

## RESEARCH ARTICLE

# Occupational posttraumatic stress disorder and workplace violence in workers' compensation claims

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The authors report that there was no funding source for the work that resulted in the article or the preparation of the article. The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the VA, United States government, or any of the organizations associated with the authors.

Kerri Wizner was an employee of ReedGroup Ltd. during the study, which provided salary. Brad Grunert provided medical review for the 2018 American College of Occupational and Environmental Medicine's (ACOEM) Practice Guidelines for posttraumatic stress disorder used in this study. ReedGroup, Ltd. are the sole proprietors of the ACOEM guidelines but did not have any role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript.

## Abstract

Acts of violence are the fifth leading cause of nonfatal occupational injuries in the United States. Experiencing a traumatic event at work can have serious mental health consequences, including the development of posttraumatic stress disorder (PTSD). This study aimed to quantify the prevalence of PTSD caused by workplace violence (WPV) in a statewide workers' compensation system and compare the outcomes and treatment of WPV cases versus those caused by other traumatic events. Using a retrospective cohort study design, workers who reported PTSD as the primary reason for a workers' compensation claim and had no coexisting physical injuries were found in California during 2009–2018. A total of 3,772 PTSD cases were identified, 48.9% of which were attributed to WPV. Demographic risk factors associated with WPV PTSD included lower income, younger age, female gender, and employment in retail or finance,  $p < .001$ – $p = .007$ . For individuals who returned to work, claims due to WPV resulted in longer medically approved time away from work than non-WPV causes ( $Mdn = 132.5$  days vs.  $Mdn = 91$  days, respectively),  $p < .001$ . Three of the top 10 most frequently prescribed medications were administered against evidence-based guidelines. This study found that many treatments prescribed to PTSD patients are based on insufficient evidence, and the provision of existing empirically supported treatments is needed, particularly in generalized populations. The findings support the need for additional recognition of the cause of workplace PTSD to facilitate appropriate referrals to WPV or PTSD specialists to support return-to-work efforts.

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Acts of violence are the fifth leading cause of nonfatal occupational injuries in the United States and have been on the rise since 2017 despite suspected underreporting (U.S. Bureau of Labor Statistics, 2019). Workplace violence (WPV) is defined as incidents during which employees are abused, threatened, harassed, or assaulted in circumstances related to their work and can include robbery, assault, or sexual assault (Harrell, 2011; International Labour Organization, 2021; Occupational Safety and Health Administration [OSHA], 2020). The definition of WPV is broad, evolving, and sometimes uniquely defined by the workplace (Boyle & Wallis, 2016). One workers' compensation study from Washington state found that claims for work-related injuries due to violence cost \$8,848 (USD) per claim, \$17,500,000 annually, and affected 13.5 per 10,000 full-time employees (Foley & Rauser, 2012).

Experiencing a traumatic event at work can have serious mental health consequences, including the development of posttraumatic stress disorder (PTSD; Andersen et al., 2018; Hogh & Viitasara, 2005). PTSD is a protracted response to a stressful event or life-threatening situation that can have an immediate or delayed onset (World Health Organization [WHO], 2019). Symptoms interrupt normal activities and may include intrusive thoughts about or flashbacks of the event, the avoidance of reminders of the event, negative changes in thought and mood, hypervigilance, and alterations in physiological arousal and emotional reactivity (American Psychiatric Association, 2013). In the United States, the national estimate for the lifetime prevalence of PTSD is 6.8% among adults (Kessler et al., 2005).

Much of the available research on workplace-related PTSD focuses on occupational groups that encounter high-stress environments, such as first responders, emergency public service providers, and military personnel, who have higher rates of PTSD diagnoses than the general public, with an estimated prevalence above 10% (Berger et al., 2012; Petrie et al., 2018; Richardson et al., 2010). PTSD can make it difficult to stay employed or be successful at work (Belleville et al., 2012; Davis et al., 2012; Hoge et al., 2007). Within military veterans, studies have found that severe PTSD symptoms are correlated with an inability to work full time and that specialized programs may be needed to maintain steady work (Davis et al., 2018; Smith et al., 2005). There is less information about PTSD among workers employed in jobs that involve face-to-face interactions with distressed or constrained populations, such as health care, retail services, and prison systems, who also encounter violent traumatic situations that can result in PTSD and may be affected by rising cases of work-related violence (James & Todak, 2018; Lanctot & Guay, 2014; Skogstad et al., 2013). In cases of WPV, the workplace itself can become a trauma trigger, making return-

ing to work an important milestone that can be inhibited by PTSD symptoms (Sophie et al., 2017; Stergiopoulos et al., 2011). To our knowledge, no studies have systematically compared PTSD work outcomes, such as return-to-work (RTW) durations, in generalized populations and occupations.

