

Research Report

Psychological Resilience After Disaster

New York City in the Aftermath of the September 11th Terrorist Attack

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ABSTRACT—*Research on adult reactions to potentially traumatic events has focused almost exclusively on post-traumatic stress disorder (PTSD). Although there has been relatively little research on the absence of trauma symptoms, the available evidence suggests that resilience following such events may be more prevalent than previously believed. This study examined the prevalence of resilience, defined as having either no PTSD symptoms or one symptom, among a large (n = 2,752) probability sample of New York area residents during the 6 months following the September 11th terrorist attack. Although many respondents met criteria for PTSD, particularly when exposure was high, resilience was observed in 65.1% of the sample. Resilience was less prevalent among more highly exposed individuals, but the frequency of resilience never fell below one third even among the exposure groups with the most dramatic elevations in PTSD.*

Bad things happen, and unfortunately they happen to most people. Epidemiological studies indicate that the majority of adults are exposed to at least one potentially traumatic event (PTE; e.g., physical or sexual assault or a life-threatening accident) in their lifetimes. However, not everyone reacts to PTEs in the same way, and although most people experience distress and confusion, typically only a small subset of exposed adults develop posttraumatic stress disorder (PTSD; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Given the health costs associated with severe trauma reactions, it is not surprising that a vast literature on PTSD and its treatment has arisen (McNally,

2003). However, one consequence of this focus is that relatively little is known about the adult capacity to maintain healthy, symptom-free functioning, or *resilience*, following PTEs.

For decades, developmental researchers have documented the prevalence of resilience among children growing up in caustic socioeconomic circumstances (Garmezy, 1991; Luthar, Doernberger, & Zigler, 1993; Masten, 2001; Rutter, 1987). Although fewer and farther between, studies of adults have also documented the pervasiveness of resilience following PTEs (Bonanno, 2004; Rachman, 1978) and highlighted the distinction between resilient individuals and those who show a more gradual recovery from trauma (Bonanno, 2004). Nonetheless, the empirical reality of this distinction is still poorly understood. Trauma investigators have often used the terms *resilience* and *recovery* somewhat interchangeably (McFarlane & Yehuda, 1996) or simply pooled these different types of outcome into a single, non-PTSD category (King, King, Foy, Keane, & Fairbank, 1999). And in the absence of an adequate database for the normal range of trauma reactions, the near or complete absence of trauma symptoms had been commonly assumed to occur only in people with exceptional physical or emotional strength (Casella & Motta, 1990; McFarlane & Yehuda, 1996; Tucker et al., 2002). Even theorists sympathetic to the idea of adult resilience have tended to remain skeptical about its prevalence in the context of exposure to extreme stressor events (Litz, 2005; Roisman, 2005).

To date, the most explicit and systematic research on adult resilience has focused on one particular type of PTE: the death of a spouse. A growing number of prospective studies have shown, for example, that even in the early months following a spouse's death, many and sometimes the majority of bereaved individuals exhibit few or no overt symptoms of psychopathology and continue to function at or near their normal level across time (Bonanno, Moskowitz, Papa, & Folkman, 2005; Bonanno et al., 2002).

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A comparable body of evidence on adult resilience in the aftermath of potentially more traumatic life events is not yet available. Proponents of the broader application of the resilience construct have tended to rely on estimates from previously published trauma studies (Bonanno, 2004; Rachman, 1978). Yet these estimates suffer from inherent methodological limitations. For example, many early studies cited as evidence for widespread resilience (Rachman, 1978) were based on retrospective and unsystematic assessments. Recent trauma studies (Bryant, Harvey, Guthrie, & Moulds, 2000), although more systematic, typically report only proportions of PTSD diagnosis and not data necessary to establish the presence of resilience. Several studies have explicitly examined adult resilience to PTEs using prospective or longitudinal designs (Bonanno, Rennie, & Dekel, 2005; Saigh, 1988). However, these studies used small samples that limit generalizability and preclude examination of variations in exposure.

The potential implications of widespread adult resilience, coupled with the limitations of the existing evidence, suggest a need for more systematic research. Ideally, such research would involve a large, randomly selected sample representative of the broader population. The sample should vary in level of exposure to an isolated PTE of at least sufficient magnitude to produce PTSD reactions in a subset of individuals. However, sufficient data should be available to permit examination of the full range of trauma reactions, from PTSD to the absence of trauma symptoms. Finally, it should be possible to examine how the range of trauma reactions varies in relation to demographics and levels of exposure.

