Racial Discrimination, Mood Disorders, and Cardiovascular Disease Among Black Americans

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Abstract

Purpose—This study examines associations between racial discrimination, mood disorders, and cardiovascular disease (CVD) among Black Americans.

Methods—Weighted logistic regression analyses on a nationally representative sample of Black Americans (n = 5022) in the National Survey of American Life (NSAL; 2001–2003). Racial discrimination and CVD were assessed via self-report. Mood disorder was measured using the World Health Organization Composite International Diagnostic Interview.

Results—Model-adjusted risk ratios (RR) revealed that participants with a history of mood disorder had greater CVD risk (RR = 1.28 95% confidence interval [CI] = 1.12, 1.45). This relationship was found specifically among those younger than 50 years of age (RR = 1.56, 95% CI = 1.27, 1.91). There was a significant interaction between racial discrimination and mood disorder in predicting CVD in the total ($F = 2.86$, 3 *df, p* = 0.047) and younger sample ($F = 2.98$, 3 *df, p* = 0.047). Participants with a history of mood disorder who reported high levels of racial discrimination had the greatest CVD risk.

Conclusions—The association between racial discrimination and CVD is moderated by history of mood disorder. Future studies may examine pathways through which racial discrimination and mood disorders impact CVD risk among Black Americans.

Keywords

Black Americans; cardiovascular disease; mood disorders; racial discrimination

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Black Americans experience disproportionately worse cardiovascular outcomes, including hypertension, atherosclerosis, myocardial infarction, and cerebrovascular incidents

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compared to other racial groups in the United States (1–2). In addition to being a leading cause of death, Blacks are more likely to die prematurely, experience faster disease progression, and face worse consequences from heart disease (3–4). Longitudinal data suggest that the prevalence of hypertension has increased over time, and during the time period from 2003–2006, approximately 42.2% of Black men and 44.1% of Black women were hypertensive compared to 30.6% and 31.0% of White men and women, respectively (1). These data indicate that cardiovascular disease is a significant public health concern among Black Americans, and emphasize the need to identify relevant risk factors in this population.

There is an established link between mood disorders, particularly depression, and cardiovascular disease (5–8). Depression subsequent to major cardiovascular events has been shown to exacerbate declines in health and risk of mortality (9, 10). Other studies suggest that depression itself may be a risk factor for the development of cardiovascular diseases (11, 12). Mood disorders have been associated with maladaptive health behaviors that increase susceptibility to cardiovascular problems, including poor medication compliance, smoking, heavy alcohol consumption, and poor diet (5, 13, 14). Individuals with depression are at increased risk for developing cardiovascular diseases after controlling for other cardiovascular risk factors, and this association is present even in the absence of a prior diagnosis of depression (15). Depression has been shown to increase the risk of cardiovascular disease by 1.5 to two times in otherwise healthy individuals (16).

Recent studies also suggest that psychological factors, such as depression, may have direct effects on cardiovascular health via their impact on biological systems (17–19). People with mood disorders are characterized by dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, elevated baseline immune activation, and heightened inflammatory response, which may aid in the development of hypercholesterolemia, hypertension, and atherosclerosis (17, 18, 20–24). Prior studies have found strong correlations between depression and inflammatory biomarkers such as interleukin-1 and −6, tumor necrosis factor, and C-reactive protein, all clinically validated risk markers for atherosclerosis, thrombosis, and vascular occlusion (19, 22, 25–29). These studies suggest that mood disorders may lead to cardiovascular vulnerability through behavioral and/or neurobiological pathways, or that depression and cardiovascular disease may share a common underlying physiologic mechanism.

Racial discrimination may constitute an added source of psychosocial stress that contributes to racial disparities in health and increases the risk of developing cardiovascular diseases among Black Americans (30–32). Racial discrimination can be experienced in multiple domains, such as employment, housing, the legal system, and in everyday social interactions, both acutely as well as routinely (33, 34). Experiences of these racial stressors across the life-course may contribute to "weathering" or accelerated declines in health due to the cumulative physiologic burden placed on biological systems (31, 35, 36). Consistent with evidence on the deleterious impact of stress on cardiovascular health, experimental studies have found higher levels of cardiovascular reactivity in response to hypothetical scenarios consisting of a racial stressor compared to those without (37, 38). Socio-psychobiological models of health specifically posit that racial discrimination may adversely impact stress mechanisms associated with cardiovascular health, or may exacerbate cardiovascular declines when experienced in tandem with the experience of other stressors (39–43).

