

Disparities in Mental Health Treatment Following the World Trade Center Disaster: Implications for Mental Health Care and Health Services Research

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To assess disparities in mental health treatment in New York City (NYC) after the World Trade Center Disaster (WTCD) reported previously related to care access, we conducted analyses among a cross-sectional survey of adults who had posttraumatic stress disorder (PTSD) or major depression ($N = 473$) one year after the event. The dependent variables examined were use of mental health services, in general, and use of mental health services related to the WTCD. Similar dependent variables were developed for medication usage. Although a number of bivariate results were statistically significant for postdisaster mental health visits, in a multivariate logistic regression model, only WTCD exposure remained significant. For service utilization related to the WTCD, the multivariate results indicated that African Americans were less likely to have had these visits compared to Whites, while those with a regular doctor, who had greater exposure to WTCD events, and those who had a perievent panic attack were more likely to have had such visits. In terms of medication use, multivariate results suggested that African Americans were less likely to use postdisaster medications, whereas persons 45 + years old and those with a regular doctor, were more likely to use them. For WTCD-related medication use, multivariate models indicated that African Americans were less likely to use medications, relative to Whites, while those between 45 and 64 years old, those with a regular doctor, those exposed to more WTCD events, and those who had a perievent panic attack, were more likely to have taken medications related to the disaster. The primary reason respondents gave for not seeking treatment (55% of subsample) was that they did not believe that they had a problem (73%). Other reasons were that they wanted to solve the problem on their own (5%), had problems accessing services (6%), had financial problems (4%), or had a fear of treatment (4%). Despite the availability of free mental health services offered in a supportive and potentially less stigmatizing environment post disaster, there still appeared to be barriers to receiving postdisaster services among those presumably in need of care.

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The terrorist attacks in New York City (NYC) on September 11, 2001, resulted in one of the largest death tolls of any disaster in the United States (Centers for Disease Control, 2002). An initial study of the psychological impact in Manhattan after the attacks indicated that 7.5% of adults had symptoms consistent with PTSD related to these attacks and 9.7% had symptoms consistent

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with depression (Galea et al., 2002). While major disasters are rare, previous studies have suggested that psychiatric disorders are common among disaster survivors (Green, 1991; Norris, 1992; Norris et al., 2002; Smith, North, McCool, & Shea, 1990). Furthermore, although some research suggests the contrary (McFarlane, 1989), these effects may be more severe for disasters involving significant loss of life (Rubonis & Bickman, 1991).

Although use of mental health services has been documented following previous disasters (Burkle, 1996; Carr, Lewin, Carter, & Webster, 1992), few investigations focused on population-level utilization. In addition, prior to the World Trade Center disaster (WTCDD), most studies have focused on the impact among direct survivors and have used different measures and timeframes, making generalization difficult (Gleser, Green, & Winget, 1981; Joseph, Yule, Williams, & Hodgkinson 1993; Madakasira & O'Brian, 1987). Effective mental health planning requires assessment of population-level service utilization and needs (Siegel, Laska, & Meisner, 2004; U.S. Department of Health and Human Services, 1999). Earlier population studies following the WTCDD suggested lower mental health service utilization than expected (Boscarino, Adams, & Figley, 2004; Boscarino, Galea, Ahern, Resnick, & Vlahov, 2002a, 2003; Boscarino, Galea, et al., 2004). Some research also suggested that a decrease in population-level utilization actually had occurred post disaster (Boscarino, Galea, et al., 2004). For example, surveys of mental health service use indicated that 19.4% of Manhattan residents used these services over a 30-day period 1–2 months post disaster, compared with 12.0% 4–5 months post disaster (Boscarino, Galea, et al., 2004).

Despite the availability of extensive, free postdisaster mental health services in New York (Felton, 2002; Quervalu, 2002), early studies suggested that access to mental health care services was not uniform across different demographic groups (Boscarino, Galea, Ahern, Resnick, & Vlahov, 2002b). In particular, initial study data collected 1–2 months post disaster in Manhattan suggested that adults less than 25 years old, men, and those without health insurance were less likely to receive postdisaster mental health care (Boscarino et al., 2002b). Later data collected 4–5 months post disaster in NYC as a whole also suggested that Whites who met the criteria for PTSD or depression were more likely to have received postdisaster mental health care than minority group members with these disorders (Boscarino, Galea, et al., 2004). In addition, persons with PTSD or depression who were 25+ years old, especially those between 45 and 64, were more likely to have received care compared to persons less than 25 years old (Boscarino, Galea, et al., 2004). Consistent with earlier studies (Boscarino et al.,

2002b), later research indicated that cases with PTSD or depression that had health insurance coverage or had primary care doctors, were *more* likely to have received mental health services than those without these health care resources (Boscarino, Galea, et al., 2004).

