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Social, Psychological, and Psychiatric Interventions Following Terrorist Attacks: Recommendations for Practice and Research

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The terrorist attacks of September 11, 2001, and the constant threat of imminent terrorist activity have brought into the forefront the urgent need to prepare for the consequences of such attacks. Such preparation entails utilization of existing knowledge, identification of crucial gaps in our scientific knowledge, and taking steps to acquire this knowledge. At present, there is little empirical knowledge about interventions following terrorism and absolutely no available empirical knowledge about interventions following bioterrorism. Therefore, this paper reviews knowledge about (1) reactions following the September 11 terrorist attacks in New York City and other places, (2) the practical experiences accumulated in recent years in countries (eg, Israel) that have had to cope with the threat of bioterrorism and the reality of terrorism, and (3) interventions for acute and chronic stress reactions following other types of traumatic events (eg, rape, war, accidents). Our review found several treatments efficacious in treating individuals for acute and chronic post-traumatic stress disorder (PTSD) related to other traumatic events that will likely be efficacious in treating PTSD related to terrorist attacks. However, there were significant gaps in our knowledge about how to prepare populations and individuals for the possibility of a terrorist attack and what interventions to apply in the immediate aftermath of such an attack. Accordingly, we conclude the paper with several questions designed to guide future research.
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INTRODUCTION

The terrorist attacks of September 11, 2001, and the constant threat of imminent terrorist activity have brought into the forefront the urgent need to prepare for the consequences of such attacks. Such preparation entails utilization of existing knowledge, identification of crucial gaps in our scientific knowledge, and taking steps to acquire this knowledge. The preparation for the aftermath of such attacks should encompass both physical and mental health. Currently, much of the focus is on the physical aspect of preparation: immunization against biological and chemical weapons and preparation of emergency room procedures for accommodating mass casualties. No less crucial is the preparation for the psychological harm ensuing from the occurrence of terrorists' attacks. At present, there is little empirical knowledge about interventions following terrorism and absolutely no available empirical knowledge about interventions following bioterrorism. Therefore, in this paper, we include information from three sources: (1) research following the September 11 terrorist attacks in New York City and other places, (2) research and practical experiences that have been accumulated in recent years in countries (eg, Israel) that have had to cope with the threat of bioterrorism and the reality of terrorism, and (3) research into interventions for acute and chronic stress reactions following other types of traumatic events (eg, rape, war, accidents).

This paper is divided into four sections. The first section focuses on interventions for the general population. The primary goals of interventions at this level are not to address psychiatric disorders. Rather, the goals are to identify the kind of threat most likely to be widely faced, effectively communicate this to the public in a manner that

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provides a balance between vigilance for suspicious activities and maintenance of routine lifestyle activities, and build psychological resilience among the public and emergency workers. In the second section, we summarize research and experiences acquired in Israel during the First Gulf War about reactions under prolonged stress and the effects of social and psychological interventions, both in the media and at the community level, to assist the public and vulnerable populations in coping with anxiety and other reactions to prolonged stress.

The third section reviews the emerging scientific knowledge about interventions for ameliorating acute stress reactions. These interventions are administered either in small groups or individually. Research has focused on two types of interventions that are administered shortly after a traumatic event in order to prevent chronic stress reactions: psychological debriefing and brief cognitive-behavior therapy (CBT). Psychological debriefing targets all individuals who have experienced a traumatic event immediately after the trauma. CBT, on the other hand, targets individuals with severe post-trauma symptoms 2–6 weeks after the trauma. The fourth section summarizes the extensive literature demonstrating the efficacy of CBT and medication for ameliorating chronic post-traumatic stress disorder (PTSD) with random controlled trials across a range of trauma populations including war veterans, rape and physical assault victims, refugees, and survivors of motor vehicle accidents. Implicit in the organization of the paper is a distinction between two kinds of interventions. The first type of interventions are aimed at acute transient stress reactions that are expected to be experienced by most people affected by the traumatic event and which ameliorate when the situation has been stabilized. These interventions consist primarily of delivering information to the affected community. The second type of interventions address more intense and longer lasting effects that cause substantial impairment in individuals' functioning even after the situation has been stabilized. Such impairment is expected to occur in a relatively small number of people who are either more strongly affected by the traumatic event (eg, had serious physical injury) or are more vulnerable to the effects of stress. Among these more seriously affected individuals, more intense psychological or pharmacological interventions may be necessary to prevent or to treat serious chronic psychopathology such as chronic PTSD. The paper ends with a summary and conclusion as well as with a list of priorities for future research.

INTERVENTIONS FOR THE GENERAL POPULATION

Although it is impossible to accurately predict the extent, efficacy, lethality, or type of injury that will be caused by bioterrorist attacks, in the present world environment, small to medium magnitude attacks, affecting from several individuals to several hundred individuals, are one possibility (Jones and Fong, 1994). While such attacks may not cause extensive loss of life, their psychological impact can be widespread. Likely reactions may include severe anxiety, panic behavior and panic attacks, retaliatory attacks on local minority groups, actions that are themselves dangerous (eg, use of unapproved gas masks or medications), and actions that have major economic impact (eg, decreased air travel). Bioterrorist attacks of greater magnitude, those that affect several thousand to a hundred thousand individuals, are less likely (although they can occur through such means as the water system or communicable disease), but would produce much more severe psychological reactions (Boscarino *et al*, 2003; Hobfoll, 1991; Laraque *et al*, 2004). Accordingly, government, and public and private agencies, must prepare for small to medium magnitude attacks, whereas government and major pubic agencies must also have a plan for more major attacks (Bravata *et al*, 2004; Khan *et al*, 2000). All of these plans must consider not only the physical and material impact of such attacks but also the psychological impact of bioterrorism, which is the main goal of terrorism (Boscarino *et al*, 2003; Jones and Fong, 1994).

