Health Risk Behavior Profile of Construction Workers, 32 States, 2013 to 2016

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Background: Research has suggested that several health risk behaviors were more prevalent among construction workers than among the general workforce. **Methods:** The prevalences of six health risk behaviors among construction workers were compared with workers in other industries using data from 32 states in the 2013 to 2016 Behavioral Risk Factor Surveillance System (BRFSS). **Results:** Smoking, smokeless tobacco use, binge drinking, no leisure-time physical activity, and not always using a seatbelt were significantly more prevalent ($P < 0.001$), and short sleep significantly less prevalent ($P < 0.05$), for all construction workers combined compared with workers in other industries. Prevalences varied substantially for all six health risk behaviors by construction occupation. **Conclusions:** Due to the high prevalence of some health risk behaviors, construction workers may benefit from interventions to reduce these behaviors, particularly since they are also potentially exposed to workplace hazards.

Keywords: binge drinking, BRFSS, construction, epidemiology, health behavior, occupation, seatbelt, surveillance, survey, tobacco

In 2018, approximately 11.2 million people worked in the US construction industry,[1] and about 8.3 million workers held construction trades occupations such as carpenter, electrician, plumber, glazier, carpet installer, roofer, sheet metal worker, or construction equipment operator.[2] The remaining construction industry workers had non-production occupations such as architect, accountant, or secretary.

Previous research has identified the increased prevalence of some health risk behaviors among construction workers compared with other workers or the general population. These behaviors include tobacco use,[3–10] alcohol consumption,[7–9,11–14] and not always using a seatbelt.[9,15,16] Data from the 2014 to 2016 National Health Interview Survey (NHIS) indicated that tobacco use was higher among construction workers than among all workers: 25.8% of workers in construction and extraction occupations smoked cigarettes in contrast to 15.4% of all workers, and 9.0% of workers in construction and extraction occupations used smokeless tobacco as compared with 3.0% of all workers.[3,10]

In the 2005 California Health Interview Survey, construction workers had a 14.8 percentage point higher risk of binge drinking than professional workers.[11] The 2006 wave of the National Longitudinal Survey of Youth (a cohort born in 1957 to 1965) found that men working in high physically demanding jobs drank more frequently, drank more on usual drinking days, and drank six or more drinks more often than men in lower physically demanding jobs.[13] Problem drinking among construction workers may be longstanding: in a household survey conducted in the United States in the early 1980s, 6.5% of the general population had alcohol dependence or abuse disorder; construction laborers had the highest prevalence (28.0%), and four other construction occupations had prevalences of 9.8% or higher.[12]

Construction and extraction workers had among the highest crude prevalences of not always using a seatbelt by occupation in the 2013 BRFSS survey,[16] and a 1999 observational study of seatbelt use in Michigan reported anecdotally that a large majority of drivers and front seat passengers in light commercial, construction-related, vehicles did not use seatbelts.[15]

In addition to these findings for construction workers, blue-collar workers in general have been found to participate in less leisure-time physical activity (LTPA) than professional or white-collar workers,[17] although it should be noted that construction is one of the most physically demanding industries.[18–20] In contrast to these behaviors, construction has not been reported among the industries or occupations with the highest prevalence of short sleep.[21]

Most previous studies either examined construction workers as a group[3,5–7,10,11,16] or focused on one or two specific occupations.[4,8,9] The purpose of this study was to assess the prevalence of six health risk behaviors (smoking, smokeless tobacco use, binge drinking, no LTPA, short sleep, and not always using a seatbelt) among workers in a wide variety of specific construction occupations, as well as the specific occupations as a group and all workers in the construction industry as a group and to compare them with the prevalence among workers in other industries. This study was exploratory; the null hypotheses were that these prevalences among workers in the various construction groups were not statistically different from the prevalences among workers in all other industries. The large sample of currently employed workers with industry and occupation information available in BRFSS over a 4 year period enabled this assessment. This is the first study to examine selected health risk behaviors among specific construction occupations using a large population-based sample.

METHODS

Study Design and Population

The Behavioral Risk Factor Surveillance System is an annual, state-based, random-digit-dialed landline, and cell phone survey of noninstitutionalized adults aged more than or equal to 18 years residing in the United States. All 50 states, the District of Columbia, Puerto Rico, U.S. Virgin Islands, and Guam administer

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Conflicts of Interest: None declared.

Clinical significance: The prevalence of six health risk behaviors varied among construction workers by their occupation and between construction workers and all other workers. This could be taken into account when planning programs and interventions to reduce these behaviors.

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the survey. BRFSS collects information on health-related risk behaviors, chronic health conditions, and use of preventive services, as well as demographic characteristics. The survey includes core questions asked of every respondent and optional module questions that individual states select each year. Individual states can augment their survey with their own state-added questions. The National Institute for Occupational Safety and Health (NIOSH) has sponsored the industry and occupation optional module since 2013.

Respondents who reported being currently employed for wages or self-employed at the time of the interview or who had been employed within the previous 12 months were asked the occupation and industry questions: What kind of work do you do? For example, registered nurse, janitor, cashier, auto mechanic. What kind of business or industry do you work in? For example, hospital, elementary school, clothing manufacturing, restaurant. Participants' responses were coded to the 2002 version of US Census Bureau industry and occupation numeric codes.[22] We limited our analyses to those respondents who were currently employed for wages or self-employed.

