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ORIGINAL ARTICLE

Association Between Discrimination in Health Care and ASCVD Among Middle-Aged and Older Adults in the United States

Michael D. Green, PhD; Emily C. O'Brien, PhD; Ann Marie Navar, MD, PhD; M. Alan Brookhart, PhD; Roland J. Thorpe Jr, PhD; Matthew E. Dupre, PhD

BACKGROUND: Discrimination in health care can influence patient behavior and potentially lead to poor quality care. When patients perceive discrimination, they may disengage from health care, have heightened stress, and identify biased treatment practices. Atherosclerotic cardiovascular disease (ASCVD) is a condition that requires adequate disease prevention. Our objective is to assess the association between discrimination in health care and ASCVD risk.

METHODS: We examined data from adults aged 50 to 90 years enrolled in the 2008 to 2020 waves of the Health and Retirement Study who were followed for up to 12 years. Participants reported how frequently they perceived receiving poorer treatment than other people from doctors or hospitals; we characterized this as discrimination. Nonfatal ASCVD events were ascertained from dates of a doctor-diagnosed myocardial infarction or stroke during follow-up. Cox models were used to estimate hazards of ASCVD outcomes with experiencing discrimination using propensity score weights to adjust for confounding. Models included covariate adjustment, and differences by sex, race, and ethnicity were examined.

RESULTS: Of the 17 632 study participants (mean age: 65.86, 41.97% male), 3347 (18.9%) reported discrimination in health care at baseline, and 1785 (10.1%) had an ASCVD event over 10 years of follow-up. Among those who did not have an event, 2983 (18.82%) reported discrimination, and among those who had an event, 364 (20.39%) reported discrimination. Discrimination was associated with higher risks of nonfatal ASCVD within the first 2-years of follow-up (hazard ratio [HR], 1.54 [95% CI, 1.24–1.91) and was partially attenuated after 5 years (HR, 1.29 [CI, 1.11–1.50]) and 10 years (HR, 1.27 [CI, 1.10–1.46]). The associations remained largely unchanged after covariate adjustments (2-year HR, 1.44 [CI, 1.16–1.80]; 5-year HR, 1.24 [CI, 1.06–1.44]; 10-year HR, 1.23 [CI, 1.10–1.46]).

CONCLUSIONS: Discrimination in health care was associated with increased risks of nonfatal ASCVD in middle-aged and older adults. The risks persisted over time and suggest that discrimination is an important factor to consider for the prevention of ASCVD.

Key Words: cardiovascular diseases ■ ethnicity ■ hospitals ■ myocardial infarction ■ propensity score

When patients experience discrimination in health care, the quality of their care,[1–4] and overall healthcare outcomes can suffer.[5,6] Discrimination occurs when individuals perceive that they are being treated unfairly—often due to common sociodemographic factors such as race, ethnicity, age, gender, and more.[7] If discrimination is faced in healthcare settings, these experiences may discourage patients from engaging with the healthcare system or following medical guidance, and may also reflect underlying clinical biases that result in inadequate or delayed care for those with greater health needs.[8,9] These patterns point to the importance of examining whether perceived discrimination in health care is associated with differences in health outcomes.

Correspondence to: Michael D. Green, PhD, Department of Population Health Sciences, Duke University School of Medicine, 215 Morris St, Durham, NC. Email michael.d.green@duke.edu

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WHAT IS KNOWN

- Numerous social determinants of health are identified as factors upstream of care that can affect disease prevention.
- Discrimination reported outside of health care settings is associated with poor cardiovascular health and outcomes

WHAT THE STUDY ADDS

- Identifies self-reported discrimination in health care as a potential contributor to cardiovascular disease risk for middle-aged and older adults.
- Justification for addressing social determinants of health that are specifically attributed to clinical settings.

Nonstandard Abbreviations and Acronyms

ASCVD	atherosclerotic cardiovascular disease
HR	hazard ratio
HRS	Health and Retirement Study
MI	myocardial infarction

Even when care meets clinical guidelines, perceived discrimination may influence patient behavior in ways that impact health.

Cardiovascular disease remains a leading cause of death for older adults in the United States,[10] and adverse events like myocardial infarction (MI) and stroke increasingly present a burden on the clinical system as adults age.[11–13] However, the role of nonclinical patient-reported factors like discrimination experienced in health care on adverse cardiovascular events is not well understood. Prior studies have found that discrimination in health care is associated with delays in seeking care in patients with cardiovascular risk factors like diabetes and hypertension.[14,15] This presents a serious challenge in cardiovascular disease prevention as discrimination may impact both the long-term development and management of major risk factors.[16–18] Since discrimination in health care is a concern for cardiovascular disease prevention efforts, it is crucial to investigate downstream cardiovascular disease events, such as nonfatal atherosclerotic cardiovascular disease (ASCVD), like MI and stroke.

