

Research Article

SYMPTOMS OF DEPRESSION AND POSTTRAUMATIC STRESS DISORDER IN AN OUTPATIENT POPULATION BEFORE AND AFTER HURRICANE KATRINA

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*The aim of the present investigation was to evaluate symptoms of depression and posttraumatic stress disorder (PTSD) in an outpatient psychiatric population before and after Hurricane Katrina. The sample consisted of 156 patients (110 females; $M_{age} = 41.2$ years, $SD = 10.9$) at an outpatient psychiatric clinic who completed measures of psychological symptoms as part of their regular clinical care in the month before ($n = 76$; 49%) and the 1 month after ($n = 80$; 51%) Hurricane Katrina made landfall. Partially consistent with prediction, depression scores were significantly higher in the month following the hurricane, but PTSD scores were not significantly different. Depressive symptoms after the hurricane were predicted by watching television coverage of the looting that occurred in New Orleans and by the amount of time the participant was without electricity. Symptoms of PTSD after the hurricane were predicted by the participants' use of general television viewing as a coping strategy, the amount of time they spent watching television coverage of the looting in New Orleans, and the use of prayer as a coping behavior. Of these variables, only prayer was associated with a decrease in PTSD symptoms. Findings are discussed in relation to the need for collaborative efforts between clinically oriented and research-oriented institutions to study the impact of large-scale disasters on a variety of populations. *Depression and Anxiety* 25:416–421, 2008. © 2008 Wiley-Liss, Inc.*

Key words: *depression; PTSD; natural disaster; psychiatric population; outpatients*

INTRODUCTION

There have been a number of devastating natural disasters in recent years, creating an increased interest in examining the psychological sequelae of these events. Researchers have shown that following a natural disaster, individuals will report a significant increase in psychological symptoms, specifically depression and symptoms of posttraumatic stress disorder (PTSD), including intrusive thoughts, emotional numbing, and avoidance [Horowitz, 1986; Rubonis and Bickman, 1991]. Across studies, the average post-disaster prevalence rates for depression and general anxiety are 26 and 40%, respectively, resulting in a 17% increase in rates of psychopathology [Rubonis and Bickman, 1991].

A number of studies have shown that while many people return to their pre-disaster level of functioning, there is a subset of the population in which depressive

and PTSD symptoms do not remit [e.g., Altindag et al., 2005; North et al., 2004; Salcioglu et al., 2003]. To best help these individuals, variables associated with greater symptomatology need to be identified. One of the most robust predictors of post-disaster psychopathology is a

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history of psychiatric illness [McMillen et al., 2002; Salcioglu et al., 2003; Tural et al., 2004]. Research indicates that individuals with a pre-disaster psychiatric disorder, as compared to those without a disorder, are three times more likely to develop disaster-related PTSD [34 versus 11%; McMillen et al., 2002] and report more severe impairment post-disaster in terms of depression, anxiety, anger, and PTSD symptoms [Sutker et al., 2002]. In a study of victims of the Midwestern floods of 1993, pre-disaster symptom levels and diagnoses contributed uniquely to the post-disaster increase in distress among individuals with pre-disaster diagnoses and this group was 8.5 times as likely to have a post-disaster diagnosis compared to those without pre-existing psychopathology [Ginxi et al., 2000].

Other disaster-related variables associated with poorer functioning include television viewing, loss of resources, [e.g., possessions, employment; Sattler et al., 2002], and an avoidant coping style [e.g., Gil, 2005; Scarpa et al., 2006]. Indeed, researchers have shown that the amount of time spent viewing television coverage on 9-11 and the days afterward significantly contributed to PTSD symptoms [Ahern et al., 2002; Schlenger et al., 2002; Silver et al., 2002]. Ahern et al. [2004] found that individuals who watched the most television coverage of the 9-11 attacks were 66% more likely to have probable PTSD than those who watched little coverage. Media exposure seems to be particularly problematic among individuals who have a history of trauma. For example, Saylor et al. [2006] found that college students who had been victims of crime before 9-11 had significantly more PTSD symptoms related to 9-11 media exposure.

