Mental Health Service and Medication Use in New York City After the September 11, 2001, Terrorist Attack

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Objective: **A survey assessed use of mental health services and psychiatric medications in New York City four to five months after the September 11, 2001, attack on the World Trade Center.** ***Methods:*** **A telephone survey using random-digit dialing was conducted among 2,001 adult householders.** ***Results:*** **During the interviews, 7.6 percent of respondents reported use of mental health services in the past 30 days and 7.7 percent reported use of psychiatric medications. Factors associated with service use included experiencing four or more lifetime traumatic events, experiencing two or more stressful life events in the past 12 months, having posttraumatic stress disorder (PTSD), and having depression. African-American and Hispanic respondents were less likely than white respondents to use services. Greater service use after the attack was associated with a graduate education, increased alcohol use after the attack, and depression. Factors associated with medication use included being in either of two age groups (25 to 44 years and 45 to 64 years), having a primary care physician, experiencing two or more stressful life events in the past 12 months, and having depression. African-American and Hispanic respondents were less likely than white respondents to be taking medications. Greater use after the attack was associated with having depression. Mental health visits in Manhattan appeared to decrease compared with the first two months after the attack. However, among respondents with PTSD or depression, those who were nonwhite, younger, without a primary care physician, or without health insurance were less likely to use postdisaster services.** ***Conclusions:*** **Service use after the terrorist attack was related to mental status and to the amount of trauma and stress experienced. Overall, white respondents, those aged 25 to 64 years, and those with a primary care physician were more likely to use services. (*Psychiatric Services* 55:274–283, 2004)**

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Major disasters are rare, but studies suggest that psychiatric disorders, such as posttraumatic stress disorder (PTSD) and depression, are common among survivors (1–3). Furthermore, these effects may be lasting in the case of disasters that involve significant loss of life (4), although some research suggests the contrary (5). The terrorist attack in New York City on September 11, 2001, resulted in one of the largest death tolls of any disaster in the United States. An initial study in Manhattan of the psychological impact of the attack indicated that 7.5 percent of adults had symptoms consistent with PTSD that were related to the attack and 9.7 percent had symptoms consistent with depression (6).

Although use of mental health services after disasters has been documented (7,8), few investigations have focused on population-level service use. Much of the research has examined the impact on direct survivors, and different measures and time frames have been used, which makes generalizations difficult (9–12). Effective health planning requires assessment of population-level service use and needs (13). To estimate the prevalence and correlates of mental health service use in New York City after the attack, we conducted a telephone survey of adults four to five months after this event (14). The results were compared

with those from a survey of Manhattan residents that we conducted one to two months after the event (15,16).

Methods

All English- or Spanish-speaking adults older than 17 years who lived in New York City and had a telephone were potential participants. Sample selection was based on random-digit dialing, with oversampling of persons living in Manhattan. After we obtained verbal consent, one adult per household was randomly selected for an interview. Trained interviewers using a computer-assisted telephone interviewing system conducted the interviews. Both English and Spanish versions of the questionnaire were used. Questionnaires were translated into Spanish and then back-translated by bilingual persons whose native language was English to ensure linguistic and cultural appropriateness. Eight percent of the interviews were conducted in Spanish. A protocol was in place to provide assistance to participants who required counseling. The mean duration of the interview was 35 minutes. The surveys were conducted in January and February 2002.

Sampling weights were developed to correct for selection bias related to the number of telephone numbers and persons in each household as well for the oversampling of Manhattan residents. Our survey cooperation rate was based on the sum of the number of completed interviews, quota-outs (those who were eligible for the interview but who were excluded because the quota for borough or gender was exceeded), and screen-outs (those who were younger than 17 years old, who did not speak English or Spanish, or did not live in the city) divided by the sum of completed interviews, quota-outs, screen-outs, refusals, and premature terminations of the interview (17). On the basis of these calculations, the cooperation rate in our survey was 64 percent. Our survey response rate, which was based on the number of completed and partial interviews divided by the count of eligible residential telephone numbers (17), was 44 percent.

The institutional review board of the New York Academy of Medicine (NYAM) approved the study protocols. Our surveys were conducted by Schulman, Ronca, and Bucuvalas, Inc. (SRBI), of New York City, a firm experienced in conducting health interviews using telephone surveys of disaster survivors, victims of sexual assault, and combat veterans. All interviewers were trained, supervised, and monitored by senior staff of both SRBI and NYAM.

