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Unique and Related Predictors of Major Depressive Disorder, Posttraumatic Stress Disorder, and their Comorbidity Following Hurricane Katrina

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Abstract

The current study examined demographic and psychosocial factors that predict major depressive disorder (MDD) and comorbid major depressive disorder/posttraumatic stress disorder (MDD/PTSD) diagnostic status following Hurricane Katrina, one of the deadliest and costliest hurricanes in United States history. This study expanded on the findings published in Galea and colleagues (2008), which examined the same predictors for posttraumatic stress disorder (PTSD), in order to better understand related and unique predictors of MDD, PTSD, and MDD/PTSD comorbidity. A total of 810 individuals representative of adult residents living in the 23 southernmost counties of Mississippi prior to Hurricane Katrina were interviewed. Ongoing hurricane-related stressors, low social support, and hurricane-related financial loss were common predictors of MDD, PTSD, and MDD/PTSD, whereas educational and marital status emerged as unique predictors of MDD. Implications for post-disaster relief efforts that address risk for both MDD and PTSD are discussed.

Keywords

posttraumatic stress disorder; major depressive disorder; comorbidity; disasters

Major Depressive Disorder (MDD) is the most common illness worldwide (Ustun et al., 2004). In the United States, an estimated 6.6% of the general population meets diagnostic criteria for MDD in the past 12 months (Kessler et al., 2003), with 4.9% experiencing

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current (past month) MDD (Blazer et al., 1994). MDD contributes 4.4% of the total disability adjusted life years (Murray and Lopez, 1996; Ustun et al., 2004), and is associated with substantial personal, economic, and social burden (Kessler et al., 2003). For example, individuals with MDD are approximately 28 times more likely to miss workdays or usual activities due to emotional reasons (Kouzis and Eaton, 1994). Despite the high prevalence and burden of MDD, only about 60% of individuals receive treatment (Kessler et al., 2003), making it an important public health challenge. Identification of early predictors of MDD may help improve targeted prevention and intervention efforts.

Stressful life events, including traumatic events, marital difficulties, low education, and low social support have been identified as a major factor involved in the etiological pathway to MDD (Charney and Manji, 2004; Kendler et al., 2002; Kendler et al., 1999). Diathesis-stress models of depression postulate that cognitive vulnerability factors (e.g., dysfunctional beliefs) emerge in stressful situations, which then prompt the initiation of depressive episodes (Scher et al., 2005). Natural disasters are particularly salient life stressors that increase risk of developing MDD. In addition to increasing the likelihood of experiencing an immediate, life-threatening traumatic event, natural disasters are also frequently followed by displacement, which leads to significant and chronic stressors (e.g., job loss, break down of social networks) that further increase the risk for depression (Kendler et al., 2002). For example, hurricane-related stressors, including financial loss and loss or damage of sentimental possessions predicted MDD 2–5 months following Hurricane Ike (Tracy et al., 2011), a Category 2 hurricane that made landfall in Galveston, Texas on September 13, 2008.

Following natural disasters, much attention is devoted to the development of posttraumatic stress disorder (PTSD). However, MDD is also a significant concern and represents the second most common and impairing psychological problem following a natural disaster (David et al., 1996; North et al., 2004). The high degree of comorbidity between MDD and PTSD (Foa et al., 2006) underscores the importance of understanding unique and related determinants of MDD and PTSD and their comorbidity in order to shed light into the pathogensis of these disorders following a traumatic event. The existing literature collectively suggests that being female, middle aged and an ethnic minority, as well as having lower socioeconomic status, pre-disaster psychopathology and experiencing other psychosocial stressors, predict a variety of increased psychological symptoms and impairment following disasters (see Norris et al., 2002 for a review).

While there has been limited literature examining factors related to both PTSD and MDD together, evidence suggests that pre-existing vulnerabilities and subsequent psychosocial stressors may be more related to the development of MDD, while exposure to disaster-related events and stressors may be more relevant to the development of PTSD (Miguel-Tobal et al., 2006; Tracy et al., 2011). For example, Tracy and colleagues (2011) found that following Hurricane Ike, a higher number of hurricane exposures and stressors were associated with greater risk of developing both MDD and PTSD. As unique vulnerability factors, lower educational attainment and household income, and increased psychosocial stressors both before and subsequent to the hurricane predicted MDD, whereas hurricane-related traumas predicted PTSD.

