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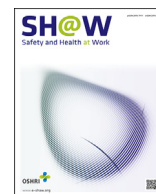
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Short Communication

Prevalence and Correlates of Current and Former Smoking among Urban Transit Workers



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ABSTRACT

Transit workers constitute a blue-collar occupational group that have elevated smoking rates relative to other sectors of employed adults in the United States. This study analyzed cross-sectional tobacco survey data from 935 workers (60% African American; 37% female) employed at an urban public transit agency in California. Prevalence of current and former smoking was 20.3% and 20.6%, respectively. Younger workers were less likely than older workers to be current or former smokers. Having a complete home smoking ban was associated with decreased likelihood of being a smoker [odds ratio (OR) = 0.04, 95% confidence interval (CI) = 0.01–0.17], as were neutral views about whether it is easy for a smoker to take a smoking break during their shift (OR = 0.50, 95% CI 0.28–0.88). Current smoking among the sample is > 50% higher than the adult statewide prevalence. Potential points of intervention identified in this study include perceived ease of worksite smoking breaks and establishing home smoking bans. Tailored cessation efforts focusing on older transit workers more likely to smoke are needed to reduce tobacco-related disparities in this workforce.

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1. Introduction

Smoking-related disparities persist among many blue-collar occupational groups [1,2]. Transit workers constitute a blue-collar occupational group that have elevated rates of smoking relative to other sectors of employed adults in the United States. For example, data from the 2004–2012 National Health Interview Survey show that age-adjusted smoking prevalence among workers classified in the transportation and material moving occupational group is 27.8%. In contrast, smoking prevalence among workers in the education, training, and library occupational group is 8.4% [2]. These disparities remained after adjustment for race/ethnicity, education, and income [3]. Additionally, studies from two geographically distinct locations indicate that the prevalence of current smoking among transit workers exceeds statewide adult smoking prevalence. One study, conducted among a sample of transit workers employed in the Minneapolis–St. Paul area, found that 25.4% were current smokers [4]; at the time of the study, smoking prevalence among Minnesota adults was ~18% [5]. Similarly, 26.6% of transit workers who participated in the 1993–1995 San Francisco Municipal Railway (MUNI) Study were current smokers [6], yet smoking prevalence among Californian adults

during the study period ranged from 17% to 19% [7]. In order to capture the baseline of smoking prevalence prior to implementing a concerted intervention aimed at reducing the number of transit workers who smoke, the purpose of this study was to estimate the prevalence and correlates of current and former smoking among a diverse sample of workers employed at an urban public transit agency in California. We hypothesized that the prevalence of current smoking would be elevated in comparison to the adult statewide prevalence.

Previous research suggests that sociodemographic and employment-related factors may contribute to increased risk for tobacco-related disparities. For example, among working adults in the 2004–2010 National Health Interview Survey, female smokers were more likely to have adverse health outcomes than male smokers [3]. Given the increasing number of women employed as transit workers, a key research question is to determine whether gender is associated with smoking status. Moreover, African Americans experience excessive rates of tobacco-related health consequences, such as lung cancer, compared to other racial/ethnic groups [8]. Because African Americans constitute one-quarter of those employed as bus drivers in the United States [9], it is imperative to consider the role of race/ethnicity *vis-à-vis* smoking within this

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occupational group. Regarding employment-related factors, there is research evidence that employees subject to nonstandard work schedules (e.g., afternoon, night, rotating, or split shift) are more likely to smoke compared to those on a standard (day) schedule [10]. This is particularly salient for workers employed at public transit agencies that strive to provide service to passengers around the clock. We hypothesized that transit workers who usually work non-standard shifts would be more likely to smoke than those on standard (day shift) schedules. Workplace smoking policy is another employment-related factor that could be associated with smoking status, but may vary among occupational groups. For example, in an analysis of employed women stratified by race/ethnicity, Shavers et al found that those who reported a no smoking in work area policy were significantly less likely to be current smokers compared to those whose workplace had no official smoking policy, but only among non-Hispanic whites [11]. Okechukwu and colleagues, however, found no association between workplace smoking policy and smoking at baseline or follow-up among a national sample of blue-collar workers [12]. In the context of a workplace-smoking ban, the ability of a smoker to take a break during their shift in order to smoke a cigarette may take on a sense of urgency [13]. This could pose a particular challenge for bus operators who are under time pressure to maintain the schedule in the face of traffic congestion, and do not have regularly scheduled breaks for eating, restroom use, or smoking [14]. We hypothesized that perceived ease of taking a smoking break would be positively associated with smoking status among transit workers. These research questions were driven by the goal of ensuring that we can measure the impact of an intervention informed by the research findings.

