

# Posttraumatic Stress Disorder and Other Psychological Sequelae Among World Trade Center Clean Up and Recovery Workers

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**ABSTRACT:** We assessed the health of workers exposed to the World Trade Center (WTC) site and of a comparison group of unexposed workers, by means of a mail survey. Exposed workers reported higher frequency of symptoms consistent with posttraumatic stress disorder (PTSD), depression, anxiety, and other psychological problems, approximately 20 months after the disaster. PTSD was positively associated with traumatic on-site experiences and with respiratory problems. These findings may have important clinical and public health implications.

**KEYWORDS:** September 11; World Trade Center; clean up and recovery; disaster workers; posttraumatic stress disorder; depression; respiratory problems; cough

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## INTRODUCTION

Many thousands of workers from the New York City (NYC) area responded to the terrorist attacks on the World Trade Center (WTC) on September 11, 2001. They were involved in an often-heroic effort to rescue survivors and recover the remains of those who died in the attack and subsequent collapse of the towers. Thousands more were involved in the removal of debris from "Ground Zero" and surrounding buildings, and restoration of the essential infrastructure services. In the course of their efforts, many sustained exposure to a wide range of traumatic and hazardous conditions, posing risk to their psychological well-being. It is important from a public health perspective to describe the occurrence of mental disorders and psychosocial problems in workers that respond to disasters, and to study its predictors and correlates. Such data are essential to planning response to future events, and to designing and implementing mental health interventions among workers involved in postdisaster efforts.<sup>1</sup>

Significant psychological sequelae could be expected in disasters that were caused by human intent or resulted in extensive loss of life, widespread property damage, or long-term financial strain.<sup>2</sup> While several papers documented the psychological aftermath of the 9/11 attacks on the residents of NYC<sup>3</sup> and nationwide<sup>4,5</sup> to date, 4 years after the disaster, there has been no published systematic research about the psychological well-being of the WTC workers, with the exception of the NYC Firefighters and Con-Ed workers.<sup>6</sup> Previous data on the mental health of disasters workers are limited.<sup>7</sup> Moreover, very little is known about the effects of continuous exposure following a large-scale disaster, and the relationship between posttraumatic stress disorder (PTSD) and postdisaster physical health.

## METHODS

### *Study Population*

Data were collected on members of four separate organizations: Local unions associated with International Brotherhood of Teamsters, International Union of Operating Engineers and, Labors International Union of North American; and the New York City Department of Sanitation. Work conducted on site by members of these organizations included moving and hauling debris off the WTC site, dust suppression at the WTC site. Each organization identified all workers who were involved in the clean up and recovery effort. Two of these organizations provided also assistance in contacting members who did not participate in the WTC clean up effort. A total of 6649 questionnaires have been distributed by mail to workers.

### *Measurements*

Questionnaires included detailed information on sociodemographics and physical and psychological exposures. PTSD was assessed using the civilian version of the PTSD checklist (PCL-C), a highly accurate and reliable 17-item self-report measure developed for use when administration of a structured clinical interview is not feasible.<sup>8</sup> Depression, anxiety disorders, and alcohol abuse were assessed using the Patient Health Questionnaire (PHQ). There is a good agreement between the PHQ diagnoses and those of independent mental health professionals.<sup>9</sup> Data on respiratory problems were obtained using a structured questionnaire.

### *Analytic Strategy*

We used chi-square tests to compare categorical variables between the exposed and unexposed workers; *t*-test to compare mean age; and logistic regression models to compute odds ratios and 95% confidence intervals, and to adjust for potential confounders. Statistical significance was set at 0.05, and all tests were two-sided.

## RESULTS

Response rate among exposed ranged from 22% to 34%. Data were available on 1131 exposed and 224 unexposed workers. Prevalence of probable PTSD was 13.5% among exposed workers compared with 5.7% in the unexposed; major depression: 16.1% versus 4.4%; panic disorder: 7.2% versus 1.5%; alcohol use: 6.8% versus 3.9%. As shown in TABLE 1, compared with those without PTSD, exposed workers with PTSD were more likely to report peri-event anxiety, loss on 9/11, exposure to death and to human remains, current cough (73% versus 43%) and wheezing (84% versus 53%), and past or present asthma (19.8% versus 9.7%). Differences persisted also when age and duration of work were taken into account.

## COMMENT

According to our preliminary analysis, workers exposed to work on the WTC site report symptoms consistent with high prevalence rates of PTSD, depression, anxiety, and other psychological problems, approximately 24 months after the disaster. These prevalence rates were significantly higher among exposed workers when compared to those unexposed. PTSD was positively associated with respiratory problems. Main limitations of this study include low response

TABLE 1. PTSD and psychological and respiratory variables

Variable	Probable DSM-IV PTSD (N = 149)	No DSM-IV PTSD (N = 983)	Odds ratio (95% CI)	P value
Loss on 9/11	N (%) 73 (49.7)	N (%) 336 (35.5)	1.48 (1.07–2.06)	0.02
Peri-event anxiety	101 (68.2)	247 (26.4)	4.47 (3.17–6.30)	<0.0001
Exposed to human remains	133 (89.3)	680 (71.4)	3.00 (1.87–4.82)	<0.0001
Witnessed death	107 (71.8)	489 (51.4)	2.62 (1.84–3.73)	<0.0001
Major depression	102 (68.9)	72 (7.70)	16.25 (11.07–23.85)	<0.0001
Cough (current)	109 (73.1)	406 (43.3)	3.09* (2.14–4.46)	<0.0001
Wheezy (current)	123 (84.2)	496 (53.3)	3.64* (2.40–5.53)	<0.0001
Asthma (ever)	24 (19.8)	85 (9.7)	2.16* (1.32–3.54)	0.02

\* Adjusted for age and duration of work on site.

rates, self-report, and limited information on the mental health of participants prior to 9/11. Our findings, though possibly inflated by selection bias generated by the low response rates, and plausibly not generalizable to all workers, may have important clinical and public health implications, both for the large population of dedicated workers who took part in the post 9/11 effort, as well as for future preparedness.

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