Mental Health Outcomes in Police Personnel After Hurricane Katrina

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Objective: *We examined symptoms of depression and posttraumatic stress disorder (PTSD) among New Orleans Police Department (NOPD) personnel who provided law enforcement and relief services to affected communities following Hurricane Katrina.* ***Methods:*** *We conducted a cross-sectional survey of mental health outcomes related to personal and work-related exposures of police personnel 8 weeks after the Hurricane.* ***Results:*** *Of the 912 police personnel who completed the questionnaire, 227 (26%) reported symptoms consistent with depression and 170 (19%) reported symptoms consistent with PTSD. Risk factors associated with PTSD include recovery of bodies, crowd control, assault, and injury to a family member. Depressive symptoms were associated with rare family contact, uninhabitable home, isolation from the NOPD, assault, and injury to a family member.* ***Conclusions:*** *Police personnel reported symptoms of PTSD and depression associated with work-related and personal factors following Hurricane Katrina.* (J Occup Environ Med. *2008;50:689–695*)

Past studies have shown that emergency responders are at increased risk of developing posttraumatic stress disorder (PTSD) and depression after natural disasters.[1–6] Among these responders, little is known about specific mental health outcomes of police officers after natural disasters. When Hurricane Katrina struck the Gulf Coast in August 2005, New Orleans Police Department (NOPD) personnel faced competing demands: a need to uphold their sworn duty to protect citizens and defend the city of New Orleans while simultaneously meeting the shelter and survival needs of their own families.[7]

Following the Hurricane, police personnel faced increased physical and psychosocial demands related to search and rescue, law enforcement, life-threatening conditions (such as increasing violence during crowd control activities), loss of communication equipment, and isolation from coworkers and family. They experienced extended work hours, loss of sleep, and austere living conditions in makeshift quarters. Many police buildings were flooded or damaged during the Hurricane, so most of the police force was operating in temporary facilities.[8] In addition to these demands, police personnel were under close media scrutiny resulting in broadcast reports of suicides, desertions, lootings, and police brutality.[9–11] Amid these concerns, the Superintendent of the NOPD requested a health hazard evaluation from the Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (CDC/

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NIOSH) to assess potential mental health problems in the police force related to Hurricane Katrina. The goal of the study was to document the stressors and strains among NOPD police related to their involvement in Hurricane Katrina and determine occupational and nonoccupational risk factors associated with PTSD and depression.

Materials and Methods

Study Population

This cross-sectional study included all NOPD personnel working in the 181^2-mile area of Orleans Parish on October 17 through 28, 2005. To encourage participation, we sought assistance from police affiliate groups such as the Police Association of New Orleans, Fraternal Order of Police, Black Order of Police, and Police Officer Women of Every Rank.

Questionnaire

We distributed self-administered, anonymous questionnaires during the 2-week period to police personnel at all NOPD locations; this included the NOPD Command Center, roll call at each of the eight district stations and supporting units, and the monthly Police Association of New Orleans meeting. At each contact we explained the purpose, confidentiality of responses, and voluntary nature of the survey. After completing the questionnaire, participants received a resource packet that contained contact information regarding available local and national health and mental health services.

The questionnaire covered demographics, previous medical history, symptoms of PTSD and depression, and use of mental health care services after Hurricane Katrina. Participants were asked to describe where they were located the first week after Katrina made landfall, what work activities they were involved in during and after Hurricane Katrina, and if they were isolated from family or their regular NOPD assignment. We also asked if their home was uninhabitable because of Hurricane damage.

