



Mental Health Needs in New York State Following the September 11th Attacks

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ABSTRACT *In October 2001, the New York State Office of Mental Health and the Department of Epidemiology of the Mailman School of Public Health of Columbia University conducted a rapid assessment of the nature and magnitude of mental health needs in the state resulting from the September 11th terrorist attacks on the World Trade Center. This effort was carried out during a period of great turmoil and uncertainty as New Yorkers responded to the shocking events of this unprecedented disaster. Using the limited data available at the time, we estimated that over 520,000 persons in New York City and the surrounding counties would experience posttraumatic stress disorder resulting from exposure to the attacks, and that more than 129,000 would seek treatment for this disorder during 2002. This assessment is part of an ongoing collaborative process between public and academic partners; the effort is designed to strengthen the capacity of the mental health system to respond to current and future terrorism. Estimates from this initial assessment will be refined over time as further data concerning the impact of the September 11th attacks become available.*

INTRODUCTION

Following the terrorist attacks of September 11, 2001, many persons throughout the United States reported symptoms of mental distress related to the events.¹ Both the physical and the emotional impact of the attacks were most severe in New York City, the site of the World Trade Center destruction. As part of New York State's response to the disaster, several needs assessment activities began immediately after the attacks. The first was a broad-based assessment of mental distress in the general population pursuant to a large-scale public mental health program known as Project Liberty,* which is described elsewhere.² Because Project Liberty was short term and addressed only emotional distress, policymakers believed that a separate assessment of mental health need related to diagnosable mental disorders† would better enable the state to prepare its public mental health system for the current and potential demand placed on it as a result of September 11th.

In October 2001, the New York State Office of Mental Health commissioned the Department of Epidemiology of the Mailman School of Public Health of Co-

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*The Federal Emergency Management Agency (FEMA) and state and local governments fund this relief effort.

†A mental disorder is a condition that can be diagnosed and treated according to specified criteria; mental distress is a nonspecific condition that may be associated with many different kinds of mental disorder or with no diagnosable mental disorder at all.

lumbia University to conduct a rapid assessment of the nature and magnitude of mental disorder in the state resulting from the terrorist attacks.* The assessment also identified problems in planning and coordination and in the workforce related to emergency preparedness in the public mental health system and recommended ways in which the system could improve its capacity to respond to current and future terrorism. The assessment was conducted over roughly 6 weeks, during a period of great turmoil as New Yorkers struggled to cope with the shocking events of September 11th. This article summarizes the key methods and results of this effort relating to the impact of the disaster on the prevalence of mental health disorders and use of mental health services.

NEEDS ASSESSMENT METHODS

The needs assessment adopted an empirical approach utilizing available administrative and research data to estimate the impact on mental disorders. However, both of these data sources were very limited. Therefore, to make meaningful projections based on these limited data, the research team chose to establish a “floor” for the number of individuals with a mental disorder related to the attacks, thereby establishing an estimate of minimum need.

Since the intensity of exposure to September 11th varied widely in the population, the first step was to develop exposure categories for classification of affected persons. The literature used to develop the exposure groups and their associated rates of disorder are summarized below. Combining census data, government reports, and news accounts as necessary, the team then estimated the number of persons in each exposure group, obtaining respective population sizes for the computation of the number of cases of disorder in each group. Key studies selected on the basis of their methodological strengths and relevance to the current situation were used to estimate the associated rates of disorder for each group. More complete details of our estimation methods and calculations are detailed in our original report,³ available from the second author.

Previous Disaster Research

A growing epidemiological literature consistently documents mental disorder as a common outcome of direct exposure to disaster. This research typically classifies disaster exposures into one of three categories: (1) natural disasters such as hurricane, flood, or earthquake; (2) technological disasters such as chemical spills; and (3) mass violence disasters such as riots or terrorism. Mass violence disasters that result in widespread injuries, loss of life, and property damage appear to be associated with especially high risk of severe, lasting, and pervasive psychological effects.⁴