We were able to meet these criteria in the current study by examining PTSD symptoms among a large probability sample of people living in or near New York City at the time of the September 11th terrorist attack (Galea, Ahern, et al., 2002; Galea, Resnick, et al., 2002; Galea et al., 2003). Few people would question the potentially traumatic nature of the September 11th attack. Although the probable prevalence of PTSD for the New York metropolitan area during the first 6 months after the attack was estimated at 6.0% (Galea et al., 2003), PTSD estimates were considerably higher among people most directly exposed during the attack. Nonetheless, a recent study using a relatively small high-exposure sample ($N = 54$) of people who had been in or near the World Trade Center (WTC) during the attack indicated that more than one third (35%) exhibited few or no PTSD symptoms (Bonanno, Rennie, & Dekel, 2005).

In determining the cutoff for resilience in the current study, we considered that even ostensibly healthy individuals sometimes exhibit low levels of psychiatric symptoms (Bonanno, Moskowitz, et al., 2005; Judd, Akiskal, & Paulus, 1997). The PTSD diagnosis comprises 17 symptoms, which include non-specific symptoms (e.g., difficulty sleeping) that may be present even in the absence of trauma exposure. When PTSD symptoms were assessed in the absence of trauma exposure, the normal range was found to be 2 or fewer symptoms (Bonanno, Mosko-

witz, et al., 2005). Studies of subthreshold depression have typically set a more conservative criterion for the absence of depression as 1 or 0 symptoms (Judd et al., 1997), and the same criterion has been used to determine resilience during bereavement (Zisook, Paulus, Shuchter, & Judd, 1997). Therefore, in the current study, we adopted this more conservative definition. Specifically, we defined *resilience* as 1 or 0 PTSD symptoms and *recovery* from trauma as 2 or more PTSD symptoms in the absence of the PTSD diagnosis. We then assessed the proportions of the sample exhibiting resilience, recovery, or a probable PTSD diagnosis across different demographic and exposure categories.

METHOD AND RESULTS

Participants were contacted by random digit dial approximately 6 months after September 11th. The sampling frame included all adults in New York City and contiguous geographic areas in New York State, New Jersey, and Lower Fairfield County in Connecticut. Participants were interviewed in English, Spanish, Mandarin, and Cantonese, using translated and back-translated questionnaires and a computer-assisted telephone interview system. The overall cooperation rate was 56%, and the overall response rate (the sum of the number of completed and partial interviews divided by the sum of all numbers that were either eligible as residential telephone numbers or of unknown eligibility) was 34%. Sampling weights were used to correct for potential selection biases related to the number of household telephones, the number of persons in the household, and oversampling (see Galea et al., 2003). The final sample ($N = 2,752$) adequately represented the broader New York population, as evidenced by comparison with the most recent census data (see Table 1). Of particular importance, the sample included a diverse spectrum of potential trauma experience both during the attack (e.g., being in the WTC at the time) and in its aftermath (e.g., losing possessions).

PTSD symptoms since September 11th were assessed using the National Women's Study PTSD module. This module showed good construct validity in previous research and was validated in a field trial (Kilpatrick et al., 1998), demonstrating that it has a sensitivity of 99% and specificity of 79% when compared against PTSD from the Structured Clinical Interview for DSM-III-R (Spitzer, Williams, Gibbon, & First, 1990). Both the 6-month cumulative PTSD estimates and raw PTSD symptom totals were found to be highly reliable with PTSD estimates obtained from similar samples 1 and 4 months after September 11th (Resnick, Galea, Kilpatrick, & Vlahov, 2004).

Despite our conservative definition for resilience, 65.1%¹ of the respondents ($n = 1,672$) had one or no PTSD symptoms during the first 6 months and thus provided striking evidence of an overall adjustment in the sample. Although there was vari-

¹Percentages reported reflect weighted rather than actual proportions.

TABLE 1

Comparison of the Current Sample With 2000 Census Data for New York City

Category	Current sample (%)	Census 2000 (%)
Gender		
Male	46.1	46.9
Female	53.9	53.1
Age		
18–24	13.7	11.7
25–34	24.1	20.4
35–44	20.5	21.9
45–54	18.9	17.7
55–64	12.2	11.8
65+	10.5	16.5
Race		
White	53.2	54.8
African American	16.7	16.5
Hispanic	20.6	18.5
Asian	5.4	7.7
Other	4.2	2.6

ation in the prevalence of resilience across demographic categories (see Table 2), resilience remained high (over 50%) in all categories except Staten Island residents (48.0%) and unmarried couples (39.1%).

