Pain and Prescription Opioid Use Among US Construction Workers: Findings From the 2011–2018 Medical Expenditure Panel Survey

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See also Atkins and Bohnert, p. S33.

Objectives. To examine prescription opioid and nonopioid analgesic use among US construction workers and their associations with pain conditions and sociodemographic factors.

Methods. We analyzed data for about 9000 (weighted 11.5 million per year) construction workers who responded to the Medical Expenditure Panel Survey from 2011 to 2018. We applied both descriptive statistics and multiple logistic regression procedures in the analyses.

Results. An estimated 1.2 million (10.0%) of construction workers used prescription opioid analgesics annually. The adjusted odds of prescription opioid use were significantly higher for workers suffering from work-related injuries (adjusted odds ratio [AOR] = 3.82; 95% confidence interval [CI] = 2.72, 5.37), non–work-related injuries (AOR = 3.37; 95% CI = 2.54, 4.46), and musculoskeletal disorders (AOR = 2.31; 95% CI = 1.80, 2.95) after we controlled for potential confounders. Adjusted odds of prescription opioid use were also higher among workers with poorer physical health (AOR = 1.95; 95% CI = 1.42, 2.69) or mental health disorders (AOR = 1.95; 95% CI = 1.41, 2.68).

Conclusions. Work- and non–work-related injuries and musculoskeletal disorders significantly increased prescription opioid use among construction workers. To prevent opioid use disorders, multipronged strategies should be approached. (*Am J Public Health*. 2022;112(S1):S77–S87. https://doi.org/10.2105/AJPH.2021.306510)

The opioid epidemic and its impact on the US population have raised national concerns.[1,2] Over the past 2 decades, more than 446 000 opioid-related deaths have occurred in the United States,[3] with 71% of drug overdose deaths in 2019 involving opioids.[4] From 1999 to 2019, overdose deaths in the United States increased by 4-fold.[5]

Opioids have also had adverse effects on millions of working people in the United States. In 2019, 60% of adults who misused opioids were employed.[6] One study that used nationally representative survey data found that about 12.6% of US workers used prescription opioids, which accounted for about $3 billion in medical expenses annually.[7] Meanwhile, fatal work injuries from unintentional overdose increased by an average of 24% per year from 2011 to 2018, of which 41% were from nonmedical drugs (n = 528) and 32% were from multiple drugs, alcohol, and medicines (n = 411).[8] The most recent data from the US Bureau of Labor Statistics (BLS) show that the unintentional overdose fatalities that occurred in the workplace increased in 2019, totaling 1606 deaths from 2011 to 2019.[9] This number only captures a small proportion of overdose fatalities, because decedents who were not at their worksite or performing work duties may be out of the scope of the BLS data collection, even though initially the decedent could have used medication to alleviate the pain from a work-related injury.[10]

Among workplaces confronting the opioid epidemic, the construction industry was especially pronounced.

A study based on the BLS data shows that overdose deaths on construction jobsites increased 9-fold from 2011 to 2018, which was twice that of the increase observed in all industries combined.[11] Using data from the National Occupational Mortality Surveillance system, researchers found that proportional mortality ratios for both heroin-related overdose deaths and methadone-related overdose deaths were highest for the construction occupation group, and proportional mortality ratios were also significantly elevated for all types of opioids within construction trade workers.[12] Studies using different data sources at the state or national level all concluded that construction workers were more likely to use opioids and die of opioid-related overdoses than workers in other industries.[12–15]

The elevated opioid-related overdoses among construction workers could be preceded by injuries that happen in the workplace. Research has found that injuries and musculoskeletal conditions were associated with increased opioid use among construction workers.[16,17] The odds of prescription opioid use for workers with occupational injuries was more than triple that of their noninjured counterparts when demographics and occupational factors were controlled.[16] Furthermore, research indicates that construction workers diagnosed with chronic musculoskeletal disorders (MSDs) were more than 4 times as likely to develop opioid use disorders compared with those who started on opioids for other diagnoses, and the relationship between opioid use disorders and doses or duration of opioid use was positively correlated: the higher doses and longer duration, the higher probability to develop opioid use disorders.[18]