Given previous reports related to disparities in mental health service utilization in general (U.S. Department of Health and Human Services, 1999), the postdisaster findings for race and ethnicity were not altogether surprising. Earlier population studies have documented racial and ethnic disparities in mental health care, including gaps in access, differences in diagnostic practices, and availability of optimal treatments (Snowden, 2003). Although cultural issues may have been a factor (Cauce et al., 2002), the racial and ethnic disparities initially found in postdisaster service utilization were noteworthy, given the wide availability of free postdisaster mental health services in NYC (Felton, 2002; Quervalu, 2003). Perhaps somewhat less surprising, however, was the finding that persons with postdisaster PTSD or depression were less likely to receive mental health treatment, if they did not have primary care doctors or health insurance coverage (U.S. Department of Health and Human Services, 1999). The focus of the current study was to examine access barriers to postdisaster care in NYC in more detail and to determine if the initial disparities found at 1–2 months and at 4–5 months persisted over a longer period, 1-year post disaster. In the current study, we focus on a subsample of New Yorkers, who meet the study criteria for either PTSD or depression. This group would have presumably benefited from mental health care or psychotropic medications. While our previous studies briefly examined this group related to care access, we used relatively short timeframes (e.g., less than 6 months), and did not adjust the data for potential confounding factors, such as age, gender, borough of residence, and insurance status. The purpose of the current study was to overcome these previous study limitations.

Method

Participants

Using random-digit dialing, we conducted a random household survey one year after the World Trade Center Disaster. Potential participants were English or Spanish-speaking adults (18 years old or older) who were living in NYC at the time of the study and at the time of the attacks. When interviewers reached a person at a residential telephone number, they obtained verbal consent, ascertained the area of residence in New York City, screening out nonresidents and those who were not living in NYC on September 11, 2001, and selected one adult for an

interview (based on the most recent birthday), if more than one eligible adult lived in the household. As part of the overall study, we oversampled residents who reported receiving any mental health treatment after the attacks, identified by means of screener questions at the beginning of the survey. This survey methodology, combined with our survey weights discussed below, permits a more accurate assessment of those potentially affected by this disaster in the context of a representative population survey (Groves et al., 2004). The population was also stratified by the five NYC boroughs and sampled proportionately. Interviews occurred between October and December 2002. Questionnaires were translated into Spanish and then back-translated by bilingual Americans to ensure the linguistic and cultural appropriateness of survey items. Trained interviewers used a computer-assisted telephone interviewing system in all of the interviews. All interviewers were supervised and monitored by the survey contractor in collaboration with the investigative staff. The Institutional Review Board of The New York Academy of Medicine reviewed and approved the study's protocols.

Overall, 2,368 individuals completed the survey. Approximately, 7% of the interviews were conducted in Spanish (23% of Hispanics completed the interview in Spanish). Using industry standards (American Association for Public Opinion Research, 2000), the cooperation rate was approximately 63%.¹ A protocol was in place to provide assistance to participants who required mental health counseling. The mean duration of the interviews was 45 minutes. Sampling weights were developed to correct for potential selection bias related to the number of telephone numbers and persons per household and for the oversample of treatment-seeking respondents. These weights allowed us to treat the sample as representative of the NYC population (Groves et al., 2004).

Study Case Definition

As overall service utilization findings were reported elsewhere (Boscarino, Adams, et al., 2004; Boscarino et al., 2002a; Boscarino, Galea, et al., 2004), we were interested in identifying barriers to treatment for those with major postdisaster psychological problems. Thus, for the

present study we retained only those who met criteria for PTSD or major depression in the year after the WTC. Our PTSD measure was based on the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*; American Psychiatric Association, 1994). This measure was developed for telephone administration and used in previous national surveys (Kilpatrick et al., 2003; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993) as well as in recent WTC studies (Boscarino, Adams, et al., 2004; Boscarino et al., 2002a; 2003; Boscarino, Galea, et al., 2004). Cronbach's alpha for the symptoms used in this scale was 0.90 (Boscarino, Adams, et al., 2004; Boscarino et al., 2002a). In addition, our PTSD scale had kappa coefficients with the clinician-administered, Structured Clinical Interviews for *DSM-III-R* (SCID) of 0.71 for current and 0.77 for lifetime PTSD (Kilpatrick et al., 1998). Furthermore, we compared our PTSD scale to the PTSD Check List (PCL; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996) among a random subsample of 229 survey participants in NYC and found that the PCL had 75% sensitivity and 95% specificity in detecting PTSD cases as classified by our PTSD instrument. In a receiver operating characteristic (ROC) curve analysis (Pepe, 2003), a PCL cutoff score of ≥ 50 , which was the cutoff recommended, also optimally predicted PTSD using our instrument (area under the curve = 0.97). To date, versions of this PTSD scale have been used in mental health surveys involving over 15,000 telephone interviews (Acierno et al., 2003; Boscarino, Adams, et al., 2004; Boscarino, Galea, et al., 2004; Boscarino, Figley, et al., 2004; Galea et al., 2003; Resnick et al., 1993).

