ORIGINAL RESEARCH

Workplace Discrimination and Risk of Hypertension: Findings From a Prospective Cohort Study in the United States

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BACKGROUND: Mounting evidence has demonstrated a role of psychosocial stressors such as discrimination in hypertension and cardiovascular diseases. The objective of this study was to provide the first instance of research evidence examining prospective associations of workplace discrimination with onset of hypertension.

METHODS AND RESULTS: Data were from MIDUS (Midlife in the United States), a prospective cohort study of adults in the United States. Baseline data were collected in 2004 to 2006, with an average 8-year follow-up period. Workers with self-reported hypertension at baseline were excluded, yielding a sample size of 1246 participants for the main analysis. Workplace discrimination was assessed using a validated 6-item instrument. During follow-up with 9923.17 person-years, 319 workers reported onset of hypertension, and incidence rates of hypertension were 25.90, 30.84, and 39.33 per 1000 person-years among participants with low, intermediate, and high levels of workplace discrimination, respectively. Cox proportional hazards regression analyses demonstrated that workers who experienced high exposure to workplace discrimination, compared with workers with low exposure, had a higher hazard of hypertension (adjusted hazard ratio, 1.54 [95% CI, 1.11–2.13]). Sensitivity analysis excluding more baseline hypertension cases based on additional information on blood pressure plus antihypertensive medication use (N=975) showed slightly stronger associations. A trend analysis showed an exposure-response association.

CONCLUSIONS: Workplace discrimination was prospectively associated with elevated risk of hypertension among US workers. The adverse impacts of discrimination on cardiovascular disease have major implications for workers' health and indicate a need for government and employer policy interventions addressing discrimination.

Key Words: cohort ■ hypertension ■ psychosocial factors ■ workers ■ workplace discrimination

Hypertension is a major risk factor for cardiovascular diseases, which are the leading causes of illness, disability, and death worldwide.[1] According to the 2017 *American College of Cardiology/ American Heart Association Guideline*, nearly half of all adults in the United States met diagnostic criteria for hypertension.[2] Notably, cardiovascular diseases and related cardiometabolic health conditions are increasing in younger people and working populations across all racial groups; current forecasts predict "a new epidemic of cardiovascular disease" and adumbrate a critical need to address potentially modifiable risk factors.[3] According to a recent report, average working-age mortality rates decreased after 2010 in 16 high-income countries, but the opposite pattern was observed in the United States, with mortality rates increasing over time.[4]

In recent years, the general public has given special attention to systemic racism, discrimination, and their associated health impacts, including cardiovascular outcomes. Social activist movements and the overarching cultural zeitgeist have rapidly and prominently shifted toward prioritizing issues of social justice and health inequity. The inverse hazard

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CLINICAL PERSPECTIVE

What Is New?

- Adverse health effects of perceived unspecific discrimination have been cumulatively examined, but the role of the workplace is not well recognized.
- Recent research has suggested prospective links between workplace discrimination and depressive disorders, whereas such evidence on cardiovascular outcomes is still lacking.
- Using prospective data from the MIDUS (Midlife in the United States) national study with an 8-year follow-up period, it was discovered for the first time that exposure to high levels of workplace discrimination was associated with a 54% elevated risk of hypertension among US workers, and this effect was independent from sociodemographic factors, behavioral factors, and other psychosocial factors.

What Are the Clinical Implications?

- It has been reported that hypertensive heart disease substantially contributed to the rising working-age mortality in the United States after 2010, and although understudied, psychosocial factors in the workplace may play important roles.
- In addition to systemic racism and everyday discrimination, clinicians (particularly occupational physicians and occupational health nurses) should pay more attention to psychosocial work characteristics, such as workplace discrimination, as potential risk factors for hypertension and cardiovascular diseases among workers.
- In occupational settings, interventions at the organizational level to eliminate workplace discrimination would be one of key measures for primary prevention of working population's mental and physical diseases.

