Mental Health Consequences of September 11: A Five-Year Review of the Behavioral Sciences Literature

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On a personal note, the author researched this topic because she lost her son Peter E. Mardikian in the World Trade Center attacks of September 11, 2001.

ABSTRACT. This publication provides an overview of studies conducted on different segments of the population and the psychological reactions of respondents to the devastating events of September 11, 2001. This investigation stems out of an intellectual curiosity to learn about the psychological impact of this tragedy in general, and to retrieve studies conducted on families who lost loved ones in particular. To this end, a comprehensive review of the medical and psychological literature was conducted in order to retrieve original research, peer-reviewed journal articles published between October 2001 and December 2006. Findings suggest that the September 2001 terrorist attacks attributed to widespread psychological and emotional problems.

KEYWORDS. September 11 terrorist attacks (MeSH heading), terrorism, posttraumatic stress syndrome, psychological stress, emotional trauma

METHODOLOGY The author reviewed the medical and psychological literature published between October 2001 and December 2006. Only original research articles published in peer-
reviewed journals in the MEDLINE (produced by the U.S National Library of Medicine) and PsycINFO (produced by the American Psychological Association) databases are included. The author also searched the PILOTS database, sponsored by the National Center for Post-Traumatic Stress Disorder at the U.S. Department of Veterans Affairs, a specialized database on post-traumatic stress disorder (PTSD) and other mental health disorders emanating from exposure to traumatic events. The selection is limited to original research articles conducted on different segments of the population. For purposes of this publication, studies dealing with medical symptoms such as asthma exacerbated from post September 11 psychological symptoms are included. But, articles focused on medical conditions of respiratory illnesses due to the unhealthy conditions of the destruction site are not included. Such descriptive articles as the effectiveness of intervention programs, coping mechanisms, counselor training evaluations, preparedness for bioterrorism, responses to terrorism and emergency safety issues are not included in this study even if they were peer-reviewed. Articles about respiratory effects of first responders and recovery workers, impact of pollutants on pregnant women and rescue workers and the increase in asthma severity are also disregarded. Such publication types as editorials, letters, case studies, and review articles are excluded from this article.

This compilation of original research studies is organized in the following order: national studies; followed by studies conducted on adults in the two cities that were the targets of the attacks; New York City, Washington DC, Other States; impact on the working population; impact on children and adolescents; impact on college students; impact on ethnic groups; impact on the international community; and impact on families of September 11.
INTRODUCTION  The September 11 terrorist attacks on the World Trade Center, the Pentagon and the airplane crash in Shanksville, Pennsylvania resulted in the largest amount of loss of life and were by far the most profoundly traumatic man-made disaster that hit American soil. Approximately 2,800 civilians and fire fighters lost their lives and thousands were injured and traumatized as they escaped from danger; while the whole world witnessed the tragedy unfold right in front of their eyes, either in person or on television. But, the loss was at a much larger scale when one considers the psychological, medical, and financial, including property destruction created by the disaster. Furthermore, the entire country was traumatized and lived with the fear of subsequent terrorist threats and heightened alerts, anthrax contamination in the postal service, and anxiety over biological warfare. Soon after September 11, America declared war on Afghanistan, followed by another war in Iraq in March 2003. The magnitude of this national disaster and ongoing violence against terrorism is unprecedented, and the long term psychological difficulties and emotional distress, fear, anger and shock will undoubtedly evolve and linger over a long period. Researchers in the mental health arena took the unfortunate events of this disaster as an opportunity to study human subjects in a real-life laboratory. How did all those who witnessed the massive terrorist attacks of September 11 in person or through the media survive the traumatic experience?

NATIONAL STUDIES/ adult population

As early as three to five days after September 11, the first national telephone-based study consisting of a sample of 560 adults was conducted. The study revealed a significant prevalence of psychological distress in the community at large. Forty-four percent of the sample experienced at least one of the symptoms of post-traumatic stress disorder (PTSD) as defined in
section 309.81 of the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*. This study reported on the prevalence of trauma, on how adults and children responded to the tragedy, described modes of coping mechanisms they used, and how viewing the disaster on television exasperated psychological symptoms. Levels of stress were highest amongst non-whites, women and individuals with previously reported mental illness conditions. This study had a similar finding to the Schlenger (2002) study indicating a potential association between indirect exposure to the terrorist attacks and PTSD (Schuster et al 2001).

Another study using 2273 participants in an Internet-based national survey, conducted soon after September 2001 attacks, compared stress levels amongst those in the Washington, DC and New York City areas against those living in other Metropolitan cities and the rest of the United States. In this order, levels of PTSD were found to be the highest in New York City and Washington, DC, followed by major cities, followed by other cities in the U.S. This study concluded that most individuals in the country were affected by indirect exposure through the media. Distress levels were highest amongst those in closest proximity to the attacks. Furthermore, over 60% of households in New York City reported that at least one of the children in their homes was showing signs of distress (Schlenger et al 2002).

Three weeks after the attacks, a large sample of 3,134 individuals were assessed to determine their reactions to the traumatic events of September 11. Findings of this national study (Cardena et al 2005) showed that NYC residents, and in particular women, young adults and new immigrants exhibited highest stress levels. Those who watched more hours of television also seemed to be most impacted. Other demographic characteristics such as religion, income,
education and ethnic background were not factors in determining distress levels in this sample of this population.

Data in another study (Peterson et al 2003) was gathered in an online survey completed by 4817 responders on the World Wide Web between January 2001 and June 2002. The purpose of the study was to examine trends in how character strengths changed after September 11, 2001 (9/11). The study determined that character strengths (gratitude, hope, kindness, leadership, love, spirituality and teamwork) were increased immediately after the attacks and were still somewhat elevated ten months after the attacks. This study demonstrates how trauma has the potential of bringing out the best character strengths in people.

A two part national study using 973 participants was conducted in September and November 2001 to examine how such emotions as fear and anger affect risk perceptions and responses to terrorism. The dominant emotion reported by most participants was anger. The majority of participants who expressed emotions of anger in turn demonstrated more optimistic outlooks for the future. Conversely, those participants who reported emotions of fear showed more pessimistic responses. Findings in gender differences revealed that men expressed less pessimism than females for future terrorist-like events (Lerner et al 2003).

Silver and colleagues conducted two national longitudinal studies (Silver et al 2002 and Silver et al 2004) using random web-based samples. The first study included a sample of 3,496 participants and the second study collected data from 1,900 subjects in order to determine the long-term psychological impact of 9/11. Another purpose of the studies was to explore the
correlation between proximity to the attacks and the levels of emotional distress. Findings suggested that all those who experienced the events of September 11, regardless of geographic proximity, showed symptoms of anxiety. Although the psychological impact including anxiety and post-traumatic stress symptoms declined a year after the attacks, many of those participants not directly impacted by the attacks continued reporting symptoms of distress with the same severity as those participants who were directly exposed. The authors advised that health care providers should be aware that individuals who are geographically far (indirect exposure) from terrorism could potentially be as traumatized as those who are in direct exposure.

A longitudinal study (Holman and Silver 2005) examined how Americans adjusted to the traumatic events of September 11 and how their fears and insecurities about the future had transformed three years after the attacks. In order to capture progressions over the three years, surveys were conducted at five different time periods. Many interesting and complicated findings emerged showing that a variety of adjustment techniques were utilized to create positive or negative outlooks for the future.

Another national longitudinal study (Stein et al 2004) examined the reactions, distress levels, coping techniques and seeking behaviors for help from counseling services in 395 telephone survey responders. Findings showed that two months after September 11, psychological distress levels remained high and normal functioning was still problematic. In terms of coping techniques, the majority reported that they did not seek help from counseling services, but rather found support by talking to family and friends.
Data obtained from 807 adults in a national random dialing conducted between July and September 2002, revealed that their lifestyles and behaviors including coping mechanisms had changed considerably since 9/11. This study demonstrates the long-term effects on Americans. Examples of behavioral changes listed by the respondents included an increase in spirituality, increase in home security, considering purchasing a weapon for self-protection, limiting outside activities, and changing modes of transportation. One year after the attacks, the most predominant change in behavior was an increase in television viewing. The most prominent negative change respondents listed was anxiety. Respondents had become more anxious and exhibited such behavioral changes as avoidance of crowds, avoidance of flying, and watching world politics in general. On the positive side, 30% responded that they had become more appreciative of family and friends, more patriotic, and more spiritual (Torabi and Seo 2004).

Another national study was conducted using interviews of young adults between 18 to 26 years of age from July to November 2001. Data from 7,095 participants was analyzed comparing results before with results after September 11. The most predominant reactions voiced after the September 11 attacks, were general feelings of sadness and distress. On the positive side, interviewers rated faith and spirituality as more important values in their lives, and their trust in our government remained strong. Young adults geographically close to the attacks, and in particular young women showed more symptoms of distress (Ford et al 2003).

A study (Cohn et al 2004) analyzed language changes used by 1,084 adults who wrote their personal journals in an online journaling service. This study captured the moods and feelings of the participants in their own words over a period of four months before and after September 11.
The frequency in which participants wrote about death, the attacks and religion increased in the immediate days after the attacks, while descriptions about common, every day topics such as family, friends, hobbies and relationships declined. Immediately after the attacks, their writings were more negative and psychologically more distant than the days before September 11. After two months, anger and distress subsided, but psychological distancing remained higher than the participants’ original writings prior to September 11.

A total of 537 participants completed an online survey. One hundred and seventy-seven of them chose to write about their emotions regarding September 11. This study (Graves et al 2005) analyzed linguistic characteristics and compared the feelings of those who chose to write as against those who did not participate in the writing portion of the study. Individuals who chose to write about their feelings vis-à-vis the September 11 events showed higher distress levels than the non-writers.

Another national study (Eidelson and Plummer 2005) compared the differences in beliefs held in a group of 198 Americans before September 11 with a group of 208 Americans after 9/11. The investigation showed that the strength levels of beliefs such as vulnerability, injustice, distrust, superiority and helplessness, varied considerably in the national sample tested after the September 11 attacks.