For a diagnosis of major depression, we used a version of the SCID's major depressive disorder scale designed for nonpatients (Spitzer, Williams, & Gibbon 1987), which also has been adopted for use in telephone-based population surveys (Acierno et al., 2000; Boscarino, Adams, et al., 2004; Boscarino, Galea, et al., 2004, 2004b; Galea et al., 2002; Kilpatrick et al., 2003). Consistent with *DSM-IV* (American Psychiatric Association, 1994), respondents met the criteria for depression if they had five or more depression symptoms for at least 2 weeks within the past year. Cronbach's alpha for the 10 symptoms used in this scale in the current study was 0.87 (Boscarino, Adams, et al., 2004). When the diagnostic results for depression in the past 30 days using this depression scale were compared to those obtained by the BSI-18 Depression Scale (Derogatis, 2001) among current survey participants, the results were as follows. The BSI-18 Depression Scale had 73% sensitivity and 87% specificity in detecting depression cases as classified by our depression instrument. In a ROC curve analysis (Pepe, 2003), a BSI-depression score of ≥ 65 , which was a clinical

¹Specifically, the cooperation rate is composed of (a) completed interviews, (b) screen outs—respondents who were not living in New York City at the time of the interview, were not living in New York City on September 11, or did not speak English or Spanish, (c) quota outs—respondents who were eligible to be interviewed but were a gender or lived in a borough where the required number of interviews had been completed, and (d) refusals. (Cooperation rate = completed interviews [2,369] + screen outs [4,985] + quota outs [117]/completed interviews + screen outs + quota outs + refusals [4,330].)

cutoff for BSI-depression, also optimally predicted depression using our instrument (area under the curve = 0.89; Boscarino, Adams, et al., 2004). More detailed data on the reliability and validity of this depression scale have been reported elsewhere (Boscarino, Adams, et al., 2004; Boscarino, Galea, et al., 2004; Boscarino, Galea, et al., 2004).

Based on these two diagnostic measures, we included respondents in our analysis who had either PTSD or major depression in the year after the WTC. Given the prevalence of these conditions post disaster, our total subsample for the current study consisted of 473 individuals (12% had PTSD only, 59% had major depression only, and 29% with both these disorders).

Service Utilization Variables

For our mental health utilization measures, we adopted the National Comorbidity Survey (NCS) methodology (Kessler et al., 1997, 1999), which essentially represents the “gold standard” in mental health services research. Here we asked participants about receiving counseling from a helping professional (e.g., psychiatrist, counselor, physician, self-help group, etc.) for “problems with emotions or nerves or use of alcohol or drugs” in the year after the attacks. Validity studies of self-reported mental health visits suggest that this may underrepresent actual visits, but is accurate when the timeframe is short (Kessler et al., 1997). For our current analysis, we coded any postdisaster mental health service use as a binary variable to indicate whether service used had occurred. In addition, respondents who had postdisaster visits also were asked if these visits were related to the WTC. Based on the response to this question, a binary variable was created to indicate whether a mental health visit was related to the WTC. Psychotropic medication use was assessed in a manner similar to service utilization and also adapted from the NCS. Respondents were asked if they had taken any medications prescribed by a doctor, such as antidepressants, tranquilizers, or sleeping pills for emotional problems in the year after the attacks. Similar to service use, we created binary variables to indicate that postdisaster medication use had occurred and, if it did, whether this was related to the disaster or not. It should be noted that both mental health service use and medication use related to the WTC are subsets of the general service and medication use variables.

Study Independent Variables

In our analyses, we included four sets of variables that past research suggested would be associated with

postdisaster service and medication use (Boscarino et al., 2002a, 2003; Boscarino, Galea, et al., 2004). These included four demographic variables, two health care system variables, a WTC-event exposure variable, and a mental health variable. For demographic variables, we included the borough where the respondent currently lived, with Manhattan defined as the reference category. Self-reported race was coded into White, African American, Hispanic, and Other, with White defined as the reference category. Gender was dummy-coded so that male was the reference category. Finally, age was coded in years into four categories, including 18–29, 30–44, 45–64, and 65+, with 18–29 as the reference category. The two health care system variables we included in our analyses were having health insurance (private or public) and having a regular doctor. We dummy-coded both variables, with having insurance and not having a regular doctor as the reference categories.

Our WTC-related event exposure measure was the sum of 14 potential events that could have occurred during or after the attacks (e.g., fear of being killed, having a friend or relative killed, being forced to move, having financial difficulties, etc.). For our analysis, since we had no a priori method to weight the severity of these events, we categorized these into low (0–1 events), moderate (2–3 events), high (4–5 events), and very high (6+ events) exposures. This scale was developed from other disaster studies (Freedy, Kilpatrick, & Resnick 1993) and used in previous WTC research (Boscarino, Adams, et al., 2004; Boscarino et al., 2002a; Boscarino, Figley, et al., 2004; Boscarino, Galea, et al., 2004). Finally, our mental health covariate measure was perievent panic attack. This measure was a modified version of the Diagnostic Interview Schedule (DIS) scale for panic attack (Robins et al., 1999; revised 2002) and adopted directly from the *DSM-IV* (American Psychiatric Association, 1994). The scale’s 14 items were phrased to assess symptoms that occurred during or shortly following the terrorist attacks (Cronbach’s alpha = 0.85). The presence of four or more symptoms that reached a peak within 10 minutes after they started was defined as a perievent panic attack. This scale was used previously in WTC telephone surveys predicting services use and has been described in detail elsewhere (Boscarino et al., 2003; Boscarino, Figley, et al., 2004; Boscarino, Galea, et al., 2004; Galea et al., 2002).

