

**Intersectional Discrimination and Change in Blood Pressure Control among Older Adults:
The Health and Retirement Study**

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Abstract

Background: Associations between multiple forms of discrimination and blood pressure control in older populations remain unestablished.

Methods: Participants were 14582 non-institutionalized individuals (59% women) in the Health and Retirement Study aged at least 51 years (76% Non-Hispanic White, 15% Non-Hispanic Black, 9% Hispanic/Latino). Primary exposures included the mean frequency of discrimination in everyday life, intersectional discrimination (defined as marginalization ascribed to more than one reason), and the sum of discrimination over the lifespan. We assessed whether discrimination was associated with change in measured hypertension status (N=14582) and concurrent medication use among reported hypertensives (N=9086) over four years (2008-2014).

Results: There was no association between the frequency of everyday discrimination and change in measured hypertension. Lifetime discrimination was associated with higher odds of hypertension four years later among men (OR: 1.21, 95% CI: 1.08, 1.36) but not women (OR: 0.98, 95% CI: 0.86, 1.13). Only among men, everyday discrimination due at least two reasons was associated with a 1.44 (95% CI: 1.03, 2.01)-fold odds of hypertension than reporting no everyday discrimination; reporting intersectional discrimination was not associated with developing hypertension among women (OR: 0.91, 95% CI: 0.70, 1.20). All three discriminatory measures were inversely related to time-averaged antihypertensive medication use, without apparent gender differences (e.g., OR for everyday discrimination-antihypertensive use associations: 0.85, 95% CI: 0.77, 0.94)).

Conclusions: Gender differences in marginalization may more acutely elevate hypertensive risk among older men than similarly aged women. Experiences of discrimination appear to decrease the likelihood of antihypertensive medication use among older adults overall.

BACKGROUND

Non-Hispanic Black and certain Hispanic subgroups receive hypertension diagnoses at younger ages(1,2) and go on to experience disproportionately more adverse events including cardiovascular events(3), disability(4), as well as death(5) than non-Hispanic Whites. The risk of hypertension also appears to be higher among people of lower socioeconomic status (SES).(6) However, factors such as race and socioeconomic status are insufficient proxies to evaluate the impact of corresponding forms of unfair treatment (e.g., racism and classism, respectively) on blood pressure management among older adults.

Experiences of discrimination are theorized to simultaneously produce stress that dysregulates the cardiovascular system(7) and inhibit the ability to control blood pressure(8,9). Cross-sectional evidence of the discrimination-hypertension association has been equivocal(10–12). By focusing on racism among African Americans, the predominance of studies may have insufficiently captured intra- as well as inter-group variability across sociodemographic categories. Epidemiological research should take into account how intersectional discrimination, such as combined classism, ageism, and racism, impairs blood pressure control (13,14).

Epidemiologic applications of Crenshaw's intersectionality theory involve moving beyond evaluations of sociodemographic factors such as race, gender, or class as independent and immutable primary exposures, or assuming consistent societal treatment across such identifiers(15,16). Though initially addressing the distinct inequity experienced by African American women, the intersectionality framework should be extended to diverse populations experiencing discrimination due to reasons experienced potentially since birth (e.g., sexism) as

well as acquired (e.g., ageism). Overlapping explanations as to why intersectional discrimination may acutely induce stress later in the life course include losing the ability to generate income or exert power, in conjunction with an increased comorbidity burden and being classified as frail (33). Compared to discrimination ascribed to a single attribute, discrimination due to multiple aspects of identity may deprive individuals of more socioeconomic and psychological resources to engage in hypertension-preventing behaviors (15). Moreover, the association between discrimination and blood pressure management may vary by gender due to varying exposure to discrimination, relative societal standing over the life course, as well as coping mechanisms(17–19).

The current study extends examination of the link between discrimination and hypertension risk by evaluating the association of intersectional discrimination and blood pressure control in a diverse population of older adults. We assessed experiences of discrimination using three measures: the mean frequency of discrimination occurring in one’s daily life, the number of reasons for everyday discrimination, and the amount of systemic discrimination that occurs over an entire lifespan. As discrimination may influence access to and use of medication, we also evaluated the association of discrimination and antihypertensive medication use among participants with reported hypertension diagnoses. We evaluated whether the magnitude of these associations differs by gender, hypothesizing that the difference in how men and women experience as well as respond to unequal treatment informs blood pressure control.