Construction is one of the most dangerous industry sectors in the United States. Despite continuous intervention efforts, the construction industry still reports more fatalities and a higher injury rate than other major industries in the nation. According to the most recently published data from BLS, 1102 construction workers died on jobsites in 2019, accounting for nearly 21% (1102 of 5333) of fatal injuries in all industries.[19] This is disproportionately high given that construction employment only accounted for approximately 6% of the overall workforce in the United States.[20] In the same year, 79 660 construction workers suffered severe injuries or illnesses involving days away from work.[19] While the rate of overall reported injuries and illnesses was similar for construction and all private industries combined in 2019, the rate of injuries involving days away from work in construction was 29% higher than the rate for workers in all private industries on average (112.3 vs 86.9 cases per 10 000 full-time workers).[19] Therefore, it is not surprising that injured workers in construction were more likely than injured workers in other industries to be prescribed opioids to treat their pain.[21]

The effects of opioid use and misuse are not isolated to work or home environments.[22] Given that construction workers are commonly prescribed opioid pain relievers, it is necessary to better understand patterns of prescribed opioid use and how the use is associated with work and nonwork factors among this high-risk working population. To achieve this goal, we examined types of pain and analgesic use among construction workers, as well as factors associated with their use. We hypothesized that prescription opioid use was determined by types of pain or medical conditions the worker experienced, and the use was associated with demographic and employment characteristics of the user. We anticipate the results to provide information for workplace interventions targeting opioid use and misuse in the construction industry, and to stakeholders battling the opioid epidemic.

METHODS

Data were from the Medical Expenditure Panel Survey (MEPS), a set of large-scale national surveys collecting information on health, health care cost, and health care utilization among noninstitutionalized people in the United States. MEPS is cosponsored by the Agency for Healthcare Research and Quality and the National Center for Health Statistics.[23] Every year, a new panel of MEPS survey participants is followed for 2 calendar years, during which they complete 5 rounds of interviews. We downloaded 3 household component data files between 2011 and 2018 from the Agency for Healthcare Research and Quality Web site for this study: (1) full-year consolidated files for demographic and employment information collected from 3 survey rounds in each calendar year, (2) medical condition files for data on injury and other medical conditions, and (3) prescribed medications files for data on prescription opioid and nonopioid analgesic use. These 3 files were linked by individual survey identifiers for analyses.

Measures

Construction workers were respondents who were aged 16 years or older and self-reported that their primary employment was in the construction industry during at least 1 of the 3

survey rounds in the year, regardless of their occupation. The construction industry was coded as "3" in the MEPS industry codes, corresponding to the code "23" in the North American Industry Classification System.

Opioids in this study refers to only outpatient prescription fills of opioids including narcotic analgesics and narcotic analgesic combinations.[16,24] A prescription opioid user was a respondent who had 1 or more prescription opioid fills in any survey round during the year.[16,24] Nonopioid analgesics purchased by respondents included nonsteroidal antiinflammatory agents, salicylates, topical nonsteroidal antiinflammatories, topical anesthetics, and analgesic combinations.[16,24]

Injury was identified by 2 questions. When the MEPS respondents reported a medical condition, they were asked whether the condition was caused by an accident or injury. If they answered "yes," they were asked whether the accident or injury occurred at work. If the answer was "yes," a work-related injury was counted.[16]

We defined musculoskeletal disorders (MSDs; excluding musculoskeletal injuries) and musculoskeletal injuries based on the *International Classification of Diseases* (*ICD*) codes adopted by the MEPS, with the *ICD-9* for 2011–2015 data[25] and the *ICD-10* for 2016–2018 data.[26] *ICD* codes were also used to define other pain conditions (i.e., cancer and headaches, including migraines) and mental health disorders (i.e., adjustment disorders, anxiety disorders, attention-deficit conduct and disruptive behavior disorders, impulse-control disorders, mood disorders, personality disorders, schizophrenia and other psychotic disorders, alcohol-related disorders, substance-related disorders, and miscellaneous mental health disorders).

The respondent self-rated perceived health status at the time of the interview. We used 3 categories to analyze both physical and mental health: (1) excellent or very good, (2) good, and (3) fair or poor.

We defined age in 3 groups: 16 to 34 years, 35 to 54 years, and 55 years or older. We combined and grouped race and ethnicity into 3 major categories: Hispanic, non-Hispanic White, and non-Hispanic other. We grouped educational attainment into 3 categories: (1) less than high-school diploma or GED, (2) high-school diploma or GED, and (3) postsecondary. We defined family poverty status according to the US Census Bureau's poverty threshold: poor to low income (< 200%), middle income (200% to < 400%), and high income (≥ 400%).[27]

Self-employment status referred to workers who were self-employed at their current main job. White-collar occupations were composed of management or professional and administrative support, sales, or service. Blue-collar occupations included construction trade workers (e.g., roofers, carpenters) and other production occupations (e.g., truck drivers). We grouped average hours worked per week as part-time (< 35 hours), full-time (35–40 hours), and overtime (> 40 hours).