Open-Ended Questions

Our survey also included several “open-ended” questions related to reasons for not using services or for service delays experienced. These questions were administered and coded in accordance with standard procedures

for qualitative survey research (Groves et al., 2004). For example, following accepted survey protocols, all open-ended questions were recorded verbatim. Each question was probed up to three times for specificity, if necessary (i.e., if a vague answer was given, the respondent was asked: "Can you be more specific?"; Groves et al., 2004). After survey completion, the verbatim responses were manually coded by trained survey coders employed by the survey contractor. As a guide for this coding, we used previous research findings from a similar access study (Kessler, 2000). Following this, tabulations were done and coding revised, as necessary, in consultation with study investigators to capture any new categories that emerged or to collapse categories, if needed. When these steps were completed, the final categories were assigned numeric values and value labels and then these data were added to the study database (Groves, 2004).

Statistical Analysis

Our analytic approach was to first provide descriptive statistics for our subsample of New Yorkers with PTSD or depression. We then conducted a series of multivariate logistic regressions to investigate the association between our predictor variables and the service and medication utilization measures described (Hosmer & Lemeshow, 2000). Finally, we used the survey estimation (svy) command in Stata, version 7 (Stata Corporation, 2001), to generate frequency distributions, point estimates, and our regression models. This command is required for complex surveys and uses the first-order Taylor series linear approximation method. This adjusted the data (i.e., the point estimates, confidence intervals, standard errors, etc.) for the sampling design, which included stratification by borough, case weights to adjust for potentially overrepresenting persons in households with more telephone lines per adult, and the treatment oversample. It is noted that the *N*s presented are not adjusted by the svy command; therefore these will not be consistent with the adjusted percentages shown and this is footnoted in all the tables. All *p* values presented are based on two-tailed tests.

Results

Of the 473 respondents who had either PTSD or major depression in the past year, 281 of them (45% weighted) reported using mental health services post disaster and 220 (33.1% weighted) reported receiving services for WTCDD-related problems (Table 1). As our descriptive statistics show (Table 1, columns 1 and 2), the majority (61%) of PTSD–depression cases lived in

Manhattan or Brooklyn, 58% were female, nearly 70% were under 45 years old, 79% had health insurance coverage, 81% had a regular doctor, 82% had moderate to heavy exposure to the WTCDD, and 27% had a perievent panic attack during this event. These statistics were not different from expectations, as past research tends to show that persons with PTSD or depression are female and younger (Kessler, Sonnega, Bromet, & Hughes, 1995; Kessler et al., 2003). Also, noteworthy was the fact that the percentage of respondents in this subsample who met criteria for perievent panic attack was more than double that found for the entire sample (27% versus 11%, respectively; Boscarino, Adams, et al., 2004).

Examining the bivariate associations between our predictor variables and any postdisaster mental health visits (Table 1, columns 3–5), suggested few significant relationships. Specifically, there were no statistically significant differences in service utilization 1-year post disaster by borough, race, gender, age, health insurance status, or perievent panic attack. Individuals with a regular doctor and those in the very high exposure category were the only ones more likely to have a postdisaster mental health service visit, $OR = 2.13, p < .05$, $OR = 2.73, p < .05$, respectively. However, once the independent variables were included in the regression model, only WTCDD exposure remained statistically significant, $OR = 2.55, p < .05$ (Table 1, columns 6 and 7). Analyses for mental health service utilization related to the WTCDD, however, revealed different findings (Table 1, columns 8–12). In the bivariate results (Table 1, columns 8–10), African Americans were less likely to have had a WTCDD-related mental health visit compared to Whites, $OR = 0.47, p < .05$. In addition, individuals with a regular doctor, $OR = 2.43, p < .01$, those who had greater exposure to WTCDD events, $OR = 5.96, p < .001$, for very high exposure, and those who had a perievent panic attack, $OR = 1.89, p < .05$, were more likely to have had such a visit, compared with those who did not have a regular doctor, who had no exposure to WTCDD events, or who did not experience a perievent panic attack. The multivariate analysis that included all the variables did not appreciably alter these associations (Table 1, columns 11 and 12).