Although pre-existing psychopathology has been well documented as a risk factor for post-disaster psychopathology, few studies have examined symptom changes in a treatment-seeking, outpatient population. Extant research indicates that this population is likely at greater risk of experiencing an increase in depressive and anxiety symptoms following exposure to a disaster. Taken together, current research indicates that while most people recover relatively quickly after experiencing a natural disaster, there are those who do not recover. Within this subgroup, pre-existing psychopathology seems to place individuals at a greater risk for post-disaster problems. Few researchers, however, have examined the psychiatric symptoms in populations who are already exhibiting symptoms and who are seeking treatment before the disaster, and none have looked at what happens when these populations are indirectly (c.f. directly) impacted by the event. Thus, the aim of this study was to examine depressive and posttraumatic stress symptoms before and after Hurricane Katrina in a psychiatric population being treated at an outpatient clinic in Jackson, Mississippi. It was hypothesized that, as a group, patients who completed measures of symptomatology in the 4 weeks after Hurricane Katrina made landfall would report higher

levels of depressive and posttraumatic stress symptoms as opposed to patients who completed measures of symptomatology in the month before the storm. As most participants in our sample were only indirectly affected by Hurricane Katrina, we did not expect to find new psychiatric disorders in relation to the storm. Thus, we examined depressive and posttraumatic stress symptoms rather than diagnoses. Furthermore, it was expected that damage from the hurricane, greater amounts of television viewing, and utilization of negative coping behaviors would predict greater post-hurricane depressive and posttraumatic stress symptoms. For this study, we were only able to examine overall group differences in the clinic population pre- to post-hurricane as we did not have both pre- and post-hurricane data on the patients.

METHODS

HURRICANE KATRINA

Hurricane Katrina was one of the strongest storms to impact the coast of the United States in the last 100 years [National Climatic Data Center, 2005]. The storm made landfall on August 29, 2005, near Buras-Triumph, Louisiana as a strong category 3 hurricane with sustained winds of 125 mph. After making landfall, the storm moved to the north and east through the state of Mississippi. Katrina was still classified as a category 1 hurricane (winds of 74–95 mph) as it passed just to the west of Jackson, MS. The Jackson metro area received approximately 4 in of rain from the storm and maximum wind gusts of 74 mph were recorded. Although not as devastating as on the coast, there was a significant amount of wind and rain damage across the city. Individuals in some areas of Jackson were without water for a week, without electricity for a few days to over a week, and had to deal with gasoline shortages and the resulting hours-long wait at the fuel pumps. Furthermore, television coverage on local and national stations of the storm and its destruction was continuous for 1–2 weeks after the storm.

PARTICIPANTS

The sample consisted of 76 (50 females; $M_{age} = 41.5$, $SD = 12.2$) patients at an outpatient psychiatric clinic who completed measures of psychological symptoms as part of their regular clinical care in the month before Hurricane Katrina made landfall and 80 (60 females; $M_{age} = 41$, $SD = 9.47$) patients who completed measures in the month after the storm. The pre- and post-hurricane samples were combined to examine the demographic data. Overall, the sample was primarily Caucasian ($n = 96$, 66%) and unemployed ($n = 115$, 79%). Participants were diagnosed by third year psychiatry residents under the supervision of an attending psychiatrist using an unstructured clinical interview. The most common primary diagnostic category was depressive disorders ($n = 64$; 41%) with the majority of

people being given a diagnosis of major depressive disorder ($n = 42$, 66%; depression due to a general medical condition, $n = 11$, 17%; dysthymic disorder, $n = 7$, 11%; depression not otherwise specified, $n = 4$, 6%), followed by anxiety disorders ($n = 29$; 19%) with 22 people being given a diagnosis of PTSD (76%), and four with Anxiety Not Otherwise Specified (14%). Other diagnoses included bipolar disorders ($n = 29$; 20%), psychotic disorders ($n = 13$; 9%), and other disorders (e.g., Axis II, substance abuse; $n = 8$, 6%).

MEASURES

Demographic information. A chart review was carried out to obtain demographic information (age, ethnicity, marital status, and employment status), psychiatric diagnoses, current medication regimen, and attendance of clinic appointments.

Hurricane-related experiences. Patients were asked several questions about how the storm affected their lives. Questions included information on amount of time without electricity and water, storm damage to their home, number of people staying with them, whether or not they knew people who had been evacuated, and whether or not there were individuals that they had not heard from yet or who had died during the hurricane. Patients were also asked to report the amount of time spent viewing television coverage of the effects of Hurricane Katrina both immediately after the storm and in the weeks that followed. Time was divided into 2-hr increments from *no time at all* to *8+ hours*. Patients were then asked to report on the amount of time spent viewing specific types of television coverage of the storm and its aftermath (e.g., people being rescued, looting, coverage of the superdome). Responses were reported on a 5-point Likert scale ranging from 0 = *none* to 4 = *a great deal*.