Because one of our objectives was to compare service use in the January–February survey with the results from the earlier survey, we briefly describe that data collection effort. The interviews for the earlier survey were conducted in October and November 2001 among English- or Spanish-speaking adults. The sampling frame was adult residents living in Manhattan south of 110th Street. As with the January–February survey, respondents were selected by using random-digit dialing in the manner described. For the earlier survey, we completed 1,008 interviews and achieved a cooperation rate of 64 percent. Detailed reports of the previous survey have been published elsewhere (6,15,16).

The results suggest that mental health service use in the community four to five months after the attack on the World Trade Center was modest.

Dependent variables

We asked whether participants sought help for personal or emotional problems from a helping professional, such as a psychiatrist, a psychologist, a counselor, a social worker, a pastoral counselor, or some other helping professional or from a self-help group in their lifetime, in the month before the terrorist attack, and in the past month. When participants answered "yes," the interviewer asked them to report the number of times that they had seen that service provider (15). These questions were adapted from previous disaster research (18) and modified on the basis of the National Comorbidity Survey (19,20).

We also asked respondents about whether they had taken any psychiatric medications prescribed by a physician, such as antidepressants or sleeping pills for emotional problems, in the month before the attack and in the past month. We asked those who took medications to report the number of days that they had taken them. These survey questions were adapted from items in the National Comorbidity Survey (19,20).

On the basis of previous research (16), we developed two variables for further analyses: increased mental health visits and increased psychiatric medication use. Mental health visits were classified as "increased" if a person had an increase of one or more mental health visits in the past month compared with the month before the attack. Psychiatric medication use was defined as increased if a person had an increase of one or more medication days in the past month compared with the month before the attack.

Independent variables

We collected information about demographic variables that might affect use of mental health services or medications, including age, race or ethnicity, gender, household income, educational level, and marital status. In our analyses, we divided age into four groups, race or ethnicity into five groups, and education into five groups. We also asked respondents whether they had a primary care physician and health insurance cov-

erage. Finally, we asked them about increased alcohol use after the disaster, and we used this variable in our analyses.

We asked participants to report the number of traumatic events to which they had been exposed in their lifetime (21) and grouped the responses into four categories: no events, one event, two or three events, and four or more events. We also asked about stressful life events, such as the death of a spouse, that the participant experienced in the 12 months before the attack (18). We divided these responses into three categories: no events, one event, and two or more events. We also assessed ten specific events or experiences associated with the World Trade Center attack, such as whether the respondent had witnessed the attack, had been injured, had lost friends or relatives in the attack, had been displaced, or had lost his or her job (6,15,16). We classified respondents by how far they lived from the disaster site—three miles or more, or less than three miles—and how involved they were in the postdisaster rescue efforts—no, some, or direct involvement.

Our analyses included three mental health measures: PTSD, depression, and a peri-event panic attack—that is, an attack that occurred during the disaster or within a few hours of it. The PTSD measure was used in the National Women's Study (22) and later modified on the basis of *DSM-IV* criteria (23,24). This scale used a non–event-specific approach for PTSD assessment (22,24). It was designed for administration by trained nonclinical interviewers during a structured telephone survey. The onset of PTSD since the disaster was based on the respondent's meeting diagnostic criteria in the previous four or five months—that is, since the attack. Specifically, a participant was deemed to have PTSD if symptoms were present for the necessary criteria B, C, and D. For our analysis, the measure of onset of PTSD since the disaster did not require the symptoms to be related to the attack. An additional variable was developed for onset of PTSD that was related specifically to the attack (6) and was used for comparison. We found these two PTSD measures to be highly correlated (kappa=.86). Cronbach's alpha for the symptoms used in this scale was reported to be .90 (15). In addition, our PTSD scale has been reported to be highly correlated with the clinician-administered Structured Clinical Interview for DSM-III-R (SCID) (kappa=.71 for current PTSD) (24,25). Since its implementation, this PTSD scale has been used in several large-scale mental health surveys involving more than 16,000 completed telephone interviews (22,26–28).