In terms of any medication use, 177 of those with PTSD or depression (26% weighted) used psychotropic drugs in the year after the WTCDD and of those, 114 (16% weighted) indicated that this use was related to emotional problems associated with the attacks (Table 2). Bivariate results for postdisaster medication use suggested a different pattern of associations relative to mental health visits. These analyses (columns 3–5) indicated that African Americans were less likely to use medications post disaster, $OR = 0.38, p < .01$, and persons 45–64 years old,

Table 1. Logistic Regressions Predicting Postdisaster Mental Health Service Use Among New York City Residents Who Had PTSD or Major Depression ($N = 473$)^a

Demographic and exposure variables	Study sample		Any mental health visits post disaster ($n = 281$)					Mental health visits related to disaster ($n = 220$)				
	<i>N</i>	% Total	% Service utilization	Unadjusted OR ^b	Unadjusted 95% CI ^b	Adjusted OR ^b	Adjusted 95% CI ^b	% Disaster related	Unadjusted OR ^b	Unadjusted 95% CI ^b	Adjusted OR ^b	Adjusted 95% CI ^b
Borough												
Manhattan (Ref)	125	25.58	50.86	1.00	—	1.00	—	35.69	1.00	—	1.00	—
Bronx	84	15.22	43.94	0.76	0.36–1.58	0.77	0.33–1.78	35.45	0.99	0.48–2.05	1.10	0.45–2.65
Brooklyn	150	35.01	39.26	0.62	0.32–1.22	0.64	0.31–1.32	28.77	0.73	0.38–1.39	0.88	0.42–1.81
Queens	88	19.23	49.99	0.97	0.46–2.04	1.03	0.47–2.23	35.96	1.01	0.49–2.08	1.28	0.60–2.71
Staten Island	26	4.96	42.22	0.71	0.23–2.13	0.56	0.20–1.53	31.71	0.84	0.27–2.58	0.57	0.21–1.59
Race												
White (Ref)	201	39.53	48.32	1.00	—	1.00	—	36.43	1.00	—	1.00	—
African American	114	25.69	38.18	0.66	0.36–1.20	0.66	0.33–1.33	21.24	0.47*	0.27–0.83	0.43*	0.22–0.83
Hispanic	128	29.81	44.78	0.87	0.47–1.59	0.80	0.40–1.60	36.53	1.00	0.56–1.82	0.85	0.41–1.78
Other	30	4.97	58.22	1.49	0.46–4.84	1.37	0.36–5.18	47.12	1.56	0.53–4.53	1.45	0.46–4.56
Gender												
Male (Ref)	181	41.88	40.95	1.00	—	1.00	—	31.22	1.00	—	1.00	—
Female	292	58.12	48.18	1.34	0.82–2.00	1.54	0.90–2.62	34.43	1.16	0.71–1.88	1.30	0.78–2.17
Age												
18–29 (Ref)	96	30.82	41.20	1.00	—	1.00	—	25.38	1.00	—	1.00	—
30–44	206	38.08	50.78	1.47	0.77–2.79	1.30	0.68–2.50	39.29	1.90	0.99–3.67	1.77	0.87–3.59
45–64	144	26.51	43.79	1.11	0.56–2.01	0.98	0.48–2.01	35.11	1.59	0.79–3.19	1.54	0.71–3.33
65+	22	4.59	33.62	0.72	0.24–2.21	0.60	0.20–1.82	23.28	0.89	0.28–2.86	0.91	0.26–3.13
Health insurance												
Insurance (Ref)	387	78.62	46.46	1.00	—	1.00	—	33.18	1.00	—	1.00	—
No insurance	85	21.38	40.61	0.79	0.42–1.47	1.26	0.58–2.76	32.96	0.99	0.54–1.83	1.88	0.87–4.09
Has regular doctor												
No (Ref)	67	18.66	30.66	1.00	—	1.00	—	19.03	1.00	—	1.00	—
Yes	406	81.34	48.47	2.13*	1.12–4.04	2.24	0.97–6.23	36.31	2.43**	1.29–4.58	3.99***	1.76–8.95
Exposure to WTCD												
Low (Ref)	67	18.31	35.72	1.00	—	1.00	—	14.55	1.00	—	1.00	—
Moderate	163	35.83	46.14	1.54	0.73–3.24	1.41	0.65–3.04	34.32	3.07**	1.40–6.70	2.66*	1.19–5.97
High	153	30.03	41.76	1.29	0.62–2.71	1.22	0.56–2.65	33.81	2.99**	1.38–6.52	2.58*	1.14–5.92
Very high	90	15.84	60.25	2.73*	1.22–6.12	2.55*	1.05–6.21	50.36	5.96***	2.59–13.69	4.48***	1.87–10.72
Perievent panic attack												
No (Ref)	338	73.1	44.46	1.00	—	1.00	—	29.18	1.00	—	1.00	—
Yes	135	26.8	47.04	1.11	0.64–1.92	1.09	0.61–1.93	43.75	1.89*	1.10–3.24	2.06**	1.19–3.54
% Total service use	—	—	45.15	—	—	—	—	33.09	—	—	—	—

^aAll *N*'s are unweighted. All other results are weighted using sampling weights to adjust for stratification, the number of telephone lines and adults in the household, and for the treatment oversample. ^bOR = Odds ratio; CI = Confidence interval; Ref = reference group. Unadjusted ORs represent the bivariate results, while the adjusted ORs are adjusted for all variables shown in table.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2. Logistic Regressions Predicting Postdisaster Psychotropic Medication Use Among New York City Residents Who Had PTSD or Major Depression ($N = 473$)^a