METHODS

Study Sample

The Health and Retirement Study (HRS) is an ongoing cohort of initially non-institutionalized adults, as well as their spouses of any age. Investigators on the HRS collect comprehensive information on the transitions from middle age to older adulthood(20). The four-stage sampling of the contiguous 48 United States is nationally representative, with oversamples of Black and Hispanic populations as well as Floridians. The University of Michigan Institutional Review Board approved the study protocol. This paper, based on analyses of de-identified data, required no further ethical approval. Figure 1 details criteria for inclusion in the current analytic sample.

In 2008, approximately half of the entire HRS sample participated in a face-to-face interview conducted in their home and provided information about their socioeconomic status (e.g., income) and health conditions (e.g., hypertension), along with biomarker and physical functioning (e.g., sphygmomanometer readings) measures. Meanwhile, the other half of the study sample completed telephone interviews and had their face-to-face interview in 2010. After the face-to-face interview, participants were given a “Left Behind Questionnaire” about psychosocial (e.g., discrimination) and lifestyle (e.g., physical activity) factors to self-complete and return by mail(21). Accordingly, in the current analyses, an indicator for belonging to the half of the study sample completing the baseline wave for 2008 versus 2010 was included to account for potential period trends. As the discrimination measures were updated in 2008, all analyses were conducted on the 2008, 2010, 2012, and 2014 waves of the HRS to ensure consistency of exposure assessment and provide four years of follow-up for each participant. The current analytic sample was restricted to the pooled 2008 and 2010 waves (time one) and pooled

2012 and 2014 waves (time two) of the Health and Retirement Study who were at least 51 years of age at study baseline, did not use a proxy during their baseline wave, and had completed at least one of the everyday and lifetime discrimination subscales on the Left Behind Questionnaire (N=14582, Figure 1).

Measures

Mean frequency of everyday discrimination

The six questions from the frequency of everyday discrimination scale concerned unfair treatment within the past twelve months, following the prompt: “In your day-to-day life, how often have any of the following things happened to you?” Items determined whether participants 1) were treated with less respect 2) received poorer customer service, 3) were treated as unintelligent 4) evoked others acting as if fearful of them 5) threats or harassment 6) received disproportionately poor healthcare treatment. The possible answer choices, a Likert scale ranging from “Never” to “Almost Every Day”, were reverse-coded and averaged for the current analyses. The frequency of everyday discrimination has a Cronbach’s alpha of 0.80 for the 2008 HRS wave and 0.82 for the 2010 HRS wave(21), indicating high reliability of this measure among this study sample.

Intersectional everyday discrimination

In a subsequent question, participants could ascribe the experiences of everyday discrimination to any combination of the following reasons: ancestry or national origin, gender, race, age, religion, weight, physical disability, aspect of physical appearance, sexual orientation, financial status, or other. Intersectional everyday discrimination was operationalized into three categories: ascribing everyday discrimination to at least two reasons, one reason, or no everyday discrimination.

Sum of lifetime discrimination

The questionnaire also contained seven dichotomous questions about lifetime discrimination, after specifying, “For each of the following events, please indicate whether the event occurred at any point in your life”. In the current analyses, lifetime discrimination was the summed affirmatives to questions about unfairly 1) being prevented from moving to a neighborhood, 2) not being hired, 3) not being promoted, 4) losing employment 5) receiving adequate treatment in healthcare settings 6) denied a bank loan, and 7) encountering harassment or abuse from the police. Possible scores on this scale ranged from “no lifetime discrimination” (0) to “experienced all seven domains of lifetime discrimination” (7). The lifetime discrimination subscale has moderate reliability in this study sample (Cronbach’s $\alpha=0.71$)(22) Per HRS guidance(21), participants missing more than three items on either the everyday or lifetime discrimination scale were excluded (N=563).

Measured hypertension

Trained interviewers used Omron HEM-780 Intellisense automated sphygmomanometers with ComFit cuffs to take systolic and diastolic readings from participants seated with both feet on the floor(23). Three sets of readings, taken between 45 and 60 seconds apart from a participant's supported left arm with the palm facing upwards, were averaged for the current analyses. Blood pressure readings below 40 mmHg (102 readings at time one and 40 readings at time two) were recoded as missing due to probable measurement error. Measured hypertension was defined based on mean sphygmomanometer readings, and classified according to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) criteria(24), the guideline during the period of the study: at least 140 mmHg for systolic and/or at least 90 mmHg for diastolic blood pressure. The use of JNC 7 as outcome accounts for the period trend of blood pressure control awareness and practices known to healthcare providers and study participants between 2008 and 2014.