Hurricane Katrina made landfall on the Louisiana/Mississippi border on August 25, 2005 and represents one of the deadliest and costliest hurricanes in United States history (Knabb et al., 2006). Additionally, this hurricane led to significant displacement and chronic stressors for a significant amount of individuals. High levels of psychopathology have already been documented following this disaster (Galea et al., 2008; Kessler et al., 2006). For example, depressive symptoms increased one month after Hurricane Katrina made landfall as compared to one month before in an outpatient psychiatric clinic (McLeish and Del Ben, 2008). A few studies have investigated predictors of adverse mental health after Hurricane Katrina. For example, Galea and colleagues (2008) conducted a large-scale epidemiological study of Mississippi residents to investigate predictors of PTSD following Hurricane Katrina. This study found that female gender, increased financial loss, greater exposure to stressors, lower perceived social support, and greater exposure to traumatic events after Hurricane Katrina predicted PTSD (Galea et al., 2008).

Galea and colleages (2008), however, did not examine vulnerability factors associated with the development of MDD. Understanding combined and unique risk for the development of MDD and PTSD, particularly after a high impact natural disaster, where stressors related to the trauma are chronically present for some time, may inform public health policy, disaster relief, and intervention efforts post-disaster. As such, the aim of the current study was to expand on the findings published in Galea and colleagues (2008) in order to better understand related and unique predictors of both MDD and PTSD as well as MDD/PTSD comorbidity, by examining demographic and psychosocial factors in predicting MDD and comorbid MDD/PTSD diagnostic status post-Katrina.

Materials and Methods

Participants

Data for the current project were collected as a part of a large-scale, representative sampling of adults living in the 23 southernmost Mississippi counties prior to Hurricane Katrina. The sampling strategy is fully described in Galea and colleagues (2008). Briefly, an area probability sampling frame was created for counties that received the most widespread hurricane damage. All housing units existing prior to the hurricane were enumerated; randomly selected addresses were sampled within aggregations of 2000 Census blocks. For counties suffering less hurricane damage, potential respondents were selected using a random digit dialing sampling frame. Extensive efforts were made to locate residents of selected addresses prior to Hurricane Katrina. The computer-assisted phone interviews lasted 37 minutes on average and took place between February and July 2007 (i.e., 1.5 to 2 years after Hurricane Katrina). Respondents provided oral consent and received compensation for their time. This study was approved by the Institutional Review Board of the University of Michigan.

Measures

Depression—The Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001; Kroenke and Spitzer, 2002) assesses nine symptoms corresponding to *DSM-IV-TR* diagnostic criteria for MDD. Respondents were asked to indicate how often they had been bothered by each

symptom since Hurricane Katrina on a 4-point Likert scale ranging from “not at all” to “nearly every day.” Participants were also asked to note whether symptoms occurred during the same 2-week period and to indicate the degree of impairment these symptoms caused. Additionally, respondents were asked whether they were experiencing symptoms in the past month to assess current MDD. Based on these responses, participants were classified as either having or not having met criteria for current MDD (i.e., past 30 days) and MDD since Hurricane Katrina (i.e., anytime in the 1.5 – 2 years between Hurricane Katrina and assessment). MDD diagnosis was established using a broad definition (i.e., reporting 5 symptoms of depression with one being depressed mood or loss of interest in usual activities that occur together within the same two week period).

Posttraumatic Stress Disorder—The Composite International Diagnostic Interview – *DSM-IV* PTSD Module (CIDI; Kessler and Ustun, 2004) was used to identify probable cases of PTSD related to Hurricane Katrina. Items were modified to specifically reference Katrina (e.g., "Did you deliberately try not to think or talk about Katrina?"). Respondents were classified as either having or not having met a broad definition of PTSD related to Hurricane Katrina since Hurricane Katrina (i.e., anytime in the 1.5 – 2 years between Hurricane Katrina and assessment) and in the past 30 days (current). A broad definition of PTSD required that respondents felt “terrified” or “helpless” during Hurricane Katrina, reported one or more reexperiencing symptoms (e.g., “kept remembering Katrina even when they didn’t want to”), three or more avoidance symptoms (e.g., “avoided places or people that might have reminded you of Katrina”), and two or more arousal symptoms (.e., “trouble sleeping”) that lasted at least one month since Hurricane Katrina (Galea et al., 2008; Hoge et al., 2004).

