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Mental Health and Primary Care in a Time of Terrorism: Psychological Impact of Terrorist Attacks

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The mobilization of specialized mental health resources to assist victims and their families after the September 11, 2001, terrorist attacks was impressive and unprecedented. Nevertheless, primary-care settings are the first point of contact within the health care system for most people. The purpose of this integrative review of literature is to examine existing research literature regarding the psychological impact of the September 11 terrorist events on adults and children and to identify directions for future research that will guide resource development for health care providers. The review is organized around three themes: (a) prevalence of psychological and somatic symptoms immediately after September 11, (b) trends in symptom reporting over time, and (c) correlates or predictors of psychological symptom severity and resilience. The results of these studies are discussed in relation to those of previous natural disasters and other terrorist attacks. Recommendations for future research and implications for primary-care practice are presented.

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The September 11, 2001, terrorist attacks and the subsequent mobilization of health care resources to assist victims and their families were unprecedented in the United States. Within days of the events, the limited data that were available on survivors and other people living in close proximity to the attack sites, in concert with information regarding previous mass disasters, were used to map the extent and nature of the psychological impact and need for mental health services. In an initial attempt to extrapolate from these data, Herman, Felton, and Susser (2002) estimated that more than 520,000 people in New York City (NYC) and surrounding counties might experience posttraumatic stress disorder (PTSD) due to some aspect of the attacks, and they predicted that more than 129,000 people could seek treatment for PTSD in the coming year.

Although modified over time, these early estimates were used to establish an immediate response. The NYC Department of Health created a network of service providers called *Project Liberty*, operational within 6 weeks, which focused specifically on serving adults and children who needed counseling relating to September 11 (Felton, 2002). An existing 24-hr hotline, LifeNet, was expanded to serve as a key component of Project Liberty; it was a referral link between people requesting counseling services and clinics that provided

them (Wunsch-Hitzig, Plapinger, Draper, & Del Campo, 2002).

The anthrax bacteria transmitted through the U.S. postal system shortly after the events of September 11 raised new fears of bioterrorism, contributing further to heightened anxiety. Even people who were not in close physical proximity to the events demonstrated moderate to high levels of stress (Norris, 2001; Schuster et al., 2001; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002). Reports indicate that across the United States and Canada, people experienced a diminished sense of control, safety, and well-being as well as perceived discrimination because of their religion or ethnicity (Austin, Mamdani, Jaakkimainen, & Hux, 2002; Norris, 2001). Americans and other individuals living overseas were affected as well (Apolone, Mosconi, & La Vecchia, 2002; Speckhard, 2003). The emotional and financial costs of the terrorist events are immeasurable (Jack & Glied, 2002).

Many research and scholarly articles have now been published that assess the impact of past episodes of trauma and disaster on individuals, families, and communities. Most focus on acute stress disorder and PTSD. For the majority of people, acute posttraumatic symptoms, such as anger, disbelief, sadness, anxiety, fear, and sleep disturbance, tended to recede or be resolved over time. Others, both adults and children, experienced PTSD characterized by symptoms of persistent re-experiencing of the event (e.g., recurrent nightmares, intrusive thoughts), avoidance of thoughts or activities that remind them of the event, emotional numbing (e.g., deliberate efforts to forget the event, feelings of emotional detachment), and increased arousal (e.g., hypervigilance, sleep disorders, irritability, difficulty concentrating), that persist for over a month (American Psychiatric Association, 1994).

In addition to PTSD, which is a significant and disabling disorder, other problems and related behaviors may develop as a result of traumatic events. Adjustment disorders, major depression, and anxiety disorders may be expressed in indirect ways: complicated bereavement, increased tobacco and substance use, family violence, poor school performance, increased risk taking, and other behavior problems (Norwood, Ursano, & Fullerton, 2002). In fact, even patients with PTSD may not present clinically with psychiatric symptoms as chief complaints: Somatic manifestations of stress can be expressed as symptoms of musculoskeletal, gastrointestinal, neurological, gynecological, cardiovascular, or respiratory problems. Symptoms include headaches, back- and neckaches, fatigue, indigestion, abdominal pain, nausea and vomiting, paralysis, double vision, and fainting. Unexpected symptoms may also occur as a result of self-medication or missed medications for chronic illnesses (Hassett & Sigal, 2002). Children's symptoms may be more subtle or may be acted out as changes in social behavior (Davidhizar & Shearer, 2002; Seideman et al., 1998).

Treatment for these problems is far more likely to be sought in primary-care settings than in the offices of mental health professionals. Many somatic symptoms will be misinterpreted as being related to physical illnesses, and the stigma regarding mental illness may prevent other individuals from seeking mental health treatment. Primary-care settings are an appropriate first point of contact with the health care system for the majority of individuals, regardless of their symptoms. However, accurate diagnoses are difficult to make, and many primary-care providers are not prepared or inclined to deal with mental health issues (Samson, Bensen, Beck, Price, & Nimmer, 1999; Stephenson, 2001). Although the symptoms of PTSD are readily identifiable by a primary-care practitioner, the diagnosis may be missed if exposure to a specific event is not assessed or if symptoms are attributed to depression and other anxiety disorders (Yehuda,

2002). Perhaps equally important is that physicians and other primary-care providers must be sensitive to the vague symptoms that are not clearly pathological but that do point to mental health problems (Hassett & Sigal, 2002; Katon, Sullivan, & Walker, 2001). Documenting qualitative and quantitative characteristics of mental health problems resulting from the September 11 terrorist attacks will help health care providers develop useful resources and contribute to new models of health care delivery that integrate mental health and primary care in community settings.

Within the 1st year after the terrorist incidents, a number of data-based studies regarding the psychological impact of the attacks on Americans were conducted. The findings of these studies are supported by reports of the aftermath of other national disasters and terrorist events in the United States and other countries. They all can inform future research and contribute to resource development.

The purpose of this integrative review of literature is to examine existing research literature regarding the psychological impact of the September 11 terrorist attacks on adults' and children's health and to identify directions for future research that will guide resource development for health care providers. The review is organized around three themes: (a) prevalence of psychological and somatic symptoms immediately after September 11, (b) trends in symptom prevalence over time, and (c) correlates or predictors of psychological distress and resilience.

The results of these studies are discussed in relation to studies of natural disasters and terrorist attacks in the United States and international settings before September 11, 2001.

METHOD

This review of articles reporting psychological responses to the September 11, 2001, terrorist events includes 32 data-based reports of 29 studies published in English between September 2001 and August 2003. All studies were conducted in the United States within the 1st year after the attacks. Articles were identified through the MEDLINE, PsycINFO, and CINAHL databases. Search terms included *terrorism*, *terrorist attacks*, and *September 11*. All but 4 are reported in full research articles published in peer-reviewed journals; 2 are reports published in the Center for Disease Control's *Morbidity and Mortality Weekly Reports* (Kramer et al., 2002; Melnik et al., 2002); and 2 are available on-line: (a) an instrument development study reported on the National Institutes of Health's Web site (Norris, 2001) and (b) a study report to the New York City Board of Education conducted by Hoven et al. (Applied Research and Consulting, LLC, Columbia University Mailman School of Public Health, & New York State Psychiatric Institute, 2002). They are included because they provide unique information documenting the nation's earliest responses to the terrorist attacks.

