

IRENE H. YEN, PHD ■ DAVID R. RAGLAND, PHD MPH
BIRGIT A. GREINER, PHD ■ JUNE M. FISHER, MD

Racial Discrimination and Alcohol-Related Behavior in Urban Transit Operators: Findings from the San Francisco Muni Health and Safety Study

SYNOPSIS

Objective. A growing body of literature is documenting the health effects of racial discrimination. The authors investigated the association between racial discrimination and alcohol-related behavior in a sample of urban transit operators.

Methods. Using data from a 1993–1995 cross-sectional study of transit operators in San Francisco, California, the authors analyzed responses to two sets of questions about racial discrimination; the first set focused on reaction to unfair treatment and the second on arenas, or domains, of discrimination. Alcohol-related variables were: number of drinks per month, heavy drinking, alcohol dependence, and negative consequences of alcohol consumption.

Results. Operators who reported five or more domains of discrimination drank an average of 13.4 more drinks per month than those who reported no domains of discrimination ($P = 0.01$). Similarly, they were more likely to be heavy drinkers (adjusted odds ratio [OR] = 2.16; 95% confidence interval [CI] 1.14, 4.09) and dependent on alcohol (adjusted OR = 2.02; 95% CI 1.08, 3.79) than operators who reported no domains of discrimination. The number of domains in which operators reported having experienced discrimination was not related to sex, age, household income, job seniority, or marital status, but varied significantly by educational level and race/ethnicity.

Conclusions. Data from a sample of urban transit operators showed an association between the number of domains of discrimination and some alcohol-related outcomes, but not others.

Drs. Yen and Ragland are with the School of Public Health, University of California, Berkeley. Dr. Yen is a Postdoctoral Fellow, and Dr. Ragland is an Adjunct Professor. Dr. Greiner is Research Specialist with the Ernst-Moritz-Arndt-Universität, Greifswald, Germany. Dr. Fisher is an Associate Clinical Professor of Medicine with the Trauma Foundation, San Francisco General Hospital, and University of California, San Francisco.

Address correspondence to:

Dr. Yen, Behavioral Risk Factor Training Program, 140 Warren Hall, Box 7360, School of Public Health, Univ. of CA, Berkeley CA 94720; tel. 510-643-7625; fax 510-643-9922; e-mail <xiaoyan@uclink4.berkeley.edu>.

Research suggests that racial discrimination is a form of stress and may contribute to higher risks of high blood pressure, poor general health status, and poor mental health status for non-whites than for whites.¹⁻⁷

Stress has been identified as an important risk factor for a variety of health outcomes, including respiratory infections and cardiovascular diseases.⁸⁻¹¹ There is also a large literature exploring the relationship between stress, especially occupational stress, and consumption of alcoholic beverages. The results of some studies suggest that stress increases alcohol consumption or problem alcohol behaviors.¹²⁻¹⁶ Other studies have found no direct association between stress and amount of alcohol consumed or problem alcohol behaviors.¹⁷⁻¹⁹ Here we consider the hypothesis that racial discrimination, almost certainly a major form of stress, is associated with higher levels of alcohol consumption.

Alcohol researchers have identified racial differences in patterns of alcohol use, in alcohol-related behaviors, and in the relationship between coping and drinking problems. For example, an analysis of national survey data on drinking patterns and problems indicated that black men reported a significantly higher average rate of many types of alcohol-related problems than white men, and black men reported more drinking problems than white men for comparable quantities consumed.²⁰ Cooper and colleagues examined the relationship between drinking to cope with stress, coping strategies, and drinking problems and found racial differences.^{21,22} One study suggested that blacks may be more vulnerable to stress-related alcohol use and abuse than other groups.²¹ Data on alcohol-related health problems, such as liver cirrhosis, show that black men are at higher risk than white men.²³

Few studies have examined the possible association between racial discrimination and alcohol-related behavior. In 1990, Taylor and Jackson reported an association between internalized racism and quantity of alcohol consumed among 289 African American women.²⁴ Another study reported that experiencing negative comments regarding one's race or ethnicity was related to both problem drinking and quantity of drinking among 72 male medical interns.²⁵

We investigated the relationship between perceived racial discrimination and self-reports of the amount of alcohol consumed, alcohol dependence, and negative consequences of drinking in a multi-ethnic sample of urban transit workers. In particular, we looked at (a) the relationship between the number of arenas in which racial discrimination was experienced and alcohol-related

behavior, and (b) the relationship between reactions to unfair treatment and alcohol-related behavior.

We used an existing measure of the experience of racial discrimination that did not collect data on number of instances of discrimination or their severity. We assumed that the number of areas of discrimination would reflect level of exposure, with more areas suggesting more exposure and thus more stress.