The racial and ethnic disparities in postdisaster mental health service use that we found were surprising, because free counseling services were available in New York City after the attack.

To further validate our PTSD measure, we compared our results with those of the PTSD Check List (PCL) (29), an established screener for PTSD, for a random subsample of 229 participants in our January–February survey. Overall, we found that the PCL had 75 percent sensitivity and 95 percent specificity in detecting PTSD as classified by our PTSD instrument (30). In a receiver operating characteristic analysis (31), we found that a PCL cutoff score of 50 or higher, which is the cutoff score recommended for the instrument, also optimally predicted PTSD when our instrument was used (area under the curve=.97).

Analyses performed for another postdisaster community survey conducted with 2,368 adults in New York City (27) provided additional validity data for our PTSD measure. In the other postdisaster study, we found that a diagnosis of PTSD in the past year was significantly associated with a lower Rosenberg self-esteem score (32) (odds ratio [OR]=7, p<.001), a clinically low mental health score on the 12-item Self-Report scale (SF-12) (33) (OR=8.3, p<.001), and lower reported work quality among employed persons (OR=3.4, p<.001). In addition, a PTSD diagnosis in the past year was associated with meeting the clinical case definitions in the past month on the 18-item Brief Symptom Inventory (BSI-18) (34) for depression (OR=6.8, p<.001), anxiety (OR=7.8, p<.001), and global severity (OR=7.1, p<.001). The correlation coefficients for PTSD symptoms in the past 30 days were .45, .46, and .48 with BSI-18 depression, anxiety, and global severity scales, respectively.

To measure depression we used an adapted version of the SCID's major depressive disorder subscale from the nonpatient version (25), which has been used in other population studies (6,35). Respondents were considered to have major depressive disorder if they reported five or more symptoms listed for the *DSM-IV* criteria for at least two weeks. Respondents were also asked to report the last time they experienced these symptoms. The research team has had experience with this scale in previous surveys focusing on the World Trade Center disaster (6,14,15). Cronbach's alpha for the eight symptoms used in this scale was .79 (15). We also compared the results for depression in the past 30 days obtained by using our depression scale with those obtained by using the BSI-18 (34) depression scale (27). Overall, the BSI-18 depression scale had 73 percent sensitivity and 87 percent specificity in detecting depression as classified by our depression instrument (27). In a receiver operating

characteristic analysis (31), the BSI depression cutoff score of 65 or higher, which is a clinical cutoff for BSI depression, also optimally predicted depression when our instrument was used (area under the curve=.89).

We also found that a diagnosis of depression in the past year as measured by our scale was associated with a lower Rosenberg self-esteem score (OR=8.1, p<.001), a clinically low mental health score on the SF-12 scale (OR=12.8, p<.001), and lower reported work quality among employed persons (OR=4, p<.001). Furthermore, a diagnosis of depression in the past year on our scale was associated with meeting the clinical case definitions on the BSI-18 in the past month for depression (OR=11.3, p<.001), anxiety (OR=9.7, p<.001), and global severity (OR=13.4, p<.001). The correlation coefficients for depression symptoms in the past 30 days were .52, .52, and .56 with BSI-18 depression, anxiety, and global severity scales, respectively.

The panic attack measure used was a modified version of the Diagnostic Interview Schedule (DIS) subscale for panic (36), phrased to assess peri-event symptoms—those that occurred during or shortly after the terrorist attack; we have used this measure in other telephone surveys (6,15,16). We asked about panic symptoms specifically in the first few hours after the events of September 11. If a participant reported at least four of the symptoms listed for panic attack in the *DSM-IV,* that person was considered to have a diagnosis of a peri-event panic attack (23).

