

## Association of Occupational and Substance Use Factors with Burnout among Urban Transit Operators

Carol B. Cunradi, Meng-Jinn Chen, and Rob Lipton

---

**ABSTRACT** *Burnout is a special type of prolonged occupational stress that is linked with numerous psychosomatic and psychological sequelae and negative job consequences. The purpose of this study is to estimate the contribution of occupational and substance use factors to burnout among a multiethnic sample of urban transit operators (n=1231). Survey and medical exam data were obtained from participants in the 1993–1995 San Francisco MUNI Health & Safety Study. Burnout was measured with the Maslach Burnout Inventory emotional exhaustion subscale. Occupational factors included frequency of job problems (e.g., equipment, passengers, and traffic), years driving, full or part-time work status, and ergonomic problems (e.g., adjusting the seat, back support, vibration, and rocking or bouncing of seat). Substance use measures were alcohol consumption and smoking status (i.e., current, former, and never smokers). The results of multivariable linear regression analysis showed that job problems (beta=0.426,  $p<0.001$ ), ergonomic problems (beta=0.138,  $p<0.001$ ), and full-time work status (beta=0.070,  $p<0.01$ ) were associated with burnout. Smoking was not significant, but alcohol consumption was positively associated with burnout (beta=0.067,  $p<0.01$ ). Age was negatively correlated with burnout (beta=-0.106,  $p<0.001$ ), which may reflect a healthy worker effect. Because aspects of the psychosocial and physical work environments can be modified, the findings have important implications for the prevention of burnout among municipal transit operators.*

**KEYWORDS** *Burnout, Urban transit operators, Occupational health*

---

### INTRODUCTION

Burnout is a special type of prolonged occupational stress that results from interpersonal demands at work that exceed the worker's resources. Recognition of burnout in the 1970s<sup>1</sup> coincided with the 1974–1975 worldwide recession, major cutbacks in municipal budgets, the beginnings of corporate restructuring, “downsizing,” and layoffs. Burnout was originally conceived as a three-dimensional syndrome consisting of emotional exhaustion, depersonalization (becoming callous toward and withdrawn from clients or colleagues), and reduced personal accomplishment.<sup>2</sup> While the majority of burnout studies have been conducted among white-collar professionals whose job involve a high degree of client interaction (e.g., teachers, nurses, and social workers), burnout research has expanded to include studies of workers not employed in the “helping” professions, such as blue-collar workers.<sup>3–6</sup>

---

Cunradi, Chen, and Lipton are with the Prevention Research Center, Pacific Institute for Research and Evaluation, Berkeley, CA, USA.

Correspondence: Carol B. Cunradi, Prevention Research Center, Pacific Institute for Research and Evaluation, 1995 University Avenue, Berkeley, CA 94704, USA. (E-mail: [cunradi@prev.org](mailto:cunradi@prev.org))

Findings from international research demonstrate the importance of preventing burnout in order to optimize occupational health. For example, burnout has significant consequences for the worker, including psychosomatic and psychological problems (e.g., headaches, gastrointestinal illness, hypertension, muscle tension, chronic fatigue, anxiety, depression, and sleep disturbances)<sup>3,7-9</sup> as well as negative job consequences (e.g., absenteeism and job turnover).<sup>10,11</sup> Investigating burnout among urban transit operators is particularly relevant given multiple job stressors faced by these workers, including poor cabin ergonomics, rotating shift patterns and inflexible running times, and traffic congestion (see review in Tse et al.<sup>12</sup>). Other potential stressors include noise, air quality, and extremes of temperature. Moreover, transit operators are increasingly faced with challenging interpersonal on-the-job demands, such as providing assistance to underage, elderly, indigent, or substance-abusing passengers, enforcing security on their vehicles, acting as “ambassadors” to the riding public, and being confronted by hostile or violent passengers.<sup>13</sup>

The purpose of this study is to estimate the contribution of occupational and substance use factors to burnout, after controlling for sociodemographic characteristics, among a multiethnic cohort of urban transit operators. By expanding the research base on correlates of burnout among transit operators, a blue-collar occupational group subject to considerable work-related stressors, these findings can be used to help modify the work environment and thus aid occupational health prevention efforts. Given previous findings demonstrating the association of job stress with alcohol-related behavior<sup>14</sup> and smoking<sup>15</sup> among this population, it is also important to explicate the role of substance use in relation to burnout in an effort to eliminate these health disparities.