Although, as expected, there was meaningful variation in resilience, recovery, and PTSD proportions across the different exposure groups (see Table 3), we were particularly interested in resilience following different types of exposure, especially in categories that resulted in high rates of PTSD. The overall pattern of findings was consistent with the view that resilience is prevalent even among the most highly exposed individuals (Bonanno, 2004). Across the range of exposure conditions, the prevalence of resilience was more than 50% in most categories and never fell below one third even in exposure categories that generated the greatest proportion of probable PTSD. For example, more than half of the people who saw the attack in person or experienced the death of a friend or relative in the attack were resilient. Of particular interest were the two relatively small groups that had the highest proportions of probable PTSD: people who were physically injured ($n = 59$) or in the WTC ($n = 22$) during the attack. Although 26.1% of the respondents who were physically injured had probable PTSD, approximately one third (32.8%) in this category were resilient. The findings for respondents who were in the WTC at the time of the attack were even more compelling; 25.4% in this category had probable PTSD, yet more than half in this category (53.5%) were resilient.

The exposure categories were created so as to be relatively exclusive. However, the most widely represented category, people who saw the WTC attacks in person ($n = 798$), overlapped sufficiently with two other categories (people who lost a friend or relative in the attack and people who were involved in the rescue effort) to permit analyses of compound exposure.

TABLE 2

Prevalence of Resilience Across Demographic Categories

Category	<i>n</i>	Resilience (0 or 1 PTSD symptom)	
		<i>n</i>	%
Gender***			
Male	1,273	858	71.3
Female	1,479	814	59.8
Age***			
18–24	261	163	62.2
25–34	667	360	57.7
35–44	598	368	68.4
45–54	521	294	62.2
55–64	333	214	69.4
65+	341	256	79.5
Race***			
White	1,592	986	67.8
African American	391	238	64.1
Asian	166	126	82.3
Hispanic	465	243	56.3
Other	91	47	53.2
Income*			
< \$20,000	400	214	58.3
\$20,000–\$29,999	242	145	63.1
\$30,000–\$39,999	270	143	59.2
\$40,000–\$49,999	195	124	64.3
\$50,000–\$74,999	392	229	63.4
\$75,000–\$99,999	272	160	58.9
\$100,000+	497	320	72.6
Education*			
No high school diploma	274	156	56.8
High school or general equivalency diploma	600	376	65.2
Some college	517	304	62.9
College degree	875	521	65.9
Graduate degree	469	301	72.3
Marital status***			
Married	1,182	786	70.0
Divorced	271	144	57.1
Separated	85	46	52.8
Widowed	182	117	65.2
Never married	927	525	62.5
Unmarried couple	93	47	39.1
Living location***			
Proximity to World Trade Center			
Manhattan below 14th St.	669	342	54.5
Other	2,083	1,330	65.3
Borough			
Bronx	85	51	58.6
Brooklyn	347	186	54.8
Queens	167	95	61.2
Manhattan	907	485	58.7
Staten Island	64	30	48.0
State**			
Connecticut	53	36	73.3
New Jersey	66	451	69.5
New York	2,037	1,185	62.9
New York City**			
Yes	1,570	847	57.7
No	1,182	825	71.2

Note. The percentages shown reflect weighted proportions. Asterisks indicate a significant nonchance chi-square distribution within the category. PTSD = posttraumatic stress disorder.

* $p_{rep} > .87$. ** $p_{rep} > .95$. *** $p_{rep} > .99$.

TABLE 3
Prevalence of Resilience, Recovery From Trauma, and Probable PTSD Across Exposure Categories

Exposure	<i>n</i>	Resilience (0 or 1 PTSD symptom)			Recovery from trauma (≥ 2 PTSD symptoms)			Probable PTSD related to the attack		
		<i>n</i>	%	<i>p</i> _{rep}	<i>n</i>	%	<i>p</i> _{rep}	<i>n</i>	%	<i>p</i> _{rep}
Total sample	2,752	1,672	65.1	> .99	863	28.9	> .99	217	6.0	> .99
Saw attacks in person from outside WTC	798	396	55.6	> .99	289	31.9	> .87	113	12.5	> .99
In WTC	22	10	53.5	n.s.	5	21.1	n.s.	7	25.4	> .95
Friend or relative killed	392	192	53.9	> .99	151	34.9	> .87	49	11.2	> .95
Loss of possessions	105	41	42.6	> .95	35	36.0	n.s.	29	21.4	> .99
Physically injured	59	16	32.8	> .99	25	41.0	n.s.	18	26.1	> .99
Involved in rescue	296	141	51.2	> .99	110	37.0	> .87	45	11.8	> .95
Lost employment	147	54	39.1	> .99	64	43.4	> .95	29	17.5	> .99
Involved in rescue and saw attack	119	52	40.3	> .99	64	45.2	> .95	26	14.5	> .95
Friend or relative killed and saw attack	142	38	33.4	> .99	49	35.4	n.s.	32	31.3	> .99

Note. The percentages shown reflect weighted proportions. The *p*_{rep} values represent significant differences in chi-square tests comparing each group with all other groups combined. PTSD = posttraumatic stress disorder; WTC = World Trade Center.

