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## Workplace Violence and the Mental Health of Public Health Workers During COVID-19



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**Introduction:** During the COVID-19 pandemic, public health workers were at an increased risk for violence and harassment due to their public health work and experienced adverse mental health conditions. This article quantifies the prevalence of job-related threats, harassment, and discrimination against public health workers and measures the association of these incidents with mental health symptoms during the COVID-19 pandemic.

**Methods:** A nonprobability convenience sample of state, local, and tribal public health workers completed a self-administered, online survey in April 2021. The survey link was emailed to members of national public health associations and included questions on workplace violence, demographics, workplace factors, and mental health symptoms. Mental health symptoms were measured using standardized, validated tools to assess depression, anxiety, post-traumatic stress disorder, and suicidal ideation. Multivariable Poisson models calculated adjusted prevalence ratios of mental health symptoms, with workplace violence as the primary risk factor. Analyses were conducted in 2021–2022.

**Results:** Experiencing any type or combination of workplace violence was significantly associated with an increased likelihood of reporting depression symptoms (prevalence ratio=1.21, 95% CI=1.15, 1.27), anxiety (prevalence ratio=1.21, 95% CI=1.15, 1.27), post-traumatic stress disorder (prevalence ratio=1.31, 95% CI=1.25, 1.37), and suicidal ideation (prevalence ratio=1.26, 95% CI=1.14, 1.38), after adjusting for confounders. A dose–response relationship was found between the number of workplace violence events experienced by a public health worker and the likelihood of reporting mental health symptoms.

**Conclusions:** Violence targeted at the public health workforce is detrimental to workers and their communities. Ongoing training, workplace support, and increased communication after a workplace violence incident may be helpful. Efforts to strengthen public health capacities and support the public health workforce are also needed.

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### INTRODUCTION

Coronavirus disease 2019 (COVID-19) had an unprecedented impact on U.S. employees. Regardless of occupation, most U.S. workers faced and continue to face extraordinary stress and uncertainty. One study found that 70% of U.S. workers felt more stressed at work during COVID-19 than at any other point in their professional careers.<sup>1</sup> Public health workers (PHWs) served on the front lines of the pandemic, yet they have been relatively understudied during this event. In 2021, to assess the impact of the pandemic

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on symptoms of depression, anxiety, post-traumatic stress disorder (PTSD), and suicidal ideation (SI), the Centers for Disease Control and Prevention (CDC) initiated an online survey of PHWs in all the 50 state, tribal, local, and territorial health departments and found that half of the respondents reported symptoms of at least 1 mental health condition during the pandemic.<sup>2</sup>

In addition to workplace and personal challenges faced by PHWs during the pandemic, numerous media reports described PHWs facing unparalleled hostility, harassment, and threats.<sup>3–6</sup> A recent study found that 21% of surveyed U.S. adults believe that threatening PHWs during the COVID-19 pandemic was justified owing to business closures.<sup>7</sup> This was an increase from the previous study cycle, and increases were most apparent among those with more education and those most trusting of science. These violent incidents may have played a role in the burnout and subsequent resignation of many public health (PH) officials during the pandemic.<sup>8</sup> Although the spectrum of workplace violence (WPV) can range from exposure to offensive language to homicide, nonphysical forms of WPV such as bullying, verbal abuse, and threats are most common and have greater negative impacts on the worker.<sup>9–13</sup> These adverse effects could include increased fear, job-related stress, anxiety, depression, and fatigue.<sup>10–13</sup>

The impact of WPV directed at PHWs during the COVID-19 pandemic has not been fully investigated. More recently, concerns about the well-being of the PH workforce and their ability to confront future PH crises have been raised.<sup>7,14</sup> This study utilized data collected in the 2021 CDC survey to describe the prevalence of non-physical WPV directed at state, tribal, local, and territorial PHWs. The association between nonphysical WPV and symptoms of depression, PTSD, anxiety, and SI was also explored.

## METHODS

### Study Population

A cross-sectional design and nonprobability-based convenience sample of U.S. state and local PHWs in all the 50 U.S. states, the District of Columbia, Tribal Nations, and U.S. territories were employed in 2021.<sup>1</sup> A link to an anonymous, online survey was distributed to a representative at each of the 4 national PH organizations that agreed to participate and represented the target audience. These representatives distributed the survey link to members of their organizations through e-mail. Members of these organizations in leadership roles circulated the link to employees

in their respective PH departments. All persons who worked at a state, tribal, local, or territorial health department for any time in 2020 were eligible to participate. The survey link was open between March 29, 2021 and April 16, 2021. This activity was reviewed by CDC and conducted consistent with applicable federal law and CDC policy.<sup>2</sup>