RESULTS

Methodological Characteristics of the Studies

Methodological characteristics and major findings of the studies are summarized in Table 1. Data collection methods included structured personal interviews (Beauchesne, Kelley, Patsdaughter, & Pickard, 2002; DeLisi et al., 2003; Factor et al., 2002; Ford, Udry, Gleiter, & Chantala, 2003; Ho, Paultre, & Mosca, 2002; Stuber et al., 2002; Weiss et al., 2002), self-administered or assisted self-report questionnaires (Applied Research and Consulting, LLC, et al., 2002; Chen, Chung, Chen, Fang, & Chen, 2003; Fredrickson, Tugade, Waugh, & Larkin, 2003; Halperin-Felsher & Millstein, 2002; Kinzie, Boehnlein, Riley, & Sparr, 2002; Kramer et al., 2002; Melnik et al., 2002; Melnyk et al., 2002; Murphy, Wismar, & Freeman, 2003; Pantin, Schwartz, Prado, Feaster, & Szapocznik,

(*text continues on page 15*)

Table 1
Summary of Studies of the Psychological Impact of the September 11, 2001, Attacks

Article	Region	Time frame (after 9/11)	Method	Recruitment	Sample population	*N*	Psychological distress/ resilience variables	Symptom prevalence/correlates of symptom severity
Beauchesne et al. (2002)	Boston	0–4 weeks	Personal interview/ qualitative	Convenience (snowball) sample	School-aged children & parents	81 children, 51 parents	Fear, sadness, empathy	Fear expressed by all children. Developmental differences in reactions. Parents felt unsafe and confused regarding how to help their children.
Kramer et al. (2002)	NYC	1.5 mos.	Personal interview/ questionnaires	Door–door survey; random sample	Adults	485	PTSD score, alcohol use	Close to 40% had PTSD; 14% used more alcohol.
Chen et al. (2003)	NYC	4–5 mos. & retrospective to 2 weeks	Self-administered questionnaires	Convenience samples in community agencies	Chinese Americans	555	Symptoms of emotional distress	88% had 1 or more symptoms in 2 weeks after 9/11; by 5 months, 53% still had some symptoms. Symptoms included upset by reminder; worried, anxious most of time; feeling sad, depressed; jumpy, easily startled. Highest in people who had suffered a loss. Symptoms higher for 40–50-year-olds than for children or older adults.
Connery (2003)	RI	0–3 mos.	Record review	All names A–L; 14 random M–Z	Severely mentally ill adults	147 outpatient charts	Psychiatric symptoms, drug use	Only 18 had new symptoms attributed to 9/11; 2 lasted >6 weeks (both had psychotic reaction). All treated w/usual treatments; none hospitalized. No evidence of change in suicidal behavior, substance abuse, or domestic violence.
DeLisi et al. (2003)	NYC	3–6 mos.	Personal structured interviews/ questionnaires	Convenience sample stratified by age, sex, and ethnicity	Adults	516 men, 493 women	PTSD symptoms	56.3% had at least 1 severe or 2+ mild to moderate symptoms. Women had more symptoms than men.
Deren et al. (2002)	NYC	2–3 mos.	Focus groups, questionnaires	Convenience sample in community	Heroin & cocaine users; substance abuse service providers	5 outreach supervisors, 26 drug users, 126 providers	Drug use, treatment services	After 9/11, increased demand for drugs, drug use, and demand for treatment.
Factor et al. (2002)	NYC	0–2 mos. Compared 0–2 mos. to prior 2 mos.	Personal interview	Convenience sample in community treatment center	Heroin & cocaine users	93 post 9/11, 86 pre 9/ 11	Drug use	No difference in drugs used or frequency after 9/11 before compared with prior.

Table 1 (*continued*)

Article	Region	Time frame (after 9/11)	Method	Recruitment	Sample population	*N*	Psychological distress/ resilience variables	Symptom prevalence/correlates of symptom severity
Ford et al. (2003)	National	Compared to prior sample	Computer-assisted personal interviews	Representative sample	Young adults 18–26	7,095	Sadness, symptoms of psychological distress	After 9/11, more likely to report sadness & trust in government; returned to baseline in 4–6 weeks. No pre–post difference in substance use. Those closest to sites most affected.
Fredrickson et al. (2003)	MI	2–8 weeks	Self-administered questionnaires	Subset of prior convenience sample	College students/ recent grads	47	Positive & negative emotions, symptoms of depression, resilience, resources	Problems identified included fear of future attacks, possibility of war; concern for others in NYC, difficulty concentrating on studies, helping friends. Correlates of resilience included positive emotions, psychological resources, finding positive meaning; negative correlation with depression.
Galea, Resnick, et al. (2002)	NYC	1–2 mos.	Phone interview/ questionnaires	Random sample	Adults	1,008 (including 112 parents)	PTSD, depression	NYC sample: 7.5% PTSD; 9.7% depression. WTC sample: 20% PTSD. Predictors of PTSD: Hispanic, 2+ prior stressors, panic attack during events, proximity, loss of possessions. Predictors of depression: Hispanic, 2+ prior stressors, panic attack during events, low social support, death of friend/relative, loss of job.
Galea, Ahern, et al. (2002)								58% had at least 1 symptom of PTSD 22% children had received some counseling.
Stuber et al. (2002)								Close to 35% reported an increase in smoking, alcohol, or marijuana use. Smokers & marijuana users more likely to report PTSD symptoms.
Vlahov et al. (2002)								
Halperin-Felsher & Millstein (2002)	CA	4 weeks Compared to groups in 1997 & 2000	Self-administered questionnaires	Convenience samples in classroom & by mail	9th-grade adolescents	227 in 2002, 119 in 2000, 160 in 1997	Probability of death in next year	Those surveyed after 9/11 perceived higher vulnerability to death than those before.

(*table continues*)

Table 1 (*continued*)

