

# REVIEWS: CARDIOVASCULAR DISEASE AND RISK FACTORS

## EXPLORING THE ASSOCIATION BETWEEN REPORTED DISCRIMINATION AND HYPERTENSION AMONG AFRICAN AMERICANS: A SYSTEMATIC REVIEW

**Background:** The experience of racial discrimination among African Americans may contribute to an increased risk of developing hypertension and having poor hypertension control once diagnosed. Although it is a commonly held belief that experiences of discrimination may exert lasting effects on health behavior and physiology, the existing evidence is mixed.

**Objective:** The objective of this review was to identify evidence linking the experience of discrimination with hypertension among African Americans and to provide an updated synthesis of the literature.

**Design:** Articles for the review were identified through an electronic search of PubMed, OVID, and other pertinent journals. The review was augmented with a manual search of references. We assessed the quality of included articles using modified Downs and Black criteria.

**Results:** In total, 15 articles were selected for the review, 12 cross-sectional studies and 3 cohort studies. The preponderance of evidence (9 of 15 articles) indicated that discrimination was associated with an increased risk of developing hypertension, difficulty obtaining control of existing hypertension, and/or elevated blood pressure among those without a diagnosis of hypertension.

**Conclusions:** This systematic review supports the association of racial discrimination with an increased risk of developing hypertension; however, the picture is not uniform. Methodological challenges, such as floor or ceiling effects of reported discrimination and low sample size, may have prevented researchers from detecting important associations. A better understanding of the emerging but complex relationship between discrimination and hypertension among African Americans is needed, as we seek to resolve existing cardiovascular health disparities. (*Ethn Dis.* 2012;22[4]:422–431)

**Key Words:** Discrimination, Racism, Bias, Unfair Treatment, Hypertension, Elevated Blood Pressure, African Americans, Black

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### BACKGROUND

Hypertension is the leading cause of cardiovascular disease in the United States, affecting nearly one in three adults.<sup>1</sup> In 1999–2000, the prevalence of hypertension was 33.5% among African Americans compared to 28.9% among Whites.<sup>2</sup> These statistics are particularly concerning for African Americans who are disproportionately affected by the condition. Hypertension is more prevalent, has greater severity, earlier onset, and contributes to more frequent organ damage among African Americans than Whites.<sup>3</sup>

Stress can evoke a physiological response such as elevated blood pressure. By stimulating the release of cortisol and catecholamines through activation of the autonomic nervous system, stressful experiences, such as discrimination, may increase blood pressure and cardiovascular reactivity.<sup>4</sup> Blood pressure reactions to discrimination may be transient but still cause detrimental effects.

There has been a steady increase in the number of studies examining the association between discrimination and hypertension, but findings from these studies do not immediately present a clear picture. Both reported racial discrimination and adverse health outcomes have been variably associated with the setting in which patients receive care, poor

patient-physician communication, and residual feelings of distrust stemming from everyday experiences of discrimination.<sup>5,6</sup> Additionally, it has been suggested that racial differences in health may be influenced by physiological responses induced by the stress of living in a race-conscious society.<sup>7</sup> For example, a study of African American students exposed to film clips depicting acts of racism demonstrated an instantaneous elevated blood pressure among the students.<sup>8</sup>

The subjective experience of racial bias may be a neglected determinant of health and a contributor to racial disparities in health. A 2003 review found evidence of an association between racism and hypertension; however, the subsequently emerging body of literature included studies of variable quality, diverse settings, and different methods for measuring outcomes.<sup>9</sup> Thus, there was a need for an updated synthesis, as several important papers analyzing the effects of discrimination have been recently published, and these papers have added to the complexity of this association. Therefore, the objective of this review was to explore the association of reported racial discrimination with hypertension among African Americans.

