts, models, measures, and methods for rigorous scientific evaluation of the association between perceived discrimination and hypertension.

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References

1. National Center for Health Statistics. *Health, United States, 2000 With Adolescent Health Chartbook*. Hyattsville, Md: US Dept of Health and Human Services; 2000.
2. Cooper RS, Rotimi CN, Ward R. The puzzle of hypertension in African Americans. *Sci Am*. 1999;280:56–63.
3. Krieger N. Racial and gender discrimination: risk factors for high blood pressure? *Soc Sci Med*. 1990;30:1273–1281.
4. Harrell JP, Merritt MM, Kalu J. Racism, stress and disease. In: Jones RL, ed. *African-American Mental Health*. Hampton, VA: Hampton, Cobb & Henry; 1998:247–280.
5. Bonilla-Silva E. Rethinking racism: toward a structural interpretation. *Am Sociol Rev*. 1996;62:465–480.
6. Jones JM. *Prejudice and Racism*. New York, NY: McGraw-Hill Inc; 1997.
7. Krieger N. Embodying inequality: a review of concepts, measures, and methods for studying health consequences of discrimination. *Int J Health Serv*. 1999;29:295–352.
8. Marger MN. *Race and Ethnic Relations: American and Global Perspectives*. Blemont, Calif: Washington Publishing Company; 1997.
9. Pierce C. The mundane extreme environment and its effects on learning. In: Brainard SG, ed. *Learning Disabilities: Issues and Recommendations for Research*. Washington, DC: Institute of Education; 1975:1–23.
10. Jackman MR. *The Velvet Glove: Paternalism and Conflict in Gender, Class, and Race Relations*. Los Angeles, Calif: University of California Press; 1994.
11. Massey DS, Denton NA. *American Apartheid: Segregation and the Making of the Underclass*. Cambridge, Mass: Harvard University Press; 1993.
12. Williams DR, Collins CA. Racial residential segregation: a fundamental cause of racial disparities in health. In press.
13. Adler NE, Boyce T, Chesney MA, Folkman S, Syme SL. Socioeconomic inequalities in health: no easy solution. *JAMA*. 1993;269:3140–3145.
14. Williams DR. Socioeconomic differentials in health: a review and redirection. *Soc Psychol Q*. 1990;53:81–99.
15. Haan M, Kaplan G. The contribution of socioeconomic position to minority health. In: US Dept of Health and Human Services, ed. *Report of the Secretary's Task Force on Black Minority Health*. Vol 2. Washington, DC: US Printing Department; 1986:69–103.
16. Williams DR, Collins C. US socioeconomic and racial differences in health. *Annu Rev Sociol*. 1995;21:349–386.
17. Lillie-Blanton M, Parsons PE, Gayle H, Dievler A. Racial differences in health: not just Black and White, but shades of gray. *Annu Rev Public Health*. 1996;17:411–448.
18. McKetney E, Ragland D. John Henryism, education, and blood pressure in young adults: the CARDIA study. *Am J Epidemiol*. 1996;143:787–791.
19. Levenstein S, Smith MW, Kaplan GA. Psychosocial predictors of hypertension in men and women. *Arch Intern Med*. 2001;161:1341–1346.
20. National Center for Health Statistics. *Health, United States, 1998 With Socioeconomic Status and Health Chartbook*. Hyattsville, Md: USDHHS; 1998.
21. Mayberry RM, Mili F, Ofili E. Racial and ethnic differences in access to medical care. *Med Care Res Rev*. 2000;57(suppl 1):108–145.
22. Tull ES, Wickramasuriya T, Taylor J, et al. Relationship of internalized racism to abdominal obesity and blood pressure in Afro-Caribbean women. *J Natl Med Assoc*. 1999;91:447–452.
23. Dressler W. Modernization, stress, and blood pressure: new directions in research. *Hum Biol*. 1999;71:583–605.
24. Williams DR. Black-White differences in blood pressure: the role of social factors. *Ethn Dis*. 1992;2:126–141.
25. Saunders E. *Cardiovascular Diseases in Blacks*. Philadelphia, Pa: F A Davis Company; 1991.
26. Gerin W, Pickering TG, Glynn L, Christenfeld N, Schwartz A, Carroll D, Davidson K. An historical context for behavioral models of hypertension. *J Psychosom Res*. 2000;48:369–377.