2. Materials and methods

2.1. Procedures

Data for this project were collected as part of a mixed-methods study at an Oakland, California-based public transit agency aimed at identifying perceived and structural barriers to transit workers' participation in health-insurance-sponsored cessation treatment. As a formative part of the research, focus groups were conducted among current and former smokers; results on barriers to treatment such as inaccessibility of classes [14] and perceptions that medication assisted therapy bears excessive risks for this population [15] are reported elsewhere. At the outset of the project, the researchers established a Union–Management Advisory Group with transit agency managers and transit union officers in order to get feedback and practical suggestions on all aspects of the project. The research team posted flyers advertising the survey at the facilities of the agency (3 bus garages, a large bus maintenance facility, a training center, and the agency headquarters). Self-administered questionnaires were distributed to eligible employees. Research team members were available on site at the break room in each location to collect completed surveys, answer questions, and distribute \$25 incentive gift cards to survey participants. The voluntary, confidential nature of study participation was emphasized in the survey materials and during verbal interactions with participants. The agency provided the researchers with an Excel database of employee names and identification numbers. When a worker turned in a completed survey to a research team member, their name was electronically checked off in the database using Google Nexus tablets. This helped limit the possibility that duplicate surveys might inadvertently be obtained from the same participant. No identifying information (name, employee identification number) appeared on the collected surveys. Data collection took place between January 2014 and March 2014. Informed consent was obtained. All procedures were approved by the

Institutional Review Board of the Pacific Institute for Research and Evaluation. Printed informed consent materials were provided to each study participant. In accordance with the protocol approved by the Institutional Review Board, participants checked a box affirming their consent to take the survey following receipt of the informed consent materials. Signatures were not obtained in order to protect the anonymity of the participants.

2.2. Measures

2.2.1. Tobacco use

Smoking status was determined using the questions, "Have you smoked or used the following at least 100 times in your lifetime: cigarettes, cigarillos, cigars, e-cigarettes, hookahs, smokeless tobacco ("dip"), snus, or chewing tobacco ("spit")?", and "How often do you currently smoke?" Response categories were: not at all, some days, and every day. Participants who answered affirmatively to the first question, and indicated that they smoked some days or every day, were classified as current smokers. Those who answered affirmatively to the first question, and "not at all" to the second question, were classified as former smokers. Participants who indicated that they had never smoked at least 100 times in their lifetime were classified as never smokers. Current smokers were asked which tobacco products they used from a list that included cigarettes, cigarillos, cigars, E-cigarettes, hookahs, and smokeless tobacco, as well as the usual daily amount of cigarettes, cigarillos, and cigars smoked during the past 30 days. Smokers were asked if they usually smoked menthol cigarettes, non-menthol cigarettes, or no usual type.

2.2.2. Other covariates

Employment-related factors included job classification, usual shift, and length of employment. For job classification, workers were categorized as bus operators; those who were in maintenance or clerical positions served as the reference group. Length of employment was categorized as up to 5 years, 5–10 years, 11–15 years, and > 15 years (reference group). Usual shift was categorized as day shift; afternoon shift; night shift; and split, rotating, irregular or extra board (reference group). Respondents were asked to rate their level of agreement on a 5-point scale ("strongly agree" to "strongly disagree") with the statement "It is very easy for a smoker to take a smoking break during their shift." Responses were categorized as strongly agree/agree, neither agree nor disagree, and disagree/strongly disagree (reference group).

Sociodemographic characteristics included gender, age, race/ethnicity, educational level, and marital status. For gender, each respondent was coded as female or male (reference group). The age of each respondent was categorized as 20–39 years, 40–49 years, 50–55 years, and > 55 years (reference group). Respondent race/ethnicity was coded as non-Hispanic Black, Latino/Hispanic, Asian/South Asian, multiethnic or other, and non-Hispanic White (reference group). Respondents were asked about the highest level of education they had completed. Education was coded as those who had up to 12 years of schooling, and those who had at least some college education (reference group). Marital status was categorized as being married/cohabiting; separated, divorced or widowed; or single and never married (reference group). Home smoking rules were assessed by asking respondents to endorse one of three statements: "No one is allowed to smoke anywhere inside your home"; "Smoking is allowed in some places or at some times inside your home"; and "Smoking is permitted anywhere inside your home" (reference group).