Nonstandard Abbreviations and Acronyms

ACC	American College of Cardiology
AHA	American Heart Association
MIDUS	Midlife in the United States
SBP	systolic blood pressure

law, generally defined as the tendency for the accumulation of health hazards to "vary inversely with the power and resources of populations affected," characterizes the nature and magnitude of the predicaments faced by vulnerable and marginalized populations.[5] Notably, Harris et al highlighted substantial contribution of "hypertensive heart disease" to the rising working-age mortality in the United States, and "chronic exposure to discrimination" was considered a potential risk factor.[4] Psychosocial stressors have gained substantial research attention when exploring the cause and pathophysiology of hypertension and cardiovascular diseases.[6] Evidence on the adverse health effects of perceived unspecific discrimination has also accumulated.[7] However, the role of the workplace, where adults spend on average one-third of their time per day, has not been carefully considered. Workplace discrimination is generally characterized as unfair conditions or unpleasant treatment at work because of personal characteristics, particularly race, sex, or age.[5,8]

To the best of our knowledge, only 3 cross-sectional studies, all from the United States, have investigated associations of discrimination in the workplace with hypertension, reporting inconsistent and mixed findings.[5,8,9] Therefore, the objective of this study was to provide the first instance of research evidence on prospective associations of workplace discrimination with risk of hypertension among US workers, using data from a national cohort study.

METHODS

Study Population

All data used for this study are publicly available via the International Consortium for Political and Social Research and can be accessed at https://www.icpsr.umich.edu/web/NACDA/series/203. The program code and scripts for statistical packages used to conduct the research are available from the corresponding author upon request. We used data from the Wave II and Wave III surveys of the MIDUS (Midlife in the United States) study.[10,11] A detailed description of MIDUS is published elsewhere.[12] In brief, the MIDUS Wave II survey was performed from 2004 to 2006 (baseline of current study), whereas MIDUS Wave III occurred from 2013 to 2014 (follow-up of current study). Out of 4963 participants in the MIDUS Wave II survey, 2313 reported that they were working. Among them, 2180 workers (94.2%) had complete data on relevant variables. During the MIDUS Wave III survey, 1724 participants were followed up (follow-up rate=79.1%). We compared the baseline characteristics of this sample of 1724 participants with the sample available in MIDUS Wave II to identify bias because of loss of participants during follow-up (N=2180−1724=456). Nonparticipants were found to be more often divorced, separated, or widowed; non-White (including Black and/or African American, Native American or Alaska Native, Asian, Native Hawaiian or Pacific Islander, and unspecified); less educated; and more often smokers; moreover,

they exhibited lower levels of job control and higher prevalence of hypertension. However, there were no systematic differences with regard to exposure levels of workplace discrimination and distributions of age, sex, alcohol consumption, physical activity, or major depressive episode. We excluded participants who self-reported doctor-diagnosed hypertension at baseline, yielding a sample size of 1246 for the main analyses. To minimize misclassification bias, we applied alternative measures to define prevalent hypertension for sensitivity analyses: systolic blood pressure (SBP) at least 130 mm Hg, diastolic blood pressure at least 80 mm Hg (based on the *American College of Cardiology/American Heart Association Guideline*), or use of antihypertensive medication at baseline. This approach additionally excluded 271 individuals, resulting in an analytic sample of 975 (for details see the Figure). All participants provided written informed consent. This study was reviewed and approved for exemption by the University of California, Los Angeles Institutional Review Board (IRB#22–000604), and followed the *Strengthening the Reporting of Observational Studies in Epidemiology* reporting guideline.

Measures

Workplace discrimination was measured at baseline by a validated 6-item instrument ("How often do you think you are unfairly given the jobs that no one else wanted to do?" "How often are you watched more closely than other workers?" "How often does your supervisor or boss use ethnic, racial, or sexual slurs or jokes?" "How often do your coworkers use ethnic, racial, or sexual slurs or jokes?" "How often do you feel that you are ignored or not taken seriously by your boss?" "How often has a coworker with less experience and qualifications gotten promoted before you?"), with a Cronbach α coefficient of 0.76.[13] Each item was measured on a 5-point Likert response scale (1=never, 5=once a week or more). Discrimination scores were constructed by calculating the sum of the values of the 6 items. We categorized workplace discrimination into 3 groups (low, intermediate, high) by tertile split.