Hurricane Experiences and Stressors—Respondents were asked whether they experienced a traumatic event (e.g., being physically injured, seeing someone else injured or killed) or financial loss (e.g., loss of income or employment) related to Hurricane Katrina. The psychosocial impact of the hurricane was also assessed with 8 items modified from scales assessing stressors following other natural disasters (Riad and Norris, 1996). Respondents were asked whether they had been displaced from their home, lost sentimental possessions, or experienced any of six stressors in the 6 months after the hurricane (e.g., shortage of food or water, difficulty finding adequate housing). Items were summed to create a total psychosocial stress score ranging from 0 to 8 (Cronbach’s $\alpha = 0.75$). Level of exposure to post-hurricane stressors was categorized as low (0–2 stressors) or high (3 or more stressors).

Other Traumatic Events—Lifetime traumatic events were assessed using a modified version of the Criterion A traumatic events section of the Composite International Diagnostic Interview (CIDI; Kessler and Ustun, 2004). Respondents reported whether they experienced each traumatic event and whether it occurred prior to or after Hurricane Katrina. Number of traumatic events prior to Hurricane Katrina was represented in three categories: low (0–1 traumatic events), medium (2–3 traumatic events), and high (4 or more traumatic events). Number of traumatic events after Hurricane Katrina was represented in two categories: low (0–1 traumatic events) and high (2 or more traumatic events).

Social Support—The Crisis Support Scale (Joseph et al., 1992) is a 7-item measure used to assess social support (e.g., “someone to listen to you”) received in the 2 months subsequent to Hurricane Katrina. Respondents rated items on a 7-point Likert scale ranging from “never” to “always.” Items were summed to produce a total social support score ranging from 6 to 42 (Cronbach’s $\alpha = .77$).

Data Analysis

Bivariate associations between theoretically relevant variables of interest and current MDD and MDD since Hurricane Katrina were assessed using two-tailed chi-square tests. All theoretically relevant variables were fitted into a logistic regression to assess unique variance of each in the prediction of current MDD and MDD since Hurricane Katrina. This process was repeated for current MDD/PTSD comorbidity and MDD/PTSD comorbidity since Hurricane Katrina.1 All analyses were conducted in SPSS Version 19.0 and weights were applied in all analyses to account for demographic differences reported by the 2000 U.S. Census (Bureau of the Census, 2000) and over-sampling in the more affected regions.

Results

Participant Characteristics

A total of 810 respondents completed interviews, representing 50.3% of eligible sampled households. The participation refusal rate was 9.4%, which is consistent with comparable population-based studies (Galea and Tracy, 2007). Sample demographics are provided in Table 1. After applying weights, respondents were representative of the 2000 U.S. Census population (see Galea et al., 2008). Of the total sample, 11.7% met criteria for MDD following Hurricane Katrina, 9.1% met current MDD criteria, 8.0% met criteria for both MDD and PTSD following Hurricane Katrina, and 6.5% met current MDD and PTSD criteria. Of note, 20 (2.5%) individuals met criteria for MDD since Katrina but not current MDD. Similarly for PTSD, 62 (7.7%) individuals met criteria for PTSD since Katrina but not current PTSD, while 120 (14.8%) individuals met criteria for both current PTSD and PTSD since Katrina. In terms of rates of comorbidity, 68.4% ($n = 65$) of those with MDD since Katrina also had comorbid PTSD, and 71.6% ($n = 53$) of those with current MDD also had comorbid PTSD. Of individuals with PTSD since Katrina, 35.7% ($n = 65$) also had comorbid MDD, whereas 44.2% ($n = 53$) of those with current PTSD also had comorbid MDD. Therefore, of the total sample, 8% ($n = 65$) had comorbid MDD/PTSD since Katrina and 6.5% ($n = 53$) had current comorbid MDD/PTSD.

