

A Tale of Two Studies of Two Disasters: Comparing Psychosocial Responses to Disaster Among Oklahoma City Bombing Survivors and Hurricane Katrina Evacuees

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Purpose: An accumulation of disaster mental health research literature in the last few decades has contributed knowledge to direct disaster mental health interventions. However, no single set of principles can necessarily outline all anticipated mental health needs to be encountered in a particular disaster. **Methods:** To illustrate how different disaster scenarios may yield a divergence of mental health needs, this article compares mental health findings from two distinctly different studies of two very different populations affected by two very different disasters: directly exposed survivors the Oklahoma City bombing and sheltered evacuees from Hurricane Katrina. **Results:** Research on the two disasters reviewed illustrates many facets and complexities of postdisaster mental health needs in different populations in different settings after different types of disasters. The major findings of the Oklahoma City bombing study related to posttraumatic stress disorder and the main findings of the Hurricane Katrina study involved need for treatment of preexisting chronic mental health and substance abuse problems. **Conclusion:** The disaster studies in this review diverged in type of disaster, affected populations, setting, and timing of the study, and these studies yielded a divergence of findings. One disaster mental health model clearly cannot adequately describe all postdisaster scenarios.

Keywords: disaster, mental health, posttraumatic stress disorder, substance use disorder, hurricane

Findings from studies of many different disasters in recent decades, collectively involving tens of thousands of survivors, have accumulated considerable knowledge to guide mental health interventions in disaster settings. General principles of disaster mental health emerging from this research have been detailed in several major reviews (Norris, Friedman, & Watson, 2002a; Norris et al., 2002b; North, 2004; North, 2007; North, Hong, & Pfefferbaum, 2008a) and will be briefly summarized below. This overview will provide a general background for an illustrative comparison of findings from two very different studies of major disasters to follow. This comparative review will demonstrate that although there are certain consistent findings from one disaster to another, various disasters and affected populations and distinct

settings within them may differ in important ways; therefore, mental health interventions need to be tailored for the specific disaster, population, and setting.

In most disaster-exposed populations, the psychiatric disorder most often found to develop is posttraumatic stress disorder (PTSD), followed in frequency by major depression. In certain groups, though, problems with alcohol abuse/dependence may be more apparent than PTSD or major depression, such as among disaster responders (North et al., 2002) and people residing on low ground of Midwestern flood plains (North et al., 2004a). Regardless of which psychiatric disorders are found in the postdisaster setting, however, PTSD, major depression, substance use disorders, and other major psychiatric disorders are serious and potentially disabling psychiatric illnesses with important medical and psychosocial consequences, warranting efforts to identify cases and apply appropriate psychiatric interventions.

A number of studies have observed increases in alcohol consumption in various populations after the September 11, 2001, terrorist attacks (Boscarino, Adams, & Galea, 2006; Grieger, Fullerton, & Ursano, 2003; Osnos, 2001; Vlahov et al., 2002). Increased alcohol use after disasters has not been a uniform finding, however (Kasl, Chisholm, & Eskenazi, 1981; Shimizu et al., 2000). To sort out such apparently divergent findings and understand the nature of the relationship between disasters and alcohol, it will be necessary to reconcile studies of alcohol consumption with research on alcohol use disorders, and to differentiate new-onset (incident) alcohol abuse/dependence following disaster from continuing alcohol use disorders that were already present before the disaster.

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PTSD is the psychiatric disorder most extensively studied in relation to disasters. When PTSD follows disaster trauma, it more often than not is found in the presence of other psychiatric disorders, a consistent finding in disaster studies as well as in broader trauma research (Breslau, 2001a, 2001b). Thus, successful management of PTSD involves recognition and management of potential comorbid disorders, which may have important implications for planning treatment and predicting mental health outcomes. The course of PTSD can be variable, but it may be chronic and protracted in survivors of disasters as it is in other populations (Breslau, 2001a), indicating that the need for interventions may continue for a very long time after the disaster is over.

In most disaster studies, PTSD has been found more often in women than in men, and in those with preexisting psychopathology compared to those without. High-impact disasters are associated with greater incidence and severity of subsequent mental health problems. Exposure to disaster, reflected in variables such as physical injury and experiences of terror, horror, and life threat, is also associated with incidence and severity of PTSD. Other contributors to mental health problems after disaster may include death or injury of loved ones, property damage, financial loss, relocation, and other stressful life events (Norris et al., 2002b). Together, these findings indicate that limited mental health resources in postdisaster settings may be most efficiently targeted for those most likely to suffer PTSD: women, people with preexisting psychological problems, those most severely exposed to highly catastrophic events, and individuals with other psychosocial problems. This profile, however, does not limit potential postdisaster psychopathology to people with these characteristics, because some individuals without these risk factors may also develop mental health problems after disasters. In disasters of especially large scope and magnitude, the numbers of these individuals may be substantial and warrant mental health interventions in addition to those more obviously vulnerable.