Data Analyses

We pooled data from 2011 through 2018 MEPS to increase sample size and improve data reliability. We used MEPS survey weight variables to weight all calculations and divided by 8 for annual averages. We stratified prescription analgesic use categories by pain categories (i.e., injury, MSDs, or other pain), other health indicators, and demographic and employment characteristics. Because 1 respondent may report more than 1 medical or pain condition, or multiple records of prescription opioid or nonopioid analgesic use, we used person-times in the percentage calculations for each category. We calculated weighted percentages and their 95% confidence intervals (CIs), and applied the χ^2 test to measure whether differences in prescription analgesic use among worker subgroups were statistically significant. We also evaluated prescription analgesic use by medical condition and calculated weighted percentages.

We used multiple logistic regressions to tabulate adjusted odds ratios (AORs) and their 95% CIs to examine how the selected independent variables affected prescription opioid use collectively. We selected variables included in the multiple regression model based on the level of significance in the descriptive statistics and correlation coefficients. We assessed multicollinearity, and no collinearity was present in the model. Results of correlation coefficients and multicollinearity assessment are in Tables A, B, and C (available as supplements to the online version of this article at http://www.ajph.org). All statistical testing (including the χ^2 test) was 2-sided, and we considered *P* values of less than .05 statistically significant. We used SAS version 9.4 (SAS Institute, Cary, NC) for the data analysis. We applied SAS SURVEY procedures and MEPS survey weights, strata, and clusters for all statistical analyses accounting for the MEPS survey design.

RESULTS

Approximately 11.5 million (weighted) workers reported that they were employed in the construction industry annually from 2011 to 2018 (Table 1).

TABLE 1— Characteristics of US Construction Workers: 2011–2018

Characteristic	Distribution, % (95% CI)
Demographics	
Gender	
Men	90.8 (89.8, 91.8)
Women	9.2 (8.2, 10.2)
Age group, y	
16–34	35.3 (33.6, 37.0)
35–54	45.5 (43.8, 47.1)
≥ 55	19.2 (17.7, 20.8)
Race/ethnicity	
Hispanic	26.4 (23.8, 28.9)
Non-Hispanic White	63.7 (60.9, 66.5)
Non-Hispanic other	9.9 (8.5, 11.2)
Education	
< high school diploma or GED	19.3 (17. 8, 20.8)
High school diploma or GED	40.6 (38.7, 42.5)
Postsecondary	40.1 (38.1, 42.0)
Family poverty status[a]	
Poor to low (< 200%)	26.1 (24.4, 27.8)
Middle (200% to < 400%)	34.0 (32.4, 35.5)
High (≥ 400%)	39.9 (37.8, 42.0)
Employment	
Occupation	
White-collar	31.2 (29.3, 33.1)
Blue-collar	68.8 (66.9, 70.7)
Self-employed	
Yes	27.4 (25.5, 29.2)
No	72.6 (70.8, 74.5)
Average hours worked per week	
35–40	55.6 (53.5, 57.7)
< 35	16.5 (15.2, 17.8)
> 40	27.9 (25.8, 29.9)
Health indicators	
General physical health status	
Excellent or very good	62.9 (61.1, 64.7)
Good	27.4 (26.0, 28.9)
Fair or poor	9.7 (8.8, 10.5)
Mental health status	
Excellent or very good	73.5 (71.8, 75.2)
Good	22.6 (21.2, 24.1)
Fair or poor	3.9 (3.3, 4.5)
Mental health disorders	
Yes	11.6 (10.4, 12.7)
No	88.4 (87.3, 89.6)
Injury status	
No injury	80.0 (78.6, 81.5)

Continued

Construction was predominantly male, as women accounted for less than 10% of its workforce. The majority of construction workers were younger than 55 years, and 1 in 5 were 55 years or older. Hispanic workers made up a major component of construction employment, at 26.4% on average during this period. A large number of construction workers had lower educational attainment; nearly 20% of workers did not have a high-school diploma or GED. Despite being employed, about 26% of construction workers had poor or low income according to the federal poverty level.