## METHODS

### Study Population

The sample was drawn from transit operators employed by the San Francisco Municipal Railway (MUNI). MUNI is part of the seventh largest public transit agency in the USA, with current ridership estimated at over 200 million annually.<sup>16</sup> Vehicles operated by the agency include diesel and electric buses, electric trolleys, light rail, and historic cable cars. Data reported in this study were collected as part of a cross-sectional study on worksite-related alcohol consumption in urban transit operators (for a detailed description of the study, see Ragland et al.<sup>14</sup>). Data collection activities were integrated with an ongoing medical clinic that conducts health screening of MUNI operators every 2 years for their commercial driver's license renewals. All transit operators who underwent routine medical examination for driver's license renewal between August 30, 1993 and September 29, 1995 were eligible to be in the study ( $n=1,974$ ). This number represented nearly the entire workforce of transit operators. Following re-licensing exam, operators were asked to complete confidential interviews about work-related stress, alcohol use, and other factors, and 1,553 workers (78%) participated. The sample for this study consists of 1,231 transit operators for whom we had complete data. There were no differences in age, gender, marital status, full or part-time work status, years employed, ergonomic problems, annual household income, alcohol use, or burnout scores between operators included in the sample and those for whom we lacked complete data, but excluded cases were more likely to be African American, to report fewer job problems, and to be current smokers.

### **Data Collection**

The first step in the data collection occurred as part of a state-mandated commercial driver's license renewal examination. Operators completed a self-reported health questionnaire, which included assessment of medical history and sociodemographic variables. The health history was reviewed with the medical examiner, and each operator received a complete physical examination. The second step in the data collection was conducted after the license renewal examination. Operators were asked to complete a self-administered occupational and psychosocial questionnaire. This questionnaire included detailed questions on occupational factors related to job stress, as well as extensive alcohol-related variables. The questionnaires and interviews were administered after the re-licensing exam, when it was less likely that operators would perceive any relationship between our study and their employment. Operators provided informed consent for the interviews and could choose not to answer any of the questions. The project was approved by the Institutional Review Boards at the University of California, Berkeley, the University of California, San Francisco, and the Western Consortium for Public Health.

### **Measures**

*Burnout (dependent measure)* Survey participants completed the emotional exhaustion subscale of the Maslach Burnout Inventory (MBI),<sup>17</sup> which consists of nine statements. Sample items include the following: I feel emotionally drained from my work; I feel used up at the end of the workday; I feel fatigued when I get up in the morning and have to face another day on the job; Working with people all day is really a strain for me; and I feel burned out from my work. Response categories ranged from 1=*never* to 7=*every day*. Internal reliability (Cronbach's  $\alpha$ ) was 0.94. Burnout was treated as a continuous variable in the analysis. A mean score was computed by summing across items and dividing by number of items. Higher scores reflect greater levels of burnout (i.e., emotional exhaustion).

### **Substance Use**

*Alcohol Consumption.* As part of the self-administered questionnaire given after the re-licensing examination was completed, operators were asked, "In an average week, how much of the following do you drink?" They were asked to separately list the number of glasses of wine per week, number of cans or bottles of beer per week, and the number of drinks of liquor (e.g., gin, rum, vodka, and whiskey) per week. Based on responses to these questions, an overall measure of alcohol quantity-frequency was calculated from which a measure of daily mean ounces of alcohol was derived.

*Smoking Status.* As part of the medical examination, operators were asked about their current smoking and smoking history. Based on responses to these questions, operators were classified as current smokers, former smokers, or never smokers.

### **Occupational Factors**

Information on occupational factors was measured as follows.

*Years of Driving.* The duration of professional driving as a transit operator was measured in years of service.

*Full- or Part-Time Work Status.* A dichotomous variable was created to compare workers who operated a transit vehicle full vs. part-time.