Studies have shown that discrimination, particularly racial discrimination, is associated with increased cardiovascular risk and adverse outcomes.[19,20] Much of this work relies on general measures such as the Everyday Discrimination Scale, but identifying where discrimination occurs and which type is experienced is more complex and ultimately more actionable. eg, a systematic review identified that many of the studies evaluating the association between general discrimination and cardiovascular health are cross-sectional and focus on intermediate biomarkers such as blood pressure and lipids.[17] Other work shows that overlapping forms of discrimination, such as self-reported weight and racial discrimination, are also associated with cardiovascular disease.[21] Collectively, these studies highlight the need to investigate specific sources of discrimination and their association with cardiovascular events. In particular, discrimination within healthcare settings may be a uniquely actionable risk factor. Unlike discrimination occurring in broader society, it identifies a specific intervention target, within the healthcare system itself, where interventions can be implemented and directly evaluated.

In this study, we assessed longitudinally whether perceived discrimination in healthcare settings is an independent risk factor for nonfatal ASCVD among US middle-aged and older adults. We assessed the association prospectively at 2 years, 5 years, and 10 years to examine the potential short- and long-term risks following reported discrimination in a healthcare setting.

METHODS

Sample

Our analysis used data from the HRS (Health and Retirement Study), the largest ongoing longitudinal study of US adults over age 50. The HRS is supported by the National Institute on Aging (grant number National Institute on Aging U01AG009740) and is led by the University of Michigan.[22] The HRS has accumulated over 3 decades of data on >40 000 adults since 1992. Comprehensive details on its methodology and response rates are provided elsewhere.[23] Starting in 2006, the HRS selected a random half-sample of respondents to collect detailed psychosocial data every 4 years.[24] Subsequent data were collected in the 2008 random half-sample and continued through 2020, providing quadrennial follow-up data for all participants.

The current study included respondents aged 50 years and older who participated in the HRS Psychosocial and Lifestyle Questionnaire administered from 2008 to 2020. We included all participants aged 50 to 90 years who answered the question on experiencing discrimination in healthcare settings and had follow-up data (n=19 839). We excluded individuals who did not report a doctor visit or hospitalization at baseline (n=1835) to ensure that participants had recent healthcare interactions. Individuals with an unknown date of an ASCVD event (n=2) were also excluded. Lastly, we excluded those who had missing covariate information (n=370), for a final sample of 17 632 adults.

Data Availability

Data are publicly available and can be accessed at https://hrs.isr.umich.edu/.

Human Subjects Research Approval

All HRS participants provided informed consent. Our study was approved by the Duke University Health System under IRB no. Pro00118479.

Nonfatal ASCVD Outcome

Incidence of MI or stroke was constructed as a composite outcome for our analysis. This measure is consistent with the nonfatal ASCVD outcomes included in the American College of Cardiology/American Heart Association tools used for clinical risk assessment.[25] HRS study participants were asked whether they had "a heart attack or myocardial infarction" and (separately) "has a doctor ever told you that you have had a stroke?" at each biannual core and exit interview. Participants who reported an event were asked in what year and month it occurred. For participants who reported the year of the event, but not the month (n=320), we assigned their month (6 or June) to retain all reported events occurring among study subjects.

Discrimination in Health Care

Our primary exposure was self-reported perceived discrimination in a health care setting. The measure was obtained at baseline from the Everyday Discrimination Scale,[26] which consists of 6 items designed to measure the frequency of discrimination experienced in various daily contexts, including interactions in retail environments, restaurants, and wider social contexts. In 2008, an item was added to the Everyday Discrimination Scale to capture discrimination experienced in health care settings. The item asks, "In your day-to-day life, how often have any of the following things happened to you …You receive poorer service or treatment than other people from doctors or hospitals." Following prior research, we dichotomized the responses as 0 for never experiencing discrimination and 1 for any experienced discrimination (less than once a year, a few times a year, a few times a month, at least once a week, almost every day).[27] Only ≈13% of participants had a different response than their baseline survey across the 10 years of follow-up. For our primary analysis, we employ discrimination as a time-invariant factor and consider the first time a participant answered this question as the start of follow-up for our analysis.

Covariates

We included sociodemographic and clinical characteristics of participants at baseline to account for factors that have previously been associated with reporting discrimination in health care,[28,29], and experiencing a nonfatal ASCVD event. Sociodemographic factors included age (years), self-reported race and ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic other race), sex (female or male), educational attainment (less than high school, educational development or high school diploma, some college, or college and above), and insurance status (insured or uninsured). Clinical factors included number of doctor visits in the past 2 years (count; winsorized at 50+), body mass index (categorized as underweight, normal weight, overweight, or obese), current smoking status (not current smoker or current smoker), self-reported doctor diagnoses of diabetes (yes or no), high blood pressure (yes or no), and prior ASCVD event ([MI or stroke] yes or no). Participants with prior events were included in the analyses to minimize possible selection bias due to earlier disparities that are well-documented.[30]