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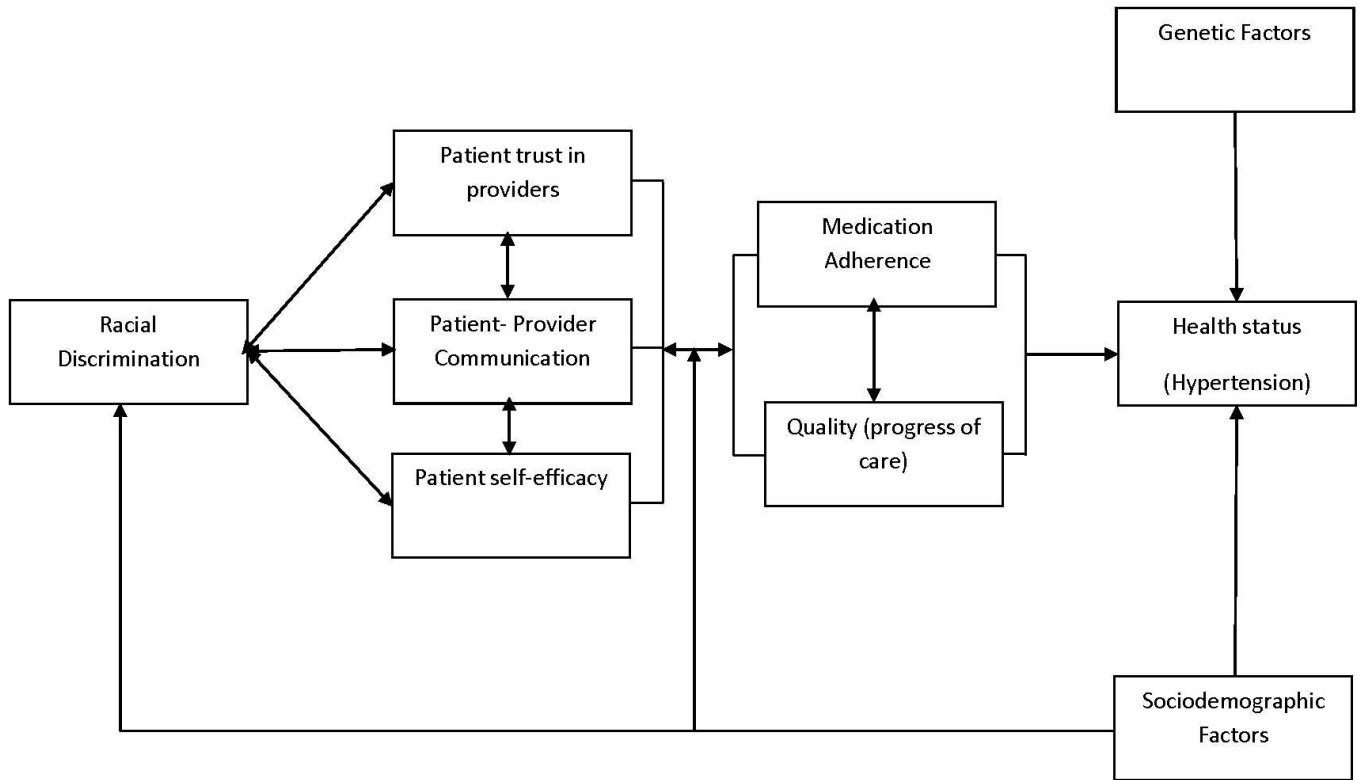


Fig 1. Model of racial discrimination and health outcomes

**METHODOLOGY**

**Search Strategy**

To identify potential manuscripts, a comprehensive review of online databases was conducted. First, articles were identified using MeSH terms in PubMed and other pertinent databases such as Ovid, Cochrane Central Register of Controlled Trials, and Google Scholar. The keywords and MeSH terms included the following: race, ethnicity, African American, Black, ethnic group, Caucasian, White, discrimination, racism, prejudice, unfair treatment, hypertension, high blood pressure, and elevated blood pressure. Article titles and abstracts were reviewed and articles with applicable content were saved for further review. To increase the likelihood of finding articles not included in the database searches, reference lists from articles of interest were also searched. Additionally, clinicians and researchers who worked with vulnerable populations at the Uni-

versity of Massachusetts Medical School and the University of Alabama at Birmingham were consulted for references that might add to the review.