Thirty-two states used the industry and occupation questions for at least 1 year from 2013 to 2016: Alaska, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Oregon, Tennessee, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming. In 2013, Washington and Wyoming collected their industry and occupation data via equivalent state-added questions[23,24] and are included in the study population; in 2014 to 2016, all contributing states used the NIOSH industry and occupation module questions. The median state BRFSS survey response rates among all states were 46.4%, 47.0%, 47.2%, and 47.1% for 2013, 2014, 2015, and 2016, respectively.[25–28]

Industry and Occupation Classification

Most of the workers in the construction industry work in construction trades. The construction industry also employs construction project managers and workers whose jobs are primarily non-production (eg, secretary). We were interested in describing the health-related risk behaviors of workers within the construction industry in the 38 occupations defined by the U.S. Census Bureau (consistent with the Standard Occupational Classification System [SOC])[29] as construction managers (Census code 0220) or construction workers (Census codes 6200 through 6760) plus six other construction-related occupations (Census codes 6820, 7310, 7410, 8140, 9130, 9520). We refer to these 38 occupations within the construction industry as individual ''selected occupations.'' We also created three industry-occupation groups: (1) workers in the 38 individual selected occupations within the construction industry were grouped into ''selected occupations,'' (2) all workers in the construction industry regardless of occupation were grouped into ''construction industry,'' and (3) all workers who did not work in the construction industry were grouped into ''all other industries'' (Table 1).

Among the 32 states that used the BRFSS industry and occupation module in 2013 to 2016, there were a total of 859,921 respondents aged 18 or older, 429,344 (50%) of whom were currently employed for wages or self-employed. Of these, 41,714 (9.7%) respondents who did not have a coded industry due to missing or insufficient information were excluded from all analyses. BRFSS is not representative of the active duty military, so 1,010 currently employed respondents who reported the military for either industry or occupation were also excluded from the analyses. Therefore, the study population consisted of 386,620 participants (25,842 in the construction industry and 360,778 in all other industries). Of respondents who worked in the construction industry, 20,593 (79.7%) were employed in the 38 selected occupations, 4,725 (18.3%) worked in non-construction occupations such as engineer or accountant, and 524 (2%) had an unknown occupation due to missing or insufficient information. Respondents who worked in the construction industry but had a non-construction or unknown occupation were included in the construction industry category. We report results only for occupational categories containing at least 50 respondents; 26 of the 38 selected occupations met this criterion. Respondents in all 38 selected occupations (including the 12 with less than 50 respondents) were included in the ''selected occupations'' and ''construction industry'' group categories.

Health Risk Behaviors

The health risk behaviors were assessed among workers employed in the selected occupations and the three industry-occupation groups. Current smokers were defined as having smoked at least 100 cigarettes in their entire life and currently smoking some days or every day. Current smokeless tobacco users were defined as currently using chewing tobacco or snuff (including snus) some days or every day. Binge drinking was defined as five or more drinks for men or four or more drinks for women on at least one occasion in the past 30 days. No LTPA was defined as not participating in any physical activities or exercise other than their regular job in the past month. Short sleep was defined as averaging less than 7 hours of sleep per day (this behavior was not included in the 2015 survey). ''Not always'' using a seatbelt was defined as reporting frequency of seatbelt use as ''nearly always,'' ''sometimes,'' ''seldom,'' or ''never.''

Statistical Analysis

Data were weighted and analyzed to account for the complex BRFSS sampling design. Individual states provided 1 to 4 years of data; for states providing 2 to 4 years, the sampling weights were divided by the number of years, so the population estimates would be the average of all years. Multiple logistic regression was used to estimate the adjusted prevalence of each behavior by industry-occupation. Age, sex, race/ethnicity, and education were included in the regression models as potential confounders. In order to compare construction workers to other workers, each of the selected occupations as well as the groups ''selected occupations'' and ''construction industry'' were tested against the reference category ''all other industries.'' Analyses were performed using SAS version 9.4 software (SAS Institute, Inc., Cary, NC) and SUDAAN version 11.0 software (FTI International, Research Triangle Park, NC).

RESULTS

The following criteria were used in reporting results. Estimates with a relative standard error (RSE) more than 50% are not reliable and are not reported. Estimates with an RSE more than 30% and less than or equal to 50% should be interpreted with caution; they are shown in Supplemental Digital Content 1, http://links.lww.com/JOM/A734 but are not discussed.

Demographics

The sample included 25,842 construction workers representing 6,551,480 construction workers in the population of the 32 states. Table 2 shows the number of respondents in the sample who worked in the construction industry and in all other industries combined, respectively, and the weighted percentage within selected sociodemographic characteristics for both industry groups. There were notable differences between construction industry workers and workers in all other industries for each characteristic except age group. For example, construction industry workers were more likely to be male, Hispanic, and have less than a college education.

For the 38 selected occupations, Table 1 presents the number of respondents in the construction industry sample and the

TABLE 1. Distribution of Adults Currently Employed in the Construction Industry by Selected Occupations and in All Other Industries Combined—Behavioral Risk Factor Surveillance System (BRFSS), 32 States, 2013–2016

Industry and Occupation (2002 US Census Occupation Codes*)	Unweighted Sample	Weighted† Number
Construction industry	25,842	6,551,480
Selected occupations	20,593	5,373,515
Construction managers (0220)	2,701	534,697
First-line supervisors/managers of construction trades & extraction workers (6200)	2,013	423,832
Boilermakers (6210)	17	2,707
Brick masons, block masons, & stone masons (6220)	289	78,433
Carpenters (6230)	2,595	595,450
Carpet, floor, & tile installers & finishers (6240)	340	108,349
Cement masons, concrete finishers, and terrazzo workers (6250)	201	60,844
Construction laborers (6260)	5,231	1,697,905
Paving, surfacing, & tamping equipment operators (6300)	27	3,533
Pile-drive operators (6310)	<5	
Operating engineers & other construction equipment operators (6320)	833	154,957
Drywall installers, ceiling tile installers, & tapers (6330)	186	51,573
Electricians (6350)	1,360	398,635
Glaziers (6360)	66	13,124
Insulation workers (6400)	55	26,686
Painters, construction & maintenance (6420)	744	233,320
Paperhangers (6430)	15	2,593
Pipe layers, plumbers, pipefitters, & steamfitters (6440)	921	238,809
Plasterers & stucco masons (6460)	32	8,526
Reinforcing iron & rebar workers (6500)	18	3,564
Roofers (6510)	369	125,325
Sheet metal workers (6520)	106	21,662
Structural iron & steel workers (6530)	139	34,178
Helpers, construction trades (6600)	33	11,921
Construction & building inspectors (6660)	139	26,543
Elevator installers & repairers (6700)	66	18,830
Fence erectors (6710)	44	6,241
Hazardous materials removal workers (6720)	15	5,025
Highway maintenance workers (6730)	421	65,800
Rail-track laying & maintenance equipment operators (6740)	<5	
Septic tank servicers & sewer pipe cleaners (6750)	<5	
Miscellaneous construction & related workers (6760)	22	7,554
Earth drillers, except oil & gas (6820)	70	11,066
Heating, air conditioning, & refrigeration mechanics & installers (7310)	646	191,587
Electrical power-line installers & repairers (7410)	56	11,553
Welding, soldering, & brazing workers (8140)	192	53,866
Driver/sales workers & truck drivers (9130)	566	136,247
Dredge, excavating, & loading machine operators (9520)	60	8,238
All other industries	360,778	71,221,398