Demographic and Psychosocial predictors of MDD and MDD/PTSD Comorbidity

Bivariate associations and logistic regression results for MDD since Hurricane Katrina and current MDD are presented in Table 2. Having less than a high school degree, being single,

[1]We carefully considered whether to include PTSD and MDD diagnosis since Hurricane Katrina (i.e., anytime in the 1.5–2 years after Hurricane Katrina) as an additional covariate in analyses when predicting current MDD and MDD/PTSD. Retrospective reports are heavily influenced by the experience of current symptoms. Since assessment of symptoms since Hurricane Katrina and current symptoms occurred at the same time, it is possible that individuals experiencing current symptoms may be more likely to report past symptoms, and this may be especially problematic given the symptom overlap between PTSD and MDD. Given this we decided not to include PTSD and MDD diagnosis since Hurricane Katrina as a covariate in analyses of current diagnoses.

exposure to Hurricane Katrina-related traumatic events, exposure to stressors after Hurricane Katrina, and having less social support significantly predicted MDD since Hurricane Katrina. Exposure to Hurricane Katrina-related traumatic events, exposure to stressors after Hurricane Katrina, and having less social support, and more financial loss as a result of Hurricane Katrina significantly predicted current MDD. Additionally, having less than a high school education and earning less than $20,000 exhibited were marginally associated with current MDD.

Bivariate associations and logistic regression results for MDD and PTSD comorbidity since Hurricane Katrina and in the past month are presented in Table 3. Having more financial loss as a result of Hurricane Katrina, exposure to stressors after Hurricane Katrina, having less social support and exposure to traumatic events after Hurricane Katrina significantly predicted MDD/PTSD comorbidity since Hurricane Katrina. Having more financial loss as a result of Hurricane Katrina, exposure to stressors after Hurricane Katrina, and having less social support significantly predicted current MDD/PTSD comorbidity. Additionally, having less than a high school education and exposure to traumatic events after Hurricane Katrina were marginally associated with current MDD/PTSD.

Discussion and Conclusions

The aim of the current study was to identify demographic and psychosocial factors that predict MDD and comorbid MDD/PTSD diagnostic status after Hurricane Katrina. The prevalence of MDD and MDD/PTSD since Hurricane Katrina was 11.7% and 8%, respectively. Hurricane-related financial loss and other stressors during the 6 months following Hurricane Katrina, as well as lower social support during the 2 months following Hurricane Katrina, were common predictors of both MDD and comorbid MDD/PTSD.

The prevalence of MDD after Hurricane Katrina in this study is greater than what has been reported in the general population (6.6%; Kessler et al., 2003) but is similar to reports following other natural disasters (11.1%; Hussain et al., 2011; 11.7%; Onder et al., 2006). However, the prevalence of current MDD in this study (9.1%) is significantly greater than what has been documented in the general population (2.2%; Regier et al., 1993) and following other natural disasters (4.9%; Tracy et al., 2011). Given that ongoing and chronic stressors have been linked to MDD (Breslau & Davis, 1986; Kendler et al., 2002), the increased prevalence rate of current MDD in this sample is not surprising as the severity and impact of Hurricane Katrina is marked with long lasting chronic stressors (i.e., financial loss, break down of social support networks). The present study found that educational and marital status, exposure to Hurricane Katrina related events, exposure to stressors within the 6 months after Hurricane Katrina, and low social support within the 2 months after Hurricane Katrina predicted a diagnosis of MDD since Hurricane Katrina. In terms of current MDD diagnosis, all these factors remained as significant predictors with the exception of educational status. Additionally, financial loss emerged as an additional predictor of current MDD.

The percentage of individuals with PTSD who also had comorbid MDD in this study is similar to what has been reported previously in the literature (44 – 48%; Foa et al., 2006;

Shalev et al., 1998). Financial loss, exposure to stressors within the 6 months after Hurricane Katrina, low social support within the 2 months after Hurricane Katrina, and exposure to traumatic events after Hurricane Katrina significantly predicted MDD/PTSD since Hurricane Katrina. All these factors remained as significant predictors of current MDD/PTSD diagnosis with the exception of exposure to traumatic events after Hurricane Katrina.