Although in both of these latter groups the prevalence of resilience was above 50%, resilience was reduced among individuals with compound exposure, as in previous research (Bonnanno, Rennicke, & Dekel, 2005). More than half (51.2%) of the respondents who were involved in the rescue effort ($n = 296$) were resilient. However, resilience was about 10 percentage points less prevalent (40.3%) for respondents who both were involved in the rescue effort and had seen the attack in person ($n = 119$). The effect of compound exposure was even more pronounced for people who had experienced the death of a friend or relative ($n = 392$); 53.9% in this category were resilient, whereas for respondents who both experienced the death of a friend or relative and saw the attack in person ($n = 142$), 33.4% were resilient.

DISCUSSION

On the whole, these findings demonstrate widespread resilience in the New York City area during the 6 months after the September 11th attack. Even among the groups with the most pernicious levels of exposure and highest rate of PTSD, the proportion that was resilient never dropped below one third. Of particular interest, although the exposure categories that generated the highest estimates of probable PTSD tended to have lower levels of resilience than other categories, the concordance between PTSD prevalence and resilience prevalence was far from perfect. For example, PTSD was almost twice as common in respondents who were in the WTC at the time of the attack compared with those who witnessed the attacks in person from outside the WTC. However, more than half the respondents in both groups were resilient. Similarly, although people who were physically injured had a relatively high PTSD prevalence

(26.1%) and a relatively low resilience prevalence (32.8%), respondents who had lost possessions in the attack also had a high PTSD prevalence (21.4%) but were more resilient (42.6%).

The design of the current study made it possible to address the methodological limitations of previous studies. However, this design also generated its own limitations; most notably, although the measure of PTSD used had adequate reliability and validity, because these data were collected by telephone interview, more thorough clinical judgments about functioning or the relative absence of PTSD symptoms were not possible. Another limitation, inherent in the use of a large probability sample, is that our operational definition of resilience was restricted. However, when we explored using either a more stringent or a more liberal definition of resilience, the results did not change meaningfully. For example, because some respondents may have been depressed even in the absence of PTSD symptoms, we tried further narrowing the definition of resilience to include the absence of depression. However, this added restriction did not appreciably lower the proportions of resilience across exposure categories. We also explored expanding the definition of resilience to include individuals with up to two PTSD symptoms. This more liberal definition did increase the proportion of resilience across the entire sample from 65.1% to 73.2%, and also increased resilience for some types of exposure (e.g., the prevalence of resilience for people with a friend or relative who was killed in the attack increased from 53.9% to 62.0%). However, increases were not uniform across exposure categories (e.g., the prevalence of resilience among people who were physically injured in the attack increased only slightly from 32.8% to 33.1%). Thus, the original cutoff of one or no symptoms produced a relatively stable, albeit conservative, pattern of findings and seems

preferable for considering resilience in a general population sample.

These data, of course, do not solve the controversy about adult resilience to PTEs. They do, however, provide the most convincing data to date indicating that resilience is prevalent even following the most pernicious and potentially traumatic levels of exposure, and they are compatible with results of studies examining resilience using different types of outcome measures (Bonanno, Moskowitz, et al., 2005; Bonanno, Rennicke, & Dekel, 2005). It is our hope that future research will help untangle how both level and nature of exposure may influence the relation between resilience on the one hand and clinically relevant trauma reactions on the other. Additionally, if resilience is not limited to exceptionally healthy individuals, then as preliminary research has shown (Bonanno, Rennicke, & Dekel, 2005), there are probably many different ways to be resilient (Bonanno, 2004). A greater understanding of resilient functioning could shed light on new avenues for preparation and training in anticipation of expectable PTEs (e.g., war, terrorist attack) and could bolster arguments against the use of wholesale prophylactic psychological interventions in the aftermath of trauma (McNally, Bryant, & Ehlers, 2003). From a public-health standpoint, clear evidence for resilience would indicate a need to reconceptualize resource allocation and timing, as well as mental health practices and policies, following natural disasters or major terrorist attacks (van Ommeren, Saxena, & Saraceno, 2005; World Health Organization, 2003). Perhaps a silver lining of the terror of September 11th will be that the resilience observed in the New York area will inspire further research on these fundamental questions.

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