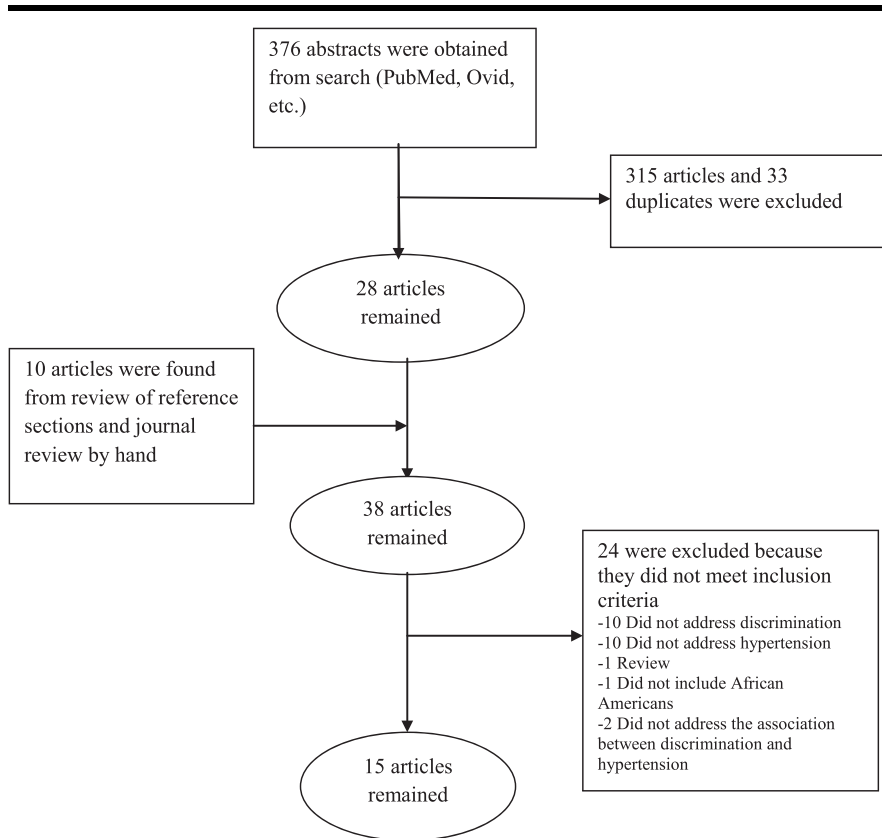
**Inclusion/Exclusion Criteria**

All articles ultimately included in the review met the following inclusion criteria: 1) study participants must be diagnosed or self-reported as having elevated blood pressure, hypertension or use of antihypertensive medications; 2) articles must have been published on or after January 1, 1990 and published before January 1, 2011; 3) articles must be published in English; 4) studies must include African Americans; and 5) discrimination/racism/unfair treatment or bias must be self-reported by the study participants.

Articles were ineligible if they: 1) included only children (ie, birth-17 years old); 2) focused exclusively on forms of discrimination other than racial/ethnic; 3) did not contain original data; and 4) focused on non-humans.

**Definitions**

Hypertension was defined using both objective and subjective measures. Subjective measures were based on patient self-report of having hypertension or self-reported use of antihypertensive medications. Objective measures were defined as a physician diagnosis of hypertension, cardiovascular reactivity, medical/administrative records indicating hypertension or use of antihypertensive medications, or elevated systolic or diastolic blood pressure measurement. We chose to focus on hypertension and not pre-clinical markers because hypertension has a clearly defined clinical definition and is linked to subsequent outcomes by unequivocal evidence. As such, the diagnosis of hypertension is a clear indication that early intervention may prevent future morbidity and mortality. Racial discrimination was based on the patient's report of discriminatory behavior, racism, bias, or unfair treatment. Several of the discrimination scales



**Fig 2. Selection of articles included in systematic review**

specified the domain in which the discrimination was experienced, such as at school, work, and when seeking health care. For the purpose of the present study we included any domain in which discrimination was experienced.

### Conceptual Model

The conceptual model for this review (Figure 1) was adapted from the Model of Perceived Discrimination and Health Outcomes.<sup>10</sup> We hypothesized that the experience of discrimination may directly influence trust in providers, communication, and self-efficacy. Factors such as adherence, genetic factors, sociodemographic, and quality of care measures may influence the severity of hypertension, the risk of developing hypertension, and determine how patients with hypertension manage their care. It should be noted that not all of the articles in this review address each of the factors included in the conceptual model. However,

we present the conceptual model as a method of organizing the intervening factors between perceived discrimination and hypertension outcomes. In addition, the model serves as a guide for future research that can better elucidate the mechanism through which discrimination leads to health status.

### Data Abstraction and Tabulation

Article details were abstracted using an electronic data abstraction form. Information on the year of publication, journal, study design, study population, study objectives, sample size, analytic method, demographics, and modified Downs and Black score were collected.<sup>11</sup> Definitions for hypertension and discrimination were collected, as well as the limitations and key findings from each of the studies.