### Measures

The survey included questions on sociodemographics, work variables, and stressful experiences and was pilot tested by state, local, and federal PHWs. Questions were constrained within specific timeframes; for example, respondents reported on WPV since COVID-19 was declared a pandemic in March 2020.<sup>2</sup> Respondents also self-reported symptoms of anxiety, depression, and SI for the previous 2 weeks.<sup>2</sup> Respondents used prespecified response options developed using the National Association of County and City Health Officials job categories (NACCHO).<sup>15</sup> All job titles were coded to 2010 Standard Occupational Classification system codes using the NIOSH Industry and Occupation Computerized Coding System.<sup>16,17</sup> Detailed Standard Occupational Classification codes were collapsed into major occupation groups, excluding healthcare practitioners and support workers who were categorized separately.<sup>16</sup>

WPV questions were developed by the research team and included 3 yes/no questions: *Experienced stigma or discrimination due to your work*; *Received job-related threats due to your work*; and *Felt bullied, threatened and/or harassed due to your work*. This definition excludes physical WPV such as kicking, beating, and hitting but includes stigma and/or discrimination. These non-physical WPV events will be collectively referred to as WPV.

Mental health symptoms were measured using standardized tools. The 9-item Patient Health Questionnaire measured depression symptoms.<sup>18</sup> Each question was scored from 0 to 3, with a final score range of 0–27. Respondents were considered symptomatic for moderate-to-severe depression if they scored  $\geq 10$ .<sup>18</sup> A single 9-item Patient Health Questionnaire question measured SI (*How many days have you thought that you would be better off dead or thought of hurting yourself?*). Any positive response indicated SI in the previous 2 weeks. Anxiety was measured using the 2-item Generalized Anxiety Disorder scale.<sup>19</sup> Each 2-item Generalized Anxiety Disorder item was scored from 0 to 3, for a total score of 0–6. Respondents were considered symptomatic if they scored  $\geq 3$ .<sup>19</sup> PTSD was measured using the 6-item Impact of Events Scale.<sup>20</sup> The 6-item Impact of Events Scale questions were scored from 0 to 4, with a mean score range of 0–4. Respondents were considered symptomatic for PTSD if their mean score was  $\geq 1.75$ .<sup>20</sup> Questions on job stress and work support were developed for the study by the research team.

### Statistical Analysis

Descriptive statistics were calculated for the sample demographics and work characteristics across the 3 WPV questions. WPV was categorized into a dichotomous experienced any type of WPV or a combination of WPV variables. To determine the strength and significance of the association between WPV and variables of

<sup>1</sup>Membership associations that participated were the Association of Public Health Laboratories, the Association of State and Territorial Health Officials, the Council of State and Territorial Epidemiologists, and the National Association of County and City Health Officials.

<sup>2</sup>45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44:3501 et seq

interest, prevalence ratios (PRs) and 95% CIs were estimated using Poisson regression with a robust SE.

Multiple imputation was performed to address missing data on the multivariable analysis using 25 imputed data sets. The imputation data set included the 4 mental health outcomes, 3 WPV variables, and other covariates of interest. Multiple imputation was performed using the fully conditional method discriminant function with the class effects option (Version 9.4, SAS Institute Inc, Cary, NC). Ordinal variables were treated as continuous for the imputation and rounded back to the original ordinal scale.

A factor analysis was used to create construct scales to combine highly correlated variables. These construct scales were used as explanatory variables in the Poisson regression. A Spearman rho correlation matrix of all binary and ordinal variables was used as the basis for the factor analysis. Scales were created of related variables, which loaded on specific factors. Orthomax rotation with equal weights was used to distinguish the loadings for each factor beyond the original principal component results.

Separate multivariable Poisson models were constructed to calculate the adjusted PRs of the WPV variable for each of the 4 mental health outcomes. For modeling, WPV was defined as experiencing any 1 of the WPV responses versus not experiencing any of the WPV responses. The total number of WPV outcomes that a respondent checked yes was also used for modeling. State of residence was included as the cluster effect employing generalized estimating equations adjustments with an exchangeable working correlation matrix, which assumes that respondents within a state are correlated. All variables were first included in the model, with only the dichotomous WPV variable. If the included variable was not significant ( $p>0.1$ ) and did not change the PR for WPV by  $>10\%$ , it was excluded from further consideration. All variables not excluded were fit together in a full model. Variables not significant in the full model and did not change the PR for WPV by  $>10\%$  were then removed to create a final model. Years of working in PH were used as surrogates to age because of missing data. Analyses were conducted in 2021–2022.

## RESULTS

In total, 26,174 PHWs responded to the survey. Table 1 shows the work characteristic and sociodemographics by WPV using the unimputed data. Overall, 26% of respondents experienced stigma due to their PH work ( $n=5,962$ ), 12% received job-related threats ( $n=2,688$ ), and 24% were bullied or harassed ( $n=5,350$ ). A total of 32% experienced at least 1 form or combination of forms of WPV ( $n=8,244$ ). The occupations most likely to report WPV were management ( $n=1,396$ ; 46%), art/design/entertainment/sport/recreation ( $n=247$ ; 44%), and nursing ( $n=1,416$ ; 41%). Nearly all the job titles under the arts/design/entertainment/sports/recreation category were public relations specialists (97%). As the number of hours worked per week increased, so did the likelihood that the PHW experienced WPV (<20 hours=16%, 20–40 hours=25%, 41–60 hours=41%, 61–75 hours=52%, >75 hours=61%). This same trend was

seen for the degree of public interaction (little interaction=22%, some=31%, a lot=46%).