*Job Problems.* Survey participants were asked to rate the past-year frequency of the following potential job problems: equipment problems, problems with fares and transfers, too many passengers, problems caused by passengers, problems caused by coworkers, problems with supervisor, long or odd hours, written up for rule violation, unfairly written up for rule violation, minor accident with no injuries, serious accident with injuries, accident that is your fault, serious traffic or road problems, problems with other vehicles, crimes against you while on duty, crimes against your passengers, problems communicating with central control, poor access to restrooms, and not maintaining run schedule. Response categories ranged from 1=*never* to 5=*daily*. Internal reliability was Cronbach's  $\alpha=0.86$ . A mean score based on the frequency of job problems was calculated by adding across events and dividing by the number of items. This list of job problems was developed by conducting individual interviews and focus groups among MUNI transit operators,<sup>18</sup> and previous studies have found a significant relationship between this measure and alcohol-related behavior.<sup>14,19,20</sup>

*Ergonomic Problems.* Operators were asked, "Think of the type of vehicle you usually drive. How much of a problem is each of the following? (1) adjusting the seat; (2) back support; (3) vibration, rocking or bouncing of seat; (4) steering; (5) reaching across the wheel; (6) position of the cash box and transfer cutter; (7) adjusting mirrors; (8) heat, cold, or draft." Response categories were 1=*no problem*, 2=*small problem*, 3=*some problem*, 4=*a big problem*. Internal reliability was Cronbach's  $\alpha=0.87$ . A continuous variable based on a summary index for intensity of ergonomic problems was calculated by adding across each type of problem and dividing by the number of items. The list of problems was based on an ergonomic evaluation of the vehicle fleet by an ergonomist in an earlier study.<sup>21,22</sup>

### **Background Characteristics**

Background characteristics included gender, age, marital status, annual household income, and race/ethnicity. Since black operators constitute more than half the sample and due to small numbers of operators in some of the racial/ethnic categories, black operators were compared to operators in all other racial/ethnic groups in the multivariate analysis. Since ergonomic problems can be confounded by height and weight, we included these two measurements that were obtained from the medical examination in the multivariate model.

*Data Analysis* Means and standard deviations (SDs) for continuous variables and proportions for categorical variables were calculated in order to describe characteristics of the sample. A multivariate linear regression model was developed to estimate the contribution of occupational and substance use factors to burnout. Control variables included gender, race/ethnicity, age, income, and marital status. All analyses were conducted with SPSS v.15.0 (SPSS, Inc., Chicago, IL). The significance level for multivariate analysis was set at  $\alpha=.05$ .

## RESULTS

### Sample Characteristics

The average transit operator in the sample was 46.5 years old (SD, 7.8 years). The majority of operators (53.1%) were African American. In comparison, based on the 1990 Census, 10.9% of the population in the city and county of San Francisco were African American. Most operators (83.4%) were male. Approximately two thirds of the operators were married. On average, operators reported annual household income between \$50,000 and \$59,000 and had been employed by MUNI for 12.4 years (8.0 SD). About 90% of the operators drove full-time. Regarding smoking status, 26.6% reported being former smokers, 26.6% reported being current smokers, and 46.8% reported never smoking. Slightly less than two thirds of the operators were current drinkers (i.e., reported having at least one drink of alcohol in the past 12 months; Table 1).

### Factors Associated with Burnout

Job problems ( $\beta=0.426$ ,  $p<0.001$ ) and ergonomic problems ( $\beta=0.138$ ,  $p<0.001$ ), adjusted for height and weight, were positively associated with burnout. Working full-time as a transit operator was correlated with burnout ( $\beta=0.070$ ,  $p=0.006$ ), but there was no association with years of driving as a transit operator. Age ( $\beta=-0.106$ ,  $p=0.001$ ) and income ( $\beta=-0.095$ ,  $p=0.001$ ) were negatively correlated with burnout. Quantity/frequency of alcohol consumption was positively associated with burnout ( $\beta=0.067$ ,  $p=0.008$ ), but there was no significant