No single set of principles can necessarily outline all anticipated mental health needs to be encountered in a particular disaster. Disasters vary in type, scope, intensity, and populations affected; all of these factors may contribute to the emerging portrait of postdisaster mental health issues and need for intervention. To illustrate how different disaster scenarios may yield a divergence of mental health needs, this article will compare mental health findings from two distinctly different studies of two very different populations affected by two very different disasters: directly exposed survivors the Oklahoma City bombing (North et al., 1999) and sheltered evacuees from Hurricane Katrina (North et al., 2008b).

Mental Health Effects on Directly Exposed Survivors of the Oklahoma City Bombing

The bombing of the Murrah Federal Building in Oklahoma City on April 19, 1995 was, at the time, the most severe terrorist act ever perpetrated on American soil. Approximately 6 months after the bombing, 182 directly exposed adults were randomly selected from a state registry of survivors, with a 71% participation rate (North et al., 1999). The Diagnostic Interview Schedule (DIS) for *DSM-III-R* (Robins, Helzer, Cottler, & Goldring, 1989) and the Disaster Supplement (North, Pfefferbaum, Robins, & Smith, 2001)

provided data on full diagnostic criteria for postdisaster and pre-disaster psychiatric disorders, disaster exposure, injuries, treatment, level of functioning, subjective levels of upset and distress, and other stressful life events. A follow-up study with 75% participation of the index sample was conducted approximately a year later (North et al., 2004b).

The sample of Oklahoma City bombing survivors was, on average, approximately half male, 43 years of age, predominantly White, educated through 2 years of college, and employed. This sample was highly exposed to the bomb blast: approximately one third were in the Murrah Building at the time of detonation, the remainder being either unprotected in outside locations or in nearby buildings that sustained severe damage and injuries or death of occupants. Most (87%) of the sample were injured in the bombing; 20% were hospitalized for injuries.

Despite their high level of exposure to this disaster, the majority of the bombing survivors did not develop a psychiatric disorder afterward. Nearly all (96%), however, had one or more symptoms of PTSD. PTSD related to the bombing was the most prevalent postdisaster diagnosis, identified in 34%, being approximately twice as common among women (45%) as men (23%). The second most prevalent postdisaster disorder was major depression, diagnosed in 23%. Nearly two thirds (63%) of those with bombing-related PTSD had a comorbid postdisaster psychiatric disorder. Additionally, more than one half (57%) of those with PTSD had a pre-disaster disorder, which more than doubled the likelihood of having a postdisaster psychiatric disorder. No new alcohol or drug use disorders were identified after the disaster. No cases of somatization disorder, antisocial personality disorder, schizophrenia, or bipolar disorder were found.

Although PTSD by definition cannot be diagnosed until after a month has passed from the time of the traumatic event (American Psychiatric Association, 2000), the onset of PTSD was rapid, with 76% of cases beginning the day of the bombing, 94% within 1 week, and 98% within 1 month. There were no delayed-onset PTSD cases (defined by *DSM* criteria as symptoms beginning at least 6 months after the event) (American Psychiatric Association, 2000). All PTSD cases were chronic (defined by *DSM* criteria as lasting at least 3 months). On follow-up a year after the index interviews, only a fraction (11%) of all identified PTSD cases had fully remitted. The rapidity of symptom onset and the chronicity of PTSD in the Oklahoma City bombing studies suggest the importance of rapid deployment of mental health interventions after a disaster and continuation of services for the long duration of need among those who develop chronic PTSD.

The three defining groups of PTSD symptoms varied in their prevalence and in their associations with indicators of psychopathology. Symptom group B represents intrusive re-experience symptoms (e.g., flashbacks, nightmares, vivid mental images of the event). Symptom group C includes of avoidance and numbing symptoms (e.g., active avoidance of reminders of the event, numbing of emotions, and emotional distancing from loved ones). Symptom group D consists of hyperarousal symptoms (e.g., jumpiness, sleep disturbance, impaired concentration, and hypervigilance for potential danger). Criteria for groups B and D were each met by about 80% of the sample, but group C criteria were met by only about one third of the sample. Compared to group C symptoms, symptoms of groups B and D were much more prevalent.