Table 2 shows the unadjusted PRs and 95% CIs for WPV and the mental health symptoms using the unimputed data. Experiencing any type or combination of WPV was significantly associated with an increased likelihood of reporting symptoms of depression (PR=1.95, 95% CI=1.87, 2.03), PTSD (PR=2.0, 95% CI=1.93, 2.07), anxiety (PR=1.87, 95% CI=1.80, 1.94), and SI (PR=1.99, 95% CI=1.83, 2.18). Because dose–response relationship was found between the number of WPV events and the likelihood of reporting symptoms for each mental health outcome. As an example, the proportion of PHWs reporting symptoms of depression was 1.7-fold greater if they experienced a single type of WPV, twofold if they experienced 2 types, and 2.4-fold greater if they experienced all the 3 types of WPV.

Table 3 shows the top 4 factors in terms of variance explained by the factor analysis using the imputed data. The numbers represent the factor loadings, with numbers closer to  $\pm 1$  indicating variables with a high factor loading. Survey items with high loadings were used to develop 3 scales for the models: perceived work support, perceived job stress, and perceived stress due to environment. *Perceived work support* was defined as the sum of *felt supported by coworkers/peers*, *felt supported by supervisor/leadership*, *felt supported by organization/agency*, and *felt unappreciated at work*. Perceived job stress was the sum of *felt disconnected from family/friends because of work*, *felt overwhelmed by work load or family/work balance*, *felt inadequately compensated at work*, *able to take time off work when needed*, *percentage of time spent on COVID*, and *hours worked in a typical week*. Perceived stress due to environment was the sum of *felt stressed due to civil unrest* and *felt stressed due to racial tensions*.

Table 4 shows the multivariable models for the 4 mental health outcomes using the imputed data. After controlling for confounders such as sociodemographics, work characteristics, support from family/friends, feelings of isolation, death of a loved one, perceived stress due to environment, and worry about the health of family, the association between WPV and the mental health outcomes remained moderate and significant. The dose–response relationship between the number of WPV events and the likelihood of reporting mental health symptoms also persisted. For example, the proportion of PHWs reporting symptoms of depression was 1.1-fold greater among those experiencing 1 type of WPV, 1.2-fold greater among those experiencing 2 types, and 1.3-fold greater among those experiencing all the 3 types.

**Table 1.** Work Characteristics and Sociodemographics of Public Health Workers by Workplace Violence, March 2021–April 2021, U.S.

