Original Contribution

Cross-Sectional Association between Perceived Discrimination and Hypertension in African-American Men and Women

The Pitt County Study

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Few studies have examined the impact of the frequency of discrimination on hypertension risk. The authors assessed the cross-sectional associations between frequency of perceived racial and nonracial discrimination and hypertension among 1,110 middle-aged African-American men (n = 393) and women (n = 717) participating in the 2001 follow-up of the Pitt County Study (Pitt County, North Carolina). Odds ratios were estimated using gender-specific unconditional weighted logistic regression with adjustment for relevant confounders and the frequency of discrimination. More than half of the men (57%) and women (55%) were hypertensive. The prevalences of perceived racial discrimination, nonracial discrimination, and no discrimination were 57%, 29%, and 13%, respectively, in men and 42%, 43%, and 15%, respectively, in women. Women recounting frequent nonracial discrimination versus those reporting no exposure to discrimination had the highest odds of hypertension (adjusted odds ratio = 2.34, 95% confidence interval: 1.09, 5.02). A nonsignificant inverse odds ratio was evident in men who perceived frequent exposure to racial or nonracial discrimination in comparison with no exposure. A similar association was observed for women reporting perceived racial discrimination. These results indicate that the type and frequency of discrimination perceived by African-American men and women may differentially affect their risk of hypertension.

African continental ancestry group; discrimination (psychology); hypertension; prejudice; sex factors; stress

Abbreviations: CI, confidence interval; OR, odds ratio.

In the United States, the prevalence of hypertension continues to rise, especially among Blacks, despite moderate improvements in the treatment and control of hypertension (1, 2). For example, from 1988–1994 to 1999–2002, in nationally representative samples of Blacks and Whites aged 20 years or older, the prevalence of hypertension increased from 33.9 percent to 38.6 percent in Black men and from 37.6 percent to 44.0 percent in Black women (3). In comparison with Blacks, the increases among White men (from 24.4 percent to 26.6 percent) and women (from 24.2 percent to 29.6 percent) remained significantly lower in both time periods (3). While obesity (4, 5), physical inactivity (6, 7), socioeconomic status (3), and access to quality health care (8–10) undoubtedly explain some of the residual differences in Black Americans’ elevated risk of hypertension, there is a growing interest in elucidating the potentially causal role of less traditional risk factors, particularly discrimination (11, 12).

Jones describes discrimination as the “behavioral enactment of prejudice, which can be defined as a negative attitude towards a person or group based on social comparisons” (13, p. 288). Negative attitudes attributed to
Material And Methods

Data for this study came from the 2001 follow-up survey of African Americans in the Pitt County Study, carried out in Pitt County, North Carolina. The Pitt County Study was initiated in 1988 for the purpose of identifying social, economic, and behavioral precursors of hypertension and related disorders among African Americans aged 25–50 years at baseline. Neighborhoods containing middle-class African-American households were oversampled in order to achieve an economically diverse study population. Of the 2,225 race- and age-eligible persons, 1,773 (80 percent; 661 men and 1,112 women) were interviewed (27). In 2001, household interviews were sought with all cohort members believed to be alive, noninstitutionalized, and residing within a 100-mile (160-km) radius of Greenville, North Carolina, the county’s principal city. Of the 1,540 persons (543 men and 997 women) meeting these criteria, 1,221 (79 percent; 428 men and 793 women) were reinterviewed. Of these, 43 were excluded because of significant discrepancies in birth year (≥2 years) or height (≥2 inches (≥5 cm)) between the 1988 and 2001 surveys (28). Observations with missing values for the outcome, main exposure, and potential confounders were also excluded (n = 68). The final study population included 1,110 participants (393 men and 717 women), 63 percent of the original baseline cohort.