During both MIDUS Wave II and Wave III surveys, hypertension (yes or no) was ascertained on the basis of self-reported doctor-diagnosed hypertension (ie, "Has a doctor ever told you that you have or had high blood pressure?"), together with information on timing of diagnosis. We defined time-to-event outcomes as
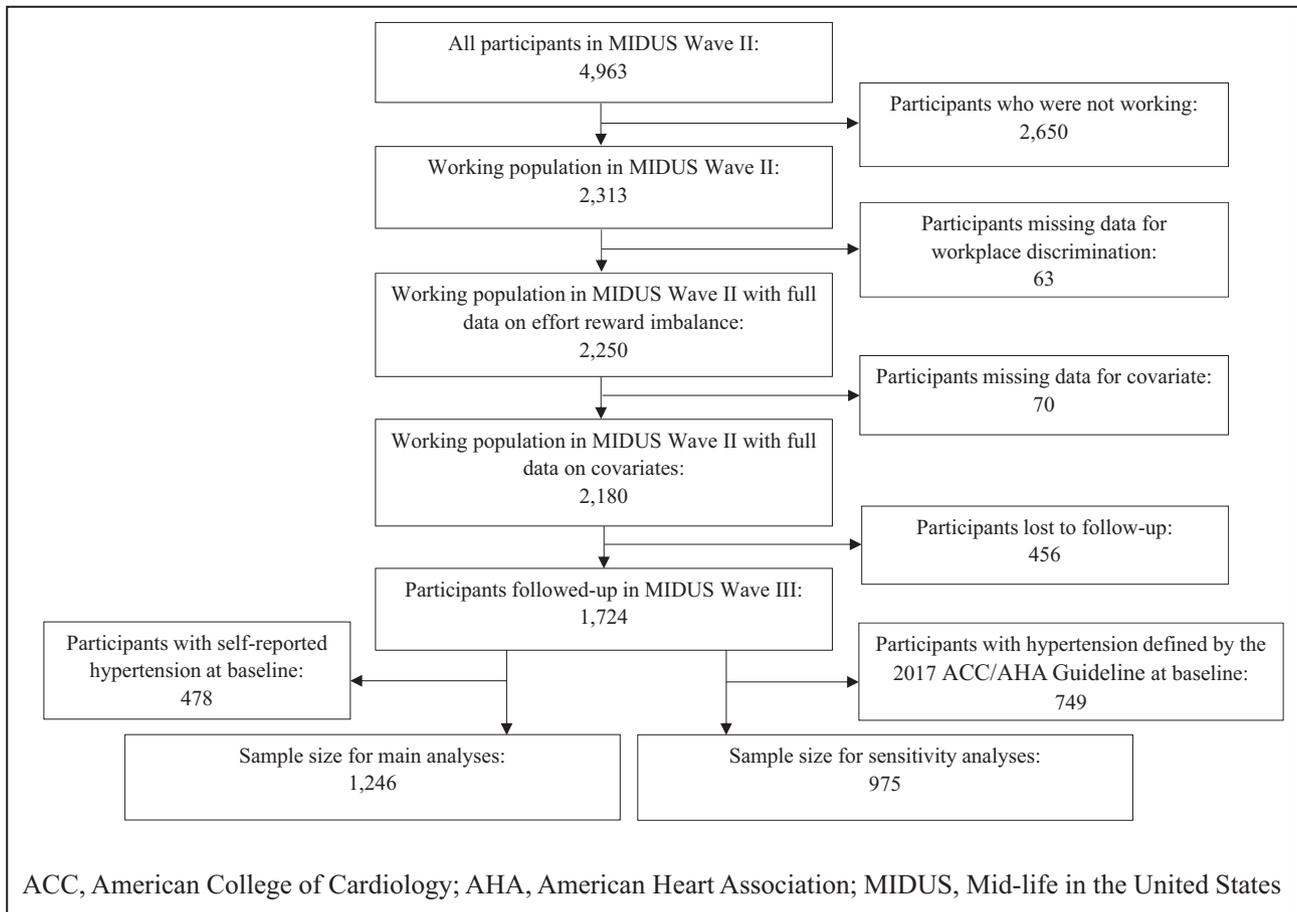
Figure. Sample size selection.
ACC/AHA indicates American College of Cardiology/American Heart Association; and MIDUS, Midlife in the United States.

an onset of diagnosed hypertension between Wave II and Wave III among those without prevalent hypertension at baseline. This approach has been widely used in other national studies in the United States, such as the Health and Retirement Study.[14]