The purpose of this study is to examine associations between history of mood disorder, racial discrimination, and cardiovascular disease among Black Americans. We further investigate whether associations between racial discrimination and cardiovascular disease

are moderated by history of mood disorder. We hypothesized that the association between racial discrimination and cardiovascular disease would be greater among those with a history of mood disorder compared to those without a history of mood disorder.

Methods

Sample and Procedures

Data for this study are from the National Survey of American Life (NSAL; 2001–2003), which recruited a national household probability sample of Black Americans (N = 5191) (44–46). In the core sampling component of the NSAL, 64 primary sampling units (PSUs) were sampled, consisting of self-representing metropolitan statistical areas (MSAs) and non-MSA PSUs which were selected based on overall size of the Black population or using a modified probability sampling method. Secondary sampling units (SSUs) defined as area segments were selected using probabilities proportionate to the number of 1990 Census Black households. The NSAL Caribbean Supplement was based on an over-sampling of housing units in geographic areas with at least a 10% density of people of Caribbean origin. Data were collected between February 2001 and June 2003. Weighted response rates for African Americans and Caribbean Black participants were 70.7% and 77.7%, respectively. Sampling weights were constructed to take into account joint probabilities of selection of Caribbean participants into the different sampling components.

Measures

Racial Discrimination—Racial discrimination were assessed using the Major Experiences of Discrimination measure, which consists of nine items asking participants whether they had ever unfairly experienced any of the following events: being fired, not being hired, being denied a promotion, being abused by the police, being discouraged in education, being prevented from renting or buying housing, experiencing poor treatment by neighbors, being denied a loan, and receiving poor treatment from service providers (47). Following each item was a single item assessing the reason for each experience (e.g., race, age, gender, socioeconomic status). Participants who reported experiencing the event and made an attribution of race, ancestry, or skin color were classified as having experienced racial discrimination in that situation. The total number of situations in which racial discrimination was reported was categorized into: 1 = none; 2 = low (1–2 situations); 3 = moderate (3–4 situations); and 4 = high (5 or more situations).

Mood Disorder—Mood disorder was defined as having a history of any of the following: (1) major depression; (2) dysthymia; and (3) bi-polar disorder I, II. History of each disorder was assessed using a modified version of the World Mental Health Survey Initiative version of the World Health Organization Composite International Diagnostic Interview (WMH-CIDI) (48, 49). The WMH-CIDI is a structured interview designed to detect mental disorders using Diagnostic and Statistical Manual, Version 4 (DSM-IV) criteria (50). Major depression criteria include affective, cognitive and somatic symptoms, including depressed mood, loss of interest, irritability, difficulty concentrating, and changes in appetite, weight and sleep. Symptoms of dysthymia are similar to those of depression, but are more pervasive and less severe, and unlike major depression, are not characterized by discrete episodes. Bipolar I criteria include having at least one manic episode or period of abnormal elevated mood, which can occur with or without episodes of major depression, while bipolar II is characterized by less severe hypomanic episodes and at least one episode of major depression. Earlier versions of the WMH-CIDI have been found to have high concordance with blind clinical appraisals (51).

History of Cardiovascular Disease—History of cardiovascular disease was assessed through self-report. Four items asked participants whether they had ever had hypertension, atherosclerosis, heart attack, or stroke. Participants who indicated that they ever had any of these problems were classified as having a history of cardiovascular disease. Although retrospective reports of cardiovascular health are limited, prior studies have found high levels of recall accuracy (52, 53). Furthermore, non-clinical terms that were linguistically and culturally appropriate for the target population were used (e.g., "high blood pressure", "blood circulation problems or hardening of the arteries", "heart trouble or heart attack"). In addition, in order to take into account differences in knowledge of cardiovascular health resulting from access to medical care, we controlled for insurance status in multivariable models.