Clinical practice guidelines, which summarize available research and literature to offer care recommendations, help clinicians assess and treat medical conditions, such as PTSD (Institute of Medicine [IoM], 2011). Following evidence-based medicine is an important strategy to help patients receive quality care and can help reduce overtreatment or low-value care, which is estimated to waste \$76,000,000–\$101,000,000 per year in U.S. health care systems (IoM, 2001; Shrank et al., 2019). The American College of Occupational and Environmental Medicine (ACOEM) and the American Psychological Association both recommend cognitive behavioral therapy (CBT), exposure therapy, and certain antidepressant medications, including paroxetine, sertraline, and venlafaxine, to treat PTSD (ACOEM, 2018; American Psychological Association, 2017). However, there is limited information about treatment effectiveness across demographic characteristics, trauma type, or comorbid diagnoses (American Psychological Association, 2017). Furthermore, treatments may be applied unequally by mental health professionals, and ongoing specialized training or referrals to specialists would likely benefit patient care (Moses et al., 2021).

The present study aimed to quantify the prevalence of PTSD diagnoses due to WPV without a secondary physical injury in a statewide workers' compensation system and compare factors associated with the outcomes and treatment of WPV cases versus those caused by other traumatic events, such as being in vehicle crashes, machinery accidents, or witnessing a death. The exclusion of claims with a physical injury was designed to decrease the confounding effects of physical injuries on time away from work or treatment received during the disability period that was not directly related to PTSD. The use of guideline-recommended treatments on RTW durations was also explored to add to the available literature about treatments for patients with PTSD caused by WPV. This study reflects an important contribution to the literature because it was based on register data rather than self-report.

## METHOD

### Participants and procedure

Using a retrospective cohort study design, workers with PTSD as the primary reason for a workers' compensation claim were found using California Workers' Compensation

Information System (WCIS) claims data during 2009–2018. A claim was included if the first date of injury was within this timeframe, the claim was approved by the workers' compensation system, and was considered to be a closed claim. All subsequent records were captured, even if they fell outside the specified timeframe. California employers report occupational injuries or illnesses that result in lost work time beyond the date of the incident or that require medical treatment beyond first aid (Office of Policy, Research, and Legislation Title 8 Regulations, 2019). WCIS hosts statewide injured-worker claim information, which includes the first report of injury, subsequent reports, medical bills and payment records, and an annual summary of benefits for each claim for the purpose of workers' compensation system management, evaluation, and research (Baker & Parisotto, 2017, 2018).

Claims were included if they had at least one medical record in the billing systems with an *International Classification of Diseases* (9th or 10th rev., clinical modification [ICD-9-CM and ICD-10-CM, respectively]) PTSD diagnostic code (i.e., ICD-9-CM code 309.81 or ICD-10-CM codes F43.10, F43.11, or F43.12); did not report coexisting physical injuries, defined in the data as the claim's main nature of injury being "no physical injury," "mental stress," or "mental disorder"; and the part of body injured was reported as "no physical injury" or "brain." Eliminating claims with a co-occurring physical condition enabled us to more clearly attribute time away from work and medical treatments to the PTSD diagnosis.

This study compared claims with a PTSD diagnosis and no additional physical injuries caused by workplace violence versus claims caused by other traumatic events to measure if there was a difference between the two groups in terms of the duration of time away from work and the cost of the medical care accumulated during that claim. Data were deidentified by WCIS and contained no personally identifiable information and, therefore, did not require institutional review board (IRB) approval. These research efforts were supported, but not directed, by the authors' institutions.

## Measures

### WPV assessment

The OSHA definition of occupational violence, which is, "any act or threat of physical violence, harassment, intimidation, or other threatening disruptive behavior that occurs at the worksite," was used for this study and is consistent with definitions by the WHO and the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (International

Labour Organization, 2021; OSHA, 2020; National Institute for Occupational Safety and Health, 2002). Cases were classified as WPV if the available free-text injury description contained words such as "assault," "gunpoint," "harassed," "intimidated," "punch," "threat," "robbery," "violent," or "verbal abuse." Nonworkplace violence (non-WPV) cases included words such as "crash," "fall," "stress," "accident," or "witnessed." Witnessing a violent event, including death, is not part of the OSHA definition of workplace violence and, therefore, was categorized as non-WPV.

### Demographic, job-related, and clinical characteristics

Demographic characteristics, such as age and gender, can be predictors of work disability (White et al., 2015). Furthermore, job and industry information can inform RTW strategies (Blank et al., 2008). Industry categories utilized the U.S. Census Bureau's North American Industry Classification System's (NAICS's) 20 major sectors to provide a broad view of industries at higher risk, which is distinct compared to other studies that focus on only one subsector. In this dataset, job-specific information was limited to Department of Labor job classifications based on physical strength (sedentary, light, medium, heavy, or very heavy work) to infer information about the type of work the claimant did. These codes were mapped using a fuzzy word-matching algorithm on SQL Server Integration Services. If values were missing, they were classified as a medium job class ( $n = 834$ ; WPV = 392, non-WPV = 442). Cost consisted of total medical bill costs, including lump sum medical payments. Comorbidities were grouped using the Agency for Healthcare Research and Quality's Clinical Classification Software single-level grouper (Agency for Healthcare Research and Quality, 2019). Of the behavioral health comorbidities, this study focused on depression and anxiety disorders listed as comorbidities on the claim; however, these did not indicate if it was a new or ongoing diagnosis. Depression and anxiety were included because they are common co-occurring conditions that may make PTSD more severe or affect recovery recommendations (Brady et al., 2000; O'Donnell et al., 2004; Rytwinski et al., 2013). Depressive disorders included ICD codes for depressive episode, major depressive disorder, and mood disorders. Anxiety-related disorders included ICD codes for phobic disorders, panic disorders, generalized anxiety disorder, other anxiety disorders, and induced anxiety disorder. An employee was determined to have returned to work if they had an RTW date and assumed to not have returned if this date was missing. If there was no RTW date, the disability duration was undeterminable.