Gathering information from the largest two pharmacy data sets in the nation, this study compared the use of psychotropic medications 12 weeks before and 12 weeks after September 11. The study determined that with the exception of New York City, in the nation as a whole there was
not a measurable increase in the use of antidepressants and hypnotic medications (Druss et al 2004).

A study (Halkitis et al 2003) examined how September 11 impacted adherence to HIV medications in 68 HIV positive men in NYC. The study compared adherence and missed doses of HIV medications in the immediate aftermath of 9/11 with adherence measures taken two to four months before September 11. The study showed that the events of September 11 made it more difficult for HIV patients to adhere to their medication regimens.

In another study, anxiety levels of a random population of 610 participants were assessed. The changes in self-reporting with regard to levels of anxiety were studied between July 2001 and December 2003, and compared with symptoms studied prior to September 11. This national longitudinal study demonstrated significant anxiety reactions to the terrorist attacks with levels of anxiety elevating to peak levels in the immediate aftermath of 9/11 and at the two anniversaries in 2002 and 2003 (Cohen et al 2006).

In November 2001, a total of 973 participants responded to a national random survey in order to ascertain the types of emotions that dominated their minds. Participants were randomly asked to respond as to which emotion, sadness or anger; best described how they felt about the terrorist attacks. When feelings of anger were experimentally primed, blame for terrorism was more evident in this sample compared to experimentally priming feelings of sadness. This study proves the important role media plays when covering stories about terrorism in how it influences and triggers specific emotions to its viewing audience (Small et al 2006).
An Internet-based survey was completed by 2,915 gay men to determine any changes in sexual behavior after 9/11. Gay men who lost a relative or friend in the terrorist attacks reported using unprotected intercourse, an increase in sexual partners and drinking more alcohol than those who did not lose a relative or friend. Findings show that exposure to traumatic events has the potential for changing sexual behavior (Chiasson et al 2005).

Another major national study conducted by telephone surveys identified 7,317 respondents in order to determine the prevalence of fatiguing illnesses, such as chronic fatigue syndrome in the United States. Similar to findings published by Raphael et al., 2002 about fibromyalgia, the unexpected findings in this study suggest that the prevalence of fatiguing symptoms actually decreased in the first three months after the attacks. One possible explanation is that the September 11 attacks may have altered the perception of fatigue. In other words, the events of September 11 may have served as a powerful distraction causing these patients to refocus away from their own physical pain (Heim 2004 et al).

Scientists conducted several studies on the impact of September 11 on Veterans. The main objective of these studies was to determine how this already vulnerable group to war-related post-traumatic stress disorders was impacted by the horrific events of September 11. Data was obtained about the use of mental health services at Department of Veterans Affairs (VA) in all major cities. In response to the attacks, the studies concluded that use of mental health services in VA facilities was not increased. One possible interpretation to this surprising finding is that the
numbing of emotions and overwhelming reactions blocked them from seeking psychological help (Rosenheck and Fontana 2003a).

Another study (Rosenheck and Fontana 2003b) evaluated the impact of 9/11 using a national sample of 9,000 veterans who were diagnosed with PTSD. Surprisingly, six months after the attacks, the severity of PTSD symptoms in VA patients with pre-existing PTSD diagnosis were less than those admitted prior to September 11. Moreover, when these patients were assessed in follow-up visits, their symptoms showed considerable improvement. One possibility for this improvement is that the events of September 11 caused these veterans to become more patriotic and proud of their country and felt a sense of “sameness” with the rest of society. In other words, they may have felt that their PTSD symptoms were a normal reaction to traumatic events. Having had the experience of dealing with this illness prior to 9/11, these patients may have developed better coping techniques than the rest of society as a whole. Other studies conducted on veterans are listed under the section entitled “New York City” in this publication.

The purpose of another study conducted on 178 veterans in VA clinics in the West coast was to determine how veterans with pre-existing PTSD were affected by the traumatic events of 9/11. Two national studies by Schuster et al., 2001 and Silver et al., 2002 showed a high prevalence of acute mental illness symptoms including PTSD as related to 9/11 in individuals from the general population who were previously diagnosed with these symptoms. However, the study by Rosen and colleagues found that veterans with pre-existing symptoms did not exhibit worse symptoms after being exposed to 9/11 media coverage. This finding is consistent with other studies by Rosenheck et al., 2003 and Niles et al., 2003 conducted on veterans. It is possible that veterans
with a pre-existing PTSD diagnosis were already traumatized by combat experiences and therefore did not exhibit worse symptoms when exposed to September 11 stressors (Rosen et al 2005).

Another national study (Penner et al 2005) focused on the effects of volunteerism in America following the 9/11 attacks. Entries for 605,454 volunteers in a large national website, VolunteerMatch, were analyzed in order to determine the duration, frequency and number of volunteers added to the database on a daily basis from August 1997 to the end of December 2001. Findings indicated that the number of volunteers increased dramatically in the immediate aftermath of 9/11 and lasted at that high peak level for three weeks. Over 30,000 individuals enrolled in the online volunteer program. Although the greatest increase was felt in crisis-related organizations, all charity organizations saw a significant increase. The author discussed in detail the psychological factors motivating this massive volunteer effort.

**New York City/ adult population**

In the immediate aftermath of the September 11 attacks on the World Trade Center (WTC), it became clear to Dr. Galea and his colleagues from the Center for Urban Epidemiologic Studies at the New York Academy of Medicine that this unprecedented event would cause severe psychological trauma to New York City residents. They conducted several studies to investigate the prevalence of depression and PTSD throughout the New York metropolitan area. By using random digit dialing of 988 adults in lower Manhattan, Galea and colleagues studied the prevalence of PTSD five to eight weeks after the attacks. Those who lived closest to the WTC in lower Manhattan were most affected showing a 20% rate of PTSD. More than 50% of
participants reported at least one symptom of PTSD. It was concluded that 8.8% of participants suffered from PTSD, and 9.7% were diagnosed with symptoms consistent with depression (Galea et al 2002a, Galea et al 2002b).

Six months after 9/11, the rate of PTSD was still highest amongst those who were directly exposed. However, participants who were not directly affected by the attacks also exhibited PTSD-like symptoms. In the three survey samples taken over a one-year period, Galea reported that persons who were most directly affected were most likely to find it upsetting to answer the questionnaires. Similarly, emotional distress over answering survey questions amongst those who had previous depression was higher compared to those individuals who did not suffer from depression (Galea et al 2003, Galea et al 2005).

Boscarino and colleagues published eight articles on the psychological effects of September 11 on New York City adults. How was the utilization of mental health services in NYC affected by the attacks on the WTC? Results of this study showed a significant increase in seeking mental health services in 988 adults 30 days after September 11. Some of the factors attributable to this increase in utilization of mental health services were being between 45 – 64 years of age, mostly female, and having experienced previous traumatic events (Boscarino et al 2002).

When Boscarino and colleagues assessed medication use among 1,008 Manhattan residents in a telephone survey a month after the attacks, a significant increase in the amount of psychiatric medication was observed. Individuals who had used psychiatric medications prior to September 11, those with panic attacks or PTSD, being female, and NYC residents with health insurance
coverage appeared to have higher drug utilization rates. The most predominant determining factor for increased use was prior use of psychiatric medications. For new users, the most predominant factor for increased use after the disaster was experiencing panic attacks (Boscarino et al 2003a).

To determine if New Yorkers were still afraid of new attacks on NYC, Boscarino and colleagues conducted another study one year after the attacks using 1,001 participants. The study indicated that Manhattan residents were still concerned about future terrorist attacks. Those who lived in close proximity to Ground Zero, African Americans, Hispanics, women, those between 45 to 64 years old, less educated and low-income residents exhibited higher levels of fear and were most likely to evacuate immediately in future attacks. Understanding tendencies in evacuation behavior of different populations has important implications for emergency preparedness (Boscarino et al 2003b).

In a study of 2,001 participants conducted four to five months after the attacks, the findings showed a significant decrease in mental health utilization, but a significant increase in use of medication as compared to the study conducted a month after the attacks. This study found ethnic disparities. Hispanic and African American responders used mental health services and medications less than white participants. Other factors that attributed to greater medication use were being an adult younger than 64 years of age, having a family physician, experiencing previous stressful events and having depression. Factors that attributed to the highest use of mental health services were those who were white responders, aged 25 to 64 years, and who had a primary care physician (Boscarino et al 2004a).
Another longitudinal study using 2368 participants conducted a year after the attacks found that the rate of visits to mental health services and use of psychiatric medication increased slightly since the previous study. PTSD increased by 5.3% and depression increased by 11.8% one year after the previous study. Findings revealed consistent results that African Americans used medications less frequently than Whites (Boscarino et al, 2004b).

Boscarino and colleagues were interested in determining if participants in studies found the questioning in surveys upsetting. Using a random sample of 2,368 participants, the authors assessed the reaction of subjects when answering survey questions related to 9/11 issues. The majority of participants tolerated participation in the surveys relatively well (Boscarino et al 2004c).

Another study examined the disparities in mental health utilization between different populations, ethnic and age groups. In a random-digit dialing survey of 473 adults, the authors determined some of the barriers to the utilization of mental health services. Even though free mental health services, such as “Project Liberty”, were made available to New York residents, results showed that African Americans were still less likely to use these services and psychiatric medications compared to Whites. Results showed that adults 45-64 years of age and those who had experienced panic attacks were the most likely to use medications. Open-ended questions revealed that the major barrier to the delay in seeking treatment was related to access issues (Boscarino et al 2005a).
How did the WTC attacks change the drinking behavior of New York City residents? The long-term effects of this disaster were investigated in terms of alcohol consumption. Findings showed that those who had the highest exposure to the events were more likely to use greater alcohol consumption at one year and at two years after the disaster. This study suggested that long after the disaster, the effects of this trauma were sustained as evidenced by a significant increase in problem drinking (Boscarino et al 2006a).