Article	Region	Time frame (after 9/11)	Method	Recruitment	Sample population	*N*	Psychological distress/ resilience variables	Symptom prevalence/correlates of symptom severity
Ho et al. (2002)	NYC	1–3 weeks & 4 mos. follow-up	Personal interviews/ health screenings	Convenience sample by public announcements	Adults	244 at 1–3 weeks, 113 at 4 mos.	Stress symptoms, lifestyle behaviors	75% had psychological & somatic symptoms or lifestyle change related to CV risk. 37% with lifestyle changes did not return to baseline at 4 mos.
Applied Research and Consulting, LLC, et al. (2002)	NYC	6 mos.	Self-administered questionnaires	Probability sampling of classrooms	4th–12th-grade children/ adolescents	8,266	Symptoms of anxiety, depression, alcohol use, PTSD, depression, etc.	10.5% of children in Grades 4–12 had symptoms of PTSD or other disorder. 5% teens had alcohol abuse.
Kinzie et al. (2002)	OR	0–2 mos.	Personal interview/ questionnaires	Convenience sample of patients	Adult refugees from Vietnam, Cambodia, Laos, Bosnia, & Somalia	181		Patients with prior PTSD reacted more intensely. Patients with schizophrenia had little reaction. Severity of symptoms varied by ethnicity.
Melnik et al. (2002)	NYC, CT, & NJ	1–3.5 mos.	Phone interview/ questionnaire	Random sample	Adults	3,512	Psychological symptoms, participation in community activities, alcohol use & smoking, mental health worries	75% reported problems; 48% experienced anger; 50% participated in community service. Some increase in alcohol; 21% of smokers increased smoking.
Melnyk et al. (2002)	National	0–8 weeks	Personal interviews/self-administered questionnaires	Randomly selected patients from pediatric primary-care settings	Children and parents	621 children, 603 parents		Greatest worries were knowing how to cope with stress, anxiety, depression, parent–child relationships, & self-esteem. Most worries higher in children studied after 9/11, but parents reported worrying less about these after 9/11.
Murphy et al. (2003)	New Orleans, LA	2–3 days	Self-administered questionnaires	Convenience sample of college students	African American young adults	219	PTSD symptoms, behavioral problems	Higher school level, parental separation, and marital status were significant contributors to PTSD score.
Norris (2001)	Atlanta, GA	1 month	Self-administered questionnaire	Convenience sample of college students	Young adults	319	Exposure and stress indicators	Pilot study of instrument.

Table 1 (*continued*)

Article	Region	Time frame (after 9/11)	Method	Recruitment	Sample population	*N*	Psychological distress/ resilience variables	Symptom prevalence/correlates of symptom severity
Pantin et al. (2003)	Miami, FL	2–3 mos.	Investigator-administered questionnaires	Convenience sample of community-dwelling immigrants	Hispanic adults (parents of 8th-graders)	110	PTSD only	87% endorsed 3–6 PTSD symptom clusters. Gender & TV not related to PTSD symptoms. Experience of prior war & national disaster predicted PTSD symptom severity.
Schlenger et al. (2002)	National	1–2 mos.	Internet survey	Random sample	Adults	2,273	PTSD & other distress symptoms	11% PTSD in NYC sample; 4% nationally. 60% of children upset; mean age 11 at highest risk. For adults, younger age (18–29), female, proximity, and TV predicted PTSD.
Schuster et al. (2001)	National	3–5 days	Phone interview	Random sample	Adults	560	Psychological symptoms, coping behavior	44% had at least 1 of 5 significant stress symptoms, and 90% had some stress. Stress in parents was associated with stress in children. Predictors of symptoms for adults and their children include being female, minority, prior psychiatric diagnosis, TV. Coping included religion, social support, community services, donations.
Silver et al. (2002)	National	9–23 days, 2 mos., 6 mos.	Internet survey	Random sample	Adults	2,729 (1), 933 (2), 787 (3)	PTSD symptoms, global distress	17% had symptoms of PTSD at 2 mos; 6% at 6 mos. Symptom severity associated with being female, marital separation, prior depression or anxiety disorder, physical illness, exposure to attacks, early disengagement from coping efforts. Global distress associated with severity of loss and denial; decreased with active coping.
Trout et al. (2002)	NYC & Dallas, TX	3 mos.	Self-administered questionnaires	Federal office workers	Adults	199 in NYC, 155 Dallas	Health status, PTSD, & depression	NYC workers were more likely to have psychiatric and constitutional symptoms. Education level not related to symptom reporting.
Walker & Chestnut (2003)	North Carolina	3–7 weeks	E-mail and self-administered open-ended questions (content analysis)	Convenience sample of college students and community residents	Adults	224	Emotional distress, coping mechanisms	Women reported greater emotional distress; Whites reported more anger than non-Whites; younger participants reported more fear than older. Women reported more emotional distress but engaged in more positive coping strategies. Modest differences by race and age were found for explanation for cause of attacks.

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Table 1 (*continued*)

Article	Region	Time frame (after 9/11)	Method	Recruitment	Sample population	*N*	Psychological distress/ resilience variables	Symptom prevalence/correlates of symptom severity
Weiss et al. (2002)	NYC	1–6 mos.	Personal interviews/ qualitative	Convenience sample of present/former drug users	Adults	57	Drug use	No apparent increase in drug use as result of 9/11.
Wolinsky et al. (2003)	Indianapolis, IN & St. Louis, MO	1–6 mos. & compared to 1–6 mos. prior	Self-administered questionnaires	Convenience sample of primary-care patients	Older adults/ (CVD or COPD)	291	Symptoms of stress, mental health, & sense of control	Stable mental health throughout; decline in sense of control after 9/11 with gradual restoration to pre-9/11 level. Working for pay, higher income, & higher religiosity contributed to improvement of symptoms over time.
Wunsch-Hitzig et al. (2002)	NYC	0–6 mos. & 3 mos. prior	Record review	All telephone calls to stress hotline	Adults/children	48,480	Caller volume for PTSD, depression, and other problems	Increase in calls following 9/11; 6-month delay in peak for calls reporting depression. More female callers than males.
Zywiak et al. (2003)	Boston & RI	1–2 mos. & 1–2 mos. prior	Telephone contact	Convenience sample of alcoholics in treatment	Adults	14	Alcohol use	42% had relapse after 9/11 compared with none prior to 9/11.

Note. NYC = New York City; mos. = months; PTSD = posttraumatic stress disorder; WTC = World Trade Center; CV = cardiovascular; CVD = cardiovascular disease; COPD = chronic obstructive pulmonary disease.

2003; Trout, Nimgade, Mueller, Hall, & Scott, 2002; Wolinsky, Wyrwich, Kroenke, Babu, & Tierney, 2003), telephone surveys (Galea, Resnick, et al., 2002; Melnik et al., 2002; Schuster et al., 2001; Zywiak et al., 2003), Internet surveys (Schlenger et al., 2002; Silver et al., 2002; Walker & Chestnut, 2003), and focus groups (Deren, Shedlin, Hamilton, & Hagan, 2002). Two studies used record reviews that reported numbers of people seeking clinical or counseling services (Connery, 2003; Wunsch-Hitzig et al., 2002). The variety of methods and range of instruments used in these studies provides a broad look at the short-term impact of the September 11 attack on several constituencies but makes it difficult to compare findings across studies.

Most of the studies were initiated during the first few days (Beauchesne et al., 2002; Kinzie et al., 2002; Murphy et al., 2003; Schuster et al., 2001; Silver et al., 2002), weeks (Fredrickson et al., 2003; Halperin-Felsher & Millstein, 2002; Kramer et al., 2002; Norris, 2001; Walker & Chestnut, 2003; Wunsch-Hitzig et al., 2002), or months (Chen et al., 2003; DeLisi et al., 2003; Deren et al., 2002; Galea, Resnick, et al., 2002; Melnik et al., 2002; Pantin et al., 2003; Schlenger et al., 2002; Stuber et al., 2002; Trout et al., 2002; Weiss et al., 2002) after September 11, 2001. Silver et al. (2002) included longitudinal follow-up waves of data collection (at 2 months and 6 months), as did Ho et al. (2002; 1–3 weeks and 4 months later). Chen et al. (2003) began their study 4 months after September 11 but also obtained retrospective information regarding the first 2 weeks after the events, and Hoven et al. (Applied Research and Consulting, LLC, et al., 2002) began their study 6 months after September 11.