*From https://www.census.gov/topics/employment/industry-occupation/guidance/code-lists.html.
†Weighted to the state populations of AK, CA, CO, CT, FL, GA, HI, ID, IL, IA, LA, MD, MA, MI, MN, MS, MT, NE, NH, NJ, NM, NY, NC, ND, OR, TN, UT, VT, WA, WV, WI, and WY using the survey sample weight for each respondent.

corresponding weighted population estimate for the 32 states. The largest occupation is construction laborers (Census code 6260). A wide variety of construction tasks are subsumed within this occupation, and in BRFSS, it also includes respondents who were not specific about the type of construction work they did, so it should be considered a catch-all category.

Health Risk Behaviors

For five of the six health risk behaviors (all except short sleep), both the unadjusted and adjusted prevalences were statistically significantly higher for the grouped categories ''selected occupations'' and ''construction industry'' compared with ''all other industries'' ($P < 0.001$) (Fig. 1A–D and F, Supplemental Table S1, http://links.lww.com/JOM/A734).

The adjusted prevalence for current smoking was significantly higher among 11 occupations compared with ''all other industries'' (15.8%), and two of these prevalences were more than or equal to 30% (Fig. 1A, Supplemental Table S1, http://links.lww.com/JOM/A734).

Seven occupations had significantly higher adjusted prevalences for smokeless tobacco use than ''all other industries'' (3.6%), and two occupations had significantly lower adjusted prevalences (Fig. 1B, Supplemental Table S1, http://links.lww.com/JOM/A734).

For binge drinking in the past 30 days, 11 occupations had significantly higher adjusted prevalences than ''all other industries'' (20.2%), and six of these prevalences were more than or equal to 30% (Fig. 1C, Supplemental Table S1, http://links.lww.com/JOM/A734).

Four occupations had significantly higher adjusted prevalences for no LTPA in the past 30 days than ''all other industries'' (20.8%), and all four prevalences were more than or equal to 30% (Fig. 1D, Supplemental Table S1, http://links.lww.com/JOM/A734).

Short sleep was surveyed in 2013, 2014, and 2016 but not 2015. The adjusted prevalences were statistically significantly lower

TABLE 2. Distribution of Adults Currently Employed in Construction and All Other Industries by Selected Characteristics—Behavioral Risk Factor Surveillance System (BRFSS), 32 states, 2013–2016

Characteristic	Construction Industry		All Other Industries	
	Unweighted Sample	Weighted* % Within Characteristic	Unweighted Sample	Weighted* % Within Characteristic
Age group, yrs				
18–24	1,414	8.2	19,807	10.6
25–34	4,061	23.5	49,659	20.7
35–44	5,334	25.7	64,175	21.6
45–54	6,652	23.7	90,368	23.7
55–64	6,339	15.0	96,942	17.6
65+	2,042	4.0	39,827	5.7
Sex				
Males	22,905	91.3	163,756	51.1
Females	2,937	8.7	197,017	48.9
Race/Ethnicity				
White, non-Hispanic	20,236	62.6	284,916	63.9
Black, non-Hispanic	834	6.3	24,335	11.6
Other, non-Hispanic	1,147	4.9	20,531	9.2
Hispanic	3,191	26.3	25,991	15.2
Survey language				
English	24,050	83.2	353,188	94.3
Spanish	1,783	16.8	7,470	5.7
Education				
Less than high school	2,825	22.2	14,219	9.0
High school graduate or GED	9,959	38.0	81,069	23.9
Some college or technical school	7,626	27.5	99,369	31.7
College graduate or more	5,367	12.3	165,507	35.3
Annual household income				
$0–$14,999	936	6.7	12,149	5.4
$15,000–$24,999	3,070	16.5	34,482	12.4
$25,000–$34,999	2,445	10.7	29,112	9.3
$35,000–$49,999	3,951	15.0	45,248	13.5
≥$50,000	12,843	51.0	203,722	59.3
Employment status				
Employed for wages	16,775	68.1	302,051	85.6
Self-employed	9,067	31.9	58,727	14.4
Total	25,842		360,778	

*Weighted to the state populations of AK, CA, CO, CT, FL, GA, HI, ID, IL, IA, LA, MD, MA, MI, MN, MS, MT, NE, NH, NJ, NM, NY, NC, ND, OR, TN, UT, VT, WA, WV, WI, and WY using the survey sample weight for each respondent.

for ''selected occupations'' (32.5%) and for ''construction industry'' (32.8%) compared with workers in ''all other industries'' (36.4%, $P < 0.001$). Three occupations had significantly lower adjusted prevalences than workers in ''all other industries,'' and two occupations had significantly higher prevalences than that for ''all other industries'' (Fig. 1E, Supplemental Table S1, http://links.lww.com/JOM/A734).

For not always using a seatbelt, every occupation had a higher adjusted prevalence than ''all other industries'' (11.8%), nine of which were statistically significant and two of which were more than or equal to 20% (Fig. 1F, Supplemental Table S1, http://links.lww.com/JOM/A734).