Despite the high prevalence of PTSD reported in the literature, results of another study (Stuber et al 2006a) showed that the majority (60% of participants) who needed help were not seeking help from mental health professionals. In a telephone survey of 2,752 participants conducted six months after the attacks, results showed that very few individuals with post disaster new symptoms of psychological problems as related to 9/11 sought the help of a mental health professional. This finding is consistent with results published by Delisi et al, 2003, demonstrating the underutilization of mental health services by those who needed it the most after 9/11. The most frequent reported reason for not seeking psychological help was concern for others who may be in greater need for mental health services. The article discusses some of the barriers for seeking help and the effective measures that could be taken in future disasters to respond to this unmet need for mental health services.

In a survey of 2,368 residents, Adams evaluated the well-being of New York City residents one year after the attacks. The author and his colleagues concluded that those who were directly exposed as compared to those who were indirectly exposed to the attacks were more likely to experience a higher prevalence of psychological problems. The study showed that those residents
with the greatest exposure to the WTC events exhibited overall poor mental and physical health (Adams and Boscarino 2005a).

However, in a follow-up study using 1,681 individuals, two years after the attacks, the authors concluded that the physical and psychological well-being of responders was no longer directly linked to the intensity of exposure to the attacks. One explanation given to the short-term psychological impact of the disaster is the support and resources provided to those who were directly exposed to the WTC attacks (Adams et al 2006a).

Adams and colleagues investigated alcohol use and the mental health status of New York City residents in a two-wave study using 2,368 participants in Wave I and 1,681 participants in Wave II. The study showed that 10% of those participants surveyed reported an increase in the amount of alcohol they used after the attacks. Use was increased in order to cope with symptoms associated with PTSD and depression. It was interesting to find that alcohol drinking remained elevated even though the same individuals no longer exhibited PTSD like symptoms. This finding points to the addictive nature of drinking alcohol (Adams et al 2006b).

Adams and others examined the demographic factors and other predictors associated with PTSD and how PTSD symptoms changed over the two-year period after 9/11. A total of 2,368 completed the first survey and 1,681 individuals completed the second survey two years after the attacks. Different factors contributed to the changes in the severity of PTSD symptoms in the two time periods. Findings in the first year study showed that being young, female, high exposure to the events, prior negative events, low social support and low self esteem were factors that
contributed to high levels of PTSD. However, in the second year study, being middle age, being of Latino descent, prior negative events and low self-esteem played a role in contributing to an increase in PTSD like symptoms. This study provided insight into the determining factors for changes in PTSD following exposure to the attacks by assessing four types of reactions: those who did not experience PTSD; individuals with acute PTSD as an immediate reaction to the attacks; those with delayed onset a year after the attacks; and individuals with PTSD symptoms lasting one year (Adams et al 2006c).

A pilot survey revealed high levels of distress, and PTSD in 75 New Yorkers in the immediate aftermath of 9/11 (Simeon et al 2003). Fifty-eight out of the 75 participants in the pilot study responded to a second study (Simeon et al 2005) one year after the attacks. Findings showed that a high correlation existed between such dissociative type symptoms as avoidance, detachment, numbing and amnesia and PTSD. High initial distress levels in the initial weeks after 9/11 were not necessarily future predictors of PTSD severity in the follow-up survey. Factors such as the loss of control seemed to be the strongest predictor for developing PTSD after a disaster. This study demonstrates the complicated changes that occur in PTSD symptoms over time.

Dr. DeLisi and colleagues from the Department of Psychiatry at New York University interviewed 1,009 adults three to six months after the attacks and concluded that 56.3% were still experiencing emotional distress. The high distress level was associated with such factors as direct exposure to the attacks, being female and having a prior psychiatric condition. The main cause for distress was being reminded by painful memories when watching the events on television (DeLisi et al 2003).
Person and colleagues studied the prevalence of depression reported after the September 11 attacks. In a random telephone survey of 2,700 persons in New York City six months after the attacks, 9.4% showed symptoms of depression. This study showed that although the levels in depression were high in the first months after the disaster, they returned to the normal range six months after the attacks. Consistent with other studies, those individuals who were directly exposed to the attacks were more likely to get depressed. Experiencing panic attacks in the immediate aftermath of the disaster seemed to be another predictor for developing major depression (Person 2006 et al).

Studies showed that the traumatic events of 9/11 contributed to such behavioral changes as change in smoking rates. In a random digit telephone survey of 2,001 adults, this study (Nandi et al 2005) found that 36.8% of smokers increased smoking four months after the attacks. This study found a positive association between cigarette dependence and an increase in smoking and probable depression and PTSD.

The effect of the disaster on substance use behavior was assessed in several collaborative studies. Among 988 participants who were studied five to eight weeks after the attacks, 28% reported an increase in the use of such substances as alcohol, smoking and marijuana. Post disaster PTSD symptoms were more prevalent amongst those individuals who reported an increase in the use of tobacco and marijuana. However, the rates of PTSD were similar for those individuals who had increased alcohol use compared to those who had not. Findings revealed a positive correlation between depression and an increase in the use of all three substances (Vlahov et al 2002). In a
follow-up study using 854 survey responders, the levels of psychological disorders had slightly diminished. However, the higher levels of use of these substances were sustained over time, suggesting an addictive reaction to the substances. The authors show concern about the potential long-term effects of substance use for developing other potential health risks such as heart disease and cancer (Vlahov et al 2004a).

Six to nine months after the attacks, in a random-digit dialing survey using 1,570 responders, researchers examined the prevalence of substance use. Findings showed that 27.3% continued to use these substances. Individuals who were most directly impacted and in particular those individuals who lost their jobs as a result of the attacks, increased cigarette consumption. A significant increase in marijuana and alcohol use amongst rescue workers was detected (Vlahov et al 2004b).

Another investigation focused on the impact and changes in alcohol drinking following the WTC attacks. This study compared the changes in drinking problems of 1,570 adults in NYC six months before and six months after September 11. Findings indicated a 2.2% rate in new cases of drinking problems amongst New York City residents in the six months following September 11 that did not exist prior to the terrorist events. Furthermore, a strong association was observed between those who started drinking after exposure to the disaster and the incidence of PTSD and depression (Vlahov et al 2006).
Unlike studies by Vlahov and others on behavioral changes in the use of substances after 9/11, this study concluded that the frequency of drug use amongst 86 heroin and cocaine users in Harlem and the Bronx did not increase after the attacks (Factor et al 2002).

A study of 52 NYC residents assessed levels of functioning of survivors of the attacks. Using questionnaires, the study was conducted at seven months and at 18 months after the attacks. The same questions that were answered by the participants were also asked and validated by their friends and relatives. Ratings from family and friends indicated that even those who were self-enhancers, who showed resilience in the healthy way they coped in the early findings, seemed to have become somewhat less adjusted socially over time. This study shows that reactions to trauma vary considerably over time and situations (Bonanno et al 2005).

The occurrence of psychological resilience from exposure to trauma was examined when 2,752 participants in NYC were contacted by a random-digit dialing survey six months after the attacks. Findings demonstrated that even though many exhibited PTSD symptoms, 65% showed high resiliency scores. Data showed a high prevalence of resiliency amongst New Yorkers at six months after the attacks (Bonnano et al 2006).

A sample consisting of 79 New Yorkers who were near the WTC on the morning of September 11, 2001 were interviewed at seven and at 18 months after the attacks. The authors measured the respondents’ attachment styles, depression and PTSD symptoms and compared them to the responses by their friends and relatives. Findings indicate that secure individuals seemed to adjust better and exhibited fewer symptoms of PTSD and depression. Interestingly, their friends
and relatives rated the well-adjusted subjects as becoming even more secure than they were prior to 9/1, thus demonstrating psychological growth (Fraley et al 2006).

At the one-year anniversary of September 11, seventy-one staff members and students in a NYC graduate school were evaluated using a questionnaire to measure their levels of forgiveness and rumination. The findings revealed that individuals with high levels of rumination exhibited more stress symptoms, whereas those who had high tendencies to forgive experienced lesser stress levels. This study suggests that when facing trauma individuals who have forgiving tendencies may experience overall lower stress levels (Friedberg et al 2005).

Several studies discussed the effects of repetitive television viewing of the tragedy on people’s psyches. In a random telephone survey conducted of 1,008 adults in NYC in the first few months after September 11, findings showed that PTSD and depression were highest amongst those individuals directly exposed to the attacks and in particular amongst those who saw people falling from the towers. Individuals who were most directly affected by the attacks and those individuals who watched the disturbing images on television repeatedly experienced greater PTSD and depression type symptoms. However, among respondents not directly affected by the attacks, prevalence of PTSD and depression was not associated with frequency of exposure to graphic images of terrorism (Ahern et al 2002).

Six months after the attacks, a similar study was conducted using 2001 NYC residents in order to study the association between watching the events of September 11 on television and PTSD.
Similar to the earlier study, those who were personally connected to the tragedy were more traumatized by the images (Ahern et al 2004a).

Consistent findings emerged in another study (Ahern et al 2004b) using 2,011 respondents showing a correlation between the frequency of viewing disturbing television images in the first few days following the attacks on the WTC and the prevalence of PTSD. The associations between television images and probable PTSD have been well documented in other studies by Ahern et al., 2002; Ahern et al., 2004; Dougall et al., 2005; Schlenger et al, 2002, Schuster et al., 2001; Silver et al 2002.

How does income inequality effect depression after a national disaster? A demographically representative sample of 1,570 participants in NYC was interviewed six months after the attacks. The depression scales indicated a 12% depression rate amongst this population. In the general population, insignificant correlation between levels of inequality and depression were detected. However, communities with low incomes exhibited more symptoms of depression than those with high incomes (Ahern et al 2006).

Gerin and colleagues (2005) assessed the effects of psychological stress on medical conditions. This study evaluated the effects of acute stress on hypertension following the attacks on the WTC. Data was obtained from the monitoring of 427 blood pressure patients two months before and after 9/11. When the data was analyzed, the systolic blood pressure measurements appeared significantly higher in the two months following September 11 as compared to the previous two months. It is clear from this study that a catastrophic event such as September 11 had the
potential to elevate and sustain high blood pressure during the months of the study, thus raising concern for health care professionals when dealing with future disasters.