We hypothesized that people who reported racial discrimination in more areas of life would report higher alcohol consumption and more problem alcohol-related behaviors than those who reported fewer areas of discrimination or no experiences of discrimination. Based on the results of an earlier study,⁷ we also hypothesized that people who said they accepted unfair treatment as a fact of life and kept it to themselves, not sharing it with others, would report higher alcohol consumption and more problem alcohol behaviors than people who said they would do something about unfair treatment and would talk to others about it.

Muni Health and Safety Study. The San Francisco Municipal Railway (Muni) is the seventh largest public transit system in the United States, as measured by ridership.²⁶ Muni has 700,000 boardings on an average weekday on approximately 90 different transit lines, including bus, light rail, and cable car lines. Since 1982, the Muni Health and Safety Study has collected data on work stress and alcohol-related behavior among San Francisco's Municipal Railway (Muni) transit operators. The research team has worked closely with Muni's management and labor unions and has had ongoing access to all of the worksites.

Throughout authors DRR and JMF's involvement with the study, they have heard comments about racial/ethnic tensions among operators, between supervisors and operators, and in particular between operators and passengers. In designing the 1993-1995 survey, they and author BAG decided that items on discrimination should be included. Initially, they were hesitant to include such items since questions about a highly sensitive issue, alcohol consumption, were already the focus of the study. When authors DRR and BAG reviewed drafts of the questionnaire with a group of drivers, the drivers encouraged them to retain the questions since they felt that racial discrimination was a major problem.

METHODS

For the present study, we analyzed data from the 1993-1995 San Francisco Muni Health and Safety Study.

A majority of the transit workers reported experiencing racial discrimination on the job.

Transit operators go through a routine medical examination for driver's license renewal. Of the 1974 operators examined in 1993–1995, 1542 (78%) were interviewed for the Muni Health and Safety Study. Operators provided informed consent for the interview portion, and they could choose not to answer any of the questions. All data were kept confidential. Coded data for analyses did not include any personal identifiers.

Of the 1542 who were interviewed in 1993–1995, 993 (64%) reported that they had had at least one drink in the previous 12 months. Of these 993 transit workers, we excluded 110 operators (11%) with missing data. Respondents self-identified their race/ethnicity by choosing from the following categories: African American, American Indian or Alaska Native, Asian or Pacific Islander, Filipina(o), Latina(o), white, or "other." We excluded six American Indian operators and 21 operators who identified themselves as "other," due to small numbers. The final sample was 836 transit operators.

Discrimination. We measured perceived racial discrimination using the responses to two sets of questions.

First, respondents were asked to describe how they reacted to unfair treatment. They were asked, "If you feel you have been treated unfairly, do you usually accept it as a fact of life or try to do something about it?" and "If you feel you have been treated unfairly, do you usually talk to other people about it or keep it to yourself?" We divided respondents into four categories: (a) those who said they accepted being treated unfairly as a fact of life and said they would keep it to themselves; (b) those who said they accepted being treated unfairly as a fact of life and said they would talk to other people about it; (c) those who said they would try to do something about racial discrimination and said they would keep it to themselves; and (d) those who said they would try to do something about

racial discrimination and said they would talk to other people about it.

Then, respondents were asked, "Have you ever experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior because of your race or color in any of the following situations or 'domains': at school, getting a job, at work, at home, getting medical care, from the police or in the courts, in your job as a bus driver." ("At work" could include their current job as a driver or previous work circumstances.) This question was based on the question that Krieger and Sidney used in their study of discrimination and blood pressure.⁷ Preliminary analyses suggested that number of reported circumstances of discrimination was not normally distributed and not linearly related to alcohol behaviors; therefore, we chose not to use a single discrimination variable in the multivariate models indicating the number of domains in which the respondents said they had experienced discrimination. Instead, based on the distribution of responses in the overall sample (before nondrinkers were excluded), we divided respondents into four categories based on number of situations or domains in which they reported having experienced discrimination: 0; 1 or 2; 3 or 4; ≥ 5 .

Alcohol outcome variables. We calculated *drinks per month* by multiplying the number of times per month respondents reported drinking beer, wine, malt liquor, and liquor, by the number of drinks they said they usually had per occasion. We defined *heavy drinking* as consuming 60 or more drinks per month.

We assessed alcohol dependence with the four-question CAGE screening instrument.²⁷ CAGE has been shown to work well in diagnosing alcohol dependence as defined in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV).^{28,29} The criterion for alcohol

dependence is two or more positive answers to the four questions.

We assessed *negative consequences of alcohol consumption* with a set of questions adapted from the 1984 and 1990 National Alcohol Survey, conducted by the Alcohol Research Group.^{30,31} Interviewers asked respondents if, during the previous 12 months, there had been a time when they felt their drinking had a harmful effect on: friendships and social life; health; outlook on life; home life or marriage; work and employment opportunities; financial position; attendance at work; safety at work; safety off work; or sex life. The variable *negative alcohol consequences* was set equal to 1 if respondents said yes to any of the above situations.