Socio-Demographic Characteristics—Covariates were self-reported measures of: ancestry (African American vs. Caribbean Black), age, gender, marital status, poverty level specified as the ratio of household income to the poverty threshold, employment status, educational level, insurance status, and region of residence. Social desirability bias was also assessed to control for personality factors that may influence responses to sensitive items, and was calculated as the mean of 10 items endorsed as false (with a value of zero) or true (with a value of one), with higher scores reflecting higher levels of personality bias (54). In addition, four indicators of health were examined: body mass index, calculated using self-reported height and weight; smoking status; physical activity, measured as the average of three items assessing the frequency of exercise, walking, and household chores, with response choices of 1 = never, 2 = rarely, 3 = sometimes, and 4 = often; and number of chronic conditions from a checklist of 14 common health issues (excluding cardiovascular outcomes), such as arthritis, ulcer, diabetes, and cancer.

Analysis

A total of 169 participants with missing data on cardiovascular disease were excluded, leaving a total analytic sample size of 5022 participants. Missing data on remaining variables were handled using multiple imputation, in which five imputations for missing values were generated using a Markov chain Monte Carlo technique assuming an arbitrary missing data pattern (55–57). Imputed data were truncated to fit the bounds of possible values but were not rounded due to potentially bias of effect estimates (58, 59).

Multivariable logistic regression models were specified examining associations between mood disorder, racial discrimination, and the interaction between mood disorder and racial discrimination in predicting cardiovascular disease. Given the higher prevalence of cardiovascular disease among older groups, we also examined interactions by age. We hypothesized that associations with our primary predictors may be less apparent among older participants given that poor cardiovascular outcomes may be driven dominantly by increasing age in this group, masking associations with mood disorders and racial discrimination. We examined interactions between age group (49 years of age or younger versus 50 years of age and older) and both mood disorder and racial discrimination in predicting cardiovascular disease. We chose the cut-point of 50 years of age in light of descriptive analyses indicating a very high prevalence of cardiovascular disease among those 50 years of age and older (67.7%); and a lower prevalence of 24.0% among those 49 years of age and younger.

All analyses were conducted using SAS-callable SUDAAN Version 10.0.0 taking into account sampling weights and study design variables. Because risk ratios are more interpretable than odds ratios in examining common binary outcomes, we computed model-

adjusted risk ratios (RR) and 95% confidence intervals (CI) based on average marginal predictions (60).

Results

The prevalence of cardiovascular disease in our sample was 36.9%. Approximately 13% percent had a history of mood disorder. Participants with a history of mood disorder had a significantly higher prevalence of cardiovascular disease (43.8%) compared to those without a history of mood disorder (35.8%). Although participants reporting greater levels of racial discrimination had a higher prevalence of cardiovascular disease, this association was not significant. Additional socio-demographic characteristics are presented in Table 1.

Weighted Logistic Regressions Predicting Cardiovascular Disease

Controlling for covariates, history of mood disorder was positively associated with cardiovascular disease (RR = 1.29, 95% CI = 1.13, 1.46) (Table 2: Model 1). Racial discrimination was not a significant predictor ($F = 0.65$, 3 *df*, $p = 0.59$) (Table 2: Model 2). Including both mood disorder and racial discrimination in the model, mood disorder remained statistically significant (RR = 1.28, 95% CI = 1.12, 1.45) (Table 2: Model 3).

In two separate models testing interactions with age group (≤ 49 years vs. ≥ 50 years): there was no significant interaction with racial discrimination ($F = 0.20$, 3 *df*, $p = 0.89$); however, there was a significant interaction with mood disorder ($F = 7.29$, 1 *df*, $p = 0.01$). We performed age-stratified analyses to illustrate differences in associations by age group (Table 3).

There was a positive relationship between mood disorder and cardiovascular disease among participants younger than 50 years of age (RR = 1.56, 95% CI = 1.27, 1.91). However, among those 50 years of age and older, there was little relationship (RR = 1.02, 95% CI = 0.91, 1.14). There was no significant relationship between racial discrimination and cardiovascular disease in either age group. With the exception of social desirability, the magnitudes of associations for significant covariates were greater among those younger than 50 years of age.