Information about what type of job a person returned to or if modified duty occurred was not available.

## Treatment

The ACOEM Clinical Practice Guideline (2018) was consulted to examine outcomes associated with treatment recommended by evidence-based guidelines. These guidelines are based on condition-specific literature reviews, where available studies have been critically appraised by subject-matter experts and categorized as providing evidence that is strong (A), moderate (B), limited (C), or insufficient (I). Recommendations then indicate whether a treatment is recommended (“yes”), not recommended (“no”), or if there is not enough evidence to prove a treatment is either helpful or harmful (“none”; ACOEM, 2017). These treatment guidelines have been adopted in California’s Medical Treatment Utilization Schedule, which defines reasonable and necessary medical care in the state workers’ compensation system (State of California Department of Industrial Relations, 2020b).

Treatments were split into outpatient services or medications. Common Procedure Terminology® and Healthcare Common Procedure Coding System codes, established by the Centers for Medicare and Medicaid and the American Medical Association for processing health insurance claims, were used to study services while National Drug Codes for medications were used and grouped by IBM Micromedex® RED BOOK® coding. Some cases spanned multiple years; all treatment information was included.

## Data analysis

For the univariate analysis, chi-squared tests were used to compare the two groups for categorical data, and two-sample Wilcoxon rank tests were used for continuous data. A binary logistic regression was utilized to explore the impact of demographic factors on the risk of having a WPV-related claim within the study population. Reference groups for this analysis were gender (female), industry (public administration), job class (sedentary/light), annual income (less than \$25,000), and location (rural). Income was used as a proxy for educational attainment, which has been shown to be associated with the risk of disability (White et al., 2015). For the logistic regression, NAICS industries were collapsed into an “other” category if they represented less than 5% of the WPV or non-WPV groups; these industries included arts and entertainment, transportation and warehousing, administrative and support services, construction, information, wholesale trade, real

estate, other, management, professional services, utilities, agriculture, and mining. We set an alpha level of .01 a priori due to the large dataset utilized. Medians were used to quantitatively describe data, as claims data are often skewed right because of outliers (i.e., claims over 2 years in this study) and high numbers of treatments (i.e., in the hundreds) over the lifetime of the claim. California workers’ compensation offers temporary disability for up to 104 weeks (State of California Department of Industrial Relations, 2020a); therefore, cases were truncated to 104 weeks ( $n = 138$ , truncation range: 729–1,680 days) to minimize potentially unreliable data. All analyses were done using the R statistical software (Version 3.6.1; R Core Team, 2021).

## RESULTS

### Demographic characteristics

A total of 23,545 California workers’ compensation cases that included a PTSD diagnosis and were filed from 2009 to 2018 were identified, representing 0.6% of all claims during this period. The data were then limited to claims with no coexisting physical injury (16.0%,  $n = 3,772$ ), and this subset of claims was then split into claims caused by WPV (48.9%,  $n = 1,845$ ) or events other than WPV (51.1%,  $n = 1,927$ ).

Table 1 describes the demographic characteristics of WPV and non-WPV PTSD cases. Univariate analysis was performed to compare the demographic risk factors for WPV PTSD versus non-WPV PTSD claims and indicated differences in the groups across gender, age, industry, job class, and income,  $ps < .001$ . Compared to the non-WPV group, individuals with WPV-related PTSD were more likely to be women (66.7% vs. 57.6%), younger (i.e., 17–30 years; 29.3% vs. 13.7%), working in retail (17.3% vs. 8.3%) or finance and insurance (11.1% vs. 4.3%), at jobs classified as sedentary or light work (63.4% vs. 57.8%), and making less annual income (i.e., \$25,000 or less; 31.1% vs. 14.5%). Individuals with non-WPV-related PTSD were more likely to have comorbid depression and/or anxiety (32.7% vs. 40.2% with neither condition) and were less likely to return to work (57.8% vs. 67.5% returning to work). Claim medical bill costs were not statistically different in workers who experienced WPV compared with non-WPV workers (\$12,750 vs. \$12,408). For individuals who returned to work, claims due to WPV resulted in longer medically approved time away from work than non-WPV claims ( $Mdn = 132.5$  days vs.  $Mdn = 91$  days, respectively),  $p < .001$ . In the WPV group, 181 (14.5%) cases had a duration of 0 days, whereas 266 (23.9%) non-WPV cases were away from work for 0 days. Individuals in the WPV group were diagnosed with PTSD sooner after the traumatic incident than those in the non-WPV group (65 days vs. 114 days),  $p < .001$ . Some of the