Table 1

Psychiatric disorders and use of mental health services and psychiatric medications reported by respondents to a survey conducted in New York City four to five months after the attack on the World Trade Center[a]

Variable	N	%	95% CI
Posttraumatic stress disorder			
Since the attack	193	9.0	7.6–10.5
Related to the attack	148	7.0	5.7–8.3
Depression since the attack	176	7.8	6.5–9.2
Panic attack during or shortly after the terrorist attack	325	16.7	14.8–18.7
Mental health visits[b]			
In the month before the attack	206	8.6	7.2–9.9
In the past month	192	7.6	6.3–8.8
In the past month but not in the month before the attack	40	1.3	.8–1.8
More visits in the past month than in the month before the attack	78	2.7	2.0–3.4
Use of psychiatric medications[c]			
In the month before the attack	161	6.8	5.5–8.0
In the past month	189	7.7	6.5–9.0
In the past month but not in the month before the attack	65	2.8	2.0–3.6
More use in the past month than in the month before the attack	69	2.8	2.1–3.6
Mental health visit or use of psychiatric medications in the past month	293	12.0	10.4–13.5

[a] Percentages are weighted to adjust for the number of telephone lines and adults in the household and for oversampling of Manhattan residents. Ns are unweighted.

[b] χ^2=5.1, df=1, p=.024; pre-post McNemar test for comparison with visits in the past month and in the month before the attack

[c] χ^2=4.4, df=1, p=035; pre-post McNemar test for comparison with use in the past month and in the month before the attack

Statistical analyses

We focused on four outcome variables, all occurring in the past 30 days: visits to mental health professionals, psychiatric medication use, increased mental health visits, and increased psychiatric medication use. We used a pre-post McNemar chi square test to assess the comparison of mental health visits in the 30 days before the attack and in the past 30 days. On the basis of previous research, we identified demographic, mental health, and stress-related variables that might have been associated with postdisaster mental health service use (19,37,38). The unadjusted ORs and 95 percent confidence intervals (CIs) were calculated for these associations. We then used multivariate logistic regression to examine these associations in a predictive model. The models predicted any mental health visits, increased mental health visits, any psychiatric medication use, and increased medication use—all in the past 30 days. In our final multivariate models, only predictor variables with a p value of .05 or less in the initial bivariate analyses (based on the respective overall p values) were selected.

We also tested for interaction effects in the models between age, education, marital status, and race, because these variables have been associated with different utilization rates (13). We used the survey estimation ("svy") commands in Stata, version 7, to generate our point estimates, p values, CIs, and logistic models (39). This approach was needed to adjust the data for our sampling design, which included case weights to correct for overrepresentation of persons in households with more telephone lines and oversampling Manhattan residents. Therefore, our McNemar chi square tests were calculated as follows. First, the Stata survey estimates were conducted by using the survey estimations to generate pre-post percent point estimates. These point estimates were then converted into their respective survey frequencies. Next, these frequencies were entered into the "immediate" Stata command for pre versus post design ("mcci" in epitab command set) and used to generate the McNemar chi square tests.

Additional bivariate analyses were conducted to assess factors related to access to services among participants who met criteria for either PTSD or depression, because an earlier study suggested that younger adults, men, and persons without health insurance faced barriers to obtaining care (40). In addition, we wanted to as-

Table 2

Results of multivariate analyses of predictors of use of mental health services by respondents to a survey conducted in New York City four to five months after the attack on the World Trade Center[a]