2.3. Statistical analysis

Means and standard deviations (SDs) for continuous variables and percentages for categorical variables were calculated. Cross

tabulations of smoking status by each of the independent variables were performed. χ^2 tests of independence were used to analyze the degree of association between each set of cross-tabulated categories. Multinomial logistic regression models were developed to identify characteristics of current smokers and former smokers in comparison to never smokers. All analyses were conducted using IBM SPSS Statistics version 20 (SPSS Inc., Chicago, IL, USA). Missing data for independent variables ranged from 0.6% to 4.7%. Missing data were not imputed.

3. Results

3.1. Participants

All employees of the transit agency who were members of the transit workers union were eligible to participate. This included bus

operators, maintenance workers, mechanics, dispatchers, and some clerical workers. All employees were able to communicate in English. Among 1,572 eligible workers, 935 completed the survey (59% participation rate). Mean participant age was 47.0 years (SD 10.4). Approximately 72% were bus operators, 60% were African American, and 37% were female.

3.2. Smoking prevalence

As shown in Table 1, 20.3% of study participants were current smokers, 20.6% were former smokers, and 59% were never smokers. Among current smokers, 83.5% endorsed cigarette use, 10.6% reported cigarillo use, 11.2% endorsed cigar use, 10.6% used E-cigarettes, and 6.9% used hookahs. Few workers (< 1%) reported smokeless tobacco use. Daily mean use over the past 30 days for cigarettes was 8.18 (SD 6.3); for cigarillos, 1.04 (SD 1.9); and for

Table 1
Sample characteristics by smoking status, number (%)

	Total sample (n = 935)	Current smokers (n = 190)	Former smokers (n = 193)	Never a smoker (n = 552)	χ^2
Gender					
Female	352	85 (24.1)	70 (19.9)	197 (56.0)	6.02
Male	564	100 (17.8)	119 (21.1)	345 (61.1)	
Missing	19	5 (26.3)	4 (21.1)	10 (52.6)	
Race/ethnicity					
Asian/South Asian	90	8 (8.9)	23 (25.6)	59 (65.6)	19.73*
African American	558	125 (22.4)	100 (17.9)	333 (59.7)	
Latino/Hispanic	116	21 (18.1)	23 (19.8)	72 (62.1)	
Multiethnic/other	64	14 (21.9)	19 (29.7)	31 (48.4)	
White	86	16 (18.6)	21 (24.4)	49 (57.0)	
Missing	21	6 (28.6)	7 (33.3)	8 (38.1)	
Age (y)					
20–39	234	33 (14.1)	26 (11.1)	175 (74.8)	68.18 [‡]
40–49	242	55 (22.7)	34 (14.1)	153 (63.2)	
50–55	218	50 (22.9)	48 (22.0)	120 (55.1)	
≥ 56	208	45 (21.6)	74 (35.6)	89 (42.8)	
Missing	33	7 (21.2)	11 (33.3)	15 (45.5)	
Marital status					
Married/live with partner	533	102 (19.1)	108 (20.2)	323 (60.6)	11.53
Separated, divorced, or widowed	187	39 (20.9)	44 (23.5)	104 (55.6)	
Single, never married	194	44 (22.6)	32 (16.5)	118 (60.8)	
Missing	21	5 (23.8)	9 (42.9)	7 (33.3)	
Education					
Up to high school or GED	322	78 (24.2)	69 (21.4)	175 (54.4)	13.45 [†]
Some college or BA	598	107 (17.9)	118 (19.7)	373 (62.4)	
Missing	15	5 (33.3)	6 (40.0)	4 (26.7)	
Job classification					
Bus operator	676	134 (19.8)	130 (19.2)	412 (61.0)	8.35
Maintenance or clerical	245	50 (20.4)	60 (24.5)	135 (55.1)	
Missing	14	6 (42.9)	3 (21.4)	5 (35.7)	
Usual shift					
Day	393	73 (18.6)	94 (23.9)	226 (57.5)	16.52*
Afternoon	98	12 (12.2)	14 (14.3)	72 (73.5)	
Night	147	38 (25.9)	24 (16.3)	85 (57.8)	
Split, rotating, or extra board	267	59 (22.1)	54 (20.2)	154 (57.7)	
Missing	30	8 (26.7)	7 (23.3)	15 (50.0)	
Years employed at agency					
≤ 5	236	37 (15.7)	32 (13.6)	167 (70.8)	23.0 [†]
> 5 to ≤ 10	160	32 (20.0)	36 (22.5)	92 (57.5)	
> 10 to ≤ 15 years	238	60 (25.2)	49 (20.6)	129 (54.2)	
> 15 years	264	53 (20.1)	69 (26.1)	142 (53.8)	
Missing	37	8 (21.6)	7 (18.9)	22 (59.5)	
Easy to take a smoking break at work					
Strongly agree/agree	435	89 (20.4)	89 (20.4)	257 (59.1)	9.78
Neither agree nor disagree	248	37 (14.9)	55 (22.1)	156 (62.9)	
Disagree/strongly disagree	226	59 (26.1)	45 (19.9)	122 (54.0)	
Missing	26	5 (19.2)	4 (15.4)	17 (65.4)	
Home smoking rules					
No one allowed to smoke in home	830	130 (15.7)	172 (20.7)	528 (63.6)	117.32 [‡]
Smoking allowed some places or times in home	50	31 (62.0)	6 (12.0)	13 (26.0)	
Smoking permitted anywhere in home	30	20 (66.7)	7 (23.3)	3 (10.0)	
Missing	25	9 (36.0)	8 (32.0)	8 (32.0)	