DISCUSSION

This study assessed, for the first time, a set of health risk behaviors among construction workers employed in a wide variety of occupations in 32 US states. The study used 4 years of data from BRFSS to estimate the prevalence of six health risk behaviors by occupation among construction workers and compared them with workers in all other industries. The prevalences of five of the six behaviors were significantly higher for workers in the groups ''selected occupations'' and ''construction industry'' compared with workers in ''all other industries.''

The results for the group ''selected occupations'' are somewhat comparable to the results in other studies for ''blue-collar workers,'' since most of the 38 selected occupations could be considered ''blue-collar.''[30] The ''construction industry'' group is equivalent to assessments of construction workers as an industry group in other studies. This study shows the value of assessing behaviors by individual occupation in addition to the more general blue-collar and construction industry categories because this approach can identify individual occupations with high prevalences and facilitates follow-up by targeted health promotion/health protection interventions.

No single construction occupation stood out as particularly high or low across all behaviors, but several had elevated prevalences for multiple health risk behaviors. Construction managers had statistically elevated prevalences for four of the six behaviors (smoking, smokeless tobacco use, binge drinking, and not always using a seatbelt). Construction managers plan, direct, and coordinate construction projects, overseeing their organization and overall performance. Because of their important leadership roles, behavior changes among construction managers could have positive effects on the safety and health culture in the construction industry. The next highest leadership occupation, first-line supervisors/managers of construction trades and extraction workers, also had statistically

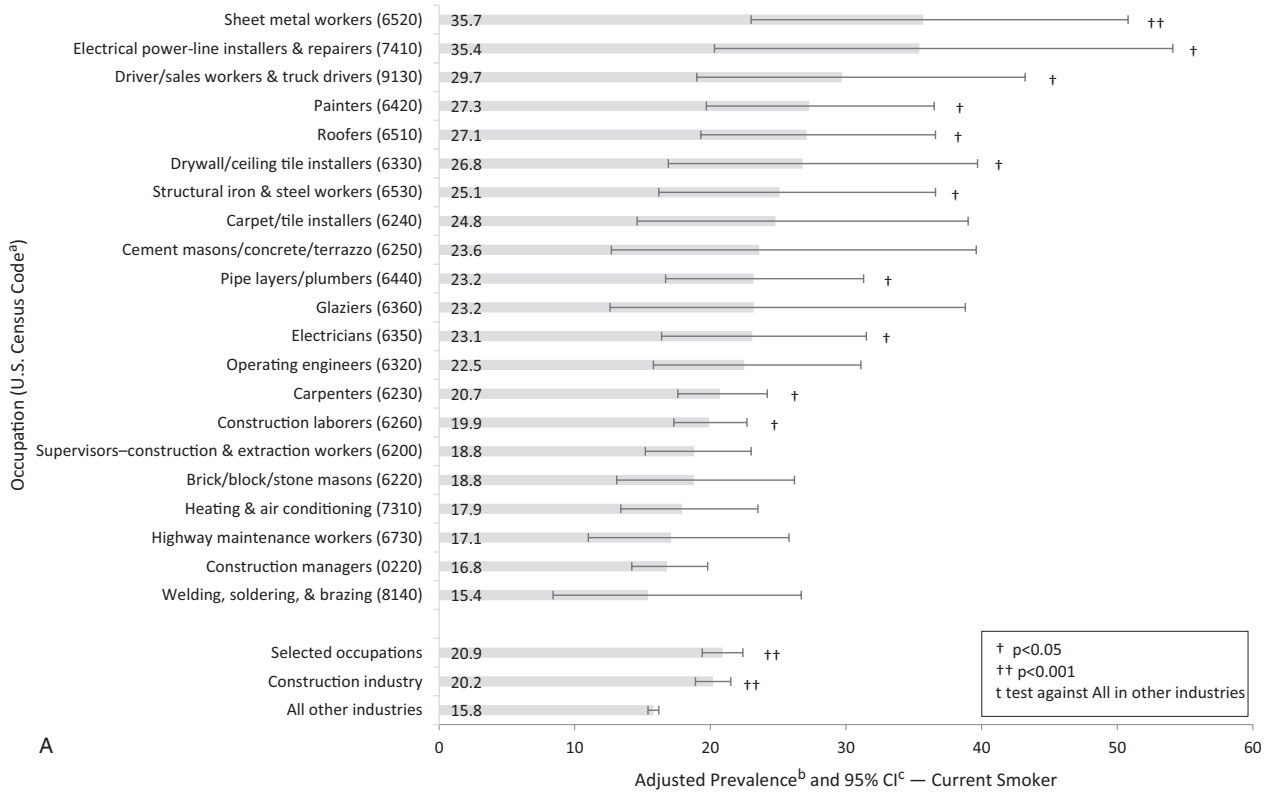


FIGURE 1. Adjusted prevalence among workers employed in selected occupations in the construction industry, all workers in the construction industry, and workers employed in other industries—BRFSS, 32 states, 2013 to 2016. (A) Current smoker, (B) current smokeless tobacco user, (C) binge drinker in past 30 days, (D) no leisure-time time physical activity in past 30 days, (E) less than 7 hours of sleep per day, (F) does not always use seatbelt. [a]From https://www.census.gov/topics/employment/industry-occupation/guidance/code-lists.html. [b]Adjusted by age group, sex, race/ethnicity, and education, and weighted to state populations using the survey sample weight for each respondent. [c]CI, confidence interval. Note: ''Selected occupations'' includes all 38 selected occupations.

elevated prevalences for the same four behaviors as construction managers.

Three occupations (carpenters, construction laborers, and roofers) all had significantly elevated unadjusted prevalences for five of the six behaviors (all except short sleep). It is not clear why these occupations had significantly high rates for so many behaviors. Since construction laborers are the largest construction occupational group, this study may have had sufficient statistical power to detect significant differences among laborers from workers in all other industries; however, since this is not a well-defined occupational category, it is not clear how to interpret these findings.