The present study found three common predictors of both MDD and comorbid MDD/PTSD (since and current): ongoing hurricane-related stressors within the 6 months after Hurricane Katrina, low social support within the 2 months after Hurricane Katrina, and hurricane-related financial loss. It is worth commenting that these are 3 of the 5 predictors for PTSD (female gender and traumatic events also predicted PTSD since Katrina; Galea et al., 2008). This is not surprising, as MDD is the most prevalent disorder accompanying PTSD (Onder et al., 2006). Some have argued that the high rates of co-occurrence of PTSD and MDD indicate that these disorders may exacerbate one another and/or develop in a comorbid fashion in response to traumatic events. While some prospective studies have demonstrated unique development and course of MDD and PTSD and their comorbidity following a trauma (Shalev et al., 1998), other studies have found that following a trauma, MDD and PTSD tend to occur together and are predicted by similar factors, particularly at 12 months post-trauma, suggesting that a general traumatic stress reaction may represent a better conceptualization of psychopathology following a trauma (O'Donnell et al., 2004). The similarities among predictors of PTSD and MDD found in this study may support the conceptualization of general traumatic stress reaction, however, future research utilizing prospective longitudinal designs are needed to answer this question. In particular, it would be interesting to understand how MDD and PTSD exacerbate each other over time. For example, chronic symptoms of PTSD may increase a learned helplessness response that may secondarily trigger or maintain MDD.

Previous research has reported that depression after a mass traumatic event is influenced by more intangible qualities of personal vulnerability and exposure to stressors, in contrast to PTSD, which is primarily influenced by the more tangible quality of event exposure (Tracy et al., 2011). In this study we found that low educational attainment, having never been married, and Katrina-related traumatic event exposure were all unique predictors of MDD, post-disaster traumatic events were a unique predictor of PTSD, and ongoing nontraumatic stressors, financial loss, and social support were shared vulnerability factors for MDD and PTSD. This is generally consistent with previous literature (Person et al., 2006; Tracy et al., 2011), however, the examination of MDD/PTSD comorbidity represents a novel addition to this literature.

Research has shown that the factors that occur following a natural disaster (i.e., coping efforts, resource loss, and received support) have a significant impact on symptom severity long after the event and that these factors, as opposed to the trauma event itself, may be more important in influencing how long psychological distress persists (Norris et al., 1999). Given this, it is not surprising that ongoing stressors, financial loss, and social support emerged so consistently in the prediction of psychopathology both immediately following the event and 1.5–2 years later, particularly after this specific event. It has been estimated that 1.5 million people aged 16 years or older evacuated to other parts of the United States

following Hurricane Katrina with only an estimated 71% returning home one year later (Groen & Polivka, 2008). This massive disruption has a significant impact on job loss and subsequent unemployment, as well as the breakdown of social support networks, all of which increase vulnerability for psychopathology.

These findings have implications for post-disaster relief efforts. For example, access to food, water, and housing, all of which fall under ongoing stressors, are more easily addressed than factors such as socioeconomic status. Wealth, race, and marital status as well as trauma before and after Katrina are less modifiable by post-trauma interventions. This reinforces the notion mentioned in the previous study (i.e., Galea et al., 2008) that interventions focused on increasing access to food and water, temporary housing, social support groups, and support counselors may help to prevent both PTSD and MDD following a natural disaster. Additionally, the chronicity of stressors and increased prevalence of current MDD 1.5–2 years following Hurricane Katrina implies that disaster relief efforts may benefit from increasing services past 1 year.

There are several important limitations to this study. First, there may have been a misclassification of MDD and PTSD in a few different ways: 1) MDD and PTSD were assessed by lay interviewers using the PHQ-9 and CIDI rather than by trained clinicians on structured diagnostic interviews, however, these measures are validated and frequently used in epidemiological research (e.g., National Comorbidity Survey and Replication; Tracy et al., 2011), 2) MDD and PTSD were retrospectively assessed 1.5–2 years after Hurricane Katrina, which may have been subject to poor recall, and 3) there was no assessment of psychopathology prior to Hurricane Katrina, which does not allow us to infer incidence of MDD. Second, as with all population-based studies, there is the concern that the subjects here are not an accurate representation of the area's general population. However, the response rate of this study was comparable to other population-based studies. Finally, the number of study participants with MDD and PTSD alone was too small to examine predictors of these conditions to those with comorbid MDD and PTSD.

