

Perceived Discrimination, Psychological Distress, and Current Smoking Status: Results From the Behavioral Risk Factor Surveillance System Reactions to Race Module, 2004–2008

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The public health burden of cigarette smoking is well established. Smoking is the leading preventable cause of mortality in the United States, accounting for 1 of every 5 deaths,¹ and is associated with cardiovascular and respiratory diseases as well as several cancers and adverse reproductive effects.² Although rates of smoking have declined over the past several decades, a substantial proportion of the population still smokes.

Data from the National Health Interview Survey show that 21% of adults aged 18 years or older are current smokers.³ Smoking prevalence is substantially higher among those of lower socioeconomic status (SES), and because of the disproportionate representation of minorities among the poor, low-SES members of racial/ethnic minority groups are particularly affected by smoking-related health disparities.^{4,5} When considered by race, the highest rate of adult smoking is found among American Indians and Alaska Natives (23%), followed by African Americans and Whites (both 21%); the lowest rate is that among Asian Americans (10%).³ The rate of smoking in the adult Hispanic population is 15%.³ In light of high levels of smoking-related morbidity and mortality and demonstrated health disparities, it is important to understand the factors that promote smoking among members of different racial/ethnic groups.

Several investigators have proposed that perceived discrimination or unfair treatment may account in part for disparities in health behaviors and outcomes, particularly among members of racial and ethnic minority groups.^{6–8} Much of this work has been developed within the framework of stress and coping models, with perceived discrimination treated as a chronic stressor that has potentially negative effects on health.^{8,9}

Objectives. We examined the association between perceived discrimination and smoking status and whether psychological distress mediated this relationship in a large, multiethnic sample.

Methods. We used 2004 through 2008 data from the Behavioral Risk Factor Surveillance System Reactions to Race module to conduct multivariate logistic regression analyses and tests of mediation examining associations between perceived discrimination in health care and workplace settings, psychological distress, and current smoking status.

Results. Regardless of race/ethnicity, perceived discrimination was associated with increased odds of current smoking. Psychological distress was also a significant mediator of the discrimination–smoking association.

Conclusions. Our results indicate that individuals who report discriminatory treatment in multiple domains may be more likely to smoke, in part, because of the psychological distress associated with such treatment. (*Am J Public Health.* 2012;102:844–851. doi:10.2105/AJPH.2012.300694)

Investigations linking discrimination to smoking are included in this growing body of research. For example, studies involving adolescent,¹⁰ young adult,^{11,12} and adult^{13,14} African Americans have shown that experiences of racial discrimination, and the stress caused by such experiences, are positively associated with cigarette smoking. Similar findings were reported in a study of Asian Americans experiencing high levels of unfair treatment and racial/ethnic discrimination, who were 2 to almost 3 times more likely to be current smokers than those who experienced no unfair treatment or discrimination.¹⁵

Landrine et al. reported that racial/ethnic discrimination is associated with psychiatric symptoms as well as smoking behavior, and these relationships were stronger for racial and ethnic minority groups.¹⁴ Krieger et al. found a trend toward an association between discrimination and smoking among Blacks and Latinos but not among Whites.¹⁶ Guthrie et al. demonstrated that a daily hassles measure of stress mediated the relationship between reported discrimination and smoking among

African American adolescent girls, offering support for stress and coping explanations of the relationship between discrimination and smoking.¹⁰

According to Williams et al., in their review of the literature on discrimination and health, more research exploring mechanisms underlying the association between discrimination and health is needed.⁸ Much of the research on discrimination and smoking has been framed within stress and coping models, but relatively little work has been done to test whether psychological distress mediates this relationship.

The theoretical framework that guided our investigation is the Clark et al. biopsychosocial model of the effects of perceived racism,⁹ which proposes that psychological distress may be one of the psychological responses to perceived discrimination. Consistent with this model, several studies have shown an association between perceived discrimination and psychological distress.^{17–19} However, whereas the Clark et al. model considers the relationship between discrimination and health outcomes,

we were interested in the health behavior of smoking, which is commonly thought of as a means of coping with stress²⁰ and is also associated with certain forms of psychological distress and psychopathology.²¹ Smoking may be used as a form of self-medication to alleviate stress and associated psychological distress.