More than two thirds of workers in construction held a job in blue-collar occupations, such as construction trades (e.g., roofers, carpenters) and other production occupations (e.g., truck drivers), and the rest were employed in white-collar occupations (e.g., managers, engineers, professionals, office workers). While more than half of construction workers reported working full-time, or 35 to 40 hours weekly, nearly 28% of construction workers worked overtime (> 40 hours/week), and another 16.5% worked part-time (< 35 hours/week). Furthermore, about 27.4% of construction workers were self-employed.

Nearly 10% of workers in construction perceived their physical health as fair or poor. Although less than 4% of workers self-rated their mental health as fair or poor, 11.6% reported they had mental health disorders. Conditions that typically caused pain were not uncommon among construction workers: MSDs (25.7%) and injuries (11.2% for non–work-related injuries and 8.7% for work-related injuries) were major pain-related conditions among these workers, and a smaller proportion (4.8%) was attributable to

TABLE 1— Continued

Characteristic	Distribution, % (95% CI)
Work-related injury	8.7 (7.7, 9.8)
Non–work-related injury	11.2 (10.2, 12.3)
MSD	
Yes	25.7 (24.0, 27.4)
No	74.3 (72.6, 76.0)
Other pain[b]	
Yes	4.8 (4.0, 5.6)
No	95.2 (94.4, 96.0)

Note. CI = confidence interval; GED = general educational development; MSD = musculoskeletal disorder. The total sample was 9070, and the weighted total was 11 484 000. All values in table are weighted.

[a]Defined according to the US Census Bureau's poverty threshold.
[b]Other pain category comprises cancer and headaches, including migraines.

other conditions (i.e., cancers and headaches, including migraines).

From 2011 to 2018, about 1.8 million construction workers (weighted) used prescription analgesics per year on average, accounting for nearly 16% of the study population (Table 2). Prescription opioid analgesics were used more frequently than prescription nonopioid analgesics among these workers, with 1.2 million (10.0%) for opioid analgesics, and nearly 1.1 million (9.3%) for nonopioid analgesics.

In general, prescription opioid or nonopioid analgesic use varied among worker subgroups. Both opioid and nonopioid prescription analgesic use increased with age. Higher use was found among women, non-Hispanics, and workers in poorer health ($P < .05$). Prescription opioid analgesic use was also higher among construction workers who worked part-time or overtime and those who held a white-collar occupation ($P < .01$). Moreover, prescription opioid use was highest among workers suffering an injury (work-related: 25.0%; non–work-related: 24.4%) or MSD (21.5%). We found similar results for prescription nonopioid analgesic use at 21.6% for work-related injuries and 22.9% for MSDs. Furthermore, workers with mental health disorders were also more likely to use prescription opioid or nonopioid analgesics than their counterparts without such disorders.

Patterns of prescription analgesic use by pain-related conditions are illustrated in Figure 1. Construction workers who suffered an injury (work- or non–work-related injuries, or musculoskeletal injuries), had a mental health disorder, or had cancer were more likely to use prescription opioids than nonopioid analgesics. Conversely, workers who experienced back pain alone or headaches (including migraines) were more likely to use prescription nonopioids than opioid analgesics.

Table 3 presents the results of the multiple logistic regression model showing major factors associated with prescription opioid use. Workers with work-related injuries were 3.8 times more likely to use prescription opioids than workers without such injuries (AOR = 3.82; 95% CI = 2.72, 5.37). Higher prescription opioid use was found among workers with non–work-related injuries as well (AOR = 3.37; 95% CI = 2.54, 4.46). Prescription opioid use among workers with MSDs was twice that of those without such conditions (AOR = 2.31; 95% CI = 1.80, 2.95). Poorer physical health (fair or poor vs excellent or very good; AOR = 1.95; 95% CI = 1.42, 2.69) and mental health disorders (AOR = 1.95; 95% CI = 1.41, 2.68) were also significant in the model. In addition, women and older construction workers were 49% and 44%, respectively, more likely to use prescription opioids than their male and younger counterparts (women: AOR = 1.49; 95% CI = 1.03, 2.17; those aged 55 years or older: AOR = 1.44; 95% CI = 1.04, 1.98). Odds of prescription opioid use among Hispanic workers were significantly lower than among their non-Hispanic White counterparts when other factors were constant (AOR = 0.59; 95% CI = 0.46, 0.75).

DISCUSSION

In this study, we used a large national household survey to examine pain-related conditions and their associations with prescribed opioid and nonopioid use among US construction workers. The demographic distribution of this sample was consistent with the results from other population surveys, such as the Current Population Survey and American Community Survey during similar time periods,[20] indicating that the study sample was normally distributed and nationally representative. The results show that about 16% of construction workers used prescription analgesics on average during 2011 to 2018, and 10% used prescription opioids.