Another study examined the association between psychological distress and an increase in the number of life-threatening ventricular arrhythmias in 200 patients with implanted defibrillators after experiencing the attacks on the WTC. Results showed a significant increase in the frequency of arrhythmias in the first month, and a leveling off to normal rates after that. This finding suggests that acute mental stress can trigger cardiac type events in this vulnerable group (Steinberg et al 2004).

In two studies (Raphael et al 2002 and Raphael et al 2004) using a sample of 1,312 NYC and Newark, New Jersey residents, the authors tested a hypothesis about whether fibromyalgia-like pain, which is normally believed to be triggered and exasperated by stress and depression-like disorders did indeed increase in the aftermath of September 11. A surprising research finding discovered that fibromyalgia-like pain symptoms after the WTC attacks did not change significantly from the baseline complaints taken prior to the attacks. This finding is similar to a national study by Heim et al, 2004 on chronic fatigue syndrome. When the association between fibromyalgia and PTSD was tested on the women in this sample, it was difficult to determine which one of the two disorders triggered the other.

Three weeks after the attacks, 244 New York City residents were observed over a four-month period to determine if they had altered their life-style as a result of the attacks. Seventy-four percent experienced a change in at least one habit in the first screening. Fifty-three were having
sleeping problems and 38% were less sociable. Those who were present at the World Trade Center the morning of September 11 started drinking more alcohol, exercising and sleeping less compared to those who were physically distant from the site. Four months after the attacks, participants had not returned to their normal routines, thus suggesting that this disaster had long-term effects. Additionally, data from this study suggested that participants’ life-styles and habits changed considerably over the short and long-term and had the potential to elevate the risk of heart attacks (Ho et al 2002).

Could the shocking and stressful events of 9/11 have contributed to an escalation of cardiac events? A study demonstrated a higher incidence of myocardial infarction and other cardiac incidents following the 9/11 attacks. This finding was ascertained by reviewing medical records of 1,653 hospital admissions at New York Methodist Hospital in the two months before and after September 11. This study demonstrates that a strong correlation exists between physical and psychological stress (Feng et al 2006).

Other 9/11 studies showed a high correlation between psychological stress and physical illness. The impact of 9/11 on the severity of such respiratory illnesses as asthma was assessed. In a random digit dialing study using 2,755 adults in NYC conducted between March and June, 2002, post-traumatic stress levels seemed to have contributed to more frequent severe asthmatic attacks resulting in urgent emergency room visits (Fagan et al 2003). An earlier study by the same team of researchers conducted five to nine weeks after the attacks used a sample of 1,008 individuals. Similar findings were discovered, whereby those experiencing higher levels of psychological distress experienced more severe asthmatic-type symptoms (Fagan et al 2002).
Wagner and others documented the incidence of asthma-like symptoms as related to the September 11 events. In a sample of 3,664 individuals enrolled in Medicaid who completed this survey, 45% responded that their asthma worsened since 9/11. Perhaps the smoke and high level of pollutants in the air resulting from the airplane attacks into the twin towers was the main culprit for the increase in asthma severity. The study also showed, however, that the group who suffered the most from asthma following the terrorist attacks was also the same population needing the most mental health services. This finding suggests that being psychologically vulnerable to the effects of 9/11 may have exacerbated asthma severity in those individuals (Wagner et al 2005).

Several articles in the literature (excluded in this bibliography) discussed the effects of exposure to air pollution from the World Trade Center attacks on the outcomes of pregnancies. This study (Engel et al 2005) examined the stressful effects of the 9/11 traumas on 187 pregnant women living in close proximity to the WTC. Mothers, who suffered from depression or PTSD as a result of 9/11, seemed to have longer gestation periods. Moreover, PTSD was also associated with smaller infant head circumference. This study suggested the need for evaluation of these children on a long-term basis.

Several studies compared the prevalence of PTSD in women and men in the aftermath of September 11. In a study using a total of 988 respondents, five to eight weeks after the attacks, women appeared to have been twice more likely to have developed PTSD than men. This study is consistent with other findings in the literature indicating that women are generally more
vulnerable to developing PTSD symptoms after trauma. The study discussed gender characteristics and factors that may have contributed to a higher prevalence of probable PTSD in women. Such factors as previous sexual traumatic experiences and being primary caregivers in the family placed women at a higher risk for developing PTSD following the September 11 attacks (Pulcino et al 2003).

Samples of 2,752 individuals (1,479 women, 1,273 men) were interviewed in NYC six to nine months after the attacks to determine gender differences in PTSD. Findings showed that the percentages of PTSD amongst men and women were not significantly different after 9/11. This finding is in contrast with the finding by Pulcino and others who found that women were more likely to develop PTSD-like symptoms than men after experiencing trauma. Further research is needed in order to explain the gender disparities in PTSD after experiencing mass trauma (Stuber et al 2006).

Consistent with findings by Stuber and colleagues, results of another study using 123 subjects in NYC, this study (Sciancalepore et al 2004) did not find gender disparities in PTSD. One reason may be that the magnitude of this tragedy was so unprecedented and enormous that men and women exhibited similar fears for future terrorist threats.

Another extensive study examined gender differences in association with PTSD using a sample of 982 patients in a primary care clinic in NYC. Results showed that the rate of PTSD, depression and other psychiatric disorders were significantly higher in women compared to men. Gender disparities in PTSD were attributed to several socioeconomic factors. It is plausible that
such circumstances as poorer living conditions, lesser education and being single may have rendered the women in this sample to feel more vulnerable than the men when exposed to the traumatic events of September 11 (Weissman et al 2005).

The medical records of 156 psychiatric patients in a psychiatric hospital close to the World Trade Center were examined to determine if the patients’ psychiatric disorders were exasperated after watching from their hospital windows the catastrophic airplanes’ attack and the collapse of the twin towers. Findings suggested that patients with a diagnosis of schizophrenia developed more severe symptoms, whereas no changes in symptoms were observed in those patients with other psychiatric illnesses (DeLisi et al 2004).

In a sample of 930 NYC adults in an outpatient medical clinic approximately one year following the terrorist attacks, the frequency of probable PTSD was significantly high. Some of the characteristics contributing to PTSD symptoms were being female, being an immigrant, being single, and having experienced prior trauma or psychiatric illnesses. Those who lost someone they knew in the attacks were also more likely to develop PTSD than those who did not have this experience. Similar to findings published by Silver et al., 2002 and Galea et al, 2003 as time passed, a decline in the rate of PTSD was observed, with a peak level observed on the first anniversary of 9/11 (Neria et al 2006).

Another study (Franklin et al 2002) compared 643 medical and psychiatric outpatients living in close proximity to New York City and Washington DC who filled out questionnaires two to three weeks after the attacks. Findings, as expected, demonstrated that psychiatric patients were
more vulnerable to the catastrophic event than medical patients. Psychiatric patients exhibited 33% PTSD-type symptoms while 13% of primary care patients experienced PTSD related to the 9/11 attacks.

Unlike results of studies on veterans conducted at the national level by Rosenheck and colleagues, the findings of a study conducted in the New York City area, showed a significant increase in the number of VA outpatients who were seeking treatment for PTSD as well as an increase in the number of newly diagnosed cases after September 2001. The reason for the discrepancy in findings is the different time frames used in each of the studies. Rosenheck and colleagues studied veterans for six months after the attacks, whereas the Weissman study had a longer time frame (which ended in June 2002). The highest increase in PTSD cases occurred in the last three months of the study, thus suggesting delayed onset of PTSD in these veterans (Weissman et al 2003).

Another study compared 490 outpatients in a Veterans Healthcare Administration Manhattan facility with a VA Midwestern facility in order to evaluate health changes as related to September 11. PTSD symptoms of veterans in the New York City area scored higher on scales measuring PTSD than in the Midwest. This study demonstrated that proximity to the site of the attacks was an important contributor to the higher prevalence of PTSD in the Manhattan population of veterans. This is a consistent finding with Schlenger et al., 2002 and Galea et al., 2002 who also found that residents of NYC who were in close proximity to the attacks demonstrated a higher rate of PTSD-like symptoms than the rest of the country (Copeland et al 2005).
New York City residents experienced two consecutive disasters in 2001. Soon after the World Trade Center attacks, American Airlines Flight 587 crashed. A study on the cumulative effect of both disasters was conducted by assessing 471 patients in emergency departments of two large hospitals in NYC. Findings showed that a year after the traumatic events, those who had exposure to both events scored lower on overall health status compared to participants who had exposure to one or neither of the events (Fernandez et al 2005).

In a random digit dialing survey 2,001 NYC residents participated in a study to examine the predictors of PTSD as related to September 11. When results were analyzed, it was discovered that complex peritraumatic response patterns emerged. In addition to discussing the predictors of PTSD, the authors provide healthcare professionals with important implications for taking measures to prevent the development of PTSD in the future (Lawyer et al 2006).

Six to nine months after the attacks, 2,752 randomly selected NYC residents were interviewed, and 1,939 of them were interviewed a second time 12 to 16 months later. The purpose of the study was to assess the association between resource loss and PTSD or depression. Findings indicate that resource loss was the major contributing predictor for probable PTSD and depression. Basically, resources are the core values; the personal characteristics that help us achieve our goals. A traumatic event such as 9/11; a large scale disaster that is beyond anybody’s control, erodes psychosocial resources, generates extreme psychological distress, which ultimately leads to symptoms of probable PTSD and depression. The finding that resource loss is
a predictor of PTSD provides clinicians with important implications for treatment and intervention during disastrous events (Hobfoll et al 2006).