Most studies of the effects of disasters on mental disorders have focused mainly on posttraumatic stress disorder (PTSD). In studies that did examine other disorders along with PTSD, the effect on PTSD has generally been greater than the effect on these other disorders.⁵ Studies that do consider comorbidity tend to report high rates of co-occurrence of PTSD and other postdisaster psychiatric disorders. In ad-

*This project was funded by the Center for Mental Health Services of the federal Substance Abuse and Mental Health Services Administration. Additional project contributions came from the New York City Department of Mental Health, the Department of Health Policy and Management of the Mailman School of Public Health of Columbia University, the New York State Psychiatric Institute, the Nathan Kline Institute for Psychiatric Research, and the New York Academy of Medicine.

dition, some studies have reported higher rates of anxiety disorders and depression than of PTSD.⁶ Finally, few studies report rates of other disorders in the absence of PTSD. Given the variation in findings, the needs assessment focused exclusively on PTSD since this is the only disorder commonly associated with trauma for which the research base is sufficiently strong to support a rigorous estimation of need.

Furthermore, while previously studied disasters have rarely matched the severity and the impact of September 11th, they did provide a useful framework for understanding the magnitude and types of effects on mental disorder that might be expected after a major man-made disaster. They also served as a crucial source of information for defining groups with different kinds and degrees of exposure to the attack.

Oklahoma City Research

The 1995 bombing of the Alfred P. Murrah Building in Oklahoma City, Oklahoma, is one of the best-documented mass violence disasters in terms of its impact on mental disorders. Studies have examined the bombing's effects on individuals directly exposed to the blast, on residents of the city who were not directly exposed, and on family members of survivors. Our estimates relied heavily on the findings for individuals directly exposed to the blast in Oklahoma City and also utilized other findings as described below.

North and coworkers⁷ studied the impact of the Oklahoma City event on mental disorders among persons who were directly exposed to the blast. Using a standardized diagnostic interview, they assessed a representative sample of 182 adults 6 months after the disaster; these individuals were selected from a confidential registry of the directly exposed. In this sample, 34% had developed PTSD by the time of the 6-month assessment. Three-fourths of those who developed PTSD reported that the symptoms had started the same day as the bombing, and 94% of cases had started within the first week.

In a study of the impact of the Oklahoma City bombing on the general population of adult residents of Oklahoma City, the rate of diagnosable PTSD was 7.8%, even among those who did not see, feel, or hear the blast.⁸ Studies that examined family members of those exposed to the blast suggest an appreciable impact on PTSD symptoms in these individuals, which is consistent with other disaster research.⁹

Defining the Exposed Groups

The previous literature on the effects of disasters did not provide any clear precedent for classification of exposure. This is not surprising considering the diversity of traumatic events that have been studied and the range of contexts in which they occurred. But the literature did provide a wealth of data that were useful for considering and selecting a classification. These data suggested that the most powerful influences on degree of psychological impact include physical proximity to and magnitude of the disaster event, degree of injury and life threat, and loss of friends or family members.⁴

Based on these findings, and considering the specific context of this disaster, the primary dimension for classification of exposure was *proximity* to the World Trade Center attacks on September 11th. This direct and positive association of psychological impact and proximity was supported by the findings of the Oklahoma City studies, as well as by the direct research on the events of September 11th. Accordingly, four main exposure groups were defined: (1) the World Trade

Center population (defined below), (2) residents of Manhattan below 110th Street, (3) residents of New York City, and (4) residents of the 10 counties surrounding New York City. Each category excludes the people in prior categories; for example, category 3 excludes people in categories 1 and 2.

Category 1 (the World Trade Center population) is defined by both physical and emotional proximity. It includes persons who were physically present at the disaster site and their nuclear family members. The decision to include these family members is supported by previous research suggesting that close family members of persons who have died or sustained serious injuries under traumatic circumstances are also at high risk of developing PTSD.¹⁰⁻¹⁴ This category has five subgroups: (a) hospitalized and injured; (b) families of the dead, missing, hospitalized, and injured; (c) rescue workers; (d) World Trade Center employees; and (e) families of rescue workers and World Trade Center employees. These groups are all considered proximate and extremely exposed, although each had qualitatively different experiences. We assigned a rate of disorder of 34% to subgroups a and b and a rate of 24% to subgroups c through e.