The findings support the study hypothesis that prescription opioid use was determined by types of pain conditions. Construction workers who suffered an injury were more likely to use

TABLE 2— Prevalence of Prescription Analgesic Use by Selected Characteristics Among US Construction Workers: 2011–2018

Characteristic	Any Analgesic, % (95% CI)	Opioid,[a] % (95% CI)	Nonopioid,[a] % (95% CI)
Overall	15.9 (14.7, 17.0)	10.0 (9.1, 11.0)	9.3 (8.3, 10.2)
Gender[b,c,d]			
Men	15.2 (13.9, 16.4)	9.5 (8.5, 10.4)	8.9 (7.9, 9.9)
Women	22.6 (18.7, 26.5)	15.4 (12.2, 18.7)	12.7 (9.4, 16.0)
Age group, y[b,c,d]			
16–34	11.7 (10.2, 13.1)	7.7 (6.5, 8.9)	6.7 (5.3, 8.1)
35–54	16.4 (14.9, 18.0)	10.3 (8.9, 11.7)	9.7 (8.4, 10.9)
≥ 55	22.2 (18.9, 25.5)	13.5 (11.0, 16.0)	13.1 (10.2, 16.0)
Race/ethnicity[b,c,d]			
Hispanic	10.3 (9.0, 11.5)	5.3 (4.3, 6.3)	6.9 (5.9, 7.9)
Non-Hispanic White	18.2 (16.6, 19.8)	12.2 (10.8, 13.5)	10.1 (8.7, 11.4)
Non-Hispanic other	15.6 (12.8, 18.5)	8.7 (6.6, 10.8)	10.3 (8.0, 12.7)
Education[b,c,d,e]			
< high school diploma or GED	13.2 (11.1, 15.2)	6.9 (5.5, 8.2)	8.5 (6.9, 10.1)
High school diploma or GED	17.4 (15.5, 19.2)	10.9 (9.4, 12.5)	10.7 (9.2, 12.3)
Postsecondary	15.8 (14.1, 17.5)	10.8 (9.3, 12.2)	8.2 (6.9, 9.6)
Family poverty status[f]			
Poor to low (< 200%)	14.8 (13.1, 16.6)	9.9 (8.4, 11.4)	8.6 (7.1, 10.1)
Middle (200% to < 400%)	15.1 (13.3, 16.9)	9.0 (7.6, 10.4)	10.0 (8.5, 11.5)
High (≥ 400%)	17.1 (15.0, 19.3)	10.9 (9.2, 12.6)	9.1 (7.4, 10.7)
Self-employed			
Yes	16.8 (14.3, 19.3)	11.2 (9.0, 13.4)	9.0 (7.0, 10.9)
No	15.4 (14.0, 16.7)	9.5 (8.5, 10.5)	9.3 (8.1, 10.5)
Average hours worked per week[c]			
35–40	14.8 (13.3, 16.4)	8.7 (7.5, 9.8)	9.5 (8.2, 10.9)
< 35	18.1 (15.6, 20.6)	13.0 (10.8, 15.2)	9.2 (7.4, 11.0)
> 40	16.2 (13.9, 18.5)	11.0 (9.0, 13.1)	8.5 (6.8, 10.1)
Occupation[b,c,e]			
White-collar	17.6 (15.5, 19.8)	11.7 (9.9, 13.5)	9.5 (7.8, 11.3)
Blue-collar	14.9 (13.5, 16.2)	9.1 (8.0, 10.2)	8.9 (7.8, 10.1)
General physical health status[b,c,d]			
Excellent or very good	11.4 (10.1, 12.6)	6.9 (6.1, 7.8)	6.5 (5.6, 7.4)
Good	22.2 (19.9, 24.6)	14.8 (12.8, 16.9)	12.6 (10.6, 14.6)
Fair or poor	26.9 (22.8, 31.1)	16.3 (13.0, 19.7)	17.6 (13.7, 21.5)
Mental health status[b,c,d]			
Excellent or very good	14.0 (12.7, 15.3)	8.8 (7.8, 9.8)	8.3 (7.3, 9.4)
Good	19.6 (17.3, 21.9)	12.2 (10.1, 14.4)	11.0 (9.2, 12.9)
Fair or poor	28.7 (21.9, 35.5)	20.1 (14.6, 25.6)	16.4 (10.2, 22.5)
Mental health disorders[b,c,d]			
Yes	30.0 (26.0, 34.1)	21.0 (17.0, 25.1)	15.2 (12.1, 18.3)
No	14.0 (12.9, 15.1)	8.6 (7.7, 9.5)	8.5 (7.6, 9.4)
Injury status[b,c,d]			
No injury	11.2 (10.0, 12.3)	6.4 (5.5, 7.2)	6.6 (5.8, 7.5)
Work-related injury	35.5 (30.8, 40.2)	25.0 (20.6, 29.3)	21.6 (17.7, 25.5)