The present study replicates and extends previous work by showing that demographic vulnerability factors (i.e., educational and marital status) are unique predictors of MDD, while ongoing nontraumatic stressors, social support, and financial loss were all common predictors of MDD, PTSD, and MDD/PTSD comorbidity. These findings support the notion that there may be a general traumatic stress reaction following natural disasters and that individuals with heightened nontraumatic stressors, low social support, and greater disaster-related financial loss might be at particular risk for such a reaction. These findings underscore the importance and potential public health impact of interventions focused on increasing access to food and water, temporary housing, social support groups, and support counselors following a natural disaster. Further research is needed to explore the course of MDD and PTSD over time and to examine how additional factors, such as premorbid psychological functioning might impact the course of these disorders and comorbidity between them.

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Table 1

Demographic Characteristics ($N = 810$)

	Total		U.S. Census 2000	
Characteristic	***n***	**Weighted %**	***n***	**%**
Gender				
Male	387	47.8	314869	48.0
Female	423	52.5	340773	52.0
Age				
≥ 65 years	146	18.1	109031	16.6
55 – 64 years	125	15.4	80989	12.4
45 – 54 years	109	13.4	115729	17.7
35 – 44 years	201	24.8	136026	20.7
25 – 34 years	110	13.6	118667	18.1
18 – 24 years	119	14.8	95200	14.5
Race/Ethnicity				
White non-Hispanic	590	73.1	475413	72.5
Black non-Hispanic	194	24.0	157190	24.0
Hispanic	9	1.1	10010	1.5
Asian/PI non-Hispanic	2	0.2	6484	1.0
Other non-Hispanic	8	1.0	2213	0.3
Mixed race non-Hispanic	5	0.6	4332	0.7
Marital Status				
Married	432	53.4	373266	56.9
Divorced	86	10.6	76511	11.7
Separated	23	2.9	17157	2.6
Widowed	60	7.4	53446	8.1
Never married	208	25.7	135582	20.7
Education				
Bachelor’s degree or higher	113	14.1	92187	14.1
Some college	243	30.2	197572	30.1
High school or equivalent	252	31.3	203879	31.1
< High school	197	24.4	162324	24.7
Income				
< $20,000	25.3	28.7	10698	32.1
$20,000 – $39,000	25.4	28.8	97306	29.2
$40,000 – $59,000	14.3	16.2	61651	18.5
$60,000 – $99,000	15.2	17.3	48826	14.6
$100,000 or more	8.0	9.1	18853	5.7

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Table 2

Bivariate Associations and Adjusted Model Between Covariates and Current MDD and MDD Since Hurricane Katrina

	MDD Since Katrina		Adjusted Model		Current MDD		Adjusted Model	
	***n* MDD**	**% MDD**	**Odds Ratio**	**95% CI**	***n* MDD**	**% MDD**	**Odds Ratio**	**95% CI**
Total	95	11.7			74	9.1		
Gender								
Male	53	13.7	1.00		38	9.8	1.0	
Female	42	9.9	0.74	0.43 – 1.26	37	8.7	1.1	0.62 – 2.1
Age								
Age 55 and older	19*	7.0	1.00		15*	5.5	1.00	
Age 35–54	41*	13.2	1.20	0.62 – 2.32	34*	11.0	1.44	0.68 – 3.04
Age 18–34	35*	15.3	0.96	0.42 – 2.22	26*	11.3	1.26	0.49 – 3.22
Race/Ethnicity								
Caucasian Non-Hispanic	54**	9.1	1.00		47	8.0	1.00	
African American Non-Hispanic	38**	19.6	1.41	0.76 – 2.60	24	12.4	0.71	0.34 – 1.47
Hispanic	2**	20	1.06	0.15 – 7.27	2	20.0	1.44	0.21 – 9.72
Other Non-Hispanic	1**	7.1	0.78	0.07 – 8.73	1	7.1	1.13	0.09 – 14.69
Educational Attainment								
≥ High school or equivalent	51***	8.4	1.00		36***	5.9	1.00	
< High school	44***	22.3	2.28*	1.21 – 4.29	38***	19.4	1.92+	0.96 – 3.84
Household Income								
≥ $100,000	3***	4.6	1.00		2***	3.1	1.00	
$60,000 – $99,000	9***	7.3	1.86	0.41 – 8.37	8***	6.5	2.15	0.38 – 12.10
$40,000 – $59,000	8***	6.9	1.18	0.25 – 5.59	6***	5.2	1.08	0.18 – 6.66
$20,000 – $39,000	30***	14.6	3.64+	0.87 – 15.20	14***	6.8	2.20	0.40 – 12.11
< $20,000	44***	21.5	2.18	0.49 – 9.74	44***	21.5	4.64+	0.83 – 25.97
Marital Status								