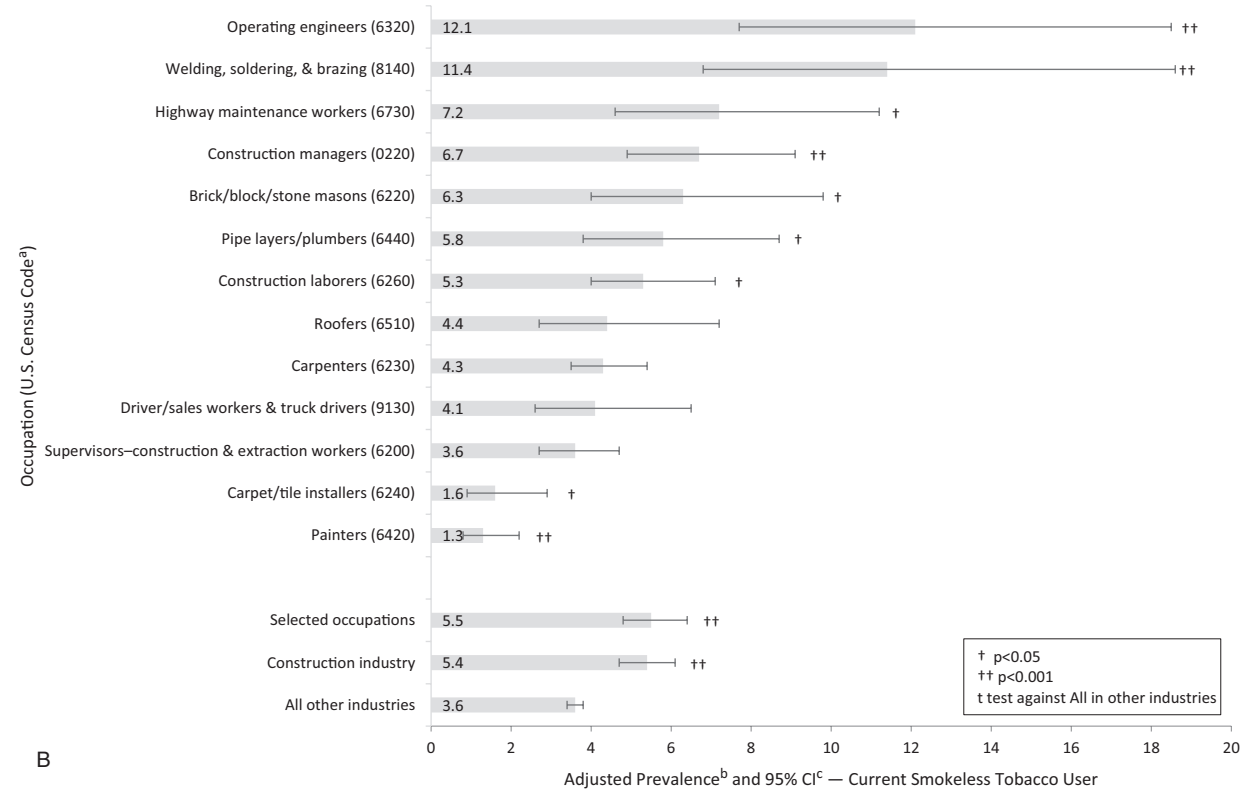
Roofers, as well as electrical power-line installers and repairers, had significantly elevated unadjusted prevalences for binge drinking and are also among the 10 civilian occupations with the highest fatal work injury rates in 2017.[31]

Electrical power-line installers and repairers had the highest unadjusted prevalences of all the occupational groups for smoking and smokeless tobacco use ($P < 0.001$). This occupational group is small, occurring primarily in the utilities and construction industrial sectors, and the current study may be the first to have identified their potentially high rates of tobacco usage and binge drinking.

Operating engineers, who operate and maintain heavy earthmoving equipment, also had very high rates (both unadjusted and adjusted) for smokeless tobacco use. A 2008 cross-sectional survey of 498 Michigan operating engineers found that younger age, male sex, and lower rates of past month cigarette use were significantly, and higher alcohol intake was not significantly, associated with use of smokeless tobacco.[4]

The two occupations with the highest significantly elevated adjusted prevalences for not always using a seat belt were operating engineers and driver/sales workers and truck drivers (in the construction industry, the latter are primarily truck drivers). It is not clear how operating engineers and construction truck drivers interpreted the BRFSS seatbelt question (How often do you use seat belts when you drive or ride in a car?) since the question specifies only ''car'' and does not address work-related versus personal driving. However, a low prevalence of seatbelt use among these workers is especially concerning since their occupations involve driving. For operators of earthmoving equipment, lack of functioning seatbelts, or nonuse of seatbelts have been found to contribute to occupational fatalities,[32] and in a study of construction fatalities involving dump trucks,[33] over a quarter of dump truck operators who died in roadway accidents did not fasten their seat belt.

Short sleep, which was prevalent among all workers, stood out as the one health risk behavior assessed where construction workers overall had a significantly lower prevalence than that for workers in all other industries combined. Only structural iron and steel workers and welding, soldering, and brazing workers had significantly elevated prevalences for short sleep, and these became non-significantly elevated after adjusting for confounders. It is not clear why construction workers were less likely to experience short sleep, especially since their worksites are transitory and may