Reported antihypertensive medication use

Only the participants who responded in the affirmative to the question, "Has a doctor ever told you that you have high blood pressure or hypertension?" (N=9086) were asked a subsequent question about taking antihypertensive medication: "In order to lower your blood pressure, are you now taking any medication?" An indicator variable of antihypertensive medication use among reported hypertensive HRS participants was derived from an affirmative to this question. People without reported hypertension were excluded from the medication analyses.

Confounders

Selection and categorization of baseline confounding variables were considered based on prior evidence. Age, sex, race/ethnicity, and U.S. nativity were assessed by self-report. Racial and ethnic designation categories were non-Hispanic White, non-Hispanic Black, and Hispanic/Latino ethnicity inclusive; less than 2% of the sample, who did not belong to those identities were recoded as missing. Highest educational attainment for study participant, mother, and father was categorized as less than high school, high school degree/General Education Diploma (GED), two year college degree, at least a four year college degree(25); the systematic missingness in parental education was addressed with a distinct category. Marital status was classified as married/partnered, divorced/separated, widowed, never married/partnered, and unknown(26). Household net income was classified as none, unknown, equaling to twice above the 2000 Current Population Survey (CPS) poverty threshold, more than twice to four times above the CPS poverty threshold, and more than four times above the CPS poverty threshold(27). Housing status categories included home ownership, renting or living rent free with family, or unknown. Insurance type was categorized as private (i.e., employer-based or individually purchased) non-private only (i.e., Medicare, Medicaid, Civilian Health and Medical Program Uniformed Service, and Department of Veterans Affairs), or unknown(28). Self-rated health was determined by a five-point Likert scale, with possible answers from “excellent” to “poor”(29).

Statistical Analyses

We conducted analyses in 2020 using Stata version 15.1. All estimates were weighted by the probability of being eligible for completing the Left Behind Questionnaire to account for the complex sampling methodology of the HRS. We first described baseline characteristics of the study population, across categories of number of reasons for everyday discrimination (none versus one versus at least two) and tested for differences using the Wilcoxon rank-sum test for continuous variables and Pearson chi-squared test for categorical variables. We reported the weighted medians and weighted interquartile ranges of continuous variables, along with the weighted percentages and unweighted counts of categorical variables. The 882 participants who did not ascribe their everyday discrimination to any reason were combined with the no everyday discrimination category. People reporting either never experiencing everyday discrimination or no reasons for everyday discrimination were compared to those reporting one as well as those reporting at least two of these reasons.

To minimize selection bias due to substantial incomplete covariate and outcome data, we implemented multiple imputation by chained equations (MICE) in sensitivity analyses(30). Complete data predictively provided values to variables with continuous, binary, and ordinal distributions, conditional on all other variables in the chained equation. Results across 35 imputed datasets were pooled, with standard errors adjusting for intra- and inter- variability using Rubin's rule(31). We made the following specifications to the imputation chains:

1) variables that had no missingness: age, baseline wave, highest educational attainment of father, as well as the discrimination measure (e.g., mean everyday frequency, everyday attribution, and lifetime sum); 2) variables that had missingness (percentage noted parenthetically): racial/ethnic designation (3%), highest educational attainment of participant

(<1%), US nativity (<1%), marital status (<1%), household net income relative to 2000 poverty line (1%), insurance type (<1%), and self-rated health (<1%), systolic blood pressure at time 1 (15%), systolic blood pressure at time 2 (35%), diastolic blood pressure at time 1 (15%), and diastolic blood pressure at time 2 (35%) ; and 3) interaction terms between the discrimination measures and sex. Hypertensive status was passively generated from the imputed blood pressure readings. Separate models with the same specifications were used for medication use among reported hypertensives at time 1 (<1%) and time 2 (14%). We compared the imputed and unimputed estimates as qualitative evaluations of accurate MICE specification as well as non-systematic data missingness(32).

The everyday, everyday attribution, and lifetime measures of perceived discrimination were evaluated individually as predictors in three sets of models. The associations of perceived discrimination and hypertensive outcomes were first estimated without adjustment for confounding variables. To obtain adjusted estimates in a research area without conclusive guidelines for confounder selection, the models of each hypertensive outcome were then fitted using a backward stepwise process, based on a p-value of 0.20 for retention. The following variables were commonly retained across hypertensive outcomes: 2008 baseline wave, age in years, sex (used here as the only available proxy for gender), racial/ethnic designation (Non-Hispanic White, Non-Hispanic Black, Hispanic/Latino), study participant highest educational attainment (less than high school, high school degree/GED, two year college degree, four year college degree), US nativity, marital status (married/partnered, divorced/separated, widowed, never married/partnered, unknown), highest educational attainment of father (less than high school, high school degree/GED, two year college degree, four year college degree, unknown),

household net income relative to 2000 poverty line (no income, unknown, at to twice above, more than twice to four times above, more than four times above), insurance type (private, only federal/public, neither), self-rated health (excellent, very good, good, fair, poor).