Outcome Measures

To assess for posttraumatic stress, we used the 19-item Veterans Administration PTSD Checklist (PCL) and criteria for PTSD from the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (DSM-IV) to score for PTSD.[12] Respondents were asked to rate the severity of each of the 19-PTSD items in the last 4 weeks on a five-point scale ("not at all," "a little bit," "moderately," "quite a bit," and "extremely"). The questions in the checklist are grouped in the following three subject areas: 1) recurrent and intrusive thoughts, 2) avoidance and numbing, and 3) hyperarousal and hypervigilance. Respondents were required to answer (at a moderate to severe level) at least one question from the first subject area, three questions from the second, and two questions from the third to meet our criteria for PTSD. As a screening instrument, the PCL has demonstrated high sensitivity and specificity in past studies when compared with a PTSD diagnosis made through a structured clinical interview using criteria from the *Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition* (DSM-III-R).[13,14]

We used an abbreviated Center for Epidemiologic Studies Depression Scale (CES-D)[15] to establish the prevalence of depressive symptoms. This scale has been shown to be reliable and valid to detect symptoms of depressed mood for a wide range of study populations.[16,17] Scale values were adjusted to correspond with cutoff scores used in the full version of the CES-D. Mild to moderate depression is defined as a score of 15 to 21 out of a total possible score of 60; scores of 22 or higher are consistent with major depression. For the purpose of this study, we used a cutoff score of 22 and higher for depression to reduce outcome misclassification.

Statistical Analysis

We examined relationships between exposures and health outcomes using prevalence ratios (PR) along with their corresponding 95% confidence intervals (95% CI). We constructed regression models to adjust for potential nonoccupational confounding factors such as age, gender, and previous history of mental health symptoms. When determining the association between exposures and PTSD, the variables initially included in the model were rare family contact, injury to a family member, assault, crowd control, rescue of citizens, recovery of bodies, gunfire incidents, and SWAT activities. For depression, we initially included the following variables in the model: isolation from family; isolation from NOPD; rare family contact; assault; injury to a family member; home uninhabitable; and presence in the Superdome, Convention Center, or other evacuation centers during the first week after the Hurricane. For both the PTSD and depression analyses, modeling began with all of the initial variables as well as the potential confounders. Variables were removed from the initial set, one at a time, selecting the variable with the largest P value first until a statistically significant subset remained. Additional frequency data describe the characteristics of the survey population and selective activities following the Hurricane. The statistical software used for the analyses was SAS version 9.1.3 (SAS Institute, Cary, NC).

Results

Nine hundred twelve NOPD personnel completed the questionnaire. We were unable to verify official reports of the number of officers present in the city at the time of our survey; however, estimates varied from 1200 to 1448 officers,[18] giving an estimated participation rate of 63% to 76%. Table 1 presents basic demographics, work activities and locations, and living status of police

TABLE 1
Demographics, Work Duties, Locations, and Personal Factors in NOPD Personnel Following Hurricane Katrina

	Number (%)*
Demographics	
Median age, yr (range)	37 (19–78)
Median yr with NOPD (range)	8 (0–41)
Men	724 (80)
Current smoker	166 (18)
Former smoker	114 (13)
Never smoker	623 (69)
Activities†	
Patrol duty	709 (78)
Looting control	535 (59)
Crowd control	525 (58)
Rescue of citizens in flooded areas	473 (52)
Recovery of bodies	121 (13)
Evacuation	444 (49)
Gunfire incidents	364 (40)
Traffic control	257 (28)
Narcotic control	61 (7)
SWAT	70 (8)
Locations‡	
Districts 1–9	424 (46)
Hotel	189 (21)
Convention center	110 (12)
Hospital	82 (9)
Headquarters	76 (8)
Superdome	69 (8)
A location outside of New Orleans	58 (6)
Home, apartment, condo	46 (5)
Evacuation center	25 (3)
Currently living with family	
No	618 (69)
Home damage	
Uninhabitable	501 (55)
Reparable flood/ wind damage	381 (42)
No damage	41 (5)

*Denominators ranged from 845 to 912 due to missing values.

†Eighty-five percent of respondents reported more than one of the listed activities.

‡Nineteen percent of respondents indicated more than one of the listed locations.

