Frequency of Job Stressors, Difficulty Unwinding After Work, and Sleep Problems among Urban Transit Operators

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ABSTRACT

Poor sleep quality is associated with numerous physical and mental health problems. The purpose of this study is to analyze the occupational and demographic factors associated with sleep problems among a sample of urban transit operators. The sample consists of 676 workers (44% female; 67% African American) at a Northern California public transit agency who participated in a cross-sectional worksite tobacco survey. Approximately 27% of the sample reported that they often had trouble going to sleep or staying asleep in the past 12 months. Results of multivariate logistic regression analysis showed that frequency of job stressors (e.g., equipment problems; road or traffic problems; poor access to bathrooms) and amount of time needed to unwind and relax after work were significantly associated with often experiencing insomnia symptoms (Odds Ratio [OR] = 1.76 and 2.44, respectively). Younger workers, females, and nicotine-dependent smokers were more likely to report often experiencing sleep problems than older workers, males, and non-smokers. Employment length and work shift were not associated with the outcome. The findings indicate that transit operators experience elevated prevalence of past-year sleep problems, and

occupational factors play a role in their occurrence. Future research should explore if policies that help reduce frequency of job stressors can mitigate poor sleep quality among this occupational group.

Key Words: Transit operators; sleep problems; job stressors; unwinding; blue-collar.

INTRODUCTION

Urban transit operators constitute a blue-collar occupational group at risk for numerous physical, mental health, and behavioral problems, including hypertension (1997), obesity (Escoto et al., 2010), musculoskeletal problems (Rugulies & Krause, 2005), job burnout (Cunradi, Greiner, Ragland, & Fisher, 2003),and tobacco use (Cunradi, Moore, & Battle, 2017). Job-related stressors that transit workers encounter have been implicated in many of these outcomes. These stressors include aspects of the physical work environment, such as cabin ergonomics and traffic congestion, and job design issues, such as time pressure, shift work, and rest breaks (Tse, Flin, & Mearns, 2006). Of note, transit operators' self-reported frequency of job stressors (e.g., equipment problems, keeping the schedule, traffic congestion) has been linked with alcohol-related behavior (Ragland, Greiner, Yen, & Fisher, 2000), job burnout (Cunradi, Chen, & Lipton, 2009), back and neck pain (Krause, Ragland, Greiner, Syme, & Fisher, 1997), and initiation or maintenance of smoking (Cunradi, Lipton, & Banerjee, 2007). Moreover, Delaney and colleagues found that transit operators' length of time to unwind and relax after work mediated the association between stressful job problems and drinking behavior (Delaney, Grube, Greiner, Fisher, & Ragland, 2002). In the presence of competing job demands (passengers, traffic, safe vehicle operation, time pressure) with which transit operators must contend, length of time to unwind may be a particularly relevant construct for

understanding the impact of job stress on health-related behavior in this workforce.

As noted in a review article by Grandner and colleagues, socioeconomic position appears to be inversely associated with sleep quality such that those with lower levels of education, income, and occupational status report higher rates of sleep disturbance (Grandner, Williams, Knutson, Roberts, & Jean-Louis, 2016). Despite evidence of socioeconomic sleep disparities, sleep problems have not been investigated among U.S. transit operators. The paucity of research in this area is significant for several reasons. First, from a public safety perspective, it is imperative that transit operators obtain adequate, restorative sleep because sleepiness has been shown to increase impaired driving and risk of accidents among general population samples and among professional drivers (Carter, Ulfberg, Nystrom, & Endling, 2003; Di Milia, 2006; Léger et al., 2014). For example, sleep-disordered breathing associated with untreated sleep apnea results in excessive daytime sleepiness, cognitive dysfunction, and impaired work performance (Punjabi, 2008). Most of those affected remain undiagnosed, and there is evidence that the prevalence is increasing among adults (Peppard et al., 2013). Anund and colleagues found that apnea was associated with having to fight to stay awake while driving the bus among Swedish transit operators (Anund, Ihlström, Fors, Kecklund, & Filtness, 2016). Studies of transit operators in Taiwan (Wu et al., 2017) and Turkey (Taşbakan, Ekren, Uysal, & Başoğlu, 2018) found that sleep apnea is linked