### Quality Assessment and Grading

The validity of all articles selected for the review was assessed using a modified

version of the Downs and Black criteria. The Downs and Black checklist was developed to assess the quality of randomized and non-randomized studies of health care interventions. The original Downs and Black checklist consisted of 27 questions. The checklist was modified to exclude questions that were only applicable to randomized studies. Items that were not applicable to the review were excluded, such as: those pertaining to adverse events; patients lost to follow-up, blinding and randomization; data dredging; intervention compliance; and for calculating the power of the study. The potential range of this modified checklist was 0 to 18, with a higher score indicating higher quality. After reviewing the questions included in the modified Downs and Black checklist, the authors decided that a minimum of 12 of the checklist criteria must be met for inclusion in the review, thus any articles scoring lower than 12 would be excluded.

## RESULTS

The article selection process is illustrated in Figure 2. The initial search of primary databases generated a total of 376 abstracts and manuscript titles; after eliminating articles that were not applicable to the review and duplicates articles, 28 articles remained. An additional 10 articles were included as a result of reference section review and a hand search of journals. Twenty-four additional articles were excluded because they did not meet the inclusion/exclusion criteria. The author reviewed and confirmed that all remaining articles met the inclusion criteria; 15 articles were included in the review.

The characteristics of the 15 articles included in the review are described in Table 1. There were noted differences in the settings, sample sizes and measures used in each of the studies. Included articles had sample sizes ranging from 69 to 4,694 participants. The Everyday Discrimination and the Expe-

periences of Discrimination Scales were the most commonly used instruments to capture the main exposure.<sup>12,13</sup> Other studies used focus groups and developed new scales to obtain discrimination data. Twelve of the studies were cross-sectional in study design and three were cohort studies. All articles included in the review were classified as being of high quality.

### Discrimination and Hypertension

Nine of the 15 articles found that discrimination was associated with an increased risk of hypertension (Table 2).<sup>3,14-21</sup> For example, the study by Guyll et al, which consisted of a cohort of 363 African American and European American women participating in the Study of Women's Health Across the Nation (SWAN), assessed the relationship between discrimination and cardiovascular reactivity (instantaneous rise in blood pressure and heart rate) in response to viewing a video depicting racially stressful situations.<sup>15</sup> The participants in this study were a subset of all SWAN study participants drawn from a single site in Pittsburgh, Pennsylvania. Approximately 67.3% of the study participants reported experiences of discrimination or mistreatment. Among African American participants, those who reported experiencing mistreatment showed greater diastolic blood pressure reactivity when exposed to situations depicting racial prejudice.

Cozier et al assessed self-reported hypertension and discrimination among 2,316 African American women using the Black Women's Health Study.<sup>17</sup> The participants in this study self-reported hypertension or the use of diuretics for treatment of hypertension. The researchers found an association between discrimination and self-reported hypertension, but only among certain subgroups of women, namely African American women born outside of the United States and African American women who grew up in predominantly White neighborhoods. However, among other African American

women, the association between hypertension and discrimination was close to the null. The authors noted potential reasons for the variation in reported discrimination and inconsistent findings. First, they suggested that reported discrimination might vary by time and region. For example, participants in the South who lived during the pre-Civil Rights era may have greater exposure to racism and discrimination. Second, foreign-born women may have experienced more racism in their nation of origin compared to the United States, thus biasing their current estimation of discrimination downward compared to native women who never experienced extreme racism.

Din-Dzietham et al analyzed data obtained from the Metro Atlanta Heart Disease Study.<sup>14</sup> The objective of their study was to assess rates of hypertension among individuals reporting race-based discrimination at work in a cohort of 356 African American men and women in Atlanta, Georgia. For this study, hypertension was diagnosed based on an average of the last two of three sequential blood pressure measurements. In addition to measured blood pressure, the researchers collected self-reported rates of physician-diagnosed hypertension and self-reported use of antihypertensive medications. Within this sample of African American men and women, 39% reported race-based discrimination at work. Stress from race-based discrimination at work originating from those other than African Americans was significantly associated with a self-reported diagnosis of hypertension, but these findings were attenuated with adjustment for age, sex, and weight. No association was found between self-reported hypertension diagnosis and discrimination originating from other African Americans. Both systolic and diastolic blood pressures tended to increase with increasing category of stress from discrimination from any source, but these associations were of marginal statistical significance.