TABLE 2
Prevalence of Symptoms Consistent With Posttraumatic Stress Disorder and Depression and Use of Mental Health Services in NOPD Personnel Following Hurricane Katrina

	Number (%)*
Mental health symptoms	
Posttraumatic stress disorder symptoms†	170 (19)
Depressive symptoms‡	227 (26)
Posttraumatic stress disorder and depressive symptoms	119 (14)
Posttraumatic stress disorder or depressive symptoms	278 (31)
Mental health services	
Individual counseling	126 (14)
Group meeting (held at shift change or when left site)	105 (12)
Debriefing/critical incident stress debriefing (held postcrisis, usually within 1–4 wk of incident conclusion)	98 (11)
Defusing (held postcrisis, usually within 12–72 hr of incident conclusion)	36 (4)
Family counseling	21 (2)
Counseling follow-up referral for individual or family	14 (2)

*Denominators ranged from 854 to 912.

†A participant with posttraumatic stress disorder symptoms is defined as a person who provided an affirmative response (defined as an answer of moderately, quite a bit, or extremely) to those questions defining PTSD according to DSM-IV criteria.

‡Depressive symptoms defined using a shortened CES-D using a cutoff score of 22 and higher out of a total possible score of 60.

personnel after the Hurricane. Participants were predominately men (724 of 909, 80%) with a median age of 37 years (range: 19–78). Most reported they never smoked (623 of 903, 69%); 18% (166 of 903) reported being a current smoker, and 13% (114 of 903) reported being a former smoker. Median duration of employment with NOPD was 8 years (range: 0–41). Of the activities in which NOPD personnel were involved during and after the Hurricane, patrol duty (709 of 912, 78%) and looting control (535 of 912, 59%) were the most commonly reported. Of the locations reported among NOPD participants for the first week after Katrina made landfall, the most common response was working at district stations (423 of 912, 46%) or being at a hotel (189 of 912, 21%). Last, 69% (618 of 899) of NOPD participants reported they were not living with their family at the time of the survey. Fifty-five percent (501 of 905) of NOPD personnel reported that their home was uninhabitable; only 5% (41 of 905) reported their home was not damaged as a result of the Hurricane.

Table 2 lists the prevalence of mental health symptoms and the services used by participants. Nineteen percent of police personnel reported symptoms that met the criteria for PTSD, and 26% reported symptoms that met the criteria for depression. Fourteen percent of participants reported symptoms of both PTSD and depression. Overall, 31% of officers reported either PTSD or depressive symptoms. Individual counseling was the most common service used (126/889, 14%) although participants noted that they used these services infrequently.

Table 3 describes the associations between personal and work-related exposures and symptoms of PTSD and depression. We used prevalence ratios to describe the relationship found between Hurricane-related factors and symptoms of PTSD and depression. Predictors of PTSD, after adjusting for age, gender, and a previous history of PTSD, were injured due to an assault (PR = 2.0, CI = 1.2,3.5), family member injury (PR = 2.3, CI = 1.5,3.4), involvement in crowd control (PR = 1.6, CI = 1.1,2.1), and recovery of bodies (PR = 1.7, CI = 1.2,2.3). After adjusting for age, gender, and a previous history of depression, NOPD personnel who had rare contact with their family (PR = 1.6, CI = 1.2,2.1), a family member injured (PR = 1.7, CI = 1.2,2.4), an uninhabitable home (PR = 1.4, CI = 1.02,1.8), were injured due to an

TABLE 3
Multivariable Model for PTSD* and Depressive† Symptoms in NOPD Personnel Following Hurricane Katrina

	PR‡ (95% CI§)
PTSD symptoms	*n* = 836
Assault	2.0 (1.2,3.5)
Family member injured	2.3 (1.5,3.4)
Crowd control‖	1.6 (1.1,2.1)
Recovery of bodies‖	1.7 (1.2,2.3)
Depressive symptoms	*n* = 699
Rare family contact#	1.6 (1.2,2.1)
Family member injured	1.7 (1.2,2.4)
Uninhabitable home¶	1.4 (1.02,1.8)
Assault	1.8 (1.05,3.1)
Isolation from NOPD**	1.5 (1.1,2.0)

*Adjusted for age, gender, and previous history of PTSD.

†Adjusted for age, gender, and previous history of depression.

‡PR, prevalence ratio; §CI, confidence interval.

‖Involvement in the activity during and after Hurricane Katrina.

#If participants answered "rarely" in response to the question "To what extent were you able to stay in contact with your immediate family during the crisis?"