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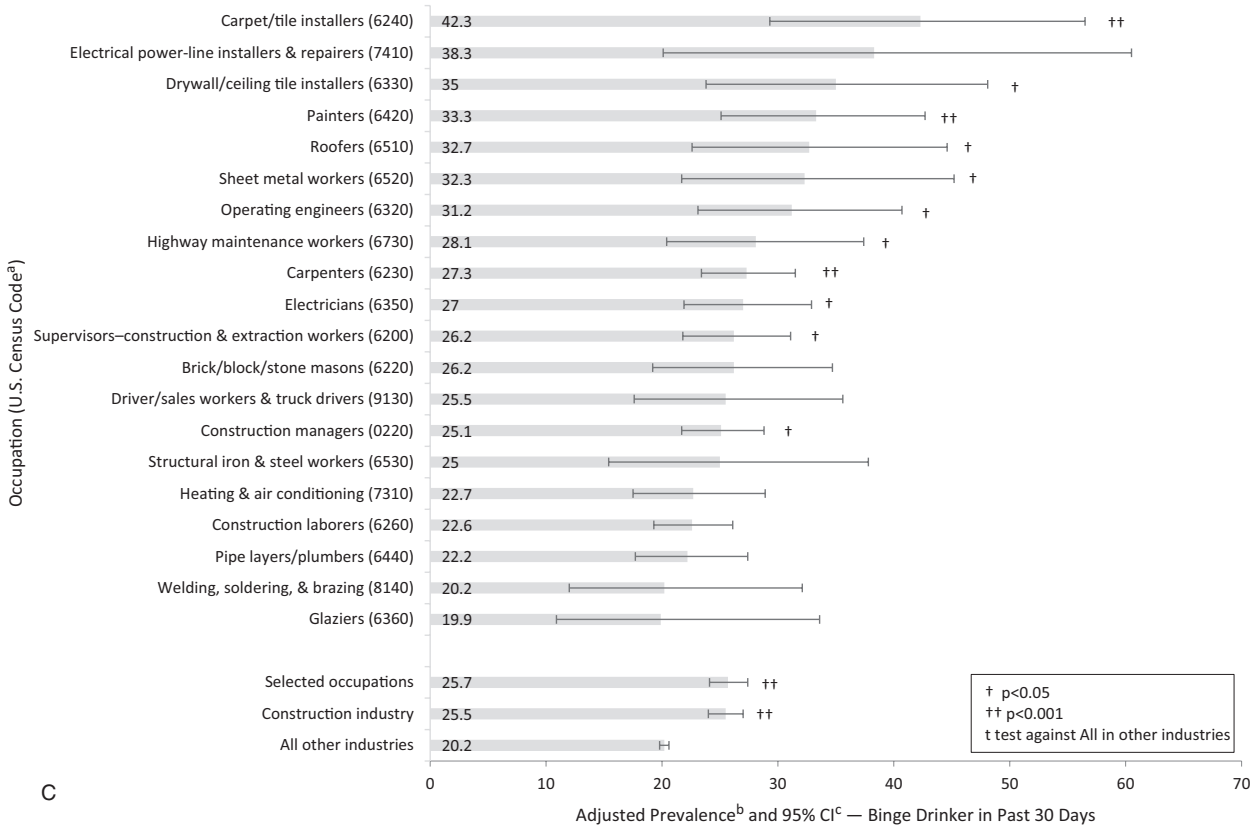

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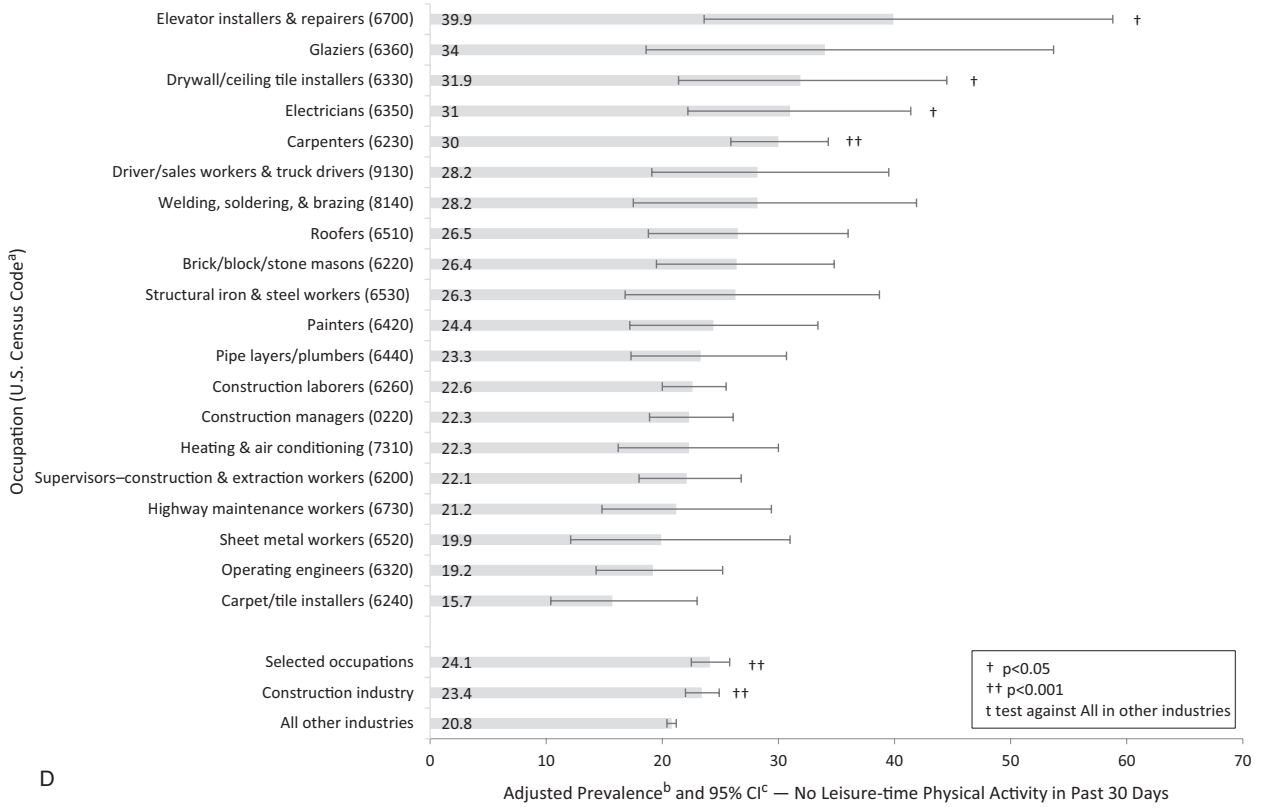