with accident risk. Research is therefore needed to estimate the prevalence and correlates of sleep problems among U.S. transit operators to address this gap in the literature. Second, occupational factors have been linked with sleep problems, including non-standard shift work (Bushnell, Colombi, Caruso, & Tak, 2010; Kerkhof, 2017; van Mark et al., 2010) and job stress (Halonen et al., 2017; Knudsen, Ducharme, & Roman, 2007; Ota et al., 2009; Salvagioni et al., 2017). Little is known, however, about how these factors influence the likelihood of sleep problems among transit operators. Given that transit operators' work schedules are subject to non-standard shifts, and that job stress and difficulty unwinding among transit operators are associated with behavioral, physical and mental health problems as noted above, it is important to quantify how work-related factors are linked to sleep problems in this occupational group. Third, short sleep duration (less than 6 hours of sleep per night) is more prevalent among African Americans than whites (Jackson, Redline, Kawachi, Williams, & Hu, 2013; Luckhaupt, Tak, & Calvert, 2010; Whinnery, Jackson, Rattanaumpawan, & Grandner, 2014). This racial disparity remains when short sleep duration is defined as less than 7 hours of sleep (Jackson et al., 2013). Short sleep duration is associated with risk of coronary heart disease (Lao et al., 2018; Strand et al., 2016), poorer health-related quality of life and premature all-cause mortality (Loprinzi & Joyner, 2017). This is salient to the study of sleep problems among transit operators because African Americans comprise a substantial proportion of the U.S. transit workforce (U.S. Bureau of Labor Statistics, October 2013).

The purpose of this study is to estimate the prevalence of sleep problems (i.e., difficulty falling asleep and staying asleep) among a multiethnic sample of transit operators, and to assess the contribution of occupational factors to the likelihood of the outcome. We hypothesized that workers who reported more frequent job stressors and had difficulty unwinding and relaxing after work would be at greater risk for experiencing sleep problems compared to workers who reported less frequent job stressors and did not have difficulty unwinding and relaxing after work. Our analytic framework is guided by empirical findings from previous studies (Tse et al., 2006) and the conceptual model of transit operator health proposed by Ragland and colleagues (Ragland, Krause, Greiner, & Fisher, 1998). Regarding the former, research across transit jurisdictions (and countries) demonstrates that transit operators are subject to similar transit industry-wide stressors, such as shift work and inflexible running times, which are linked with unhealthy physiological and behavioral outcomes (Evans & Johansson, 1998). In terms of the conceptual model, Ragland et al. (1998) posit that dynamic, reciprocal relationships exist between transit systems and the health of employees. For example, occupational stress and the health of transit operators can affect the transit system, including system performance and work attendance. Rather than focus solely on individuals, transit system redesign and organizational change within transit agencies are needed to successfully address transit work-related health issues (Dobson, Choi, & Schnall, 2017).

METHODS

Study design and participants

Data for this project were collected as part of a multi-method study aimed at identifying perceived and structural barriers to transit workers' participation in health insurance-sponsored cessation treatment. The study was conducted with the cooperation and support of the management of a Northern California public transit agency, and the local elected leaders of the transit union. The transit agency is the 3rd largest public bus system in the state, with a daily weekday ridership of 171,300. As a formative part of the research, focus groups were conducted among current and former smokers; results are reported elsewhere (Battle, Cunradi, Moore, & Yerger, 2015; Cunradi, Moore, Battle, & Yerger, 2015). Next, a cross-sectional survey on tobacco use and cessation activities was conducted (Cunradi, Moore, & Battle, 2016; Cunradi et al., 2017). All workers who were employed with the transit agency at the time of the study and were members of the transit union bargaining unit were eligible to participate. This included transit operators, maintenance workers, mechanics, and clerks. Among 1,572 eligible workers, 935 completed the survey (59% participation rate). Workers who were retired or not on active duty at the time of the study were excluded from participation. All workers at the transit agency can speak and read English. The analyses herein are limited to transit workers whose job classification is transit operator (n=676).