After the attacks on the World Trade Center, the five boroughs NYC and surrounding areas were declared a federal disaster. This declaration gave NYC eligibility for government financial aid programs. To respond to emergency mental health needs, Project Liberty was established by the New York State Office of Mental Health and funded by the Federal Emergency Management Agency. Many articles in the literature described the impact of Project Liberty, the largest federal disaster mental health program in the United States. An entire issue in *Psychiatric Services*, September 2006, was dedicated to articles about this program and its effectiveness in dealing with the crisis. Two studies were conducted on adult service recipients of Project Liberty. The first study (Shear et al 2006), was conducted eighteen months after the attacks on the WTC, 149 service recipients were screened for complicated grief. Forty-four percent screened positive for complicated grief. Those individuals who had lost a relative in the attacks were more likely to score positive for complicated grief. Furthermore, individuals who had lost acquaintances were more likely to show symptoms of depression or PTSD and to seek mental health services. When tested using the complicated grief psychological instrument, family members were four times more likely to screen for complicated grief. Complicated grief usually associated with a loss of a close relative or friend is a unique diagnosis and needs to be differentiated from other mental health conditions.

The second study (Jackson et al 2006) assessed the levels of functioning of 452 Project Liberty clients who had been in counseling for 16 to 26 months after the attacks. Results showed that
55% to 68% of clients reported returning to normal pre-September 11 satisfactory life functioning. Individuals who lost their jobs as a result of the attacks had a more difficult time returning to pre-attack normal functioning levels.

Using focus groups, a qualitative study (Menendez et al) assessed the reactions of 21 women whose firefighter husbands worked in the response and rescue operation at the WTC. Concern for the safety of their husbands produced feelings of anxiety, emotional distress, and insomnia. Two similar themes were reported by all participants: the need to feel connected to other spouses who were undergoing the same experiences, and the need to stay vigilant in order to help their husbands and children cope.

**Washington District of Columbia/ adult population**

A study compared the number of arrests amongst those who were receiving mental health services in the Washington DC area one year before and one year after the September 11 attacks on the Pentagon. Datasets from approximately 5,000 people receiving mental health services on a monthly basis in the Washington, DC area were analyzed. Findings indicated that there was a significant increase in the number of police arrests in the year after the attacks and a leveling-off at the end of the study. A better understanding of why mass terrorism attributed to the elevation in rates of arrests amongst recipients of mental health services in Washington DC needs to be investigated (Pandiani et al 2005).

A study (Forman-Hoffman et al 2005) assessed the impact of the 9/11 attacks on 462 smokers (who were enrolled in a smoking cessation program) in the Washington DC area. In spite of the
emotional impact of September 11 reported by the participants, their motivation to stop smoking was not altered. As a result, there was no significant change in smoking behavior, thus demonstrating the success of the smoking cessation program. This finding is in contrast to results discovered by Vlahov and colleagues demonstrating that the events of 9/11 increased smoking consumption in the New York City area.

In order to determine the effects of stress related to the terrorist attacks on seizures in 66 epileptic patients at Georgetown University Hospital in Washington DC, a study (Klein and von Passel 2005) compared the frequency of seizures before and after the attacks. Findings showed that stress levels had the potential to exacerbate seizures. Twelve percent of patients experienced a worsening of seizures in the immediate aftermath of 9/11. This study substantiates findings in other studies by Ho et al., 2002 and Feng et al., 2006 demonstrating a strong correlation between physical and psychological stress.

Several other studies were conducted on Washington DC residents, and in particular on Pentagon staff that was directly impacted by the terrorist attack. These studies are listed under the section entitled “Workers”.

**Other States/ adult population**

Within this section, the author organized studies conducted along bordering states to New York City first followed by studies in states geographically farther from the site of the attack. Does close proximity to the attacks increase anxiety and other stress related illnesses following a trauma? A whole issue of the *Mortality and Morbidity Weekly Report* September 6, 2002, was
devoted to reports about the September 11 terrorist attacks. For the purpose of this article, two reports were selected. The report about the psychological and emotional effects of the attacks on residents in New York, Connecticut and New Jersey gave a summary of the findings of 3,512 respondents. Approximately 75% of individuals who completed the Behavioral Risk Factor Surveillance System, a telephone survey between October and December 2001, reported one or more psychological symptoms related to the attacks. This high percentage demonstrates the magnitude of the psychological impact of the tragedy on individuals living in the tri-state area (Melnik and Baker 2002). The other selected report from the MMWR was by Bernard and colleagues and is listed under the section entitled “Impact on the working population”.

Survey questions to the Connecticut Behavioral Risk Factor Surveillance System were added to assess the emotional impact and the help-seeking behaviors of Connecticut residents after the WTC attacks. Interviews of 1,774 adults were conducted between October and December 2001. The findings suggested that most affected individual by the disaster, with such problems as anxiety, nervousness, lack of control, hopelessness or lack of control, and did not seek immediate professional help. Rather, they seemed to rely on other informal means to cope with the tragedy. Patterns of help-seeking behavior after trauma needs to be further investigated (Adams et al 2004).

The purpose of a study conducted on New Jersey residents examined the effects of traumatic stress on cardiac events. The number of myocardial infarction cases admitted to emergency departments in 16 New Jersey hospitals in the two months before and after September 11, 2001 was analyzed. It was determined that there was a significant 49% increase in the cases admitted
to hospitals. This study indicates that the high stress levels experienced as a result of the disaster may have contributed to an elevation in the level of heart attack cases in New Jersey (Allegra et al 2005).

Another study that examined the relationship between acute myocardial infarction (AMI) cases and traumatic stress was conducted in Massachusetts. When studying hospital records, the risk of AMI seemed to have increased significantly on September 11 and September 12, 2001. However, the rates of AMI seemed to have leveled off in terms of frequency to their normal rates in the week and month following 9/11. This study suggests that acute stress may trigger cardiac events (Goldberg et al 2005).

A study compared reactions and memories of 131 adults with PTSD with those in a control group living in Connecticut in the first and tenth month after the attacks. When the two time frames were compared in the PTSD group and the control group, both groups were equally affected by the 9/11 events in the first month. However, the PTSD group showed more negative PTSD symptoms in the tenth month. In terms of memories, both groups scored the same in the degree to which they remembered the event. In the tenth month, however, the PTSD group tended to demonstrate forgetfulness of certain details. Delayed onset of memory deficits in PTSD patients further complicates this psychiatric disorder (Qin et al 2003).

A highly technical study using interviews compared how memory and emotion were affected by the 9/11 events in three samples: 22 patients with Alzheimer’s disease; 21 patients with mild cognitive impairment; and 23 healthy adults in Massachusetts. Types of information
remembered and levels of reaction to the events of September 11 by each one of the groups appeared to be quite dissimilar (Budson et al 2004).

Does traumatic stress cause preterm delivery? In another study of 606 pregnant women in Massachusetts, the gestation period of pregnant women was examined. Contrary to expectation, this heightened stress experienced from the attacks did not increase preterm deliveries (Rich-Edwards et al 2005).

The authors of another study in Massachusetts examined 137 bipolar patients. It was believed that these patients would be at high risk for developing PTSD after the September 11 attacks. Results showed that 20% of patients met the criteria for a PTSD diagnosis as a result of indirect exposure by watching the attacks on television (Pollack et al 2006).

A two-year longitudinal study was conducted on 17 Vietnam veterans with PTSD living in Massachusetts. Findings suggested that initially PTSD symptoms increased significantly. By the end of the study, however, PTSD symptoms leveled off to their normal rate, which indicates that veterans demonstrated resiliency (Niles et al 2003).

Dougall and colleagues (2005) conducted a study using 300 adult residents living in Pennsylvania. The purpose of the study was to determine both the psychological distress levels after 9/11, as well as the perceived threat to the anthrax attacks. It was observed that television exposure to the anthrax threats further increased distress symptoms in this population. This
finding showing a powerful association between media exposure and distress levels is consistent with other studies by Pfefferbaum et al 2001; Schlenger et al 2002; Schuster et al 2001.

The effect of alcohol consumption on 86 alcohol drinkers living in Vermont in the first three months after the attacks was documented. Contrary to expectation, this study found that there was not a significant increase in alcohol consumption in this sample. Despite the stress, anger and sadness reported by the participants over the events of September 11, they did not change their alcohol consumption. In another study, the authors tested the likelihood of error reported in this population (Perrine et al 2004, Perrine et al 2005).

Medical charts of 147 functionally impaired outpatients in Rhode Island were reviewed in order to assess levels of distress after exposure to the September 11 attacks. Consistent findings with Schuster et al, 2001 revealed that individuals residing far from the site of the attacks were as likely to experience traumatic reactions as those in close proximity to the site. Three months after the attacks, findings revealed that individuals with severe mental illness demonstrated acute stress reactions and were at a higher risk to develop probable PTSD than the rest of the population (Connery et al 2003).

A study (Haidet et al 2005) used 303 adults with chronic illnesses in an outpatient clinic in Houston, Texas, to assess the impact of September 11 on patients’ perception of health. Despite the distance from New York, Washington DC and Pennsylvania, the majority of participants in this study reported that the September 11 attacks had a negative impact on their health.
A study (Mehl and Pennebaker 2003) tracked the amount of daily social interactions of 11 residents in Texas using a new method for collecting data in a natural setting for 10 days after 9/11 in order to determine the change in social interactions in the aftermath of a disaster. In the first 10 days after the terrorist attacks, it was interesting to note that although the amount of conversations did not change, a shift occurred in the pattern of interaction; from interacting with a group to limiting conversations with only one other person. This study needs to be duplicated in order to understand the change in social interaction after exposure to massive trauma.

Three weeks after the attacks, a sample of 35 substance abuse outpatients and 51 clinical staff in a hospital in Texas were studied to explore the emotional impact and stress reactions of participants to the 9/11 attacks. One finding indicated that the higher stress scores in the substance abuse outpatient group accounted for an increase in its use of tobacco. This finding is consistent with findings by Vlahov and colleagues that the use of cigarettes, alcohol and marijuana increased drastically in Manhattan in the weeks following the terrorist attacks. This study showed that exposure to the 9/11 events through media coverage had a significant effect on raising stress levels and on increasing substance abuse in this population (Creson et al 2003).

