Fear of Terrorism and Preparedness in New York City 2 Years After the Attacks: Implications for Disaster Planning and Research

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Objectives: To help improve disaster planning and research, we studied psychosocial predictors of terrorism fear and preparedness among New York City residents after the World Trade Center disaster (WTCD). **Method:** We conducted a random cross-sectional survey of 1,681 adults interviewed 2 years after the WTCD. Participants were living in New York City at the time of the attack and exposed to ongoing terrorist threats. **Results:** We found 44.9 percent (95% confidence interval [CI] = 41.9–47.9) of residents were concerned about future attacks and 16.9 percent (95% CI = 14.7–19.3) reported a fear level of "10" on a 10-point analog scale. Furthermore, 14.8 percent (95% CI = 12.8–17.0) reported they had made some plans for a future attack, a significant increase from the previous year. In addition, although 42.6 percent (95% CI = 39.6–45.7) indicated that they would likely wait for evacuation instructions following a chemical, biological, or nuclear attack, 34.4 percent (95% CI = 31.5–37.3) reported they would evacuate immediately against official advice. Predictors of high terrorism fear in a multivariate model included Hispanic ethnicity (odds ratio [OR] = 2.0, P = .006), lower education (OR = 4.4, P < .001, and OR = 3.7, P < .001, respectively, for nonhigh school and high school graduates, compared with college graduates), being exposed to stressful life events (OR = 1.6, P = .048), having current posttraumatic stress disorder (3.1, P < .001), having a fear of death (OR = 2.5, P = .002), and reporting a likelihood of fleeing an attack against advice (OR = 1.5, P = .034). The best predictors of preparedness in a multivariate model was being between 30 to 64 years old (30–44 years old, OR = 2.6, P = .001; 45–64 yeas old, OR = 1.8, P = .03, respectively, compared with 18–29 years old), having higher exposure to the WTCD (moderate exposure, OR = 1.7, P = .05; high exposure, OR = 2.4, P = .002; very high exposure, OR = 4.1, P < .001), respectively, compared with no/little WTCD exposure), and having greater exposure to other lifetime traumatic events (high traumatic event exposure, OR = 2.1, P = .005, compared with no exposure). **Conclusion:** Our study suggests that among those exposed to ongoing terrorism threats, terrorism fear and preparedness were related to socioeconomic factors, mental health status, terrorism exposure levels, and exposure to stressful life events.

KEY WORDS: bioterrorism, community disasters, mental health, preparedness, public health, risk communication, terrorism

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The terrorist attacks in New York City (NYC) on September 11, 2001, killed nearly 3,000 persons and had an adverse affect on the local economy.[1] These attacks not only increased pubic concerns about terrorist threats in NYC[2] but also affected the psychological status of area residents.[3–7] One study reported that 11 percent of NYC adults (approximately 700,000 persons) suffered a panic attack during this event.[3] Other studies conducted locally and nationally following the attacks, also found widespread psychological distress.[8,9] Adding to the level of anxiety and distress among NYC residents were the anthrax attacks that occurred in New Jersey and New York City shortly after the September 11 attacks, the first publicized bioterrorism event in US history,[10] and the onset of war in the Middle East.[11]

Recent evidence of attacks among other civilian populations provides further evidence related to the possible psychological impact of terrorism. For example, of the 5,510 persons who sought medical treatment following the Tokyo sarin attack in 1995, 12 died, 17 were critically injured, and 4,000 had minor or no apparent injuries,[12,13] During the 1991 Scud missile attacks in Israel during the Gulf War, it was reported that most persons presenting to emergency departments, nearly 80 percent, were psychiatric casualties.[14] In addition, although the evacuation during the World Trade Center attacks appeared to be orderly, examination of evacuation activities closer to the impact area suggested that this was not the case at all.[15] In addition, outbreaks of sociogenic illnesses have also been reported following these kinds of events.[16] Although there are many risk factors to consider,[17] a terrorist attack involving weapons of mass destruction (WMDs), even on a small scale, could generate significant psychiatric casualties.[12,17–19]