* $p < 0.05$.

† $p < 0.01$.

‡ $p < 0.001$.

cigars, 1.30 (SD 2.1). Approximately 65% of current smokers smoked daily, and 35% were intermittent smokers. Most cigarette users (62.1%) usually smoked menthol brands; 31% smoked nonmenthol, and 6.9% stated no usual type.

Smoking status differed by usual shift ($\chi^2 = 16.52$; $p < 0.05$); years employed at the transit agency ($\chi^2 = 23.0$; $p < 0.01$); race/ethnicity ($\chi^2 = 19.73$; $p < 0.05$), age ($\chi^2 = 68.18$; $p < 0.001$), level of education ($\chi^2 = 13.45$; $p < 0.01$); and endorsement of home smoking rules ($\chi^2 = 117.32$; $p < 0.001$). No differences in smoking status were observed based on gender or marital status.

3.3. Factors associated with current smoking

Gender, marital status, race/ethnicity, and level of education were not associated with likelihood of being a current smoker (Table 2). Workers in the youngest age group (20–39 years) were less likely to be current smokers [odds ratio (OR) = 0.38; 95% confidence interval (CI) 0.19–0.74] compared to workers age ≥ 56 years. Workers who reported a complete home smoking ban were less likely to be current smokers (OR = 0.04; 95% CI 0.01–0.17) compared to those that allowed smoking anywhere in their home. Those who neither agreed nor disagreed about whether it is easy for a smoker to take a smoking break during their shift were less likely to be current smokers (OR = 0.50; 95% CI 0.28–0.88) compared to workers that disagreed with the statement.

3.4. Factors associated with former smoking

Gender, race/ethnicity, marital status, and education were not associated with likelihood of being a former smoker. Workers aged

20–39 years, 40–49 years, or 50–55 years were less likely to be former smokers than those aged ≥ 56 years. Compared to those that allowed smoking anywhere in their home, workers who reported a complete home smoking ban (OR = 0.11; 95% CI 0.02–0.55) were less likely to be former smokers.

4. Discussion

The findings indicate that prevalence of current smoking among this sample of transit workers (20%) is elevated relative to that of adults in the statewide California population (12%) [7]. Despite statewide decreases in current smoking among African American and White Californians [7], the results underscore the importance of reducing tobacco-related disparities among transit workers and other blue-collar occupational groups. Identifying the prevalence and correlates of smoking is a requisite first step in the process.

In contrast to the higher smoking prevalence seen among younger workers in the National Health Interview Survey, 2004–2011 [3], the results showed that the youngest workers (aged 20–39 years) were less likely to be current smokers compared to workers aged ≥ 56 years. This finding suggests that cessation program outreach is needed for older transit workers. Although African American men and women have a higher smoking prevalence than other racial/ethnic groups in California [7], transit worker race/ethnicity did not increase the likelihood of being a current smoker. Similarly, marital status and level of education – factors associated with smoking [16] – were not linked with smoking status in the sample. Lastly, findings from large national surveys of employed adults show that male workers are more