At baseline, information on sociodemographic factors and health-related behaviors was collected. The following covariates were selected because they are known as traditional risk factors for hypertension[15] that have commonly been adjusted for when examining associations between discrimination and hypertension in previous studies[5,7–9]: age (≤45 years, 46–55 years, ≥56 years), sex (men, women), race (White, non-White), marital status (married, never married, other), educational attainment (high school or less, some college, university degree or more), annual household income (<\$60 000, \$60 000–99 999, ≥\$100 000), current cigarette smoking (no, yes), alcohol consumption (low to moderate drinking, up to 2 drinks per day for men and 1 drink per day for women; heavy drinking, more than moderate drinking), and physical exercise (low, never; moderate, once a week to once a month; high, several times a week). In addition, other risk factors for hypertension such as psychological job demand (5-item validated scale with score range 5–25; example item: "How often do you have to work intensively?"), job control (9-item validated scale with score range 9–45; example item: "How often do you have a say in decisions about your work?"),[12,16] and major depressive episode during the 12 past months (a binary variable based on the 19-item well-established Composite International Diagnostic Interview Short Form). An affirmative diagnosis of major depressive episode requires the simultaneous presence of either depressed mood or anhedonia for most of the day, nearly every day, and ≥4 symptoms (such as fatigue, appetite change, insomnia for a period of at least 2 weeks).[12]

Statistical Analysis

First, descriptive statistics were generated for characteristics of the study samples. Means and SDs were calculated for continuous variables, and relative frequencies were examined for categorical variables. Second, the prospective associations of workplace discrimination at baseline with time-to-event outcomes (onset of hypertension) during follow-up were estimated using Cox proportional hazards regression. Estimates were calculated as hazard ratios (HRs) with 95% CIs and adjusted for covariates in 4 multivariable models. Model I was adjusted for age, sex, marital status, educational attainment, and household income. Further adjustment for smoking, alcohol consumption, and physical exercise was added in Model II. Model III and Model IV additionally adjusted for other risk factors of hypertension, including psychological job demand,

job control, and major depressive episode, respectively. Hypothesis tests were 2-sided at the 5% α level. Calendar time was used as the time scale of the Cox proportional hazards models for calculating length of follow-up in terms of person-years, and participants were right-censored at the end of follow-up (up to June 2014) or the time of diagnosis of hypertension, depending on whichever came first. The proportional hazards assumptions of the Cox models were verified by the SAS PHREG procedure and ASSESS function with the PH option (the supremum test). Alternatively, logistic regression was also applied for data analyses. Finally, using a subsample of the Biomarker Project in MIDUS II with measured SBP and diastolic blood pressure (N=625), we examined baseline cross-sectional associations of workplace discrimination with measured blood pressure via linear regression. All analyses were conducted using the SAS 9.4 software package (SAS Institute, Cary, NC).

RESULTS

At baseline, the sample of 1246 study participants for main analyses were predominantly middle aged, with roughly equal numbers of men and women. Most participants were White and were married. Almost half of all participants had at least some college education. Most participants were nonsmokers, had no-to-moderate alcohol consumption, and engaged in moderate-to-high physical exercise. Approximately 8% of participants fulfilled criteria for a major depressive episode at baseline. The characteristics of the sample for sensitivity analyses (N=975) were similar to those for the main analyses (Table 1).

During the average follow-up period of 7.96 years (9923.17 person-years) among the study sample of 1246, there were 319 new cases of hypertension reported, with an overall incidence rate of 32.15 per 1000 person-years. Hypertension incidence rates were 25.90, 30.84, and 39.33 per 1000 person-years among participants with low, intermediate, and high levels of workplace discrimination, respectively. Table 2 displays the results of the Cox regression analyses. In the fully adjusted model (Model IV), the HRs of hypertension among individuals who experienced discrimination at work were 1.22 (95% CI, 0.90–1.65 for intermediate exposure) and 1.54 (95% CI, 1.11–2.13 for high exposure), suggesting a significant trend of increasing hypertension incidence rates with increasing perceptions of workplace discrimination (P for trend=0.008). The sensitivity analyses indicated that, when using blood pressure in combination with antihypertensive medication use to define prevalent hypertension, a similar pattern was observed; the hazard of hypertension was significantly elevated by high-level exposure to workplace discrimination, with slightly stronger associations