Although understanding how to prevent psychiatric casualties is imperative in military operations, from a public health point of view, managing adverse psychological reactions among the public following a terrorist attack is also important.[20,21] Notwithstanding the possibility of a future terrorist attack, to date much terrorism preparedness activities in the United States have mostly focused on the technological and biomedical aspects of these events.[22–24] In the following, we present results from a recent NYC study that provides findings related to the potential social psychological impact of terrorist threats that should be useful in future disaster research and planning. To help guide our approach, we incorporated a Terrorism Management Theory (TMT) framework into our research design. Generally, TMT suggests that fear of terrorism is related to social background, fear of death, self-esteem, social support, as well as other factors, such as exposure to stressors events.[25] This theory represents a social psychological model that has been useful in understanding reactions to terrorism.[25] In this article, we construct multivariate models, based on TMT, to help assess psychosocial correlates of terrorism fears in a population recently exposed to terrorist events. We did this in order to provide empirical data to assist with disaster planning, risk communications, and new research efforts. Although our study did not focus on actual behavior during an attack, we note that we did study reported behavioral intent in future situations and current preparedness behaviors among a population exposed to terrorist attacks and ongoing threats over the past 2 years.

● Methods

Study participants

The data for this study come from a longitudinal survey of English- or Spanish-speaking adults living in NYC on the day of the World Trade Center disaster (WTCD), which have been described in detail elsewhere.[3,26,27] Briefly, we conducted a baseline telephone survey, using random-digit dialing, 1 year after the attacks between October and December 2002 (year 1). This population survey was stratified by the five NYC boroughs and sampled proportionately. For the follow-up survey (year 2), we attempted to reinterview all baseline participants 1 year later (ie, 2 years after the WTCD). Year 2 interviews occurred between October 2003 and February 2004. For both surveys, trained interviewers, using a computer-assisted telephone interviewing system, conducted the interviews. The duration of the interview was 45 minutes for year 1 and 35 minutes for year 2. The institutional review board of the New York Academy of Medicine reviewed and approved the study's protocols. Overall, 2,368 individuals completed the year 1 survey and 1,681 completed the year 2 survey. Using industry standards,[28] the year 1 cooperation rate was approximately 63 percent and the reinterview rate for year 2 was 71 percent. For both years, sampling weights were developed to correct for potential selection bias and for nonresponse bias, which is a standard procedure in population health surveys and we have discussed in detail elsewhere.[29,30]

Study measurement

Predictor variables

Demographic characteristics—Our analyses included five demographic variables: age, gender, race/ethnicity, education, and children at home. Age was coded 18–29, 30–44, 45–64, and 65+, with 18–29 coded as the reference category. Self-reported race/ethnicity was coded White, African American, Hispanic, Asian, other/none reported, with White coded as the reference category.

Education was coded as less than high school graduate, high school graduate, some college, and college graduate, with college graduate coded as the reference category. Having a child at home was coded as a binary variable, with no children younger than 18 years coded as the reference category. The demographic factors were collected during the year 1 interview.

Stressors exposure variables—Our analyses also examined stressors variables that could have placed the individual at risk for psychological problems. These included WTCD event exposures, lifetime traumatic events, posttraumatic stress disorder (PTSD), perievent panic attack, and negative life events in the past year. WTCD exposure was the sum of 14 possible events (yes; no) that the responded could have experienced during the attacks (eg, having a friend or relative killed, lost job as a result of the WTCD). The WTCD exposure scale was the sum of these events. Since there was no a priori method to assess severity, we summarized these into none or 1 event exposure, 2–3 event exposures, 4–5 event exposures, and 6+ event exposures, with none/1 event coded as the reference category. The lifetime traumatic events scale measured 10 traumatic events that could have occurred anytime prior to the year 1 interview (eg, forced sexual contact, having a serious accident), and was based on previous research.[31] We coded these responses into no traumatic events, 1 traumatic event, 2–3 traumatic events, and 4 or more traumatic event groups, with no traumatic events coded as the reference category. Our PTSD scale was based on the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*,[32] and has been used in other surveys.[33,34] To have PTSD for our study, the respondent had to meet the full A–F criteria for PTSD,[3] which was defined as present if the person met these within 2 years after the attacks. Our PTSD measure has been shown to be valid and reliable, has been used in previous WTCD studies, and has also been described elsewhere in detail.[3,35,36]