**TABLE 1** Sample characteristics ( $N=1,231$ )

Characteristic	Number (%)
Mean Age (SD)	46.5 (7.8)
African American	654 (53.1)
Other race/ethnicity	578 (46.9)
Male	1028 (83.4)
Female	204 (16.6)
Married	807 (65.5)
Non-married	425 (34.5)
Annual household income	
<\$40,000	184 (14.9)
\$40,000–49,999	392 (31.8)
\$50,000–59,999	250 (20.3)
\$60,000–69,999	136 (11.0)
\$70,000–79,999	114 (9.3)
\$80,000+	156 (12.7)
Mean years employed (SD)	12.4 (8.0)
Drive full-time	1110 (90.1)
Drive part-time	122 (9.9)
Former smoker	328 (26.6)
Current smoker	328 (26.6)
Never smoker	576 (46.8)
Current drinkers	784 (63.6)

association for smoking status. Lastly, the race/ethnicity, gender, and marital status of the transit operators were not significantly associated with burnout (Table 2).

## DISCUSSION

The current study extends the results of previous analyses among the study sample that focused on the consequences of burnout (e.g., absenteeism and alcohol dependence) among urban transit operators.<sup>13,23</sup> Results of this study indicate that job problems and intensity of equipment-related ergonomic problems (adjusted for weight and height) were each positively associated with the emotional exhaustion subscale of the MBI. In addition, working full-time as a transit operator was significantly associated with this outcome. The results also suggest that increasing transit operator age confers a protective effect against burnout. While greater alcohol consumption was significantly correlated with burnout, the analysis indicated that current or former smokers did not report higher levels of burnout than operators who had never smoked. Interestingly, the findings suggest that many of the sociodemographic characteristics (e.g., gender, race/ethnicity, and marital status) of transit operators may not be correlated with burnout. Annual household income, however, was inversely related to burnout, which suggests that increased financial resources may serve to buffer operators from developing burnout in the face of job stressors.

This study adds to the growing literature on burnout among blue-collar populations in general, and, specifically, among transit operators. Moreover, this study analyzed burnout in relation to two sources of work stress (frequency of job problems and intensity of ergonomic problems) using reliable scales that were specifically developed to measure stressors that are common among transit operators. While previous studies on burnout have included bus drivers as part of a range of occupational groups (e.g., Langbelle et al.<sup>24</sup> and Innstrand et al.<sup>25</sup>), the current study was able to analyze the contribution of occupational and substance

**TABLE 2** Standardized coefficients from linear regression model of burnout among transit operators

	Beta	<i>t</i>	Sig.
Constant		0.846	0.398
Age	-0.106	-3.478	0.001
African American	-0.044	-1.622	0.105
Male	-0.030	-1.016	0.310
Married	0.025	0.898	0.369
Income	-0.095	-3.410	0.001
Former smoker	-0.032	-1.195	0.232
Current smoker	0.025	0.921	0.357
Alcohol quantity×frequency	0.067	2.672	0.008
Drive full-time	0.070	2.758	0.006
Years driving	0.029	0.905	0.366
Height	-0.002	-0.082	0.935
Weight	0.028	1.024	0.306
Job problems	0.426	15.939	<0.001
Ergonomic problems	0.138	5.183	<0.001
$R^2=0.301$			

use factors to burnout among a multiethnic sample of urban transit operators. Thus, by limiting the sample to workers in the same occupation, rather than “controlling” for occupational status, this analysis was able to more directly address the relationship of burnout to day-to-day occupational factors faced by transit operators. Findings from this study can be used to modify the psychosocial and physical work environments of urban transit operators in order to potentially reduce the development of burnout. For example, transit agencies can take steps to modify the frequency in which transit operators encounter job problems and can also modify aspects of the physical work environment that result in ergonomic problems. While it may not be feasible to entirely eliminate all work-related stressors that occur, reducing their frequency and intensity would likely improve transit operator psychological and physical health and thereafter decrease levels of burnout.