Six articles found no significant association between discrimination and hypertension (Table 2).<sup>22-27</sup> Davis reported that stress-related racial discrimination was not related to hypertension within their cohort of 356 African American men and women. For this study hypertension was diagnosed using both resting systolic and diastolic blood pressure measurements.<sup>24</sup> The authors attributed the lack of association to the high prevalence of the exposure reported by the study participants. Approximately 74% of the study participants reported incidents of discrimination. Thus, a "ceiling effect" may have decreased variability and masked important associations.

Brown et al conducted a study of 3,330 middle-aged and racially diverse women drawn from using the full, nationwide SWAN study.<sup>23</sup> The authors reported that unfair treatment varied by race; however, they did not find a correlation between unfair treatment and blood pressure. These results stand in stark contrast to those of Guyll, reported above. Guyll's approach, based on cardiovascular reactivity, may have been more sensitive to blood pressure differences resulting from exposure to discrimination. For example, blood pressure may be elevated in stressful moments but return to near baseline when stress is withdrawn. Such transient changes may not be detected by average resting blood pressure measurement. Additionally, the full SWAN study included study participants from Pittsburgh, Boston, and Detroit, and both the experiences and reporting of discrimination may differ between these cities.

Barksdale et al examined the relationship between discrimination and blood pressure among 211 African Americans. Blood pressure was measured two times within one hour during the screening visit. No association was found between lifetime exposure, past year exposure, or total exposure to discrimination and mean SBP and DBP.<sup>22</sup> The authors attributed their findings to the location and setting of the study, and the relatively small sample

**Table 1. Characteristics of articles included in systematic review**

	Name	Author Name and Citation Year	Data Source	Sample Size	Racial/Ethnic Comparison
1	Racial Discrimination and Blood Pressure: Perceptions, Emotions, and Behaviors of Black American Adults	Barksdale, 2009	Everyday Life of Black American Adults	211	African Americans
2	The Relation between Perceived Unfair Treatment and Blood Pressure in a Racially/Ethnically Diverse Sample of Women	Brown, 2006	Study of Women's Health across the Nation (SWAN)	3,330	African American, Hispanic and White, Japanese and Chinese
3	Racial Discrimination and the Incidence of Hypertension in US Black Women	Cozier, 2006	Black Women's Health Study	2,316	African American
4	Stress-Related Racial Discrimination and Hypertension Likelihood in a Population-Based Sample of African Americans: The Metro Atlanta Heart Disease Study	Davis, 2005	Metro Atlanta Heart Disease Study (MAHDS)	356 (Pilot study)	African American
5	Perceived Stress Following Race-based Discrimination at Work is Associated with Hypertension in African-Americans. The Metro Atlanta Heart Disease Study, 1999–2001	Din-Dzietham, 2004	Metro Atlanta Heart Disease Study (MAHDS)	356	African American
6	Discrimination and Unfair Treatment: Relationship to Cardiovascular Reactivity Among African Americans and European American Women	Guyll, 2001	Study of Women's Health across the Nation (SWAN)	363	African American and White
7	Racial and Gender Discrimination: Risk Factors for High Blood Pressure	Krieger, 1990	Recruited by random-digit dialing in Alameda County, California	101	African American and White
8	Racial Discrimination and Blood Pressure: The CARDIA Study of Young Black and White Adults	Krieger, 1996	Coronary Artery Risk Development in Young Adults Study (CARDIA)	4,086	African American and White
9	The Inverse Hazard Law: Blood Pressure, Sexual Harassment, Racial Discrimination, Workplace Abuse and Occupational Exposure in US Low-income Black, White and Latino Workers	Krieger, 2008	United for Health Study	1,202	African American, Hispanic, White and Other
10	Perceived Discrimination and Blood Pressure in Older African American and White Adults	Lewis, 2009	Chicago Health and Aging Project (CHAP)	4,694	African American and White
11	Racism and Hypertension among African Americans	Peters, 2004	Community sample of African Americans	162	African American
12	Cross-Sectional Association between Perceived Discrimination and Hypertension in African-American Men and Women: The Pitt County Study	Roberts, 2008	Pitt County Study	1,110	African American
13	The Association between Self-reported Discrimination, Physical Health and Blood Pressure: Findings from African Americans, Black Immigrants and Latino Immigrants in New Hampshire	Ryan, 2006	New Hampshire Racial and Ethnic Approaches to Community Health 2010	680	African American and Hispanic
14	Effects of Perceived Racism and Anger Inhibition on Ambulatory Blood Pressure in African American	Steffen, 2003	Duke Biobehavioral Investigation of Hypertension Study	69	African American
15	Factors Associated with Hypertension Awareness, Treatment, and Control in Dallas County, Texas	Victor, 2008	Dallas Heart Study	1514	African American and White