The survey also assessed whether the respondent met criteria for a perievent panic attack during the WTCD. This measure was based on the *Diagnostic Interview Schedule*,[37] phrased to assess panic symptoms that occurred during or shortly after the events of September 11.[32] The presence of four or more symptoms classified the person as having a perievent panic attack, if these symptoms reached their peak within 10 minutes of onset. This variable was coded as a binary measure, with not meeting the criteria classified as the reference category. Our negative life event scale was the sum of eight experiences that have occurred in the previous 12 months (eg, divorce, death of spouse, problems at work) and was based on previous research.[31] We coded respondents into three groups, including no life events, 1 life event, and 2 or more life events, with no life events as the reference category. Our PTSD, WTCD event exposure, negative life events, traumatic events, and perievent panic attack measures have been extensively used and validated in previous WTCD studies.[3–6,8,26,27,29,35,36]

Stress moderator variables—Stress moderator variables in our analyses included one social and one psychological resource variable from the year 2 survey, which could potentially reduce or moderate the effect of stressful events.[29,38] The social support scale used was a version of the measure utilized in the Medical Outcomes Study,[39] which has been included in other WTCD studies.[3,5,8] Self-esteem was measured by a version of the Rosenberg Self-Esteem (RSE) Scale,[40] a widely used measure that has been incorporated into hundreds of studies.[41] The RSE validity studies are numerous and suggest that higher scores were positively correlated with positive attributes, such as high self-regard, and negatively correlated with negative attributes, such as anxiety and depression.[41] For analytical purposes, we divided responses for social support and self-esteem into groups reflecting low, moderate, or high levels, respectively, based on a tertile (one-third) distribution.[3,27]

Fear of death scale—To measure the respondent's fear of death, a key component of TMT,[25] we used the 3-item thanatophobia subscale adopted from the Illness Attitude Scale.[42] This fear of death scale has been used in medical research to assess attitudes, fears, and beliefs related to hypochondriasis and abnormal illness behavior, and is based on a 5-point Likert-type scale. In the current survey, Cronbach α for this subscale was .80. For our analyses, we divided these scale scores into approximate quartiles, ranging from no fear of death to a high fear of death, with the lowest designated group as the reference category.

Evacuation behavior—We asked respondents two questions related to their likely evacuation behavior "during an attack involving biological, nuclear, or chemical weapons." Specifically we asked, hypothetically, whether respondents (i) would wait for instructions from police or health department officials and (ii) would immediately leave the area, regardless of police or health department instructions. Those who responded "very likely" to these questions were classified as likely to wait for instructions or likely to flee before instructions following an attack, respectively. These survey questions had content and face validity, were pretested, and were used in previous New York surveys.[2,11,44]

Outcome variables

Terrorism fear measures—Study participants were also asked about their level of concern related to the