A number of study limitations should be noted. First, due to the cross-sectional study design, it is not possible to infer causality or temporal ordering from the findings. Therefore, while it is plausible that job-related stressors such as frequency of job problems and ergonomic problems precede the development of burnout, an alternative explanation is that those with higher levels of burnout are more likely to report frequent job problems and more intense ergonomic problems. Similarly, although the findings show a positive association between alcohol consumption and burnout, it is possible that workers with higher levels of burnout are more likely to consume more alcohol than other workers. Moreover, personality characteristics that may underlie the association between burnout and job stressors, such as negative affectivity,<sup>5</sup> were not accounted for in the analysis.

Second, the role of bias in influencing the results should be considered. For example, occupational samples typically consist of workers healthy enough to be in the workforce; those who were on disability or had left the workforce due to occupational stress or other health problems would not be represented in the study population. This source of bias is known as the “healthy worker effect.”<sup>26</sup> Another potential source of bias may arise from the measurement of alcohol. For example, despite assurances of confidentiality, transit operators may not have felt comfortable revealing the amount of alcohol they consumed in the context of an occupational health study. Therefore, workers’ alcohol quantity/frequency may be underreported, which would result in the underestimation of this variable.

Third, because the data were collected from 1993–1995, its applicability to present day working conditions of urban transit operators is a potential limitation of the study. The available evidence, however, suggests that operators continue to face increased road traffic, violent passengers, and increasingly tight running schedules.<sup>12</sup> Thus, these findings likely remain relevant.

Fourth, the findings are based on the results of a study carried out at a single worksite, a municipal transit agency in San Francisco. This limits the ability to generalize the results to other occupational settings. Additional research is needed to determine if the factors associated with burnout in this sample can be replicated among transit operators at other agencies in different locations. Nevertheless, given the consistently high levels of stressors encountered by urban bus drivers and documented by international research,<sup>12</sup> it is likely that these findings will generalize beyond this work setting. Future studies using longitudinal design are needed to more precisely trace the evolution of burnout over time among transit operators and to determine if burnout contributes to accidents. Conducting this type of research among transit workers is a requisite step toward understanding the etiology of work-related mental and physical health issues. Such knowledge can then be used to



design programs and implement changes in the work environment aimed at improving transit operator safety, occupational health, and well-being.

## ACKNOWLEDGMENTS

Funding for this study was received from the California Tobacco-Related Disease Research Program, University of California, Office of the President, Grant 14-RT-0116, "Context & Consequences of Smoking in a Blue-Collar Cohort" by Dr. Carol Cunradi, principal investigator. The authors gratefully acknowledge the contribution of Drs. June Fisher and David Ragland. Finally, we thank the transit operators for their participation in the study.

## REFERENCES

1. Maslach C. Burned-out. *Hum Behav.* 1976; 5: 16–22.
2. Maslach C, Schaufeli W, Leiter MP. Job burnout. *Annu Rev Psychol.* 2001; 52: 397–422. doi:10.1146/annurev.psych.52.1.397.
3. Melamed S, Ugarten U, Shirom A, Kahana L, Lerman Y, Froom P. Chronic burnout, somatic arousal and elevated salivary cortisol levels. *J Psychosom Res.* 1999; 46: 591–598. doi:10.1016/S0022-3999(99)00007-0.
4. Salanova M, Llorens S, Garcia-Renedo M, Burriel R, Bresó E. Towards a four-dimensional model of burnout: a multigroup factor-analytic study including depersonalization and cynicism. *Educ Psychol Meas.* 2005; 65: 807–819. doi:10.1177/0013164405275662.
5. Toppinen-Tanner S, Kalimo R, Mutanen P. The process of burnout in white-collar and blue-collar jobs: eight-year prospective study of exhaustion. *J Organ Behav.* 2002; 23: 555–570. doi:10.1002/job.155.
6. Schutte N, Toppinen S, Kalimo R, Schaufeli W. The factorial validity of the Maslach Burnout Inventory–General Survey (MBI-GS) across occupational groups and nations. *J Occup Organ Psychol.* 2000; 73: 53–66. doi:10.1348/096317900166877.
7. Golembiewski R, Boudreau R, Munzenrider R, Luo H. Human costs of burnout: health-related indicators around the world. In: *Global Burnout: A Worldwide Pandemic Explored by the Phase Model.* Greenwich, CT: Jai; 1996: 83–128.
8. Maslach C, Leiter M. *The Truth about Burnout: How Organizations Cause Personal Stress and What to Do About it.* San Francisco: Jossey-Bass; 1997.
9. Schaufeli W, Van Dierendonck D. The construct validity of two burnout measures. *J Organ Behav.* 1993; 14: 631–647. doi:10.1002/job.4030140703.
10. Dignam J, West S. Social support in the workplace: tests of six theoretical models. *Am J Community Psychol.* 1988; 16: 701–724. doi:10.1007/BF00930022.
11. Firth H, Britton P. 'Burnout,' absence and turnover amongst British nursing staff. *J Occup Psychol.* 1989; 62: 55–60.
12. Tse JLM, Flin R, Mearns K. Bus driver well-being review: 50 years of research. *Transp Res, Part F Traffic Psychol Behav.* 2006; 9: 89–114.
13. Cunradi CB, Greiner BA, Ragland DR, Fisher JM. Burnout and alcohol problems among urban transit operators in San Francisco. *Addict Behav.* 2003; 28: 91–109. doi:10.1016/S0306-4603(01)00222-2.
14. Ragland DR, Greiner BA, Yen IH, Fisher JM. Occupational stress factors and alcohol-related behavior in urban transit operators. *Alcohol Clin Exp Res.* 2000; 24: 1011–1019. doi:10.1111/j.1530-0277.2000.tb04644.x.
15. Cunradi CB, Lipton R, Benerjee A. Occupational correlates of smoking among urban transit operators: a prospective study. *Subst Abuse Treat Prev Policy.* 2007; 2: 36. doi:10.1186/1747-597X-2-36.