What Interventions Should We Implement?

With the exception of those who are exposed directly to 'conventional' terrorist attacks, reactions of the general public are expected to be mild to moderate (Ayalon and Lahad, 2000; Boscarino *et al*, 2002; Hobfoll, 1991; Galea *et al*, 2002; Silver *et al*, 2002). Reactions can be made worse by sensationalizing in the media and poor transfer of specific recommendations by public officials (Ahern *et al*, 2002; Slone, 2000). In the case of 'nonconventional' attacks involving chemical, radiological, or biological weapons, however, the reactions of the general public could be quite severe irrespective of the competency of the information (Boscarino *et al*, 2003; Karsenty *et al*, 1991; Ohbu *et al*, 1997). Interventions for the US general population through Homeland Security have consisted of vague recommendations for action with no postwarning information updates. This current practice is inconsistent with what research and practice in other places suggest. Instead, preventive intervention for the population under threat should aim at increasing actual and perceived conditions of comprehensibility, manageability, and meaningfulness (Antonovsky, 1987; Weisaeth, 1994; Zimbardo *et al*, 1977; McQuire, 1964; Rosenfeld *et al*, 2004). Accordingly, interventions for the general population should be informed by the following recommendations (Khan *et al*, 2000; Zimbardo, 2003): (1) Provide information on the believed likelihood of such an attack and of possible impact. (2) Communicate that individual risk is quite low. (3) Clarify that negative health behaviors, which may increase during time of stress (ie, smoking, unhealthy eating, excessive drinking), constitute a greater health hazard than the hazards likely to stem from bioterrorism. (4) Emphasize that the only necessary action against terrorism on the individual level is increased vigilance of suspicious actions, which should be reported to authorities. (5) Clearly communicate the meaning of different levels of warning systems when such warnings are issued. (6) When issuing a warning, specify the type of threat, the type of place threatened, and indicate specific actions to be taken. (7) Make the public aware of steps being taken to prevent bioterrorism without inundating people with unnecessary information. (8) Provide the public with follow-up information after periods of heightened alert.

Building Resilience

At a descriptive level, resilience can be thought of as one end of a continuum of vulnerability to emotional dysfunction and psychopathology when exposed to a stressful experience. Thus, an individual at the extremely vulnerable end of the continuum may experience great distress, dysfunction, and even significant psychopathology in response to even relatively minor stressors that most people would cope with readily, while a person at the resilient end would require a great deal of stress to cause significant impairment in functioning (Ingram and Price, 2001). Several different mechanisms at each of the varying levels of analysis (biological, psychological, and social) may contribute to increased resilience. Accordingly, one of the major goals of preventive intervention is building resilience of the general population. On the basis of the existing literature (Aspinwall and Taylor, 1997; Ayalon and Lahad, 2000; Hobfoll, 1998; Hobfoll *et al*, 1991; Bandura, 1997), we recommend that public officials should communicate that the public is at some risk due to terrorism and this risk is likely to be long term, but the nation is strong. In addition, public officials should: (1) invoke historical examples of public resilience and (2) demonstrate enthusiasm for actions at schools, businesses, and community organizations that strengthen American ideals, as these are the principle targets of terrorism.

Interventions Following a Small to Moderate Attack at a Single or Multiple Sites

An attack of small to moderate impact will likely generate moderate to major psychological and behavioral reactions (Boscarino *et al*, 2003; Jones and Fong, 1994). The greater the impact of the attack in terms of harm or lives lost, the greater the reaction (Hobfoll, 1991; Hobfoll *et al*, 1994; Zimbardo, 2003). Proximity to the attack site or to a similar type of site, and the number of attacks will influence the severity of psychological reaction in individuals (Galea *et al*, 2002; Lomranz *et al*, 1994; North *et al*, 1999).

Immediate reactions and interventions. The most common immediate psychological reactions to an attack include heightened anxiety, psychological panic reactions (which may be perceived as heart attacks by some; Boscarino *et al*, 2003), increased problems with sleeping, alcohol/drug use (Vlahov *et al*, 2002), absenteeism, and retaliatory actions against minorities identified in some ways with the terrorists. It is important to remember, however, that the vast majority of people are making their utmost effort to help their family and neighbors in the immediate aftermath. Thus, intervening forces should look at the population as a resource, identify people who are ready to help others, and use their assistance. Immediate interventions should consist of the following. (1) Dispatch of police and emergency for coordination and management of activities in the site of the incident and installation of law and order if necessary. (2) Activation of community-based support and intervention systems that should be prepared long before the terrorist attack (Laraque *et al*, 2004). (3) Initiation of public announcements that suggest specific actions and provide nonspecific information as to the extent and type of attack (Boscarino *et al*, 2003). For those who do not need to take direct action (ie, the general public), knowing the full extent of loss and harm in the immediate stages after an attack may actually increase further worries and unrest. (4) Facilitation of communication by the media, schools, and businesses immediately after an attack (Covello *et al*, 2001). (5) Utilization of local media and the Internet to establish information centers and call-in centers, where relatives can leave messages for their next of kin (Lahad and Cohen, 1998). Help lines utilizing volunteers should be established in coordination with public communication authorities (eg, added phone lines; Antonovsky, 1987).