Ten studies took advantage of ongoing longitudinal research or clinical treatment programs to examine pre- and postattack characteristics (Connery, 2003; Factor et al., 2002; Ford et al., 2003; Halperin-Felsher & Millstein, 2002; Melnyk et al., 2002; Pantin et al., 2003; Weiss et al., 2002; Wolinsky et al., 2003; Zywiak et al., 2003). In addition, Melnik et al. (2002) reported the results of a special terrorism module for people living in New York, Connecticut, and New Jersey that was added October 11, 2001, to December 31, 2001, to the Behavioral Risk Factor Surveillance System, a national telephone survey. The record reviews report service trends; change over time; compare mental health services obtained after September 11, 2001, with care sought during the prior 1- to 2-year period, or some combination of these (Connery, 2003; Wunsch-Hitzig et al., 2002).

The majority of the studies included individuals from communities located in close proximity to attack sites (primarily New York City; Washington, DC; New Jersey; and Connecticut; Applied Research and Consulting, LLC, et al., 2002; Chen et al., 2003; DeLisi et al., 2003; Galea, Resnick, et al., 2002; Kinzie et al., 2002; Kramer et al., 2002; Trout et al., 2002; Wunsch-Hitzig et al., 2002), and Boston, where two of the hijacked flights originated (Beauchesne et al., 2002; Zywiak et al., 2003). Other locations include Atlanta, Georgia (Norris, 2001); Indianapolis, Indiana, and St. Louis, Missouri (Wolinsky et al., 2003); New Orleans, Louisiana (Murphy et al., 2003); Miami, Florida (Pantin et al., 2003); Dallas, Texas (Trout et al., 2002); Michigan (Fredrickson et al., 2003); northern California (Halperin-Felsher & Millstein, 2002); Rhode Island (Connery, 2003); North Carolina (Walker & Chestnut, 2003); and Oregon (Kinzie et al., 2002). Five included national samples (Ford et al., 2003; Melnyk et al., 2002; Schlenger et al., 2002; Schuster et al., 2001; Silver et al., 2002). Only two studies included patients recruited from primary-care practices (Melnyk et al., 2002; Wolinsky et al., 2003), and only one study specifically recruited participants from a rural area. The latter included only patients with serious mental illness (Connery, 2003). None of the studies focused on sites

where previous terrorist activity or natural disasters had occurred.

Most of the studies were designed and carried out by multidisciplinary teams in research, academic, administrative, and clinical settings. The studies were conducted by researchers from varied professional backgrounds that included medicine, nursing, psychology, public health, and social work. Excluding the articles that reported the use of indirect measures, such as record reviews, to report trends in service utilization, the experiences of more than 30,000 individual adults, adolescents, and children are reflected in the findings of these studies.

Prevalence of Psychological and Somatic Symptoms Immediately Following September 11

Many of the studies published within the 1st year following September 11, 2001, focused on identifying the most commonly occurring symptom clusters or establishing the prevalence of PTSD or general psychological and somatic symptoms. PTSD was the most frequently assessed reaction, but other mental health problems also were documented, including anxiety, panic, phobia, and bereavement-related symptoms. The most prevalent symptoms were those of sadness, anxiety/fear, irritability/anger, difficulty sleeping, and difficulty concentrating. Other major complaints included intrusive thoughts or images and isolation/withdrawal.

Through interviews or surveys of individuals, the prevalence of selected symptoms of PTSD was estimated at approximately 40% locally (Kramer et al., 2002; Trout et al., 2002) and nationally (Schuster et al., 2001) in the period immediately following September 11, 2001. Galea, Resnick, et al. (2002), however, found the prevalence of PTSD symptoms to be only 20% in the respondents living near the World Trade Center and 7.5% in their random sample of Manhattan residents. The two studies that reported record reviews comparing post-September 11, 2001, visits for mental health care with those of 1 year before found significant increases in symptoms of PTSD (Wunsch-Hitzig et al., 2002). Symptoms of depression were estimated at approximately 60% (Trout et al., 2002). Less severe or nonspecific symptoms of stress, including feeling upset and feeling sad were reported by up to 90% of the U.S. population (Chen et al., 2003; Melnik et al., 2002; Schuster et al., 2001), with anger also a commonly reported reaction (Melnik et al., 2002). Somatic symptoms and lifestyle changes, including sleep disorders, appetite changes, decreased socialization, and exercising less were identified in close to 75% of NYC residents (Ho et al., 2002). These lifestyle changes and other symptoms were considered to have the potential to affect cardiovascular risk in the future.

Special Populations

Special populations surveyed include children and their parents, immigrants and refugees, people who reported substance use (cigarettes, alcohol, or illicit drugs), and patients with particular psychiatric or medical diagnoses. None of the studies specifically recruited rescue workers or health care providers as participants.

Children, Adolescents, and College Students

Beauchesne et al. (2002), Halperin-Felsher and Millstein (2002), Hoven et al. (Applied Research and Consulting, LLC, et al., 2002), and Melnyk et al. (2002) included children and adolescents as participants. Young adults, including college students, were studied by Ford et al. (2003); Fredrickson et al. (2003); and Murphy et al. (2003). Schuster et al. (2001) and Stuber et al. (2002) surveyed parents or caretakers about their children's reactions as well as their own. As would be expected, the impact on children was significant as well. In a study of 8,266 children, Hoven et al. (Applied Research and Consulting, LLC, et al.,

2002) extrapolated from their findings that 75,000 (10.5%) of NYC public school children who were in Grades 4–12 had symptoms of PTSD, and more than one quarter of the students (approximately 190,000) had at least one of seven surveyed mental health problems. They estimated that 15% of the children had agoraphobia, with rates of major depression, generalized anxiety disorder, separation anxiety disorder, panic attacks, and conduct disorder ranging from 8% to 12% of their sample. For children in Grades 9–12, 5% reported alcohol abuse. Fear was expressed by all 81 children in a study conducted by Beauchesne et al. (2002), with differences in other themes related to developmental levels. Adolescents surveyed after September 11, 2001, perceived their risk of dying from natural disasters as much more likely than those surveyed prior to the events (Halperin-Felsher & Millstein, 2002) and reported more worry about selected mental health issues (Melnyk et al., 2002). Other reactions included decreased school performance, relationship problems, and other characteristic symptoms of anxiety and depression (Murphy et al., 2003).

Schlenger et al. (2002) assessed specific distress symptoms reported by parents in their national sample and found that slightly more than 60% of NYC families had at least one child who was upset; differences for other areas of the country were not statistically significant. Among the children who were most upset, the most commonly reported symptoms were having trouble sleeping; being irritable, grouchy, or easily upset; and fearing separation from their parents. Stuber et al. (2002) found that the 112 NYC parents and caretakers in their sample reported that 22% of their children received some counseling within the first 2 months after September 11, 2001.