Demographic and exposure variables	Study sample		Any medication use post disaster ($n = 177$)					Medication use related to disaster ($n = 114$)				
	<i>N</i>	% Total	% Drug utilization	Unadjusted OR ^b	Unadjusted 95% CI ^b	Adjusted OR ^b	Adjusted 95% CI ^b	% Disaster related	Unadjusted OR ^b	Unadjusted 95% CI ^b	Adjusted OR ^b	Adjusted 95% CI ^b
Borough												
Manhattan (Ref)	125	25.58	31.67	1.00	—	1.00	—	18.29	1.00	—	1.00	—
Bronx	84	15.22	26.00	0.76	0.37–1.53	0.83	0.39–1.84	15.58	0.82	0.38–1.78	0.87	0.36–2.12
Brooklyn	150	35.01	21.67	0.60	0.31–1.14	0.77	0.40–1.50	14.81	0.78	0.38–1.57	1.07	0.51–2.22
Queens	88	19.23	25.40	0.73	0.36–1.51	0.86	0.41–1.78	14.12	0.73	0.35–1.55	0.93	0.43–1.95
Staten Island	26	4.96	31.51	0.99	0.33–2.97	0.73	0.24–2.19	24.61	1.46	0.44–4.83	0.94	0.29–3.06
Race												
White (Ref)	201	39.53	33.42	1.00	—	1.00	—	21.26	1.00	—	1.00	—
African American	114	25.69	16.07	0.38**	0.20–0.72	0.41*	0.20–0.84	7.34	0.29**	0.15–0.59	0.27**	0.12–0.61
Hispanic	128	29.81	25.47	0.68	0.38–1.22	0.78	0.38–1.61	18.41	0.84	0.45–1.54	0.78	0.35–1.73
Other	30	4.97	23.31	0.61	0.23–1.61	0.77	0.27–2.19	7.90	0.32	0.09–1.07	0.33	0.09–1.14
Gender												
Male (Ref)	181	41.88	23.47	1.00	—	1.00	—	13.75	1.00	—	1.00	—
Female	292	58.12	27.98	1.27	0.77–2.08	1.49	0.85–2.60	17.92	1.37	0.78–2.39	1.55	0.83–2.90
Age												
18–29 (Ref)	96	30.82	15.88	1.00	—	1.00	—	8.95	1.00	—	1.00	—
30–44	206	38.08	26.32	1.89	0.96–3.72	1.71	0.85–3.44	18.53	2.16	0.97–4.78	1.96	0.84–4.56
45–64	144	26.51	34.44	2.78**	1.37–5.64	2.52*	1.22–5.19	22.42	2.94**	1.34–6.48	2.65*	1.10–6.41
65+	22	4.59	46.58	4.61*	1.42–14.97	3.90*	1.24–12.32	18.57	2.32	0.63–8.52	2.40	0.57–10.04
Health insurance												
Insurance (Ref)	387	78.62	28.57	1.00	—	1.00	—	16.86	1.00	—	1.00	—
No insurance	85	21.38	17.15	0.52	0.25–1.07	1.01	0.42–2.42	13.76	0.79	0.35–1.75	1.42	0.52–3.90
Has regular doctor												
No (Ref)	67	18.66	12.63	1.00	—	1.00	—	8.00	1.00	—	1.00	—
Yes	406	81.34	29.18	2.85**	1.37–5.92	2.36	0.97–5.75	18.05	2.53*	1.09–5.89	2.98	0.96–9.23
Exposure to WTC/D												
Low (Ref)	67	18.31	24.66	1.00	—	1.00	—	7.93	1.00	—	1.00	—
Moderate	163	35.83	23.18	0.92	0.45–1.90	0.75	0.36–1.53	15.14	2.07	0.87–4.96	1.67	0.67–4.13
High	153	30.03	26.60	1.11	0.53–2.30	0.85	0.38–1.87	18.26	2.59*	1.07–6.31	1.92	0.74–4.97
Very high	90	15.84	33.38	1.53	0.69–3.39	1.27	0.54–2.94	24.08	3.68**	1.46–9.29	2.47	0.96–6.33
Perievent panic attack												
No (Ref)	338	73.15	25.60	1.00	—	1.00	—	13.53	1.00	—	1.0	—
Yes	135	26.85	27.42	1.10	0.65–1.86	1.32	0.74–2.35	23.37	1.95**	1.11–3.41	2.51**	1.38–4.55
% Total medication use	—	—	26.09	—	—	—	—	16.17	—	—	—	—

^aAll *N*'s are unweighted. All other results are weighted using sampling weights to adjust for stratification, the number of telephone lines and adults in the household, and for the treatment oversample. ^bOR = Odds ratio; CI = Confidence interval; Ref = reference group. Unadjusted ORs represent the bivariate results, while the adjusted ORs are adjusted for all variables shown in the table.

* $p < .05$. ** $p < .01$.