			Mental health service use after the attack (N=192)						
				Unadjusted			Adjusted		
Variable	N	% of total	Users (%)	OR	95% CI	p	OR	95% CI	p
Race									
White	930	39.9	10.7	1			1		
Asian	91	5.3	8.5	.8	.2–2.5	.67	.7	.1–3.6	.67
African American	475	25.3	5.2	.5	.3–.7	.001	.4	.3–.8	.005
Hispanic	406	24.6	5.4	.5	.3–.8	.004	.5	.3–.9	.028
Other	99	4.9	4.7	.4	.1–1.2	.097	.3	.1–1.3	.11
Education									
Less than high school	191	11.5	6.2	1			1		
High school graduate	427	25.3	3.8	.6	.3–1.3	.21	.7	.3–1.9	.53
Some college	414	22.1	8.6	1.4	.7–2.9	.35	1.3	.5–3.3	.56
College graduate	663	30.4	7.7	1.3	.6–2.5	.51	1	.4–2.4	.93
Graduate school	290	10.8	15.9	2.8	1.3–6.0	.007	2.1	.8–5.3	.11
Age (years)									
18 to 24	213	15.2	3.9	1			1		
25 to 44	961	47.8	7.9	2.1	.9–4.7	.074	2.0	.7–5.9	.22
45 to 64	548	27.2	10.5	2.9	1.2–6.6	.013	2.3	.8–6.6	.12
65 or older	236	9.8	4.3	1.1	.4–3.2	.85	1.2	.3–4.3	.75
Primary care physician									
No	285	16.3	3.8	1			1		
Yes	1,716	83.7	8.3	2.3	1.1–4.6	.022	1.8	.8–3.9	.15
Lifetime trauma events									
None	570	30.3	3.5	1			1		
One	461	23.5	5.8	1.7	.9–3.1	.11	1.6	.8–3.3	.19
Two or three	559	27.1	9.6	2.9	1.6–5.2	<.001	1.8	.9–3.6	.08
Four or more	411	19.2	13.4	4.2	2.4–7.6	<.001	2.6	1.3–5	.005
Stressful events in the past 12 months									
None	1,094	55.8	4.8	1			1		
One	569	28.1	7.9	1.7	1.1–2.6	.015	1.4	.8–2.2	.22
Two or more	338	16.1	16.6	3.9	2.5–6.2	<.001	2.5	1.4–4.6	.002
Increased alcohol use									
No	1,786	93.8	6.5	1			1		
Yes	140	6.2	18.8	3.4	2–5.7	<.001	1.8	1–3.3	.072
Distance from the World Trade Center (miles)									
Three or more	1,677	92.2	7.3	1			1		
Less than three	248	7.8	11.4	1.6	1.0–2.6	.032	1.2	.7–2	.427
Posttraumatic stress disorder									
No	1,808	91.0	6.1	1			1		
Yes	193	9.0	22.1	4.3	2.8–6.7	<.001	2.2	1.3–3.8	.003
Depression									
No	1,789	92.2	6.0	1			1		
Yes	176	7.8	26.9	5.7	3.7–8.8	<.001	2.6	1.5–4.3	<.001
Panic attack during or shortly after the terrorist attack									
No	1,676	83.2	6.8	1			1		
Yes	325	16.7	11.5	1.8	1.2–2.7	.007	1	.6–1.6	.98

[a] Percentages are weighted to adjust for the number of telephone lines and adults in the household and for oversampling of Manhattan residents. Ns are unweighted. The adjusted results are from a logistic regression model that included all the variables shown in the table.

sess changes in the use of mental health services since our earlier survey (6,15,16). To assess these changes, we used the data from Manhattan, which was the focus of our earlier survey. All p values presented were based on 2-tailed tests.

Results

Among the 2,011 participants in our study, ten persons were eliminated because of missing demographic data. In the remaining sample, 53.5 percent were women, and the mean±SD age was 41±16 years. Of the participants, 39.9 percent were white, 5.3 percent were Asian, 25.3 percent were African American, 24.6 percent were Hispanic, and 4.9 percent were classified as "other." Geographically, at the time of the survey, 18 percent of respondents

Table 3

Results of multivariate analyses of predictors of use of psychiatric medications by respondents to a survey conducted in New York City four to five months after the attack on the World Trade Center[a]