Variables	Experienced stigma		Received job threats		Was bullied or harassed		Any type or combination of workplace violence		Total <sup>a</sup>
	n (%)	PR (95% CI)	n (%)	PR (95% CI)	n (%)	PR (95% CI)	n (%)	PR (95% CI)	
Occupation									
Art, design, entertainment, Sports, recreation	156 (28)	ref	117 (21)	ref	185 (33)	ref	247 (44)	ref	615 (3)
Business and financial operations	158 (19)	0.71 (0.57, 0.88)	62 (8)	0.37 (0.27, 0.50)	120 (15)	0.45 (0.36, 0.57)	200 (25)	0.57 (0.47, 0.68)	910 (4)
Community and social service	1,211 (25)	0.90 (0.76, 1.1)	487 (10)	0.48 (0.39, 0.59)	1,115 (23)	0.69 (0.59, 0.81)	1,707 (35)	0.80 (0.70, 0.92)	5,410 (22)
Computer and mathematical	74 (16)	0.57 (0.43, 0.75)	18 (3.8)	0.19 (0.11, 0.30)	58 (12)	0.37 (0.28, 0.51)	104 (22)	0.51 (0.40, 0.64)	525 (2)
Life, physical, and social science	1,143 (28)	1.0 (0.86, 1.19)	576 (14)	0.68 (0.56, 0.83)	1,081 (26)	0.80 (0.69, 0.94)	1,586 (39)	0.89 (0.78, 1.02)	4,493 (18)
Management	1,036 (34)	1.23 (1.04, 1.46)	586 (19)	0.93 (0.76, 1.14)	993 (32)	0.99 (0.85, 1.16)	1,396 (46)	1.05 (0.92, 1.20)	3,281 (13)
Office and administrative support	524 (19)	0.71 (0.59, 0.84)	213 (8)	0.38 (0.31, 0.48)	472 (17)	0.53 (0.45, 0.63)	748 (28)	0.64 (0.55, 0.74)	3,096 (13)
Health practitioner									
Health practitioner, doctor	36 (22)	0.78 (0.55, 1.13)	30 (18)	0.87 (0.58, 1.29)	47 (28)	0.86 (0.63, 1.18)	63 (38)	0.86 (0.66, 1.14)	184 (<1)
Health practitioner, nurse	1,110 (32)	1.16 (0.98, 1.37)	454 (13)	0.63 (0.51, 0.77)	946 (27)	0.83 (0.71, 0.97)	1,416 (41)	0.93 (0.82, 1.07)	3,748 (15)
Health practitioner, other	366 (19)	0.70 (0.58, 0.85)	96 (5)	0.25 (0.19, 0.32)	244 (13)	0.39 (0.33, 0.48)	477 (25)	0.58 (0.50, 0.68)	2,073 (15)
Other	30 (17)	0.63 (0.43, 0.94)	15 (9)	0.43 (0.25, 0.73)	20 (12)	0.36 (0.23, 0.57)	38 (22)	0.52 (0.37, 0.73)	198 (<1)
Supervisor	2,259 (31)	1.29 (1.23, 1.36)	1,227 (17)	1.78 (1.65, 1.92)	2,109 (29)	1.37 (1.30, 1.45)	3,082 (42)	1.29 (1.23, 1.35)	7,957 (32)
Years of public health experience									
<1 year	603 (21)	ref	237 (8)	ref	534 (18)	ref	880 (30)	ref	3,316 (13)
1–4 years	1,628 (27)	1.32 (1.20, 1.45)	729 (12)	1.50 (1.30, 1.73)	1,460 (24)	1.34 (1.21, 1.48)	2,260 (38)	1.26 (1.16, 1.36)	6,559 (26)
5–9 years	1,311 (29)	1.42 (1.29, 1.56)	597 (13)	1.65 (1.41, 1.91)	1,183 (27)	1.45 (1.31, 1.60)	1,750 (39)	1.30 (1.20, 1.41)	4,868 (19)
10–14 years	815 (28)	1.34 (1.20, 1.48)	389 (13)	1.62 (1.38, 1.90)	735 (25)	1.36 (1.21, 1.52)	1,078 (37)	1.21 (1.11, 1.32)	3,216 (13)
≥15 years	1,585 (24)	1.17 (1.07, 1.29)	744 (11)	1.40 (1.21, 1.62)	1,452 (22)	1.21 (1.10, 1.34)	2,151 (33)	1.09 (1.01, 1.18)	7,125 (28)
Interaction with public									
A lot of interaction	3,514 (34)	2.06 (1.91, 2.22)	1,878 (18)	4.05 (3.56, 4.62)	3,440 (33)	2.79 (2.57, 3.03)	4,826 (46)	2.12 (1.99, 2.26)	11,143 (46)
Some interaction	1,476 (23)	1.38 (1.27, 1.50)	553 (8)	1.90 (1.64, 2.20)	1,228 (19)	1.59 (1.45, 1.74)	2,017 (31)	1.42 (1.32, 1.52)	7,061 (29)
Little to no interaction	952 (16)	ref	259 (4)	ref	688 (12)	ref	1,272 (22)	ref	6,257 (26)
Hours worked									
<20 hours/week	35 (10)	ref	10 (3)	ref	31 (9)	ref	58 (16)	ref	385 (2)
20–40 hours/week	1,575 (18)	1.81 (1.30, 2.54)	555 (6)	2.24 (1.20, 4.19)	1,307 (15)	1.70 (1.19, 2.43)	2,182 (25)	1.52 (1.17, 1.98)	9,608 (39)
41–60 hours/week	3,198 (30)	3.04 (2.18, 4.24)	1,382 (13)	4.6 (2.48, 8.59)	2,847 (26)	3.06 (2.15, 4.36)	4,333 (41)	2.49 (1.92, 3.22)	11,466 (47)
61–75 hours/week	803 (38)	3.85 (2.74, 5.40)	495 (23)	8.36 (4.47, 15.64)	831 (39)	4.51 (3.15, 6.46)	1,098 (52)	3.18 (2.44, 4.14)	2,232 (9)
>75 hours/week	339 (46)	4.69 (3.31, 6.64)	249 (34)	12.16 (6.46, 22.88)	346 (47)	5.44 (3.76, 7.85)	450 (61)	3.77 (2.87, 5.0)	786 (3)

(continued on next page)

**Table 1.** Work Characteristics and Sociodemographics of Public Health Workers by Workplace Violence, March 2021–April 2021, U.S. (continued)