Immigrants and Refugees

Kinzie et al. (2002) studied the reactions of Somali, Bosnian, and southeast Asian refugees living in Oregon. The majority of the refugees were known to suffer from PTSD, depression, or both. For example, all of the Somalis, 69% of the Bosnians, 65% of the Vietnamese, 86% of the Cambodians, and 59% of the Laotians had existing diagnoses of PTSD. Of the 181 participants, 92% felt the terrorist attacks had affected them. For all refugees, fear, uncertainty, and insecurity were the most common reactions. Somalis reported the most significant change in sense of security or safety; Bosnians reported the greatest increase in depression and generalized fear. Differences among the ethnic groups were believed to reflect the more recent war experiences of the Somalis and Bosnians compared with the southeast Asians, as well as cultural or religious differences across these populations. Among Hispanic immigrants, those who had experienced previous war violence or natural disasters were more likely to have evidence of PTSD than those who had not (Pantin et al., 2003).

Substance Use

After the September 11 attacks, some researchers found increases in alcohol intake and cigarette smoking for people in the NYC region (Ho et al., 2002; Melnik et al., 2002; Vlahov et al., 2002) as well as a small increase in the use of marijuana (Melnik et al., 2002). This was not consistent across other NYC and national studies, however (DeLisi et al., 2003; Ford et al., 2003). The findings for known users of illicit drugs such as heroin and cocaine are somewhat equivocal. Factor et al. (2002) did not find a significant difference in drugs used or frequency of use after the terrorist events compared to before September 11; this is corroborated by the findings of Weiss et al. (2002). Deren et al. (2002) studied focus groups of 26 heroin and cocaine users and found some increased drug use immediately following the terrorist attacks in NYC, but some participants reported decreased use and more attempts to seek treatment. In a small

sample of recovering alcoholics, a significant number of relapses were reported immediately after the September 11 attacks (Zywiak et al., 2003). PTSD, depression, or both were found to be more common among people who reported an increase in alcohol use or cigarette or marijuana smoking (Vlahov et al., 2002), but this was not consistent across study populations (Silver et al., 2002).

People With Prior Psychiatric Diagnoses

Among refugees, those with a prior diagnosis of PTSD responded most intensely to the events of September 11; those with a primary diagnosis of depression also had the strongest reactions. Refugees with prior diagnoses of schizophrenia, however, exhibited the fewest overt symptoms, regardless of ethnicity (Kinzie et al., 2002). Similarly, and contrary to expectations, calls to LifeNet did not indicate greater risk for individuals with serious persistent mental illness (Wunsch-Hitzig et al., 2002). This was found as well in Connery's (2003) sample of mentally ill community-dwelling adults, of whom only 13.5% reported acute symptoms that were attributed to September 11. All of the latter had a primary diagnosis of mood disorder.

Trends in Symptom Prevalence Over Time

Analyses of symptoms and clinical visits over time must be interpreted carefully, because most studies did not collect data longitudinally for the same people. Nevertheless, two patterns emerge. In the first pattern, a generally high or increasing trend was followed by a gradual decrease within 2 to 6 months to normal or preattack levels of symptom severity. This pattern was found primarily for symptoms of PTSD, anxiety, panic, and phobias (Chen et al., 2003; DeLisi et al., 2003; Ford et al., 2003; Ho et al., 2002; Kinzie et al.; 2002; Silver et al., 2002). Wunsch-Hitzig et al. (2002) reported that the highest number of calls to LifeNet occurred at 6 months for symptoms of PTSD.

A second pattern, delayed response, was found for people with symptoms of depression. Wunsch-Hitzig et al. (2002) found no increase in the number of callers to LifeNet for depression during the first 3 months following September 11; calls for these symptoms did not begin to increase until 4 to 6 months after the event. A significant decline in new cases of stress-related problems was not seen in that group until July 2002.

Correlates or Predictors of Psychological Symptom Severity and Resilience

Demographic Characteristics

In general, proximity to the primary terrorist targets predicted the intensity of response. Among NYC residents, symptoms of PTSD were more prevalent among those living or working near the World Trade Center buildings (DeLisi et al., 2003; Galea, Ahern, et al., 2002; Galea, Resnick, et al., 2002). As might be expected, the prevalence of psychological reactions was significantly higher in the NYC metropolitan area than in other areas of the country (Ford et al., 2003; Trout et al., 2002). Nevertheless, a distinction between symptoms of PTSD compared with other symptoms of distress must be made when evaluating variations in distribution across the country. For example, Schlenger et al. (2002) found the prevalence of PTSD to be significantly higher in NYC than other cities 1 to 2 months after September 11, but no significant differences were found for general distress symptoms between NYC and the rest of the country at that time. Among Norris's (2001) sample of college students in Georgia, however, even those who were unexposed to direct effects of the attacks were at least moderately stressed and experienced loss of resources, fear for safety, and some harassment due to ethnic backgrounds. Because few studies were

able to provide comparisons across locations, methodological differences and definitions of symptoms may account in part for discrepancies in prevalence across the studies.

Other important demographic predictors of psychological distress were gender, age, and ethnicity. Girls and women were at highest risk of PTSD and other symptoms (Applied Research and Consulting, LLC, et al., 2002; DeLisi et al., 2003; Ford et al., 2003; Schlenger et al., 2002; Schuster et al., 2001; Silver et al., 2002; Walker & Chestnut, 2003), but this was not a consistent finding (Chen et al., 2003; Murphy et al., 2003; Pantin et al., 2003). Although more calls for assistance were made by women in the LifeNet sample, Wunsch-Hitzig et al. (2002) noted that women traditionally seek mental health care more frequently than men, and the proportion did not change after September 11. Among adults and children, younger age predicted symptoms (Applied Research and Consulting, LLC, 2002; Schlenger et al., 2002), although for college students a later college year was associated with greater symptom severity (Murphy et al., 2003). Young adult participants reported more fear than older adults (Walker & Chestnut, 2003). Midlife adults had the most significant reactions (Chen et al., 2003), and older age appeared to be a protective factor in adults (Wolinsky et al., 2003).

Marital status was a contributor to symptom severity, with divorced or separated individuals being at higher risk (Silver et al., 2002). Among college students, having parents who were divorced or separated predicted higher severity of stress symptoms (Murphy et al., 2003). When studied, educational achievement was not predictive of symptoms (Trout et al., 2002).

Although few of the studies specifically assessed the role of ethnicity, being non-White or Hispanic (Applied Research and Consulting, LLC, et al., 2002; Galea, Resnick, et al., 2002; Schuster et al., 2001) appeared to contribute to greater distress. In their study of NYC workers, Trout et al. (2002) found that non-White individuals were more likely to have depressive symptoms but less likely to have symptoms of PTSD. Whites reported more anger than non-Whites and differed on explanations for the cause of attacks compared with Blacks (Walker & Chestnut, 2003).

Differences among refugees by nationality were found, with individuals who had experienced greater premigration violence (i.e., Bosnians and Somalis) at higher risk (Kinzie et al., 2002). In studies that did not include comparison samples, prevalence of symptoms for Chinese Americans and for African American college students appear to be similar to those in the general U.S. population (Chen et al., 2003; Murphy et al., 2003).