Reports on the association between discrimination and smoking have also tended to focus on single racial or ethnic groups (e.g., African Americans, Asian Americans) or have compared members of a single racial/ethnic minority group with Whites, limiting our ability to compare the relative effects of perceived discrimination on smoking behavior between groups. In addition, most previous research has involved convenience samples and, in some cases, relatively small sample sizes, limiting generalizability.

We used 2004 through 2008 data from the Behavioral Risk Factor Surveillance System (BRFSS) to examine the association between perceived discrimination and smoking status and whether psychological distress mediates this association in a large multistate, multiethnic random sample. Beginning in 2002, an optional module, Reactions to Race, was added to the BRFSS and adopted by several states in an attempt to capture data on perceived racial discrimination and its effects in a population-based sample.

On the basis of findings from previous studies examining perceived discrimination and smoking, we hypothesized that the odds of smoking would be higher among those who perceived that they were treated differently because of their race (hypothesis 1). We also hypothesized that the association between discrimination and smoking would be stronger for racial and ethnic minority groups (hypothesis 2) and that psychological distress, as measured by reported mental health problems, would mediate the association between discrimination and smoking status (hypothesis 3).

METHODS

The BRFSS is administered by the Centers for Disease Control and Prevention along with US states and territories. It involves a random-digit-dialing, multistage-cluster sample survey designed to collect data on preventive health practices and risk behaviors linked to chronic

diseases, injuries, and preventable infectious diseases in the adult population (those aged 18 years or older).²² The survey has 3 parts: the core component, optional modules, and state-added questions.

Although the Reactions to Race module was added in 2002, we used BRFSS data from 2004 through 2008 because the 2002 and 2003 modules were not available from the Centers for Disease Control and Prevention for analysis. The 2008 data were the most recent data available at the time of the study. The module was administered by Arkansas, Colorado, Delaware, the District of Columbia, Mississippi, Rhode Island, South Carolina, and Wisconsin in 2004; Delaware and Ohio in 2005; Michigan and Wisconsin in 2006; Rhode Island in 2007; and Nebraska and Virginia in 2008. We pooled 2004 through 2008 data for these 11 states and the District of Columbia. A total of 90 363 respondents were administered the BRFSS survey in the states and years selected, and 85 130 of these individuals (94.2%) completed the Reactions to Race module.

Measures

Perceived discrimination. Perceived racial discrimination was assessed in 2 domains (i.e., while seeking health care and in the workplace) as measured by the Reactions to Race module. Perceived racial discrimination while seeking health care was assessed with the following item: “Within the past 12 months when seeking health care, do you feel your experiences were worse than, the same as, or better than people of other races?” Perceived racial discrimination at work was assessed with the item “Within the past 12 months at work, do you feel you were treated worse than, the same as, or better than people of other races?”

In addition to better than, the same as, and worse than people of other races, individuals could respond that they felt they were treated worse than some races and better than others. For both discrimination items, these 4 responses were coded 1 to 4, respectively, with lower scores indicating not being the perceived target of discrimination and higher scores indicating some degree of perceived discrimination. Individuals could also respond that they encountered only people of the same race. These respondents were excluded from

analyses related to the 2 perceived discrimination items.

Two yes–no items were used to assess the effects associated with perceived discrimination. The emotional effect of perceived discrimination was assessed with the following item:

During the past 30 days, have you felt emotionally upset, for example angry, sad, or frustrated, as a result of how you were treated based on your race?

The physical effect of perceived discrimination was assessed with the item:

Within the past 30 days, have you experienced any physical symptoms, for example headache, an upset stomach, tensing of your muscles, or a pounding heart, as a result of how you were treated based on your race?

Psychological distress. Psychological distress was examined as a potential mediator of the association between perceived racial discrimination and cigarette smoking. Psychological distress was assessed with a single item: “Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?” Potential scores on the item ranged from 0 (none of the past 30 days) to 30 (all of the past 30 days).