We used generalized estimating equations to evaluate the time-averaged associations between the three discrimination measures and antihypertensive use among reported hypertensives, (N=9086), specifying a binomial distribution, a logistic link function, and an independent correlation structure. We evaluated the longitudinal changes in measured hypertension, specifying an independent covariance structure and robust standard errors in the logistic mixed models. Depending on the participant baseline wave, the four-year changes in hypertensive outcomes were either between 2008 and 2012 or 2010 and 2014. We added an interaction term for sex to all models to evaluate effect modification. When the sex differences were significant, we presented stratified estimates with corresponding 95% confidence intervals, as well as the p-value for the 3-way interaction term (discrimination measure x sex x time).

RESULTS

Sixty-one percent of the HRS study sample reported experiencing everyday discrimination. Of those participants, 25% ascribed these experiences to one reason and another 25% to at least two reasons. Thirty-three percent of participants had experienced discrimination in any of the seven domains specified in the lifetime discrimination scale. We presented the baseline characteristics of the combined 2008 and 2010 study waves in Table 1. Compared to those reporting no everyday discrimination, participants reporting one or more reasons for everyday discrimination

within the past 12 months of assessment were more likely be younger. Participants reporting one reason for everyday discrimination were more likely to be men, non-Hispanic White, born in the United States, or currently married than participants reporting no everyday discrimination as well as at least two reasons for everyday discrimination. Participants experiencing at least two reasons for everyday discrimination were less likely than participants experiencing no everyday discrimination to have measured or reported hypertension and, if hypertensive, were less likely to report antihypertensive use.

There was no association between the frequency of everyday discrimination and change in measured hypertension over four years among men or women. (Table 2). However, men whose everyday discrimination was ascribed to at least two reasons had 1.44-fold odds of measured hypertension over four years (95% CI: 1.03, 2.01), compared with men reporting no everyday discrimination. The results were significantly different in women, among whom there was no association between the number of reasons for everyday discrimination and hypertension ((OR: 0.91, 95% CI: 0.70, 1.20), p-value for attribution x time x sex interaction: 0.04). We observed a significantly larger association between lifetime discrimination and measured hypertension over four years of follow-up in men (OR: 1.21 (95% CI: 1.08, 1.36)). This association was not present among women ((OR: 0.98 (95% CI: 0.86, 1.13), p-value for lifetime discrimination x time x sex interaction =0.03).

There were consistent inverse associations between discrimination measures and time-averaged antihypertensive use among those participants diagnosed with hypertension (Tables 3). For example, among persons with hypertension, each point of increased frequency of everyday

discrimination was associated with a 0.85 (95% CI: 0.77, 0.94) OR of antihypertensive use.

Participants reporting at least two reasons for everyday discrimination had a lower likelihood of antihypertensive use than those reporting never experiencing everyday discrimination (OR: 0.82 (95% CI: 0.69, 0.98)). There were no differences in the association of discrimination and antihypertensive use by sex.

The imputed estimates in Supplemental Tables 1 and 2 generally followed the same trends as the unimputed estimates, though the imputed effect sizes were modestly attenuated compared to the original results (e.g., OR: 1.35 (95% CI: 0.97, 1.86) for measured hypertension over four years among men ascribing everyday discrimination to at least two reasons versus no everyday discrimination).

DISCUSSION

Main results

Among men in our study, everyday discrimination due to at least two reasons as well as a higher amount of discrimination experienced over the lifetime were associated with more detrimental hypertensive trajectories over four years. We did not, however, observe similar associations among women. Additionally, hypertensive participants of both sexes who experienced frequent everyday discrimination, everyday discrimination ascribed to at least two reasons, and more experiences of discrimination over the lifetime were less likely to report taking medication to manage their condition. Our study is among the first to report a detrimental association between discrimination ascribed to multiple reasons and hypertension outcomes. Moreover, we included

longitudinal data and mixed models that allow us to evaluate both the development and resolution of hypertension associated with perceived discrimination.