Mid-term reactions and interventions. In the days following an attack, public psychological reaction may vary from subsiding to greatly increasing, depending on the extent and number of sites of the attack, the number of dead people (especially children), the extent of the damage to infrastructure, and the response to immediate interventions. The greater the extent and number of sites and the less effective is the handling of the public immediate reactions, the more severe will the psychological reactions likely be later on (Jones and Fong, 1994; Jones, 1995). The primary interventions involve providing suggestions for what people and organizations can do on their own and collectively, as well as identifying individuals with severe reactions for referral to appropriate professionals (Laraque *et al*, 2004).

Most individuals who are not immediately and directly victimized will have minor to moderate psychological reactions (Boscarino *et al*, 2003, 2004), which can be handled by family physicians and mental health professionals through a combination of reassurance, relaxation and cognitive behavioral techniques, and medication (Laraque *et al*, 2004; McFarlane, 1994). Schools, businesses, and the public at large should be made aware of the signs of more severe reactions (PTSD, clinical depression, suicidality) and instructed how to make referrals. To this end, mental health professionals who are representatives of established groups and therefore certified (eg, the American Psychological Association, State Board of Psychiatry, etc.) should be given media time (Covello *et al*, 2001; Khan *et al*, 2000).

Individuals should be encouraged to continue to live their lives as normally as possible. Identifying individuals who need more significant help requires that they be in contact with others and not isolated. Centers of public meeting should be designated and staffed using a cascade model approach (eg, a lead mental health professional with others trained at lesser levels and volunteers (Antonovsky, 1987; Hobfoll, 1998; Lahad, 1996; Milgram *et al*, 1994). In many communities, a major spiritual support may come from local religious leadership such as pastoral care. Mental health professionals should make contact with support systems in the community.

Intervention should be communicated by major media, especially electronic media (TV, radio, internet). This can include: instruction in relaxation techniques, meditation, and positive mental imagery; suggestions for things do to enhance a sense of control; advice to limit exposure to the constant retelling of events and to limit young children's exposure to the media (Ahern *et al*, 2002; Slone, 2000); and

the broadcast of 'town meetings' where community individuals can ask questions to a panel of mental health experts who can respond with suggestions (Lahad and Cohen, 1998).

As time passes from days to weeks, more specific information will be known about the threat, extent of reaction, and efficacy of initial responses. During this time frame, it is critical that government officials work with the American Psychological and American Psychiatric Associations and their panels of experts, as well as other professional groups, such as the American Academy of Pediatrics and similar groups (Covello *et al*, 2001; DiGiovanni, 1999; Khan *et al*, 2000; Laraque *et al*, 2004). While the mechanisms for this kind of collaboration has been lacking in the past, this is changing (Bravata *et al*, 2004).

Interventions Following an Attack of Large Magnitude

Attacks that kill, injure, or threaten the lives of tens or hundreds of thousands of individuals are less likely, but possible (Jones and Fong, 1994). The nearest models for such reactions are unexpected attacks, such as Israel's experience during the 1973 War, the disaster at Chernobyl, the threat of SARS in the Spring of 2003, and the September 11 attacks in New York City in 2001. None of these are perfect models for a bioterrorist attack, but we can still extrapolate from these events (Boscarino *et al*, 2003). For example, during the terrorist attacks in New York City on September 11, 2001, panic behavior was not evident. Yet, it was estimated that 17% of the adults (ie, nearly 1 million persons) experienced a panic attack during this event (Boscarino *et al*, 2004). Clearly such an attack will produce major psychological reactions (Keim and Kaufmann, 1999). However, most people, while in a state of heightened arousal, are expected to act reasonably (Gal and Jones, 1995).

All of the recommendations for mid-level bioterrorist events should be implemented for large-scale attacks. In addition, public centers should be established for secondary (those with affected family and friends, but who are not themselves victims) and tertiary victims (the general citizenry who have severe stress reactions) to seek shelter, counseling, and guidance. In so far as possible, individuals with high levels of training, such as social workers, psychologists, and psychiatrists, should direct the activities of volunteers with lower levels of counseling training, including teachers, clergy, human resource professionals, etc. (Khan *et al*, 2000). Regional experts should be at information centers and called upon for guidance and to create daily recommendations, given the evolving psychological problems that will inevitably occur (Jones and Fong, 1994).

Hospitals are expected to be inundated with patients, as many psychological reactions will be severe enough to exacerbate current major illnesses and to create their own set of severe panic symptoms (Karsenty *et al*, 1991; Ohbu *et al*, 1997). Triage must include mental health professionals and nurses with psychiatric training (Antonovsky, 1987; Rosenfeld *et al*, 2004). Breakdown of frontline professionals and emergency workers also may become a problem (Boscarino *et al*, 2004).

Reactions and interventions to major bioterrorist attack are likely to require real-time decision making that can generally only be predicted in advance (Boscarino *et al*, 2003). The immediate establishment of expert mental health teams that can be called upon at national, regional, and local levels, and the connections of these teams to biotechnical experts, major media representatives, and public officials are imperative (Covello *et al*, 2001; Khan *et al*, 2000).

Empirical evidence suggests that greater fear of terrorism and adverse evacuation behaviors are more likely to occur among minority group members and those with lower levels of education (Boscarino *et al*, 2003). Consequently, future planning for these events needs to explicitly incorporate relevant cultural, ethnic, and environmental factors to be most effective. Clearly in this situation, effective risk communication will be critical (Covello *et al*, 2001). It is important to note that while we have discussed the impact of terrorism primarily in the context of the US, cultural considerations and modifications need to be considered for the proposed interventions to be effective. The recent collaboration between the International Society of Traumatic Stress Studies and the World Health Organization related to trauma interventions is a good example of the kind of collaboration we will likely need in order to foster success (Green *et al*, 2003).