			Use of psychiatric medications after the attack (N=189)						
				Unadjusted			Adjusted		
Variable	N	% of total	Users (%)	OR	95% CI	p	OR	95% CI	p
Race									
White	930	39.9	11.9	1			1		
Asian	91	5.3	8.2	.7	.2–2	.46	1	.4–2.7	.98
African American	475	25.3	4.7	.4	.2–.6	<.001	.4	.2–.6	.001
Hispanic	406	24.6	4.5	.3	.2–.6	<.001	.3	.2–.6	<.001
Other	99	4.9	5.6	.4	.2–1.2	.097	.2	0–.7	.017
Age (years)									
18 to 24	213	15.2	1.4	1			1		
25 to 44	961	47.8	7	5.3	1.8–15.7	.002	3.8	1.1–12.8	.033
45 to 64	548	27.2	12.4	10.1	3.4–29.9	<.001	5.3	1.5–19.2	.01
65 or older	236	9.8	8.1	6.3	1.9–20.2	.002	3.4	.8–14.7	.10
Marital status									
Married	768	44.9	7.5	1			1		
Separated, divorced, or widowed	418	16.6	13.3	1.9	1.2–2.9	.004	1.5	.9–2.7	.14
Single	736	35.3	5.6	.7	.5–1.1	.171	1.2	.7–2	.56
Unmarried cohabiting	67	3.2	6.8	.9	.3–2.7	.852	1.4	.3–6.3	.68
Social support									
Low	553	30.7	7.5	1			1		
Moderate	694	37.4	9.8	1.3	.9–2.1	.191	1.4	.8–2.6	.28
High	593	31.9	5.7	.7	.5–1.2	.209	1.6	1–2.8	.069
Primary care physician									
No	285	16.3	2.3	1			1		
Yes	1,716	83.7	8.8	4.2	1.8–9.8	.001	3.8	1.4–10.5	.01
Health insurance									
No	341	20	2.9	1			1		
Yes	1,650	80	8.8	3.2	1.6–6.4	.001	1.6	.7–3.6	.22
Lifetime trauma events									
None	570	30.3	4.3	1			1		
One	461	23.5	6.2	1.5	.8–2.6	.174	1.2	.6–2.4	.54
Two or three	559	27.1	9.4	2.3	1.4–4	.002	1.3	.7–2.4	.42
Four or more	411	19.2	12.7	3.2	1.9–5.5	<.001	1.8	.9–3.4	.075
Stressful events in the past 12 months									
None	1,094	55.8	3.9	1			1		
One	569	28.1	9.7	2.6	1.7–4	<.001	2.3	1.4–3.9	.001
Two or more	338	16.1	17.4	5.1	3.3–8.1	<.001	4.4	2.4–8.1	<.001
Increase in alcohol use after the attack									
No	1,786	93.8	7.1	1			1		
Yes	140	6.2	16.4	2.6	1.5–4.5	.001	1.2	.6–2.3	.65
Posttraumatic stress disorder									
No	1,808	91	6.5	1			1		
Yes	193	9	19.8	3.5	2.3–5.5	<.001	1.2	.6–2.2	.66
Depression									
No	1,789	92.2	5.8	1			1		
Yes	176	7.8	29.7	6.9	4.5–10.6	<.001	3.9	2.2–6.7	<.001
Panic attack during or shortly after the terrorist attack									
No	1,676	83.3	6.5	1			1		
Yes	325	16.7	13.7	2.3	1.5–3.4	<.001	1.2	.7–2.1	.46

[a] Percentages are weighted to adjust for the number of telephone lines and adults in the household and for oversampling of Manhattan residents. Ns are unweighted. The adjusted results are from a logistic regression model that included all the variables shown in the table.

lived in Manhattan, 16 percent in the Bronx, 29.8 percent in Brooklyn, 30.3 percent in Queens, and 6 percent in Staten Island. The age, gender, race, and regional distributions in our sample were not significantly different from estimates in the 2000 U.S. Census (41). Thus our sampling method or cooperation rate did not appear to lead to demographic biases.

As Table 1 shows, 9 percent of the participants were classified as probably having PTSD in the postdisaster period, 7.8 percent as probably having major depression in the postdisaster period, and 16.7 percent as having had a peri-event panic attack

Table 4

Mental health service use among respondents in New York City who had posttraumatic stress disorder (PTSD) or depression when they were surveyed four to five months after the attack on the World Trade Center (N=277)[a]

Variable	Total N	Used mental health services %	χ^2	df	p
Place of residence			10.4	4	.096
Bronx	39	23.7			
Brooklyn	73	15.7			
Queens	55	14.3			
Manhattan	96	31.8			
Staten Island	14	37.9			
Race			10.1	3	.029
White	125	31.2			
African American	64	13.7			
Hispanic	69	16.3			
Other	19	16.1			
Sex			1.3	1	.31
Male	102	18.2			
Female	175	24.0			
Age (years)			16.2	3	<.001
18 to 24	28	1.0			
25 to 44	156	20.3			
45 to 64	76	34.7			
65 or older	17	18.4			
Health insurance			16.6	1	<.001
No	53	2.5			
Yes	222	27.2			
Primary care physician			13.1	1	.002
No	43	2.6			
Yes	234	25.9			

[a] Percentages are weighted to adjust for the number of telephone lines and adults in the household and for oversampling of Manhattan residents. Ns are unweighted.

associated with the disaster. In addition, 7.6 percent visited a professional for mental health problems in the past 30 days, and 7.7 percent used psychiatric medications in the past 30 days. More than 95 percent of the sample reported no change in postdisaster mental health visits or medication use. However, 2.7 percent reported more visits in the past 30 days than in the month before the disaster, and 2.8 percent reported more medication use. In addition, 1.3 percent reported visits in the past month but none in the month before the disaster, and 2.8 percent reported medication use in the past month and none in the month before the disaster. Overall, 3.9 percent reported fewer visits in the past month than in the month before the disaster (CI=3 to 4.8) and 1.8 percent reported less use of medications (CI=1.1 to 2.4) (analyses not shown).