Table 1. Characteristics of Study Participants at Baseline

Variables	Sample size for main analyses, N=1246	Sample size for sensitivity analyses, N=975
Age, y		
≤45	451 (36.20)	362 (37.13)
46–55	476 (38.20)	381 (39.08)
≥56	319 (25.60)	232 (23.79)
Sex		
Men	599 (48.07)	445 (45.64)
Women	647 (51.93)	530 (54.36)
Race		
White	1165 (93.50)	918 (94.15)
Non-White	81 (6.50)	57 (5.85)
Marital status		
Married	933 (74.88)	738 (75.69)
Never married	120 (9.63)	90 (9.23)
Other	193 (15.49)	147 (15.08)
Educational attainment		
High school or less	281 (22.55)	232 (23.79)
Some college	335 (26.89)	248 (25.44)
University degree or more	630 (50.56)	495 (50.77)
Annual household income, US$		
<60000	430 (34.51)	339 (34.77)
60000–99999	398 (31.94)	314 (32.20)
≥100000	418 (33.55)	322 (33.03)
Current smoking		
No	1083 (86.92)	845 (86.67)
Yes	163 (13.08)	130 (13.33)
Alcohol consumption		
None to moderate	1217 (97.67)	950 (97.44)
Heavy	29 2 (0.33)	25 (2.56)
Physical exercise		
Low	272 (21.83)	211 (21.64)
Moderate	420 (33.71)	332 (34.05)
High	554 (44.46)	432 (44.31)
Psychological job demand, mean±SD	15.09±3.24	15.12±3.26
Job control, mean±SD	33.63±5.54	33.66±5.54
Major depressive episode		
No	1146 (91.97)	893 (91.59)
Yes	100 (8.03)	82 (8.41)

Data are presented as n (%) unless indicated otherwise.

(HR, 1.72 [95% CI, 1.17–2.51]). Further details of the fully adjusted models (Model IV) are presented in Table S1. The findings based on logistic regression are similar to those based on the Cox proportional hazards regression (see Table S2).

The results of cross-sectional analyses at baseline for measured blood pressure showed that workers who reported high levels of workplace discrimination had an increase or 4.36 mm Hg for diastolic blood pressure and 4.65 mm Hg for SBP (for details, see Table S3).

DISCUSSION

To the best of our knowledge, this 8-year follow-up cohort study is the first prospective study showing an association between exposure to workplace discrimination at baseline and onset of hypertension at follow-up. Estimates indicated an exposure-response association, offering preliminary evidence for causality, and the association remained robust after adjustment for numerous covariates, including demographic factors, socioeconomic status, health behaviors, other psychosocial workplace factors, and prevalent major depressive episodes at baseline. Our findings were strengthened by supplementary analyses among a cross-sectional subsample at baseline who had data on measured blood pressure.

Previously, only cross-sectional studies reported findings on associations between workplace discrimination and hypertension. For instance, in the Metro Atlanta Heart Disease Study, it was reported that racial discrimination at work was associated with hypertension in Black individuals.[8] In contrast, in the United for Health Study in the Greater Boston Area and the national Health and Retirement Study, workplace abuse and discrimination were not related to hypertension in the entire samples of workers or in ethnic groups.[5,9] Importantly, although hypertension associations were null, the United for Health Study formalized the inverse hazard law, as well as compelling findings critical to issues of social justice and health equity. Employees subjected to more stressful or hazardous working conditions were more likely to be racial minority groups and women, and "in a context of high exposure, differential susceptibility to exposure matters."[5]

Potential biologically plausible mechanisms underlying the association between discrimination and adverse cardiovascular outcomes center around perturbations to the psycho–neuro–endocrine–immune systems, especially the hypothalamic–pituitary–adrenocortical axis, autonomic nervous system, and proinflammatory immune response.[17] The human body undergoes high arousal when encountering discriminatory experiences, resulting in activation of the cardiovascular system to cope with stress. With chronic exposure, high levels of discrimination lead to increased cardiovascular susceptibility because of continued stress reactions, culminating in reduced capacity for recovery and elevated allostatic load.[17]