MANAGING A CHRONIC STATE OF HEIGHTENED VIGILANCE: LESSONS FROM THE ISRAELI EXPERIENCE

Reactions in the General Population

In 1990–1991, the population in Israel was subjected to threats of biological and chemical warfare for almost 6 months before the Gulf War and then subjected to Iraqi missiles during the 6 weeks of the war. In the long prelude to the war, there was widespread apprehension that the threat would lead to mass panic. This apprehension was held by decision makers and mental health professionals alike and led to the erroneous decision to delay the distribution of protective gear and later on, after protective gear was distributed, to instruct the public that they should not unpack the gas masks or try them out. This apprehension was also behind some of the excessive activity of many mental health professionals who took to the airways and newspapers to calm the public fears, actions that were harshly criticized after the war. As the long series of studies summarized in a book entitled *Coping with War Induced Stress: The Gulf War and the Israeli Response* (Solomon, 1995) clearly indicates, the apprehension mentioned above was unwarranted.

For example, data collected on a representative sample during the 15 years preceding the Gulf War and during the War showed that 80% of respondents indicated an ability to adjust to the stressful conditions and, on some measures, the mood during the war was better than before the war (S Levy, 1991). Similarly, a longitudinal study by the Israeli Defense Force (IDF) (Carmeli *et al*, 1992) with approximately 8000 people indicated that: (1) the percentage of people who reported feeling strong fear between missiles attacks gradually declined; and (2) as the war progressed,

fewer and fewer people reported strong fear in the wake of each attack. Reduction was also observed on somatic symptoms and coping patterns while in the sealed rooms. Parallel to fear, compliance with Emergency Instructions was high in the beginning (eg, 57–87% took their gas kits with them when leaving their homes; 57–77% wore their masks until the sign to remove them was given) and decreased with time. The protective measure least observed was wearing the gas mask.

Large numbers of people left Israel before the war broke out. When the missiles began to fall, 34% of the residents of the high-risk areas left their homes for safer areas of the country. Those who left their homes were more fearful, perceived more fear and distress in people around them and also exhibited more caution in their compliance with safety instructions. Data collected on emergency admissions during the first hours after each missile alarm indicated that the cause of the vast majority of admission (825 of 1059) could not be attributed directly to damage caused by the missiles. Rather, many applied for help after false alarms for reasons that reflect their fear and lack of preparedness. Of the 11 people who died, four had heart attacks, seven suffocated by gas masks that were worn with their airtight caps on. A total of 40 people were hurt while rushing to safety, 230 needlessly injected themselves with atropine, and 544 were admitted with acute stress reactions. These figures show the toll of fear and lack of preparedness (of the population that was instructed, as pointed above, not to unpack the safety kits and exercise the use of the protective devices). In other words, more people died of fear and lack of knowledge than of the missile strikes. The figures also show that as many as 70% of all casualties were psychological in nature. However, the same process of accommodation that was observed among the general population operated in the treated population as well. There were progressively fewer and fewer self-injections and psychological casualties in the course of the war.

In summary, the findings described above and many other studies of Israelis in the Gulf War dispel the myth that large proportions of people behave irrationally in large public disasters. In fact, the findings provide no reason for concern that substantial numbers of people will be adversely affected from prolonged yet contained traumatic events such as the Gulf war. For all its anxiety, the public behaved rationally throughout and at no point was there any behavior that can be described as mass panic behavior. Findings from studies on children found a similar pattern to that in the adults (eg, Klingman, 1992).

Reaction in High-Risk Populations

Several groups of vulnerable individuals were identified. These included, among others, individuals who were previously traumatized by the Nazi Holocaust and by war, new immigrants and women, and the evacuees who lost their homes in the Scud strikes. Individuals whose homes were hit by scuds, and consequentially forced to be evacuated, showed elevated rates of distress. Initially, very high level of PTSD symptoms was found among the evacuees, with 80% showing symptoms consistent with DSM criteria. After 1 year, trauma-related symptoms declined somewhat but rates were still high: 60%. The most vulnerable among the evacuees were those who had low income (Solomon *et al*, 1993).

Studies have shown that prior psychiatric disturbances influence people's reaction to a traumatic event (eg, Blanchard *et al*, 1996; Bremner *et al*, 1993; Breslau *et al*, 1991). Accordingly, psychiatric patients would constitute a high-risk population. The overall findings from both clinical observations (eg, A Levy, 1991) and empirical studies (eg, Bendor *et al*, 1993) show a fairly consistent pattern: (1) schizophrenics, during acute episodes, tended to be fairly oblivious to the war, although it colored the content of the delusions or hallucinations for some of them; (2) schizophrenics not actively delusional became more reality oriented and socially concerned for the duration of the war; and (3) in a very small number of cases with no prior history of psychosis, the stress of war may have triggered a first brief transient psychotic episode in those with some kind of constitutional vulnerability (Talmon *et al*, 1992).

Mental Health Professionals in the Gulf War

During the 8-month Gulf War period, many people suspended therapy. Instead, a large number of hotlines, most of them staffed by volunteer mental health professionals, were set up to serve various segments of the public who were perceived as having special needs, including new immigrants, the aged, and Holocaust survivors. They provided authoritative information and advice for people who sought solutions to immediate, war-related problems and who did not have easy access to help. These hotlines were quite popular during the war. After the war, unlike other public activities of mental health professionals, their work on the hotlines was not called into question.

Numerous initiatives took place in hospitals, schools, businesses, and army units. For example, workshops for teachers and school staff were designed based on Meichenbaum's 'stress inoculation' concept, which holds that people who are preacquainted with the harmful characteristics of a stressful situation are better able to deal with it when it occurs. The workshops were started before the war broke out, and there was a second round during the war. Another example is a project launched by IDF mental health professionals. They wrote and distributed a small, pocket-size guide to stress management called 'The Tranquilizer.' It was based on cognitive-behavioral principles and was initially distributed to soldiers, usually at the end of stress-reduction workshops. Later, it gained popularity and was revised and distributed to groups of civilians.