Life stress prior to the events of September 11 predicted subsequent symptoms of acute stress disorder, PTSD, and depression (Applied Research and Consulting, LLC, et al., 2002; Galea, Ahern, et al., 2002; Galea, Resnick, et al., 2002; Kinzie et al., 2002), as did previous history of psychological problems or diagnoses of mental illness, such as PTSD, depression, or anxiety (Connery, 2003; Galea, Ahern, et al., 2002; Galea, Resnick, et al., 2002; Kinzie et al., 2002; Schuster et al., 2001; Silver et al., 2002). Having a physical illness was also related to severity of symptoms (Silver et al., 2002).

Other psychosocial factors specifically associated with the events that predicted severity of symptoms included experiencing a panic attack during the World Trade Center attack, exposure or death of friend or relative, loss of possessions or job as a result of the attacks (Applied Research and Consulting, LLC, et al., 2002; Chen et al., 2003; Galea, Resnick, et al., 2002; Silver et al., 2002; Trout et al., 2002), and being involved in rescue attempts (Galea, Resnick, et al., 2002). Another psychosocial characteristic that contributed to symptom severity was having a low level of social support (Galea, Resnick, et al., 2002; Trout

et al., 2002). In addition, level of stress was related to the amount of television exposure to news during and immediately after the attacks for both adults and children (Applied Research and Consulting, LLC, et al., 2002), but this was not corroborated in a sample of Hispanic immigrants (Pantin et al., 2003).

Some differences were found for predictors of PTSD in NYC residents compared with individuals in other locations. For example, in a subsample of people who were in Manhattan on September 11, controlling for demographic variables (age, sex, race–ethnicity, and education) and several variables regarding the type of exposure (e.g., having family, friends or coworkers injured or killed in the World Trade Center, seeing the smoke from the site), Schlenger et al. (2002) found that younger age, being in the World Trade Center or surrounding buildings, and number of hours of television watched per day regarding the disaster each were significantly associated with symptoms of PTSD. It is interesting that for their *national* sample only number of hours of television watched per day regarding the disaster was significantly associated with the distress.

Although several studies included children or parents, only two studies reported findings from parents and children within families (Beauchesne et al., 2002; Melnyk et al., 2002), and none included relationship variables. The findings suggest that children experienced greater stress after the attacks and communicated more frequently with their parents regarding violence, self-esteem, and interpersonal relationships; however, parents indicated they felt they talked less with their children about significant issues (Melnyk et al., 2002). Parents also indicated that they felt overwhelmed by their own feelings and often felt inadequate in their ability to comfort their children regarding their fear (Beauchesne et al., 2002).

Coping Strategies and Resilience

People coped with the attacks in many different ways. For example, in contrast to the increase in cigarette smoking and alcohol use discussed above, constructive responses included turning to other people or religion, avoiding excessive television viewing, and talking about their thoughts and feelings with each other and with their children (Schuster et al., 2001). Although women reported more emotional distress, they engaged in more positive coping strategies (Walker & Chestnut, 2003). Global distress scores decreased with the use of active coping, and effects of variables related to coping strategies were stronger than demographic variables (Silver et al., 2002). Active coping strategies, such as planning or support seeking, were the only methods found to be protective against ongoing distress. Strategies such as giving up, denial, self-distraction, and other efforts to disengage from coping in a more direct manner seemed to increase PTSD symptoms and make continuing distress experiences more likely. The use of selected coping strategies in the short term may be associated with symptoms experienced later; this is especially true for disengaging from coping effects, which can signal psychological difficulties up to 6 months later.

Fredrickson et al. (2003) measured resilience and found it to be inversely related to depression. People who scored high on resilience were found to have other positive emotions that predisposed them to positive affectivity, and they were able to find positive meaning in the problems they experienced following the attacks. The apparent resilience to PTSD in people with persistent, serious mental illness seen in Connery's (2003) sample is hypothesized to be due to ongoing and effective supportive therapy and medications.

The rapidly growing literature regarding the terrorist events of the fall of 2001 documents the nation's response to this tragedy, but the largest quantitative stud-

ies are limited to describing symptoms and diagnoses specifically elicited by questionnaires. Also, few data have been published as yet from primary-care settings, and long-range implications have not been examined. The extensive literature on the impact of previous disasters and terrorist attacks in the United States and in international sites can inform the studies of the impact of the September 11 attacks and provide a context for comparison as well as corroboration.

DISCUSSION

Natural Disasters and Terrorist Events Prior to September 11, 2001

Symptom Prevalence

In general, the overall prevalence estimates for PTSD and general distress are consistent with prior estimates of the impact of natural disasters and other terrorist events in studies conducted before the September 11 attacks. Findings from the studies conducted during the 12 months following September 11, 2001, suggest a prevalence of PTSD of 7.5% to 40%, with variations relating primarily to proximity to the World Trade Center site. Symptoms of depression were reported to be up to 60% for office workers close to the site, and nonspecific symptoms of stress were reported by up to 90% of respondents in regional as well as national studies (Schuster et al., 2001) and by the NYC Department of Health (Kramer et al., 2002).

The NYC Department of Health's finding that approximately 40% of adults in their sample reported symptoms of PTSD at levels high enough to warrant further evaluation is comparable to 50% found in adults following the April 1995 bombing of the Murrah Federal Building in Oklahoma City, Oklahoma (North et al., 1999) and consistent with the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM–IV*; American Psychiatric Association, 1994) prevalence rates of 3%–58% in at-risk individuals compared with 1%–14% of community samples. In a comprehensive, integrative review of the effects of disasters and mass violence conducted by Norris and her colleagues (Norris, Friedman, & Watson, 2002; Norris, Friedman, Watson, Byrne, et al., 2002), more than half of the studies reported impairment as moderate (i.e., rates of psychopathology $< 25\%$), nearly one quarter documented severe impairment (25%–50% psychopathology), and 18% demonstrated very severe impairment (rates of psychopathology $> 50\%$). PTSD was the most frequently investigated specific psychological problem in the literature, with approximately half as many as samples reporting depression and nonspecific distress (Norris, Friedman, & Watson, 2002).

Approximately 30.7% of the injured victims who were survivors of 20 terrorist attacks in France between 1982 and 1987 were found to have PTSD, with 13.3% of all victims reporting major depression. Prevalence rates did not vary by sex or age in this survey (Abenhaim, Dab, & Salmi, 1992). Perhaps the most similar event in recent U.S. history to the September 11 attacks, and the incident studied most comprehensively, is the 1995 Oklahoma City bombing. North et al. (1999) found that close to half of the bombing survivors in the study had active PTSD symptoms, with approximately one third meeting the *DSM–III–R* (American Psychiatric Association, 1987) criteria for PTSD. The most commonly reported PTSD symptom categories were intrusive thoughts and hyperarousal (difficulty concentrating and exaggerated startle response). More rarely reported were avoidance and numbing symptoms but these, when present, were virtually pathognomic. Other reactions to the Oklahoma City bombing included increased smoking and alcohol intake for individuals who had higher scores on peritraumatic reactions, grief, stress, and difficulty functioning, with injury being associated with increased drinking only (Pfefferbaum, Vinekar, et al., 2002). The findings regard-

ing substance abuse following September 11 are somewhat equivocal.