Covariates. Regression models adjusted for age category, sex, race/ethnicity, educational level, household income, marital status, and seniority.

We characterized respondents based on self-reported characteristics. We classified age into three categories: 25–39, 40–54, ≥55. We classified race/ethnicity into four categories: African American, Latina[o], Asian (including Filipina[o]), and white. Educational level fell into three categories: up to and including high school graduate; technical school/some college; college graduate. We classified annual household income before taxes into four categories: ≤\$40,000, \$40,000–\$49,000, \$50,000–\$69,000, ≥ \$70,000. We defined marital status as partnered (married or unmarried and living with partner) or single (separated, divorced, widowed, or never married and not living with a spouse or partner). We divided respondents into three groups according to Muni seniority: <10 years, 10–19 years, ≥20 years.

Data analysis. For all analyses, we used SAS for Windows, version 6.12.³²

Univariate analyses. Using chi square tests, we first analyzed the relationship between respondents' reactions to unfair treatment and alcohol behavior. We then analyzed the relationship between the number of domains in which respondents reporting experiencing discrimination and alcohol behavior.

Multivariate analyses. We used regression analysis to explore the relationship between each of two discrimination measures (reaction to unfair treatment and number of domains of discrimination), and each of four alcohol outcome measures (drinks per month, heavy drinking, alcohol dependence, and negative consequences of alco-

hol consumption). For drinks per month, we used linear regression models. Since the other three outcomes were binary, we used logistic regression models.

In this set of analyses, we modeled the relationships for the entire sample, the nonwhite subsample (the full sample excluding the white respondents), and the African American subsample.

We tested the models using the following steps. Step 1: unadjusted models. Step 2: models with each potential confounder entered sequentially and separately. Step 3: models with all potential confounders except race/ethnicity entered simultaneously. Step 4: Models with all potential confounders entered simultaneously for the nonwhite subsample.

RESULTS

In the final sample of 836 transit operators, according to self-report, 84% were male, 65% were ages 40–54, 57% were African American, 60% earned between \$40,000 and \$69,999 per year, 63% had some formal education beyond high school, and 64% were partnered (Table 1).

On average, operators consumed 25 drinks per month. Fifteen percent (127/836) drank at least 60 drinks per month, we classified 142 (17%) as alcohol dependent using the CAGE instrument, and 109 (13%) reported at least one negative life consequence of alcohol consumption behavior in the previous 12 months.

A majority of the transit workers reported experiencing racial discrimination on the job (Table 1). Number of domains of racial discrimination was related to race/ethnicity and educational level (Table 2). A higher percentage of African Americans than of other groups reported five or more domains of discrimination; a higher percentage of whites than of members of other groups reported no domains of discrimination. Asians and Latinos were similar in their level of reporting, though Asians were more likely to report three or four domains of discrimination than Latinos. Educational level was also related to number of domains of discrimination; the lower education categories were associated with fewer domains. Number of domains was not related to sex, age, household income, seniority, or marital status.

The associations shown in Table 2 were similar for the full sample and non-whites only. Since it can be argued that the experience of racial discrimination is qualitatively different for whites and non-whites, we present findings for non-whites only. Multiple regression results for models adjusting separately for potential confounders (not shown) were similar to the results for models adjusting simultane-

Table 1. Self-reported characteristics of a sample of respondents to San Francisco Muni Health and Safety Study, 1993–1995 (N = 836)

Characteristic	Number	Percent	Characteristic	Number	Percent
Sex			Experience of discrimination		
Male	705	84	Reaction to unfair treatment (n = 821)		
Female	131	16	Do something/Talk to others	537	65
Age			Do something/Keep it to self	23	3
25–39	175	21	Accept as fact of life/Talk to others . .	176	21
40–54	542	65	Accept as fact of life/Keep it to self. .	85	10
≥55	119	14	Domains		
Race/ethnicity			In job as a bus driver.	468	56
African American.	476	57	Getting a job.	311	37
Asian ^a	136	19	From the police or in the courts. . . .	305	37
White	120	14	At work.	296	35
Latina(o)	104	12	At school	208	25
Household income^b			Getting medical care	111	13
<\$40,000.	134	16	At home	31	4
\$40,000–49,999	243	29	Number of domains		
\$50,000–69,999	259	31	0.	262	31
≥\$70,000	200	24	1.	130	16
Educational level			2.	140	17
≤high school graduate	286	34	3.	90	11
Technical school/some college. . . .	463	53	4.	93	11
College graduate.	87	10	5.	64	8
Seniority (years)			6.	41	5
0–9.99	333	40	7.	16	2
10–19.99	326	39	Alcohol use		
≥20	177	21	Heavy drinker	127	15
Marital status			Lifetime alcohol dependence	142	17
Partnered	531	64	Alcohol consequences in		
Single.	305	36	previous 12 months (n = 832).	109	13
			Alcohol consumption (drinks	<u>Mean</u>	<u>SD</u>
			per month) (n = 851)	25.9	46.3

NOTE: Percentages may not add to 100 due to rounding errors.