The most controversial area of mental health activity was involvement with the media. There was extensive criticism of the role the mental health professionals played during the war. It was argued that mental health professionals legitimized, spread, augmented, and even created public anxiety. At the least, they were accused of giving anxiety (or feelings of vulnerability in general) too much attention, and this preoccupation with fear, stress, and anxiety (rather than empowerment and coping) gave negative emotions an undesirable emphasis and legitimacy. The neglect or omission regarding appropriate means of coping was also noted. It was suggested that under conditions of war, denial, repression, and isolation, which are considered counter-

productive and signs of problems in a clinical setting, might be functional.

It is conceivable that while the advice of the professionals is directed to only a small minority of vulnerable people who should have been referred to therapy, most of the public did well on its own. Basic to the criticism of mental health professionals' focus on emotional distress is the idea that messages that are appropriate when addressed to patients in therapy may be inappropriate and even damaging to the normal, nonpathological population reached through the media during war.

Recommendations for Interventions

Based on the lessons learned, there is a need to educate and monitor the media, and if possible, create legislation that instruct them to use mental health advisers. These mental health advisers should be trained in disaster communication and resiliency messages. Clinical practice with anxious patients calls for different approaches than counseling of larger, generally nonpathological populations. Furthermore, when the traumatic events are still going on, there is a need for balanced messages that may legitimize fear while encouraging functioning. Otherwise, an overemphasis of fear and anxiety may undermine people's ability to cope and function. Since we saw the detrimental effects of panic during trauma (ie, the casualties cause by panic), it is important that the spread of panic be contained, while at the same time providing treatment to those with acute stress symptoms.

ACUTE INTERVENTIONS FOR PEOPLE EXPOSED TO TRAUMA

Two types of psychological interventions have been developed to alleviate acute distress and preventing chronic PTSD among traumatized people and emergency personnel indirectly exposed to the carnage of terrorism and other disasters. The most widespread intervention has been *psychological debriefing,* especially Critical Incident Stress Debriefing (CISD; Mitchell, 1983). The populations targeted in these studies have been survivors of a traumatic experience (eg, motor vehicle accident, miscarriage), irrespective of symptom severity. The other has been brief CBT similar to interventions developed for treating chronic PTSD. The populations targeted in these studies have been survivors of a traumatic experience (eg, motor vehicle accident, rape) who either meet symptom criteria for PTSD (eg, Foa *et al*, 1995) or who meet full diagnostic criteria for acute stress disorder (eg, Bryant *et al*, 1998). More recently, there has been increased interest in the use of medication in high-risk individuals to prevent chronic reactions.

Psychological Debriefing

A debriefing session usually occurs within a few days after the trauma, lasts for several hours, and can be administered to either an individual or a group (Raphael and Wilson, 2000). In this supportive and nonjudgmental setting, session leaders ask participants to describe their thoughts, feelings, and behavioral reactions during the event. The purpose is to have participants ventilate their emotions as they relive and process the trauma within the session. Leaders also provide psychoeducation to reassure participants that acute stress reactions are normal responses to horrific events, and not necessarily indicative of mental illness.

Here, we provide a synopsis of current knowledge about the effects of debriefing. For a comprehensive narrative review, see McNally, Bryant, and Ehlers (2003) and for meta-analyses see Rose *et al* (2001) and van Emmerik *et al* (2002).

The professionals who developed psychological debriefing assert that 'numerous studies have already been published with very positive results' (Mitchell and Everly, 2001, p 295), and that research on their methods 'proves their clinical effectiveness far beyond reasonable doubt' (Mitchell and Everly, 2001, p 84). Other scholars are less optimistic. For example, the Rose *et al*'s (2001) meta-analysis failed to demonstrate the efficacy of psychological debriefing and concluded that 'Compulsory debriefing of victims of trauma should cease' (pp 1–2).

The inconsistent conclusions stem from two sources. First, Rose *et al* (2001) pointed out that the studies cited in support of debriefing suffer numerous methodological shortcomings (eg, lack of nondebriefed control groups, lack of random assignment, lack of reliable and valid mental health measures), thus limiting the conclusion that can be drawn from their results. Second, proponents of debriefing dismiss the studies that failed to find support for the intervention because, despite their superior methodology, these studies have involved the debriefings of single individuals rather than groups of individuals who have shared a trauma.

Whereas nearly everyone who receives debriefing describes it as helpful (eg, Carlier *et al*, 2000), the critical question is whether debriefed individuals exhibit less post-traumatic psychopathology than do nondebriefed individuals. In the study providing the strongest support for debriefing (Wee *et al*, 1999), researchers asked emergency medical service workers to complete a PTSD symptom questionnaire 3 months after the 1992 Los Angeles civil disturbance. Shortly after the riot, some of them had received a debriefing session, whereas the others had not. Debriefed participants endorsed significantly fewer PTSD symptoms than did nondebriefed participants. The absence of random assignment and preintervention assessment of symptoms limit the conclusion that can be drawn from the study. Other studies that are cited in support of debriefing (see Everly and Mitchell, 1999, pp 107–129) similarly suffer methodological shortcomings (McNally *et al*, 2003).

In contrast, well-designed randomized controlled trials (RCTs) have shown that debriefing fails to reduce the incidence of post-traumatic psychopathology in survivors of crime (eg, Rose *et al*, 1999) and motor vehicle accidents (eg, Conlon *et al*, 1999). In addition, several non-RCTs concerning group debriefing have likewise failed to find debriefing effective among volunteer firefighters (Hytten and Hasle, 1989), disaster workers following an earthquake Kenardy *et al*, 1996), and police officers who worked at a plane crash disaster site (Carlier *et al*, 1998).