Analysis

Participants in our study were followed prospectively from baseline through the 2020 HRS wave. Participants who died during the study period were identified using the National Death Index and the HRS tracking file.[23] Time until death was calculated from the participants' baseline interview date and date of death (mm/yy). Individuals who survived through the end of the follow-up period were treated as censored observations. Analyses also considered events (and corresponding mortality/censoring) at 2, 5, and 10 years of follow-up. We assessed differences in baseline characteristics of participants with and without a nonfatal ASCVD event during the study period using Mann-Whitney *U* test for continuous/ordinal variables and chi-squared tests for binary/categorical variables. Next, we plotted Kaplan-Meier curves to examine the unadjusted impact of discrimination in health care on an incident nonfatal ASCVD event over follow-up. A log-rank test was used to assess the difference in nonfatal ASCVD events between participants who experienced discrimination and those who did not. Cox proportional hazards models were then used to estimate ASCVD outcomes at 2, 5, and 10 years of follow-up. The Cox models were estimated using propensity-score weights (ie, stabilized inverse-probability weights) to account for possible selection bias in experiencing discrimination in health care.[29] The variables used for propensity-score weighting included age, race, ethnicity, sex, educational attainment, doctor visits, insurance status, and body mass index (Table S1).[31] We incorporated relevant variables into the propensity-score weights and covariates of the model to adopt a doubly robust approach to account for their impact.[32,33] This approach involves specifying the model based on both the potential impact of weights and the effect of covariate adjustment. All variables that were included in the propensity score weights were included in the covariate-adjusted model. The standardized mean differences for the covariates before and after adjustment are presented in Figure S1.

We first used inverse-probability weighted Cox models to estimate hazard ratios (HR) and 95% CIs to assess the association between self-reported discrimination in health care and ASCVD events at 2, 5, and 10-years of follow-up. We then included covariates for participants' sociodemographic background and clinical characteristics. Tests from Schoenfield residuals showed that age (for 5 and 10 years of follow-up) and prior ASCVD (for 2 and 10 years of follow-up) violated the proportional hazard assumption; these were subsequently included with a time interaction term in the multivariable models. To assess potential demographic subgroup differences, we conducted a stratified analysis that presented HRs by race, ethnicity, and sex (eg, non-Hispanic White men, non-Hispanic Black women, Hispanic men, etc) after identifying a significant interaction between race and ethnicity and discrimination in health care. We excluded the non-Hispanic other subgroup from stratified analysis because the race and ethnicity of this group are unclear and lack specificity about whom it represents. Next, we performed an analysis based on full participant follow-up and using all time-varying information. Finally, we used Fine and Gray models as a sensitivity analysis to assess the potential competing risk of all-cause mortality. All analyses were performed using Stata SE 19.5.

RESULTS

Characteristics of Participants

The sociodemographic and clinical characteristics of participants in our study are presented in Table 1. In our cohort of 17 632 adults aged 50 years and older,

Table 1. Characteristics of Middle-Aged and Older Adults by Self-Reported Discrimination in Health Care, Health and Retirement Study (2008–2020)

	Overall, n=31 911	No discrimination in health care reported, n=26 224 (82.18%)	Discrimination in health care reported, n=5687 (17.82%)	*P* value
Age	69.15 (10.16)	69.60 (10.16)	67.07 (9.90)	<0.001
Race/ethnicity				<0.001
Non-Hispanic White	22 368 (70.09%)	18 682 (71.24%)	3686 (64.81%)	
Non-Hispanic Black	5466 (17.13%)	4248 (16.20%)	1218 (21.42%)	
Hispanic	3070 (9.62%)	2512 (9.58%)	558 (9.81%)	
Non-Hispanic other	1007 (3.16%)	782 (2.98%)	225 (3.96%)	
Male	12 624 (39.56%)	10 252 (39.09%)	2372 (41.71%)	<0.001
Education				0.001
Less than HS	4637 (14.53%)	3865 (14.74%)	772 (13.57%)	
GED or HS diploma	10 777 (33.77%)	8982 (34.25%)	1795 (31.56%)	
Some college	8245 (25.84%)	6579 (25.09%)	1666 (29.29%)	
College and above	8252 (25.86%)	6798 (25.92%)	1454 (25.57%)	
Uninsured	1494 (4.69%)	1118 (4.27%)	376 (6.62%)	<0.001
Body mass index				<0.001
Underweight	8374 (26.32%)	7086 (27.10%)	1288 (22.72%)	
Healthy Weight	432 (1.36%)	350 (1.34%)	82 (1.45%)	
Overweight	11 608 (36.48%)	9640 (36.86%)	1968 (34.71%)	
Obese	11 406 (35.85%)	9074 (34.70%)	2332 (41.13%)	
Current smoker	3878 (12.16%)	2999 (11.44%)	879 (15.46%)	<0.001
Diabetes	7448 (23.34%)	5956 (22.71%)	1492 (26.24%)	<0.001
Hypertension	19 331 (60.58%)	15 825 (60.35%)	3506 (61.65%)	0.068
Prior stroke or MI	3259 (10.21%)	2602 (9.92%)	657 (11.55%)	<0.001

Counts based on overall observations. Continuous variables are presented as means with standard deviations in parentheses, binary and ordinal variables are presented as counts with percentages in parentheses. GED indicates general educational development; HS, high school; and MI, myocardial infarction.