27. Myers HF. Biopsychosocial perspective on depression in African Americans. In: Lin KM, Poland RE, Nakasaki G, eds. *Psychopharmacology and Psychobiology of Ethnicity*. Washington, DC: American Psychiatric Press Inc; 1993:201–222.
28. Kulkarni S. Stress and hypertension. *WMJ*. 1998; 97(11):34–38.
29. Carroll D. Health psychology: stress, behavior and disease. In: Cochrane R, ed. *Contemporary Psychology Series 4*. London, England: The Falmer Press; 1992.
30. Anderson NB. Racial differences in stress-induced cardiovascular reactivity and hypertension: current status and substantive issues. *Psychol Bull*. 1989;105:89–105.
31. Anderson NB, McNeilly M, Myers H. Toward understanding race difference in autonomic reactivity. In: Turner JR, ed. *Individual Differences in Cardiovascular Response to Stress*. New York, NY: Plenum Press; 1992:125–145.

32. Barnes V, Schneider R, Alexander C, Staggers F. Stress, stress reduction and hypertension in African Americans: an updated review. *J Natl Med Assoc.* 1997;89:464–476.
33. Harburg E, Erfurt J, Chape C, Havenstein L, Schull W, Schork MA. Socioecological stressor areas and Black-White blood pressure: Detroit. *J Chronic Dis.* 1972;26:595–611.
34. Harburg E, Erfurt JC, Hauenstein LS, Chape C, Schull WJ, Schork MA. Socioecological stress, suppressed hostility, skin color, and Black-White male blood pressure: Detroit. *Psychosom Med.* 1973;35:276–296.
35. Strogatz DS, Croft JB, James SA, et al. Social support, stress, and blood pressure in Black adults. *Epidemiology.* 1997;8(5):482–487.
36. McGarvey ST, Baker PT. The effects of modernization and migration on Samoan blood pressures. *Hum Biol.* 1979;51:461–479.
37. Dressler WW, Mata A, Chavez A, Viteri FE. Arterial blood pressure and individual modernization in a Mexican community. *Soc Sci Med.* 1987;24:679–687.
38. Dressler WW. Social support, lifestyle incongruity, and arterial blood pressure in a southern Black community. *Psychosom Med.* 1991;53:608–620.
39. Dressler WW. Hypertension in the African-American community: social, cultural, and psychological factors. *Semin Nephrol.* 1996;16:71–82.
40. Cooper R, Rotini C, Ataman S, et al. The prevalence of hypertension in seven populations of West African origin. *Am J Public Health.* 1997;87:160–168.
41. Herrnstein RJ, Murray C. *The Bell Curve: Intelligence and Class Structure in American Life.* New York, NY: The Free Press; 1994.
42. D'Souza D. *The End of Racism: Principles for a Multiracial Society.* New York, NY: Free Press; 1995.
43. Satel SL. *How Political Correctness is Corrupting Medicine.* New York, NY: Basic Books; 2000.
44. Schuman H, Steeh C, Bobo L, Krysan M. *Racial Attitudes in America: Trends and Interpretations.* Rev ed. Cambridge, Mass: Harvard University Press; 1997.
45. Smith TW. Intergroup relations in contemporary America: an overview of survey research. In: Winborne W, Cohen R, eds. *Intergroup Relations in the United States: Research Perspectives.* New York, NY: The National Conference for Community and Justice; 1998:69–155.
46. Davis JA, Smith TW. *General Social Surveys, 1972–1990.* NORC, ed. Chicago, Ill: National Opinion Research Center; 1990.
47. Devine PG. Stereotypes and prejudice: their automatic and controlled components. *J Pers Soc Psychol.* 1989;56:5–18.
48. Hilton JL, von Hippel W. Stereotypes. *Annu Rev Psychol.* 1996;47:237–271.
49. Devine PG. Prejudice and out-group perception. In: Tesser A, ed. *Advanced Social Psychology.* New York, NY: McGraw-Hill Higher Education; 1995:467–524.