Two RCTs suggest that debriefing may even impede natural recovery from trauma. Bisson *et al* (1997) randomly assigned recently hospitalized burn victims to either

debriefing or to an assessment only control condition. Although there were no significant differences between groups at the 3-month evaluation, at the 13-month evaluation, the rate of PTSD was significantly higher among debriefed patients than among control patients (26 *vs* 9%) and debriefed participants had significantly higher scores on self-report measures of PTSD, anxiety, and depression. Mayou, Ehlers, and Hobbs (2000) conducted follow-up on a cohort of motor vehicle accident survivors who had been randomly assigned to debriefing or no debriefing conditions (Hobbs *et al*, 1996). Relative to the control group, the debriefing group was significantly more impaired on self-reported PTSD and other psychiatric symptoms. Those who had scored high on the measure of PTSD and who were not debriefed improved markedly by the 3-year follow-up, whereas those who had scored high on the PTSD measure and who were debriefed remained highly symptomatic.

Brief CBT

Brief (ie, 4–5 sessions) CBT beginning approximately 2 weeks after the trauma has been shown in several studies to speed the rate of recovery in women victims of sexual and nonsexual assault who meet symptom criteria for PTSD (Foa *et al*, 1995) and prevent the development of chronic PTSD in accident survivors and assault victims with acute stress disorder (Bryant *et al*, 1998, 1999, 2003a). For the most part, CBT in these studies consisted of a combination of prolonged exposure plus elements of stress inoculation training. In the Foa *et al* (1995) study, at 2 months after the assault, only one of 10 women receiving CBT met criteria for PTSD *vs* 70% of those in the assessment control group. At follow-up, however, natural recovery in the assessment control group erased the superiority of CBT. Thus, CBT sped the rate of recovery but did not reduce the prevalence of chronic PTSD.

Across a series of three studies by Bryant and co-workers, between 8 and 20% of participants receiving CBT met criteria for PTSD at end of treatment and between 17 and 23% at 6-month follow-up, compared to between 56 and 83% immediately following supportive counseling and 58 and 67% at 6-month follow-up. In addition, Bryant *et al* (1999) compared the full CBT program with five sessions of just the PE elements of the treatment and found no differences between them. Thus, as with studies of chronic PTSD (reviewed in the next section), both exposure therapy alone and in combination with anxiety management are efficacious treatments, and there is no apparent benefit of a combined treatment program compared to exposure therapy alone.

Medication

Two randomized controlled trials in which medication was administered beginning shortly after a traumatic event have been published. The sample sizes have been very small, but the methods rigorous. The most promising result appeared to be with hydrocortisone in septic shock sufferers on an intensive care unit (Schelling *et al*, 2001). Only 11% of patients treated with hydrocortisone developed PTSD compared to 64% in the placebo condition. However, it is difficult to generalize the results of this small study ($N=20$) to individuals without severe physical disorders. Pitman *et al* (2002) proposed that early administration of propranolol following trauma may correct excessive epinephrine release, which is hypothesized to be central in the development and maintenance of PTSD. To this end, Pitman *et al* (2002) administered propranolol or placebo for a period of 10 days beginning within 6 h after a traumatic event. Rates of PTSD 1 month following the trauma were 30% for placebo and 18% for propranolol, a difference that was not statistically significant. At 3 months after the trauma, the corresponding rates were 13 and 11%. Assessment of skin conductance in response to a tape-recorded description of the trauma 3 months after the event revealed lower levels of arousal in the propranolol condition. Although results of this small study ($N=41$) are suggestive, replication in a larger sample is warranted before drawing any conclusions regarding the efficacy of propranolol as an effective prevention for PTSD. One small study compared the effect of either clonazepam ($N=10$) or alprazolam ($N=3$) with a matched control group receiving placebo ($N=13$) that began within 1 week of the trauma in the prevention of PTSD (Gelpin *et al*, 1996). Contrary to expectations, 63% of participants receiving a benzodiazepine met criteria for PTSD 6 months after the trauma compared to only 23% receiving placebo. Although no studies have examined the efficacy of antidepressants in preventing PTSD, their efficacy in treating chronic PTSD suggests that they would be worthy of research in the future.

INTERVENTIONS FOR INDIVIDUALS WITH CHRONIC PTSD

While numerous case reports, books, and book chapters have described a variety of treatments for post-trauma reactions (for a comprehensive review, see Foa *et al*, 2000), evidence for efficacy and effectiveness in reducing chronic PTSD and other trauma-related symptoms such as general anxiety and depression comes mostly from programs that utilized cognitive behavioral techniques (for comprehensive reviews, see Foa and Meadows, 1997; Foa and Rothbaum, 1998; Foa *et al*, 2003) and antidepressant medications. The majority of the studies investigating treatment for PTSD have focused on chronic PTSD (minimum 3 month duration of symptoms) to minimize the contribution of natural recovery to treatment outcome.

The CBT programs with the greatest empirical support include variants of exposure therapy, anxiety management, and cognitive therapy. Combinations of these interventions have also been investigated (eg, Foa *et al*, 1999; Marks *et al*, 1998). More recently, the efficacy of several programs for PTSD that include nonconventional exposure and cognitive therapy techniques have also been submitted to scientific examination. The most studied such program is eye movement desensitization and reprocessing (EMDR; Shapiro, 2001).