Variables	Experienced stigma		Received job threats		Was bullied or harassed		Any type or combination of workplace violence		Total <sup>a</sup>
	n (%)	PR (95% CI)	n (%)	PR (95% CI)	n (%)	PR (95% CI)	n (%)	PR (95% CI)	
Time spent on COVID-19 response									
0%	188 (11)	ref	54 (3)	ref	129 (8)	ref	250 (15)	ref	1,787 (7)
1%–25%	802 (17)	1.47 (1.25, 1.72)	237 (5)	1.51 (1.13, 2.03)	577 (12)	1.54 (1.27, 1.86)	1,083 (23)	1.49 (1.30, 1.71)	5,151 (21)
26%–50%	762 (24)	2.07 (1.77, 2.43)	258 (8)	2.46 (1.84, 3.30)	586 (18)	2.34 (1.93, 2.83)	1,008 (32)	2.06 (1.80, 2.37)	3,432 (14)
51%–75%	873 (28)	2.48 (2.11, 2.90)	379 (12)	3.76 (2.83, 5.00)	808 (26)	3.35 (2.78, 4.03)	1,197 (39)	2.55 (2.23, 2.92)	3,283 (14)
≥75%	3,308 (33)	2.89 (2.49, 3.34)	1,760 (18)	5.37 (4.09, 7.03)	3,250 (32)	4.14 (3.47, 4.94)	4,562 (46)	3.0 (2.63, 3.39)	10,620 (44)
Type of public health agency									
State	2,472 (22)	ref	937 (8)	ref	2,133 (19)	ref	3,377 (30)	ref	12,951 (49)
Local	3,451 (30)	1.34 (1.28, 1.42)	1,744 (15)	1.80 (1.66, 1.95)	3,216 (28)	1.46 (1.38, 1.54)	4,715 (41)	1.35 (1.29, 1.41)	13,051 (50)
Tribal/territorial	39 (28)	1.28 (0.93, 1.75)	18 (13)	1.56 (0.98, 2.49)	27 (20)	1.03 (0.71, 1.51)	48 (35)	1.16 (0.87, 1.55)	172 (<1)
Sex									
Female	4,991 (27)	ref	2,102 (11)	ref	4,436 (24)	ref	6,744 (36)	ref	19,872 (83)
Male	797 (22)	0.80 (0.75, 1.87)	520 (14)	1.25 (1.14, 1.38)	786 (21)	0.90 (0.83, 0.97)	1,178 (32)	0.88 (0.83, 0.94)	3,904 (16)
Nonbinary	54 (39)	1.44 (1.1, 1.88)	18 (13)	1.15 (0.73, 1.84)	40 (29)	1.21 (0.88, 1.65)	64 (46)	1.27 (0.99, 1.62)	141 (<1)
Race/ethnicity									
Hispanic	435 (24)	0.89 (0.81, 0.98)	181 (10)	0.79 (0.68, 0.92)	332 (18)	0.72 (0.65, 0.81)	555 (31)	0.82 (0.75, 0.89)	1,974 (8)
AI/AN, NH	48 (32)	1.2 (0.91, 1.59)	29 (19)	1.53 (1.06, 2.21)	40 (27)	1.06 (0.77, 1.44)	58 (39)	1.04 (0.80, 1.34)	156 (<1)
Asian, NH	184 (20)	0.74 (0.64, 0.85)	82 (9)	0.70 (0.56, 0.87)	164 (18)	0.69 (0.59, 0.81)	256 (28)	0.74 (0.65, 0.84)	1,009 (4)
Black, NH	394 (20)	0.74 (0.67, 0.83)	121 (6)	0.49 (0.41, 0.59)	262 (13)	0.52 (0.46, 0.59)	479 (25)	0.66 (0.60, 0.72)	2,177 (9)
NH/PI, NH	16 (18)	0.68 (0.42, 1.11)	5 (6)	0.44 (0.18, 1.07)	13 (15)	0.58 (0.33, 0.99)	20 (23)	0.61 (0.39, 0.94)	96 (<1)
White, NH	4,414 (27)	ref	2,083 (13)	ref	4,191 (25)	ref	6,197 (38)	ref	17,218 (74)
Multiple races, NH	170 (29)	1.07 (0.92, 1.24)	72 (12)	0.96 (0.76, 1.22)	139 (24)	0.92 (0.78, 1.09)	220 (37)	0.99 (0.87, 1.14)	614 (2)
Age group (years)									
<29	934 (28)	ref	412 (12)	ref	893 (27)	ref	1,339 (40)	ref	3,525 (16)
30–39	1,570 (30)	1.11 (1.03, 1.19)	737 (14)	1.15 (1.02, 1.30)	1,357 (26)	0.98 (0.90, 1.06)	2,111 (41)	1.01 (0.94, 1.08)	5,461 (25)
40–49	1,424 (29)	1.08 (1.00, 1.16)	645 (13)	1.07 (0.95, 1.21)	1,216 (25)	0.93 (0.86, 1.02)	1,857 (38)	0.95 (0.89, 1.02)	5,102 (23)
50–59	1,071 (23)	0.83 (0.77, 0.90)	501 (11)	0.86 (0.75, 0.98)	1,021 (22)	0.81 (0.74, 0.88)	1,499 (32)	0.79 (0.73, 0.85)	4,925 (23)
≥60	406 (15)	0.55 (0.49, 0.61)	187 (7)	0.55 (0.46, 0.66)	417 (15)	0.57 (0.51, 0.64)	633 (23)	0.58 (0.52, 0.63)	2,830 (13)
Total <sup>b</sup>	5,962 (26)		2,688 (12)		5,350 (24)		8,244 (32)		

Note: The public health workers included are state, tribal, local, and territorial.

AI/AN, American Indian/American Native; NH, Non-Hispanic; PI, Pacific Islander; PR, prevalence ratio.