Procedures

Members of the research team posted flyers advertising the survey, and the days and hours of data collection, at the transit agency's bus garages and maintenance facilities. Self-administered questionnaires were distributed to all eligible employees through their transit agency mailbox or in person. Members of the research team were available on-site at each location's break room 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 computer tablets. This helped to limit the possibility that duplicate surveys might inadvertently be obtained from the same participant. No identifying information (name, employee ID number) appeared on the collected surveys. Data collection began in January 2014 and concluded in March 2014. All participants provided informed consent. 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.

Measures

Outcome – Sleep Problems

Participants were asked, “During the past 12 months, how often have you had trouble going to sleep or staying asleep?” Response categories were o*ften*; *sometimes*; *rarely*; and *never*. This measure originated in a health questionnaire administered to San Francisco transit operators during a mandatory health examination at the Center for Municipal Occupational Safety and Health, a city-run occupational health clinic (Center for Municipal Occupational Safety and Health, 1994). A dichotomous dependent variable was created comparing those who reported often experiencing sleep problems with those who reported them sometimes, rarely or never (reference group). This categorization (often vs. sometimes, rarely or never) is similar to the assessment of sleep adequacy among unionized truck drivers and dockworkers described by Sorensen and colleagues (Sorensen, Quintiliani, Pereira, Yang, & Stoddard, 2009).

Independent Variables

Occupational factors. Frequency of job stressors was measured with a validated 19-item scale developed in a previous occupational health study among transit operators (Krause et al., 1997; Winkleby, Ragland, & Syme, 1988). Bus operators were asked to rate the frequency of each type of problem on a 5-point scale (*daily, weekly, monthly, yearly or less often;*

almost never). Job stressors included: equipment problems, problems caused by passengers, long or odd hours, written up for a 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 dispatcher/control center, poor access to bathrooms, and not maintaining running schedule. Frequency of each stressor was coded from 5 for *daily* to 1 for *almost never*. A mean score was calculated by adding the frequency across stressors and dividing by the number of items. Thus, transit operators reporting a higher frequency of events will have a higher score, with a range of 1 to 5. Internal reliability was Cronbach's $\alpha = 0.87$.

Length of time to unwind after work was measured with a 1-item question that originated in a previous occupational health study among transit operators (Delaney et al., 2002). Workers were asked, "How much time does it actually take to unwind and relax after work?" Response categories were: *less than an hour; about an hour; several hours; I can rarely unwind or relax*. A dichotomous variable was created that compared those in the latter 2 categories with those in the former 2 categories (reference group). The decision to dichotomize the variable for the current analysis was largely data driven; exploratory analysis showed that those that took more than an hour to unwind had a greater rate of sleep problems compared to those that took up to an hour to unwind. From the standpoint of a potential

intervention, it also seems logical to make a distinction between those who take up to an hour to unwind versus those who take several hours or seem unable to unwind.

Length of employment was categorized as up to 5 years; 5-10 years; 11-15 years; and more than 15 years (reference group). Usual shift was categorized as day shift; afternoon shift; night shift; and split, rotating, irregular or extra board (reference group). An extra board shift is filled by an on-call worker to cover for someone who has reported sick for their shift, is on vacation, or is otherwise absent from work. Number of hours worked in the last 7 days was categorized as less than 40; 40 hours (reference group); greater than 40 and less than or equal to 50 hours; and greater than 50 hours.