50. Forman TA, Williams DR, Jackson JS. Race place and discrimination. In: Gardner C, ed. *Perspective on Social Problems.* New York, NY: JAI Press; 1997:231–261.
51. Kessler RC, Mickelson KD, Williams DR. The prevalence, distribution, and mental health correlates of perceived discrimination in the United States. *J Health Soc Behav.* 1999;40:208–230.
52. Williams DR. Race, stress and mental health: findings from Commonwealth Minority Health Survey. In: Hogue C, Hargraves M, Scott-Collins K, eds. *Minority Health in America: Findings and Policy Implications from the Commonwealth Fund Minority Health Survey.* Baltimore, Md: Johns Hopkins University Press; 2000:209–243.
53. Fix M, Struyk RJ. *Clear and Convincing Evidence: Measurement of Discrimination in America.* Washington, DC: Urban Institute Press; 1993.
54. Massey DA, Gross AB, Shibuya K. Migration, segregation, and the geographic concentration of poverty. *Am Sociol Rev.* 1994;59:425–445.
55. Pearlin L, Lieberman M, Menaghan E, Mullan J. The Stress Process. *J Health Soc Behav.* 1981;22:337–356.
56. Lazarus RS. From psychological stress to the emotions: a history of changing outlooks. *Annu Rev Psychol.* 1993;44:1–21.
57. Lazarus RS. Toward better research on stress and coping. *Am Psychol.* 2000;55:665–673.
58. Lazarus RS. *Psychological Stress and the Coping Process.* New York, NY: McGraw-Hill; 1966.
59. Lazarus RS, Folkman S. *Stress, Appraisal, and Coping.* New York, NY: Springer; 1984.
60. Monroe SM, Kelley JM. Measurement of stress appraisal. In: Cohen S, Kessler RC, Gordon LU, eds. *Measuring Stress.* New York, NY: Oxford University Press; 1995:122–147.
61. Essed P. *Understanding Everyday Racism.* Newbury Park, Calif: Sage; 1991.
62. Feagin JR. The continuing significance of race: anti-Black discrimination in public places. *Am Sociol Rev.* 1991;56:101–116.
63. Thompson VL. Perceived experiences of racism as stressful life events. *Community Ment Health.* 1996;32:223–233.
64. Grier WH, Cobbs PM. *Black Rage.* New York, NY: Harper Collins; 1968.

65. James SA. John Henryism and the health of African Americans. *Cult Med Psychiatry*. 1994;18:163-182.
66. James S, Thomas P. John Henryism and blood pressure in Black population: a review of the evidence. In: Taylor R, ed. *African-American Research Perspectives*. Ann Arbor, Mich: ISR; 2000:111.
67. Clark R, Anderson NB, Clark VR, Williams DR. Racism as a stressor for African Americans: a biopsychosocial model. *Am Psychol*. 1999;54:805-816.
68. Cose E. *The Rage of a Privileged Class*. New York, NY: Harper Collins; 1993.
69. Steele CM. A threat in the air: how stereotypes shape intellectual identity and performance. *Am Psychol*. 1997;52:613-629.
70. Armstead C, Lawler KA, Gordon G, Cross J, Gibbons J. Relationship of racial stressors to blood pressure responses and anger expression in Black college students. *Health Psychol*. 1989;8:541-556.
71. Jones DR, Harrell JP, Morris-Prather CE, Thomas J, Omowale N. Affective and physiological responses to racism: the roles of Afrocentrism and mode of presentation. *Ethn Dis*. 1996;6:109-122.
72. Fang CY, Myers HF. The effects of racial stressors and hostility on cardiovascular reactivity in African-American and Caucasian Men. *Health Psychol*. 2001;20:64-70.
73. McNeilly MD, Robinson EL, Anderson NB, et al. Effects of racist provocation and social support on cardiovascular reactivity in African-American Women. *Int J Behav Med*. 1995;2:321-338.