16. San Francisco Municipal Transportation Agency. About us. Accessed December 1, 2008 and available at: <http://www.sfmta.com/cms/ahome/indxabmu.htm>).
17. Maslach C, Jackson S. *Maslach Burnout Inventory*. Palo Alto: Consulting Psychologists Press; 1986.
18. Winkleby MA, Ragland DR, Syme SL. Self-reported stressors and hypertension: evidence of an inverse association. *Am J Epidemiol*. 1988; 128: 1075–1083.
19. Ragland DR, Greiner BA, Krause N, Holman B, Fisher JM. Occupational and nonoccupational correlates of alcohol consumption in urban transit operators. *Prev Med*. 1995; 24: 634–645. doi:10.1006/pmed.1995.1099.
20. Ragland DR, Krause N, Greiner BA, Fisher JM, Cunradi CB. Alcohol consumption and incidence of workers' compensation claims: a 5-year prospective study of urban transit operators. *Alcohol Clin Exp Res*. 2002; 26: 1388–1394.
21. Thompson D. *Inspection Trip to Evaluate New Prototype Bus Manufactured by Flyer Corporation for the San Francisco Muni Fleet*. Berkeley: Center for Municipal Occupational Safety and Health and School of Public Health, University of California, Berkeley; 1991: 35.
22. Krause N, Ragland DR, Greiner BA, Fisher JM, Holman B, Selvin S. Physical workload and ergonomic factors associated with prevalence of back and neck pain in urban transit operators. *Spine*. 1997; 22: 2117–2126. doi:10.1097/00007632-199709150-00010.
23. Cunradi CB, Greiner BA, Ragland DR, Fisher J. Alcohol, stress-related factors, and short-term absenteeism among urban transit operators. *J Urban Health*. 2005; 82: 43–57. doi:10.1093/jurban/jti007.
24. Langballe EM, Falkum E, Innstrand ST, Aasland OG. The factorial validity of the Maslach Burnout Inventory–General Survey in representative samples of eight different occupational groups. *J Career Assess*. 2006; 14: 370–384. doi:10.1177/1069072706286497.
25. Innstrand ST, Langballe EM, Espnes GA, Falkum E, Aasland OG. Positive and negative work-family interaction and burnout: a longitudinal study of reciprocal relations. *Work Stress*. 2008; 22: 1–15. doi:10.1080/02678370801975842.
26. Mausner J, Kramer S. *Epidemiology—An Introductory Text*. 2nd ed. Philadelphia: Saunders; 1985.