Current smoking. The primary outcome variable was current smoking status, which was assessed with the following items: “Have you smoked at least 100 cigarettes in your entire life?” and “Do you now smoke cigarettes every day, some days, or not at all?” Respondents who reported having smoked at least 100 cigarettes and smoked every day and some days were coded as current smokers. Respondents who had not smoked at least 100 cigarettes and those who responded not at all to the question on current smoking were coded as non-smokers.

Potential confounders. We identified a number of variables from the literature that could potentially confound the association between perceived discrimination and cigarette smoking. Potential confounders used in our analyses included age, gender, self-identified race, marital status, income, education, health insurance coverage, self-rated general health status, and state of residence.

TABLE 1—Sociodemographic Characteristics, by Smoking Status, Among Adults Who Completed the Behavioral Risk Factor Surveillance System Reactions to Race Module: United States, 2004–2008

	Nonsmokers, No. (Weighted %)	Smokers, No. (Weighted %)
Total	68 626 (79.0)	16 504 (21.0)
Age, y		
18–24	3092 (12.4)	1106 (16.2)
25–34	8046 (16.2)	2674 (21.0)
35–44	10 989 (18.6)	3590 (22.6)
45–54	13 500 (18.7)	4255 (21.5)
55–64	12 935 (14.2)	2884 (11.7)
≥ 65	19 545 (19.5)	1930 (6.7)
Missing	519 (0.3)	584 (0.2)
Gender		
Male	25 364 (47.3)	6886 (52.1)
Female	43 262 (52.7)	9618 (47.9)
Race/ethnicity		
Non-Hispanic White	56 442 (81.6)	12 973 (79.4)
Non-Hispanic Black	6974 (8.8)	2062 (10.7)
Hispanic	2412 (4.1)	583 (3.9)
Other	2208 (4.7)	763 (5.4)
Missing	590 (0.8)	123 (0.6)
Marital status		
Married/coupled	40 912 (67.2)	7782 (54.6)
Divorced/separated/widowed	18 542 (15.3)	5591 (21.3)
Never married	8974 (17.2)	3086 (23.9)
Missing	225 (0.3)	45 (0.2)
Annual income, \$		
< 20 000	9977 (11.0)	3802 (18.8)
20 000–34 999	13 162 (18.2)	4130 (25.6)
35 000–74 999	20 991 (31.4)	4866 (31.0)
≥ 75 000	15 024 (26.3)	2037 (13.9)
Missing	9472 (13.1)	1669 (10.7)
Educational attainment		
< high school	5630 (7.1)	2298 (14.4)
High school or equivalent	20 646 (29.2)	6517 (42.1)
Some college	17 416 (26.5)	4718 (28.1)
College	24 819 (37.1)	2953 (15.2)
Missing	115 (0.2)	18 (0.1)
Health insurance coverage		
Yes	62 809 (90.0)	13 268 (76.5)
No	5645 (9.6)	3192 (23.1)
Missing	170 (0.5)	44 (0.4)

Continued

Age in years was categorized into 6 groups: 18 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 64, and 65 or older. Self-identified racial categories included non-Hispanic White, non-Hispanic Black, Hispanic or Latino, and other (Asian, Native Hawaiian, other Pacific Islander, American Indian, Alaska Native, or another group). Marital status was categorized as married or coupled; divorced, widowed, or separated; and never married. Yearly income was categorized into 4 groups: less than \$20 000, \$20 000 to \$34 999, \$35 000 to \$74 999, and \$75 000 or more. Educational attainment was categorized as less than high school, high school or equivalent, some college, and college.

A binary variable created for health insurance coverage was based on whether participants were enrolled in a health care plan (including Medicare and Medicaid). Self-rated health status was coded into 5 categories: excellent, very good, good, fair, or poor. In the case of all variables, don't know and not sure responses were categorized as missing data, as were responses indicating refusal.

Statistical Analysis

We used SAS version 9.2 SURVEY procedures in all of our analyses to account for the complex sampling design of the BRFSS and to obtain unbiased standard errors.²³ Sample sizes presented in the tables are not weighted; however, all proportions, means, odds ratios (ORs), and 95% confidence intervals (CIs) are weighted via the final weight provided in the data set to represent the corresponding population. We used χ^2 statistics to examine sociodemographic characteristics by current smoking status. The statistical significance level was set at $P < .05$.