OR = 2.78, $p < .01$, and 65+ years old, OR = 4.61, $p < .05$, relative to those 18–29 years old, and those with a regular doctor, OR = 2.85, $p < .01$, were more likely to use medications. Examination of the multivariate model (Table 2, columns 6 and 7) showed little change from the bivariate associations, with only having a regular doctor now not statistically significant. African Americans were still less likely to use medications and older persons were more likely. Interestingly, neither WTCD event exposures nor having a perievent panic attack was significantly related to general postdisaster medication use. For WTCD-related medication use, African Americans were, again, less likely to use medications relative to Whites, OR = 0.29, $p < .01$, similar to WTCD-related service use. In contrast, those between 45 and 64, OR = 2.94, $p < .01$, who had a regular doctor, OR = 2.53, $p < .05$, who were exposed to more WTCD-related events, OR = 2.59, $p < .05$, for high exposure, OR = 3.68, $p < .01$ for very high exposure, and those who had a perievent panic attack, OR = 1.95, $p < .01$, were more likely to have taken medications related to the attacks. The multivariate analysis, again, showed that African Americans were less likely to use medications related to the WTCD, while 45–64-year-olds and those who had a perievent panic attack were more likely to use postdisaster medication related to the WTCD. It is interesting to note that once the other independent variables were controlled, exposure to WTCD events was no longer significantly associated with this outcome variable.

As suggested, to further examine barriers to treatment, our survey included several open-ended questions inquiring why New Yorkers did not seek or receive postdisaster treatment. To do this, first, we queried respondents who did not report receiving postdisaster mental health

treatment, why they did not seek this type of care. Second, for those who received treatment, but delayed for 2 or more weeks in seeking care, we asked these individuals why they waited. Third, for those who sought treatment, but were delayed for 2 or more weeks, we asked them why they had experienced this delay. (The last two questions tended to overlap somewhat.) We then coded responses to these open-ended questions into 12 categories based on the total survey population, as discussed above in the Method section. The results of these open-ended questions are presented in Table 3. As noted above, 45% of respondents with PTSD or major depression sought treatment in the year after the WTCD. Nevertheless, there were a number of specific reasons given as to why the other 55% did not (Table 3, column 1). First and foremost, 73% of the nontreatment seekers with PTSD or depression reported that they did not seek treatment because they did not believe they had a problem. Other reasons given for not seeking treatment were that respondents wanted to solve the problem on their own (5%), had problems accessing services (6%), had financial problems (4%), and had a fear of treatment (4%). For those who delayed for two weeks or more before seeking treatment (Table 3, column 3), a plurality reported that they experienced access problems (24%). The next most common reasons given were that they wanted to solve the problem on their own (14%), they did not think they had a problem (11%), and that they were afraid of treatment (10%). It is interesting to note that 17% of the respondents who waited reported that they did not know why they waited. Finally, some respondents who had difficulty in accessing treatment once they had made the decision to seek care were asked the reasons for the delay (Table 3, column 4). The major reason given for the delay in receiving treatment was, again,

Table 3. Responses to Open-Ended Questions About Why Did Not Seek Postdisaster Treatment, Why Delayed Seeking Treatment, Why Did Not Get Postdisaster Treatment Right Away When Sought Care Among New Yorkers With PTSD or Depression^a

Survey response	Reason for Not Seeking Treatment %	Reason Delayed Seeking Treatment %	Reason Delayed in Receiving Treatment %
Tried to solve on own	5.4	14.4	7.6
Got support from others	0.7	0.0	0.0
Feared treatment	4.0	10.0	8.0
Had access problems	5.9	24.2	22.6
Had financial problems	3.7	1.1	2.6
Had treatment effectiveness issues	1.2	0.5	4.4
Other issues mentioned	4.0	21.0	28.9
Did not think had problem	72.9	11.4	4.2
Don't know why did not get treatment	2.1	17.4	21.7
<i>n</i>	191	193	114

^aAll *N*s are unweighted. Percentages are weighted using sampling weights to adjust for stratification, the number of telephone lines and adults in the household, and for the treatment oversample.

that respondents reported experiencing access problems (23%). Other specific reasons included having had a fear of treatment (8%) and having had tried to solve the problem on their own (8%). In addition, a significant number of persons, again, reported that they did not know why there was a delay in receiving care (22%). It is noteworthy that few of these respondents specifically mentioned the support from others, stigma associated with mental illness, or financial problems as a reason for *not* seeking treatment or for delays in getting treatment. Finally, it is important to note that the responses listed under “Other issues” were diverse and did not fall under any specific group of problems.

Because the African Americans in our study were significantly less likely to have received mental health care or to have taken psychotropic medications post disaster, we cross-tabulated belief about having a current mental health problem by race/ethnicity among the nontreatment seekers. Although these results were not statistically significant due to the small sample size, they were insightful. While 67% of Whites mentioned that they did not seek treatment because they did not believe they had a problem, this figure was 81% for African Americans and 79% for Hispanics. In addition, because our results for race could have been confounded by level of education, we reran all our logistic regressions and included this variable in these models. The results for race in these models were the same as previously reported.