¶If participants answered "uninhabitable" in response to the question, "What damage did your home sustain as a result of Katrina?"

**If participants were isolated at least one day from regular NOPD assignment.

assault (PR = 1.8, CI = 1.05,3.1), or were isolated from their regular NOPD assignment (PR = 1.5, CI = 1.1,2.0) were more likely to report symptoms of depression.

Discussion

NOPD personnel commonly reported symptoms of depression and PTSD. We found that occupational (assault, crowd control, recovery of bodies, and isolation from their regular NOPD assignment) and personal (family member injured, rare contact with family, an uninhabitable home) factors were significant predictors for reporting of PTSD and depressive symptoms.

Posttraumatic Stress Disorder

The prevalence of PTSD symptoms was higher than that found in police officers who have experienced a single traumatizing event such as a gunfire incident or a riot, where a prevalence of 7% has been reported.[19] Similarly, the prevalence of PTSD was considerably higher than the 9% of emergency personnel (including police officers) who experienced high emotional distress 6 months after the 1989 Loma Prieta Earthquake.[6] In addition, the prevalence of PTSD was higher than that found in two separate studies of persons in the New York City metropolitan area 2 months after September 11.[20,21]

Community-based studies document a lifetime prevalence for PTSD of approximately 8% of the adult population in United States.[12] The results of our study are consistent with PTSD prevalence rates seen in other epidemiologic studies of emergency responders.[22] In a cross-sectional study in which PTSD rates were measured at 4, 11, and 29 months, McFarlane et al reported prevalences of 32%, 27%, and 30% among firefighters who were personally involved in a disaster event; approximately one-third of these individuals experienced property damage or were injured as a result of the fire.[23] Twenty-five percent of search and rescue workers were diagnosed with PTSD after responding to the 2003 Bingol earthquake.[3] In a study of disaster workers (including police officers) responding to September 11 attacks, 22% reported symptoms of PTSD 2 weeks after the event.[24]

Rescue workers such as police personnel at greatest risk for PTSD are those exposed to life-threatening danger or physical harm (or whose family members are exposed to life-threatening danger or physical harm); extreme environmental destruction; loss of home and community; intense emotional demands; loss of family contact or support; and extreme fatigue, weather exposure, and hunger or sleep deprivation.[12,18,25,26] Some of the predictors of PTSD found in responders involved in the Loma Prieta earthquake were low social support, increasing traumatic exposure, and a perception of inadequate preparation or training for the incident. Along with this, rescue workers from this disaster expressed concerns about their own families and friends as a result of the earthquake.[6] Participation in the rescue operations meant separation from family and friends, concern about damage to personal residences, and a feeling of shirking responsibility toward families. NOPD personnel experienced many of these factors, and our analysis demonstrated statistically significant associations between symptoms of PTSD and assault or injury to a family member, crowd control activities, and recovery of bodies. Exposure to dead or maimed bodies and witnessing bodily injury and gruesome death are risk factors for the development of PTSD.[12,18,27,28]

Depression

Twenty-six percent of NOPD personnel involved in Hurricane response efforts reported depressive symptoms. The rate of depression defined by the DSM-IV criteria is 2% to 9% in the general US population.[29] Fifteen percent of rescue workers responding to a major earthquake in Taiwan were found to have depressive symptoms 2 months after the event.[30] Fullerton et al determined 16.4% and 21% of exposed emergency disaster workers reported depressive symptoms 7 months and 13 months, respectively, after an airline crash.[1] Last, an evaluation of NYC transit workers after September 11 using the same depression scale as we used in this study found 16% of workers had depressive symptoms after witnessing trauma from September 11.[31] Comparing our findings with these other responder populations and to the general population suggests that the prevalence of depressive symptoms in these police officers is higher although some of

these studies involved different assessment instruments, timing of assessment, or disaster characteristics.