Continued

TABLE 2— Continued

Characteristic	Any Analgesic, % (95% CI)	Opioid,[a] % (95% CI)	Nonopioid,[a] % (95% CI)
Non–work-related injury	34.1 (30.0, 38.1)	24.4 (20.4, 28.5)	18.4 (14.7, 22.1)
MSD[b,c,d]			
Yes	35.2 (32.2, 38.2)	21.5 (18.8, 24.1)	22.9 (20.2, 25.6)
No	9.1 (8.1, 10.2)	6.0 (5.2, 6.9)	4.5 (3.8, 5.3)
Other pain[b,c,d,g]			
Yes	24.5 (18.3, 30.8)	17.5 (11.5, 23.4)	16.6 (11.3, 21.9)
No	15.4 (14.3, 16.6)	9.6 (8.7, 10.6)	8.9 (8.0, 9.8)
Weighted total, no.	1 820 000	1 150 000	1 064 000

Note. CI = confidence interval; GED = general educational development; MSD = musculoskeletal disorder. All values in table are weighted. The Rao–Scott χ^2 test was used.

[a]Prescription opioid and prescription nonopioid analgesic categories are not mutually exclusive. For instance, workers included in the prescription opioid analgesic use category may also be included in the prescription nonopioid analgesic use category.
[b]$P < .05$ for any prescription analgesic.
[c]$P < .05$ for prescription opioid analgesic.
[d]$P < .05$ for prescription nonopioid analgesic.
[e]For education, *P* values were calculated using "no college" and "some college and higher" categories. For occupation, *P* values were calculated using "white-collar" and "blue-collar" categories.
[f]Defined according to the US Census Bureau's poverty threshold.
[g]Other pain category comprises cancer and headaches, including migraines.

prescription opioids than nonopioid analgesics, while those who experienced back pain or headaches were more likely to use prescription nonopioids than opioid analgesics. Adjusted odds of prescription opioid use among construction workers with work-related injuries was almost 4 times higher than those without such injuries, and the use for workers with MSDs was double that of those without MSDs. Although this study was unable to define the work-relatedness of MSDs, previous research indicates that construction workers are frequently involved in lifting, carrying, working in awkward positions, and other heavy work.[20] While employers are required by the Occupational Safety and Health Administration to provide a safe and healthful workplace for their workers, there are no specific ergonomic regulations.[28] Because these hazards are poorly controlled, construction workers are at a high risk for developing chronic MSDs.[29] Moreover, poor physical health and mental health disorders were associated with greater prescription opioid use, which is consistent with previous studies.[16,17,21]

The study also confirms the hypothesis that workers' sociodemographic factors were associated with prescription opioid use. The odds of prescription opioid use among older construction workers (aged ≥ 55 years) were significantly higher than among younger workers when other variables remained constant. Older workers are more likely to have MSDs and chronic conditions.[17,29] Considering the increasing aging workforce trends, this age group should be given special attention because they are more likely to have an adverse event, even death, when taking opioid medications.[30] Meanwhile, prescription opioid use among female workers was significantly higher, although less than 10% of construction workers were women. This finding was consistent with studies showing greater vulnerability in opioid use among women.[31] Moreover, both prescription opioid and nonopioid use were significantly lower among Hispanic workers. The racial/ethnic disparities in prescription opioid use among construction workers reported in this study confirm previous findings that minorities are less likely to receive prescription opioids.[7,32] In addition to variations in age, insurance coverage and other factors not examined in this study may have an impact on lower prescribed opioid use among Hispanic construction workers. Previous research found that Hispanic workers are more likely to be uninsured, and workers are less likely to seek health care if they lack health insurance coverage.[20] In addition, workers who become dependent on prescribed opioids and have those prescriptions abruptly stopped, possibly because of increased public awareness of the role