RESULTS

The Table presents estimated rates of disorder and numbers of persons estimated to develop disorder in the respective exposure groups. We describe below the rates for each group.

Category 1: World Trade Center Population

a. Hospitalized and Injured Approximately 34% of persons directly exposed to the Oklahoma blast developed PTSD directly related to the event.⁷ Based on these results, the rate of PTSD in the hospitalized and injured subgroup was estimated as 34%.

b. Families of the Dead, Missing, Hospitalized, and Injured Overall, the available data indicate that the rate of PTSD among close family members of deceased, injured, hospitalized, or otherwise severely traumatized persons is very high—although estimates are unavailable. Therefore, the rate of 34%, the same as for those directly affected, was used for these family members.

c. Rescue Workers Rescue workers experienced a broad spectrum of disaster exposure, ranging from being physically present and in danger of death during the disaster, to searching disaster debris for human remains, to managing debris disposal. In the absence of any data on these exposures of rescue workers and on the size of groups of rescue workers with different kinds of exposures, the team assumed that about one half were extremely exposed and that half were not. Therefore, their risk of PTSD was estimated as 24%, the average of the rate of 34%⁷ for the extremely exposed and the rate of 14% reported for Oklahoma City rescue workers (C. North, personal communication, 2001).

d. World Trade Center Employees World Trade Center employees also experienced a broad spectrum of exposure, from severe (evacuees and eyewitnesses) to moderate (loss of friends, colleagues, workplace, jobs). Given the heterogeneity of

TABLE. New York State population expected to develop posttraumatic stress disorder (PTSD) related to 9/11

Category of exposure	Population	Percentage expected to develop PTSD related to 9/11	Number expected to develop PTSD related to 9/11	Number expected to experience PTSD in 2002*	Percentage expected to receive treatment for PTSD in 2002†	Number expected to receive treatment for PTSD in 2002
1. World Trade Center population						
a. Hospitalized, injured	7,467	34	2,539	2,031	62	1,259
b. Families of the dead and missing, hospitalized and injured	17,642	34	5,998	4,798	62	2,975
c. Rescue workers	17,859	24	4,286	3,429	62	2,126
d. WTC employees	32,361	24	7,767	6,214	62	3,853
e. Families of rescue workers, WTC employees	87,383	24	20,972	16,778	62	10,402
Subtotal WTC population	162,712		41,562	33,250		20,615
2. Manhattan below 110th Street	919,000	10	91,900	73,250	28	20,586
3. New York City	6,927,566	5	346,328	277,062	28	77,577
4. Ten surrounding counties	4,800,000	1	48,000	38,400	28	10,752
Total			527,790	422,232		129,530

*Number of people experiencing PTSD in 2002 is based on previous column, number developing PTSD in response to 9/11, multiplied by 0.80 to account for remission of some cases in the last quarter of 2001.

†Rate for the World Trade Center population based on service utilization rates among persons directly exposed to Oklahoma City blast.⁷ Rate for other exposure categories based on rate of service utilization among persons in the community diagnosed with PTSD as reported by the National Comorbidity Survey.²⁷

this subgroup's experiences, we applied the same rate used for the similarly heterogeneous rescue workers, that is, 24%.

e. Families of Rescue Workers and World Trade Center Employees Based on literature suggesting similar rates in the immediate family members as in the originally exposed individuals, we applied the same rate of PTSD (24%) to families as for their exposed relatives.

Category 2: Residents of Manhattan Below 110th Street

To estimate rates of PTSD in lower Manhattan, we relied on preliminary data from the Center for Urban Epidemiologic Studies (CUES) household survey. The methods and results of this study are described elsewhere¹⁵ and in other papers in this volume.¹⁶ Beginning in mid-October 2001, CUES sampled Manhattan households south of 110th Street, randomly selecting an adult over the age of 18 years for a 30–35-minute anonymous interview. Among 494 persons interviewed, 10.1% had current PTSD related to September 11th. A second survey of the short-term psychological impact of September 11th was conducted by the New York City Department of Health from October 25 to October 27, 2001, among residents of the Manhattan neighborhoods closest to the World Trade Center.¹⁷ Utilizing a 17-item screening scale,¹⁸ preliminary findings showed that the rate of significant PTSD symptoms was about 40%. This suggests an even higher rate for those neighborhoods than the results of the CUES study, which had a rate of 20% for the lower part of Manhattan, but was entirely compatible with the use of the CUES study as a basis for minimum estimates. We therefore applied a rate of 10% for this exposure group.