Measurement of perceived exposure to discrimination

In the 2001 follow-up survey, the Everyday Discrimination Scale designed by Williams et al. (29) was used to measure exposure to unfair treatment due to race or other factors. Seven of the original nine scale items were used in the 2001 follow-up survey. For parsimony, two of the items—“people act as though they are better than you” and “[people] think you are dishonest”—were not included, and two other items—“being treated with less courtesy” and “being treated with less respect”—were combined, for a total of six items. The participants were asked whether 1) “you are treated with less courtesy or respect than other people”; 2) “you receive poorer service than other people at restaurants or stores”; 3) “people act as if they think that you are not smart”; 4) “people act as though they are afraid of you”; 5) “you are called names or insulted”; and 6) “you are threatened or harassed.” The potential responses to each item focused on the frequency of exposure: almost every day (score = 5), at least once a week (score = 4), a few times a month (score = 3), a few times a year (score = 2), less than once a year (score = 1), or never (score = 0). Subsequently, respondents were asked to choose the single most important reason for the reported discrimination; the options included race, gender, age, height or weight, shade of skin color, or other.

To answer the first research question, we created three mutually exclusive exposure categories to represent the primary type of discrimination perceived by the participants. The first category, perceived racial discrimination, consisted of persons who attributed discrimination to their race or skin color. The second category, perceived nonracial discrimination, was composed of persons who considered their exposure to discrimination as deriving from factors other than race or skin color. The third category, no perceived discrimination, consisted of persons who answered “never” to all six questions on the Everyday Discrimination Scale.

To test the second research question, we summed numerical scores associated with the responses “never” to “almost every day,” on a scale of 0 to 5. The total sum of the scores ranged from 0 to 30 for each participant. Tertiles
were constructed for sums between 1 and 30, separately for men and women. Men in the highest tertile had a total score greater than 9; the middle group had scores of 6–9; and the lowest tertile had scores of 5 or less. For women, the respective tertiles had cutoffs of ≥9, 5–8, and ≤4. A three-level categorical variable based on the distributions of the tertiles was generated, and categories were labeled as “frequently to always,” “infrequently,” and “rarely” exposed to perceived discrimination. Persons who reported “never” having been exposed to discrimination (sum = 0) constituted the referent group.

Measurement of blood pressure

During the 2001 follow-up survey, trained interviewers used the Omron Digital Blood Pressure Monitor (model HEM-711; Omron Healthcare, Inc., Bannockburn, Illinois) to take three measurements of systolic blood pressure and fifth-phase diastolic blood pressure. Values from the second and third readings were averaged. Hypertension was defined as systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg (30) or self-reported use of antihypertensive medication.

Covariates

Age in 2001 was dichotomized as <45 years versus ≥45 years. Interviewers measured participants’ heights and weights with shoes and heavy clothing removed. Height was measured to the nearest inch with a vertical ruler. Weight was measured in pounds using a balanced Healthometer portable scale (Sunbeam Products, Inc., Boca Raton, Florida). For both men and women, body mass index was calculated as weight (kg) divided by height squared (m²). Following the guidelines of the Centers for Disease Control and Prevention, body mass index was categorized as normal (18.5–<25.0), overweight (25.0–<30.0), or obese (≥30.0) (31). Persons with underweight body mass index values (<18.5) were coded as having missing data because of their low numbers (n = 7).

Psychosocial well-being was assessed through measures of instrumental and emotional social support (32). Instrumental support (six items) evaluated how readily a participant could acquire material aid without having to pay for it, and emotional support (three items) assessed the availability of confidants. Each support measure was dichotomized at the mean into high and low levels. John Henryism, a strong behavioral predisposition to engage in high-effort coping with social or economic adversity, was measured by means of the 12-item John Henryism Scale for Active Coping (33). Total scores on this scale were divided at the median, 53, to form low and high categories.

Education and occupation were used as proxies for socioeconomic status. Education was categorized into less than high school, high school or General Educational Development diploma, some college, or college graduate. Occupation was classified as unemployed/missing data, manual labor, or white-collar/skilled craft.

The institutional review board for research on human subjects at the University of Michigan approved the data collection protocol, and the human subject review boards at the University of North Carolina and Duke University approved of the secondary data analyses for the current study.