NOPD personnel were more likely to report depressive symptoms if they reported their homes were uninhabitable due to Hurricane damage. Studies of general populations exposed to natural disasters have suggested that the amount of personal loss is a main risk factor for depression.[20,32,33] In addition, Regehr et al found that low social support is an important determinant of depressive symptoms among first responders.[34,35] This is consistent with our finding that isolation from their NOPD assignment and rare contact with family members were related to depressive symptoms. Depression and PTSD frequently coexist. The literature demonstrates that a diagnosis of depression (past or current) has been identified as a risk factor for developing PTSD.[36,37] Although 54 participants did report a history of depression, we chose not to include this variable in our analysis of PTSD because it may confound the relationship between mental health outcomes and Hurricane-related exposures.

Few participants reported use of individual or family counseling services or any type of debriefing or defusing services. Police personnel may have been too occupied to access these services soon after the Hurricane. Additionally, the literature suggests that traumatized individuals typically resist seeking mental health treatment.[22,38] A study of help-seeking patterns in disaster victims following a natural disaster found that victims were more willing to seek mental health assistance from their primary care provider or from family, relatives, friends, and neighbors than from counselors, psychologists, or mental health professionals. This preference appeared to be related to cultural norms regarding shame and self-disclosure of emotional distress. Past research suggests that police culture discourages reporting of emotional difficulties.[17,39] Every effort should be made to ensure available local counseling services are private and confidential in the affected communities.

Strengths and Limitations

Our survey included a moderately high participation rate, which increases the likelihood that the results are representative of the entire NOPD workforce. Our timely response increases the chance that exposures were accurately recalled, but may not capture the true nature of mental health conditions such as PTSD and depression, as symptoms often occur 3 or more months later.[12,24] This is a cross-sectional study that measures health outcomes and exposures at a single point in time, limiting the ability to know if health outcomes or exposures came first. Inherent in this type of study is the potential for "survivor bias," ie, not including NOPD personnel who left their job because of the health problems of interest. This may have resulted in underestimation of reported prevalence of health problems and exposures. Underestimation may have also occurred due to inclusion of some nonofficer participants such as administrators and dispatchers whose Hurricane- and work-related exposures may have differed from those of police officers. Although we knew these individuals were included in the study, we were unable to identify them by job title and thereby consider this variable in the analysis. Also, the potential stigma associated with reporting psychological symptoms as a law enforcement officer may have led to underreporting of PTSD and depressive symptoms. Reporting bias may have been a factor in this survey; suggestive of the health issues perpetuated in the media, personnel with symptoms may have been more likely to report exposure compared with those without symptoms. If this occurred, associations between those factors and symptoms may have been exaggerated. Last, bearing in mind that police work is considered one of the most stressful occupations[17] given its exposure to life-threatening events and emotionally distressing situations, high rates of these conditions may have existed before the Hurricane.

Given the timing of this survey (8 weeks after the Hurricane) many of the symptoms reported may be part of a normal and reversible acute stress reaction. Similar symptoms reported by other responder populations have been shown to decline over time.[20] It is difficult to predict the long-term effect from this disaster on mental health.

Conclusions

Despite being individually affected by the storm, NOPD personnel had to perform their job duties and ensure the security of the city. Police officers might be expected to be more resilient to traumatic stressors compared with the community at large because they undergo preemployment psychological screening for the ability to handle stressful situations and self-selection occurs where police typically will leave the profession early on if they cannot cope.[6,17] However, the Hurricane's aftermath of destruction and disruption may have overwhelmed the usual coping strategies developed for the inherent dangers of regular police work. Additionally, police were engaged in atypical activities (eg, narcotic control officers performing search and rescue operations) for which they may not have been adequately prepared.

NOPD personnel should undergo comprehensive clinical evaluations and appropriate treatment for ongoing mental health symptoms. Given the low percentage who reported seeking counseling services and the fact that responses from a survey alone are not adequate to diagnose mental health conditions, confidential and private counseling services should be made available for personnel and family members. It is important to

offer several modalities because not every individual benefits from the same treatment.

On the basis of our findings that isolation from family members and coworkers was a factor in our analysis, NOPD management should provide opportunities for social support of NOPD personnel from family, friends, and coworkers now and in future disaster situations. This could include opportunities for discussion and education about emotional responses to the disaster during and after work.

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