Overall, participants' use of mental health services was significantly lower in the fourth and fifth months after the disaster than in the month before the disaster (7.6 percent compared with 8.6 percent; McNemar χ^2=5.1, df=1, p=.024). In contrast, overall use of psychiatric medications in the fourth and fifth months after the disaster was significantly higher than in the month before the disaster (7.7 percent compared with 6.8 percent; McNemar χ^2=4.4, df=1, p=.035).

Table 2 shows the associations between any postdisaster mental health service use in the fourth and fifth month after the disaster and demographic and exposure-related variables selected for the multivariate model. The adjusted likelihood of mental health service use was significantly lower among African-American and Hispanic respondents than among white respondents. Among the predisaster variables, experiencing four or more lifetime traumatic events and experiencing two or more stressful life events in the 12 months before the attack were positively associated with mental health service use. Two postdisaster variables were positively associated with service use—having PTSD and having an episode of depression.

Predictors of increased use of mental health services after the attack (analyses not shown) were graduate school education (less than high school was the comparison group; OR=8.3, p=.024), increased postdisaster alcohol use (OR=4.5, p<.001), some involvement (but not direct) in rescue or recovery efforts (compared with none; OR=1.9, p=.041), and depression (OR=2.4, p=.02).

As can be seen in Table 3, multivariate analyses showed that African-American and Hispanic respondents were less likely than white respondents to use medication after the attack. Several variables were positively associated with medication use: being in either of two age groups—25 to 44 years and 45 to 64 years (compared with 18 to 24 years)—having a primary care physician, experiencing either one stressful life event or two or more events before the attack, and being depressed.

Only one variable—being depressed (OR=2.6, p=.032)—was significantly associated with increased postdisaster use of medications (analyses not shown).

No interaction effects were found among the key age, gender, marital status, and education groups for any of the four models.

On the basis of our earlier survey, we conducted additional analyses related to use of services among respondents with postdisaster PTSD or depression (N=277). As shown in Table 4, white respondents with PTSD or depression were more likely to have received postdisaster mental health services, as were respondents aged 25 years or older, especially those between the ages of 45 and 64 years. Furthermore, respondents with health insurance or primary care physicians were more likely to have received services.

Table 5 compares mental health service use by Manhattan residents in the survey reported here with that

reported in our earlier survey (6,14). The results show a clear decrease in use over time. For example, 19.4 percent of Manhattan residents used services in the first and second month after the attack, compared with 12 percent in the fourth and fifth month. Although an increase in psychiatric medication use was noted during this time, these differences were not significant.

Table 5

Use of mental health services after the attack on the World Trade Center by respondents in two Manhattan surveys, one conducted one to two months after the attack (N=988) and another conducted four to five months after (N=506)[a]

Variable	N	%	95% CI
Mental health visits in the past month[b]			
Surveyed at one to two months	210	19.4	16.7–22.2
Surveyed at four to five months	69	12	9–15
More mental health visits in the past month than in the month before the attack			
Surveyed at one to two months	102	10	7.9–12
Surveyed at four to five months	36	6.2	4–8.4
Use of psychiatric medications in the past month			
Surveyed at one to two months	129	11.6	9.5–13.7
Surveyed at four to five months	71	13.4	10–16.7
Mental health visits or use of psychiatric medications in the past month			
Surveyed at one to two months	253	23.3	20.4–26.2
Surveyed at four to five months	106	19.3	15.5–23.1

[a] Percentages are weighted to adjust for the number of telephone lines and adults in the household. Ns are unweighted.
[b] Significant difference between the two surveys on the basis of nonoverlapping CIs.