We used multivariate logistic regression models to determine associations (ORs) between perceived discrimination and current smoking status after control for all potential confounders (hypothesis 1). We created separate models for health care discrimination, workplace discrimination, emotional reactions, and physical reactions from the Reaction to Race module; models were selected in a stepwise, backward manner. Initially, all model terms (predictor variable and covariates) were added to the logistic model. Covariates that were not significant ($P > .05$) in the model were removed 1 at a time, beginning with the covariate with the greatest P value. We report ORs

TABLE 1—Continued

General health status		
Excellent	14 050 (22.0)	2042 (13.9)
Very good	23 567 (37.1)	5008 (31.5)
Good	19 840 (27.7)	5670 (35.2)
Fair	7793 (9.4)	2530 (13.8)
Poor	3127 (3.4)	1197 (5.3)
Missing	248 (0.3)	56 (0.3)
State or city of residence		
Arkansas	2997 (3.9)	880 (4.8)
Colorado	4701 (7.1)	1077 (6.6)
Delaware	6372 (2.6)	1745 (2.8)
District of Columbia	2242 (0.9)	514 (0.9)
Michigan	4451 (15.7)	1093 (16.9)
Mississippi	3942 (4.1)	1119 (5.0)
Nebraska	13 305 (2.8)	2460 (2.4)
Ohio	5392 (16.9)	1535 (18.2)
Rhode Island	6174 (3.2)	1359 (2.8)
South Carolina	4230 (4.9)	1189 (5.9)
Virginia	4346 (12.9)	814 (9.5)
Wisconsin	10 474 (25.0)	2719 (24.2)

Note. The sample size was n = 85 130. All group differences were significant at the $P < .001$ level.

and 95% CIs adjusted for the covariates found to be significant in the final model.

We also tested models stratified by race/ethnicity (hypothesis 2). Full models are presented in Appendix A (available as

a supplement to the online version of this article at <http://www.ajph.org>). We examined similar models with the same covariates and occasional and everyday smoking as the outcomes.

Although the data were cross sectional, we chose to conduct mediation analyses to provide conceptual support for psychological distress as a mediator of the association between perceived discrimination and smoking behavior (hypothesis 3). As suggested by Preacher and Hayes,²⁴ we initially tested 2 regression models to determine the coefficients and standard errors for the association between the independent variable (i.e., perceived discrimination) and the mediator (i.e., psychological distress) and the association of the mediator and dependent variable (i.e., smoking) with the independent variable included in the model.

We then calculated bias-corrected and accelerated bootstrap confidence intervals of the sampling distribution of the indirect effect to assess statistically significant mediation.²⁵ The bootstrapping procedure allows for a 95% CI to be constructed around a point estimate of the indirect effect and is not constrained by the assumption that the sampling distribution of the indirect effect is normal. A 95% CI that does not include zero indicates statistically significant mediation.

Following the advice of Preacher (written communication, February 2010), we used 2 million bootstrap resamples. Although formal

TABLE 2—Experiences of Discrimination, by Race/Ethnicity: Behavioral Risk Factor Surveillance System Reactions to Race Module: United States, 2004–2008

	Non-Hispanic White, No. (Weighted %)	Non-Hispanic Black, No. (Weighted %)	Hispanic, No. (Weighted %)	Other, No. (Weighted %)
Health care				
Treated better	9228 (13.6)	611 (7.4)	310 (10.4)	313 (10.1)
Treated the same	48 624 (83.8)	6322 (78.8)	2189 (81.5)	2066 (82.7)
Treated worse than some but better than others	338 (1.1)	280 (4.9)	35 (2.2)	61 (3.4)
Treated worse	1011 (1.5)	746 (8.9)	153 (5.9)	118 (3.8)
Workplace				
Treated better	1830 (4.7)	161 (4.4)	95 (6.1)	92 (4.7)
Treated the same	35 657 (91.5)	3758 (72.7)	1483 (81.8)	1367 (83.9)
treated worse than some but better than others	294 (1.2)	221 (6.0)	42 (2.8)	50 (3.3)
Treated worse	1073 (2.7)	855 (16.9)	200 (9.3)	129 (8.1)
Emotional				
Yes	2945 (4.5)	2197 (16.3)	509 (12.8)	496 (10.1)
No	65 899 (95.5)	6652 (83.7)	2462 (87.2)	2417 (89.9)
Physical				
Yes	2132 (5.7)	1369 (27.8)	338 (19.3)	291 (21.6)
No	66 653 (94.3)	7485 (72.2)	2630 (80.7)	2618 (78.4)