Interactions Between Racial Discrimination and Mood Disorder

We examined interactions between racial discrimination and mood disorder in predicting cardiovascular disease, in the entire sample and by age group (Table 4). To illustrate the relationship between racial discrimination and cardiovascular disease among those without a history of mood disorder, we examined the simple effects of racial discrimination in the model with the interaction; and then rotated the referent category for mood disorder to observe the simple effects of racial discrimination among those with a history of mood disorder (61).

The interaction between mood disorder and racial discrimination was significant for the entire sample ($F = 2.86$, 3 *df*, $p = 0.047$) and those younger than 50 years of age ($F = 2.98$, 3 *df*, $p = 0.047$). Using the entire sample, participants with a history of mood disorder and who reported high levels of racial discrimination had the highest risk of cardiovascular disease (RR = 1.62, 95% CI = 1.20, 2.10). Among those less than 50 years of age, those reporting high levels of racial discrimination and who had a history of mood disorder had approximately twice the risk of cardiovascular disease than those who reported no racial discrimination (RR = 2.01, 95% CI = 1.24, 3.25). However, there were no significant relationships between racial discrimination and cardiovascular disease among those without a history of mood disorder. Among those older than 50 years of age, the direction of these

associations were the same, the interaction between racial discrimination and mood disorder was not significant ($F = 1.13$, 3 df, $p = 0.34$).

Discussion

Results of this study support previous findings suggesting that mood disorders are associated with greater cardiovascular disease risk (8, 9, 15). After controlling for demographic, behavioral, and other health characteristics, participants with a history of mood disorder had 28% greater risk of having a cardiovascular disease compared to those without a history of mood disorder. This relationship was pronounced among those less than 50 years of age, with those with a history of mood disorder having more than 1.5 times the risk of cardiovascular disease.

Although we did not find evidence for main effects of racial discrimination, we found moderated associations with mood disorders in predicting cardiovascular disease. Our results suggest that high levels of racial discrimination may be associated with greater risk of cardiovascular disease among those with a history of mood disorder. A possible interpretation of this finding is that racial discrimination may increase the risk of cardiovascular disease among those who respond to such experiences with negative psychological reactions. Studies have consistently found evidence for the negative mental health implications of experiencing racial discrimination (62–64). This interpretation is also consistent with stress and coping frameworks which suggest that the impact of discrimination on health may depend on appraisals and responses to stress (65). An alternative explanation is that participants with a mood disorder may lack the resources to effectively manage or cope with experiences of racial discrimination. As an additional source of psychosocial burden, those with a mood disorder may be particularly vulnerable to racial discrimination and subsequent declines in cardiovascular health.

There are several caveats to our findings given the cross-sectional nature of the data. First, there were fewer associations found between our predictors and cardiovascular disease among participants older than 50 years of age, and most significant associations were found among those 49 years of age and younger. One possible explanation is that given the greater prevalence of cardiovascular disease among older groups (67.7% in our sample of participants 50 years of age and older), associations with our predictors would be masked or attenuated. Accordingly, associations with our predictors may be more apparent in younger age groups where cardiovascular disease is less common.

In addition, because of the lack of data on the temporal sequence of our exposures and outcome, inferences regarding the causal direction of associations are limited. For example, we are unable to deduce the direction of the relationship between mood disorder and cardiovascular disease, and prior studies have found evidence for a bi-directional association, with the onset of cardiovascular disease increasing the risk of depression; as well as depression being an independent risk factor for the onset of cardiovascular disease (9–12). Furthermore, it is possible that participants with a history of depression and cardiovascular disease were more likely to perceive racial discrimination. Due to the cross-sectional nature of our data, we cannot discount alternative explanations regarding the directions of the associations we found.

An additional limitation of the current study is the self-report of cardiovascular disease history. However, prior studies have demonstrated the accuracy of recall and self-report of cardiovascular disease history (52, 53). Nevertheless, some participants may have been unaware of their cardiovascular disease status. To address possible systematic differences in knowledge as well as disclosure, we controlled for a number of potential confounders in our

models, including various socioeconomic indicators, insurance status, and social desirability response bias. In addition, we controlled for four health-related variables in our models that are known risk factors for cardiovascular disease (smoking, BMI, physical activity, and other chronic conditions). Results from our study also face limitations from possible model mis-specification, including variables that were not included in analyses, such as treatment, duration, and severity of mood disorder. In addition, although the NSAL data have been shown to be representative of the Black population in the U.S., potential selection bias and non-response may have influenced our effect estimates, and also impact generalizability of findings.