Center for Epidemiologic Studies–Depressed Mood Scale. The Center for Epidemiologic Studies–Depressed Mood Scale [CES-D; Radloff, 1987] is a 20-item instrument that was designed to assess symptoms of depression. Individuals responded to the items on a 4-point Likert scale ranging from 0 = *rarely or none of the time* to 3 = *most or all of the time*. Radloff reported a Cronbach's α coefficient of .85 and test-retest correlation coefficients have ranged from .32 to .67 with time intervals ranging from 2 weeks up to 1 year.

Posttraumatic Stress Disorder Checklist–Civilian Version. The Posttraumatic Stress Disorder Checklist–Civilian Version [PCL; Weathers et al., 1994] is a 17-item self-report measure that assesses criteria B, C, and D for PTSD (symptoms of intrusion, avoidance, and hyperarousal). Each of the 17 items directly corresponds to one of the PTSD criteria. Respondents rate the severity of each symptom on a 5-point Likert scale from 1 = *not at all*, to 5 = *extremely*, over the past 30 days. Blanchard et al. [1996] reported a high correlation ($r = .93$) between scores on the PCL and the Clinician–Administered PTSD Scale [Blake et al.,

1995], a structured interview long considered to be the “gold standard” in PTSD diagnosis. Patients were asked to complete the PCL in relation to the most traumatic event they have experienced.

PROCEDURE

As part of their standard clinical care, patients completed measures of depressive and PTSD symptoms to monitor treatment progress. Patients completed the measures before their appointment so that the information was available to their treatment provider. Symptom measures took 10–15 min to complete and patients had the option of refusing to complete the measures without affecting their treatment. Following Hurricane Katrina, questions were added to the survey to collect information on the various types of stressors (e.g., home damage, time without electricity, missing/injured/deceased family or loved ones) that patients had experienced to provide better clinical care. Permission was later granted by the University of Mississippi Medical Center Institutional Review Board to collect information from the measures and clinic charts for the 1 month before (median = 2 weeks) and the month after (median = 3 weeks) Hurricane Katrina made landfall.

STATISTICAL ANALYSES

The first step to understand the nature of the data was to examine the descriptive information about the impact of the storm. Next, a series of conceptually relevant zero-order Pearson's correlations were computed to assess the association between depressive and posttraumatic stress symptoms and hurricane impact variables. Then two one-way analyses of variance were conducted to examine changes in depressive and posttraumatic stress symptoms pre- to post-hurricane. Finally, regression equations were used to identify variables that best predicted depressive and posttraumatic stress symptom levels following Hurricane Katrina. First, regression analyses were conducted to screen potential predictors related to coping behaviors (i.e., drinking alcohol, visiting with others, smoking cigarettes, exercising, watching television, attending church, and praying) and the amount of time participants spent watching certain television programs related to the hurricane (i.e., damage to buildings, financial impact, rescues, looting, people dying, evacuation efforts, coverage of the Superdome, and coverage of the Convention Center). Two linear regression analyses were then conducted using the variables identified from the previous analysis to predict depressive and posttraumatic stress symptoms.

RESULTS

HURRICANE IMPACT

Following the hurricane, 41% ($n = 29$) of the participants reported having some damage to their

home, including damage to the roof ($n = 14$, 48%), downed trees ($n = 10$, 34%), and other damage such as broken windows and missing siding ($n = 6$, 21%). In terms of utilities, 15% of the participants were without electricity for one day or less, 14% for 2–3 days, 33% for 4–5 days, 19% for 6–7 days, and 18% were without electricity for more than 7 days. 44% of the participants were without water for 1 day or less, 28% for 2–3 days, 18% for 4–5 days, 2% for 6–7 days, and 9% for more than 7 days. Despite being without electricity, participants spent many hours watching television coverage of the hurricane. In the days following Hurricane Katrina's landfall, 24% of participants watched eight or more hours per day of television, 17% watched 6–8 hr, 17% watched 4–6 hr, 4% watched 2–4 hr, 8% watched less than 2 hr/day, and 31% spent no time watching television. In the weeks following the storm, 25% of participants watched eight or more hours of television, 18% watched 6–8 hr, 10% watched 4–6 hr, 13% watched 2–4 hr, 11% watched less than 2 hr, and 23% spent no time watching television. Participants also reported how they coped with the hurricane by indicating whether or not they drank alcohol, visited with others, smoked cigarettes, exercised, watched television, attended church, or prayed at an increased or decreased rate (see Table 1).