Comparison with other studies

Our study included a diverse sample of older adults; variance in intersectional discriminatory experience may be limited in work that includes all-minority study samples. For example, a recent analysis among the African American Jackson Heart Study cohort found no significant interactions between everyday or lifetime discrimination and specific reasons (e.g., race, age) on the 13-year incidence of hypertension(11). Other studies have used two-way and three-way interactions between specific sociodemographic variables and discrimination measures to assess intersectionality among multiethnic cohorts. In an analysis conducted with CARDIA data, though a higher proportion of Black women and Black men reported more discrimination than their White counterparts, the magnitude of discriminatory experiences on worse cardiovascular health was higher among White than Black participants(18).

American male workers at least 50 years in age have reported a decline in age discrimination between 1990 and 2017 (33). However, after spending more of their working years in dominant professional or social positions, men may experience a relatively sharper decline in societal position. While experiences of discrimination may act as an acute stressor, women may on average spend more time to pursuing meaningful coping strategies such as developing interpersonal relationships (34). Compared to women, men may perceive forms of unequal treatment such as classism, ageism, and ableism both later in life as well and more acutely due to

declining health as well as a loss of financial resources after retirement from positions at the top of the social hierarchy. Marginalized groups with less legal protection from bias such as low SES older adult men may be more exposed to and less protected from discriminatory treatment. This social disadvantage may increase negative health behaviors to adhere to traditional gender roles or high effort striving to overcoming socioeconomic marginalization(35).

Our findings demonstrate that experiences of discrimination are inversely associated with antihypertensive medication adherence. The authors of a 2017 review identified lower socioeconomic status and provider-patient miscommunications as reasons that Black patients follow their antihypertensive medication regimens less consistently than Whites (36). Among 806 patients of a northeastern healthcare system, Black race was no longer statistically significant with the odds of uncontrolled blood pressure in models adjusted for healthcare discrimination, medication adherence, and socioeconomic status(37). However, other studies have demonstrated that blood pressure disparities persist when Black and White participants report equal awareness, treatment initiation, and antihypertensive adherence(38,39). As experiences of discrimination include inadequate care from health providers, our work refines the work on disparities in antihypertensive adherence beyond racial differences. Mistrust in the medical community may inhibit blood pressure control among marginalized people.

Strengths and Limitations

By conducting a longitudinal analysis, we were able to establish temporality between discriminatory experiences and hypertensive trajectories. This research adds to the literature on

discrimination and hypertension by examining the burden of discrimination as well as the perceived attribution. Additionally, our sensitivity analyses illustrate the application of multiple imputation by chained equations, in order to address the selection bias inherent to limiting analyses to study participants with complete data.

However, the limitations in our study should be considered when interpreting the results. The RAND Corporation contributed model-based imputations for missing income and asset data. Our supplemental MICE estimates should be considered in light of inadequate existing guidance regarding imputing upon imputed data. The HRS discrimination measures used for the exposure were updated in 2008, motivating our use of the combined 2008 and 2010 halves of the sample as our baseline wave. HRS integrated the biomarker and psychosocial measures beginning in 2006, randomly splitting the sample and completing the face-to-face interview for one half of the sample in 2006 and the other half in 2008; the 2006 and 2008 waves are usually pooled. We included baseline wave in our model to account for potential differences between the two waves. Antihypertensive use came from participant self-report, which may systematically fail to capture participants with low health literacy. The wording of the reason for the everyday discrimination items, from which we derived the ordinal number of reasons for everyday discrimination measure, does not specify whether the specific forms of discrimination, such as racism or classism, have the same exposure time frame. This sample attributed their everyday discrimination to more than 300 combinations of reasons, meaning we lacked power in conducting stratified analyses that could assess the differential impact of individual or combined forms of unequal treatment that are experienced earlier (e.g., sexism) or later (e.g., ageism) in the life course. Our current analytic sample, though comparatively diverse, was more than three-

quarters Non-Hispanic White. As minority participants, particularly men, are harder than non-Hispanic Whites to recruit and retain in population-health research due to historical and contemporaneous mistreatment by the medical community(40,41), our results may not be generalizable to people experiencing the most discrimination.

Conclusion

Epidemiological studies have commonly used racial/ethnic designation to determine hypertensive risk. This study builds upon previous work on disparities in blood pressure control by evaluating the independent associations of discrimination and hypertensive outcomes among a multi-ethnic cohort, as well as assessing sex differences. Future research should factor in the co-occurring reasons for unfair treatment, such as age, national origin, and physical appearance, that compound adverse blood pressure outcomes among older adults. By parsing whether various forms of discrimination operate simultaneously and inseparably, as combinations or permutations of unequal treatment, researchers can more accurately assess the influence of intersectional discrimination on health outcomes. A better understanding of the role of discrimination on hypertension can inform interventions aimed at ameliorating hypertension disparities.