The B and D symptom groups alone, in the absence of group C, did not reflect psychopathology. Avoidance/numbing criteria (group C, defined as having at least 3 avoidance/numbing symptoms of PTSD) were pivotal to the development of PTSD: 94% of those meeting group C went on to meet full criteria for PTSD, and, by definition, none of those not fulfilling group C developed PTSD per *DSM-IV-TR* definition. Symptom group C further predicted other indicators of psychopathology: predisaster psychiatric illness, postdisaster psychiatric comorbidity, receiving mental health treatment, taking psychotropic medication, coping by drinking alcohol, and interference with functioning. In contrast, symptom groups B and D in the absence of group C did not predict PTSD or these other indicators of psychopathology. Over time, remission from PTSD was highly dependent on disappearance of group C symptoms specifically.

Importantly, this study found that postdisaster distress, which is nearly universal, and psychopathology, occurring in an important minority, are distinct yet both important to address among disaster survivors. Exposure to a disaster elicits, in most people, an emotional distress response that is not incapacitating; therefore, this distress can be considered a normative response and largely represents intrusive re-experience and hyperarousal that are common responses and do not by themselves represent necessarily pathological responses. The relatively uncommon avoidance and numbing symptom cluster may represent a marker for psychopathology and specifically for PTSD.

Findings from this study indicate that clinicians and researchers alike need to be thoughtful in drawing conclusions about what represents psychiatric illness and what represents “subdiagnostic” emotional distress in postdisaster settings (North & Pfefferbaum, 2002). Because psychiatric illness can be reliably diagnosed and effectively treated with well established methods, its recognition and management can reduce suffering and help to restore mental health. It does not benefit people without psychiatric illness to have their distress pathologized with incorrect diagnostic labels, because distress not reaching the level of a psychiatric disorder requires interventions different from those appropriate for psychiatric illness. Because far more people experience psychological distress than psychiatric illness after a disaster, and both types of problems can be effectively addressed in different ways, it is important not to discount the amount of good for each that is achieved by differentiating these conditions and applying the appropriate interventions for the type of condition that is present.

A major strength of the Oklahoma City bombing studies was the faithful adherence to diagnostic criteria in assessment of psychiatric disorders with care to distinguish new (incident) from preexisting psychiatric disorders after the disaster. It is common in disaster mental health research to substitute screening scales that do not assess full diagnostic criteria for diagnostic assessment, and to confuse substance use *disorders* with patterns of substance *use*. Apparent differences in these findings from results of other disaster studies likely relate to these methodological discrepancies. The Oklahoma City bombing research findings suggest that if increases in substance use occur after disasters (Grieger et al., 2003; Joseph, Yule, Williams, & Hodgkinson, 1993; Sims & Sims, 1998; Smith et al., 1999; Vlahov et al., 2002), this increase in use does not appear to regularly lead to the onset of new alcohol and drug use disorders.

Although it seems intuitive to conceptualize alcohol and drug use after a disaster to represent a means of “self-medication” for posttraumatic symptoms and other distress, the vast majority of disaster survivors engaging in patterns of excessive substance use already had preexisting substance use disorders. The “self-medication” of distress rationale for substance use likely represents a well-known rationalization for substance use that is an inherent part of the disease of substance use disorders. A potentially important subset of the population of concern for development of substance use problems includes people with established substance abuse at the time of the disaster, who may have increased risk of relapse or escalation of use after exposure to a disaster.

This study’s findings are consistent with several general disaster mental health principles: the predominance of PTSD among postdisaster psychiatric disorders, extensive psychiatric comorbidity with PTSD, chronicity of PTSD, and predictors of PTSD (female gender and preexisting psychopathology). This study also brought to light some important but under-appreciated and even unrecognized disaster mental health issues. Most survivors did not develop PTSD or any psychiatric disorder after the bombing, despite the unusual severity of this disaster and the intense exposure of the sample to it, emphasizing the power of human resilience and the importance of distinguishing distress from psychopathology in disaster survivors. Additionally, the group C (avoidance/numbing) symptom group was a marker for postdisaster PTSD and disability, and group B (intrusion) and group D (hyperarousal) were common (normative) and not by themselves pathological.

In summary, research on directly exposed Oklahoma City bombing survivors in this landmark study confirmed a number of disaster mental health principles from other literature and provided new or previously under-appreciated contributions to disaster mental health research knowledge. It demonstrated the significance of PTSD symptom groups (especially the importance of group C), chronicled the timing of onset and remission of PTSD, and clarified the preexisting nature of substance use disorders observed after the disaster.