<sup>a</sup>Totals do not sum to the total number of survey respondents owing to nonresponse for each variable.

<sup>b</sup>Cells may not sum to 100 owing to rounding.



**Table 2.** Workplace Violence, Depression, PTSD, Anxiety, and Suicidal Ideation Among Public Health Workers, March 2021–April 2021, U.S.

Type of violence	Depression			PTSD			Anxiety			Suicidal Ideation			Total
	Clinical, n (%)	PR (95% CI)	Yes, n (%)	Yes, n (%)	PR (95% CI)	Yes, n (%)	Yes, n (%)	PR (95% CI)	Yes, n (%)	PR (95% CI)			
No violence	3,235 (23)	ref	3,790 (27)	3,380 (23)	ref	3,514 (43)	894 (6)	ref	14,443 (64)				
Any type or combination of violence	3,505 (45)	1.95 (1.87, 2.03)	4,216 (54)	3,514 (43)	2.0 (1.93, 2.07)	3,514 (43)	983 (12)	1.87 (1.80, 1.94)	7,964 (35)				
Single type of violence	1,537 (40)	1.72 (1.62, 1.83)	1,775 (46)	1,567 (39)	1.70 (1.61, 1.79)	1,567 (39)	392 (10)	1.68 (1.58, 1.78)	3,966 (18)				
Any 2 types of violence	1,076 (46)	2.00 (1.87, 2.15)	1,337 (57)	1,073 (44)	2.12 (2.0, 2.25)	1,073 (44)	309 (13)	1.91 (1.78, 2.05)	2,382 (11)				
All 3 types of violence	892 (56)	2.43 (2.26, 2.62)	1,104 (69)	874 (53)	2.57 (2.40, 2.74)	874 (53)	281 (17)	2.28 (2.18, 2.46)	1,616 (7)				
Total <sup>a</sup>	6,740 (31)		8,006 (37)	6,894 (30)		6,894 (30)	1,877 (8)						

Note: The public health workers included are state, tribal, local, and territorial.

PR, prevalence ratio; PTSD, post-traumatic stress disorder.

<sup>a</sup>Cells may not sum to 100 owing to rounding.

## DISCUSSION

This study describes the prevalence of WPV among state, tribal, local, and territorial PWHs during the COVID-19 pandemic and its association with mental health. A total of 35% of PWHs experienced at least 1 form or combination of forms of WPV, and that violence was associated with a detrimental impact on PWHs' mental health. The more WPV the PWH experienced, the more likely they were to report symptoms of depression, anxiety, PTSD, and SI. This association persisted after controlling for potentially confounding variables. PWHs play a pivotal role in PH emergencies, but there is little research on how these emergencies impact their mental health. The current findings complement a recent study that found that over half of PH agencies reported experiencing harassment from the public.<sup>6</sup> These findings are also consistent with a wide range of studies showing the associations between WPV and adverse mental health in many occupations.<sup>21–23</sup> However, these studies did not include PWHs or their work environments, which is why more research is needed on the PWH population.

The psychological impact of infectious disease outbreaks on workers has been previously described.<sup>24–27</sup> Workers experienced higher levels of depression, anxiety, and stress disorders during and after infectious disease outbreaks, including Ebola, severe acute respiratory syndrome, and influenza.<sup>24–27</sup> In the few studies where WPV was studied concurrent with an outbreak, it was found to add to the heavy burden of workplace stressors faced by workers.<sup>28–30</sup> There were only a handful of studies conducted on PWHs, which found that they had a high degree of willingness to respond to outbreaks but also felt overworked.<sup>31–33</sup> Therefore, it is difficult to compare these findings with those of other research because studies have not generally included data on WPV or its impact on mental health. One potential comparison is PH WINS (Public Health Workforce Interests and Needs Survey). PH WINS is the only nationally representative data on emerging issues and demographics of the PH workforce and is collected every 3 years.<sup>34</sup> In 2021, the survey reported that 50% of PWHs reported 1 symptom of PTSD, 41% felt bullied or threatened, and 32% were considering leaving PH.<sup>35</sup>

In 2021, a journal published several papers on violence against PH officials during the COVID-19 pandemic.<sup>36–38</sup> First, an important step is quantifying and describing the WPV. To do so, Ward et al. recommended establishing a national WPV reporting system.<sup>6</sup> Toward this goal, a school of PH-sponsored “We Stand with Public Health Call to Action” Campaign was launched with support from PH partners.<sup>36</sup> One of the