following events occurring in NYC: (i) another major terrorist attack, (ii) a terrorist attack involving biological weapons, such as smallpox or anthrax, (iii) a terrorist attack involving a "nuclear device," and (iv) a terrorist attack involving chemical weapons. Survey response options included a 5-category Likert-type scale, with the categories ranging from "very concerned" to "not concerned at all." We then summed the results for all four terrorism concern items, producing an overall summary score. Next, we dichotomized this terrorism scale, categorizing respondents with a score of 20 (ie, those "very concerned" on all four items) as having very high concerns about future attacks. The Cronbach α for these scale items was good ($\alpha = .92$). Finally, we also asked respondents to rate their fear of terrorism on a 10-point analog fear scale, measured from 0 to 10. The correlation of our global fear scale measured on the 10-point scale with our Likert-based terror concern scale discussed (scale range 0–20) in a recent survey was very high ($r = 0.63$, $P < .001$),[2,11] as it was in this survey ($r = 0.57$, $P < .001$). Our global fear scale was also correlated with current anxiety, as measured by the BSI-18 scale,[43] and with PTSD symptom count ($r = 0.36$, $P < .001$ and $r = 0.39$, $P < .001$, respectively). In addition, a score of 10 on this global fear scale was associated with high exposure to negative life events ($P < .001$), having had a perievent panic attack during the WTCD ($P < .001$), having current PTSD ($P < .001$), having a high fear of death ($P < .001$), and reporting a likelihood of fleeing in the event of a future attack ($P < .001$). The terrorism fear questions and scales used in our current survey also had content and face validity, were pretested, and were used in other previous New York surveys.[2,11,44]

Preparedness measure—Participants were also asked whether they had taken any precautions to protect themselves from future attacks, such as planning escape routes, establishing communication plans, stockpiling food or supplies, or taking some other actions. If the study participant responded affirmatively to any of these actions, the individual was classified as having made preparations for future attacks. These survey questions also had content and face validity, were pretested, and were used in other previous New York surveys.[2,11,44]

Statistical analyses

Statistical analyses in our study included descriptive statistics, as well as multiple logistic regressions.[45] First, we discuss our sample characteristics compared with the US Census for NYC. Then, we present point estimates and 95 percent confidence intervals (95% CIs) for our core terrorism measures. Next, we present re-

gression results predicting high overall terrorism fear related to future attacks (defined as a score of 10), within the context of the TMT framework discussed.[25] As noted, TMT suggests that fear of terrorism is related to social background, fear of death, self-esteem, social support, as well as other factors such as exposure to stressors events, and mental health status.[25] Thus, our predictive model included age, gender, race/ethnicity, education, the number of children in the household, PTSD, and having had a panic attack during the WTCD. We also included the reported likelihood of fleeing a future attack against official advice. Consistent with TMT, our hypothesis was that fear of terrorism would be a positively associated with minority status, lower level of education, higher fear of death, lower self-esteem, lower social support, PTSD, and a history of stressor exposures. Similarly, we predicted that these variables would also predict preparedness after the WTCD.

For our analyses, we used the survey estimation (svy) commands in Stata, Version 9.1,[46] to generate the point estimates, CIs, and our regression results. This estimation procedure was required to adjust the data for the sampling design, which included geographic stratification into five regions (to minimize sampling error) and case weights to adjust the data for the number of telephone lines per adult in the household. Demographic weights were also used for year 2 data to adjust for slight differences in response rates by different demographic groups, as is common practice in longitudinal surveys.[47,48] All P values shown are based on the more conservative two-tailed tests.

● Results

As reported elsewhere, our weighted results matched the US Census demographics for NYC.[29,30] We therefore concluded that our obtained sample was demographically representative of NYC in terms of age, gender, and city borough. In terms of concern about future terrorist attacks, 2 years after the event 44.9 percent (95% CI = 41.9–47.9) of NYC residents reported being "very concerned" about another terrorist attack, 44.8 percent (95% CI = 41.8–47.9) about biological attacks, 40.7 percent (95% CI = 37.8–43.7) about nuclear attacks, and 44.3 percent (95% CI = 41.3–47.4) very concerned about chemical attacks (Table 1). Altogether, 32.2 percent (95% CI = 29.2–34.9) were classified as having very high concerns about future attacks, because they were "very concerned" about all four of these possibilities. These results are similar to those reported in a previous survey.[2] In our current survey, as suggested, we also asked respondents to rate their overall terrorism fears on a 10-point scale. On the basis of this scale, 16.9 percent (95% CI = 14.7–19.3) of NYC residents were