Statistical analysis

Gender-specific analyses were conducted and consisted of comparisons of stratified proportions, estimation of crude odds ratios, estimation of adjusted odds ratios using unconditional weighted logistic regression, and two-sided p values. Probability values less than 0.20 were considered statistically significant for interaction terms. The presence of a dose-response relation between the frequency of perceived discrimination and hypertension was evaluated by creating cross-classified exposure categories that were modeled with indicator variables.

To account for the complex sampling design, we integrated weighted data into the analyses by assigning each observation a sampling weight equal to the inverse of its selection probability for inclusion in the sample. The final sampling weights accounted for the unequal probability of being selected due to the oversampling of middle-class households during the baseline survey in 1988, as well as nonresponse to both the 1988 and 2001 surveys. Weighted frequencies were determined via the survefreq procedure, and odds ratios and variances were estimated via the surve.logistic procedure in SAS, version 9.1.3 (SAS Institute, Inc., Cary, North Carolina).

RESULTS

As table 1 shows, the majority of the men (57 percent) and women (55 percent) in the study were hypertensive. Nearly twice as many men reported exposure to racial discrimination as exposure to other forms of discrimination. Women reported similar levels of perceived racial discrimination (42 percent) as other forms of discrimination (43 percent). Approximately 13 percent of men and 15 percent of women reported never having experienced discrimination.

Other demographic characteristics of the weighted sample are shown in table 1. The majority of participants were older than 45 years of age, and more than two thirds had at least a high school education. Over 20 percent of men and women had attended a trade school or college, and approximately 9 percent of men and women had college degrees. With respect to frequency of exposure to discrimination, reporting being “infrequently” or “rarely” exposed was more common than “frequently to always” exposed for both genders.

Table 2 displays weighted proportions of various characteristics of the study subjects by exposure status and gender, with some notable associations being apparent. For example, significantly higher percentages of men and women who reported “never” experiencing discrimination had manual occupations, higher John Henryism scores, less formal education, and higher reported levels of instrumental support.

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The low category represents not being able to receive assistance and was divided at the median to form high and low categories. Higher scores indicate a strong predisposition to engage in high-effort coping with difficult life stressors.

**DISCUSSION**

In this sample of middle-aged African Americans from the southern United States, a high level of perceived discrimination was reported. Our findings indicate that the type and frequency of discrimination were differentially associated with hypertension in men and women. The total proportion of perceived discrimination was nearly equivalent in men (89 percent) and women (85 percent), but men were
more likely than women to attribute it to racial factors (57 percent and 42 percent, respectively). Among the men, ever perceiving racial or nonracial discrimination versus never perceiving it was protective against hypertension, but the estimates were imprecise. In women, ever perceiving either form of discrimination indicated a harmful association with hypertension. Accounting for the relative frequency of either form of discrimination points to a potential dose-response relation between the frequency of perceived discrimination and hypertension. In this study, the more frequently African-American men perceived either form of discrimination, the lower their adjusted odds of hypertension tended to be. For women, including the frequency of perceiving discrimination highlighted the finding that different forms of discrimination had an opposite impact on hypertension; namely, an increase in the frequency of nonracial discrimination increased the odds of hypertension, while racial discrimination decreased the odds.

An inverse association between perceived racial discrimination and blood pressure was reported in at least two prior studies (24, 25). African-American men and women who accepted racial discrimination and kept it to themselves had higher blood pressures, on average, than their counterparts who either responded directly or talked to others about...
the experience(s) (24). In a second study, Black men and women over 40 years of age who reported less experience with and distress from racism had significantly higher mean diastolic blood pressures than those who reported more experience with racism and feeling distressed by it (25).

The effect of the frequency of discrimination on hypertension is less well-researched than exposure to discrimination. In a recent paper from the Black Women’s Health Study, day-to-day experiences of perceived racial discrimination were not associated with the incidence of self-reported hypertension among Black women born in the United States (22). In another study, however, the cumulative frequency (no experiences vs. one or more experiences) of perceived racial discrimination over a participant’s lifetime was inversely associated with self-reported hypertension (21).