The prevailing strengths of this study are grounded in the nature of the study design and the study sample. This is the first study to examine the contribution of workplace discrimination to the development of hypertension in US workers using prospective cohort

Table 2. Prospective Associations of Workplace Discrimination at Baseline With Onset of Hypertension During Follow-Up

	No. of study participants (new hypertension cases)	Incidence rates of hypertension, per 1000 person-years	Model I	Model II	Model III	Model IV
Main analyses, N=1246						
Workplace discrimination						
Low	362 (77)	25.90	1.00	1.00	1.00	1.00
Intermediate	464 (114)	30.84	1.26 (0.94–1.68)	1.25 (0.93–1.68)	1.22 (0.90–1.65)	1.22 (0.90–1.65)
High	420 (128)	39.33	1.59 (1.19–2.14)*	1.61 (1.20–2.16)*	1.54 (1.11–2.13)*	1.54 (1.11–2.13)*
P for trend			0.0017	0.0014	0.0083	0.0082
Sensitivity analyses, N=975						
Workplace discrimination						
Low	283 (54)	22.75	1.00	1.00	1.00	1.00
Intermediate	368 (78)	25.90	1.19 (0.84–1.69)	1.20 (0.84–1.70)	1.21 (0.84–1.74)	1.21 (0.84–1.74)
High	324 (94)	36.87	1.66 (1.18–2.34)*	1.68 (1.19–2.38)*	1.72 (1.17–2.51)*	1.72 (1.17–2.51)*
P for trend			0.0031	0.0026	0.0043	0.0044

Data are presented as hazard ratios and 95% CIs. Cox proportional hazards regression, Model I: adjustment for demographic factors (age, sex, race, marital status) and socioeconomic status (education, household income) at baseline; Model II: Model I+additional adjustment for behavioral factors (smoking, alcohol consumption, and physical exercise) at baseline; Model III: Model II+additional adjustment for other workplace psychosocial factors (psychological job demand, job control) at baseline; Model IV: Model III+additional adjustment for major depressive episode at baseline.

*$P<0.01$.

data from a national, population-based sample. The sensitivity analyses conducted further demonstrated the stability and robustness of the findings. In the primary analyses, prevalent cases of hypertension at baseline were excluded based on self-reported doctor-diagnosed hypertension. However, in the sensitivity analyses, the 2017 *American College of Cardiology/ American Heart Association Guideline* diagnostic criteria for SBP and diastolic blood pressure readings were applied, resulting in a far stricter definition of baseline hypertension that excluded further participants. Yet, in the sensitivity analyses, the associations of workplace discrimination hypertension not only remained significant, but demonstrated a stronger effect size.

Several limitations of our study need to be addressed. First, our results may be tempered by a degree of selection bias, because participants lost to follow-up were more likely to be non-White, less educated, with lower job control, and had higher hypertension prevalence. Second, unlike previous studies,[5,8] the measure of workplace discrimination in the MIDUS study was generic, without targeting of specific personal characteristics such as race, sex, age, religion, health, or sexual orientation. Therefore, the risk of hypertension attributable to workplace discrimination in this study might be concise because of lack of precise information, for instance, on race-related, sex-related, or age-related discrimination at work. Third, although sufficient validity of self-reported hypertension in comparison with clinically measured hypertension is documented,[18] unrecognized or undiagnosed cases of hypertension may have led to underestimation of the observed associations. The sensitivity analyses suggested stronger

associations when applying additional information on blood pressure plus antihypertensive medication use for defining prevalent hypertension. Finally, as discussed by Krieger and colleagues, multiple factors may have limited the ability to accurately capture the magnitude of the associations.[5] These include the relatively high prevalence of participants who experienced high workplace discrimination in the sample and the high probability of participants underreporting experiences of workplace discrimination, possibly because of a protective psychological mechanism of distancing from negative self-appraisals. Based on limitations on accurately classifying exposure and potentially exerting a downward bias toward the null, we may tentatively hypothesize that the true effect size of the associations is greater than those ultimately detected by the statistical analyses.