74. Clark R. Perceptions of interethnic group racism predicts increased vascular reactivity to a laboratory challenge in college women. *Ann Behav Med*. 2000;22:214-222.
75. McNeilly MD, Anderson NB, Armstead CA, et al. The perceived racism scale: a multidimensional assessment of the experience of White racism among African Americans. *Ethn Dis*. 1996;6:154-166.
76. Williams DR, Yu Y, Jackson J, Anderson N. Racial differences in physical and mental health: socioeconomic status, stress, and discrimination. *J Health Psychol*. 1997;2:335-351.
77. Guyll M, Matthews KA, Bromberger JT. Discrimination and unfair treatment: relationship to cardiovascular reactivity among African-American and European-American women. *Health Psychol*. 2001;20:315-325.
78. Light K, Obrist P, Sherwood A, James S, Stogatz D. Effects of race and marginally elevated blood pressure responses to stress. *J Hypertens*. 1987;10:555-563.
79. Manuck SB. Cardiovascular reactivity in cardiovascular disease: "once more unto the breach". *Int J Behav Med*. 1994;1:4-31.
80. Matthews KA, Wiess SM, Detre T, et al. *Handbook of Stress, Reactivity, and Cardiovascular Disease*. New York, NY: Wiley; 1986.
81. James SA, LaCroix AZ, Kleinbaum DG, Stogatz DS. John Henryism and blood pressure differences among Black men. II. The role of occupational stressors. *J Behav Med*. 1984;7:259-275.
82. Dressler WW. Lifestyle, stress, and blood pressure in a Southern Black community. *Psychosom Med*. 1990;52:182-198.
83. Krieger N. Racial and gender discrimination: risk factors for high blood pressure? *Soc Sci Med*. 1990;30:1273-1281.
84. Krieger N, Sidney S. Racial discrimination and blood pressure: the CARDIA study of young Black and White adults. *Am J Public Health*. 1996;86:1370-1378.
85. Krieger N, Sidney S. Prevalence and health implications of anti-gay discrimination: a study of Black and White women and men in the CARDIA cohort. *Int J Health Serv*. 1997;27:157-176.
86. Broman CL. The health consequences of racial discrimination: a study of African Americans. *Ethn Dis*. 1996;6:148-153.
87. Dressler WW. Social class, skin color, and arterial blood pressure in two societies. *Ethn Dis*. 1991;1:60-71.
88. Dressler WW. Social identity and arterial blood pressure in the African-American community. *Ethn Dis*. 1996;6:176-190.
89. Franklin JH. *Color and Race*. Boston, Mass: Houghton Mifflin Co; 1968.
90. Utsey SO. Assessing the stressful effects of racism: a review of instrumentation. *J Black Psychol*. 1988;24:269-288.
91. Williams DR, Spencer MJ, Jackson JS. Race, stress and physical health: the role of group identity. In: Contrada RJ, Ashmore RD, eds. *Self, Social Identity, and Physical Health: Interdisciplinary Exploration*. New York, NY: Oxford University Press; 1999:71-100.
92. Belli RF. The structure of autobiographical memory and the event history calendar: potential improvements in the quality of retrospective reports in survey. *Memory*. 1998;6:383-406.
93. McNeilly MD, Anderson NB, Armstead CA, et al. The perceived racism scale: a multidimensional assessment of the experience of White racism among African Americans. *Ethn Dis*. 1996;6:154-166.
94. Williams DR, Lavizzo-Mourey R, Warren RC. The concept of race and health status in America. *Public Health Rep*. 1994;109:26-41.

95. Harshfield GA, Alpert BS, Willey ES, Somes GW, Murphy JK, Dupaul LM. Race and gender influence ambulatory blood pressure patterns of adolescents. *Am J Hypertens*. 1989;14:598-603.
96. James GD. Race and perceived stress independently affect the diurnal variation of blood pressure in women. *Am J Hypertens*. 1991;4:382-384.
97. Murphy MB, Nelson KS, Elliot WJ. Racial differences in diurnal blood pressure profile. *Am J Hypertens*. 1988;1:55A.
98. Anderson NB, Lane JD, Monou H, Williams RB, Houseworth SJ. Racial differences in cardiovascular responses to mental arithmetic. *Int J Psychophysiol*. 1988;6:161-164.