Mental Health Needs of Sheltered Hurricane Katrina Evacuees

Hurricane Katrina was the costliest disaster in American history, and one of the deadliest (Norris & Rosen, 2009; North et al., 2008b). This author’s research team examined psychiatric records of patients treated in a mental health section of a medical clinic in a temporary Dallas shelter for Hurricane Katrina evacuees (North et al., 2008b). Systematic review of all clinical records from this endeavor yielded a total of 503 unique psychiatric contacts among 421 patients treated between September 1 and 15, 2005. This group of evacuees was 55% female, 76% African-American with few other minorities, and 40 years of age on average (with 8% of the patients comprising children under age 18). Of the patients for whom insurance information was available, 32% were uninsured, 48% had public insurance, 9% had VA benefits, and only 11% had private insurance, reflecting an economically disadvantaged population. About 10% had been directly exposed to hurricane winds or subsequent flooding, and 5% were physically injured in the disaster.

The most frequent presenting problem at the shelter mental health clinic was need for psychotropic medication refill (28%). The most requested psychotropic refill was for antipsychotic medication (20%), followed by antidepressants (17%) and benzodiazepines (11%). The most common symptom reported was insomnia (21%), followed in frequency by sadness (17%) and anxiety (16%). Only 5% of the patients seen by the mental health clinic presented for management of posttraumatic symptoms.

In contrast to the findings of most other disaster studies, PTSD was not the most common psychiatric problem identified from the clinic's psychiatric records in this study. PTSD was diagnosed in 3% of the records (despite the fact that, technically, PTSD cannot be diagnosed before 1 month has passed since the traumatic event) and acute stress disorder in 9%. The most prevalent psychiatric diagnosis recorded in the medical record was major depression (25%), and most of it predated the hurricane. The next most prevalent psychiatric diagnostic category was schizophrenia/schizoaffective disorder, diagnosed in 21%, all cases predating the hurricane.

More than one fourth of the patients (28%) had a preexisting serious and persistent mental illness (defined as schizophrenia/schizoaffective disorder or bipolar disorder). Alcohol use disorders were identified in 20% and cocaine use disorders in 17%. Mental health workers encountered pressing needs for specialized services for drug dependence such as detoxification and methadone maintenance (North et al., 2008b). Additionally, mental retardation, autism, attention deficit disorder, delirium, and dementia were represented in this population. Overall, 40% of patients presented with a predisaster history of any of the above disorders, a far higher percentage than the 24% who presented with a new-onset postdisaster disorder. Among children served in the mental health clinic, nearly three fourths presented for management of attention deficit/hyperactivity disorder, all of which predated the disaster.

In comparing findings from this study of sheltered hurricane evacuees with other research studies, it is important to appreciate that this sample of Hurricane Katrina evacuees represents only the subset of sheltered evacuees presenting for psychiatric treatment in the shelter's clinic. Findings from this sample cannot be generalized to all hurricane evacuees in the shelter, because samples of patients presenting for psychiatric treatment are selected for psychiatric problems and can be expected to exhibit a higher prevalence of psychopathology than is found among their counterparts not selected for seeking psychiatric treatment.

These sheltered hurricane evacuees also may not be representative of hurricane survivors in general or from other settings. Most of the Dallas shelter population consisted of evacuees who were transported by bus after the disaster because they lacked resources to evacuate by their own means before the hurricane. This group represented a disproportionately underprivileged segment of the population of the New Orleans area that could be expected to have an endemic overrepresentation of chronic medical and mental illness, presenting after the disaster with a disproportionate amount of preexisting chronic mental illness including schizophrenia, mood disorders, and substance abuse (North et al., 2008b). A similar profile was seen in a sample of 499 Hurricane Katrina evacuees systematically selected from Red Cross shelters in Louisiana 2 weeks after the storm, who had sociodemographic indicators of considerable economic disadvantage, one half lacking health insurance and one third having no primary care provider.

The majority in that study had one or more chronic medical conditions, with psychiatric illness being outranked in prevalence by only hypertension and hypercholesterolemia (Greenough et al., 2008).

In summary, this study of displaced Hurricane Katrina evacuees seeking mental health services in a shelter housing them in the first 2 weeks after the storm found that chronic and preexisting psychiatric illness eclipsed the emergence of new postdisaster and trauma-related psychopathology. Mental health volunteers staffing the psychiatric clinic were primed by previous disaster research to assist with posttraumatic mental health problems arising from exposure to trauma of the storm, but they did not anticipate the far greater need for management of preexisting chronic mental illness and substance abuse.