Note. All group differences were significant at the $P < .001$ level.

TABLE 3—Crude and Adjusted Odds Ratios for Current Smoking, by Experiences of Discrimination: Behavioral Risk Factor Surveillance System Reactions to Race Module: United States, 2004–2008

Measure	Crude OR (95% CI)	SE	Adjusted OR (95% CI)	SE
Perceived discrimination				
Health care	1.52** (1.43, 1.62)	0.03	1.18** (1.09, 1.26)	0.03
Workplace	1.23** (1.13, 1.33)	0.04	1.13** (1.03, 1.23)	0.05
Emotional effects of discrimination				
No emotional effects (Ref)	1.00		1.00	
Emotional effects	1.49 (1.34, 1.67)	0.06	1.09 (0.96, 1.24)	0.07
Physical effects of discrimination				
No physical effects (Ref)	1.00		1.00	
Physical effects	1.51 (1.33, 1.71)	0.06	0.99 (0.85, 1.15)	0.08

Note. CI = confidence interval; OR = odds ratio. All analyses were adjusted for age, gender, race/ethnicity, marital status, annual income, education, health insurance, general health status, and state of residence.

** $P < .001$.

effect size estimates for mediation involving dichotomous outcomes have not been developed, we also followed the advice of Preacher (written communication, October 2011) in attempting to provide at least some information on the practical significance of mediation results. We report the ratio of the indirect effect to the total effect, or the mediation ratio (P_M),

$$(1) \left(P_M = \frac{c - c'}{c} \right)$$

where c is the total effect of the independent variable (perceived discrimination) on the dependent variable (current smoking) and c' is the effect of the independent variable on the dependent variable after control for the mediator (psychological distress).²⁶

RESULTS

Table 1 provides a sociodemographic description of the study sample by smoking status. In comparison with nonsmokers, smokers were more likely to be younger, male, unmarried, and uninsured; to have lower income and educational attainment; and to have relatively poorer self-reported health status. Overall smoking rates were 24.5% among non-Hispanic Blacks, 23.3% among those in the “other” racial/ethnic category, and 20.5% among both non-Hispanic Whites and Hispanics.

Table 2 presents data on perceived discrimination experiences by race/ethnicity. The majority of respondents across racial/ethnic

groups reported that they were treated the same as others. Non-Hispanic Blacks were most likely to report perceived discrimination in both the health care and workplace domains, followed by Hispanics, those in the “other” racial/ethnic category, and, finally, non-Hispanic Whites. The same pattern was observed for adverse physical responses to perceived discrimination, with the exception that those in the “other” racial/ethnic category reported higher levels of negative emotional responses to discrimination than did Hispanics and non-Hispanic Whites.

Table 3 presents results from the logistic regression models testing the association of experiences of discrimination with current smoking status. Because all covariates were significant, all were retained in the final models. Consistent with our first hypothesis, the odds of current smoking were higher among individuals who perceived that they were treated differently because of their race. In comparison with those who received treatment similar to people of other races, those who reported being treated worse than people of other races in health care settings were 18% more likely to be current smokers (adjusted OR = 1.18; 95% CI = 1.09, 1.26), and those who reported worse treatment in the workplace were 13% more likely to smoke (adjusted OR = 1.13; 95% CI = 1.03, 1.23). Emotional and physical responses to discrimination were not associated with current smoking after adjustment for relevant covariates. Contrary to our second

hypothesis, the patterns of association remained the same when interactions by race/ethnicity were considered.