Most of the early studies of CBT for PTSD were conducted with two groups of trauma survivors: male Vietnam veterans and female sexual and nonsexual assault victims. In these studies, exposure therapy programs were generally employed with veterans (eg, Cooper and Clum, 1989; Keane *et al*, 1989; for an exception, see Foa *et al*, 1991), and anxiety

management programs such as stress inoculation training were generally employed with female assault victims (Foa *et al*, 1991; Veronen *et al*, 1978; Veronen and Kilpatrick, 1983). More recent CBT studies have examined the efficacy of cognitive therapy and combinations of exposure and cognitive therapy and include patients with traumatic experiences other than combat and assault, such as motor vehicle accidents (eg, Blanchard *et al*, 2003), childhood sexual abuse (eg, Cloitre *et al*, 2002), refugees (Paunovic and Ost, 2001), and mixed trauma samples (eg, Marks *et al*, 1998).

Early medication studies tended to focus on male veterans and utilized medications such as tricyclic (Davidson *et al*, 1990; Frank *et al*, 1988; Reist *et al*, 1989) and monoamine oxidase inhibitor (Frank *et al*, 1988; Shestatzky *et al*, 1988) antidepressants and benzodiazepines (Braun *et al*, 1990) with limited effect. The more recent, and also more successful, studies (Brady *et al*, 2000; Connor *et al*, 1999; Davidson *et al*, 2001b; Marshall *et al*, 2001; Martenyi *et al*, 2002b; Tucker *et al*, 2001; van der Kolk *et al*, 1994) have focused on more general trauma samples that included both men and women with predominately noncombat traumas and have utilized serotonin reuptake inhibitors. Below we describe the major treatments for chronic PTSD that have received empirical support.

Exposure Therapy

The idea that therapy for trauma-related disturbances should include some form of exposure to memories or reminders of traumatic event has a long history in psychology and psychiatry (Rivers, 1920). In its modern form, this idea is reflected in exposure therapy for PTSD. With PTSD, the core components of exposure therapy programs are imaginal exposure, or repeated recounting of the traumatic memory, and *in vivo* exposure, the repeated confrontation with trauma-related situations and objects that evoke excessive anxiety. Across several well-conducted studies, between 40 and 87% of participants no longer meet criteria for PTSD after 9–15 sessions of exposure therapy alone (eg, Foa *et al*, 1991, 1999; Marks *et al*, 1998; Paunovic and Ost, 2001; Resick *et al*, 2002; Tarrier *et al*, 1999; Taylor *et al*, 2003) and exposure therapy combined with either stress inoculation training (Foa *et al*, 1999) or cognitive therapy (eg, Bryant *et al*, 2003b; Marks *et al*, 1998; Paunovic and Ost, 2001). By comparison, less than 5% of participants lose the PTSD diagnosis after a comparable period of time with no intervention (ie, waitlist control) and 10–55% of participants after receiving an active control treatment such as supportive counseling (Bryant *et al*, 2003b; Foa *et al*, 1991) or relaxation (Marks *et al*, 1998; Taylor *et al*, 2003) lose the PTSD dianosis.

Stress Inoculation Training (SIT)

SIT for PTSD includes education about trauma-related symptoms as well as techniques for managing anxiety such as breathing and relaxation training, cognitive restructuring, guided (task-enhancing) self-dialogue, assertiveness training, role-playing, covert modeling, and thought-stopping. Some SIT programs include an exposure component (eg, Veronen and Kilpatrick, 1983) and others do not (eg, Foa *et al*, 1991). In two well-conducted randomized controlled trials, 42% (Foa *et al*, 1999) and 50% (Foa *et al*, 1991) of participants receiving SIT no longer met criteria for PTSD. Notably, the interest in studying SIT for PTSD has diminished in the past few years.

Cognitive Therapy

With PTSD, the goal of cognitive therapy is to teach the patient to identify trauma-related or symptom-related irrational or dysfunctional beliefs that may influence his/her response to a situation and lead to intense negative emotion (Marks *et al*, 1998; Tarrier *et al*, 1999). The patient is taught to challenge these thoughts or beliefs in a logical, evidence-based manner. Relevant facts that support/do not support the belief are examined and alternative ways of interpreting the eliciting situation are considered. The therapist assists the patient to weigh the alternative interpretations and consequently decide whether the belief is helpful and accurately reflects reality, and if not, to replace or modify it. Two studies of cognitive therapy conducted without explicit imaginal or *in vivo* exposure found that 53% (Tarrier *et al*, 1999) and 65% (Marks *et al*, 1998) of participants did not meet criteria for PTSD after treatment. Some cognitive therapy programs include an exposure component (eg, Ehlers *et al*, 2003), which seems to augment efficacy of the treatment compared to programs that do include such a component (Foa and Cahill, in press).

Medication

Since 1994, three SSRI medications have been shown to be more effective than placebo in the treatment of PTSD: fluoxetine (Connor *et al*, 1999; Martenyi *et al*, 2002b; van der Kolk *et al*, 1994), sertraline (Brady *et al*, 2000; Davidson *et al*, 2001b), and paroxetine (Marshall *et al*, 2001; Tucker *et al*, 2001). The latter two medications have received the FDA indication for treatment of PTSD. In the above studies, treatment with medication was consistently associated with the majority of participants (53–85%) being classified as treatment responders, and significantly more participants receiving medication were judged to be responders than participants who received placebo (32–62%). The samples in all of the above studies included both men and women, although the majority of participants were women, and they recruited participants across a range of traumas, although physical or sexual assault and motor vehicle accidents were the most common types of traumas.