**Table 1. Extended from p 426.**

Discrimination Defined	Hypertension Defined	Positive/Negative Findings	Study Design	Downs and Black Score
Perceived Racism Scale	Objective measures: blood pressure measured, using the average of two blood pressures found in the dataset	Negative	Cross-Sectional	18
Everyday Discrimination Scale	Subjective and objective measures: self-reported use of hypertensive medication, self-reported diagnosis with hypertension, and blood pressure measurement	Negative	Cross-Sectional	16
Williams Discrimination Scale	Subjective measures: patient self-report of antihypertensive or diuretic use	Positive	Cohort	18
Adapted and developed combination of existing validated instruments from McNeily, Cohen, Utsey, Landrine and focus groups	Objective and subjective measures: average of three blood pressure measurements and self-reported use of anti-hypertensive medications	Negative	Cross-Sectional	18
Obtained using the McNeily et al (1996) subscale	Objective and subjective measures: three blood pressure measurements and patients self-reported past diagnosis of hypertension	Positive	Cross-Sectional	18
10 item scale developed for this study	Objective measures: blood pressure was measured using an automatic blood pressure scale	Positive	Cross-Sectional	16
Questions pertaining to a) response to unfair treatment b) experience of gender and race discrimination or related types of gender and race biased treatment	Subjective measures: hypertension status was determined by asking the respondents if they had ever been diagnosed as having hypertension	Positive	Cross-Sectional	17
Experiences of Discrimination Scale	Objective measures: blood pressure measured, using an average of three measurements	Positive	Cohort	17
Experiences of Discrimination (EOD) questionnaire	Objective and subjective measures: blood pressure was obtained by three average readings for systolic and diastolic blood pressures and self-report of hypertension or antihypertensive use	Negative	Cohort	16
Everyday Discrimination Scale	Objective measures: blood pressure was measured using standard procedures, the average of the two measurements was recorded SBP and DBP and inspection of antihypertensive medications	Positive	Cross-Sectional	17
Racism and Life Experiences Scale and the Krieger Racial Discrimination Questionnaire	Objective and subjective measures: hypertension was defined as self-reported use of hypertensive medication or patient self-report of diagnosis of hypertension. Hypertension was also measured and defined as BP $\geq$ 140 SBP, or $\geq$ 90 DBP	Negative	Cross-Sectional	17
Everyday Discrimination Scale	Objective and subjective measures: hypertension was defined as self-reported use of hypertensive medication or patient self-report of diagnosis of hypertension. Hypertension was also measured and defined as BP $\geq$ 140 SBP, or $\geq$ 90 DBP	Positive	Cross-Sectional	18
Adapted version of the Reactions to Race module	Objective measures: blood pressure was measured using standard procedures, and SBP and DBP were recorded	Positive	Cross-Sectional	17
Perceived Racism Scale	Objective measures: blood pressure (BP) was measured using standard procedures, and systolic (SBP) and diastolic blood pressure (DBP) were recorded	Positive	Cross-Sectional	16
Kaiser Family Foundation Survey of Race, Ethnicity and Medical Care	Objective and subjective measures: hypertension was defined as self-reported use of hypertensive medication or patient self-report of diagnosis of hypertension. Hypertension was also measured and defined as BP $\geq$ 140 SBP, or $\geq$ 90 DBP	Negative	Cross-Sectional	18