^aIncludes respondents who identified themselves as Filipina(o)s

^bAnnual pre-tax household income

ously. Here we present the findings for the models with all covariates included simultaneously.

Among non-white respondents, reaction to unfair treatment was not associated with heavy drinking, alcohol dependence, negative consequences, or drinks per month.

In unadjusted logistic regression models, ≥5 domains of discrimination was associated with a higher likelihood of heavy drinking (OR = 1.92, 95% confidence interval [CI] 1.04, 3.55) than no domains of discrimination as well as with a higher likelihood of alcohol dependence

(OR = 1.99, 95% CI 1.10, 3.61) among nonwhite respondents (Table 3.). When regression models were adjusted for age, sex, educational level, household income, marital status, and seniority, the strength of the associations between number of domains of discrimination and heavy drinking increased slightly. Number of domains was not associated with negative alcohol consequences.

We further investigated the relationship between perceived racial discrimination and alcohol-related behavior among nonwhite respondents by adjusting for race/

Table 2. Number of domains in which discrimination experienced, by demographic and job-related characteristics, sample of respondents to San Francisco Muni Health and Safety Study, 1993–1995 (N = 836)

Characteristic	Number	Number of domains								X ²	P value
		0		1 or 2		3 or 4		≥5			
		Number	Percent	Number	Percent	Number	Percent	Number	Percent		
Sex										0.18	0.98
Male	705	222	31	227	32	153	22	103	15		
Female	131	40	31	43	33	30	23	18	14		
Age										3.46	0.75
25–39	175	48	27	56	32	46	26	25	14		
40–54	542	173	32	178	33	112	21	79	15		
≥55	119	41	34	36	30	25	21	17	14		
Race/ethnicity										101.67	0.001
African American	476	100	21	150	32	123	26	103	22		
Asian ^a	136	52	38	42	31	33	24	9	7		
Latina(o)	120	67	56	40	33	13	11	0	0		
White	104	43	41	38	37	14	13	9	9		
Household income^b										7.92	0.54
<\$40,000	134	52	39	40	30	27	20	15	11		
\$40,000–49,999	243	72	30	81	33	57	23	33	14		
\$50,000–69,999	259	79	31	77	30	58	22	45	17		
≥\$70,000	200	59	30	72	36	41	21	28	14		
Educational level										28.46	0.001
≤ high school graduate	286	111	39	98	34	51	18	26	9		
Technical school/some college	463	125	27	147	32	104	22	87	19		
College graduate	87	26	30	25	29	28	32	8	9		
Seniority (years)										8.94	0.18
0–9.99	333	96	29	103	31	83	25	51	15		
10–19.99	326	107	33	116	36	65	20	38	12		
≥20	177	59	33	51	29	35	20	32	18		
Marital status										4.66	0.20
Partnered	531	168	32	180	34	116	22	67	13		
Single	305	94	31	90	30	67	22	54	18		

^aIncludes respondents who identified themselves as Filipina(o)s

^bAnnual pre-tax household income

ethnicity (see Table 4). In the conventional sense, race/ethnicity is a confounder as it is related to both the exposure (domains of discrimination) and the outcome of interest. However, adding race/ethnicity to the models could be considered overadjusting, given that the predominant relevance of race/ethnicity to health may in fact be the discrimination experience. By adding race/ethnicity to the model, the associations between number of domains of discrimination and heavy drinking and alcohol dependence were weakened.

In the linear regression models, racial discrimination was associated with drinks per month [unadjusted β for 1 or 2 domains of discrimination = 5.2, $P = 0.24$; unadjusted β for 3 or 4 domains = 4.1, $P = 0.39$; unadjusted β for five or more domains = 11.9, $P = 0.03$; reference group = no domains] among nonwhite respondents (Table 5). Operators who reported five or more domains of discrimination tended to drink nearly 12 drinks more per month than those who reported no domains. After adjustments for age, sex, educational level, household

Table 3. Perceived racial discrimination and alcohol consumption among nonwhite respondents, San Francisco Muni Health and Safety Study, 1993–1995 (N = 704)