3347 (18.98%) adults reported discrimination in health care at study baseline. There were 2069 (11.69%) participants who had an ASCVD event before baseline and 1785 (10.12%) participants who had an incident ASCVD event during the 10 years of follow-up. Adults who had an incident event were significantly older, more likely to be men, less educated, had more doctor visits in the prior 2 years, and had more cardiovascular comorbidities at baseline. The characteristics of participants were largely similar among those experiencing ASCVD at 2 years (Table S2) and at 5 years (Table S3). Details on the reported discrimination for the overall sample across all observations are available in Table S4, and for all race, ethnicity, and gender subgroups in Tables S5 through S10.

Association Between Discrimination in Health Care and ASCVD

Figure 1 illustrates the results from the Kaplan-Meier curves of ASCVD events over the follow-up period and shows that participants who reported discrimination in health care had significantly greater risks of ASCVD than participants who did not report discrimination (*P*=0.015). Table 2 presents the results from the inverse-probability weight-weighted Cox models for the unadjusted and adjusted associations between discrimination in health care and nonfatal ASCVD. In the unadjusted models, we found that discrimination was associated with significantly higher risks of ASCVD within the first 2 years of follow-up (HR, 1.54 [95% CI, 1.24–1.91]); these associations were only partially attenuated after 5 years (HR, 1.29 [CI, 1.11–1.50]) and 10 years (HR, 1.27 [CI, 1.10–1.46]) of follow-up. Associations remained largely unchanged after adjusting for covariates (2-year HR, 1.44 [95% CI, 1.16–1.80]; 5-year HR, 1.24 [CI, 1.06–1.44]; 10-year HR, 1.23 [CI, 1.09–1.38]). When excluding individuals at elevated risk due to prior events, the association between discrimination and health care settings and nonfatal ASCVD was nearly identical (Table 3). Allowing all covariates (including discrimination in health care) to vary over the full follow-up period produced results largely consistent with the medium and long-term analyses (Table 4), even after excluding participants at higher risk due to prior ASCVD events

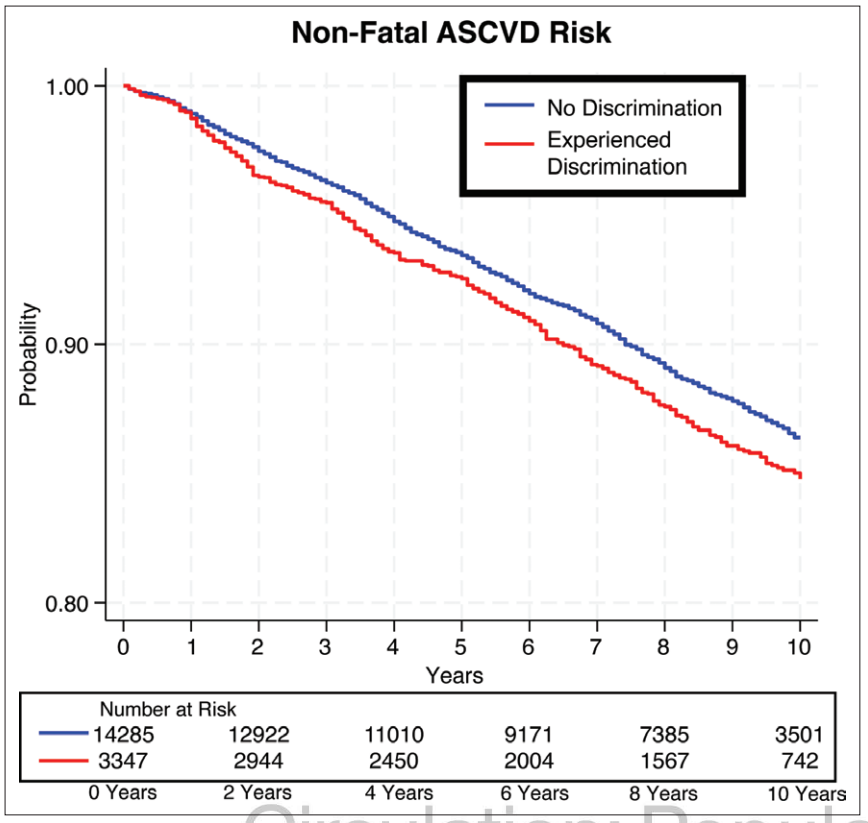

Figure 1. Kaplan-Meier survival curves stratified by reported discrimination in health care settings among Unite States.
Middle-Aged and Older Adults, Health and Retirement Study (2008–2020). Log-rank test *P*=0.015. ASCVD indicates atherosclerotic cardiovascular disease.

(Table S11). Adjusted and unadjusted event rates by discrimination reports are present in Table S12. Additional analyses accounting for the competing risk of death (Table 5) further demonstrated findings that were consistent with our primary models. Finally, when accounting for the competing risk of death and excluding individuals with prior ASCVD, the associations were largely unchanged.