Demographic characteristics. Respondents were given the option of selecting male, female, or transgender. Five respondents chose transgender as their gender identity. Rather than drop these respondents from the analysis due to small numbers, we imputed their gender as female or male. Males served as the reference group for this dichotomous variable. The age of each respondent was categorized as 20-39 years, 40-49 years, 50-55 years, and those older than 55 years (reference group). Self-reported 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, including a high school diploma or GED, and those who had at least some college education (reference group). The former category included four workers who did not complete high school. Marital status was categorized as being married/cohabiting; separated, divorced or widowed; or single and never married (reference group).

Smoking status. Smoking status was assessed 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; every day*. *Current smokers* were participants who answered affirmatively to the first question and indicated that they smoked some days or every day. This measure was adapted from the 2010-2011 TUS CPS (U.S. Department of Commerce & Census Bureau, 2012). To obtain an indicator of nicotine dependence, a single question from the Fagerström Nicotine Dependence Scale (Fagerström & Schneider, 1989) was used to ask current smokers about usual time to first cigarette smoked after waking up. Those who smoked within 30 minutes were categorized as nicotine dependent; those who first smoked later than 30 minutes were categorized as non-dependent. A 3-level variable was then created with nicotine dependent smokers, non-nicotine dependent smokers, and non-smokers (reference group). The non-smoker group include life-long abstainers and former smokers.

Statistical analyses

Frequencies and descriptive statistics were calculated for sample characteristics (occupational and demographic factors; smoking status) and past-year sleep problems. Cross-tabulations of sleep problems by each of the independent variables was performed. Chi square tests of independence were used to analyze the degree of association between each set of cross-tabulated categories. A logistic regression model was developed to test the factors associated with often experiencing past-year sleep problems. This included occupational factors (frequency of job stressors, difficulty unwinding after work, usual shift, length of employment, hours worked in past 7 days); smoking status; and demographic factors (gender, race/ethnicity, age, education, marital status). Selection of independent variables was guided by previous research and empirical investigations, and univariate statistical analysis. Basic assumptions for logistic regression analysis (e.g., independence of errors, absence of multicollinearity, lack of strongly influential outliers, appropriate number of variables) were met (Stoltzfus, 2011). Odds ratios and 95% confidence intervals were estimated for each variable. Interaction terms (time to unwind and frequency of job stressors by gender) were tested and found to be non-significant. Results of the main effects model were therefore retained. All analyses were conducted using IBM SPSS Statistics v. 25 (Armonk, NY). Missing data on independent variables ranged from 1.5%-5.0%. Missing data values were imputed using the Multiple Imputations procedure in SPSS.

RESULTS

Sample characteristics by sleep problems

Overall sample characteristics and results of the bivariate analysis are shown in Table 1. Approximately 44% of the transit operators are female, and 67% are African American. Mean age of sample participants is 46.3 years (SD 10.5). On average, transit operators worked 44.6 hours in the past 7 days (SD 14.7). The mean job stressors score was 2.83 (SD 0.65). Twenty seven percent of all workers reported often experiencing sleep problems during the past 12 months. Results of the bivariate analysis indicate that compared to male workers, a greater proportion of female workers often experienced past-year sleep problems (37.4% vs. 18.7%; χ^2=29.41, 1*df*, p< 0.001.) Significant differences are also seen for age, with a smaller proportion of workers in the 56+ age group (16.9%) reporting sleep problems often compared to those in the younger age categories (28.4-30.5%; χ^2=8.87, 3*df*, p< 0.05). In terms of occupational factors, a greater proportion of workers who report taking several hours or more to unwind after work often had sleep problems compared to those who report unwinding in 1 hour or less (38.8% vs. 18.9%; χ^2=32.57, 1*df*, p< 0.001). Workers who often had sleep problems reported more frequent job stressors (as measured by mean score) than those who sometimes, rarely or never experienced sleep problems (3.04 vs. 2.75; t=5.18, 22861*df*, p< 0.001).