TABLE 1 ● **Terrorism concerns/fears, reported evacuation behavior, and preparedness in New York City 2 years after the terrorist attacks (N = 1,681)**

Study measures	N* (%)	95% CI[†]
Concern about another major terrorist attack		
% Very concerned	799 (44.9)	41.9–47.9
Concern about terrorist attack with biological weapons		
% Very concerned	761 (44.8)	41.8–47.9
Concern about terrorist attack with nuclear weapons		
% Very concerned	709 (40.7)	37.8–43.7
Concern about terrorist attack with chemical weapons		
% Very concerned	767 (44.3)	41.3–47.4
Overall concern about future terrorist attacks		
% Very high	555 (32.2)	29.2–34.9
Highest score on terrorism fear scale (0–10)		
% Score of 10	303 (16.9)	14.7–19.3
If attack occurs, would wait for instructions from police/health officials		
% Very likely	700 (42.6)	39.6–45.7
If attack occurs, would leave area immediately, without waiting for information from officials		
% Very likely	602 (34.4)	31.5–37.3
Made any preparations for future attacks		
% Yes	274 (14.8)	12.8–17.0

*All Ns shown represent the unweighted frequencies for categories presented. All other data shown are the results of weighted data using weights to adjust the sample for the number of telephone lines and adults in the household, the treatment oversample, and survey nonresponse.
[†] CI indicates confidence interval.

classified as very fearful of future attacks, because they rated their fear level a "10" on this scale. Finally, similar to results reported in a previous survey, 42.6 percent (95% CI = 39.6–45.7) of New Yorkers indicated they would likely wait for instructions before evacuating during a WMD-type event, whereas 34.4 percent (95% CI = 31.5–37.3) indicated they would probably flee the area immediately if such an attack occurred.[2] In addition, 14.8 percent (95% CI = 12.8–17.0) of NYC residents indicated they had taken one or more terrorism-related precautions, a significant *increase* from what was reported 1-year postdisaster (5.4%, 95% CI = 3.8–7.7).[2]

The bivariate and multivariate results predicting fear of terrorism are presented in Table 2. The bivariate analyses indicated that terrorism fear was associated (all Ps < .05) with being female (odds ratio [OR] = 1.6, CI = 1.1–2.2), African American (OR = 2.5, CI = 1.6–3.8), Hispanic (OR = 4.4, CI = 2.9–6.7), or being another race (OR = 3.0, CI = 1.1–7.7), having less education (less than high school, OR = 8.5, CI = 5.1–14.4; high school graduate, OR = 4.0, CI = 2.6–6.0; some college, OR = 1.6, CI = 1.0–2.6), having children in the home (OR = 1.9, CI = 1.4–2.6), experiencing more WTCD events (very high, OR = 2.4, CI = 1.3–4.4), and experiencing negative life events (moderate level, OR = 1.6, CI = 1.1–2.5; high level, OR = 3.2, CI = 2.2–4.8), having a perievent panic attack (OR = 3.3, CI = 2.2–5.0), meeting criteria for PTSD (OR = 5.4, CI = 3.5–8.2), having a high fear of death (OR = 4.9, CI = 3.0–7.9), and reports of

evacuating against advice during a WMD event (OR = 1.8, CI = 1.3–2.5). Conversely, having higher self-esteem (moderate level, OR = 0.6, CI = 0.4–0.9; high level, OR = 0.3, CI = 0.2–0.5) and greater social support (moderate level, OR = 0.5, CI = 0.4–0.8; high level, OR = 0.4, CI = 0.2–0.6) protected against having a high fear of terrorism.