Subgroup Differences

Figure 2 illustrates the HRs for discrimination in the health care setting for the models that excluded covariates and those that included covariates. Across short term (2 years), medium-term (5 years), and long-term (10 years) follow-up the only race, ethnicity, and sex subgroup that consistently had a significant result after covariate adjustment were White men (2-year HR, 1.74 [95% CI, 1.23–2.47]; 5-year HR, 1.32 [95% CI, 1.03–1.70]; 10-year HR, 1.39 [95% CI, 1.14–1.69]), White women also had significant results through short-term follow-up (2-year HR, 1.60 [95% CI, 1.10–2.34]).

DISCUSSION

Our study found that patient-reported discrimination in health care settings is associated with a higher incidence of nonfatal ASCVD over both short-term and long-term follow-up. This builds on prior work demonstrating the consequences of discrimination more broadly to ASCVD risk through stress and other biopsychosocial pathways.[34,35] Prior studies have also identified associations between perceived discrimination in medical settings and specific cardiovascular risk factors such as poor A1c,[36] and elevated CRP (C-reactive protein).[37] Notably, discrimination in health care is often reported as a recurrent experience.[38] Our findings extend this work by showing that patient-reported discrimination in health care is associated with a higher risk for the clinically significant events nonfatal MI and stroke, with potentially serious implications for patients' quality of life.

Although experiences of discrimination in general locations have been shown to adversely affect disease risk,[35,39–42] intervening on discrimination outside of clinical settings often requires multilevel and intersectional solutions.[43,44] In contrast, discrimination within healthcare systems may be more directly modifiable. Importantly, discrimination in health care is not synonymous with racism; individuals of any racial or ethnic background, including Non-Hispanic White patients, may perceive unfair treatment based on factors like older age, a disability, or appearance. Prior research suggests that the nature and interpretation of discriminatory experiences can vary significantly by group. For example, both Black and Asian-Americans report experiencing racism in health care,

Table 2. Multivariable Cox Proportional Hazard Models for the Association Between Self-Reported Discrimination in Health Care and Nonfatal ASCVD in the Health and Retirement Study (n=17 632)

	2-year ASCVD	5-year ASCVD	10-year ASCVD
	HR (95% CI)	HR (95% CI)	HR (95% CI)
Unadjusted			
Discrimination in health care	1.54 (1.24–1.91)	1.29 (1.11–1.50)	1.27 (1.10–1.46)
Adjusted			
Discrimination in health care	1.44 (1.16–1.80)	1.24 (1.06–1.44)	1.23 (1.09–1.38)
Age	1.03 (1.02–1.05)	1.03 (1.02–1.05)	1.03 (1.02–1.04)
Race/ethnicity			
Non-Hispanic White	1.00	1.00	1.00
Non-Hispanic Black	0.98 (0.76–1.26)	1.06 (0.90–1.26)	1.03 (0.90–1.18)
Hispanic	0.96 (0.70–1.34)	0.83 (0.66–1.05)	0.79 (0.65–0.95)
Non-Hispanic Other	1.29 (0.79–2.14)	0.91 (0.61–1.37)	0.82 (0.59–1.13)
Male	1.35 (1.12–1.63)	1.33 (1.17–1.51)	1.27 (1.15–1.40)
Education			
GED or HS diploma	1.00	1.00	1.00
Less than HS	1.20 (0.94–1.53)	1.19 (1.01–1.41)	1.22 (1.07–1.39)
Some college	0.90 (0.70–1.15)	0.97 (0.82–1.14)	1.03 (0.91–1.17)
College and above	0.68 (0.51–0.91)	0.74 (0.61–0.89)	0.81 (0.70–0.93)
Uninsured	0.96 (0.59–1.56)	1.18 (0.87–1.59)	1.19 (0.94–1.51)
Body mass index			
Healthy weight	1.00	1.00	1.00
Underweight	1.27 (0.61–2.64)	1.46 (0.92–2.32)	1.49 (1.02–2.17)
Overweight	0.81 (0.63–1.03)	0.84 (0.72–0.99)	0.89 (0.79–1.01)
Obese	0.87 (0.67–1.12)	0.89 (0.76–1.06)	0.95 (0.84–1.08)
Current smoker	1.88 (1.48–2.38)	1.78 (1.51–2.10)	1.78 (1.56–2.03)
Diabetes	1.61 (1.31–1.98)	1.60 (1.39–1.83)	1.52 (1.36–1.69)
Hypertension	1.68 (1.32–2.13)	1.46 (1.26–1.70)	1.40 (1.25–1.57)
Prior ASCVD	4.43 (2.86–6.88)	3.09 (2.69–3.54)	3.88 (3.17–4.74)

Estimates based on models with inverse propensity score weighting. ASCVD indicates atherosclerotic cardiovascular disease; GED, general educational development; HR, hazard ratio; and HS, high school.