**TABLE 1** Demographic characteristics of posttraumatic stress disorder (PTSD) patients with no physical injuries, comparing cases caused by workplace violence (WPV) versus nonworkplace violence (non-WPV)

Variable	WPV ( <i>n</i> = 1845)			Non-WPV ( <i>n</i> = 1927)			<i>p</i>
	<i>n</i>	%	<i>Mdn</i> (IQR)	<i>n</i>	%	<i>Mdn</i> (IQR)	
Gender							
Men	600	32.5%		803	41.7%		< .001
Women	1,230	66.7		1,110	57.6		
Age (years)							
17–30	540	29.3		264	13.7		< .001
31–40	479	26.0		501	26.0		
41–50	443	24.0		585	30.4		
51–65	347	18.8		554	28.7		
Industry <sup>a</sup>							
Public administration	428	23.2		663	34.4		< .001
Retail trade	320	17.3		159	8.3		
Finance/insurance	205	11.1		83	4.3		
Health care/social assistance	79	4.3		109	5.7		
Accommodation/food services	111	6.0		61	3.2		
Manufacturing	66	3.6		108	5.6		
Job class							
Sedentary/light	1,169	63.4		1,114	57.8		< .001
Medium	628	34.0		720	37.4		
Heavy/very heavy	48	2.6		93	4.8		
Annual income (USD)							
< \$25,000	573	31.1		279	14.5		< .001
\$25,000–\$49,999	631	34.2		575	29.8		
\$50,000–\$74,999	315	17.1		509	26.4		
≥ \$75,000	325	17.6		561	29.1		
Medical cost only			\$12,750 (\$3,500–\$38,724)			\$12,408 (\$3,594–\$40,881)	0.6529
Depressive or anxiety disorders							
Neither	741	40.2		631	32.7		< .001
One condition	663	35.9		679	35.2		
Both conditions	441	23.9		617	32.0		
Return to work							
No	599	32.5		814	42.2		< .001
Yes	1,246	67.5		1,113	57.8		
Duration of leave if returned to work (days)			132.5(17–372)			91(1–351)	< .001
Time from incident to initial PTSD diagnosis (days)			65(25–209)			114(34–335)	< .001

Note: IQR = interquartile range; WPV = workplace violence; PTSD = posttraumatic stress disorder.

<sup>a</sup>Industries that represented less than 5% of the WPV or non-WPV groups are not shown.

delay between the traumatic event and diagnosis for both groups can be attributable to assessing PTSD, which, at the earliest, can be diagnosed 30 days after a traumatic event.

The binary logistic regression analysis (Table 2) demonstrated that female gender, younger age, work in retail or finance, a sedentary or light job class, or an income of less than \$25,000 per year were significant risk factors of experiencing WPV in this study population,  $p < .001$ – $p = 0.007$ .

Factors that were protective with regard to experiencing WPV included being male, odds ratio (OR) = 0.82, 95% CI [0.71, 0.95],  $p = .007$ ; older age, OR = 0.98, 95% CI [0.97, 0.98],  $p < .001$ ; working in manufacturing, OR = 0.60, 95% CI [0.43, 0.88],  $p = .002$ ; having a heavy or very heavy job class, OR = 0.59, 95% CI [0.40, 0.85],  $p = .005$ ; and having a higher income, \$25,000–\$50,000: OR = 0.65, 95% CI [0.53, 0.78],  $p < .001$ ; \$50,000–74,999: OR = 0.42, 95% CI [0.33,



TABLE 2 Binary logistic regression predicting risk of workplace violence–caused posttraumatic stress disorder

Variable	$\beta$	SE	OR	95% CI	p
Male gender	−0.197	0.074	0.82	[0.71, 0.95]	.007
Age	−0.023	0.003	0.98	[0.97, 0.98]	< .001
Industry					
Public administration (Ref.)					
Retail trade	0.384	0.122	1.47	[1.16, 1.86]	.002
Finance/insurance	0.507	0.144	1.66	[1.25, 2.21]	< .001
Educational services	0.023	0.153	1.02	[0.76, 1.38]	.881
Accommodations/food services	0.153	0.178	1.16	[0.82, 1.66]	.392
Health care/social assistance	−0.322	0.161	0.72	[0.53, 0.99]	.045
Manufacturing	−0.510	0.168	0.60	[0.43, 0.83]	.002
Other <sup>a</sup>	−0.054	0.099	0.95	[0.78, 1.15]	.584
Job class					
Sedentary/light (Ref.)					
Medium	−0.089	0.074	0.92	[0.79, 1.06]	.228
Heavy/very heavy	−0.534	0.191	0.59	[0.40, 0.85]	.005
Annual income (USD)					
< \$25,000 (Ref.)					
\$25,000–\$49,999	−0.438	0.099	0.65	[0.53, 0.78]	< .001
\$50,000–\$74,999	−0.871	0.115	0.42	[0.33, 0.52]	< .001
≥ \$75,000	−0.901	0.119	0.41	[0.32, 0.51]	< .001
Location					
Rural (Ref.)					
Urban	0.197	0.136	1.22	[0.93, 1.59]	.148

Note: OR = odds ratio; Ref. = reference group. <sup>a</sup>Industries were grouped together if they represented less than 5% of the workplace violence (WPV) or non-WPV groups.