In the multivariate model with all the variables included (Table 2), high terrorism fear was associated (all P's < .05) with being Hispanic (OR = 2.0, CI = 1.2–3.3), having less education (less than high school, OR = 4.4, CI = 2.3–8.6; high school graduate, OR = 3.7; CI = 2.2–6.1, respectively, compared with college graduates), reporting higher negative life events (OR = 1.6, CI = 1.0–2.7), meeting criteria for PTSD (OR = 3.1, CI = 1.7–5.5), having a very high fear of death (OR = 2.5, CI = 1.4–4.3), and reports of fleeing the area in the event of a WMD attack (OR = 1.5, CI = 1.0–2.2).

Using the same variables, we also estimated a model for terrorism preparedness (table not shown, but available from the first author). This model indicated that those who reported that they had made recent disaster preparations were between 30 and 64 years old (30–44 years old, OR = 2.6, CI = 1.5–4.4, P = .001; 45–64 yeas old, OR = 1.8, CI = 1.1–3.2, P = .03, respectively, compared with 18–29 years old), were exposed to more WTCD events (moderate exposure, OR = 1.7, CI = 1.0–2.8, P = .05; high exposure, OR = 2.4, CI = 1.4–1, P = .002; very high exposure, OR = 4.1, CI = 2.1–8.1,

TABLE 2 ● Multivariate model predicting high fear of terrorist attacks among NYC residents 2 years after the WTCD (N = 1,681)*

Variables assessed	N†	% Total	% Highest fear	Unadjusted OR	Unadjusted 95% CI	Unadjusted P	Adjusted OR	Adjusted 95% CI	Adjusted P
Age									
18–29 (ref)	284	22.8	17.6	1.0	. . .	. . .	1.0	. . .	. . .
30–44	596	32.6	18.8	1.1	0.7–1.8	.67	1.1	0.7–1.8	.738
45–64	586	32.7	16.7	1.0	0.6–1.5	.84	1.2	0.7–1.9	.570
65+	215	12.0	10.9	0.6	0.3–1.1	.08	0.9	0.5–1.9	.833
Gender									
Male (ref)	693	44.3	13.6	1.0	. . .	. . .	1.0	. . .	. . .
Female	988	55.7	19.7	1.6	1.1–2.2	.01	1.4	1.0–2.2	.080
Race/ethnicity									
White (ref)	782	43.3	8.7	1.0	. . .	. . .	1.0	. . .	. . .
African American	422	25.6	19.0	2.5	1.6–3.8	<.001	1.4	0.8–2.3	.220
Hispanic	367	24.1	29.5	4.4	2.9–6.7	<.001	2.0	1.2–3.3	.006
Asian	62	4.6	12.1	1.4	0.6–3.8	.44	1.4	0.5–4.1	.556
Other	48	2.4	22.0	3.0	1.1–7.7	.03	1.6	0.6–3.9	.330
Education level									
Less than high school	155	8.2	43.0	8.5	5.1–14.4	<.001	4.4	2.3–8.6	<.001
High school graduate	389	27.3	25.9	4.0	2.6–6.0	<.001	3.7	2.2–6.1	<.001
Some college	362	22.7	12.6	1.6	1.0–2.6	.05	1.4	0.8–2.3	.278
College graduate (ref)	775	41.8	8.1	1.0	. . .	. . .	1.0	. . .	. . .
Children at home									
No (ref)	1,041	58.0	13.0	1.0	. . .	. . .	1.0	. . .	. . .
Yes	640	42.0	22.1	1.9	1.4–2.6	<.001	1.2	0.8–1.8	.305
Self-esteem									
Low (ref)	633	36.3	24.9	1.0	. . .	. . .	1.0	. . .	. . .
Moderate	408	23.9	17.1	0.6	0.4–0.9	.03	1.2	0.7–1.9	.475
High	640	39.8	9.4	0.3	0.2–0.5	<.001	0.7	0.4–1.1	.116
Social support									
Low (ref)	596	35.5	24.2	1.0	. . .	. . .	1.0	. . .	. . .
Moderate	659	38.1	14.4	0.5	0.4–0.8	.001	0.7	0.5–1.1	.150
High	429	26.4	10.5	0.4	0.2–0.6	<.001	0.7	0.4–1.2	.167
WTCD event exposure									
None/low (ref)	362	26.7	12.2	1.0	. . .	. . .	1.0	. . .	. . .
Moderate	719	44.0	17.3	1.5	0.9–2.4	.09	1.5	0.9–2.6	.123
High	416	21.8	18.8	1.7	1.0–2.8	.06	1.4	0.7–2.7	.301
Very high	184	7.5	25.2	2.4	1.3–4.4	.03	1.6	0.7–3.5	.240
Lifetime traumatic event exposures									
None (ref)	466	33.8	17.0	1.0	. . .	. . .	1.0	. . .	. . .
Low	400	23.5	14.4	0.8	0.5–1.3	.40	1.0	0.6–1.8	.882
Moderate	484	26.8	18.1	1.1	0.7–1.6	.72	1.3	0.8–2.2	.233
High	331	15.9	18.2	1.1	0.7–1.7	.72	1.0	0.6–1.9	.896
Negative life events									
None/low (ref)	730	49.9	11.3	1.0	. . .	. . .	1.0	. . .	. . .
Moderate	487	28.3	17.3	1.6	1.1–2.5	.02	1.4	0.8–2.2	.212
High	464	21.9	29.2	3.2	2.2–4.8	<.001	1.6	1.0–2.7	.048
Perievent panic									
No (ref)	1,451	89.6	14.6	1.0	. . .	. . .	1.0	. . .	. . .
Yes	230	10.4	36.4	3.3	2.2–5.0	<.001	1.3	0.8–2.2	.243