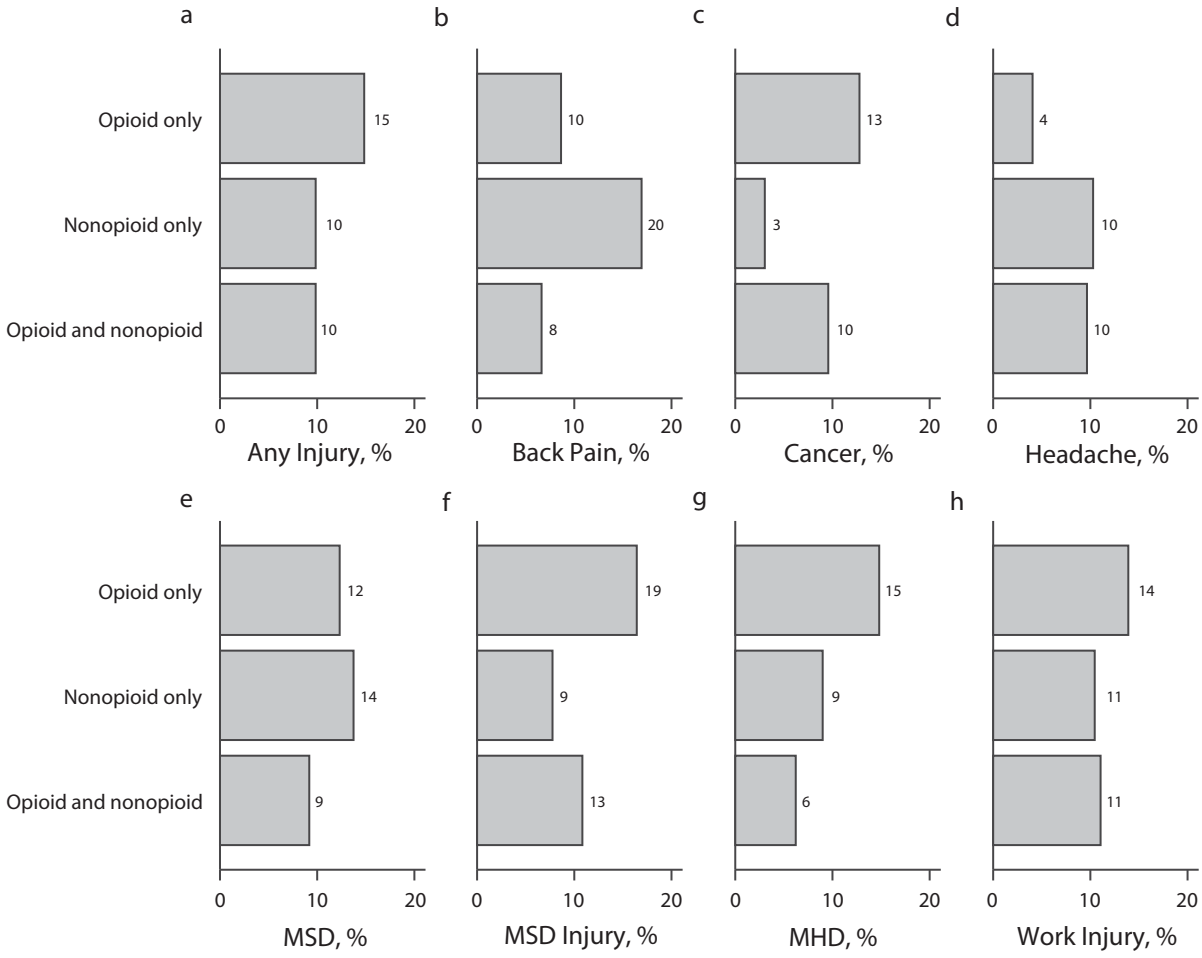

FIGURE 1— Average Prescription Analgesic Use Among Construction Workers With (a) Any Injury, (b) Back Pain, (c) Cancer, (d) Headache, (e) Musculoskeletal Disorder (MSD), (f) MSD Injury, (g) Mental Health Disorder (MHD), and (h) Work-Related Injury: United States, 2011–2018

Note. Weighted percentages are presented. Prescription analgesic categories are mutually exclusive. The "any injury" category includes work-related and non–work-related injuries.

pharmaceutical companies have played in the opioid crisis, may seek illicit sources driven by opioid withdrawal syndrome.[33] Both scenarios could make the opioid crisis even worse.