0.52],  $p < .001$ ; \$75,000 or more: OR = 0.41, 95% CI [0.32, 0.51],  $p < .001$ .

## Treatment

Outpatient services during the claim, referred to as services, included diagnostic tests, assessments, or nonpharmaceutical services, such as an evaluation or therapy. Across both the WPV and non-WPV groups, 41.9% received services only, 25.7% received both prescriptions and services, 24.2% received no treatment, and 8.1% received prescriptions only. The percentage within each treatment group did not significantly differ between WPV and non-WPV patients. Among individuals who returned to work, the median number of days away from work for those in the WPV group was higher across all treatment categories compared to the non-WPV group (Figure 1), with mixed statistical significance between the WPV and non-WPV groups. There were statistically significant differences in the number of days away from work between the WPV and non-WPV group for workers who received only services ( $Mdn = 98$  days vs.  $Mdn = 70$  days),  $p = .004$ , and those

who received neither treatment ( $Mdn = 42$  days vs.  $Mdn = 14$  days),  $p = .009$ . However, the between-group differences did not meet statistical significance for workers who received only prescriptions (WPV  $Mdn = 189$  days vs. non-WPV  $Mdn = 116$  days),  $p = .081$ , or those who received both prescriptions and services (WPV  $Mdn = 324$  days vs. non-WPV 246 days),  $p = .075$ . For individuals who did not return to work, duration was not available.

Patients were categorized into (a) those who received only recommended treatments versus (b) those who received at least one service or prescription that had either no recommendation due to insufficient clinical research evidence or was not recommended by the ACOEM guidelines (Figure 2). Although the proportion of patients who received recommended services or prescriptions was similar for WPV and non-WPV claims, individuals in the WPV group consistently reported more days away from work than those in the non-WPV group. However, these differences were only statistically significant when comparing the groups with respect to whether treatment guidelines for services were followed, with WPV-exposed workers having longer claims (WPV  $Mdn = 164$  days vs. non-WPV  $Mdn = 111$  days),  $p = .004$ .

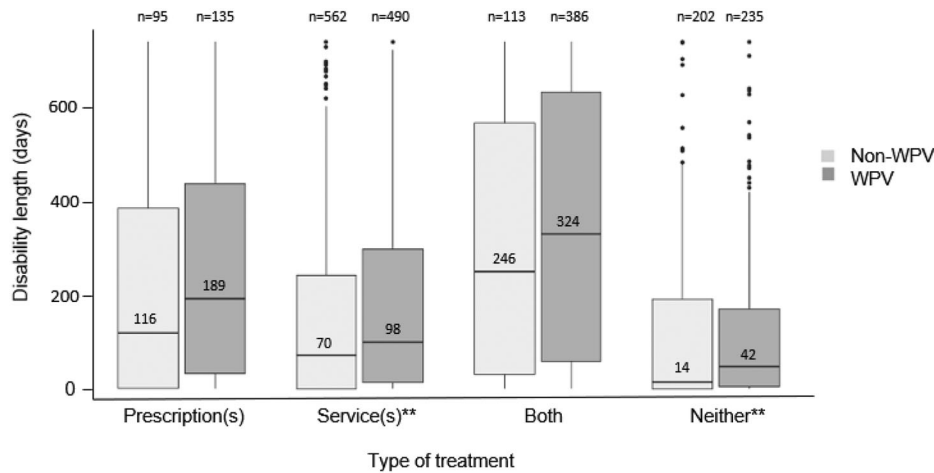


FIGURE 1 Number of calendar days away from work for posttraumatic stress disorder patients who returned to work and the type of medical treatment received, by workplace violence (WPV) exposure group. Note: \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