Implications of Different Studies for Postdisaster Mental Health Interventions

Research on the two studies of two disasters reviewed here illustrate many facets and complexities of postdisaster mental health needs in different populations in different settings after different types of disasters. One disaster mental health model clearly cannot adequately describe all postdisaster scenarios. Although both disasters in this review were massive in scope and magnitude and constituted national catastrophes, the similarities stop there. The Oklahoma City bombing sample was subjected to a horrific impact lasting only seconds, and the Hurricane Katrina sample was exposed to hurricane winds and then flooding that evolved over days with extensive and widespread property destruction. The Oklahoma City bombing sample was a representative group of people with business at the Murrah Federal Building, whereas the Hurricane Katrina sample was a disproportionately disadvantaged group with many preexisting chronic health and mental health problems. The Oklahoma City bombing sample was a randomly selected group of survivors from a state registry, but the Hurricane Katrina sample was selected from a mental health treatment setting. Other methodological differences between these two studies, such as use of structured diagnostic interviews in the Oklahoma City bombing and reliance on physician diagnoses in medical charts in the Hurricane Katrina sample, and different timing of the studies (6 months in Oklahoma City compared to the first 2 weeks after Hurricane Katrina), could further be expected to contribute to divergent disaster mental health findings.

The main finding of the Oklahoma City bombing study was the incidence of PTSD after this disaster. Because this study involved such a severe event and examined such a highly exposed sample, the 34% incidence of PTSD after the bombing might be considered to mark an upper limit of the amount of PTSD that may be expected from incidents of this type.

Posttraumatic distress was not the main finding in the Hurricane Katrina study, however. Disaster mental health research has traditionally focused on PTSD or PTSD symptoms. A recent review of Hurricane Katrina research by Norris and Rosen (Norris & Rosen, 2009) also found a focus on psychological trauma and symptoms of PTSD (Coker et al., 2006; Desalvo et al., 2007; Galea et al., 2007; Hyre et al., 2007; Kishore et al., 2008; Rhoads et al., 2007; Weems et al., 2007). Therefore, it is not surprising that mental health workers at the shelter for Hurricane Katrina evacuees were

well prepared for posttraumatic distress but not for the many other psychiatric problems they encountered in this population. The findings of the Hurricane Katrina study suggest that focusing on psychological trauma may not always provide sufficient preparation for mental health interventions in all postdisaster populations and settings.

Despite major methodological differences in the studies reviewed here, this comparative review of two distinct disaster-affected populations and settings in studies of the Oklahoma City bombing and Hurricane Katrina found two very different collective sets of mental health problems with very different implications for service delivery. The picture emerging from the study of sheltered Hurricane Katrina evacuees reviewed here differed from the portrait of Oklahoma City bombing survivors in a very different setting, whose mental health issues were predominantly about PTSD. In contrast, the prominent finding among sheltered Hurricane Katrina evacuees was an abundance of unmet treatment needs for serious and persistent, largely preexisting, psychiatric illness needing services in the immediate postdisaster period.

The findings of this comparative review suggest that different approaches to mental health interventions may be needed for different disaster-exposed populations from different disasters in different settings and time frames. Based on the findings of the Oklahoma City bombing study, the bombing survivors, who were coping more with PTSD than with any other psychiatric problem, would be best served by making available appropriate treatments for PTSD. Additionally, more generic interventions for distress, such as psychological first aid, may be helpful for most of the survivors, because of their nearly universal psychological distress in the aftermath of the disaster.

In contrast, a different mental health approach was more appropriate for responding to the mental health needs of Hurricane Katrina evacuees in the setting of a psychiatry clinic in a shelter in the immediate aftermath of the disaster. Because of the ongoing serious and persistent mental illness including longstanding substance abuse problems, the intervention needs of this group in this time frame and in this setting were more complex. The main tasks in the psychiatry clinic were rapid diagnostic assessment, resumption of psychotropic medications, and linkage to ongoing psychiatric care for these disorders. Conversely, for the very different mental health issues found among Oklahoma City bombing survivors, setting up a methadone clinic and providing antipsychotic medications would have been off target for the needs of the disaster survivors.

Distinctly divergent findings from these two very different disaster studies illustrate the importance of targeting disaster intervention plans to meet expected mental health problems emerging in these different populations, settings, and time frames. Clearly, not all disasters are alike, and not all exposed populations and intervention settings and postdisaster time frames are alike. Therefore, varied strategies may be needed in approaches to addressing mental health effects of different disasters, surviving populations, postdisaster settings, and postdisaster time frames.

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