yet describe different implications and emotional reactions in response.[45] In our analysis, self-reported discrimination in healthcare settings was found to be an independent risk factor for nonfatal ASCVD events across groups. When we tested demographic subgroup differences, the only race, ethnicity, and sex subgroup that showed a consistently significant risk of nonfatal ASCVD when reporting discrimination in health care was White men. This does not imply that discrimination holds clinical significance solely for this group, but our results suggest an elevated risk of nonfatal ASCVD for them. Our measure of discrimination captures general poor treatment, which is in contrast to frequent investigations of discrimination self-attributed to race (ie, racial discrimination or racism). Because we employed a measure of discrimination that is attributed to factors outside of just race, this is a distinct finding from analysis and solutions that only center on racism. Previous research suggests that discrimination has similar detrimental consequences across racial and ethnic groups when assessed using nonrace-specific measures.[46] In our study, individuals are reporting discrimination across a variety of socially constructed attributes.[47] White adults were the most prevalent group in our survey data. Given their high prevalence, there is a greater opportunity to capture diverse lived experiences, such as varying socioeconomic status, geographic locations, and more. Previous studies have also shown that the association between discrimination in general settings and cardiovascular disease risk can be moderated by mood disorders[48] and health behaviors, such as smoking status.[49] The timing of discrimination exposure is an additional important consideration, since experiencing discrimination in early life is associated with later-life cardiovascular disease risk.[50] Research using more comprehensive, validated discrimination scales, especially those that capture the perceived reason for

Table 3. Multivariable Cox Proportional Hazard Models for the Association Between Self-Reported Discrimination in Health Care and Nonfatal ASCVD in the Health and Retirement Study, Excluding Individuals With Prior-ASCVD (n=15 563)

	HR (95% CI)	HR (95% CI)	HR (95% CI)
Unadjusted			
Discrimination in health care	1.54 (1.16–2.03)	1.24 (1.02–1.50)	1.27 (1.10–1.46)
Adjusted			
Discrimination in health care	1.48 (1.12–1.96)	1.20 (0.99–1.46)	1.24 (1.07–1.43)
Age	1.04 (1.02–1.05)	1.04 (1.03–1.05)	1.04 (1.03–1.05)
Race/ethnicity			
Non-Hispanic White	1.00	1.00	1.00
Non-Hispanic Black	1.04 (0.75–1.43)	1.13 (0.91–1.39)	1.07 (0.91–1.25)
Hispanic	0.95 (0.64–1.42)	0.85 (0.64–1.13)	0.81 (0.65–1.00)
Non-Hispanic other	0.85 (0.39–1.81)	0.73 (0.42–1.25)	0.68 (0.45–1.03)
Male	1.40 (1.10–1.77)	1.34 (1.15–1.56)	1.31 (1.17–1.47)
Education			
GED or HS Diploma	1.00	1.00	1.00
Less than HS	1.32 (0.96–1.81)	1.24 (1.00–1.55)	1.22 (1.04–1.44)
Some college	0.82 (0.59–1.14)	0.93 (0.76–1.14)	1.01 (0.88–1.17)
College and above	0.73 (0.51–1.05)	0.78 (0.62–0.98)	0.81 (0.69–0.95)
Uninsured	0.87 (0.49–1.58)	1.17 (0.82–1.66)	1.11 (0.84–1.46)
Body mass index			
Healthy weight	1.00	1.00	1.00
Underweight	2.00 (0.90–4.48)	1.71 (0.98–2.98)	1.68 (1.09–2.60)
Overweight	0.92 (0.67–1.26)	0.94 (0.77–1.15)	0.96 (0.82–1.11)
Obese	0.90 (0.63–1.27)	0.91 (0.73–1.13)	0.97 (0.83–1.13)
Current smoker	1.97 (1.45–2.68)	1.90 (1.55–2.33)	1.84 (1.58–2.15)
Diabetes	1.73 (1.31–2.29)	1.71 (1.43–2.04)	1.54 (1.35–1.76)
Hypertension	1.69 (1.26–2.26)	1.44 (1.20–1.71)	1.40 (1.23–1.59)

Estimates based on models with inverse propensity score weighting. Discrimination in health care for the 5-year model adjusted for covariates violates the proportional hazard assumption. ASCVD indicates atherosclerotic cardiovascular disease; GED, general educational development; HR, hazard ratio; and HS, high school.

discrimination and its life course context, would enhance future investigations.

Previous research has shown that reports of discrimination vary by health care setting (eg, clinics versus hospitals).[51] Among older adults, those who report discrimination in health care often believe that they are not receiving the care that they need to improve their health.[52] Understanding the context in which discrimination occurs, and collecting direct patient anecdotes about the impact on health behaviors, would further enrich our understanding. Although our study focused specifically on discrimination within health care, we acknowledge that structural racism and other societal factors may interact with these experiences and should also be measured.[34,53] Research on the health implications of social factors must consider the broader context in which these factors exist.[19,54] Future analysis that incorporates additional, and possibly modifiable, factors within clinical encounters (eg, medication prescribing, patient-provider communication) could provide greater insight into how discrimination affects nonfatal ASCVD outcomes and where health systems may intervene.