Measure of discrimination	Alcohol use											
	Heavy drinker				Alcohol dependence				Negative consequences			
	Unadjusted		Adjusted ^a		Unadjusted		Adjusted ^a		Unadjusted		Adjusted ^a	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Number of domains												
1 or 2	1.50	0.87, 2.59	1.55	0.89, 2.70	1.17	0.67, 2.03	1.17	0.66, 2.07	0.76	0.41, 1.42	0.76	0.40, 1.43
3 or 4	0.92	0.49, 1.73	0.99	0.52, 1.89	1.22	0.68, 2.19	1.25	0.68, 2.29	1.12	0.60, 2.09	1.12	0.59, 2.14
5 or more	1.92	1.04, 3.55	2.16	1.14, 4.09	1.99	1.10, 3.61	2.02	1.08, 3.79	1.31	0.68, 2.54	1.30	0.65, 2.60
Reaction to unfair treatment												
Do something/												
Keep it to self	1.73	0.55, 5.46	1.59	0.49, 5.11	0.93	0.26, 3.30	1.10	0.30, 4.09	0.89	0.20, 3.99	0.91	0.20, 4.22
Accept as fact of life/												
Talk to others	0.90	0.53, 1.51	0.87	0.51, 1.48	0.59	0.34, 1.02	0.59	0.34, 1.04	1.33	0.78, 2.26	1.33	0.78, 2.29
Accept as fact of life/												
Keep it to self	1.15	0.57, 2.32	1.01	0.50, 2.07	0.72	0.34, 1.53	0.74	0.35, 1.60	0.58	0.22, 1.51	0.55	0.21, 1.45

^aAdjusted for age, sex, educational level, household income, marital status, and seniority

OR = odds ratio

CI = confidence interval

income, marital status, and seniority, the differential increased, with an adjusted difference of 13.4 ($P = 0.01$).

We found the same relationship between number of domains of discrimination and drinks per month for the subsample of African Americans, though the differences between five or more domains and no domains were not statistically significant. Logistic regression analysis of the subsample of African Americans showed similar results as for the entire nonwhite sample, with one exception (see Table 6). For alcohol dependence, both unadjusted and adjusted models showed stronger associations between domains of discrimination than for the nonwhite sample.

DISCUSSION

In a multi-ethnic sample of transit operators, we found that reaction to unfair treatment was related to the quantity of alcohol consumed but not related to problem alcohol behavior. We also found that number of domains of perceived racial discrimination was associated with drinks per month, heavy drinking, and alcohol dependence. These associations remained after analyses were adjusted for age, sex, educational level, household income, marital status, and seniority. Number of domains of perceived racial discrimination was not associated with negative consequences of alcohol consumption.

Our findings are consistent with those reported in a small but growing body of literature that suggests that racial discrimination is associated with negative health effects. We were able to look at racial discrimination in a multi-ethnic sample of African American, Latino, Asian, and white respondents. Unlike in other studies of discrimination,⁴⁻⁷ we found that number of domains of perceived discrimination was positively associated with alcohol outcomes in our full sample as well as in the non-white and African American subsamples. In general, other studies have focused on the experiences of African Americans only. In these studies, investigators found that African Americans who reported no domains of discrimination were at higher risk of high blood pressure than those who reported one or more domains. The authors have suggested that the former have suppressed their responses to discrimination. Winkleby et al. found an inverse association between reported stress and hypertension in transit operators;³³ those who reported the least stress were most likely to suffer from hypertension. Some people experiencing discrimination may use alcohol as a stress reducer, which may lead to problem drinking.¹⁴

Why would discrimination be associated with some drinking behaviors but not others? We found that reports of multiple domains of discrimination were related to a higher number of drinks per month, heavy drinking, and alcohol

Table 4. Perceived racial discrimination and alcohol consumption among nonwhite respondents: San Francisco Muni Health and Safety Study, 1993–1995 : models adjusted for race/ethnicity and models adjusted for all covariates (N = 704)

Measure of discrimination	Alcohol use											
	Heavy drinker				Alcohol dependence				Negative consequences			
	Adjusted for race/ethnicity		Adjusted for all covariates ^a		Adjusted for race/ethnicity		Adjusted for all covariates ^a		Adjusted for race/ethnicity		Adjusted for all covariates ^a	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Number of domains												
1 or 2	1.45	0.84, 2.52	1.45	0.83, 2.55	1.08	0.62, 1.90	1.04	0.58, 1.87	0.76	0.40, 1.42	0.73	0.39, 1.40
3 or 4	0.87	0.46, 1.64	0.89	0.46, 1.71	1.14	0.62, 2.07	1.14	0.61, 2.13	1.21	0.68, 2.69	1.16	0.59, 2.25
≥5	1.76	0.94, 3.29	1.87	0.97, 3.59	1.68	0.91, 3.11	1.67	0.88, 3.19	1.36	0.68, 2.69	1.27	0.62, 2.60
Reaction to unfair treatment												
Do something/												
Keep it to self	1.85	0.58, 5.91	1.72	0.54, 5.59	0.88	0.24, 3.16	0.97	0.26, 3.66	0.73	0.16, 3.35	0.76	0.16, 3.63
Accept as fact of life/												
Talk to others	0.92	0.55, 1.56	0.91	0.54, 1.55	0.64	0.37, 1.11	0.64	0.36, 1.13	1.37	0.81, 2.34	1.40	0.81, 2.42
Accept as fact of life/												
Keep it to self	1.20	0.59, 2.44	1.07	0.52, 2.21	0.84	0.39, 1.80	0.84	0.39, 1.82	0.59	0.22, 1.57	0.58	0.22, 1.55