Another study (Powell and Self 2004) assessed the reactions of 400 residents in Alabama to the events of September 11 in terms of personalized fear. The theory of personalized fear refers to fear of personal injury and the perception of control an individual has over the fear-provoking situation. Findings indicated that individuals who viewed more than four hours of 9/11 television coverage a day had the highest level of personalized fear compared to those who watched less than one hour of television a day.
Six months after the attacks, a study (Hall 2005) interviewed 174 participants living in Tennessee. Three themes emerged when participants recalled their reactions to the events. The first phase or “unimaginable” phase was a state of shock. The second phase, “response of accommodation”, as participants started absorbing the reality of what happened, shock turned into anger, and a lingering unreality emerged. In the four to six month period, the third phase in the study, the “manageable” phase, as the potential threat died down, people were able to start re-evaluating their lives.

The emotional reactions as related to September 11 of a small sample of 17 male patients hospitalized in a psychiatric unit in Tennessee were examined. Television viewing was associated with stronger emotions of anger in this sample of patients. The majority exhibited considerable psychotic responses as a result of television exposure to the disturbing events of September 11. Authors of this study recommend that the amount of television viewing of disturbing images should be monitored in this vulnerable group of mentally ill patients (Stout and Farooque 2003).

Sandra Thomas (2003) saw the September 11 attacks as a natural laboratory for testing terror management theory (TMT). Basically, TMT deals with events that cause heightened death awareness, and the complicated process of coping with death. The study focused on the impact of 9/11 on middle-aged women (ages 35-60) in Tennessee. With a total sample of 192 men and women, the study found that 61% of the women continued to exhibit symptoms of distress, fear and anxiety four to six months after the terrorist attacks. Thomas recommends that long-term
psychological effects of 9/11 should continue to be monitored on this vulnerable segment of the population.

In spring 2002, Julie Masters (2005) assessed reactions of 298 older and younger adults in the Midwest to the events of September 11. Results showed that both age groups scored high on the Social Avoidance and Distress Scale, demonstrating that both age groups were equally impacted by the stressful events of 9/11. The authors tested the theory of “cognitive dissonance” on residents not directly impacted by the attacks. It seemed that all participants seemed equally affected, connected to other Americans, and shared a similar vulnerability towards feelings of insecurity about future terrorist threats.

The impact of the 9/11 attacks was examined in 25 obsessive-compulsive disorders (OCD) and 27 non-clinical volunteers in Wisconsin. In the three months after the attacks, both groups reported small changes in behavior and moods. Interestingly, the normal group seemed more impacted emotionally and cognitively by the events of 9/11 than the OCD group (Riemann et al 2004).

Another study (Starkman 2006) was conducted to compare suicide rates in Michigan two years before and after September 11. The investigation showed a 49% increase (representing 254 subjects) in the number of suicide attempts following September 11. The numbers of suicide attempts spiked in the first months, but continued at a higher level in the following year. This study demonstrated significant psychological impact in a state close to 600 miles from the site of
the attacks; an increase in both psychiatric disorders and suicide rates spiked in the immediate aftermath of September 11 and had a lasting effect for the next two years.

The number of emergency calls to police and the number of psychiatric emergencies in San Francisco, California were examined to determine a pattern over time in a period of 424 days starting on January 1, 2001. The number of individuals who were coerced to be admitted to a hospital and the number of mental health related phone calls to police in the immediate aftermath of the attacks increased significantly. It is possible that the increase in coerced admissions to receive psychiatric services may have been related to less tolerance from the community at large rather than an increase in mental illness in general (Catalano et al 2004). Consistent findings emerged in another study (Catalano et al 2005) conducted in Florida, suggesting that the 9/11 terrorist events may have contributed to decreased tolerance for mental illness. In the three-week period after September 18, 2001, law enforcement officers coerced a total of 34 more men than expected into psychiatric evaluation. These two studies show that the threatening events of September 11 influenced law officers to react less tolerantly towards the mentally ill who have the potential of harming others.

A total of 132 patients with implantable cardioverter-defibrillators in Florida participated in a study to determine whether the tragedy affected the incidence of ventricular arrhythmias. Comparing data one month before and after the attacks, the frequency of ventricular arrhythmias in these patients increased by 68%. Despite the geographic distance from the site of the attacks, psychological distress triggered a higher rate of arrhythmias in this high-risk patient population (Shedd et al 2004).
A total of 224 participants in North Carolina participated in a study to determine how such variables as ethnicity, gender, age or educational level played a role in the reactions to the terrorist attacks of 9/11. Regardless of ethnic and demographic differences, first reactions in most participants were shock and disbelief. The most influential variable appeared to be in gender differences, with women reporting more psychological distress and positive coping mechanisms than men (Walker and Chestnut 2003).

One hundred and fifteen participants who were enrolled in a “fear of flying” treatment program in North Carolina before the September 11 attacks were assessed in order to determine if an extreme “fear-relevant” event, such as 9/11, caused them to revert back to their fear of flying phobia-like symptoms. Findings suggested that most participants were able to maintain the gains received from the fear of flying treatment for almost a year after the attacks, thus showing that the program was successful (Anderson et al 2006).

Davidson and colleagues (2006) studied flashbulb memories in Arizona by measuring participants’ retention rates of how they learned about the terrorist attacks. The study compared retention rates of 46 young adults (mean age 22 years) and 43 older adults (mean age 74 years) in two time periods. Interestingly, findings discovered that there was virtually no difference in the retention rates of the two age groups one year after the attacks. Flashbulb memories by nature are different from normal memories in that they are vivid, shocking, surprising and long-lasting. Even when other kinds of memories were impaired in the older population, the events of 9/11 remained vivid in this group.
Another study (Sadler et al 2005) conducted in Colorado assessed the emotional responses of 122 adults to the terrorist events of September 11. The emotional reactions of anger and sadness they displayed affected the policies they endorsed and individuals they blamed for the attacks.

**Impact on the working population**

Many New York City residents lost their jobs and experienced economic hardships after the World Trade Center attacks. According to the New York State Department of Labor, unemployment rates grew from 6.5% in September 2001 to 7.6% in September 2002. In addition to job loss, and a reduction in work hours, many NYC employees’ job situations changed considerably and some businesses were relocated to other parts of the city creating longer commuting time and much disruption in the workforce. How did the economic hardships and loss of wages affect the overall mental health of NYC workers? This study examined the association of work stress and unemployment as a result of the September 11 attacks on the PTSD-type symptoms in New York City. Six months after the attacks, in a random telephone survey (n=1939) using a representative sample of New York City adults, the study found a high correlation between those who were experiencing high levels of stress in the workplace and elevated rates of PTSD symptoms in this population. One year after the attacks, unemployment continued to be a strong predictor of lingering PTSD symptoms (Nandi et al 2004).

A total of 1,167 workers residing in NYC were studied over a two-year period in order to assess their productivity and outpatient service use following the WTC attacks. Experiencing PTSD
and depression from exposure to the stressful events of 9/11 correlated with more frequent office visits and lower productivity in the workplace. Although worker productivity was directly affected by the traumatic events of 9/11 in the first year, this outcome did not persist in the follow-up study a year later. One factor that may have contributed to an improvement in worker productivity may have been due to psychological resiliency (Boscarino et al 2006b).

A sample of 1,681 workers in NYC was interviewed in two sessions one year apart to determine their mental health progress. Two years after the attacks, this study found that crisis interventions offered by employers in NYC were effective in reducing the symptoms of mental illness in the workplace (Boscarino et al 2005b).

In a random survey of 236 social workers in NYC, this study examined the “compassion fatigue” or emotional exhaustion experienced from providing mental health services to those affected by the WTC attacks. Results indicate that those social workers working with traumatized victims from the attacks were at a high risk for suffering from emotional fatigue (Boscarino et al 2004d).

In the first two months after the WTC attacks, the United States Public Health Service hired teams of health care professionals and set up temporary stations to provide immediate medical assistance to everyone assisting at Ground Zero. Many articles reported on the physical injuries and respiratory illnesses caused by the hazards at the site. This article by Perritt and Boal (2005) is the only article selected in this bibliography because it gives an excellent overview of the medical attention provided as a response to the health and safety hazards created by the devastation and destruction of the WTC site.
Six months after the attacks, 777 social workers in the NYC area including Connecticut and New Jersey were assessed to examine how they were coping with the catastrophic event. Findings demonstrated that over 79% of subjects experienced stress, and a significant number reported an increase in symptoms, such as anxiety and depression. The increase in stressors experienced was directly related to the amount of hours social workers spent with clients discussing 9/11 concerns (Colarossi et al 2005).

The Centers for Disease Control assessed the physical and mental health of 1,167 workers employed in buildings close to the vicinity of the WTC. The Center for Epidemiologic Studies Depression Scale and the Veteran’s Administration PTSD scales were utilized in this assessment. A considerable amount of respondents from nearby institutions reported depression and probable PTSD from having witnessed the attacks (Bernard et al 2002).

A total of 6,649 questionnaires were mailed to WTC recovery and cleanup workers 20 months after the attacks. Recovery workers were involved in such stressful situations as having to rescue survivors and recover human remains. Workers at the site reported a high incidence of PTSD, depression, anxiety and other psychological symptoms. PTSD was highest amongst those suffering from respiratory complaints (Gross et al 2006).

Out of a total of 1,114 surveys completed by cleanup and recovery workers at the WTC disaster site, 332 answered open-ended questions. Twenty-four percent reported a psychosomatic illness or a physical injury related to the clean-up effort. Ten percent of the workers experienced
depression, anxiety, sleeping problems, including PTSD and suicidal thoughts (Johnson et al 2005).

Many responders at the sites of the attacks felt unsafe, and their work conditions were hazardous. Two weeks after the attacks on the WTC, 89 disaster workers completed a survey to assess how their perception of safety, and fear from terrorism affected their health and their ability to function. Individuals who handled dead bodies or witnessed someone being killed reported lower perception of safety, which, in turn, was associated with more complicated psychological symptoms (Fullerton et al 2006).