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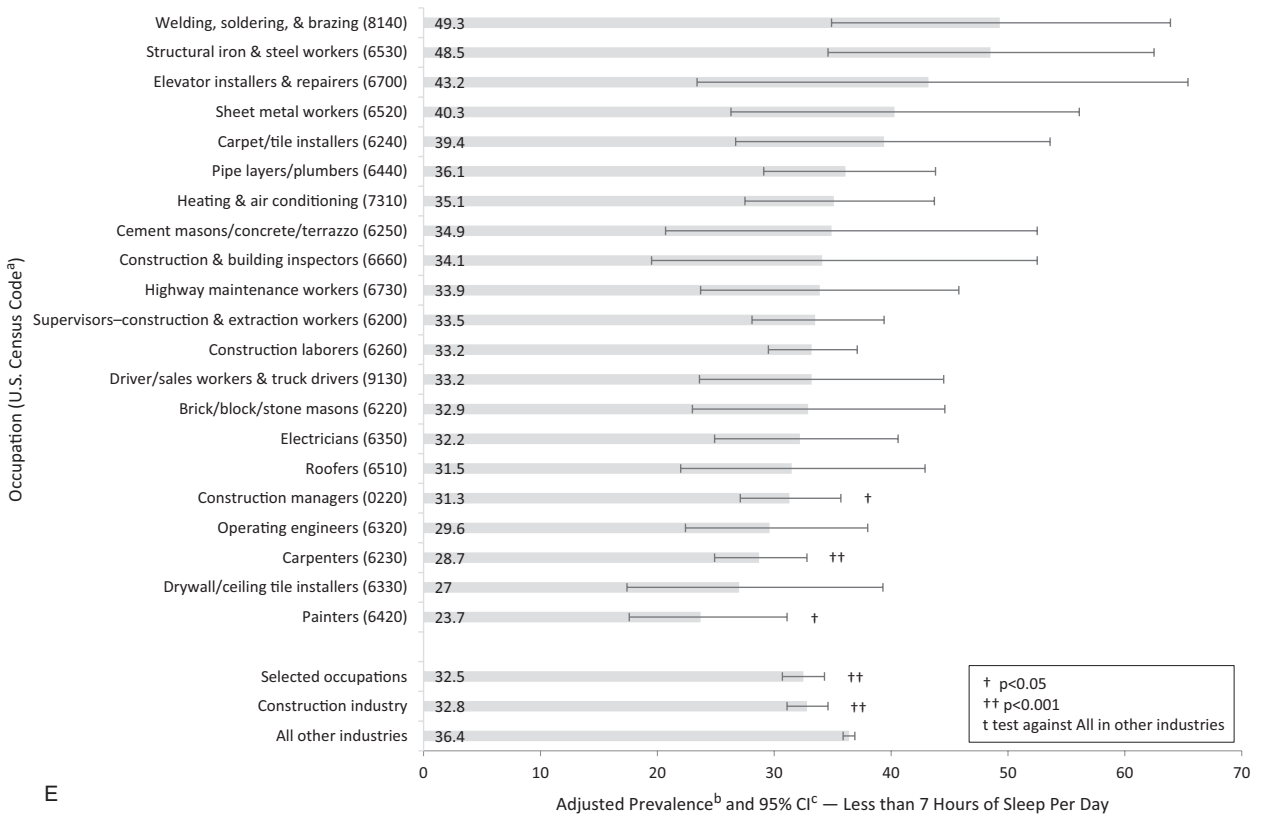

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FIGURE 1. (Continued).