CONFLICT OF INTEREST

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AUTHOR CONTRIBUTIONS

K.D.S developed the research question and ran all analyses. All authors contributed to data interpretation and manuscript revision. The final version of the manuscript was reviewed and approved by all authors.

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Figure 1. Study Inclusion Criteria

Table 1. Baseline sociodemographic characteristics of Health and Retirement Study participants, aged 51-101 years, by reasons for everyday discrimination, 2008-2010 (N=14429)

Table 2. Longitudinal Associations of Perceived Discrimination and Four-Year Changes in Measured Hypertension, Health and Retirement Study, 2008-2014

Table 3. Associations of Perceived Discrimination and Time-Averaged Odds of Antihypertensive Use among Hypertensives, Health and Retirement Study, 2008-2014

Supplemental Table 1. Imputed Longitudinal Associations of Perceived Discrimination and Four-Year Changes in Measured Hypertension, Health and Retirement Study, 2008-2014

Supplemental Table 2. Imputed Associations of Perceived Discrimination and Wave-Averaged Odds of Antihypertensive Use among Hypertensives, Health and Retirement Study, 2008-2014

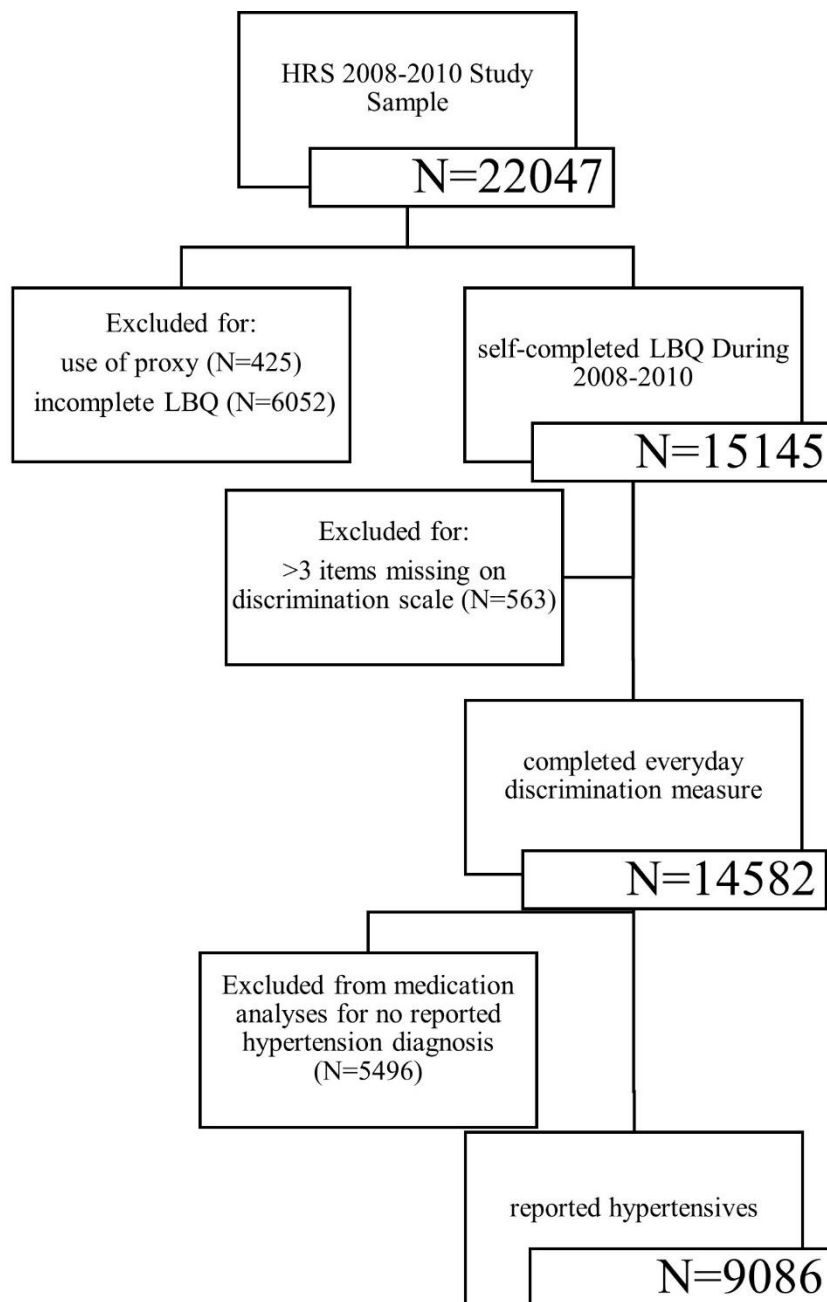


Table 1. Baseline sociodemographic characteristics of Health and Retirement Study participants, aged 51-101 years, by reasons for everyday discrimination, 2008-2010 (N=14429)