CONCLUSIONS

We found that workplace discrimination was prospectively associated with elevated risk of hypertension among US workers. If supported by further research, our findings may offer several evidence-based implications. In terms of primary prevention, although there are not yet interventional studies at the organizational level to eliminate workplace discrimination, a successful 3-year quasiexperimental study reported a reduction of SBP by 2.0 mm Hg following improvements of working conditions such as decreasing job demand and increasing job control.[19] At the individual level, a potential approach might be to improve workers' coping skills. Preliminary evidence has been reported

among hypertensive workers from the United States, where 10-week, group-based training in cognitive behavioral stress management resulted in a lower SBP of 9.1 mmHg compared with only a 1.7-mmHg decrease in the control group.[20] Such stress management interventions were also clinically effective in lowering medical events and mortality among patients with coronary heart disease.[21]

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SUPPLEMENTAL MATERIAL

Table S1. Prospective Associations of Workplace Discrimination and Other Covariates at Baseline with Onset of Hypertension during Follow-up (HRs and 95% CIs)

Variables		Main analyses (N = 1,246)	Sensitivity analyses (N = 975)
Age (years)	≤45	1.00	1.00
	46–55	1.26 (0.96, 1.66)	1.22 (0.89, 1.67)
	≥56	1.83 (1.36, 2.46)	1.59 (1.11, 2.26)
Sex	Men	1.00	1.00
	Women	0.92 (0.73, 1.16)	1.01 (0.77, 1.32)
Race	White	1.00	1.00
	Others	1.26 (0.84, 1.89)	0.98 (0.56, 1.70)
Marital status	Married	1.00	1.00
	Never married	1.13 (0.76, 1.68)	1.19 (0.74, 1.93)
	Others	1.36 (1.00, 1.86)	1.31 (0.90, 1.91)
Educational attainment	High school or less	1.00	1.00
	Some college	1.14 (0.84, 1.54)	1.02 (0.72, 1.46)
	University degree or more	0.99 (0.73, 1.34)	0.87 (0.61, 1.23)
Annual household income (US $)	<60,000	1.00	1.00
	60,000–99,999	1.13 (0.86, 1.49)	1.08 (0.78, 1.50)
	≥100,000	0.83 (0.61, 1.14)	0.79 (0.54, 1.16)
Current smoking	No	1.00	1.00
	Yes	1.13 (0.81, 1.58)	1.32 (0.88, 2.00)
Alcohol consumption	No to moderate	1.00	1.00
	Heavy	1.23 (0.63, 2.41)	1.18 (0.56, 2.53)
Physical exercise	High	1.00	1.00
	Moderate	1.21 (0.93, 1.58)	1.26 (0.91, 1.73)
	Low	1.56 (1.17, 2.08)	1.67 (1.18, 2.35)
Psychological job demand	(continuous)	1.02 (0.98, 1.06)	1.01 (0.97, 1.06)
Job control	(continuous)	1.00 (0.98, 1.02)	1.01 (0.99, 1.04)
Major depressive episode	No	1.00	1.00
	Yes	1.08 (0.72, 1.63)	0.90 (0.55, 1.49)
Workplace discrimination	Low	1.00	1.00
	Intermediate	1.22 (0.90, 1.65)	1.21 (0.84, 1.74)

| | High | 1.54 (1.11, 2.13) | 1.72 (1.17, 2.51) |

CI, confidence interval; HR, hazard ratio; US, United States.
Cox proportional hazards regression, fully adjusted estimates.

Table S2. Prospective Associations of Workplace Discrimination and Other Covariates at Baseline with Onset of Hypertension during Follow-up (ORs and 95% CIs)