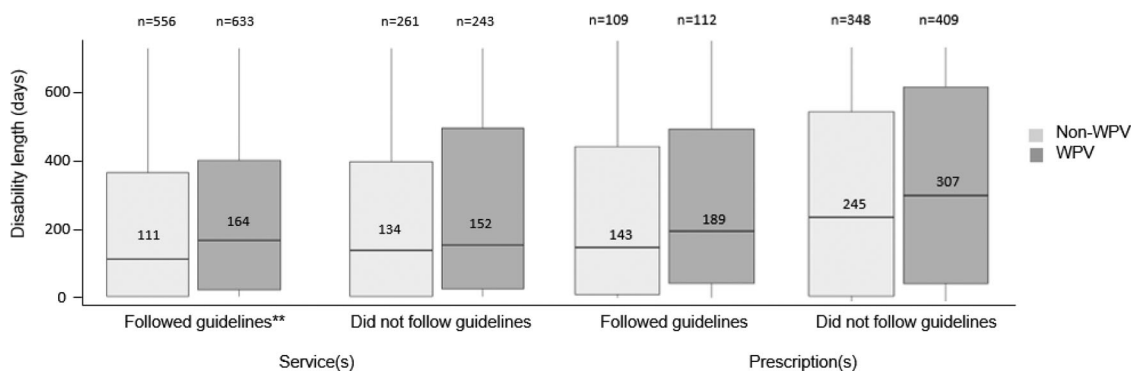


FIGURE 2 Number of calendar days away from work for posttraumatic stress disorder patients who returned to work, types of medical treatment received, and American College of Occupational and Environmental Medicine Clinical Guideline treatment recommendation status, by workplace violence (WPV) exposure group. Note: \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

Among individuals who returned to work in the WPV group, claims had shorter durations when workers received only recommended medications (i.e., treatments adhered to the guidelines:  $Mdn = 189$  days vs. did not adhere:  $Mdn = 307$  days),  $p = .025$ . WPV claims had longer durations for workers who returned to work when they received only recommended services (followed guidelines:  $Mdn = 164$  days vs. did not follow guidelines:  $Mdn = 152$  days),  $p = .320$ , but this was not statistically significant. Among individuals who returned to work in the non-WPV group, claims had shorter durations when patients received only recommended treatments, both for services (followed guidelines:  $Mdn = 111$  days vs. did not follow guidelines:  $Mdn = 134$  days),  $p = .188$ , and medications (followed guidelines:  $Mdn = 143$  days vs. did not follow guidelines: 245 days),  $p = .115$ , but these were not statistically significantly different.

Across the 10-year study period, 35,767 services were provided for patients with PTSD, with similar patterns across the two groups in terms of the number of services (WPV:  $n = 17,083$ , non-WPV:  $n = 18,684$ ) and the number of patients who received services (WPV:  $n = 1,231$ , 66.7%; non-WPV:  $n = 1,316$ , 68.3%). Individuals who reported WPV received a median of seven services (interquartile range [IQR]: 2–14), whereas those in the non-WPV group received a median of six services (IQR: 1.5–13). The most common services were CBT (WPV = 44.4%, non-WPV = 42.7%), psychological evaluations (WPV = 41.6%, non-WPV = 42.3%), and psychiatric assessments (WPV = 20.3%, non-WPV = 29.4%), as outlined in Table 3. Services provided for 10% or less of the claims included biofeedback, group therapy, physical or occupational therapy, neuropsychological assessment, the Wechsler Adult Intelligence Scale, acupuncture, and aerobic exercise, with both groups receiving these services at similar rates. Additional services provided at low

**TABLE 3** Outpatient services and prescriptions and associated American College of Occupational and Environmental Medicine (ACOEM) Clinical Guideline recommendations provided to workers' compensation patients with a posttraumatic stress disorder diagnosis and no physical injury

Variable of codes	ACOEM recommendation	WPV (n = 1,845)		Non-WPV (n = 1,927)	
		Evidence quality <sup>a</sup> n	%	Number n	%
<i>Top 10 services</i>					
Cognitive behavioral therapy	Moderately recommended	9,261	819	9,822	823
Psychological evaluation	Recommended	3,594	767	3,593	815
Psychiatric assessment	Recommended	942	374	807	390
Biofeedback	No recommendation	1,763	184	1,902	194
Group therapy	No recommendation	846	110	913	141
Physical or occupational therapy	-	547	76	754	97
Neuropsychological assessment	Recommended	123	72	143	97
Wechsler adult intelligence scale	Moderately recommended	82	61	98	68
Acupuncture	No recommendation	498	34	634	51
Aerobic exercise	Moderately recommended	127	28	167	37
<i>Top 10 prescriptions</i>					
Alprazolam	Not recommended	1,228	242	903	174
Sertraline HCL	Moderately recommended	1,113	173	1,089	190
Trazodone HCL	No recommendation	776	148	710	153
Bupropion HCL	Not recommended	588	102	1055	143
Clonazepam	Not recommended	944	116	698	98
Escitalopram oxalate	Recommended	548	91	743	91
Prazosin HCL	Recommended	532	91	477	77
Fluoxetine HCL	Recommended	444	76	417	83
Quetiapine fumarate <sup>b</sup>	Recommended	494	70	457	73
Citalopram hydrobromide	Recommended	487	72	421	62

Note: Categories are not exclusive as patients could receive multiple forms of treatment. WPV = workplace violence, HCL = hydrochloride.

<sup>a</sup>ACOEM methodology: A = strong evidence, B = moderate evidence, C = limited evidence, I = insufficient evidence.