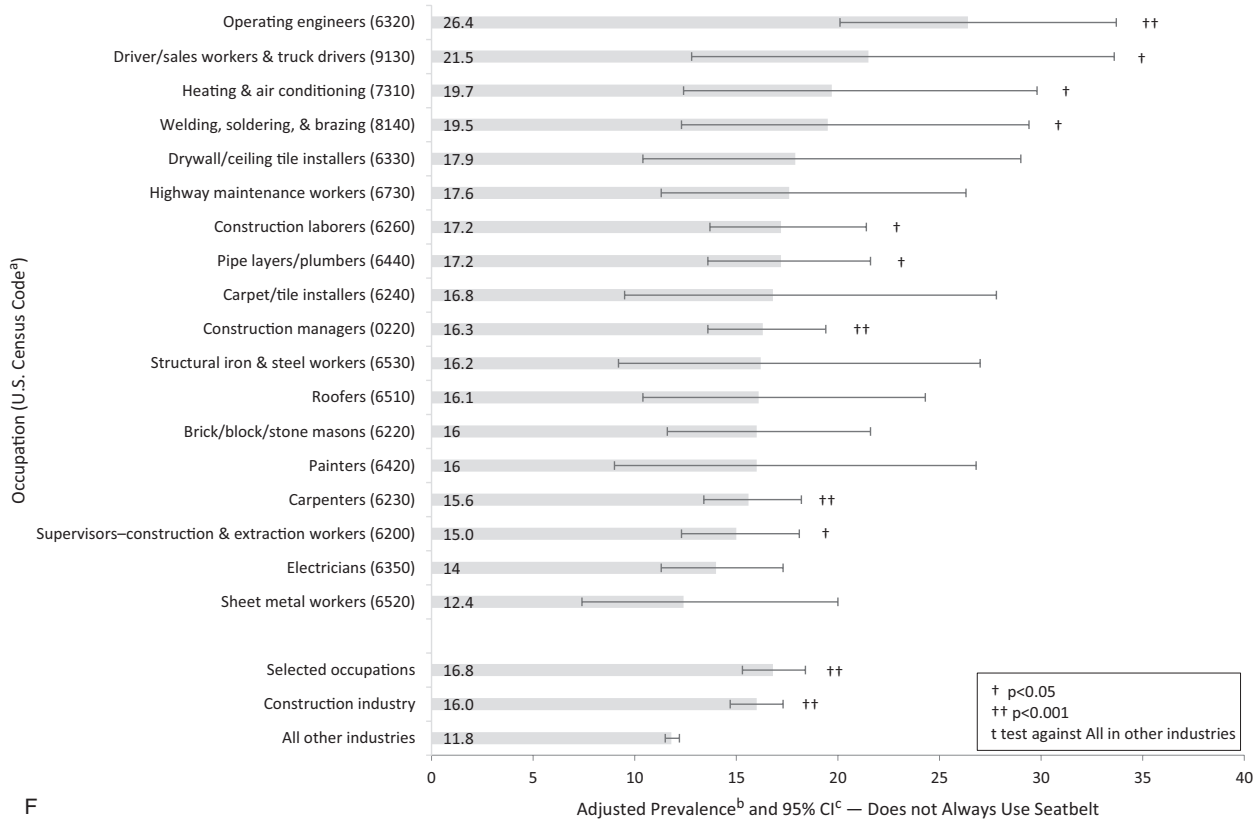

FIGURE 1. (Continued).

sometimes require getting up early to get to work on time. On the other hand, their occupational physical activity (OPA) may have helped them sleep, although this is not consistent with some findings for workers with high OPA.[34] Also, most construction workers work during the day, whereas many workers in other industries are shift workers, which is associated with a higher prevalence of sleep problems.[21]

The risks to the general population of the health behaviors we assessed in workers are well documented and have been targeted for interventions to improve the health of adults in the United States.[35–39] Tobacco use is known to cause many adverse health effects including multiple types of cancer, non-malignant respiratory diseases, cardiovascular disease, and other diverse conditions.[40] Heavy or binge drinking may be associated with short-term effects such as injuries and long-term effects such as cirrhosis of the liver.[41] Physical activity is considered healthful for many reasons, including reductions in all-cause mortality.[42,43] However, it is a paradox that while LTPA is beneficial, OPA sometimes has adverse health effects.[18,44–46] Inadequate sleep can contribute to the occurrence of injuries as well as various chronic health problems.[47] Seatbelt use has been shown to be an effective method to reduce injuries to motor vehicle occupants.[48]

Construction workers are potentially exposed to a wide range of chemical hazards at work including asbestos, silica, welding fumes, paints and solvents, and other dusts, fumes, gases, and vapors,[49,50] as well as physical hazards (eg, falls from height, repetitive motion, vibration, noise exposure).[51,52] The interaction between job hazards and health risk behaviors is not fully understood, but previous studies suggest that construction workers who exhibit some health risk behaviors are more likely to experience work-related injuries.[52] A study of construction workers aged more than or equal to 50 years[49] found a significant excess of respiratory cancer and non-malignant respiratory disease among smokers. Menvielle et al[53] found that asbestos exposure in combination with smoking and alcohol drinking had a more than additive, but not multiplicative, joint effect on laryngeal cancer in a French case–control study. Lee et al[54] reported that, even though there was a potential synergistic effect between construction workers' occupational exposures and smoking on lung disease, healthcare providers advised relatively few construction workers to cease smoking.

Total Worker Health™ (TWH) (Department of Health and Human Services, Washington, DC) is the integration of occupational health and safety with a broader approach to worker well-being such as environmental and organizational factors that can impact worker health.[55,56] These factors could include worksite safety culture, tobacco use policy, and stressors such as job or income insecurity or lack of control over work schedules. The TWH approach to the health risk behaviors assessed in this study would include health promotion activities[57–60] as well as organizational or policy changes and healthy job design to support workers' choice to adopt more healthful behaviors or reduce health risk behaviors.[61–63] For example, in an analysis of Current Population Survey data, Ham et al[64] found that workplace smoking bans and smoking cessation programs that addressed cultural factors appeared to reduce tobacco use among construction workers. Peters et al[65] reported that a TWH program among commercial construction workers which combined a worksite ergonomics program with health promotion produced improvements in ergonomic practices, health behaviors, and pain and injury. Anger et al[66] conducted a 14-week pilot TWH intervention that resulted in improvements in safety, health, and well-being among construction workers. It provided healthy lifestyle training for supervisors and employees, and it taught supervisors to support employees in their home life as well as to reinforce safe work practices.

Because of the nature of construction work for many workers (temporary jobs and work sites, multiple employers over a career or

at one worksite, small employers, self-employment, working alone, or with a few others), it can be challenging to reach construction workers with a health promotion/health protection program. Health interventions aimed at construction workers have been tried through unions and employers, including utilization of apprentice or training programs, with most focusing on tobacco use.[59,67–69]

A strength of this study was its very large population-based sample of current workers, which allowed analysis of risk behaviors by selected occupation within the construction industry. Other advantages to using BRFSS are its standard methodology by all states and use of industry and occupation questions by self-selected states. However, this study had several limitations. All BRFSS data were self-reported and may have been subject to social desirability or other biases, especially regarding the health risk behaviors. There also could have been misclassification bias due to errors in coding the industry and occupation text fields, particularly if the participants did not provide clear responses. BRFSS does not collect work-related factors such as job stress, working conditions, and physical demand that may affect some behaviors and which could have provided some context for the reported estimates; these issues could be addressed in future research using different methodology.

CONCLUSION

Overall, a higher percentage of construction workers smoke, use smokeless tobacco, binge drink, do not participate in leisure time physical activity, and do not always use a seatbelt than workers in all other industries. In contrast, a lower percentage of construction workers experienced short sleep than other workers. There was substantial variability in adjusted prevalences for the six health risk behaviors among construction occupations. Construction workers in occupations with higher prevalences, including managers and supervisors, may benefit from targeted health promotion/health protection activities to reduce the prevalences of health risk behaviors. Further study with more years of BRFSS data would be useful to improve the precision of health behavior estimates and might allow assessment of smaller construction occupations.

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