(*continues*)

TABLE 2 ● **Multivariate model predicting high fear of terrorist attacks among NYC residents 2 years after the WTCD (N = 1,681)* (Continued)**

Variables assessed	N†	% Total	% Highest fear	Unadjusted OR	Unadjusted 95% CI	Unadjusted P	Adjusted OR	Adjusted 95% CI	Adjusted P
PTSD past 2 years									
No (ref)	1,495	92.9	14.5	1.0	. . .	. . .	1.0	. . .	. . .
Yes	186	7.1	47.6	5.4	3.5–8.2	<.001	3.1	1.7–5.5	<.001
Fear of death									
Low (ref)	373	24.2	11.2	1.0	. . .	. . .	1.0	. . .	. . .
Moderate	563	34.8	8.9	0.8	0.4–1.3	.36	0.7	0.4–1.2	.221
High	352	21.0	16.6	1.6	0.9–2.7	.11	1.1	0.6–2.1	.648
Very high	380	20.0	38.1	4.9	3.0–7.9	<.001	2.5	1.4–4.3	.002
Likely flee an attack									
No (ref)	1,079	65.7	13.9	1.0	. . .	. . .	1.0	. . .	. . .
Yes	602	34.3	22.6	1.8	1.3–2.5	<.001	1.5	1.0–2.2	.034

*OR indicates odds ratio; CI, confidence interval; WTCD, World Trade Center disaster; and ref, reference category.
†All N's shown represent the unweighted frequencies for categories presented. All other data shown are the results of weighted data using weights to adjust the sample for the number of telephone lines and adults in the household, the treatment oversample, and survey nonresponse.

$P < .001$, respectively, compared with no/little WTCD exposure), and reported more lifetime traumatic events (high traumatic event exposure, OR = 2.1, CI = 1.2–3.5, $P = .005$, compared with no exposure).

● Discussion

Two years after the terrorist attacks in NYC, concerns about terrorist attacks remained high. In addition, although 43 percent of residents reported that if a WMD-type attack occurred they would likely wait for instructions from police or health department officials before evacuating, 34 percent suggested that they probably would not wait for evacuation instructions. A multivariate model indicated that high terrorism fear was associated with Hispanics, having less education, reporting higher negative life events, meeting criteria for PTSD, having a fear of death, and reports of fleeing the area against advise if a WMD event occurred. In addition, one of the best predictors of disaster preparedness in our multivariate model was greater exposure to the WTCD, which is interesting. Also associated with having made disaster plans was being between 30 and 64 years old and having a history of high exposure to other traumatic events.