	MDD Since Katrina		Adjusted Model		Current MDD		Adjusted Model	
	n **MDD**	**% MDD**	**Odds Ratio**	**95% CI**	***n*** **MDD**	**% MDD**	**Odds Ratio**	**95% CI**
Married	36**	8.3	1.00		31	7.2	1.00	
Divorced/separated/widowed	20**	11.8	0.87	0.42 – 1.80	17	10.0	0.70	0.31 – 1.57
Never been married	38**	18.3	2.15*	1.01 – 4.59	26	12.5	1.37	0.59 – 3.20
Exposure to Hurricane Katrina-related traumatic events								
No	51***	8.8	1.00		44*	7.6	1.00	
Yes	44***	19.1	1.87*	1.08 – 3.24	30*	13.1	1.20	0.64 – 2.27
Financial Loss as a result of Hurricane Katrina								
No	33***	7.4	1.00		21***	4.7	1.00	
Yes	62***	17.0	1.27	0.73 – 2.21	53***	14.5	2.12*	1.09 – 4.11
Exposure to stressors after Hurricane Katrina								
Low (0–2 stressors)	19***	3.9	1.00		12***	2.5	1.00	
High (3 or more stressors)	76***	23.3	5.96***	3.17 – 11.22	62***	19.0	5.58***	2.63 – 11.86
Social support received in the 2 months after Hurricane Katrina								
High	18***	5.7	1.00		11***	3.4	1.00	
Medium	32***	12.4	2.90**	1.40 – 6.01	27***	10.4	3.39**	1.47 – 7.83
Low	44***	19.0	4.07***	1.99 – 8.32	36***	15.5	4.70***	2.04 – 10.84
Exposure to traumatic events prior to Hurricane Katrina								
Low (0–1 traumatic events)	11**	5.5	1.00		9*	4.5	1.00	
Medium (2–3 traumatic events)	36**	12.8	1.85	0.83 – 4.13	28*	9.9	1.87	0.78 – 4.49
High (4 or more traumatic events)	48**	14.6	1.33	0.59 – 2.97	37*	11.2	1.35	0.55 – 3.31
Exposure to traumatic events after Hurricane Katrina								
Low (0–1 traumatic events)	59***	8.8	1.00		44***	6.6	1.00	
High (2 or more traumatic events)	36***	2.5	1.34	0.73 – 2.47	30***	30.0	1.43	0.73 – 2.81

Note. Significant bivariate associations are noted in the number of cases columns (i.e., *n* MDD).

*p < .05

** p < .01

*** p < .001

+ p < .10

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Table 3

Bivariate Associations and Adjusted Model Between Covariates and Current MDD/PTSD and MDD/PTSD Since Hurricane Katrina