Future studies examining cardiovascular disease among Black Americans may examine causal relationships through prospective examination of racial discrimination, mood disorders, and cardiovascular disease onset. Findings from our study suggest that examining psychological responses to racial discrimination may be informative in understanding racial disparities in cardiovascular health. In addition, our study highlights potential avenues for improving cardiovascular health among Black Americans, including efforts to address mental health and racial discrimination. Additional research investigating both broader social influences as well as psychological factors impacting cardiovascular health among Black Americans is warranted.

Acknowledgments

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Table 1

Weighted descriptive characteristics of Black Americans (n = 5022) in the National Survey of American Life (NSAL; 2001–2003) by history of CVD.

	CVD History		TOTAL
	None	Any	
CVD History, n (%)			
Any CVD			1769 (36.9)
Hypertension			1568 (33.1)
Atherosclerosis			288 (6.0)
Heart Attack			362 (7.6)
Stroke			142 (3.0)
Mood Disorder, n (%) *			
No	2868 (64.2)	1516 (35.8)	4384 (87.0)
Yes	381 (56.2)	250 (43.8)	631 (13.0)
Racial Discrimination, n (%)			
None	1826 (64.6)	974 (35.5)	2800 (55.0)
Low (1–2)	976 (62.8)	521 (37.2)	1497 (32.4)
Moderate (3–4)	264 (60.9)	156 (39.1)	420 (9.5)
High (5+)	71 (48.7)	58 (51.4)	129 (3.1)
Age, Mean (SE) ***	36.45 (0.46)	51.27 (0.54)	41.91 (0.50)
Gender, n (%) **			
Men	1259 (66.0)	588 (34.0)	1847 (44.4)
Women	1994 (60.9)	1181 (39.1)	3175 (55.8)
Race/Ethnicity, n (%) *			
African American	2130 (62.7)	1306 (37.3)	3436 (92.9)
Caribbean Black	1123 (69.2)	463 (30.8)	1586 (7.1)
Nativity, n (%) ***			
US-born	2352 (62.1)	1418 (37.9)	3770 (93.2)
Foreign-born	871 (78.1)	334 (21.9)	1205 (6.8)
Marital Status, n (%) ***			
Married	931 (58.5)	551 (41.6)	1482 (33.3)
Partnered	284 (72.1)	99 (27.9)	383 (9.0)
Widowed, Separated, Divorced	758 (48.3)	731 (51.7)	1489 (26.0)
Never Married	1280 (77.7)	388 (22.3)	1668 (31.7)
Poverty Level, n (%) *			
Poor, < 1.00	677 (58.6)	470 (41.4)	1147 (23.3)
Near-Poor, 1.00–1.99	785 (61.1)	476 (38.9)	1261 (23.8)
Non-Poor, 2.00–3.99	1095 (66.7)	488 (33.3)	1583 (32.2)
Non-Poor, 4.00+	696 (65.0)	335 (35.0)	1031 (20.7)
Education, n (%) ***			
< 12 years	619 (50.5)	563 (49.5)	1182 (23.9)