In follow-up analyses (Table 4) designed to further characterize the association between race-based discrimination and current smoking, we examined ORs and CIs for each of the responses independently, with the reference category being responses indicating that the treatment received was the same as that for people of other races. Findings differed according to the domain in which discrimination occurred. Individuals who perceived that they were treated better than other groups in health care settings were 21% less likely to be current smokers (adjusted OR = 0.79; 95% CI = 0.70, 0.90), whereas those who perceived that they were treated worse than other groups in the workplace were 42% more likely to smoke (adjusted OR = 1.42; 95% CI = 1.17, 1.73).

As expected, everyday smokers were more likely than occasional smokers, and occasional smokers were in turn more likely than nonsmokers, to report being the targets of perceived discrimination in both health care settings (4.3%, 3.3%, and 2.1%, respectively; weighted) and the workplace (6.5%, 5.8%, and 4.0%, respectively; weighted). Smokers were more likely than nonsmokers to report emotional and physical symptoms in response to perceived discrimination, although occasional smokers were more likely than everyday smokers to report both emotional (13.5% vs 11.3%) and physical (8.5% vs 8.2%) symptoms.

The results of logistic regression models with occasional and everyday smoking as the outcomes are presented in Appendix B (available as a supplement to the online version of this article at <http://www.ajph.org>). In a logistic regression analysis with occasional smoking as the outcome, neither perceived discrimination nor its effects were associated with occasional smoking. In a similar analysis with everyday smoking as the outcome, odds of everyday smoking were increased among individuals who reported being treated worse than members of other races in health care settings (adjusted OR = 1.21; 95% CI = 1.12, 1.31) as well as the workplace (adjusted OR = 1.15; 95% CI = 1.04, 1.27).

Follow-up analyses by item response showed that individuals who perceived better

TABLE 4—Crude and Adjusted Odds Ratios for Current Smoking, by Perceived Discrimination: Behavioral Risk Factor Surveillance System Reactions to Race Module: United States, 2004–2008

Measure	Crude OR (95% CI)	SE	Adjusted OR (95% CI)	SE
Health care discrimination				
Treated the same (Ref)	1.00		1.00	
Treated better	0.57*** (0.51, 0.63)	0.06	0.79** (0.70, 0.90)	0.06
Treated worse than some but better than others	1.62** (1.22, 2.17)	0.15	1.37 (0.98, 1.91)	0.17
Treated worse	1.86*** (1.56, 2.21)	0.09	1.20 (0.98, 1.46)	0.10
Workplace discrimination				
Treated the same (Ref)	1.00		1.00	
Treated better	1.11 (0.93, 1.33)	0.19	1.16 (0.96, 1.41)	0.21
Treated worse than some but better than others	1.57* (1.07, 1.33)	0.09	1.30 (0.86, 1.96)	0.10
Treated worse	1.66 (1.41, 1.96)	0.08	1.42*** (1.17, 1.73)	0.10

Note. CI = confidence interval; OR = odds ratio. All analyses were adjusted for age, gender, race/ethnicity, marital status, annual income, education, health insurance, general health status, and state or residence.

* $P < .05$; ** $P < .01$; *** $P < .001$.

treatment than people of other races in health care settings were 28% less likely to be everyday smokers (adjusted OR = 0.72; 95% CI = 0.62, 0.82), and those who perceived worse treatment in this setting were 24% more likely to be everyday smokers (adjusted OR = 1.24; 95% CI = 1.00, 1.53). In the workplace, only individuals who perceived worse treatment than people of other races were significantly more likely to be everyday smokers (adjusted OR = 1.46; 95% CI = 1.17, 1.82).

As hypothesized, the association between perceived discrimination and smoking status was mediated by psychological distress. Bias-corrected and accelerated bootstrap (BCa) point estimates were 0.05 (95% CI = 0.04, 0.06; $P_M = 0.08$) for the indirect effect of perceived discrimination in health care settings and 0.04 (95% CI = 0.02, 0.05; $P_M = 0.21$) for perceived discrimination in the workplace. Because the confidence intervals for these point estimates did not include zero, we conclude that there is statistically significant mediation of the relationship between perceived discrimination in both domains and current smoking status through the effect of psychological distress.