^aAdjusted for age, sex, race/ethnicity, educational level, household income, marital status, and seniority

OR = odds ratio

CI = confidence interval

dependence among all ethnicities. On the other hand, number of domains of racial discrimination was not associated with negative consequences of alcohol consumption. Drinks per month and heavy drinking are correlated by definition; heavy drinking is defined as 60 or more drinks per

month. The alcohol research literature suggests that how much people drink and whether they have alcohol problems are two different outcomes.³⁴ Our data confirm this distinction: alcohol dependence and heavy drinking were correlated (correlation coefficient = 0.092, *P* = 0.007); negative

Table 5. Perceived racial discrimination and quantity of alcohol consumed among nonwhite respondents, San Francisco Muni Health and Safety Study, 1993–1995 (N = 677)

Measure of discrimination	Mean number of drinks per month			
	Unadjusted		Adjusted ^a	
	β	P value	β	P value
Number of domains				
1 or 2	5.2	0.24	5.7	0.21
3 or 4	4.1	0.39	5.2	0.28
≥5	11.9	0.03	13.4	0.10
Reaction to unfair treatment				
Do something/Keep it to self				
	-0.73	0.95	-1.4	0.90
Accept as fact of life/Talk to others				
	-2.9	0.49	-2.4	0.57
Accept as fact of life/Keep it to self				
	5.9	0.32	4.5	0.44

^aAdjusted for age, sex, educational level, household income, marital status, and seniority

consequences and heavy drinking were also correlated at (correlation coefficient = 0.025, $P = 0.048$).

Limitations. There are important limitations that will affect the interpretation of these findings. Since this was a cross-sectional study, it is impossible to establish a direction of effect between discrimination and alcohol-related behavior. Perhaps racial discrimination is a form of stress and leads to harmful patterns of alcohol consumption. Or perhaps for some reason heavy drinking or alcohol problems lead to increased reporting of discriminatory experiences. Because of the way the questions were worded, no temporal relationship between perceived discrimination and alcohol behavior can be established or assumed with the present data.

It is also possible that unknown or unmeasured confounders, such as personality, that are not included in the models would affect the magnitude of association between perceived discrimination and alcohol-related behavior.

Racial discrimination and alcohol-related behavior are both difficult to measure. Our measures of discrimination were relatively simple: how does the respondent react if treated unfairly, and has the respondent experienced unfair treatment in a variety of situations? We found that less education was associated with reporting fewer

domains of discrimination. Do people with low levels of education experience less unfair treatment? Do people with low levels of education have lower expectations of fair treatment? Are people with low levels of education reluctant to report unfair treatment? Without qualitative research or more objective measures of discrimination, it is difficult to know what this finding means.

Respondents were not asked how often they experienced unfair treatment or how much of a problem unfair treatment was for them. Nor were they asked about internalized racism, the phenomenon of adopting mainstream negative stereotypes and applying them to oneself. After the survey was administered in 1993–1995, Landrine and Klonoff³⁵ published a study in which an 18-item Schedule of Racist Events inventory was used to assess African American respondents' experience of racial discrimination. This instrument will be useful in future research on the health effects of racial discrimination.

Alcohol consumption is a sensitive area for the general public and even more sensitive for transit workers. It is possible that because the survey was connected to work, alcohol consumption was underreported. A workplace alcohol testing policy was implemented during the last quarter of data collection, drawing attention to the issue of drinking and work; this may have influenced operators

Table 6. Perceived racial discrimination and alcohol consumption among African American respondents, San Francisco Muni Health and Safety Study, 1993–1995 (N = 468)

Measure of discrimination	Alcohol consumption							
	Heavy drinker				Alcohol dependence			
	Unadjusted		Adjusted ^a		Unadjusted		Adjusted ^a	
OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	
Number of domains								
1 or 2	1.19	0.60, 2.36	1.13	0.56, 2.28	1.23	0.62, 2.43	1.11	0.55, 2.25
3 or 4	0.69	0.32, 1.51	0.65	0.29, 1.44	1.04	0.51, 2.15	0.95	0.45, 2.02
≥5	1.64	0.80, 3.36	1.62	0.77, 3.40	1.99	0.99, 4.00	1.91	0.91, 3.98
Reaction to unfair treatment								
Do something/								
Keep it to self	0.54	0.07, 4.39	0.53	0.06, 4.48	0.46	0.06, 3.73	0.50	0.06, 4.29
Accept as fact of life/								
Talk to others	0.75	0.39, 1.45	0.72	0.37, 1.41	0.84	0.46, 1.53	0.83	0.44, 1.57
Accept as fact of life/								
Keep it to self	1.31	0.54, 3.21	1.22	0.49, 3.05	1.16	0.48, 2.81	1.19	0.47, 2.98