Limitations

The results of our study must be interpreted in light of several limitations. First, the gender, race, and ethnicity categories in the HRS are broad and might not be generalizable to all sociodemographic groups in the United States. However, the HRS makes a concerted effort to over-sample and retain participants from underrepresented racial minority groups,[55] and we believe this contributed to a more balanced sample than other longitudinal time-to-event analyses of this scale. Second, relying solely on self-reported clinical data introduces the possibility of misclassification, particularly around the timing of diagnoses. It is an additional limitation that fatal ASCVD events could not be assessed due to the lack of cause-specific mortality. Although we believe our

Table 4. Time-Varying Multivariable Cox Proportional Hazard Models for the Association Between Self-Reported Discrimination in Health Care and Nonfatal ASCVD in the Health and Retirement Study (n=17 632)

	HR (95% CI)	*P* value
Unadjusted		
Discrimination in health care	1.21 (1.08–1.35)	0.001
Adjusted		
Discrimination in health care	1.26 (1.12–1.41)	<0.001
Age	1.04 (1.03–1.05)	<0.001
Race/ethnicity		
Non-Hispanic White	…	…
Non-Hispanic Black	0.99 (0.87–1.12)	0.869
Hispanic	0.76 (0.63–0.91)	0.003
Non-Hispanic other	0.80 (0.59–1.10)	0.172
Male	1.24 (1.13–1.36)	<0.001
Education		
GED or HS diploma	…	…
Less than HS	1.23 (1.09–1.40)	0.001
Some college	0.99 (0.88–1.12)	0.934
College and above	0.80 (0.70–0.91)	0.001
Uninsured	1.12 (0.87–1.43)	0.388
Body mass index		
Healthy weight	…	…
Underweight	1.27 (0.89–1.80)	0.181
Overweight	0.89 (0.79–1.00)	0.055
Obese	0.92 (0.81–1.04)	0.167
Current smoker	1.79 (1.57–2.03)	<0.001
Diabetes	1.51 (1.37–1.67)	<0.001
Hypertension	1.43 (1.28–1.60)	<0.001
Prior ASCVD	3.43 (2.84–4.13)	<0.001

Estimates based on the full follow-up period. Observation, 31 768; events, 1905; and time at risk, 1 511 732. ASCVD indicates atherosclerotic cardiovascular disease; GED, general educational development; HR, hazard ratio; and HS, high school.

Table 5. Results From Competing Risk Model

	2-year ASCVD	5-year ASCVD	10-year ASCVD
Unadjusted SHR (95% CI)			
Discrimination in health care	1.49 (1.20–1.86)	1.23 (1.06–1.44)	1.21 (1.07–1.36)
Unadjusted SHR, excluding individuals with prior ASCVD (95% CI)			
Discrimination in health care	1.53 (1.15–2.02)	1.22 (1.00–1.48)	1.23 (1.07–1.42)
Adjusted SHR (95% CI)			
Discrimination in health care	1.41 (1.13–1.76)	1.18 (1.00–1.37)	1.16 (1.02–1.31)
Adjusted SHR, excluding individuals with prior ASCVD (95% CI)			
Discrimination in health care	1.47 (1.11–1.94)	1.18 (0.97–1.43)	1.20 (1.04–1.39)

Estimates based on models with inverse propensity score weighting. ASCVD indicates atherosclerotic cardiovascular disease; and SHR, subdistribution hazard ratio.

analysis remains clinically meaningful since the majority of first ASCVD events are nonfatal.[56–58] Some of these concerns could be overcome with the use of external linkage to claims data, such as Medicare, but doing so would exclude middle-aged adults—an important population for this analysis, given their higher likelihood of reporting discrimination. Since discrimination in health care was measured from a single self-reported item, we are guarded in the reliability of the measure of discrimination. Few studies have prospective designs assessing discrimination in health care as a novel risk factor, and we encourage future analysis with more comprehensive scales to assess the source(s) and severity of discrimination in health care.

Because discrimination in health care was only measured at baseline for the primary analysis, we may have missed individuals who first experienced discrimination later in the study. We presented the limited variability in responses after baseline and presented a shorter follow-up interval (2 years), medium-term interval (5 years), and long-term follow-up interval (10 years) to assess the risk of discrimination. The fact that discrimination was associated with greater risk both shortly after baseline and over the longer term supports the robustness and potential clinical relevance of this factor. Furthermore, the consistency of the findings after assessing the full follow-up period with time-varying covariates (including discrimination) further underscores the significance of discrimination as a risk factor.

Finally, it is important to reiterate that our measure of discrimination lacked specific attribution and should not be over-interpreted as a single specific lived experience. The differential exposure to discrimination observed across racial subgroups did not align with the subgroup that most consistently demonstrated a significant association between discrimination and nonfatal ASCVD (White adults). This discrepancy aligns with prior research suggesting that for Black adults, high awareness of systemic racism may buffer the negative health effects of interpersonal discrimination because such treatment is anticipated and managed through protective coping strategies.[59] In contrast, for groups where discrimination is less prevalent, such experiences may be unexpected and thus more consequential. Future studies should capture both more granular participant sociodemographic characteristics as well as attribution for discrimination to identify mechanisms that underlie the association we identified.