Another study of WTC workers was conducted on 174 utility disaster workers who were hired to secure gas and electricity at Ground Zero. The purpose of this study was to assess the predictors for seeking psychotherapy as a result of working at the site. Interesting findings emerged when analyzing the demographics of this group. Most workers did not utilize the available treatment options. Of those workers who did utilize treatment, non-Hispanic whites were most likely to seek help. Those workers who entered treatment programs seemed to have a higher prevalence of PTSD-type symptoms (Jayasinghe et al 2005).

The authors conducted another study (Jayasinghe et al 2006a) using a total of 328 utility workers to determine their responses to psychotherapy. The questions of who refused, who chose and who considered treatment were assessed in relation to other factors in order to determine how best to reach this highly traumatized group of workers. Mental illness levels in general, and PTSD in particular, seemed to be the most important predictors for seeking psychological help.
Another study (Jayasinghe et al 2006b) questioned whether disaster workers at Ground Zero at the WTC site, who had served as military in Vietnam, were more vulnerable for PTSD than disaster workers with no combat experience. This study compared three groups of disaster workers: Vietnam service men (n=125), workers without prior trauma (n=116) and workers with childhood physical abuse, but with no combat history (n=57). Unexpected results were found. Disaster workers with combat experience in Vietnam did not exhibit significantly more PTSD symptoms than the other two groups. The finding in this comparison study is consistent with results published about Vietnam Veterans by Niles et al., 2003 and Rosenheck et al., 2003. Interestingly, workers who had experienced abuse as children demonstrated higher rates of PTSD than the other two groups.

Another study examined whether the vulnerability of male childhood sexual abuse in disaster workers, who were employed for cleanup and restoration work at the WTC site, was greater to develop psychiatric illnesses after exposure to the disaster than those who were not abused as children. A total of 92 out of the 2,122 utility workers reported having experienced childhood sexual abuse. After exposure to the WTC attack site, the study revealed that those workers who had been abused as children were three times more likely to score high on the depression and PTSD inventory measurement scales (Leck 2006 et al).

A study (Evans et al, 2006) assessed a total of 626 utility workers who responded to the attacks at the WTC site. Findings revealed that higher levels of anger were directly associated with a higher level of PTSD symptoms in this population.
A large group consisting of 55,000 paid and volunteer workers from the American Red Cross responded to the relief efforts at the disaster sites. Results of a study (McCaslin et al 2005) indicated that a year after the attacks, 757 American Red Cross workers were still emotionally affected. To minimize anxiety, traumatic stress and negative life changes, the authors suggest that these workers should be monitored and followed long after they are assigned to a disaster.

A study (Simons et al 2005) of 779 American Red Cross workers who responded to the attacks in NYC, Washington DC and Shanksville, Pennsylvania crash sites filled out questionnaires conducted in the first three months after the attacks. The purpose of the study was to determine such responders’ risk for developing PTSD and alcohol abuse and to examine associations between alcohol use and PTSD. Findings suggested that there was a strong association between alcohol use and PTSD. Surprisingly, results indicated that both PTSD and alcohol consumption were lower than anticipated. The reason for the low levels of PTSD and alcohol use is the adaptive coping mechanisms used by these workers in order to maintain equilibrium in a time of disaster.

A similar finding was concluded in another study (Elhai et al 2006). To examine the utilization of mental health services, 6,300 American Red Cross disaster workers were mailed questionnaires in the first three months of the attacks, followed by a subsequent mailing one year after the attacks. Results indicated that the use of mental health services did not increase in this period. This finding may suggest that Red Cross workers had already obtained the necessary skills to cope with this tragedy.
In the aftermath of September 11, negative effects such as alcohol problems were evaluated in a sample of 779 disaster workers from the American Red Cross who helped survivors at the WTC, Pentagon and the Pennsylvania crash sites. Results of the study showed that most participants who were well trained to deal with disasters coped well in the aftermath of September 11. Despite the well adjustment of most of the disaster workers, some young workers used alcohol as a coping mechanism to the adverse reactions of September 11 (Gaher et al 2006).

In another study (Creamer and Liddle 2005), 81 disaster mental health workers, who had responded to help victims after the attacks participated in a survey conducted between December 2001 and February 2002. It is well recognized that therapists and other mental health workers helping distressed patients could themselves become victimized. The process of compassion fatigue or secondary traumatic stress has already been discussed in another study by Boscarino et al 2004d. Variables that caused the highest amount of secondary traumatic stress in this population as a direct result of working with distressed clients were discussed.

In another study (Tapp et al 2005), 269 NYC transit workers were assessed for physical and mental symptoms in April 2002. Findings demonstrated that the health and mental symptoms associated with dust and other environmental pollutants emanating from the fires and collapse of the twin towers persisted in transportation workers. Close to 3,000 of the 45,000 transportation workers in NYC witnessed the attacks and were directly exposed to the disaster. It was not surprising to discover that those individuals who witnessed the attacks had the higher vulnerability for major depressive symptoms.
Alvarez and Hunt (2005) measured the psychological impact as related to 9/11 of 82 canine search and rescue workers as compared to 32 non-deployed handlers (the control group) in NYC, the Pentagon and the Staten Island landfill. As expected, six months following the attacks, the rescue handlers, faced with a highly stressful situation of having to rescue survivors and human remains, reported higher psychological distress including PTSD than the non-deployed handlers. Nevertheless, the rescue workers seemed resilient and were able to endure working under such difficult conditions.

A total of 124 NYC staff members working in after-school programs were assessed six months after the attacks to determine the correlation between direct exposure and PTSD symptoms. A large percentage of female participants in this study (Piotrkowski and Brannen 2002) experienced significantly more PTSD symptoms than men. When all variables were considered, gender was not an important predictor of PTSD. The most significant predictors for higher levels of PTSD symptoms were direct exposure to the WTC attacks, the degree of threat felt for future attacks, and the degree to which these staff members lost confidence in themselves.

In a small study (Pferrerbaum et al 2004), 32 teachers in a private school in lower Manhattan were assessed to ascertain how they dealt with this traumatic event. Findings demonstrated that even as the end of the school year after 9/11, teachers’ distress levels remained high and that they felt ill-prepared to assist their students in coping with this traumatic event.
McCarter and Goldman (2002) investigated data obtained from two health insurance companies providing health insurance benefits to two employer groups in NYC. The purpose of this study was to examine changes in the use of medication as a result of the attacks. A slight increase in anti-anxiety type medications was noted in the immediate aftermath of the attacks. Unexpectedly, the use of antidepressants, other psychotropic drugs and the use of mental health services did not increase. It is believed that these employees sought support from family and friends in lieu of medications as a coping mechanism.

Eidelson and D’Alessio (2003) surveyed 712 clinical psychologists in New York, New Jersey and Pennsylvania in December 2001 in order to investigate the impact of 9/11 on their professional work. Consistent with studies on disasters in other countries, respondents reported that relatively few new patients sought their services after the trauma. Despite the fact that psychologists felt unprepared to deal with a disaster of this magnitude, they revealed generally positive feelings about their work and were optimistic that they could rise to the challenge during the period of elevated stress.

A study (Cabaniss et al 2003) conducted at Columbia University in New York City investigated how 106 practicing analysts were affected by the events of September 11. The responses to the survey suggest that 42% of analysts had been affected by the disaster and had to change their psychoanalytic techniques in order to deal with the overwhelming anxiety of their patients. The analysts started using techniques of “shared reality”. By acknowledging that this national tragedy affected everyone, analysts were able to share their own feelings and concerns with their patients.
The impact of the traumatic response efforts of law enforcement officers in NYC was studied. The Police Organization Providing Peer Assistance, a volunteer assistance program, counseled and assessed the stress reactions of NYC police officers. Thirty-four percent of the 28,232 officers who completed the questionnaires exhibited at least one behavioral change related to 9/11. The major reported symptom was social isolation or withdrawal. In addition, over half of this population reported at least one emotional symptom, such as irritation, anger, sadness, anxiety, including concentration problems. Forty-three percent reported such physical ailments as headaches, fatigue, insomnia, and stomach problems. Twenty percent of those interviewed had such severe stress related problems that they were advised to seek professional help. Given that under normal circumstances police officers are usually reluctant to admit that they are having difficulties handling stress, the findings of this study demonstrate the magnitude of the horrible disaster (Dowling et al 2006).

In a comparative study, a total of 480 emergency medicine practitioners and nurses living close to New York and Wisconsin were compared in terms of their distress levels toward the events of September 11. Geographic proximity to the site of the WTC attacks in itself and exposure to media were not significant determinants of distress. Such factors as treating an injured patient, personally knowing the patient and the discipline of the health care professional, however, were the most significant contributing factors to emotional distress (Warren et al 2003).

The Department of Defense examined how recipients, (the military and their dependents) enrolled in the Department’s health care system perceived their health status following the
terrorist attacks. When data gathered pre-9/11 was compared to data presented after the attacks, the majority of responses from the 13,843 completed questionnaires indicated a significant increase in unfavorable health. This study demonstrates the negative impact of 9/11 on the overall health status of service men and women and their families (Linton et al 2004).

An entire supplement of *Military Medicine* was dedicated to articles on the mental health response to the terrorist attacks on the Pentagon. One article focused on assessing the mental health of workers in the Pentagon. The questionnaires of 19,450 Pentagon workers were completed between October 2001 and January 2002. Forty percent reported symptoms of depression, alcohol-related problems, anxiety and PTSD (Hoge et al 2002).

Using the Pentagon Post Disaster Health Assessment, a new psychological instrument was conducted on Pentagon employees from October 2001 to January 2002 to rapidly understand the level of mental illness. It was determined that as a result of the traumatic events, psychological symptoms such as depression, anxiety, panic attacks, PTSD and alcohol abuse were widespread, and that these Pentagon employees needed further screening and monitoring (Jordan et al 2004).