^aAdjusted for age, sex, educational level, household income, marital status, and seniority

Reports of multiple domains of discrimination were related to a higher number of drinks per month, heavy drinking, and alcohol dependence among all ethnicities.

to underreport their alcohol consumption. However, because these interviews were administered after, rather than before, the relicensing medical examination, it was less likely that operators would have perceived a relationship between the answers and their employment. We also did not ask about drinking on the job. If operators who consumed higher amounts or who had experienced more alcohol-related consequences underreported more than drivers who consumed lesser quantities or who had fewer negative consequences, our findings would be underestimations of the magnitude of the associations between perceived discrimination and alcohol behaviors.

While 1542 operators agreed to participate in the study, only 1312 completed the alcohol interview, as a result of study logistics. Of these, 993 indicated that they had had at least one drink in the previous 12 months and were labeled "current drinkers." Only current drinkers were asked about alcohol consumption, alcohol dependence, negative life consequences, and drinking patterns. People who had not had at least one drink in the previous 12 months were asked if they were lifelong abstainers or had consumed alcohol in the past and had stopped drinking. More Asians were represented in the nondrinking group (23% of nondrinkers) than in the overall sample (19%), and fewer whites were represented (9% of nondrinkers vs 12% in the overall sample). Among the nondrinkers, African Americans were more likely to have stopped drinking (75% of nondrinkers) than to be lifelong abstainers (25%), while Asians were more likely to be lifelong abstainers (61% of nondrinkers) than to have stopped drinking (39%). In any case, including only those who were classified as current drinkers limits the general-

izability of our findings.

Finally, our sample was a small group of transit operators from one company. Although the occupation of transit driver is unique in several respects, the demographic profile (age, educational level) of the drivers, the level of skill required, and the supervisory structure are all similar to those of other blue collar occupations. Therefore our results should have relevance for alcohol-related behavior in other blue collar occupations.

Implications. The US is becoming more ethnically diverse. Race/ethnicity is an important factor in health research, as risk differences between groups have been documented for a variety of outcomes.^{36,37} Increasingly, researchers are looking beyond biological explanations to account for these differences.^{38,39} We have presented research that suggests that an important set of health behaviors is associated with perceived racial discrimination. More research should be done to clarify the quality and quantity of the experience of discrimination and to detail its effects on health behavior and health status.

Support for the SF Muni Health and Safety Study was provided by the National Institute on Alcoholism and Alcohol Abuse (Grant #AA06927), the Alcoholic Beverage Medical Research Foundation, and the Robert Wood Johnson Foundation.

The authors thank San Francisco Transport Workers Union Local 250A, the San Francisco Municipal Railway, and the San Francisco General Hospital Occupational Health Service for their ongoing support, and especially thank the transit operators for their participation in this research.