Conclusions

Discrimination in health care is both a potential short-term and long-term cardiovascular risk factor for middle-aged and older adults. Although clinical metrics are essential for evaluating quality of care, nonclinical patient-reported experiences, such as perceived

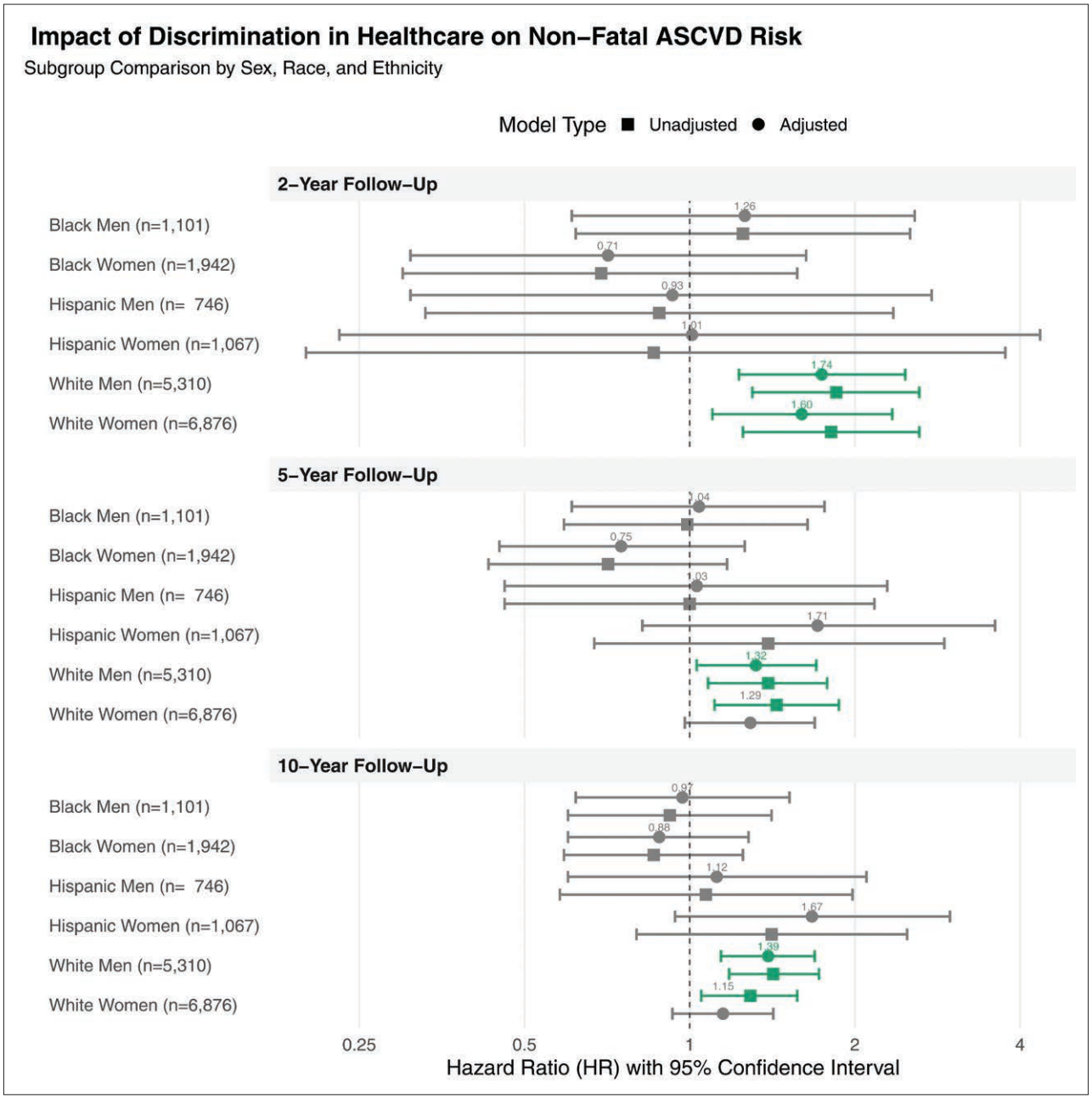

Figure 2. Forest plots of hazard ratio (HR) for discrimination in healthcare derived from Cox proportional hazard models. Estimates based on models with inverse probability weighting. Adjusted models include covariates. Green denotes statistically significant values. ASCVD indicates atherosclerotic cardiovascular disease.

discrimination, provide critical insight into cardiovascular risk and care equity.

ARTICLE INFORMATION

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Affiliations

Department of Population Health Sciences, Duke University School of Medicine, Durham, NC (M.D.G., E.C.O., A.B., M.E.D.). Division of Cardiology, Department of Medicine, University of Texas Southwestern, Dallas (A.M.N.). Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD (R.J.T.). Johns Hopkins Alzheimer's Disease Resource Center for Minority Aging Research, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD (R.J.T.). Department of Sociology, Duke University, Durham, NC (M.E.D.).

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Disclosures

None.

Supplemental Material

Figure S1
Tables S1–S12

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