These findings were generally consistent with TMT.[25] In particular, this theory postulates that a key variable in understanding a person's reaction to terrorism is the fear of death. When individuals are exposed to moral threats, thoughts of death, previously not present, tend to emerge consciously.[25] Proximal defenses for these adverse thoughts include attempts to rationalize and suppress these cognitions. In TMT,

similar to stress-process theory,[29] this phenomenon is also affected by distal factors, such as social status, self-esteem, and social support—factors generally responsible for buffering individuals against traumatic events and the subsequent adverse cognitive processes associated with these occurrences.[25] Within this context, it should be noted that a recent New York State survey found that residents had the greatest level of trust in evacuation information provided by local police and fire department officials (69%).[11] Next, was trust in information from their private doctors (59%), New York State heath officials (53%), US government officials (49%), and friends and neighbors (41%).[11] Residents had the least trust (17%) in evacuation information provided by insurance companies or managed care plans for some reason, which is worrisome and should be addressed in future research.[11]

Given these findings and the current threat level, we think that preattack interventions should probably be considered, including low-key public service announcements, as well as workplace and family-based preparedness education efforts.[18] Postevent mental health surveillance also should be planned in the event of future attacks.[17,18] Drawing on past experiences, it has been suggested that public education and communication can reduce adverse population outcomes.[17,49] It has also been suggested that effective risk communications can have the effect of not only reducing fear but also promoting self-protecting behaviors, building trust, and preventing the spread of misinformation.[17,49] Without this effort, vulnerable persons and subgroups, some of which were identified in our current study, may increase the level of social disruption in the community.[2] The very nature

of these threats clearly make both mass media coverage and mass communications critical, warranting public health planning considerations.[17,50] Although additional research is warranted, a recent study indicated that worksite crisis interventions provided by mental health professionals after the WTCD may be effective in reducing mental health problems among workers,[51] clearly a positive public health finding within this context. Another interesting finding was that a previous survey in New York State indicated that nearly 40 percent of New York adults were aware of the bioterrorism information on the New York State Health Department's Web site,[11] a surprisingly high number that health departments should take note of with respect to future terrorism and disaster planning.

A limitation of this study was that it was based on a household telephone survey and, therefore, may not represent those who were institutionalized or were unavailable to be interviewed. We also excluded those who did not speak English or Spanish. In addition, our baseline survey cooperation rate of 63 percent was lower than desired, although analyses suggested that our final weighted sample matched NYC census characteristics.[29,30] However, we did find slight biases related to nonresponse that we attempted to adjust for using demographic weights in the follow-up data, which has been described elsewhere in detail.[30] Other limitations are that our terrorism survey involved only NYC residents and was limited in scope. Related to the latter was the fact that this study did not include extensive behavioral data on how individuals actually responded during an attack, but rather reports of intended behavior during possible future attacks. However, as suggested above, the participants in our survey were not simply involved in an academic exercise, since our research was conducted among a population recently exposed to terrorism events, including bioterrorism incidents and ongoing threats related to conventional terrorist attacks over the previous 2 years.

In summary, although there was substantial concern in NYC related to future terrorism events following the September 11 attacks and knowledge gaps exist, the data needed to mitigate the impact of these threats, including studies such as presented, are growing.[17] For example, here we have shown that Hispanics, those with less education, those with current PTSD, and those with a history of stressor exposures, may be at higher risk during a future attack. Public health departments, healthcare organizations, emergency response personnel, and others in the disaster response field should be aware of these findings. Furthermore, although there is usually reluctance among public health and first-responder professionals to support postdisaster research among survivors after an event,[26] given our findings, we suggest that this is what is likely needed for better planning, to identify key vulnerabilities, and to increase public resilience.

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