These inverse relations between hypertension and perceived discrimination in prior studies and frequency of perceived discrimination in the current study suggest a potentially deleterious effect, especially in Black men, of “denial” as a habitual and presumably unconscious psychological mechanism for coping with racial discrimination. Indirect evidence that “denial” may serve as a coping strategy for dealing with racial stressors is supported by our finding that more than twice as many men and nearly twice as many women who never reported suffering discrimination had high levels of John Henryism (table 2). This suggests that an important correlate of this strong predisposition to engage in high effort to cope with stressors (including race-based stressors) involves minimizing one’s perception of being exposed to them in the first place. Controlling for John Henryism in the adjusted analyses, however, did not alter the findings (results not shown). Prior studies of John Henryism and blood pressure status (33–36) have emphasized the importance of the interaction between socioeconomic status and John Henryism as a social determinant of blood pressure levels in African Americans. In the current study, the small sample size for men precluded assessment of the influence this interaction might have had on our results. For women, controlling for the interaction between socioeconomic status and John Henryism did not alter our findings (results not shown).

TABLE 3. Distribution (%) of African-American men and women† according to hypertension status and type of perceived discrimination, Pitt County, North Carolina, 2001

<table>
<thead>
<tr>
<th>Item from the Everyday Discrimination Scale (29) and type of perceived discrimination</th>
<th>Men (N = 393)</th>
<th>Women (N = 717)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hypertensive</td>
<td>Normotensive</td>
</tr>
<tr>
<td>You are treated with less courtesy or respect than other people</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial discrimination</td>
<td>36.0</td>
<td>29.7</td>
</tr>
<tr>
<td>Nonracial discrimination</td>
<td>19.0</td>
<td>15.3</td>
</tr>
<tr>
<td>You receive poorer service than other people at restaurants or stores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial discrimination</td>
<td>39.8</td>
<td>34.4</td>
</tr>
<tr>
<td>Nonracial discrimination</td>
<td>14.4</td>
<td>11.4</td>
</tr>
<tr>
<td>People act as if they think you are not smart*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial discrimination</td>
<td>35.0</td>
<td>32.1</td>
</tr>
<tr>
<td>Nonracial discrimination</td>
<td>18.9</td>
<td>14.0</td>
</tr>
<tr>
<td>People act as though they are afraid of you</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial discrimination</td>
<td>35.5</td>
<td>31.7</td>
</tr>
<tr>
<td>Nonracial discrimination</td>
<td>20.1</td>
<td>12.7</td>
</tr>
<tr>
<td>You are called names or insulted*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial discrimination</td>
<td>23.0</td>
<td>29.8</td>
</tr>
<tr>
<td>Nonracial discrimination</td>
<td>26.6</td>
<td>20.6</td>
</tr>
<tr>
<td>You are threatened or harassed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial discrimination</td>
<td>25.0</td>
<td>26.2</td>
</tr>
<tr>
<td>Nonracial discrimination</td>
<td>32.6</td>
<td>16.2</td>
</tr>
</tbody>
</table>

* p < 0.05 for women in a Rao-Scott chi-squared test.
† Unweighted population estimated counts and weighted population estimated percentages of participants aged 25–50 years at baseline.
Interactions between the main exposure and the covariates were also assessed, and all were found to be statistically nonsignificant. The absence of interactions involving socioeconomic status could reflect insufficient economic