Our crude measure of effect size suggests that 8% of the total effect of perceived discrimination in health care settings on smoking status was accounted for by its indirect effect through psychological distress and that 21% of the total effect of perceived discrimination in

the workplace on smoking status was accounted for by its indirect effect through psychological distress. We found a similar pattern in mediation models for occasional smoking with respect to health care settings (BCa point estimate = 0.03; 95% CI = 0.02, 0.03; $P_M = 0.17$) and the workplace (BCa point estimate = 0.02; 95% CI = 0.01, 0.03; $P_M = 0.08$), as well as a similar pattern for everyday smoking with respect to health care settings (BCa point estimate = 0.05; 95% CI = 0.04, 0.06; $P_M = 0.11$) and the workplace (BCa point estimate = 0.04; 95% CI = 0.03, 0.05; $P_M = 0.25$).

DISCUSSION

Our findings from this large multistate, multiethnic study showed that regardless of racial/ethnic background, individuals who reported being treated poorly because of their race were modestly more likely to be current smokers. Workplace discrimination also emerged as potentially more relevant to current smoking than discrimination (i.e., worse treatment) in health care settings. In addition, our results revealed that the association between perceived discrimination and smoking status was mediated by psychological distress, accounting for between 8% and 21% of this association. The positive relationship between perceived discrimination and smoking status is consistent with previous studies.^{10–15}

To our knowledge, however, this study is the first to report that the association between discrimination and smoking holds equally across diverse racial and ethnic groups. Our findings contrast with at least 2 studies showing that the association between discrimination and smoking was stronger for members of racial/ethnic minority groups than for Whites^{12,14} and another reporting a trend in this direction.¹⁶

In the Coronary Artery Risk Development in Adults (CARDIA) Study, discrimination was positively, although not significantly, associated with tobacco use among Whites; it was also associated with use of other substances (i.e., marijuana and cocaine).¹² The use of multidimensional, multi-item scales to measure discrimination in the CARDIA Study¹² and the study by Landrine et al.¹⁴ may account for differences between those studies and ours in the strength of the association between discrimination and smoking in different racial and ethnic groups. It is also possible that, regardless of background, individuals who perceive that they are being treated unfairly because of their race in multiple domains of life are more likely to be smokers.

Still, it should be noted that members of racial and ethnic minority groups were more likely to report perceived discrimination both in our sample and in previous studies,^{12,16} suggesting that discrimination may be a more important contributor to the occurrence of smoking in these populations. Although perceptions of race-related discrimination are relatively rare in the non-Hispanic White population, assessing whether other types of discrimination (e.g., discrimination based on age, gender, socioeconomic position, disability, or sexual orientation) are also associated with an increased risk of cigarette smoking may be warranted in light of our findings. The literature's focus on differences in the impact of discrimination on health as a function of SES, gender, and other sociodemographic characteristics^{7,8} also suggests that the interactions between these factors and discrimination should be examined in future research on smoking and other health behaviors.

Our study also adds to the existing literature by formally examining the role of psychological distress as an important mediator linking discrimination with smoking. Our results suggest that the adverse psychological impact of

discrimination in various domains may lead individuals to smoke. To our knowledge, only 1 previous study examined mediation of the association between discrimination and smoking in a relatively small sample of African American adolescents.¹⁰ Guthrie et al. found that daily hassles mediated the relationship between racial discrimination and cigarette smoking in their sample.

The findings from our study, which involved a large, diverse sample of adults representing several states, provide further evidence for the role that psychological distress plays in smoking among those who experience discrimination. Our findings are also consistent with a large body of research that links perceived discrimination to psychological distress^{7,17,18} and suggest that at least 1 of the deleterious effects of discrimination on health could be through the psychological distress it engenders, along with the negative health behaviors that may be recruited to cope with such distress.