	CVD History		TOTAL
	None	**Any**	
12 years	1195 (67.6)	574 (32.4)	1769 (37.0)
13–15 years	848 (66.6)	373 (33.4)	1221 (24.2)
16+ years	591 (66.7)	259 (33.3)	850 (14.9)
Work Status, n (%) ***			
Employed	2474 (70.0)	942 (30.1)	3416 (67.6)
Unemployed	360 (73.0)	150 (27.0)	510 (10.1)
Out of Labor Force	419 (38.1)	677 (61.9)	1096 (22.3)
Insurance, n (%) ***			
Any	2528 (61.1)	1505 (38.9)	4033 (81.8)
None	725 (72.5)	264 (27.6)	989 (18.2)
Region, n (%)			
Northeast	1034 (66.6)	477 (33.4)	1511 (18.9)
Midwest	323 (58.5)	236 (41.5)	559 (16.7)
South	1737 (63.7)	966 (36.3)	2703 (54.8)
West	159 (61.0)	90 (39.0)	249 (9.7)
Social Desirability, Mean (SE) *	1.96 (0.04)	2.14 (0.07)	2.02 (0.04)
Body Mass Index, Mean (SE) ***	27.71 (0.15)	30.44 (0.18)	28.72 (0.12)
Smoking, n (%) ***			
Never Smoker	2191 (68.2)	974 (31.8)	3165 (58.4)
Former Smoker	326 (45.4)	340 (54.6)	666 (14.7)
Current Smoker	717 (62.5)	436 (37.5)	1153 (26.9)
Physical Activity, Mean (SE) ***	2.76 (0.02)	2.6 (0.03)	2.7 (0.02)
Chronic Conditions, Mean (SE) ***	0.46 (0.02)	1.28 (0.03)	0.76 (0.01)

*
$p < 0.05$

**
$p < 0.01$

***
$p < 0.001$

Table 2

Model-adjusted risk ratios (RR) from weighted logistic regressions predicting history of cardiovascular disease (CVD) among Black Americans (n = 5022) in the National Survey of American Life (NSAL; 2001–2003).

	CVD History Model 1 RR (95% CI)	CVD History Model 2 RR (95% CI)	CVD History Model 3 RR (95% CI)
Mood Disorder ***, ‡‡‡	1.29 (1.13, 1.46)		1.28 (1.12, 1.45)
Racial Discrimination (ref: None)			
Low (1–2)		1.05 (0.96, 1.15)	1.04 (0.95, 1.14)
Moderate (3–4)		1.01 (0.88, 1.13)	0.99 (0.86, 1.11)
High (5+)		1.18 (0.90, 1.54)	1.13 (0.87, 1.45)
Age ***, †††, ‡‡‡	1.05 (1.04, 1.06)	1.05 (1.04, 1.06)	1.05 (1.04, 1.06)
Gender: Women vs. Men	0.97 (0.89, 1.05)	0.99 (0.91, 1.07)	0.98 (0.90, 1.06)
Caribbean vs. African American **, †, ‡	1.22 (1.05, 1.39)	1.23 (1.06, 1.41)	1.22 (1.05, 1.39)
Nativity: Foreign vs. US-Born **, ††, ‡‡	0.72 (0.58, 0.93)	0.72 (0.57, 0.93)	0.73 (0.58, 0.93)
Marital Status (ref: Married)			
Partnered	0.99 (0.84, 1.17)	0.99 (0.84, 1.17)	0.99 (0.84, 1.17)
Widowed/Separated/Divorced	0.91 (0.81, 1.04)	0.92 (0.81, 1.04)	0.91 (0.81, 1.03)
Never Married	0.98 (0.87, 1.13)	0.99 (0.87, 1.13)	0.99 (0.87, 1.13)
Poverty (ref: Poor, < 1.00)			
Near-poor, 1.00–1.99	0.93 (0.80, 1.08)	0.92 (0.79, 1.06)	0.92 (0.80, 1.07)
Non-poor, 2.00–3.99	0.88 (0.78, 1.00)	0.88 (0.78, 1.00)	0.88 (0.78, 1.00)
Non-poor, 4.00 +	0.88 (0.74, 1.03)	0.87 (0.74, 1.03)	0.88 (0.74, 1.04)
Education (ref: < 12 years) *, †, ‡			
12 years	0.89 (0.80, 0.99)	0.88 (0.80, 0.98)	0.89 (0.80, 0.98)
13–15 years	0.95 (0.84, 1.07)	0.94 (0.84, 1.06)	0.94 (0.84, 1.06)
16+ years	0.84 (0.73, 0.97)	0.83 (0.72, 0.96)	0.83 (0.72, 0.96)
Work Status (ref: Employed)			
Unemployed	0.93 (0.81, 1.07)	0.93 (0.81, 1.07)	0.93 (0.81, 1.07)
Out of Labor Force	1.08 (0.96, 1.21)	1.08 (0.96, 1.21)	1.08 (0.96, 1.21)
Insurance: None vs. Any	0.91 (0.80, 1.03)	0.91 (0.80, 1.04)	0.91 (0.80, 1.03)
Region (ref: South)			
Northeast	0.91 (0.81, 1.01)	0.91 (0.81, 1.01)	0.90 (0.81, 1.00)
Midwest	1.06 (0.92, 1.21)	1.07 (0.93, 1.23)	1.05 (0.92, 1.21)
West	1.05 (0.92, 1.20)	1.05 (0.92, 1.20)	1.05 (0.91, 1.20)
Social Desirability *	0.98 (0.95, 1.00)	0.98 (0.95, 1.00)	0.98 (0.96, 1.00)
Body Mass Index ***, †††, ‡‡‡	1.04 (1.03, 1.05)	1.04 (1.03, 1.05)	1.04 (1.03, 1.05)
Smoking (ref: Never)			
Former Smoker	1.05 (0.93, 1.20)	1.05 (0.92, 1.20)	1.05 (0.92, 1.20)
Current Smoker	1.03 (0.91, 1.16)	1.03 (0.91, 1.17)	1.02 (0.90, 1.16)