Discussion

Among New Yorkers in our study with either PTSD or major depression, 45% reported using postdisaster mental health services and 33% reported using these services for WTCO-related mental health problems. In multivariate analysis for service utilization, only high WTCO event exposure remained significant of all the predictor variables. For mental health service utilization related to the WTCO, results also indicated that African Americans were less likely to have had WTCO-related visits compared to Whites, while individuals with a regular doctor, those who had greater exposure to WTCO events, and those who had a perievent panic attack were more likely to have had such visits. In terms of medication use, 26% of respondents used psychotropic drugs in the year after the WTCO and 16% reported that this usage was related to the disaster. Multivariate results suggested that African Americans were less likely to use medications post disaster, whereas persons 45 years old and older were more likely to use medications. For WTCO-related medication use, multivariate analysis suggested that African Ameri-

cans, again, were less likely to use medications, relative to Whites, while those between 45 and 64 years old, who had a regular doctor, and those who had a perievent panic attack were more likely to have taken medications related to the disaster.

Everyone in our study subsample had PTSD or major depression and, presumably, might have benefited from consultation with mental health professionals. As was seen, for the majority of study respondents, treatment seeking did not occur for some reason. How much of this nontreatment seeking may have been related to a diminished functional capacity is unclear. However, we had several follow-up questions in our study that assessed the reasons for not using postdisaster service or experiencing service delays, and these results were summarized in Table 3. The most common reason for not seeking help (73%) was that the nontreatment seekers reported that they did not have a problem that warranted treatment. Interestingly, this finding also was consistent with national survey results reported for persons with PTSD in the NCS (Kessler, 2000). Among those who sought treatment in our study but experienced delays in receiving it, the reason mentioned greater than 20% of the time was that there was an access problem of some type. In addition, a noteworthy number of those who did not seek treatment, waited to seek treatment, or had delays in receiving treatment, also mentioned that they initially tried to solve their problems on their own.

As suggested previously, the postdisaster findings for race were not entirely surprising. Previous studies have documented racial and ethnic disparities in mental health care, including gaps in access, differences in diagnostic practices, and availability of optimal treatments (Snowden, 2003). Although cultural factors may have been a factor (Cauce et al., 2002), the racial and ethnic disparities initially found in postdisaster service utilization were somewhat surprising (Boscarino et al., 2002b; Boscarino, Galea, et al., 2004), given the availability and promotion of postdisaster mental health services in NYC (Felton, 2002; Quervalu, 2003). In addition to racial disparities, a study conducted 4–5 months post disaster found disparities in age, health insurance status, and primary care physician status (Boscarino, Galea, et al., 2004). Given our current findings 1-year post disaster, treatment disparities apparently have been reduced from earlier studies (Boscarino et al., 2002b; Boscarino, Galea, et al., 2004). Nevertheless, there appear to be potential barriers to receiving postdisaster mental health services for African Americans and those without a regular doctor. The underlying reasons for these apparent disparities are unclear. Recently, it was reported that treatment seeking for mental health disorders typically involves a significant

amount of time from symptom onset to actual treatment (Wang, Berglund, Olfson, & Kessler, 2004), so it is possible that the racial disparity found will diminish with time. It also has been reported that some persons may be reluctant to seek postdisaster mental health care to avoid the psychological distress associated with discussing traumatic events (Schwarz & Kowalski 1992), which could be a factor in our study.

One factor that has been consistently associated with postdisaster treatment seeking and medication use has been experiencing a perievent panic attack (Boscarino et al. 2002a, 2003). As was seen, this was also the case for this subsample of respondents with PTSD or depression. Previous work has shown that acute emotional responses are associated with the development of PTSD and depression after disasters (Harvey & Bryant, 1999). As has been previously reported (Boscarino et al., 2003), the significance of this association suggests that perievent physiological reactions—and corresponding psychological perceptions of them—may be important factors in determining both subsequent psychopathology and mental health service utilization. Furthermore, it has recently been reported that the lower use of psychotropic medications among African Americans stems more from their beliefs about the efficacy and safety of these drugs than from general cultural factors per se (Schnittker, 2003). Thus, addressing this particular utilization barrier may require significant efforts directed towards this population in the future (Schnittker, 2003).

Some limitations of this study include the fact that the survey may have missed individuals who left NYC after the attacks, although we think this number is relatively small (Boscarino et al., 2002a). Also, we omitted individuals without a telephone and those who did not speak either English or Spanish. Given that the sample matched the 2000 Census for NYC (Adams & Boscarino, 2004), the absence of these households did not appear to have introduced any overall demographic bias. Nevertheless, we are limited in generalizing to other ethnic or language groups in NYC. In addition, our data were cross-sectional and cannot be used to test causal relationships.

Given these limitations, our study suggested that while postdisaster mental treatment disparities have apparently decreased over time in New York City, African Americans were clearly less likely to have received this care for some reason. Given the level of community support and the resources available following the WTC, this finding should not have been the case. Additional research is needed to address this finding in the near future. We believe that these findings have important implications for both mental health services research, in general, and for disaster mental health service planning in particular.

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