Variables		Main analyses (N = 1,246)	Sensitivity analyses (N = 975)
Age (years)	≤45	1.00	1.00
	46–55	1.28 (0.94, 1.76)	1.22 (0.85, 1.75)
	≥56	1.91 (1.34, 2.71)	1.58 (1.04, 2.40)
Sex	Men	1.00	1.00
	Women	0.92 (0.70, 1.22)	1.02 (0.74, 1.40)
Race	White	1.00	1.00
	Others	1.27 (0.77, 2.10)	0.94 (0.49, 1.79)
Marital status	Married	1.00	1.00
	Never married	1.13 (0.70, 1.80)	1.18 (0.68, 2.07)
	Others	1.46 (1.00, 2.12)	1.37 (0.87, 2.15)
Educational attainment	High school or less	1.00	1.00
	Some college	1.17 (0.81, 1.69)	1.08 (0.71, 1.65)
	University degree or more	0.96 (0.67, 1.36)	0.83 (0.56, 1.25)
Annual household income (US $)	<60,000	1.00	1.00
	60,000–99,999	1.15 (0.82, 1.61)	1.08 (0.74, 1.59)
	≥100,000	0.81 (0.56, 1.16)	0.76 (0.49, 1.18)
Current smoking	No	1.00	1.00
	Yes	1.13 (0.76, 1.68)	1.38 (0.86, 2.21)
Alcohol consumption	No to moderate	1.00	1.00
	Heavy	1.33 (0.58, 3.03)	1.28 (0.51, 3.19)
Physical exercise	High	1.00	1.00
	Moderate	1.28 (0.94, 1.74)	1.31 (0.91, 1.89)
	Low	1.71 (1.21, 2.41)	1.83 (1.22, 2.75)
Psychological job demand	(continuous)	1.02 (0.98, 1.07)	1.01 (0.96, 1.06)
Job control	(continuous)	1.00 (0.98, 1.03)	1.01 (0.98, 1.04)
Major depressive episode	No	1.00	1.00
	Yes	1.10 (0.68, 1.78)	0.90 (0.51, 1.60)
Workplace discrimination	Low	1.00	1.00
	Intermediate	1.24 (0.87, 1.76)	1.20 (0.80, 1.81)

| | High | 1.65 (1.13, 2.41) | 1.82 (1.18, 2.83) |

CI, confidence interval; OR, odds ratio; US, United States.
Logistic regression, fully adjusted estimates.

Table S3. Cross-sectional Associations of Workplace Discrimination at Baseline with Measured Blood Pressure at Baseline (β coefficients and 95% CIs) (N = 625) *

Diastolic blood pressure (mm Hg)		Number of study participants	Crude blood pressure (Mean and SD)	Model I	Model II	Model III	Model IV
Workplace discrimination	Low	195	74.76 (10.15)	0.00	0.00	0.00	0.00
	Intermediate	214	75.47 (9.79)	0.70 (-1.20, 2.60)	0.76 (-1.13, 2.66)	1.07 (-0.90, 3.04)	1.07 (-0.90, 3.04)
	High	216	79.29 (10.19)	3.68 (1.73, 5.64) †	3.81 (1.85, 5.78) †	4.39 (2.19, 6.59) †	4.36 (2.15, 6.57) †
	p for trend			0.0002	0.0001	<0.0001	0.0001
Systolic blood pressure (mm Hg)							
Workplace discrimination	Low	195	129.03 (18.14)	0.00	0.00	0.00	0.00
	Intermediate	214	129.61 (17.96)	2.21 (-0.99, 5.40)	2.27 (-0.93, 5.47)	2.78 (-0.55, 6.10)	2.75 (-0.58, 6.08)
	High	216	131.46 (15.62)	3.60 (0.31, 6.89)*	3.84 (0.52, 7.15)*	4.76 (1.04, 8.48)*	4.65 (0.93, 8.37)*
	p for trend			0.0321	0.0234	0.0123	0.0146

CI, confidence interval.

Linear regression, *p*<0.05, †*p*<0.01.

Model I: adjustment for demographic factors (age, sex, race, marital status) and socioeconomic status (education, household income) at baseline;

Model II: Model I + additional adjustment for behavioral factors (smoking, alcohol consumption, and physical exercise) at baseline;

Model III: Model II + additional adjustment for other workplace psychosocial factors (psychological job demand, job control) at baseline;

Model IV: Model III + additional adjustment for major depressive episode at baseline.

* The data of measured blood pressure were derived from the Biomarker Project in the MIDUS II which was based on a subsample (N = 1,255) out of the total participants (N = 4,963). Among the 2,180 workers of cross-sectional analytic sample, 626 were identified to participate in the Biomarker Project. One individual did not have valid data of blood pressure, therefore the sample size for analyses on workplace discrimination and measured

blood pressure was 625. Study participants were asked to rest for 5 minutes before the blood pressure assessment. In a seated position, blood pressure was assessed three times consecutively with a 30-second interval between each measurement, and the two most similar readings were averaged.[22]