	CVD History Model 1 RR (95% CI)	CVD History Model 2 RR (95% CI)	CVD History Model 3 RR (95% CI)
Physical Activity	0.97 (0.91, 1.03)	0.97 (0.91, 1.03)	0.97 (0.91, 1.03)
Chronic Conditions [***], [†††], [‡‡‡]	1.27 (1.19, 1.36)	1.29 (1.21, 1.37)	1.27 (1.20, 1.35)

Note: Model 1 examines the association between mood disorder and history of cardiovascular disease; Model 2 examines the association between racial discrimination and history of cardiovascular disease; Model 3 examines mood disorder and racial discrimination concurrently in relation to history of cardiovascular disease. All three models adjust for socio-demographic factors.

Model: 1

[*]
$p < 0.05$

[**]
$p < 0.01$

[***]
$p < 0.001$

Model 2:

[†]
$p < 0.05$

[††]
$p < 0.01$

[†††]
$p < 0.001$

Model 3:

[‡]
$p < 0.05$

[‡‡]
$p < 0.01$

[‡‡‡]
$p < 0.001$

Table 3

Model-adjusted risk ratios (RR) from weighted logistic regressions predicting history of cardiovascular disease (CVD) among Black Americans (n = 5022) in the National Survey of American Life (NSAL; 2001–2003) by age group.

	≤ 49 years of age (n = 3532) CVD History RR (95% CI)	≥ 50 years of age (n = 1490) CVD History RR (95% CI)
Mood Disorder[***]	1.56 (1.27, 1.91)	1.02 (0.91, 1.14)
Racial Discrimination (ref: None)		
Low (1–2)	1.04 (0.86, 1.25)	1.04 (0.93, 1.16)
Moderate (3–4)	0.86 (0.68, 1.10)	1.07 (0.93, 1.23)
High (5+)	1.09 (0.70, 1.69)	1.07 (0.84, 1.35)
Age[***]	1.06 (1.05, 1.08)	1.00 (1.00, 1.01)
Gender: Women vs. Men	0.95 (0.83, 1.08)	0.98 (0.90, 1.07)
Caribbean vs. African American [*]	1.47 (1.10, 1.92)	1.01 (0.78, 1.31)
Nativity: Foreign vs. US-Born[**]	0.50 (0.29, 0.85)	0.96 (0.74, 1.25)
Marital Status (ref: Married)		
Partnered	1.07 (0.83, 1.39)	0.92 (0.71, 1.20)
Widowed/Separated/Divorced	0.95 (0.78, 1.16)	0.93 (0.83, 1.04)
Never Married	1.08 (0.88, 1.34)	0.92 (0.80, 1.06)
Poverty (ref: Poor, < 1.00)		
Near-poor, 1.00–1.99	0.86 (0.67, 1.11)	1.04 (0.90, 1.19)
Non-poor, 2.00–3.99	0.78 (0.64, 0.96)	1.02 (0.88, 1.19)
Non-poor, 4.00 +	0.76 (0.60, 0.97)	0.96 (0.78, 1.16)
Education (ref: < 12 years) [*]		
12 years	0.79 (0.66, 0.96)	0.93 (0.84, 1.03)
13–15 years	0.89 (0.72, 1.10)	0.97 (0.84, 1.11)
16+ years	0.69 (0.52, 0.91)	0.93 (0.81, 1.07)
Work Status (ref: Employed)		
Unemployed	0.87 (0.68, 1.11)	1.02 (0.85, 1.23)
Out of Labor Force	1.15 (0.90, 1.46)	1.12 (0.99, 1.28)
Insurance: None vs. Any [*]	0.83 (0.69, 0.98)	0.93 (0.80, 1.09)
Region (ref: South)		
Northeast	0.82 (0.68, 0.98)	0.99 (0.84, 1.15)
Midwest	1.01 (0.80, 1.27)	1.08 (0.97, 1.21)
West	0.96 (0.80, 1.16)	1.14 (0.93, 1.39)
Social Desirability[†]	1.00 (0.96, 1.04)	0.97 (0.96, 0.99)
Body Mass Index [*, ††]	1.04 (1.03, 1.06)	1.04 (1.01, 1.08)
Smoking (ref: Never)		
Former Smoker	1.17 (0.87, 1.59)	0.92 (0.82, 1.02)