**Table 3.** Top Factors With Corresponding Loadings for Workplace Characteristics and Workplace Violence

Variables	Perceived job support <sup>a</sup>	Perceived job stress <sup>b</sup>	Perceived stress due to environment <sup>c</sup>	Workplace violence
Experienced stigma or discrimination owing to public health work	-0.140	0.167	0.122	<b>0.673</b>
Received job threats owing to their public health work	-0.043	0.088	0.018	<b>0.795</b>
Felt bullied, threatened, or harassed owing to their public health work	-0.103	0.158	0.077	<b>0.821</b>
For most of 2020, the percentage of time spent working on the COVID-19 response	0.132	<b>0.676</b>	-0.071	0.185
A supervisor in 2020?	0.041	0.239	-0.014	0.056
Years of experience working in public health	-0.088	-0.134	-0.038	0.049
Degree of interaction with the public in the course of their work	-0.069	-0.339	0.154	-0.358
Since the COVID-19 pandemic, hours worked in a typical week	-0.011	<b>0.602</b>	-0.013	0.125
Highest level of education	0.028	0.159	0.195	-0.072
Number of children aged <18 years in the household	0.013	0.091	-0.148	0.001
Received counseling or therapy from mental health professional in last 4 weeks	-0.023	0.049	0.116	0.043
Since the COVID-19 pandemic, got divorced or separated	0.012	-0.023	-0.067	0.082
Since the COVID-19 pandemic, felt stressed owing to civil unrest	-0.060	0.043	<b>0.827</b>	0.106
Since the COVID-19 pandemic, felt stressed owing to racial tensions	-0.053	-0.002	<b>0.841</b>	0.065
Since the COVID-19 pandemic, worried about the health of family and loved ones	-0.037	0.175	0.541	-0.018
Since the COVID-19 pandemic, experienced the death of a loved one	-0.023	0.003	0.217	0.044
Since the COVID-19 pandemic, felt isolated and alone	-0.222	0.249	0.387	0.060
Since the COVID-19 pandemic, felt disconnected from family and friends because of work	-0.171	<b>0.700</b>	0.241	0.082
Since the COVID-19 pandemic, felt overwhelmed by work load or family/work balance	-0.182	<b>0.666</b>	0.268	0.041
Since the COVID-19 pandemic, felt inadequately compensated for work	-0.406	<b>0.483</b>	0.144	0.115
Since the COVID-19 pandemic, felt unappreciated at work	<b>-0.618</b>	0.317	0.137	0.163
Since the COVID-19 pandemic, able to take time off work when needed	0.275	<b>-0.532</b>	0.009	-0.143
Since the pandemic, felt supported by family/friends	0.439	-0.038	-0.040	-0.082
Since the pandemic, felt supported by coworkers/peers	<b>0.778</b>	0.066	0.001	-0.007
Since the pandemic, felt supported by supervisor/leadership	<b>0.867</b>	-0.077	-0.024	-0.061
Since the pandemic, felt supported by organization/agency	<b>0.830</b>	-0.149	-0.072	-0.045

Note: Boldface denotes numbers close to ±1, representing a high factor loading within each respective factor.

<sup>a</sup>Scale=1/4 (supported by coworkers) + 1/4 (supported by supervisor/leadership) + 1/4 (supported by organization/agency) + 1/4 (felt unappreciated at work).

<sup>b</sup>Scale=1/5 (percentage time on COVID-19) + 1/5 (hours worked in a typical week) + (felt disconnected from family/friends due to work) + (overwhelmed by work load) + (inadequately compensated at work) + (able to take time off work when needed).

<sup>c</sup>Scale=stressed owing to civil unrest + stressed owing to racial tensions.



**Table 4.** Multivariable Model of Workplace Violence, Depression, PTSD, Anxiety, and Suicidal Ideation, March 2021–April 2021, U.S.

Variables	Depression, <sup>a</sup> PR (95% CI)	Anxiety, <sup>b</sup> PR (95% CI)	PTSD, <sup>c</sup> PR (95% CI)	Suicidal ideation, <sup>c</sup> PR (95% CI)
Any type or combination of WPV	1.21 (1.15, 1.27)	1.21 (1.15, 1.27)	1.31 (1.25, 1.37)	1.26 (1.14, 1.38)
Experienced any 1 type of WPV	1.16 (1.09, 1.23)	1.16 (1.09, 1.23)	1.21 (1.14, 1.27)	1.07 (0.95, 1.21)
Experienced any 2 types of WPV	1.21 (1.12, 1.30)	1.21 (1.13, 1.30)	1.36 (1.28, 1.45)	1.28 (1.12, 1.46)
Experienced all 3 types of WPV	1.31 (1.22, 1.41)	1.32 (1.23, 1.43)	1.47 (1.38, 1.57)	1.61 (1.40, 1.85)
Degree of interaction with the public	–	–	0.96 (0.93, 0.99)	–
Year of public health experience	–	0.94 (0.92, 0.96)	–	0.94 (0.91, 0.97)
Received mental health services in the previous 4 weeks	1.28 (1.21, 1.35)	1.35 (1.28, 1.42)	1.18 (1.12, 1.24)	1.40 (1.27, 1.54)
Experienced death of loved one since COVID-19 was declared a pandemic	1.08 (1.03, 1.14)	1.05 (1.00, 1.10)	1.08 (1.03, 1.13)	–
Felt isolated and alone since COVID-19 was declared a pandemic	1.91 (1.79, 2.03)	1.96 (1.84, 2.09)	1.59 (1.50, 1.68)	3.03 (2.61, 3.50)
Since the start of the pandemic, felt supported by family/friends	0.87 (0.85, 0.89)	0.91 (0.89, 0.94)	0.94 (0.92, 0.97)	0.76 (0.72, 0.80)
Worried about health of family since COVID-19 was declared a pandemic	1.25 (1.11, 1.41)	1.34 (1.18, 1.52)	1.52 (1.34, 1.72)	–
Perceived job stress factor	1.23 (1.21, 1.25)	1.21 (1.18, 1.23)	1.24 (1.50, 1.68)	1.07 (1.03, 1.11)
Perceived work support factor	0.86 (0.84, 0.89)	1.15 (0.85, 0.90)	0.95 (0.93, 0.98)	0.71 (0.67, 0.75)
Perceived stress owing to environmental factor	1.26 (1.17, 1.35)	1.32 (1.23, 1.42)	1.51 (1.40, 1.62)	1.18 (1.02, 1.35)