Category 3: Residents of New York City

For group of category 3, a rate of 5% was applied, which was based on the general principle of a relationship between proximity and severity of exposure. The rate was determined by adjusting down the findings of the CUES study for residents of neighborhoods outside the vicinity of the World Trade Center (8%) and the rate (7.8%) reported for Oklahoma City residents who did not see, hear, or feel that bomb blast.⁸

Category 4: Residents of 10 Surrounding Counties

For the category 4 group, we extrapolated a rate of 1% based on a further reduction of the 5% rate for New York City residents. This extrapolation was also based on the general principle of a relationship between proximity and severity of exposure.

DISCUSSION

There are several important gaps in existing knowledge that should be addressed to refine the precision of these estimates and of any further needs assessment efforts that may follow future acts of terrorism. First, it is clear that PTSD encompasses only a fraction of the total burden of illness and impairment imposed on a community by a mass disaster. Many individuals develop mental disorders other than PTSD, such as depression, anxiety disorders, and substance abuse problems. Several studies indicate a considerable amount of psychiatric comorbidity between PTSD and these disorders in the same individual. Second, besides the injuries directly caused by such exposures, individuals exposed to mass disaster are also likely to experience

long-term physical morbidity, such as cardiac deaths and myocardial infarctions. There is a growing amount of literature on the adverse effects of such trauma, possibly mediated through posttraumatic stress, on the physical health of exposed individuals.^{19,20} Research in this area may have significant implications for projecting utilization rates and costs in the general medical sector and for service planning and delivery.

There is also a need to develop more comprehensive epidemiologic data regarding specific population groups. For example, although many experts on disaster mental health consider children to be a particularly vulnerable group, there is insufficient research evidence with which to make reliable projections of service need in children exposed to the September 11th disaster. Results from a number of studies assessing the psychological impact of major disasters on children and adolescents suggest that the psychological impact may be greater on children than on adults with similar exposure.^{21,22} Investigators, however, have rarely assessed both children and adults in the same design, as required for a direct comparison of PTSD in these populations.

Important questions also remain about the mental health impact on rescue workers involved in the rescue-and-recovery efforts following the World Trade Center attacks. As noted, prior studies have reported lower rates of PTSD among rescue workers than others exposed to the same disasters. However, these data are not applicable to this event because, in these other disasters, the rescue workers did not suffer the high fatality rate experienced by rescue workers on September 11th. Effective service planning and delivery to these workers and their families will require data on their unique needs.

Relatively little is known about the course of disorders resulting from terrorism and what factors are associated with their severity, recovery, and recurrence. These are critical issues since they bear directly on estimated rates of service need and use over time. Although some limited data exist on the course of PTSD in clinical²³ and general population studies,²⁴ there is scant long-term evidence on the duration of disorders seen in the aftermath of major terrorist attacks, including the Oklahoma City bombing.

Estimating Service Use

To generate data that could be directly useful for planning and resource allocation decisions in the state, we also estimated the increased level of service need and service use that could be expected to occur in calendar year 2002 as a result of the September 11th attacks. To do this, the estimated number of cases of disorder in each group first had to be adjusted to reflect the number of additional persons *having* PTSD in 2002. Available evidence suggests that, in more than 80% of individuals with PTSD, the illness lasts more than 3 months.²⁴⁻²⁶ Also, in North et al.'s⁷ study of the Oklahoma City bombing, all identified cases of PTSD persisted at least 3 months. Thus, we estimated the number of individuals with PTSD lasting into calendar year 2002 to be 80% of the number developing PTSD due to September 11th. This is a conservative assumption because the aftermath of September 11th was significant and may have contributed to more enduring symptoms.