	≤ 49 years of age (n = 3532) CVD History RR (95% CI)	≥ 50 years of age (n = 1490) CVD History RR (95% CI)
Current Smoker	1.09 (0.88, 1.36)	0.88 (0.78, 1.00)
Physical Activity	0.95 (0.86, 1.05)	0.98 (0.94, 1.02)
Chronic Conditions *** †††	1.33 (1.21, 1.47)	1.22 (1.13, 1.31)

Among ≤ 49 years of age:

*
$p < 0.05$

**
$p < 0.01$

***
$p\ 0.001$

Among ≥50 years of age:

†
$p < 0.05$

††
$p < 0.01$

†††
$p < 0.001$

Table 4

Model-adjusted risk ratios (RR) for racial discrimination by mood disorder from simple effects of weighted logistic regression predicting history of cardiovascular disease (CVD) among Black Americans (n = 5022) in the National Survey of American Life (NSAL; 2001–2003).

	No Mood Disorder CVD History RR (95% CI)	Any Mood Disorder CVD History RR (95% CI)
Racial Discrimination (ref: None)	Total Sample (n = 5022)	
Low (1–2)	1.06 (0.95, 1.18)	1.00 (0.75, 1.32)
Moderate (3–4)	1.00 (0.86, 1.15)	0.94 (0.64, 1.40)
High (5+)	0.96 (0.72, 1.28)	1.62 (1.20, 2.19)
	≤ 49 years of age (n = 3532)	
Low (1–2)	1.07 (0.87, 1.30)	0.91 (0.55, 1.48)
Moderate (3–4)	0.86 (0.65, 1.14)	0.85 (0.42, 1.79)
High (5+)	0.66 (0.34, 1.26)	2.01 (1.24, 3.25)
	≥ 50 years of age (n = 1490)	
Low (1–2)	1.02 (0.91, 1.13)	1.21 (0.87, 1.68)
Moderate (3–4)	1.07 (0.93, 1.23)	1.10 (0.77, 1.59)
High (5+)	1.01 (0.80, 1.28)	1.34 (1.02, 1.77)

Note: Controlling for age, gender, ethnicity, nativity, marital status, poverty, education, work status, insurance, region, social desirability, body mass index, smoking status, physical activity, and chronic conditions.

Interaction between racial discrimination and mood disorder:

Total Sample: Wald $F = 2.86$, 3 df, $p = 0.047$

Age ≤ 49 years: Wald $F = 2.98$, 3 df, $p = 0.047$

Age ≥ 50 years: Wald $F = 1.13$, 3 df, $p = 0.344$

Risk ratios and 95% confidence intervals by mood disorder obtained by testing the simple effects of racial discrimination in weighted logistic regression models including interaction terms.