	MDD/PTSD Since Katrina		Adjusted Model		Current MDD/PTSD		Adjusted Model	
	n MDD/PTSD	% MDD/PTSD	Odds Ratio	95% CI	*n* MDD/PTSD	% MDD/PTSD	Odds Ratio	95% CI
Total	65	8.0			53	6.5		
Gender								
Male	37	9.6	1.00		29	7.5	1.0	
Female	28	6.6	0.79	0.41 – 1.53	24	5.7	1.0	0.48 – 2.3
Age								
Age 55 and older	11**	4.1	1.00		7**	2.6	1.00	
Age 35–54	28**	9.1	1.29	0.56 – 2.98	22**	7.1	1.62	0.58 – 4.50
Age 18–34	26**	11.3	1.25	0.45 – 3.47	24**	10.4	2.05	0.62 – 6.76
Race/Ethnicity								
Caucasian Non-Hispanic	42	7.1	1.00		34	5.8	1.00	
African American Non-Hispanic	22	11.3	0.64	0.28 – 1.43	18	9.3	0.54	0.21 – 1.38
Hispanic	0	0.0	0.00	0.00	0	0.0	0.00	0.00
Other Non-Hispanic	1	7.1	0.59	0.25 – 13.71	1	6.7	0.54	0.10 – 28.49
Educational Attainment								
≥ High school or equivalent	34***	5.6	1.00		24***	3.9	1.00	
< High school	31***	15.8	1.77	0.82 – 3.83	29***	14.7	2.19+	0.91 – 5.26
Household Income								
≥ $100,000	2***	3.1	1.00		1***	1.5	1.00	
$60,000 – $99,000	7***	5.7	2.09	0.36 – 12.09	7***	5.7	3.82	0.44 – 33.15
$40,000 – $59,000	5***	4.3	0.92	0.14 – 5.99	2***	1.7	0.55	0.04 – 6.97
$20,000 – $39,000	16***	7.8	3.04	0.55 – 16.89	9***	4.4	2.67	0.30 – 23.73
< $20,000	34***	16.6	2.63	0.45 – 15.48	32***	15.6	4.28	0.47 – 38.67
Marital Status								

	MDD/PTSD Since Katrina		Adjusted Model		Current MDD/PTSD		Adjusted Model	
	n MDD/ PTSD	% MDD/ PTSD	Odds Ratio	95% CI	*n* MDD/ PTSD	% MDD/ PTSD	Odds Ratio	95% CI
Married	26 **	6.0	1.00		20 **	4.6	1.00	
Divorced/separated/widowed	12 **	7.1	0.66	0.27 – 1.63	9 **	5.3	0.54	0.19 – 1.56
Never been married	27 **	13.0	1.92	0.78 – 4.73	25 **	12.0	1.70	0.62 – 4.66
Exposure to Hurricane Katrina-related traumatic events								
No	38 *	6.6	1.00		33	5.7	1.00	
Yes	27 *	11.7	1.06	0.53 – 2.10	20	8.7	0.83	0.37 – 1.85
Financial Loss as a result of Hurricane Katrina								
No	15 ***	3.4	1.00		11 ***	2.5	1.00	
Yes	50 ***	13.7	2.34 *	1.13 – 4.82	42 ***	11.5	3.63 **	1.52 – 8.64
Exposure to stressors after Hurricane Katrina								
Low (0–2 stressors)	57 ***	17.5	1.00		6 ***	1.2	1.00	
High (3 or more stressors)	8 ***	1.6	9.33 ***	3.73 – 23.35	47 ***	14.4	7.59 ***	2.68 – 21.52
Social support received in the 2 months after Hurricane Katrina								
High	9 ***	2.9	1.00		6 ***	1.9	1.00	
Medium	22 ***	8.5	3.60 **	1.39 – 9.32	18 ***	6.9	3.69 *	1.22 – 11.17
Low	34 ***	14.7	6.82 ***	2.68 – 17.41	28 ***	12.1	8.08 ***	2.71 – 24.08
Exposure to traumatic events prior to Hurricane Katrina								
Low (0–1 traumatic events)	8 *	4.0	1.00		8	4.0	1.00	
Medium (2–3 traumatic events)	24 *	8.5	1.97	0.74 – 5.24	21	7.4	1.68	0.60 – 4.69
High (4 or more traumatic events)	33 *	10.0	1.31	0.49 – 3.51	24	7.3	1.08	0.37 – 3.13
Exposure to traumatic events after Hurricane Katrina								
Low (0–1 traumatic events)	35 ***	5.2	1.00		27 ***	4.0	1.00	
High (2 or more traumatic events)	30 ***	2.1	2.13 *	1.06 – 4.30	26 ***	18.2	2.03 +	0.90 – 4.56

Note. Significant bivariate associations are noted in the number of cases columns (i.e., *n* MDD/PTSD).

* $p < .05$

** p < .01

*** p < .001

+ p < .10