<table>
<thead>
<tr>
<th></th>
<th>Model 1†</th>
<th>Model 2‡</th>
<th>Model 3§</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial discrimination</td>
<td>0.82 0.41, 1.65</td>
<td>0.87 0.43, 1.76</td>
<td>0.84 0.39, 1.81</td>
</tr>
<tr>
<td>Nonracial discrimination</td>
<td>0.87 0.40, 1.88</td>
<td>0.89 0.41, 1.93</td>
<td>1.03 0.45, 2.33</td>
</tr>
<tr>
<td>No discrimination</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racial discrimination</td>
<td>1.03 0.62, 1.69</td>
<td>1.24 0.73, 2.12</td>
<td>1.24 0.71, 2.17</td>
</tr>
<tr>
<td>Nonracial discrimination</td>
<td>1.41 0.85, 2.33</td>
<td>1.65 0.97, 2.80</td>
<td>1.57 0.90, 2.73</td>
</tr>
<tr>
<td>No discrimination</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* Weighted population estimated effects and 95% confidence intervals.
† Results were unadjusted.
‡ Results were adjusted for age.
§ Results were adjusted for age, education, body mass index (weight (kg)/height (m)^2), instrumental support, and emotional support.
¶ OR, odds ratio; CI, confidence interval.

**FIGURE 1.** Adjusted odds ratios for the association between frequency of perceived discrimination (racial or nonracial) and hypertension among African-American men and women, Pitt County, North Carolina, 2001. Squares, model 1 (results adjusted for age); triangles, model 2 (results adjusted for age, body mass index (weight (kg)/height (m)^2), education, instrumental support, and emotional support). Bars, 95% confidence interval (CI).
To our knowledge, only two other studies included results focusing on nonracial discrimination and hypertension in African Americans. In one study, discrimination due to race and gender combined was inversely related to self-reported hypertension in Black women (21). More specifically, being quiet and accepting the discrimination versus being vocal and reacting overtly to it was associated with an increased risk of self-reported hypertension. In the Study of Women’s Health Across the Nation, perceived unfair treatment was not correlated with either systolic blood pressure or diastolic blood pressure in African-American women (37).

Our findings for nonracial discrimination in women indicate that it is also important to investigate other forms of discrimination among Black women. Unspecified sources of discrimination (33 percent) and gender discrimination (7 percent) constituted the majority of the forms of nonracial discrimination reported by women in the Pitt County Study. For men, age discrimination (23 percent) was the most commonly reported form of nonracial discrimination, followed by other forms (not specified) (4 percent). The greater odds of hypertension in women who reported being frequently exposed to nonracial discrimination versus never exposed could reflect less effective coping mechanisms for dealing with the latter. Alternatively, this could also be an example of reverse causality, where the individual’s knowledge that her health is not good increases her sensitivity to how others respond to her.

The present study had several limitations. First, because of the small sample size for men, the estimates were imprecise. As a result, we were unable to explore several potentially important interactions involving perceived discrimination. Second, eastern North Carolina, where Pitt County is located, is characterized by large pockets of racially segregated neighborhoods and work settings, which might well have limited the exposure of our Black subjects to certain common forms of discrimination, especially racial discrimination. Consequently, our ability to assess the strength of the associations between perceived discrimination and hypertension may have been compromised by local contextual factors. Third, because two of the original nine items from the Everyday Discrimination Scale were not included, measurement error may have been introduced, resulting in non-differential misclassification of the main exposure and effectively biasing the results toward the null.

Despite these limitations, this study had several strengths. Hypertension status was not self-reported but instead was measured by a trained interviewer using a digital device. Relevant anthropometric and psychosocial confounders were also controlled for in the analyses, thereby generating less biased effect estimates. Employing nonresponse weights reduced the likelihood of nonresponse bias. Finally, both gender groups were included in the analyses, permitting comparisons by gender.

Exposure to racial discrimination has been a central part of the African-American experience, and more studies, especially community-based, prospective cohort studies, are needed to determine what role it plays in shaping the physical and mental health of African Americans (11, 12, 19, 24, 26, 29). Findings from this study, as well as the mixed findings in the extant literature, suggest that the next generation of studies focusing on discrimination and health should emphasize the role of gender, the intensity and frequency of perceived discrimination, age, social class, and geographic context.

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Conflict of interest: none declared.

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