Note: The public health workers included are state, tribal, local, and territorial, and models were based on 25 imputed data sets of  $n=26,174$  each. PR, prevalence rate; PTSD, post-traumatic stress disorder; WPV, workplace violence.

<sup>a</sup>Adjusted for state of residence, sex, marital status, education, and history of self-reported COVID-19 infection.

<sup>b</sup>Adjusted for state of residence, sex, marital status, and education.

<sup>c</sup>Adjusted for state of residence, sex, and marital status.

campaign's aims is asking Congress to require state and local reporting of threats against PHWs.<sup>36</sup> Several approaches to the prevention and mitigation of WPV were suggested, including colleges of PH and national associations providing training for PHWs to respond to conflict as well as investing in the current PH workforce through increased funding and staffing. These are outlined below.

One recommendation was to train PHWs on responding to political conflict and improve support networks.<sup>6,37</sup> This study's results endorse colleague support as a potentially protective factor against adverse mental health outcomes. The Association of State and Territorial Health Officials has a leadership institute that offers training on the navigation of politics.<sup>38</sup> Evidence-based trainings on how to mitigate violence, media management, and responding to political conflict could be added to this institute. Because this study also examined city and county PHWs, NACCHO could also consider similar training topics for their constituents. In addition, schools and programs of PH could consider embedding these topics into current courses as part of their larger curriculum.

While providing PHWs with these vital skills, greater investment in the PH workforce, including funding, increased staffing, and better safety protections, is also needed.<sup>6,7,38</sup> In an effort toward this, NACCHO Officials sent a letter to U.S. Attorney General Merrick Garland requesting federal protections for PHWs owing to the findings in the report, "Legal Protections for Public Health Officials."<sup>36</sup> This report found that 35 states and the District of Columbia had "criminal statutes punishing individuals who impede PH officials' duties with such behavior," but 15 states "either do not have a statute protecting government officials in these circumstances or do not have one protecting PH officials."<sup>39</sup>

Increased workplace communication after a WPV incident is also important and may protect the PHW from adverse mental health outcomes.<sup>40–46</sup> If a WPV event occurs, PHWs should report the event to a designated official at their organization, including the frequency of the violence and other details surrounding the event.<sup>40–42,45–47</sup> Supervisors can make informed decisions about changes to work location, tasks, and shifts to reduce the probability of another WPV event.

Experiencing multiple WPV events has a cumulative effect on adverse mental health symptoms and can lead to increased turnover,<sup>35,42,45,48,49</sup> burnout,<sup>47</sup> and decreased job satisfaction.<sup>46,48,49</sup> Most important, supervisors and PH agencies need to contact law enforcement immediately if the PHWs' life or family is threatened.

### Limitations

There are limitations to these findings. Although this sample was large, it should be noted that this is a convenience sample and may not be representative of the U.S. PH workforce. In addition, owing to the study design, an accurate response rate cannot be calculated. Because the data were collected retrospectively and were self-reported, the potential for recall bias exists. Participants may have been unwilling to share or had difficulty recalling less serious WPV events.<sup>50</sup> In addition, mental health outcomes were based on screening instruments and reflect symptomology rather than clinical diagnoses. Another limitation was that respondents were reporting on experiences that may have occurred in 2020 but reporting on mental health symptoms over the past 2 weeks. In addition, the authors were unable to collect data on the exact cause of or the perpetrator of the WPV event. Because of the survey design, it is also possible that PHWs completed the survey multiple times. Finally, because this is a cross-sectional survey, a causal relationship between WPV and mental health cannot be determined.

### CONCLUSIONS

To the best of the authors' knowledge, this is the first study to document this in the PHW workforce. Public hostilities targeted at the PH workforce are not fully understood; however, any WPV directed at a PHW during a PH emergency is detrimental to them as well as the communities they serve. WPV against PHWs is an alarming outcome of the COVID-19 pandemic. A better understanding of the scope and consequences of WPV as well as understanding of differences across the type of PH agencies; geographic locations; and sociodemographic groups, including race and sex, is needed. Finally, efforts should be made to protect and support the current PH workforce.

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