Limitations

This study has some limitations that should be taken into consideration. First, the study only examined outpatient prescription opioid use. Because most opioid overdose deaths involve nonprescription opioids,[3,12] and there is a higher prevalence of illicit opioid use among construction workers,[11,15] studies on nonprescription opioid use and illicit drug use should be conducted to understand the overall opioid crisis in this industry. In addition, although the MEPS is a panel survey, this study was designed as cross-sectional based on the data collected in the calendar year rather than the entire 2-year follow-up period. Therefore, the causal relationships between prescription opioid use and the independent variables included in the model were unable to be fully determined.

Despite the limitations, this study expanded previous research and explored the relationship between pain and prescription opioid use among construction workers while taking multiple socioeconomic factors into consideration. In addition, the findings were based on 8 years of data from a large, nationally representative sample, which increases the validity and reliability of the results. Furthermore, the high prevalence of prescription opioid use among injured

TABLE 3— Multiple Logistic Regression of Prescription Opioid Use (Versus Nonuse) Among US Construction Workers: 2011–2018

Characteristic	Multiple Logistic Regression (n = 7 101), AOR (95% CI)
Gender	
Men (Ref)	1
Women	1.49 (1.03, 2.17)
Age group, y	
16–34 (Ref)	1
35–54	1.13 (0.87, 1.47)
≥ 55	1.44 (1.04, 1.98)
Race/ethnicity	
Non-Hispanic White (Ref)	1
Hispanic	0.59 (0.46, 0.75)
Non-Hispanic other	0.83 (0.60, 1.15)
Average hours worked per week	
35–40 (Ref)	1
< 35	1.28 (0.99, 1.64)
> 40	1.12 (0.86, 1.45)
Occupation	
White-collar (Ref)	1
Blue-collar	0.96 (0.75, 1.24)
General physical health status	
Excellent or very good (Ref)	1
Good	2.07 (1.63, 2.62)
Fair or poor	1.95 (1.42, 2.69)
Mental health disorders	
Yes	1.95 (1.41, 2.68)
No (Ref)	1
Injury status	
No injury (Ref)	1
Work-related injury	3.82 (2.72, 5.37)
Non–work-related injury	3.37 (2.54, 4.46)
MSD	
Yes	2.31 (1.80, 2.95)
No (Ref)	1
Other pain[a]	
Yes	1.25 (0.72, 2.17)
No (Ref)	1

Note. AOR = adjusted odds ratio; CI = confidence interval; MSD = musculoskeletal disorder. All values in the table are weighted.

[a]Other pain category comprises cancer and headaches, including migraines.

construction workers suggests that strategies to cope with the opioid crisis should include a range of tactics to improve worker safety and health, provide training and education to prevent occupational injuries and illnesses, effectively manage pain, and provide treatments and support for workers with substance use disorders or in recovery.

Conclusions and Policy Implications

This study reveals that the primary factors underlying prescription opioid use among construction workers were work- or non–work-related injuries and MSDs. Considering the high risks and high injury rates in the construction industry,[21,22] these findings may partially explain why construction workers were more likely to use opioids and die of opioid-related overdoses than workers in other industries.[12–15] In any case, the findings confirm that both poor physical and mental health were associated with increased opioid prescription use. It is possible that these factors may also contribute to the high suicide rate among male construction workers.[34]

The study suggests that the workplace plays an important role in curbing the opioid crisis. The upstream factors, such as workplace safety policies, may have downstream effects on opioid-related overdose and suicide. This could be characterized as syndemic given the presence and interlinkages of occupational health and general public health through the influences of common social and structural workplace-specific factors.[35] Specifically, it is necessary to provide guidance to employers and medical providers regarding opioid use, support workers with pain conditions in recovery, and assist workers who are already in need of health care or mental health care. It is also important to monitor opioid prescription practices and offer related education and training to medical providers, workers, and employers. Furthermore, improving working conditions and reducing work-related injuries, pain, job loss, stress, and other work-related factors that may be

leading to the use and misuse of opioids are essential. Multipronged strategies could be an effective and efficient approach to prevent opioid misuse and disorders. AJPH

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CONTRIBUTORS

X. S. Dong designed the study, interpreted the results, drafted and revised the article critically for important intellectual content, and agreed to be accountable for all aspects of the work. R. D. Brooks conducted literature reviews, analyzed data, created tables, and drafted the article. C. Rodman and R. Rinehart aided in drafting the introduction and discussion. S. Brown aided in drafting the introduction and formatting the references. All authors approved the final version before submission.

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CONLICTS OF INTEREST

The authors declare no conflicts of interest.

HUMAN PARTICIPANT PROTECTION

Because this study used only publicly accessible data, it was exempt from institutional board review by the CPWR institutional review board.

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