Discussion

The results of our study suggest that mental health service use in the community four to five months after the attack on the World Trade Center was modest. Only 7.6 percent of residents used mental health services, a slight decrease from reported use the month before the disaster (8.6 percent). Psychiatric medication use was also modest four to five months later; 7.7 percent of survey respondents reported use, a slight increase from medication use the month before the disaster (6.8 percent).

In multivariate analyses, we found that African-American and Hispanic respondents were less likely than white respondents to use mental health services or psychiatric medications after the disaster. Furthermore, respondents who reported postdisaster medication use were more likely to have primary care physicians and to be between 25 and 64 years of age. Life stress in the 12 months before the attack was also associated with postdisaster service and medication use. Some respondents reported more mental health visits after the disaster than before—those with a graduate school education, those whose use of alcohol was greater after the attack, those who were depressed, and those with some involvement with the rescue efforts.

Among residents who met criteria for either PTSD or depression after the attack (N=277), African Americans and Hispanics were less likely to report mental health visits, as were respondents aged 18 to 24 years, those without health insurance, and those without a primary care physician. When mental health service use by Manhattan residents in the fourth and fifth month after the disaster was compared with use in the first two months after the disaster, a significant decrease over time was found.

As many as 41 percent of the direct survivors of the Oklahoma City bombing reported seeking professional mental health treatment in the six months after the incident (42). Only 8.5 percent of the general population of the Oklahoma City metropolitan area sought help in the three months after the bombing (8). This lower rate of help seeking is comparable to the rate we found in the fourth and fifth months after the attack in New York City. However, because no data on use of mental health services in Oklahoma City before the bombing are available, comparisons are difficult. Six months after the Newcastle earthquake in Australia, a community survey indicated that as many as 21.3 percent of adults used disaster-related support services; however, mental health services were apparently just one of the types of services included in that category (7). As these few studies suggest, because of different exposure factors, time frames, and demographic factors, as well as regional differences, it is difficult to predict population-level mental health services use, except to state that use will usually be higher than it was before the disaster but will decline over time (9,10). Many postdisaster studies have focused on use of emergency services, which further complicates the comparison with postdisaster mental health service use (9,43).

We found that race or ethnicity, exposure to lifetime traumatic events, exposure to recent stressful life events, and current depression were consistent predictors of postdisaster use of mental health services. Previous research has shown that PTSD is associated with a history of exposure to traumatic stress as well as exposure to stressful life events (18). In addition, PTSD is commonly associated with depression (44). Given the results of previous studies, our findings for race and ethnicity are not surprising (13). Studies have found racial and ethnic disparities in mental health care, including differences in access, diagnostic practices, and availability of optimal treatments (45). Although cultural factors likely played a role (46), the racial and ethnic disparities in postdisaster mental health service use that we found were surprising, because free counseling services were available in New York City after the attack (47). Not 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 a primary care physician or health insurance coverage (13). Finally, our finding that greater use of services after the attack was associated with a reported increase in alcohol consumption warrants further investigation. Exposure to psychological trauma may put victims at risk of substance abuse, because some traumatized individuals may use alcohol or drugs to reduce psychological distress (48,49).

Our findings should be interpreted with caution. At the time of the survey, New York City was on a heightened state of alert, and residents were concerned about possible terrorist attacks. These factors may have affected service use. In addition, it is possible that residents may have temporarily left the city after September 11, although we found little evidence of this in subsequent surveys (27). We used self-reported data collected by telephone, which raises the possibility of poor respondent recall and sample selection biases, although the demographic characteristics of our sample were comparable to U.S. census estimates for New York City (41). Finally, we assessed service use during a 30-day period. The short time frame and seasonal variation may also have biased our results, although we found little evidence for this in subsequent surveys (27).

Conclusions

Despite the limitations of the study, it is one of only a few that have examined longitudinal, population-level mental health service use in the community after a catastrophic event. Although use was not as high as expected (50) and appeared to decrease over time, the access issues suggested by our findings are worthy of investigation. In particular, we found that African Americans, Hispanics, respondents aged 18 to 24 years, and respondents without health insurance or a primary care physician were less like to have received postdisaster mental health care for some reason, despite the availability of free counseling services. In addition, how New Yorkers fare over time is also an important area of investigation. We plan to study these and other issues in future research. ♦

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