<i>Characteristic</i>	None (N=7179)	One (N=3576)	At least Two (N=3674)	<i>p-value¹</i>
Age, Years (IQR)	66 (60, 76)	62 (57, 71)	61 (57, 69)	<0.001
Sex, Male N (%)	2918 (44)	1601 (48)	1463 (45)	0.002
<i>Racial/Ethnic Designation</i>				
Non-Hispanic White N (%)	5549 (84)	2814 (85)	2353 (74)	
Non-Hispanic Black N (%)	816 (8)	411 (8)	816 (16)	<0.001
Hispanic/Latino N (%)	662 (8)	281 (7)	371 (10)	
US Nativity N (%)	6397 (90)	3286 (93)	3340 (91)	<0.001
<i>Marital/Partnership Status</i>				
Married/Partnered N (%)	4486 (64)	2312 (65)	2009 (55)	
Divorced/Separated N (%)	855 (13)	512 (16)	738 (22)	<0.001
Widowed N (%)	1619 (19)	619 (14)	717 (16)	
Never Married/Partnered N (%)	213 (4)	133 (5)	207 (7)	
<i>Housing Status</i>				
Owns Home N (%)	4142 (58)	2054 (57)	1910 (52)	
Rents or Lives With Family N (%)	1049 (14)	505 (14)	793 (21)	<0.001
Other N (%)	1988 (28)	1017 (29)	971 (27)	
<i>Highest Educational Attainment</i>				
Less than High School N (%)	1444 (17)	520 (12)	693 (16)	
High School Degree/GED N (%)	3871 (53)	1950 (54)	1995 (54)	<0.001
Two-Year College Degree N (%)	313 (5)	182 (6)	208 (6)	
At Least Four-Year College Degree N (%)	1536 (25)	910 (28)	771 (24)	
<i>Income: Poverty Categorization</i>				
No Income N (%)	30 (<1)	20 (<1)	35 (1)	
>0 to 2 N (%)	1754 (22)	808 (21)	1115 (28)	<0.001
2 to 4 N (%)	2335 (30)	1075 (28)	1141 (31)	
>4 N (%)	2998 (47)	1634 (50)	1353 (40)	
<i>Insurance Type</i>				
Private N (%)	4205 (63)	2238 (68)	2076 (61)	

Only Federal/Public N (%)	2612 (31)	1117 (25)	1280 (30)	<0.001
Neither Public or Private N (%)	327 (6)	207 (7)	301 (9)	
<i>Paternal Educational Attainment</i>				
Less than High School N (%)	3848 (49)	1709 (43)	1822 (45)	
High School Degree/GED N (%)	1463 (22)	841 (27)	779 (24)	<0.001
Two-Year College Degree N (%)	370 (6)	210 (6)	173 (5)	
At Least Four-Year College Degree N (%)	502 (9)	329 (11)	260 (9)	
Unknown N (%)	996 (14)	487 (13)	640 (17)	
<i>Maternal Educational Attainment</i>				
Less than High School N (%)	3731 (46)	1640 (40)	1815 (44)	
High School Degree/GED N (%)	1979 (32)	1157 (36)	1030 (32)	<0.001
Two-Year College Degree N (%)	417 (6)	282 (8)	256 (8)	
At Least Four-Year College Degree N (%)	375 (7)	226 (8)	218 (7)	
Unknown N (%)	677 (9)	271 (8)	355 (9)	
<i>Self-Rated Health</i>				
Excellent N (%)	780 (12)	339 (11)	213 (7)	
Very Good N (%)	2386 (35)	1176 (34)	911 (25)	
Good N (%)	2224 (29)	1195 (32)	1209 (32)	<0.001
Fair N (%)	1293 (17)	649 (16)	921 (25)	
Poor N (%)	495 (7)	217 (7)	417 (11)	
Antihypertensive Medication N (%)	4230 (90)	1914 (87)	2131 (87)	<0.001
SBP, mg/L (IQR)	130(118, 144)	127(116, 141)	128(116, 141)	<0.001
DBP, mg/L (IQR)	79 (72, 87)	80 (72, 87)	80 (73, 87)	0.60
Baseline Measured Hypertension N (%)	2218 (35)	973 (31)	1033 (32)	0.002
Baseline Reported Hypertension N (%)	4540 (59)	2097 (54)	2372 (62)	<0.001