Two studies have investigated the effect of medication discontinuation on relapse by rerandomizing treatment responders to continue on medication or shift to placebo. Davidson *et al* (2001a) investigated the effects of discontinuing sertraline and found that, depending on the criterion used to define a relapse, between 26 and 52% of participants relapsed when shifted to placebo, compared to between 5 and 16% of participants maintained on medication. Martenyi *et al* (2002a) found that only 17% of participants maintained on fluoxetine relapsed compared to 34% of participants shifted to placebo. As with medication treatment for other anxiety disorders and depression, relapse on discontinuation is a frequent occurrence. Although there are no studies directly comparing medication with CBT,

comparisons across long-term follow-up studies of CBT and discontinuation studies of medication seem to indicate that relapse on discontinuation of medication is more common than relapse following completion of CBT.

Considerations in Selecting a Treatment

There are at present no studies directly comparing the efficacy of medication and CBT in the treatment of PTSD. Therefore, recommendations regarding which should be the first-line treatment must be made on the basis of factors other than outcome data. Medication has the significant advantage of being more widely available, whereas the availability of CBT is typically limited to large cities and cities with medical schools or universities offering graduate training in clinical psychology. In addition, medication management sessions tend to be shorter than CBT sessions so that, in the short run, fewer human resources would be needed to administer medication than to conduct therapy. In the event of a large-scale trauma, then, it may be more feasible to administer medication as the first-line treatment compared to CBT.

However, some PTSD sufferers are not willing to take medication and many would prefer psychotherapy to medication when given a choice (Zoellner *et al*, 2003). Thus, until there are studies directly comparing medication with CBT, it would seem that treatment availability, feasibility, and patient preference should be the primary factors in guiding treatment selection.

SUMMARY AND DISCUSSION

In the face of continued terrorist attacks around the world, it is imperative that we develop and evaluate interventions that will address the psychological reactions of people who have been exposed, directly or indirectly, to such attacks. Interventions that have been used vary with respect to the timing of delivery and the target population. Some of the interventions targeted entire populations or communities affected by the traumatic event. Others targeted individuals with psychiatric disorders resulting from the traumatic event. There is little empirical evidence about the efficacy of interventions targeted at large populations. Thus, the relevant interventions described in this paper are derived from practical experience.

We know somewhat more about the efficacy of interventions targeted at individuals and smaller groups that were exposed to a traumatic experience in order to reduce acute stress reactions and prevent the development of chronic PTSD. One such intervention, psychological debriefing, is designed to be administered in a single session within 24–72 h to all individuals exposed to a given traumatic event. Psychological debriefing has been administered to individuals and in small groups. This approach is already widely disseminated and has been routinely provided to trauma victims in several Western countries. There tends to be a high level of consumer satisfaction among recipients of psychological debriefing. However, there are a limited number of randomized controlled trials investigating the efficacy of psychological debriefing and the existing results do not support the usefulness of this intervention in the prevention of chronic stress reactions.

A second intervention, brief CBT is designed to be administered in 4–5 sessions of individual treatment beginning 2–5 weeks after the traumatic event. Brief CBT is targeted at individuals experiencing high levels of post-traumatic stress symptoms and who are thus vulnerable to develop chronic PTSD. A growing number of randomized controlled trials has shown brief CBT to accelerate recovery and possibly decrease the likelihood of developing chronic PTSD. However, despite its proven efficacy, brief CBT has not been as widely disseminated as psychological debriefing. A third approach to treating acute stress reactions with the goal of preventing chronic PTSD has been the early administration of medication. Three medications have been evaluated, benzodiazepines, propranolol, and hydrocortisone. Results of these studies have found them to be of limited benefit.

Considerably more is known about how to treat chronic PTSD. There is strong evidence for the efficacy of several CBT programs. Among the various CBT interventions, exposure therapy has gained the greatest support across the widest range of populations and has been successfully disseminated to several community clinics in the US and Israel. Despite evidence of its efficacy and disseminability, however, therapists are generally not trained in exposure therapy or reluctant to use it (Becker *et al*, 2004). Other forms of CBT that have been found effective in treating PTSD include stress inoculation training and variations of cognitive therapy. Despite the efficacy of CBT, some patients continue to experience significant symptoms. Medication has also been found efficacious in treating PTSD with two medications currently having US FDA indication: sertraline and paroxetine. Compared with CBT, medication is much more widely available but many individuals may prefer therapy over medication. Moreover, upon discontinuation of medication, there is a significant rate of relapse, which has not been the case with CBT.

The review of available interventions for populations and individuals reveals significant gaps in our knowledge. Accordingly, the following questions are suggested to guide future research.

Interventions in Preparation for a Terrorist Attack

1. How do resiliency and vulnerability factors change when the threat of terrorism is ongoing or where there have been multiple attacks?
2. What are the mechanisms that enable functioning under continuous stress?
3. What interventions can be administered prior to a terrorist attack that will promote resiliency, enhance coping, and improve compliance with safety instructions, thereby limiting the negative impact of such events on the general population, high-risk groups, and vulnerable individuals? Such interventions are likely to require that we take into account how individuals interact with organizations and institutions and how this interaction differs across the lifespan.
4. What are the most effective ways to inform the population about changes in level of threat without

generating either complacency or excessive and counter-productive fear?

Interventions Following an Attack

1. What are the most efficient methods to identify individuals most at risk for developing PTSD or other chronic impairments in order to provide them with interventions to ameliorate acute stress reactions and prevent chronic problems?
2. What are the minimal interventions necessary and what are the optimal circumstances for providing them to prevent chronic problems (eg, time elapsed since the trauma and who is most likely to benefit, who should provide the interventions)?
3. How can we improve the efficacy of treatments for chronic PTSD?
4. What are the most effective methods to disseminate empirically supported interventions for the acute and chronic post-traumatic stress reactions?

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