Multivariate correlates of sleep problems

Results of the logistic regression analysis are shown in Table 2. Regarding occupational factors, frequency of job stressors is significantly

associated with the outcome (Odds Ratio [OR]=1.76; 95% Confidence Interval [CI]=1.29-2.40) such that each 1-unit increase in the job stressors scale increases the likelihood of reporting sleep problems by a factor of 1.76. Workers who report taking several hours or more to relax and unwind after work are more than twice as likely to report often experiencing sleep problems compared to those who report unwinding within an hour (OR=2.44; 95% CI=1.63-3.66). Length of employment, usual shift, and hours worked in the past 7 days are not associated with the likelihood of often having sleep problems. In terms of demographic factors, female workers are more than twice as likely than male workers to often have sleep problems (OR=2.45; 95% CI 1.62-3.71). Compared to workers age 56 and older, workers in the 20-39 (OR=2.40; 95% CI 1.17-4.91) and 50-55 (OR=2.13; 95% CI 1.09-4.13) age categories are more likely to report often having sleep problems. Race/ethnicity, marital status, and level of education are not associated with the outcome. Compared to non-smokers, those who are nicotine dependent are more likely to report often experiencing sleep problems (OR=2.65; 95% CI 1.28-5.46). Non-nicotine dependent smokers are not at elevated risk compared to non-smokers.

DISCUSSION

To our knowledge, this is the first study to examine the contribution of occupational factors to the likelihood of often experiencing sleep problems among a sample of U.S. urban transit operators. The findings confirm our hypothesis that frequency of transit operator-related job stressors and

difficulty unwinding and relaxing after work are significantly associated with the outcome. Employment length, usual shift, and hours worked in the past 7 days were not associated with risk for often experiencing sleep problems in the past year. The results suggest that frequency of job stressors encountered by transit operators and difficulty unwinding and relaxing after work may be the most salient work-related factors to consider when addressing prevention of sleep problems among this occupational group. It is unknown, however, if these results would remain when considering potential confounders, such as psychiatric illness and chronic medical conditions.

The analysis is based on a diverse sample of transit operators; most workers in the study are African American, and nearly half are female. Although previous population-based studies have found that African Americans are at greater risk for sleep-related problems than whites (Jackson et al., 2013; Whinnery et al., 2014), our results found no racial/ethnic differences in likelihood of this outcome. One potential explanation is that these differences may be attenuated in specific occupational groups. For example, race was not related to sleep quality among a blue-collar sample of operating engineers (Choi, Terrell , Pohl, Redman, & Duffy, 2013).

While previous occupational studies have shown that non-standard shift is related to sleep problems (Bushnell et al., 2010; Kerkhof, 2017; van Mark et al., 2010), the results of the bivariate and multivariate analyses found no association for transit operators who usually work a non-standard

shift. The scarcity of comparable studies on sleep problems among U.S. transit operators makes it difficult to determine whether these results are anomalous. An analysis based on transit operators in Stockholm, for example, found that split-shift schedule was not associated with general sleep quality. The same study found that when operators who regarded working split-shift to be a problem were compared to those who didn't, those who found it problematic to work split-shift rated their sleep quality significantly lower than the other group (Ihlström, Kecklund, & Anund, 2017). In terms of gender, female transit operators were more than twice as likely as males to report often experiencing sleep problems. This finding is in accord with data from the National Health and Nutrition Examination Survey (NHANES) that showed that female workers have a higher prevalence of insomnia than male workers (Yong, Li, & Calvert, 2017). Gender differences in insomnia, however, may be attributable to history of mental health conditions (Hale et al., 2009). Further research is needed to explicate the pathways that may result in greater sleep problems among female transit operators compared to their male colleagues.