Few post-September 11 studies of rescue workers exist, and none were included in our review of literature. However, stress-related medical leave for NYC firefighters increased several months after the attack; this is believed in part to be a response to their repeated exposure to the World Trade Center site and the increasing number of memorial services (Centers for Disease Control and Prevention, 2002). Although in prior studies rescue and health workers appeared to be the least impaired (Firth-Cozens, Midgley, & Burges, 1999; Luce, Firth-Cozens, Midgley, & Burges, 2002; North, Tivis, et al., 2002), predictors for health professionals were similar to those described for victims: PTSD scores were significantly higher for staff members with prior traumatic experiences and those with past histories of psychological problems. No differences were found by gender. Although Luce et al. (2002) reported that the fewest reactions were found in medical staff compared with administrators, nurses, and aides. Nevertheless, among doctors helping the victims nearly one quarter had symptoms of PTSD.

Health Problems and Health Care Settings

Health problems, including somatic complaints, medical diagnoses, increased sick leave, decreased immune function, sleep disorders, increased substance use, and relapse of previous problems, were identified in approximately one quarter of the samples reviewed by Norris, Friedman, Watson, Byrne, et al. (2002). Chronic problems of daily life, and losses of psychosocial resources, which were found in 10% of the samples, included relationship problems, family conflicts, occupational and financial stress, and loss of support; these were, however, assessed in relatively few of the studies. Studies that examined individual and group reactions to natural disasters and terrorist events reported intensification of somatic and physical complaints in children and adults. These included elevated blood pressure and psychophysiologic symptoms such as stomachaches, dizziness and feeling faint, fear of death, reenactment, and other symptoms of stress that persisted for more than 1 year (Lutgendorf et al., 1995; Terr et al., 1999; Weinrich et al., 2000).

Only two studies conducted after September 11, 2001, specifically recruited participants from primary-care settings. Although Wolinsky et al. (2003) studied older adults with cardiovascular or pulmonary disease receiving primary-care services, they did not focus on somatic symptoms that might be secondary to post-September 11 stress. In a small study that did not meet criteria for this literature review, Lampert, Baron, McPherson, and Forrester (2002) found diminished parasympathetic tone in a small sample of cardiac patients who wore 24-hr heart rate monitors in the week following September 11 compared with a matched sample of patients monitored prior to September 11. Although it is not yet known whether there was an increase in cardiac morbidity or mortality as a result of the attacks, their findings suggest that patients might have been more susceptible to dangerous cardiac arrhythmias. This suggests that the implications of major terrorist events such the September 11 attacks could bring many people who suffer from chronic diseases to their primary-care practitioners and point to an understudied area of research.

Findings from studies of other events offer additional perspectives on the impact of disasters. A small case study sample of individuals seeking care for acute psychiatric reactions after the 1993 bombing of the World Trade Center is interesting in that the findings provide qualitative information that goes beyond cataloguing symptom clusters (Difede, Apfeldorf, Cloitre, Spielman, & Perry, 1997). The authors suggested that even more disturbing to some patients than the intrusive images related

to the traumatic event was their subjective sense of existential distress. Their basic beliefs about themselves, their world, and others had been challenged, leaving them feeling out of control, angry, isolated, and lonely; these feelings made it difficult for them to obtain comfort and support from people in their social networks. These feelings may not be documented as symptoms of any particular diagnosis; nevertheless, they are likely to be important for people who present in primary-care settings.

Children and Adolescents

Findings from studies conducted before September 11, 2001, indicate that school-aged children are at higher risk for stress-related reactions compared with adults (Norris, Friedman, Watson, Byrne, et al., 2002). This is similar to the post-September 11 study of NYC children in public schools conducted by Hoven et al. (Applied Research & Consulting, LLC, et al., 2002). Pfefferbaum et al. (1999) found significant symptoms of stress in a study that assessed clinical needs of children in Grades 6–12 seven weeks after the Oklahoma City bombing. Students reported strong reactions following the event, including fear, perceived life threat, physiological arousal, worry for safety of family members or friends, and feeling helpless. PTSD scores were related to being female and exposure through knowing someone killed or injured in the attack. Grade level accounted for little of the variance, and race–ethnicity was not significant. The amount of television viewing specific to the bombing was found to be the primary predictor of PTSD; this factor was also found to be important for children after the September 11 attacks.

In another report, Pfefferbaum, Doughty, et al. (2002) suggested that subjective appraisal of danger at the time of the event is a better predictor of subsequent posttraumatic stress than other objective measures. In their study, the three peritraumatic responses most frequently reported among middle school children were (a) fear that a family member or friend would be hurt, (b) feeling nervous, or (c) feeling afraid. Children's responses to the bombing were also studied through their letters mailed to injured patients in an Oklahoma City children's hospital (Seideman et al., 1998). Emotional responses reported most frequently include feeling hopeful, regretful, empathic, sad, fearful, and angry. Children tried to understand or make some sense out of the incident. Themes included focusing on the perpetrator, loss, punishment, and personal rights. Responses varied by cognitive and moral developmental levels, pointing out the importance of being alert to differences in the way stress is expressed at different ages.

The use of avoidance and denial in children as well as adults emerged as the least effective coping mechanisms and the ones most predictive of PTSD and poor adjustment (Whittlesey et al., 1999). For children, parental psychopathology and separation from family during the event led to greater symptom severity (Norris, Friedman, Watson, Byrne, et al., 2002). Other predictors, such as lower education and negative parental behavior (Shalev, Peri, Canetti, & Schreiber, 1996), have not been demonstrated yet in the post-September 11 studies.

Ethnicity and Race

Trautman et al. (2002) described the impact of the Oklahoma City bombing on 45 Asian and Middle Eastern immigrants living in the community. Factors that were most strongly associated with PTSD symptoms secondary to the Oklahoma City bombing in this small sample were having prior PTSD symptoms, older age, and younger age at the time of original trauma. Mollica et al. (1999) found high comorbidity between PTSD and depression in refugees (Bosnian Muslims, Bosnian Croats, Croats, Serbs, and others) living in Croatia following the war in Bosnia and Herzegovina. Close to 40% of the sample of 533 adults

reported symptoms of depression, and 26% reported symptoms of PTSD; 20.6% were given both diagnoses. Only two studies in the post-September 11 literature included refugees (Kinzie et al., 2002; Pantin et al., 2003), but prior trauma was a significant predictor of PTSD in both samples. Studies of other ethnic or racial minorities reported so far included Chinese Americans and African American college students, neither of which apparently exhibited higher than expected symptom severity. However, neither of these studies included a control group.