Table 2
Multinomial logistic regression results

	Current smokers vs. never smokers		Former smokers vs. never smokers	
	OR	95% CI	OR	95% CI
Gender (ref: male)				
Female	1.24	0.80–1.93	1.15	0.75–1.75
Race/ethnicity (ref: White)				
Asian/South Asian	0.44	0.16–1.26	1.25	0.57–2.74
African American	1.01	0.51–2.0	0.81	0.43–1.53
Latino/Hispanic	0.97	0.42–2.21	1.00	0.46–2.15
Multiethnic/other	0.89	0.32–2.49	1.52	0.64–3.65
Years of age (ref: ≥ 56)				
20–39	0.38	0.19–0.74 [†]	0.18	0.09–0.33 [†]
40–49	0.63	0.35–1.12	0.25	0.15–0.44 [†]
50–55	0.83	0.47–1.49	0.50	0.30–0.81 [†]
Marital status (ref: single, never married)				
Married/live with partner	0.76	0.45–1.27	0.74	0.44–1.25
Separated, divorced, or widowed	0.71	0.38–1.31	0.86	0.47–1.56
Education (ref: some college or BA)				
Up to high school or GED	1.39	0.92–2.09	1.27	0.86–1.88
Job classification (ref: maintenance or clerical)				
Bus operator	0.84	0.51–1.40	0.92	0.57–1.47
Usual shift (ref: split, rotating, or extra board)				
Day	0.79	0.48–1.31	1.12	0.69–1.80
Afternoon	0.57	0.26–1.24	0.57	0.28–1.16
Night	1.05	0.58–1.92	0.84	0.45–1.57
Years employed at agency (ref: > 15)				
≤ 5	1.14	0.62–2.12	0.99	0.55–1.78
> 5 to ≤ 10	1.26	0.67–2.37	1.29	0.73–2.28
> 10 to ≤ 15	1.61	0.94–2.75	1.26	0.76–2.09
Easy to take smoke breaks at work (ref: disagree/strongly disagree)				
Strongly agree/agree	0.89	0.56–1.44	0.98	0.61–1.58
Neither agree nor disagree	0.50	0.28–0.88*	1.08	0.65–1.80
Allow smoking at home (ref: yes, anywhere)				
No one allowed to smoke in my home	0.04	0.01–0.17 [‡]	0.11	0.02–0.55 [†]
Smoking allowed some places or times	0.33	0.06–1.82	0.14	0.02–1.02

* $p < 0.05$.

[†] $p < 0.01$.

[‡] $p < 0.001$.

likely to smoke than female workers [3,16,17], yet female transit workers were not less likely to be current or former smokers compared to their male colleagues. Since female smokers have a greater disease burden compared to male smokers [3], the role of gender should be explored in future studies among this occupational group.

The findings indicated that most of the employment-related factors that were tested in the model were not associated with smoking status. Interestingly, our hypothesis that perceived ease of taking a smoking break would be positively associated with smoking status was not directly confirmed. Instead, those who neither agreed nor disagreed that it is easy for a smoker to take a smoking break during their shift were less likely to be current smokers compared to those who disagreed or strongly disagreed with this statement. One potential explanation is that nonsmokers may be unconcerned with the ability to take a smoke break and may therefore hold neutral views on the issue. In contrast, smokers may be very aware of the need to take a smoking break, yet feel that it is quite difficult given the work requirements during their shift. The bivariate results lend support to this explanation. The finding that workers who had a complete home smoking ban were less likely to be current smokers compared to those that permitted smoking anywhere in their home is consistent with findings on home smoking bans and smoking status among a national sample of blue-collar workers [12] and employed adult women [11]. Perceived ease of worksite smoking breaks and home smoking bans may be points of intervention to encourage cessation among the workforce.

A few study limitations should be noted. First, the observational nature of the study and the cross-sectional design preclude drawing causal inferences from the findings. Second, although nearly 60% of eligible workers participated in the survey, no data are available that would permit a nonresponse analysis. It is therefore not possible to determine if smokers were more or less likely to participate in the survey than other workers. Third, measurement of smoking status was based entirely on self-report, with no physiological indicators (e.g., cotinine level) obtained. Fourth, due to time constraints, some potential correlates of smoking (e.g., alcohol use) were not assessed. Fifth, since the study was based among workers at one transit agency, it is unknown to what extent the findings are generalizable to transit workers at other agencies in California or other states. Regarding strengths, this study contributes to our understanding of tobacco-related disparities among blue-collar occupational groups by providing estimates of current and former smoking among a diverse sample of urban transit workers, and correlates of these outcomes. Previous studies among other blue-collar occupational groups, such as building trades apprentices [18], motor freight workers [19], and firefighters [20] demonstrate that detailed knowledge of the occupational context and culture of each group is needed in order to design interventions that can effectively reduce tobacco use. Of note, all of the workers in the study have access to health insurance as a transit agency employee benefit [14]. This is important because being uninsured is associated with increased smoking prevalence among working adults [2]. The higher rates of smoking observed in this study therefore cannot be ascribed to lack of health insurance and attendant access to cessation programs and treatment. Future studies should address the factors that may promote or hinder transit workers from participating in smoking cessation, either through individual efforts or group programs. This information can be used to inform and tailor interventions aimed at boosting cessation rates among at-risk occupational groups.

Conflicts of interest

The authors have no conflict of interest.

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