<sup>b</sup>Paroxetine HCL was common in the WPV group, with 72 patients receiving a prescription.



frequency (i.e., less than 2%) included hypnosis, massage, transcranial magnetic stimulation, and education. Seven of the top 10 most frequently ordered services were recommended according to the ACOEM Clinical Practice Guideline. No services delivered went against guideline recommendations because of demonstrative negative effects on outcomes, rather they merely lacked evidence in the literature for ACOEM to judge the service's efficacy. Among individuals who received CBT, the median number of visits was two (WPV IQR: 0–10, non-WPV IQR: 0–8) for both WPV and non-WPV patients.

There were 19,524 medication prescriptions across the 10-year study period for patients with PTSD, which were evenly split across the two groups (WPV,  $n = 9,795$ , non-WPV,  $n = 9,729$ ) and number of patients (WPV,  $n = 653$ , 35.4%; non-WPV,  $n = 622$ , 32.3%). Both groups received a median of six prescriptions per person (WPV IQR: 2–16, non-WPV IQR: 2–19). Workers in both groups received similar numbers of recommended prescriptions (46.7%), prescriptions that were not recommended (35.3%), and prescriptions that had no guidance recommendations due to insufficient evidence (18.0%).

Table 3 also outlines the top 10 most frequently prescribed medications, representing 72.3% of all prescriptions, led by alprazolam (WPV = 13.1%, non-WPV = 9.0%), sertraline hydrochloride (HCL; WPV = 9.4%, non-WPV = 9.9%), and trazodone HCL (WPV = 8.0%, non-WPV = 7.9%). Of the most frequently prescribed medications, two benzodiazepines (alprazolam and clonazepam), which are cautioned against by the ACOEM Clinical Practice Guidelines, were prescribed more often to WPV patients than non-WPV patients. Three of the top 10 most frequently prescribed medications were administered against ACOEM guideline recommendations. In total, 32 different medications were prescribed to this study population. Medications prescribed in less than 2% of claims not shown in the table included aripiprazole, venlafaxine HCL, paroxetine HCL, gabapentin, mirtazapine, temazepam, vilazodone, risperidone, propranolol HCL, topiramate, lamotrigine, amitriptyline HCL, nortriptyline HCL, divalproex sodium, olanzapine, fluvoxamine maleate, nefazodone HCL, desipramine HCL, clonidine, imipramine HCL, valproic acid, and phenelzine sulfate.

## DISCUSSION

The present study explored PTSD diagnoses without related physical injuries across 10 years of all-industry workers' compensation data in the state of California. Although other studies have found high rates of WPV in health care and public administration (which includes the justice system), this study also found that high-risk groups

for WPV-related PTSD included retail and finance professions (Foley & Rauser, 2012). This reinforces research by Fichera et al. (2015) showing that PTSD was common among bank employees who experienced a workplace robbery. These industries may require additional resources to help protect workers from experiencing traumatic violent workplace events.

In 2019, in recognition of occupational stressors, the state of California passed a bill to shift the burden of proof of a posttraumatic stress injury from firefighters and peace officers to government agencies (Stern. Workers' Compensation, S.B. 542, 2019). This study supports the expansion of this policy to other occupational groups, such as the justice system, retail sectors, and financial services.

Workplaces can play an important role in minimizing the risk of PTSD by connecting employees with appropriate care to prevent mental health disorders following a traumatic event in the workplace (Joyce et al., 2016). Traumatic events at work have detrimental occupational consequences, including a reluctance to return to work, job dissatisfaction, and staff turnover (Alden et al., 2008). Workplace factors can also play a role in delayed recovery (Blank et al., 2008). Clinicians may want to consider asking about occupational hazards, work functions, and job satisfaction when planning RTW efforts for patients with PTSD or other mental health conditions so that appropriate work support and psychological interventions can be implemented (Lacerte et al., 2017).

The lengthy disability timeframes observed in the present study are consistent with previous studies demonstrating that workers with psychological injuries due to violence were the least likely to return to work within 1 year from the incident, and PTSD recovery times averaged approximately 4.5 months (Choi et al., 2020; MacDonald et al., 2003). Other research has shown that the frequency and severity of WPV affect the risk of PTSD (Pihl-Thingvad et al., 2019). In the present study, patients with WPV-related PTSD were absent from work for longer periods regardless of treatment type and despite tending to receive a diagnosis sooner. This aligns with research indicating that interpersonal trauma or violence is a contributor to more severe and tenacious PTSD symptoms (Forbes et al., 2013).

Comorbidities, demographic characteristics, and the ability to be resilient in the face of a traumatic event likely play a role in the ability to recover (Jankovic et al., 2021; Nehra et al., 2019; Raghavan & Sandanapitchai, 2019). Studies have found that depression may play a larger role in acute, early disability, whereas PTSD impacts long-term disability 1 year after diagnosis (O'Donnell et al., 2004; Schweininger et al., 2015). The earlier impact of depression on disability claims may partially explain why non-WPV cases were able to RTW sooner

despite having a higher prevalence of anxiety and/or depression.