**Table 2. Key findings for articles exploring the association between discrimination and hypertension**

	Author	Sample Size	Prevalence of Hypertension	% Reporting Discrimination
<b>Studies with positive findings</b>				
3	Cozier	2,316	All study participants self-reported or had measured blood pressure of 140 mm Hg or greater and/or diastolic blood pressure of 90 mm Hg or greater	48% reported at least one experience of personally mediated racism and 70% reported institutional racism
5	Din-Dzietham	356	Overall 44% reported hypertension and among African American reporting discrimination 47% were hypertensive	39% reported discrimination at work, 6% reported intra-race based discrimination at work (RBDW), 35% reported inter-RBDW and 21% reported experiencing both
6	Guyll	363	Percent of participants with hypertension not reported	39 participants reported experiencing discrimination
7	Krieger	101	18% were hypertensive	Participants reported discrimination in various settings: 35.3% at school 49.0% getting a job 52.9% at work and 26% when seeking medical care
8	Krieger	4,086	Did not report percentage with hypertension. It was reported that SBP was 7 mm Hg higher among working class Black women compared with working class White women.	Among Black women 77% reported experiencing discrimination 84% of Black men reported experiencing discrimination
10	Lewis	4,694	Percent of participants with hypertension was not reported, however 30% reported using antihypertensive medications	Discrimination score was 1.3 in African Americans and .62 in Whites, higher discrimination score indicates more reported discrimination
12	Roberts	1,110	57% of male participants reported hypertension diagnosis, 55% of female participants reported hypertension diagnosis	58% of male participants reported racial discrimination and 42% of female participants reported racial discrimination. 13.2% of males reported never experiencing discrimination and 15% of women reported experiencing discrimination
13	Ryan	680	28% of African American participants reported being diagnosed with hypertension	Discrimination index ranged from 0 to 3, with 0 indicating more discrimination. African Americans had a 0.91 mean discrimination index.
14	Steffen	69	Percent of participants with hypertension not reported	Approximately 94% of the sample reported experiencing discrimination
<b>Studies with negative findings</b>				
1	Barksdale	211	150 study participants were classified as prehypertensive or hypertensive	Did not explicitly state percent that reported discrimination, authors noted that high levels of perceived racial discrimination was not found in this group
2	Brown	3,330	32% of African Americans participants self-reported hypertension	65% of African American participants self-reported unfair treatment
4	Davis	356	48% were hypertensive	74% of hypertensive and normotensive participants reported racial discrimination
9	Krieger	1,202	27% of Black male participants and 22% of Black women reported hypertension	46% of Black men and 35% of Black women reported experiencing racial discrimination in three or more situations
11	Peters	162	41% of participants had hypertension among those with known hypertension; 67% did not have controlled hypertension	83% reported experiencing racism and 68% reported experiencing discrimination when getting medical care
15	Victor	1,514	Overall 24.5% were hypertensive, 31.1% of African American participants had hypertension and 21.6% of Whites had hypertension.	Reported discrimination among African American men-50.0% Reported discrimination for African American women-47.7%

**Table 2. Extended from page 428.**

Key Findings	Geography	Objective/Subjective
Racism modestly associated with hypertension among women who grew up in predominately White neighborhoods	Nationwide	Subjective
Racism and race-based discrimination at work was associated with increased SBP and DBP and increased self-reported hypertension in African Americans	Georgia	Objective and subjective
Discrimination may contribute to cardiovascular disease, found associations with diastolic blood pressure among African Americans	Pennsylvania	Objective
Women who internalized their responses to unfair treatment were at greatest risk for self-reported hypertension	California	Subjective
Reporting discrimination was associated with elevated blood pressure	Alabama, Illinois, Minnesota	Objective
Discrimination was associated with diastolic blood pressure but not systolic blood pressure	Illinois	Objective and subjective
Discrimination was protective against hypertension for men, however estimates were imprecise; discrimination had a harmful association with hypertension among women.	North Carolina	Objective and subjective
Discrimination was associated with poor physical health and higher SBP among African Americans and Blacks. No association was found between discrimination and DBP. Also found SBP was highest among those reporting the least and most discrimination	New Hampshire	Objective
Increased reported racism was associated with higher clinical DBP and higher SBP and DBP during waking hours	North Carolina	Objective
Did not find a correlation between discrimination and blood pressure	Midwest	Objective
Unfair treatment was not a correlate of blood pressure	Pennsylvania, Massachusetts, Illinois, California, New Jersey	Objective and subjective
Discrimination not significantly associated with hypertension	Georgia	Objective and subjective
Did not find an association between social hazards such as discrimination and systolic blood pressure.	Massachusetts	Subjective
Racism was highly prevalent but not associated with blood pressure. In addition, no significant relationships were found between racism and SBP or DBP	Michigan	Objective and subjective
Perceived racism in medical care was unrelated to hypertension awareness, treatment or control	Texas	Objective and subjective



size. The participants were sampled from the Midwest, and the authors suspected that the perception of racism might not be as substantial in this region (floor effect). On a possible scale from 0 to 215 with a higher score indicating more discrimination, study participants had average scores of 54.91 for lifetime exposure and 35.23 for past year exposure. The authors acknowledged that their sample had a relatively high income and suggested the findings may reflect the experiences of discrimination among middle class African Americans. However, other studies have found more reported discrimination among African Americans who reported a higher income and greater education.<sup>28</sup>