ASSOCIATIONS AMONG HURRICANE IMPACT VARIABLES AND DEPRESSIVE SYMPTOMS

Depressive symptoms, as measured by the CES-D, were not related to any of the hurricane impact variables. Although CES-D scores were not related to overall amount of television viewing, significant correlations were found between depressive symptoms and specific types of coverage; specifically depressive symptoms were correlated with the amount of television coverage viewing regarding the looting in New Orleans ($r(67) = .28$, $P < .05$), rescue efforts ($r(67) = .27$, $P < .05$), and coverage of the Convention Center in New Orleans ($r(69) = .25$, $P < .05$).¹

ASSOCIATIONS AMONG HURRICANE IMPACT VARIABLES AND POSTTRAUMATIC STRESS SYMPTOMS

Posttraumatic stress symptoms, as measured by the PCL, were not related to any of the hurricane impact variables. Although PCL scores were not related to overall amount of television viewing, significant correlations were found between depressive symptoms and specific types of coverage; specifically posttraumatic stress symptoms were correlated with television

coverage of the damage to buildings ($r(62) = .30$, $P < .05$), looting in New Orleans ($r(62) = .37$, $P < .01$), the rescue efforts ($r(64) = .26$, $P < .05$), people dying ($r(64) = .27$, $P < .05$), the evacuation efforts [$r(64) = .31$, $P < .05$], the Superdome in New Orleans ($r(61) = .28$, $P < .05$), and coverage of the Convention Center in New Orleans ($r(63) = .30$, $P < .01$).

DIFFERENCES IN SYMPTOM LEVELS PRE- TO POST-HURRICANE

For clinic patients as a group, significant differences were found in CES-D scores between the month before ($M = 26.5$, $SD = 12.4$) and the month after ($M = 31.1$, $SD = 14.8$) the hurricane [$F(1, 146) = 4.2$, $P < .05$]. No significant differences were found between PCL scores before and after the storm.

REGRESSION ANALYSES

In terms of screening potential predictors of post-hurricane symptom levels, attending church and general television viewing were the behaviors that were significant predictors of depressive symptoms [$R^2 = .099$, $F(1, 62) = 6.8$, $P < .05$] and smoking, praying, and general television viewing were the behaviors that were significantly predictive of posttraumatic stress symptoms [$R^2 = .106$, $F(1, 58) = 3.4$, $P < .05$]. In terms of specific type of television coverage, watching coverage of the looting was the only significant predictor of both posttraumatic stress symptoms [$R^2 = .136$, $F(1, 59) = 9.3$, $P < .01$] and depressive symptoms [$R^2 = .076$, $F(1, 64) = 5.3$, $P < .05$].

Two linear regression analyses were then conducted using variables related to damage from the hurricane (time spent without electricity, time spent without water, and home damage), and the predictors identified in the previous analysis related to type of television coverage viewed (coverage of the looting), and coping behaviors used (attending church and general television viewing for the depression analysis and smoking, general television viewing, and praying for the PTSD analysis). In terms of depressive symptoms, the predictor variables accounted for 18% of the variance [$R^2 = .177$, $F(2, 47) = 5.1$, $P < .01$]. Amount of time spent watching coverage of the looting ($t = 2.8$, $\beta = 4.9$, $P < .01$) and the length of time the participant was without power ($t = 1.9$, $\beta = 3.0$, $P < .07$) were the only significant predictors of CES-D scores. Participants who watched more television coverage of the looting (*not* general television viewing) and were without electricity for a longer period of time reported higher levels of depressive symptoms. In terms of PTSD symptoms, the predictor variables accounted for 29% of the variance [$R^2 = .290$, $F(2, 43) = 5.9$, $P < .01$]. Watching coverage of the looting ($t = 2.1$, $\beta = 5.1$, $P < .05$), praying ($t = -2.6$, $\beta = -6.0$, $P < .05$), and general television viewing ($t = 2.4$, $\beta = 5.3$, $P < .05$) significantly predicted PTSD scores. Participants who

¹The number of participants for the individual correlation analyses is lower than the total number of participants due to missing data.

TABLE 1. Coping behaviors following Hurricane Katrina

	Never(%)	Much less(%)	Less(%)	About the same(%)	More(%)	Much more(%)
Drank alcohol	78	5	7	8	0	1
Visited with others	22	4	3	38	19	14
Smoked cigarettes	47	0	4	20	17	13
Exercised	33	7	12	29	10	10
Watched television	6	11	18	39	11	14
Attended church	15	7	10	42	17	8
Prayed	4	4	1	31	25	35

n = 80.

watched less coverage of the looting, less television overall, and prayed more reported lower levels of PTSD symptoms.