99. Taylor DM, Wright SC, Ruggiero K. The personal/group discrimination discrepancy: responses to experimentally induced personal and group discrimination. *J Soc Psychol*. 1991;131:847-858.
100. Taylor DM, Wright SG, Porter LE. Dimensions of perceived discrimination: the personal group discrimination discrepancy. In: Zenna MP, Olson JM, eds. *The Psychology of Prejudice: The Ontario Symposium*. Vol 7. Hillsdale, NJ: Lawrence Erlbaum Associates; 1994.
101. Brown TN, Williams DR, Jackson JS, et al. Being Black and feeling blue: the mental health consequences of racial discrimination. *Race Soc*. 2000;2:117-131.
102. Ruggiero KM, Taylor DM. Why minority group members perceive or do not perceive the discrimination that confronts them: the role of self-esteem and perceived control. *J Pers Soc Psychol*. 1997;72:373-389.
103. Crosby F. The denial of personal discrimination. *Am Behav Sci*. 1984;27:371-386.
104. Ruggiero KM, Major BN. Group status and attributions to discrimination: are low-or high-status group members more likely to blame their failure on discrimination? *J Pers Soc Psychol*. 1998;24:821-837.
105. Gomez JP, Trierweiler SJ. Does discrimination terminology create response bias in questionnaire studies of discrimination? *Pers Soc Psychol Bull*. 2001;25:630-638.
106. Neighbors HW, Sellers S. Effects of goal-striving stress on the mental health of Black Americans. Program for research on Black Americans 2000. In press.
107. Brown TN. Measuring self-perceived racial and ethnic discrimination in social surveys. *Sociol Spectrum*. 2001;21:377-392.
108. Sigelman L, Welch S. *Black Americans' Views of Racial Inequality: The Dream Deferred*. Cambridge, Mass: Harvard University Press; 1991.
109. Ruggiero KM, Marx DM. Less pain and more to gain: why high-status group members blame their failure on discrimination. *J Pers Soc Psychol*. 1999;77:774-784.
110. McWhorter JH. *Losing the Race: Self-Sabotage in Black America*. New York, NY: The Free Press; 2000.
111. Ruggiero KM, Taylor DM. Coping with discrimination: how disadvantaged group members perceive the discrimination that confronts them. *J Pers Soc Psychol*. 1995;68:826-838.
112. Williams DR, Williams-Morris R. Racism and mental health: the African-American experience. *Ethn Health*. 2000;5:243-268.
113. Davidson K, Jonas BS, Dixon KE, et al. Do depression symptoms predict early hypertension incidence in young adults in the CARDIA study? *Arch Intern Med*. 2000;160:1495-1500.
114. Anderson NB, Myers HF, Pickering T, Jackson JS. Hypertension in Blacks: psychosocial and biological perspectives. *J Hypertens*. 1989;7:161-172.
115. Johnson E, Broman C. The relationship of anger expression to health problems among Black Americans in a national survey. *J Behav Med*. 1987;10:103-116.
116. Gyll M, Contrada RJ. Trait hostility and ambulatory cardiovascular activity: responses to social interaction. *Health Psychol*. 1998;17:30-39.
117. Raikkonen K, Matthews KA, Flory JD, Ownes JF. Effects of hostility on ambulatory blood pressure and mood during daily living in healthy adults. *Health Psychol*. 1999;18:44-53.
118. McEwen BS, Seeman T. Protective and damaging effects of mediators of stress: elaborating and testing the concepts of allostasis and allostatic load. *Ann N Y Acad Sci*. 1999;896:30-47.
119. Yen IH, Ragland DR, Greiner BA, Fisher JM. Workplace discrimination and alcohol consumption: findings from the San Francisco Muni Health Safety Study. *Ethn Dis*. 1999;9:70-88.
120. Landrine H, Klonoff EA. Racial discrimination and cigarette smoking among Blacks: findings from two studies. *Ethn Dis*. 2000;10:195-202.