¹p-value (Pearson chi-squared test for categorical variables, Wilcoxon rank sum test for continuous variables) for difference between reasons for everyday discrimination categories

Household net income classifications are relative to the poverty line as determined by the 2000 Current Population Survey. Reported private insurance indicates employer-based or individually purchased, while Federal/Public indicates Medicare, Medicaid, Civilian Health and Medical Program Uniformed Service, and Department of Veterans Affairs. Antihypertensive use is only among participants self-reporting having been diagnosed with hypertension by a doctor.

IQR, Interquartile Range; GED, General Education Diploma; SBP, systolic blood pressure; DBP, diastolic blood pressure

Table 2. Longitudinal Associations of Perceived Discrimination and Four-Year Changes in Measured Hypertension, Health and Retirement Study, 2008-2014

Discrimination Subscale	Unadjusted			Adjusted ²		
	Men OR (95% CI)	Women OR (95% CI)	p-value ³	Men OR (95% CI)	Women OR (95% CI)	p-value ³
Increased Frequency of Everyday Discrimination (1-6) (N=12050)	1.06 (0.88, 1.28)	0.93 (0.78, 1.11)	0.29	1.06 (0.88, 1.28)	0.93 (0.78, 1.11)	0.32
Reasons for Everyday Discrimination (N=11924)				Ref		
0				0.88 (0.64, 1.21)	0.87 (0.66, 1.17)	0.99
1	0.89 (0.65, 1.22)	0.88 (0.66, 1.17)	0.97			
≥2	1.42 (1.02, 1.97)	0.92 (0.71, 1.21)	0.05	1.44 (1.03, 2.01)	0.91 (0.70, 1.20)	0.04
Higher Sum of Lifetime Discrimination (0-7) (N=11962)	1.21 (1.08, 1.36)	1.00 (0.87, 1.15)	0.04	1.21 (1.08, 1.36)	0.98 (0.86, 1.13)	0.03

¹adjusted for 2008 baseline wave, age in years, sex, racial/ethnic designation (Non-Hispanic White, Non-Hispanic Black, Hispanic/Latino), and highest educational attainment (less than high school, high school degree/GED, two year college degree, four year college degree), US nativity, marital status (married/partnered, divorced/separated, widowed, never married/partnered, unknown), highest educational attainment of father (less than high school, high school degree/GED, two year college degree, four year college degree, unknown), household net income relative to 2000 poverty line (no income, unknown, at to twice above, more than twice to four times above, more than four times above), insurance type (private, only federal/public, neither), self-rated health (excellent, very good, good, fair, poor); weighted by probability of being eligible for Left Behind Questionnaire

²p-value for discrimination scale x sex x time interaction term

Table 3. Associations of Perceived Discrimination and Time-Averaged Odds of Antihypertensive Use among Hypertensives, Health and Retirement Study, 2008-2014

Discrimination Subscale	Unadjusted		Adjusted ¹	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Increased Frequency of Everyday Discrimination (1-6) (N=8587 ³)	0.79 (0.72, 0.86)	<0.001	0.85 (0.77, 0.94)	0.002
Reasons for Everyday Discrimination (N=8510 ³)	0		Ref	
1	0.79 (0.65, 0.94)	0.14	0.87 (0.73, 1.05)	0.16
≥2	0.72 (0.61, 0.86)	<0.001	0.82 (0.69, 0.98)	0.03
Higher Sum of Lifetime Discrimination (0-7) (N=8499 ³)	0.86 (0.80, 0.91)	<0.001	0.91 (0.84, 0.98)	0.01

¹adjusted for 2008 baseline wave, age in years, sex, racial/ethnic designation (Non-Hispanic White, Non-Hispanic Black, Hispanic/Latino), and highest educational attainment (less than high school, high school degree/GED, two-year college degree, four-year college degree), US nativity, marital status (married/partnered, divorced/separated, widowed, never married/partnered, unknown), highest educational attainment of father (less than high school, high school degree/GED, two year college degree, four year college degree, unknown), household net income relative to 2000 poverty line (no income, unknown, at to twice above, more than twice to four times above, more than four times above), insurance type (private, non-private, unknown), self-rated health (excellent, very good, good, fair, poor); weighted by probability of being eligible for Left Behind Questionnaire

²analyses restricted to those with reported hypertension