DISCUSSION

Although there is a growing body of the literature examining the psychological effects of natural disasters, less attention, comparatively, has been paid to the effects such disasters have on a population already experiencing significant levels of psychopathology. This study represents an effort to empirically evaluate the effects of Hurricane Katrina on symptoms of PTSD and depression in an outpatient psychiatric population who were not in the direct path of the hurricane. Partially consistent with prediction, depression scores were significantly higher in the month following the hurricane but PTSD scores were not significantly different.

In terms of changes in symptoms levels, partially consistent with prediction, overall depression levels, but not PTSD levels, increased significantly in the month that followed Hurricane Katrina. These results are notable in that some individuals still reported a worsening of their symptoms despite actively receiving psychiatric treatment, highlighting the unique needs of psychiatric outpatients in the aftermath of a natural disaster. These findings suggest that clinicians should closely monitor their patients after such an event and psychoeducation regarding effective coping mechanisms may also be warranted. It will be important for future research to further examine which variables best predict patients that will experience an increase in symptomatology as well as the most effective treatment in these situations.

One explanation for the lack of change in PTSD symptoms, despite earlier research indicating a clear increase in symptoms, is that patients were assessed too soon after the disaster to evidence changes in PTSD symptoms. Indeed, Fried et al. [2005] compared mental health service usage 14 months before and 1 year after Hurricane Floyd in North Carolina and found that although there were no immediate increases in mental health visits, there was an increase in visits beginning 3–4 months after the storm which would indicate increases in symptomatology. It is also possible that

increases in PTSD and depression symptoms found in earlier research were not indicative of true increases in psychopathology due to the absence of pre-disaster data. Future research would need to assess symptoms of psychopathology more systematically in hurricane-prone areas to fully explicate the nature of these symptom changes.

Following the hurricane, depressive symptoms were predicted by watching television coverage of the looting that occurred in New Orleans and by the amount of time the participant was without electricity. Symptoms of PTSD were predicted by the participants' use of general television viewing as a coping behavior, the amount of time they spent watching television coverage of the looting in New Orleans, and the use of prayer as a coping behavior. Of these variables, only prayer was associated with a decrease in PTSD symptoms. These findings provide an avenue for individuals to actively prevent increases in mental health problems. Although individuals have little control over the amount of time they are without electricity, they can choose effective coping strategies such as the amount of time they spend watching television and the types of television coverage they select.

The negative impact of television coverage of disasters has gained an increasing amount of research attention, specifically following the September 11 attacks. Results from this line of research support the findings of this study in that viewing too much coverage of a disaster can have a negative impact on symptoms levels [Scotti et al., 2005; unpublished manuscript]; however, the current findings were not as robust as in other studies [e.g., Scotti et al., 2005; unpublished manuscript]. A number of variables, including the source of the disaster (man-made versus natural) and unpredictable nature of a terrorist attack clearly differentiate these two examples. Additionally, many of the participants were without electricity in the first few days or weeks following the hurricane and were therefore unable to watch the television coverage, thus limiting the ability to detect differences. Perhaps the recommendation from Scotti et al. to limit the amount of television viewed after a disaster was adhered to even if it was not by choice.

Although this study adds to the extant literature on PTSD and depressive symptoms among outpatients after a natural disaster in a unique manner, there are a number of interpretive caveats that deserve further comment. First, the sample was relatively small, especially those with both pre- and post-hurricane data, limiting the power available to examine changes in depression and PTSD symptoms scores. Second, there were also many variables (e.g., social support and the long-term symptom course) that were not assessed. Third, self-report measures were used as the primary assessment methodology for the key constructs. The use of self-report methods does not fully protect against reporting errors and may be influenced by shared method variance. Finally, it is not known what, if any, effect hurricane displacement had on the sample. The effect may have been direct (e.g., people leaving the Jackson area for less damaged locations or being unable to come to the clinic due to damaged roads or vehicles) or indirect as people attempted to assist victims in areas that sustained more damage causing them to miss appointments.

Despite these limitations, the findings highlight the need to examine the effect of large-scale disasters on populations already at-risk, even when that population is not in the hardest hit areas of the disaster. The overall methodology used in this study can also serve as an effective model in addressing some of these questions. The partnering of clinically oriented community mental health clinics with research orientated medical centers would combine the strengths of the two institutions and provide valuable information to clinicians and allow researchers to better understand the impact of these large-scale disasters on a variety of populations.

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