## DISCUSSION

### Findings

The preponderance of articles (9/15) suggests an association between hypertension and discrimination. However, many of the negative studies had methodological challenges not reflected in the Downs and Black criteria. The authors cited several reasons that might have contributed to the lack of association between discrimination and hypertension, including factors such as floor and ceiling effects of self-reported discrimination, geographic variation in the experience and reporting of discrimination, and small sample sizes. The included studies were similar in that most consisted of participants with a mean age in the late 30 to mid 40s with only two studies having a mean age over 50 years. Additionally, the majority of the studies were set in the South. Studies that recruited participants from the South (compared to the North, Midwest, nationwide) were more likely to show positive associations. The association may be due to more background discrimination and historical mistrust for the health care system or a result of dietary and lifestyle behaviors.<sup>29-31</sup>

Although the link between discrimination and hypertension is not consistently

clear in the literature, an indirect body of evidence suggests a mechanism through which this association may be mediated. Experiencing discrimination, especially when seeking medical care, is likely to affect future health care related decision-making. The perception of discrimination may also make one hesitant to seek medical treatment, to take medication as directed, and to engage in honest communication efforts with their physician.<sup>32</sup> Three articles included in this review addressed discrimination experienced in the health care setting, and found varied rates of reported discrimination. For example, in a study by Krieger et al, 14% of African American women and 13% of African American men reported experiencing discrimination when seeking medical care.<sup>3</sup> Similarly, another Krieger study found 25.5% of all African American participants reporting discrimination when seeking medical care.<sup>16</sup> However, in the Peters study 83% of all participants reported experiencing racism in any setting and 68% of study participants reported experiencing discrimination when seeking medical care. In this study the health care setting was the second most reported domain for experiencing discrimination.<sup>25</sup>

Reported discrimination has been linked with greater mistrust, particularly mistrust toward health care providers.<sup>33</sup> Researchers have speculated that patients who do not trust their physicians are less likely to be diagnosed, to manage their condition and to adhere to prescribed medications.

### Study Limitations

This review was challenged by the lack of consistency in definitions and measures across the selected studies; therefore, we were unable to conduct a meta-analysis. Complex heterogeneity was introduced by dissimilar patient populations, outcomes and exposures, and limited geographic and socioeconomic ranges in the articles. Population-based studies document large numbers of patients with hypertension who

are undiagnosed and unaware of their condition,<sup>34</sup> thus limiting the value of self-reported hypertension. In addition, blood pressure is highly variable and fluctuates throughout the day due to physical activity and emotional stress. Therefore, important transient elevations may be missed by averaged measurements, and measurements taken at a single time may reflect excessive random variation.

Finally, other factors not addressed in this review may modify or confound the noted association between discrimination and hypertension. For example, socio-demographic factors (such as age, income, and education), genetic factors, psychosocial factors (such as trust), cultural factors, individual self-efficacy and sensitivity to experiences of discrimination may mediate the link between discrimination and hypertension. Many of these factors are reflected in our conceptual model, but an effective synthesis across our included studies was not possible because of variable inclusion and reporting.

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*Overall, the literature suggests an important link between discrimination and hypertension.*

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## SUMMARY

Recent interest in the effects of discrimination on health has contributed to an increase in the number of studies exploring its relationship with hypertension. Overall, the literature suggests an important link between discrimination and hypertension. Studies using more sensitive methods such as cardiovascular reactivity may be able to demonstrate effects not detected by isolated or average blood pressure measurement. Improved psychometric measures will lead to better ways of

measuring and detecting the lifetime burden of discrimination and methods to overcome ceiling effects observed in many studies. Although the preponderance of evidence suggests discrimination is linked with hypertension, additional research is needed to better understand the physiological relationship between discrimination and hypertension.

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