Another important implication of our findings is the different results observed in follow-up analyses of the discrimination–smoking association. When item responses were considered individually instead of as an index of discrimination (i.e., 1 = better treatment, 4 = worse treatment), perceptions of worse treatment than people of other races were associated after adjustment with current smoking in the workplace but not in health care settings.

Better treatment in health care settings was protective in terms of current smoking. This finding makes intuitive sense because workplace discrimination is likely more chronic and more salient in that it is closely tied to one's economic well-being. This result should be interpreted with caution, however, given the nearly identical adjusted odds ratios for health care and workplace models when perceived discrimination was treated as continuous as well as the overlap in confidence intervals of the coefficient for worse treatment in both continuous and categorical treatments of the perceived discrimination variable. The protective nature of preferential treatment in health care settings is an intriguing finding worthy of further investigation.

There were also noteworthy differences when we considered occasional and everyday smoking as subcategories of current smoking. Individuals who perceived worse treatment

than people of other races in health care settings were also more likely to be everyday smokers, suggesting an interesting interaction between perceptions of discrimination, the setting in which discrimination is perceived, and frequency of smoking. The stronger mediation by psychological distress in health care settings among occasional smokers may be related to the episodic nature of perceived discrimination in these settings, which may lead to less regular smoking, whereas everyday smokers who report discrimination in the workplace may be more likely to experience chronic psychological distress. This speculative hypothesis needs to be tested in studies designed for this purpose.

Limitations

Of course, our use of cross-sectional data precludes us from being able to draw any conclusions about causality in this study. As a check on our mediation models, we did run analyses with the predictor and mediator reversed (i.e., perceived discrimination mediating psychological distress and smoking) and found near-zero estimates of indirect effects. This leads us to believe that our hypothesized model is at least preferable to a model in which perceived discrimination is the mediator. Additional longitudinal studies are needed to confirm our findings.

The limitations inherent in our estimates of the effect size of mediation should also be noted, given that methods of effect size estimation for dichotomous outcomes in mediation analyses have not been developed. The use of the mediation ratio is limited in that it does not perform strictly as a proportion in all instances (e.g., P_M may be negative or > 1 depending on the relation of c and c' , although neither was the case for our data) and it is unstable in small samples (also not the case in the present study).²⁶ Therefore, we advise caution in interpreting effect sizes within the context of our mediation analyses.

Our study was also limited by the restricted availability of measures of perceived discrimination and psychological distress within the BRFSS and the Reactions to Race module. Our results may underestimate the association between perceived discrimination and smoking status, and multidimensional, multi-item measures of the constructs under study may have yielded different results with respect

to the strength of the association by race/ethnicity.

Finally, the inconsistent adoption of the optional Reactions to Race module among the states during the study period limits the generalizability of our findings. Characteristics of the states in which the module was used may differ in significant ways from those of states that elected not to use it. Therefore, our results cannot be viewed as representing the nation as a whole.

Conclusions

Despite this study's limitations, it involved the largest and most diverse sample among the studies published to date reporting associations between perceived discrimination and cigarette smoking. It highlights a potentially high-risk group of individuals who report feeling unfairly treated because of their race and who may be smoking as a means of coping with the psychological distress associated with discrimination. Identifying these individuals for targeted smoking cessation interventions may improve cessation rates. Our findings also suggest that alternative forms of coping with discrimination may be a fruitful area of discussion in counseling interventions designed to help individuals quit smoking.

In future research, longitudinal designs should be used to confirm that psychological distress mediates the association between perceived discrimination and smoking, and measures of these constructs should represent their complex, multidimensional nature. Other forms of discrimination and additional health behaviors should also be considered. ■

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Contributors

J. Q. Purnell led the conceptualization, design, and drafting of the article. L. J. Peppone conducted analyses and contributed to drafting the article. K. Alcaraz led the analyses and contributed to drafting the article. A. McQueen assisted with and reviewed mediation analyses and contributed to interpretation. J. J. Guido extracted and managed the data, conducted analyses, and contributed to drafting the article. J. K. Carroll and G. R. Morrow reviewed analyses and contributed to the development of the article.

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Human Participant Protection

Because this study's analyses involved secondary data, no protocol approval was needed.

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