Sleep quality has been shown to decline with age (Hublin, Lehtovirta, Partinen, Koskenvuo, & Kaprio, 2017), but workers in the study's oldest age category (56+ years) were not at increased risk for often experiencing insomnia symptoms. This may be due in part to the healthy worker effect, the phenomena in which healthier individuals are more likely to be employed than unhealthier individuals, and are likewise more likely to continue working

than those in poorer health (McMichael, 1976). In the context of the current findings, transit operators in the oldest age group may have heartier (unmeasured) characteristics, such as better coping skills. Alternatively, the oldest workers may be exhibiting a cohort (generation) effect, in which variation in health status is observed among those in a birth cohort based on differential exposure to environmental and societal factors (Last, 1988). Regarding smoking, the results show that compared to non-smokers, nicotine dependent smokers are more likely to report often having sleep problems. This finding is consistent with other studies that show smokers at increased risk for insomnia and poor sleep quality (Choi et al., 2013; Jaehne et al., 2012).

The limitations of the study should be noted. First, the cross-sectional study design precludes making causal inference about the findings. It is not possible, for example, to determine the temporal ordering of events. Thus, workers may have developed sleep problems prior to the development of job stressors or difficulty unwinding after work. Additional research is needed to test the interplay of these factors using longitudinal study design. Second, the sample was obtained from 1 transit agency, which may limit the study's generalizability. Qualitative research findings from studies of transit workers at 2 geographically distinct agencies, however, indicate that themes related to work stress are common among transit operators across jurisdictions (Cunradi et al., 2015; Dobson et al., 2017); this helps mitigate concerns about generalizability. Third, important potential correlates of sleep

problems were not included in the study. These include the presence of sleep apnea, use of sleeping medications, alcohol use, self-rated health, and other physical and mental health conditions. The presence of depressive symptoms, for example, is associated with poor sleep quality (Choi et al., 2013; Knudsen et al., 2007), and is associated with new onset cases of insomnia over a 1-year period (Leblanc et al., 2009). Fourth, because sleep was not the focus of the original study, a validated instrument, such as the Pittsburgh Sleep Quality Index (Buysse, Reynolds III, Monk, Berman, & Kupfer, 1989) was not used. The study's measurement of sleep problems was limited to a single self-reported item in which problems with sleep onset and sleep maintenance were combined, despite evidence that these are distinct facets of insomnia (Ohayon, 2002). Use of a single-item measure makes it difficult to know if a single or multiple insomnia symptoms are being measured. This single-item approach also does not allow us to identify the duration and intensity of insomnia symptoms and whether participant endorsements of sleep problems are indicative of an insomnia disorder diagnosis. Although numerous studies have used a single-item measure to assess sleep quality (Hale et al., 2009; Hale, Hill, & Burdette, 2010; Hublin et al., 2017; Kim & Lee, 2015; Sorensen et al., 2009), objective measurement of sleep quality and disturbance would strengthen the design, such as through the use of actigraphy.

Despite these limitations, the current study contributes to our understanding of the prevalence and correlates of sleep problems among

urban transit operators, and the role of occupational factors. Given the vital role of transit operators in keeping public transit systems safe and efficient, the health and well-being of these workers is of crucial importance. Future research should explore if policies that help reduce frequency of job stressors can mitigate poor sleep quality among this occupational group. Finally, as to the generalizability of the findings to non-transit job settings, researchers should consider measuring length of time needed to unwind and relax after work to determine if this construct is independently related to sleep problems among workers in other blue-collar occupations.

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Table 1. Sample Characteristics by, N=676