Patients who received ACOEM guideline-recommended treatments had shorter median disability durations, if they returned to work at all, across most groups. The impact of receiving a prescription that was either explicitly not recommended or had a “no recommendation” status was likely detrimental to recovery regardless of the root cause of an individual’s PTSD. WPV patients who received only recommended prescriptions had a median 118-day-shorter disability leave than those who received prescriptions against the clinical guideline or those with no recommendation status,  $p = .025$ . This could be partially explained by the different proportions of treatments with no recommendation (i.e., insufficient evidence) versus treatments that were not recommended (i.e., demonstrably harmful). Three of the prescriptions for PTSD patients were administered against ACOEM evidence-based guideline recommendations, whereas none of the services provided were in this category. Other studies have also found a high prevalence of non-evidence-based treatments for PTSD patients (Abrams et al., 2013; Bryant, 2019). Two of the five most commonly prescribed medications were benzodiazepines, which research has shown to exacerbate PTSD symptoms, including poorer psychotherapy outcomes (Guina et al., 2015). The use of guideline-recommended care for PTSD patients could be a powerful tool, especially when a specialist or specialized training is not available. To understand prescribing patterns, future researchers should explore the circumstances in which potentially harmful pharmaceuticals were utilized. Furthermore, of the most common treatments for PTSD, none were graded as “strong evidence” by the ACOEM Clinical Practice Guidelines, highlighting the need for more high-quality clinical studies to demonstrate the efficacy of available treatments.

CBT was the most common treatment provided to patients in this study, although the *ICD-10-CM* coding does not allow further exploration of what kind of CBT was offered or if it was trauma-focused. Additionally, the median number of CBT sessions was two, which indicates that many patients did not receive a therapeutic dose of trauma-focused psychotherapy. The ACOEM Clinical Guideline recommends, “weekly to twice-weekly sessions... a minimum of 6 weeks” (ACOEM, 2018). We examined the entire length of the claim, so low counts of CBT per claim are even more striking given that the median duration was longer than 3 months. These factors also likely affected the RTW rates and recovery durations and should be explored.

Although this study utilized a very large dataset, we found only limited statistical significance, likely due to the

decreasing sample size when categorizing claims. Studies with more statistical power are needed to confirm these associations in other populations, especially with regard to individuals who did not return to work, as workers’ compensation claims are a likely underreported measure of work-related disorders (Azaroff et al., 2002). There is some debate about secondary trauma due to witnessing a traumatic event; although methods to prevent people from witnessing violent traumatic events would seem to align with the same strategies needed to prevent WPV, the present study used the current OSHA definition, which excludes witnessing an event as WPV. The ACOEM guideline for PTSD, published in 2018, was retroactively applied to the care received from 2009 to 2018 and, therefore, care may have aligned with research available at that time.

Variables used in this study also had limitations, such as the absence of an RTW date implying that patients did not return to work, *ICD* coding not consistently capturing PTSD severity, and billable treatments not measuring compliance or effectiveness. Additionally, there was no information on patient clinical characteristics from before or after the claim, such as substance abuse or nontraditional treatment, nor was there information on whether the source of trauma was a chronic exposure to violence, both of which could affect recovery timelines. In this study, classifying WPV causes was dependent upon free-text descriptions of the traumatic incident and was, therefore, likely affected by the accuracy and detailedness of the form’s data collector. Future research could identify richer data to further characterize the nature of WPV events, explore job types beyond physical strength job class, and include PTSD severity measures. Finally, the recovery of and care for individuals with co-occurring physical injuries and PTSD would be a useful avenue for future research, as it may represent more severe claims, notably of WPV that escalated to a physical injury.

WPV accounted for nearly half of all PTSD claims without coexisting physical injury in California’s workers’ compensation system over the 10-year study period. Cases due to WPV resulted in longer recovery periods than non-WPV causes, despite earlier diagnoses, across all treatment types. For patients who returned to work, those who received guideline-recommended treatments exhibited shorter disability durations, whereas receiving treatments that were not recommended or had a “no recommendation” status, particularly prescriptions, correlated with longer disability durations. This study supports the importance of recognizing the cause of workplace PTSD so that clinicians and case managers can facilitate appropriate referrals to WPV specialists during recovery. In addition, the findings show that many treatments are being administered to PTSD patients based on insufficient evidence, and increased provision of empirically

supported treatments is needed, particularly in generalized populations.


## OPEN PRACTICE STATEMENT

The current study was not preregistered. The data from this study were provided to authors under a data use agreement through the California Division of Workers' Compensation, which prohibits the authors from making the data set publicly available. More information is available here: [https://www.dir.ca.gov/dwc/wcis/WCIS\\_Reports.html](https://www.dir.ca.gov/dwc/wcis/WCIS_Reports.html). Requests for additional information should be directed to the first author.

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**How to cite this article:** Wizner, K., Cunningham, K., Gaspar, F. W., Dewa, C. S., & Grunert, B. (2022). Occupational posttraumatic stress disorder and workplace violence in workers' compensation claims. *Journal of Traumatic Stress*, 1–13. <https://doi.org/10.1002/jts.22836>