There are no complete data on exposure-specific mental health service utilization rates for the exposure groups described above. Therefore, estimates of service utilization rates were made using available data from Oklahoma City⁷ and national rates of treatment utilization reported in the National Comorbidity Survey (NCS).²⁷ North et al.⁷ reported that 62% of directly exposed individuals with PTSD follow-

ing the Oklahoma City bombing used treatment services provided by the mental health specialty sector in a 6-month period after the event. This rate was applied to persons with PTSD in the World Trade Center population to estimate the number of persons who would use mental health treatment services for this disorder during 2002. This is a conservative assumption that is likely to underestimate the number of persons receiving care because this rate is based on 6-month follow-up only. For the other exposure groups, we estimated that 28% of those developing PTSD resulting from September 11th would use mental health treatment services during 2002. This rate is based on National Comorbidity Study data, which reported the rate of treatment utilization in formal health care settings among persons with PTSD in the community is 28% in a year.²⁷

Estimates of the minimum number of persons who are expected to receive mental health treatment during 2002 for PTSD resulting from the World Trade Center attacks were made by multiplying the number of persons with PTSD in each exposure group by the estimated rate of formal health care utilization for that group (see Table). Estimates for the separate exposure groups were then combined to obtain a total of 129,530 persons in New York State expected to receive treatment during 2002 for PTSD following the World Trade Center attacks.

Need for Coordination Through a Public/Academic Partnership

Addressing these gaps in knowledge, and numerous related issues that go beyond the estimation of need such as service impacts and outcomes, will require further research as part of an ongoing needs assessment process. It is essential that these research activities occur in a coordinated fashion. First, research must be responsive to the needs of affected populations and the organizations that are responsible for service delivery. Second, limited evaluation and research resources must be utilized in an efficient manner to avoid duplication of efforts. Third, potential subjects must receive the highest level of protection from the possibility of further traumatization resulting from multiple, unwarranted approaches by competing researchers.

In the wake of the Oklahoma City bombing, the state government there felt so strongly about the need for coordination of research efforts that it ordered all research to be conducted by a single entity, the University of Oklahoma. Following the terrorist attack in New York City, state and local authorities decided that it was not feasible or desirable to implement this level of control following an event of such enormous scope. Nonetheless, state government, operating in collaboration with local government and the extensive academic research community in New York, assumed responsibility for coordinating research efforts to the greatest degree possible.

To this end, the New York State Office of Mental Health has developed ongoing public academic partnerships with a mission that includes proposing and coordinating evaluation research relevant to determining the needs for services growing out of the terrorist attacks; providing a mechanism through which affected individuals and their representatives can have input into research planning and implementation; and maintaining a central compendium of all relevant evaluation and research data to facilitate distribution among researchers, government officials, affected individuals, and the broader community.

For its part, the Department of Epidemiology of the Mailman School of Public Health of Columbia University is coordinating a number of ongoing epidemiologic studies that have grown out of this partnership. They include a citywide epidemio-

logic survey of the city's school population to assess psychological sequelae of the World Trade Center attacks; a study of workers evacuated from the Trade Center and their families; and studies of police, firefighters, and other rescue personnel who worked at Ground Zero following the attacks.*

CONCLUSION

This needs assessment was notable in several ways. It was carried out in an atmosphere of unprecedented crisis in which New Yorkers were responding to the immediate survival needs resulting from the attacks and the ongoing threat of further terrorism. Team members worked under conditions of significant emotional distress and completed the assessment in a tense, chaotic environment. Furthermore, there were few solid data or previous models on which to rely. To the best of our knowledge, the proximity-based methodology for classifying exposure groups combined with the approach of making minimum estimates to establish the floor for a needed response had not been used previously in rapid assessments following disasters. These methods appear to be particularly useful for dynamic situations in which such rapid assessment is needed.

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*Readers interested in obtaining details on this research should contact Dr. Christina Hoven (hoven@child.cpmc.columbia.edu) on school population studies; Dr. Carol North (NorthC@psychiatry.wustl.edu) on studies of evacuated workers and their families; and Dr. Daniel Herman (dbh14@columbia.edu) on studies of rescue workers.

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