Trends Over Time

Few longitudinal studies of postdisaster mental health exist. As was found in the post-September 11 studies, the prevalence of symptoms tends to decrease over time (North, McCutcheon, Spitznagel, & Smith, 2002; Tucker, Pfefferbaum, Nixon, & Foy, 1999), Within 2 months after the Oklahoma City bombing, 28% of the witnesses were diagnosed with PTSD, but by the following year the prevalence had decreased to 17%. Within 6 to 11 months after that event, some recovery, in the form of expressed happiness and less reported confusion, was apparent for children (Allen, Dlugokinski, Cohen, & Walker, 1999). In another study following the 1993 bombing of the World Trade Center, children and their parents were studied at 3 and 9 months after the event (Koplewicz et al., 2002). Children who had been in the World Trade Center during the bombing had significant levels of PTSD symptoms, but only 3 would have met the *DSM–IV* criteria for PTSD. Nevertheless, as a group, children's scores for posttraumatic stress were not significantly different at the second round. An interesting finding is that the association between parents' and children's symptoms was higher at the second round, which was interpreted as perhaps being due to parental response to their children's persistent symptoms.

Many studies showed that, for a significant number of individuals, symptoms continued for months or years. For example, 89% of the people with bombing-related PTSD continued to be symptomatic more than 3 months after the events, and many had symptoms that persisted longer than a year, despite treatment (North et al., 1999). Only about half of the people with early- and late-onset PTSD had recovered at 3 years, although most of the people with depression had recovered. None of the predictors for developing PTSD proved to be predictors for recovery. More than half the people who experienced major depression had no prior history of the disorder, but those who had a depressive illness before the event were likely to have a continuation or recurrence of symptoms.

In Israel, Amir, Kaplan, and Kotler (1996) found a positive relationship between time since event and symptoms of PTSD, depression, anxiety, and somatization in a study of people who had experienced war, civilian terrorist bombs, and accidents. Type of event was not a significant contributor to variation in any of the symptoms. Cwikel et al. (2000) found that proximity and levels of exposure to the Chernobyl nuclear disaster event in the former Soviet Union were the most significant predictors of increasing levels of long-term psychological distress for victims, with symptoms evident even 8 years after the accident. Although, as seen in studies of September 11, most symptoms of psychological stress decreased over time, somatization symptoms did not (Cwikel et al., 1997). Children whose parents were killed as a result of terrorist activity in Israel demonstrated considerable psychopathology 10 years later (Dremen, 1989).

Demographic and Psychosocial Correlates of Symptom Severity

In general, most of the findings from studies of the correlates and predictors of post-September 11 symptom severity are corroborated by studies of previous disasters. Prior studies suggest that demographic risk factors include being female,

being middle aged (40–60 years old), ethnic minority membership, and lower socioeconomic status. Social support and other psychosocial characteristics, although not well examined in the post-September 11 studies, are important considerations. Living in a highly disrupted community and lack of social support or resources were found to predict difficulties following disasters. Among women, being married and being a parent were predictors of poor outcomes, which probably is due to loss and the need to provide support to others (Norris, Friedman, Watson, Byrne, et al., 2002). Simply having a family, however, should not be used as a proxy for social support. Other correlates that predicted postdisaster problems in both pre- and post-September 11 samples include predisaster history of psychiatric illness; proximity to the event; and severity of exposure, particularly in terms of injury, panic during the disaster, bereavement, loss of property, and displacement.

Recommendations for Future Research

The studies conducted during the 1st year following the terrorist attacks and events of September 11 are impressive and contribute to an understanding of the reactions of adults, children, and families who were in close proximity to the events as well as those who live in more distant areas of the United States. Studies conducted prior to September 11 indicate that the groups at highest risk for postdisaster impairment were survivors of mass violence compared with survivors of natural or technological disasters (Norris, Friedman, Watson, Byrne, et al., 2002). This suggests that vigilance in the wake of the September 11 attacks is prudent, given the violent intent and outcome of the incidents, and it emphasizes the importance of additional research to extend the findings of studies conducted during the year after the attacks.

The time limitation in our review—to studies conducted during the first 12 months after September 11—and the necessary delay in reporting studies that may have been conducted later, precludes examination of longitudinal follow-up here. Nevertheless, important implications for practice and research are suggested from prior research findings. Differences among the studies in the prevalence of selected mental health problems either within one locality or across different locations may be a result of methodological issues in the studies. Few of the studies of the September 11 attacks assessed somatic symptoms, yet these have consistently been identified in past clinical reports as important indicators or correlates of depression, anxiety, and other mental health problems. The existing studies of the September 11 attacks tend to focus primarily on assessing prevalence of PTSD. Although this was necessary because its intensity and potential for debilitation, additional research regarding depression and other mental health problems—in NYC as well as the rest of the United States—is needed.

The impact of the events is still not well documented for areas in the country outside NYC. Further research on selected U.S. cities—for example, those that might be at risk for future terrorist attacks because of location, population density, architectural targets, and so on—is needed.

Future research on the impact of terrorist events on special populations—particularly ethnic minorities; immigrants and refugees; children; and individuals with existing diagnoses of PTSD, depression, and physical problems—is essential, as they are clearly the most vulnerable.

Although several studies included children and parents, there is a lack of family-based studies that focus on the impact of relationships on adjustment. Few studies examined factors that promoted resilience, and additional studies on coping strategies are needed.

Only two of the studies looked specifically at primary-care settings—which is where most people do in fact seek initial

health care for psychological and somatic symptoms. These articles, however, provide a context for anticipating the long-range impact of these events on the mental health of individuals and families as well as of health care providers, whose needs are as yet uncatalogued. Pursuing these areas of future research will strengthen and enrich mental health professionals' ability to deal with this and future terrorist events, should they occur.

Implications for Primary-Care Practice

The studies we have reviewed provide information that is useful for designing educational material and interventions that will increase the confidence and preparedness of health care providers. The need for early intervention and preventive psychoeducation using a family, community, and primary-care model is necessary to assist health providers who are likely to be either first responders or consulted for delayed or persistent symptoms.

Depression symptoms have been shown—both in the September 11 literature and in prior studies of disasters—to be either delayed in onset or not presented in health care settings until up to 6 months or more after the event. Because depression is one of the most commonly seen mental health problems in primary-care settings, health providers need to increase their vigilance and screening for this insidious problem.

Delayed responses, especially symptoms of depression, may also be expected in rescue workers and require that primary-care practitioners be alert to these individuals' needs.

Few longitudinal studies are available regarding the trajectory or patterns of psychological symptoms after disasters. Those that have been conducted suggest that there may be significant long-term effects that will affect the health care system.

The effects of the events on children, particularly in terms of behavior and their responsiveness to parental anxiety, corroborate previous recommendations that treatment be directed to families and communities rather than to individuals only.

The increased risk for members of racial–ethnic minorities, particularly Hispanics, to develop symptoms of PTSD, has important implications, considering the recent spotlight on disparities in the quality of health care delivery for racial and ethnic minority groups in the United States (Smedley, Stith, & Nelson, 2002; Shi, 1999).

The finding that anger (believed to be a potential contributor to heart disease and depression) was a very prevalent symptom, and findings regarding symptom development in people already suffering from chronic illnesses, indicate that long-term implications of stress may produce unexplained or unexpected symptoms (Hassett & Sigal, 2002) as well as exacerbations of health problems often treated in primary-care settings.

A now-consistent finding—that amount of television watching (related to the specific terror event) is a significant predictor of subsequent distress, particularly for children—has important implications for future community-based education, intervention, and resource development.

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