	%Total Sample	Sleep Problems		Chi Square, *df*
		% Often	% Sometimes/ Rarely/ Never	
Gender				
Female	43.9	37.4	62.6	29.41,1 *df*
Male	56.1	18.7	81.3	$p <$ 0.001
Race/ethnicity				
Asian/South Asian	9.8	15.2	84.8	7.84, 4*df*
African American	67.1	27.5	72.5	n.s.
Latino/Hispanic	10.2	26.1	73.9	
Multiethnic/other	6.6	38.0	62.0	
White	6.4	27.9	72.1	
Years of age				
20-39	29.1	29.4	70.6	8.87,3*df*
40-49	26.0	28.4	71.6	$p < 0.05$
50-55	24.7	30.5	69.5	
56+	20.1	16.9	83.1	
Marital status				
Married/live with partner	54.0	24.1	75.6	3.00, 2*df*
Separated, divorced, widowed	21.9	31.1	68.9	n.s.
Single, never married	24.1	28.8	71.2	
Education				
$\leq$ High school or GED	32.2	28.9	71.1	0.71, 1*df*
Some college or BA	67.8	25.8	74.1	n.s.
Smoking status				
Nicotine dependent smokers	6.8	43.5	56.5	7.48, 2*df*
Non-dependent smokers	12.1	29.3	70.7	$p < 0.05$
Non-smokers	81.1	25.2	74.8	
Time to unwind				
Up to 1 hour	60.4	18.9	81.1	32.57,1 *df*
Several hours or more	39.6	38.8	61.2	$p <$ 0.001
Employment length				

≤5 years	28.0	21.2	78.8	4.48, 3*df*
>5 and ≤10 years	18.6	28.6	71.4	n.s.
>10 and ≤15 years	27.8	29.8	70.2	
>15 years	25.6	28.9	71.1	
Usual shift				
Day shift	35.2	26.4	73.5	6.00, 3*df*
Afternoon shift	11.8	17.5	82.5	n.s.
Night shift	14.2	25.0	75.0	
Split, rotating, or extra board	38.8	30.9	69.1	

Table 1 (continued)

	% Total Sample	Sleep Problems		Chi Square, df
		% Often	% Sometimes/ Rarely/ Never	
Hours worked past 7 days				
<40 hours	10.9	35.1	64.9	4.53, 3*df*
40 hours	21.4	24.1	75.9	n.s.
>40 and ≤50 hours	44.4	24.7	75.3	
>50 hours	23.2	29.7	70.2	
Job stressors scale score Mean (SE)		n=182 3.04 (.05)	n=494 2.75 (.03)	*t*=-5.18, 22861*df*, *p*<0.001

n.s = not significant. Percentages may not add up to 100% due to rounding error.

Table 2. Logistic Regression for Sleep Problems.

	Odds Ratio	95% Confidence Interval
Gender (ref: male)		
Female	2.45	1.62-3.71***
Race/ethnicity (ref: White)		
Asian/South Asian	0.56	0.18-1.77
African American	0.86	0.38-1.92
Latino/Hispanic	1.05	0.39-2.80
Multiethnic/other	1.15	0.37-3.56
Years of age (ref: 56+)		
20-39	2.40	1.17-4.91*
40-49	1.79	0.89-3.53
50-55	2.13	1.09-4.13*
Marital status (ref: single, never married)		
Married/live with partner	1.28	0.77-2.12
Separated, divorced, widowed	1.40	0.78-2.52
Education (ref: some college/college degree)		
≤ High school or GED	0.93	0.60-1.45
Smoking status (ref: non-smokers)		
Nicotine dependent smokers	2.65	1.28-5.46**
Non-dependent smokers	1.08	0.59-1.96
Time to unwind (ref: up to 1 hour)		
Several hours or more	2.44	1.63-3.66***
Employment length (ref: >15 years)		
≤5 years	0.61	0.32-1.16
>5 and ≤10 years	0.80	0.43-1.49
>10 and ≤15 years	0.79	0.45-1.39
Usual shift (ref: day shift)		
Afternoon shift	0.79	0.33-1.88
Night shift	1.19	0.63-2.27
Split, rotating, or extra board	1.09	0.68-1.72
Hours worked past 7 days (ref: 40 hours)		
<40 hours	1.48	0.71-3.09
>40 and ≤50 hours	1.26	0.72-2.19
>50 hours	1.44	0.78-2.67
Job Stressors	1.76	1.29-2.40***

p<0.05*; p<0.01**; p<0.001***