References

1. James SA, LaCroix A, Kleinbaum D, Strogatz DS. John Henryism and blood pressure differences among black men. II: the role of occupational stressors. *J Behav Med* 1984;7:259-75.
2. Armistead CA, Lawler KA, Gorden G, Cross J, Gibbons J. Relationship of racial stressors to blood pressure responses and anger expression in Black college students. *Health Psychol* 1989;8:541-56.
3. Dressler WW. Lifestyle, stress, and blood pressure in a southern black community. *Psychosom Med* 1990;52:182-98.
4. Krieger N. Racial and gender discrimination: risk factors for high blood pressure? *Soc Sci Med* 1990;30:1273-81.
5. Williams DR, Yu Y, Jackson JS, Anderson NB. Racial differences in physical and mental health: socio-economic status, stress and discrimination. *J Health Psychol* 1997;2:335-51.
6. Jackson JS, Brown TN, Williams DR, Torres M, Sellers SL, Brown K. Racism and the physical and mental health status of African Americans: a thirteen year national panel study. *Ethn Dis* 1996;6:132-47.
7. Krieger N, Sidney S. Racial discrimination and blood pressure: the CARDIA Study of Young Black and White Adults. *Am J Public Health* 1996;86:1370-8.
8. Graham NM, Douglas RM, Ryan P. Stress and acute respiratory infection. *Am J Epidemiol* 1986;124:389-401.
9. Cohen S, Tyrrell DA, Smith AP. Psychological stress and susceptibility to the common cold. *New Engl J Med* 1991;325:606-12.
10. Colby JP, Linsky AS, Straus MA. Social stress and state-to-state differences in smoking and smoking related mortality in the United States. *Soc Sci Med* 1994;38:373-81.
11. Thernlund GM, Dahlquist G, Hansson K, Ivarsson SA, Ludvigsson J, Sjoblad S, et al. Psychological stress and the onset of IDDM in children. *Diabetes Care* 1995;18:1323-9.
12. Karasek RA, Baker D, Marxer F, Ahlbom A, Theorell T. Job decision latitude, job demands, and cardiovascular disease: a prospective study of Swedish men. *Am J Public Health* 1981;71:694-705.
13. House JS, Strecher V, Metzner HL, Robbins CA. Occupational stress and health among men and women in the Tecumseh Community Health Study. *J Health Soc Behav* 1986;27:62-77.
14. Sher KJ. Stress response dampening. In: Blane HT, Leonard KE, editors. *Psychological theories of drinking and alcoholism*. New York: Guilford Press; 1987. p. 227-71.
15. Trice HM, Sonnenstuhl WJ. Drinking behavior and risk factors related to the work place: Implications for research and prevention. *J Appl Behav Sci* 1988;24:327-46.
16. Steptoe A, Wardle J, Pollard TM, Canaan L, Davies GJ. Stress, social support and health-related behavior: a study of smoking, alcohol consumption and physical exercise. *J Psychosom Res* 1996;41:171-80.
17. Mensch BS, Kandel DB. Do job conditions influence the use of drugs? *J Health Soc Behav* 1988;29:169-84.
18. Cooper ML, Russell M, Frone MR. Work stress and alcohol effects: a test of stress-induced drinking. *J Health Soc Behavior* 1990;31:260-76.
19. Kawakami N, Araki S, Haratani T, Hemmi T. Relations of work stress to alcohol use and drinking problems in male and female employees of a computer factory in Japan. *Environ Res* 1993;62:314-24.
20. Herd D. Predicting drinking problems among black and white men: results from a national survey. *J Stud Alcohol* 1994;55:61-71.
21. Cooper ML, Russell M, Skinner JB, Frone MR, Mudar P. Stress and alcohol use: moderating effects of gender, coping, and alcohol expectancies. *J Abnormal Psychol* 1992;101:139-52.
22. Cooper ML, Frone MR, Russell M, Mudar P. Drinking to regulate positive and negative emotions: a motivational model of alcohol use. *J Personality Soc Psychol* 1995;69:990-1005.
23. National Institute of Alcohol Abuse and Alcoholism (US). *Alcohol and health*. Washington: Government Printing Office; 1982. DHHS Pub. No.: (ADM) 83-1193.
24. Taylor J, Jackson B. Factors affecting alcohol consumption in Black women: part II. *Int J Addictions* 1990;25:1415-27.
25. Richman JA, Flaherty JA, Rospenda KM. Perceived workplace harassment experiences and problem drinking among physicians: broadening the stress/alienation paradigm. *Addiction* 1996;91:391-403.
26. City and County of San Francisco (CA). *San Francisco Municipal Railway: facts and figures* [cited 1998 Dec]. Available from: URL: <http://www.ci.sf.ca.us/muni/abmunifa.htm>
27. Ewing JA. Detecting alcoholism: the CAGE questionnaire. *JAMA* 1984;252:1905-7.
28. Smart RG, Adlaf EM, Knoke D. Use of the CAGE in a population survey of drinking. *J Studies Alcohol* 1991;52:593-6.
29. Chan AWK, Pristach EA, Welte J. Detection by the CAGE of alcoholism or heavy drinking in primary care outpatients and the general population. *J Substance Abuse* 1994;6:123-35.
30. Alcohol Research Group. *National Alcohol Survey*. Berkeley: Medical Research Institute, Institute of Epidemiology and Behavioral Medicine; 1984.
31. Alcohol Research Group. *National Alcohol Survey*. Berkeley: Medical Research Institute, Institute of Epidemiology and Behavioral Medicine; 1990.
32. SAS Institute. *SAS for Windows, version 6.12*. Cary (NC): SAS Institute; 1989-1996.
33. Winkleby MA, Ragland DR, Syme SL. Self-reported stressors and hypertension: evidence of an inverse association. *Am J Epidemiol* 1988;127:124-34.
34. Clark WB. Conceptions of alcohol problems. In: Clark WB, Hilton ME, editors. *Alcohol in America: drinking practices and problems*. Albany: State University of New York; 1991. p. 165-72.
35. Landrine H, Klonoff EA. The schedule of racist events: a measure of racial discrimination and a study of its negative physical and mental health consequences. *J Black Psychol* 1996;22:144-68.
36. Schoenbaum M, Waidmann T. Race, socioeconomic status, and health: accounting for race differences in health. *J Gerontol B Psychol Sci Soc Sci* 1997;52 Special Issue:61-73.
37. Escobedo LG, Giles WH, Anda RF. Socioeconomic status, race, and death from coronary heart disease. *Am J Prev Med* 1997;13:123-30.
38. Williams DR. Race and health: basic questions, emerging directions. *Ann Epidemiol* 1997;7:322-33.
39. President's Cancer Panel. *The meaning of race in science—considerations for cancer research*. Washington: National Cancer Institute; 1998. ■