Seven months following the attacks, a study analyzed the effects of trauma on 77 Pentagon staff. Fourteen percent of staff members exhibited symptoms of PTSD, and 13 percent used more alcohol. Following September 11, more women than men increased alcohol use and suffered more from PTSD-like symptoms. Staff members who were more worried about safety issues in the workplace and at home exhibited higher stress levels (Grieger et al 2003).
Another study by Grieger and colleagues (Grieger et al 2004) assessed the prevalence of PTSD and depression and safety perception in a sample of 212 Pentagon staff. Thirteen months after the attacks, 23% were still suffering from PTSD, and 4% had major depression. Consistent with other findings, individuals who were more exposed seemed to have a higher incidence of PTSD.

Two years later, another study examined the long-term effects of trauma on 267 Pentagon workers. Results showed that 14% percent had PTSD and 7% suffered from depression. Being present in the building; direct exposure seemed to be a higher predictor of PTSD than those who witnessed the account on television. A strong association was noted between direct exposure such as the traumatic experience of seeing dead bodies, and the frequency of probable PTSD (Grieger et al 2005).

(Eckart et al 2004) A total of 40,981 military personnel were evaluated in a military clinic in Texas. The purpose of this investigation was to determine how the events of September 11 altered the rates of cardiopulmonary symptoms and psychiatric disorders. Contrary to expectation, the findings in this study revealed that an overall increase in cardiopulmonary diagnoses and psychiatric problems did not occur in the month before and after the attacks. Despite the geographic distance from the site of the attacks, an increase in depression was observed in this military population.

Three months after the attacks, another study (Trout et al 2002) compared the health effects among 191 federal office workers in Dallas, Texas and 155 federal office workers in a building within five blocks of the WTC in New York City. Results indicated that mental health concerns,
psychological symptoms and utilization of mental health services were more widely reported in the NYC group as compared to the Dallas group.

Two hundred and sixty-one fire fighters in Washington State filled out surveys in a study (Beaton et al 2004) to assess how they responded to the 343 fire fighters killed in the line of duty at the World Trade Center. Acute secondary stress responses were evident in the first week after 9/11. When data was analyzed, findings suggested that secondary traumatic stress responses still existed in this sample of fire fighters over a three-year period.

Data from 6,534 military service men and women stationed in California was analyzed before and subsequent to the September 11 terrorist attacks. Contrary to studies on other populations, the results of this study (Smith et al 2004) demonstrated that military personnel reported less mental health problems and lower alcohol consumption after the attacks. One explanation is that the military felt that the country was supportive of their efforts.

Another study (McCaslin et al 2006) examined the relationship between alexithymia, a psychological disorder associated with difficulty identifying, describing or expressing emotions, and symptoms of PTSD. The study was conducted using 166 police officers from NYC and the San Francisco Bay area before 9/11. Fifty-four of the officers participated in another survey subsequent to the attacks. As hypothesized, alexithymia was a significant predictor of the severity of PTSD-type symptoms.
Another study (Moore et al 2004) compared substance use changes in 661 active duty Navy personnel before and subsequent to the 9/11 attacks. In contrast to other studies by Vlahov and colleagues, the findings in this study of military personnel indicated a decrease in the rate of alcohol consumption. However, tobacco use and prescription drugs that were more readily available increased considerably. Tobacco and prescription drugs were used as a coping mechanism from anxiety and concern about safety issues in general.

More than most businesses, the airline industry was directly impacted by the acts of terrorism on September 11. A few studies examined the impact of 9/11 on the work environment of flight attendants. A focus group study examined how the 9/11 attacks impacted the well-being of 4,676 flight attendants. Approximately 80% reported direct exposure to the trauma, and major changes in flight attendants’ duties and responsibilities were implemented as a direct result of the attacks. The majority of respondents reported symptoms of anxiety, feeling jumpy, being easily startled at work, loss of control over work, irritability, depression and having problems sleeping. Findings suggested that this occupational group being in the front line of the terrorist attacks has been confronted with profound distress and added work stress as a direct result of the disaster (Corey et al 2005).

Two studies (Lating et al 2004a and Lating et al 2004b) reported on the psychological impact of 9/11 on 2,050 American Airlines (AA) flight attendants. After 9/11, the first study found that 18.2% of respondents suffered from probable PTSD. Did the fact that the targets of the attacks were on the East Coast influence how the flight crew perceived their own personal threat as compared to the crew on the West Coast? No difference in the prevalence of probable PTSD
was found between the East and West Coast-based crews, suggesting that the entire group was equally affected.

Another study (Lating et al 2006) expounded on the previous study by testing the hypothesis on an additional group of flight attendants, currently AA employees who were formerly employed by Trans World Airlines before the merger of the airlines in April 2001 and who were neither working on the East Coast nor on the West Coast. As hypothesized, results showed there was no significant difference in the prevalence of PTSD or the levels of functioning between the three groups of flight attendants. They were all equally affected by the tragedy.

Results of a survey of 2,038 employees in a Midwest university were compared to data collected prior to September 11. Did experiencing the disturbing events of 9/11 further contribute to the chronic work stress reported by employees at this university? Findings suggested that in the aftermath of September 11, more women than men were at a higher risk for elevated psychological distress, resulting in an increase in alcohol consumption (Richman et al 2004).

A total of 306 faculty members at a research university in Ohio were interviewed to determine their concerns about air travel following the September 11 attacks. Their attitude towards future travel to give lectures or attend conferences seemed very optimistic. Faculty seemed more concerned about delays and missing flights rather than fears about hijackings or security issues in air transportation (Staats et al 2006).
Another study (Speckhard 2003) reported on the psychological effects of 50 American diplomats, military and civilians living in Brussels, Belgium. In two time frames, in the first week and 10 weeks after the terrorist attacks, expatriates filled out a self-assessment survey. When scores from the psychological instrument were tabulated, results revealed that the acute stress symptoms reported in the first week persisted (although at a lesser degree) over the second period of the study.

**Impact on Children and Adolescents**

The inconceivable event, extensive media coverage and constant threats of more attacks influenced the security of families. The studies in this section discuss the impact of the terrorist attacks of September 2001 on this vulnerable group, the children. The terrorist attacks on Washington DC, New York City and Shanksville, Pennsylvania occurred when the school day had just begun. Students attending schools in close proximity to the Pentagon and the World Trade Center were shaken by the news and by witnessing the events in person. Some of the studies listed in this section include parents and families as they struggled to help their children cope with this tragedy.

Participants in the New York City Board of Education consisted of 8,236 students between the ages of 9 and 21. The purpose of this comprehensive study (Hoven et al 2004) was to examine the extent of separation anxiety disorders in this age group. Probable separation anxiety disorders were detected in 12.3% of the students. This disorder was more prevalent in girls, young children and those who had exposure to previous traumas in their lives. Additionally, a high level of association was found between separation anxiety and PTSD, as well as to direct
exposure to the attacks or to media coverage of the events. In another study (Hoven et al 2005), using the same representative sample of 8,236 NYC children was used to screen for eight probable mental disorders six months after the attacks. Findings revealed that the majority of school children in grades 4 through 12 suffered from at least one mental disorder associated with exposure to September 11.

Four months after the attacks, parents were questioned in order to determine the severity of PTSD symptoms in their children. Parents were asked questions about the rate of television exposure, and how their children were coping. According to parents’ assessments, 18% measured severe/very severe on the PTSD scales, and the majority exhibited at least moderate PTSD. The study also indicated that the level of stress in parents caused by seeing disturbing images on television was directly associated to higher levels of PTSD in children (Fairbrother et al 2003). In the aftermath of September 11, overall, 10% of children in NYC received counseling and only 27% of the children with severe/very severe PTSD actually received mental health services. Unfortunately, children who were most affected by the attacks also had the highest unmet need for counseling in NYC (Fairbrother et al 2004).

Five to eight weeks after the attacks, 112 parents were studied in NYC to assess the prevalence of counseling in their children. Overall, 22% of the children attended counseling sessions associated with exposure to the WTC attacks. The majority of the students were at school during the attacks, thus increasing anxiety levels of parents. Children, whose parents exhibited PTSD symptoms, were more likely to receive counseling. An interesting dynamic occurs, when either

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parent or child is disturbed, the risk of psychological distress for the other seems to increase (Stuber et al 2002).

Another study (Stuber et al 2005) revealed that behavior problems as a result of the attacks changed over time in children in NYC between the ages of 6 and 17. The results of a survey of 2,001 parents, four months after the attacks were compared with results of a second survey using 2,752 parents taken six months after the attacks. According to parents, the prevalence of behavior problems in their children in the first four months of the attacks subsided from the baseline survey conducted 11 months before 9/11. Behavior problems, however, returned to the normal rates during the six-month survey. It is unclear if the improvement in behavior in the first four months was due to parental assessment of the situation or if the children behaved better.

Six to nine months after the WTC attacks, a study examined panic reactions and probable PTSD in adolescents living in NYC. A total of 529 adults participated in the study, out of which 249 were parents of adolescents. In addition, 201 adolescents participated in this study. The prevalence of PTSD in adolescents was 12.6% and an additional 26% met criteria for probable PTSD. A strong correlation was found between probable panic attacks in the initial stages of the disaster and the development of probable PTSD subsequently (Pfefferbaum et al 2006a).

Twenty-one months after the attacks, Pfefferbaum and colleagues conducted focus group interviews on adolescents in NYC to discuss the emotions and reactions to the events of 9/11. Students had vivid memories of the event and realized how much their world had changed (Pfefferbaum et al 2006b).
Nine to twelve months after the attacks, a study (DeVoe et al 2006) of 180 parents in NYC assessed the frequency in which parents sought counseling services for their children (under five years old) exposed to the attacks on the WTC. The study discussed the factors that contributed to parents seeking help on behalf of their children. The most powerful predictor for enrolling a child in therapy was the concern parents had for direct exposure to the attacks. Children who witnessed the attacks in-person were 10 times more likely to encourage their parent to pursue counseling compared to those who were not exposed.

The prevalence of PTSD was examined in a large high school in the Bronx. A total of 1,214 high school students completed a questionnaire. Twenty miles from Ground Zero, eight months after the attacks, the rate of PTSD in this adolescent population was high. More young females than males reported PTSD-like symptoms. Examples of symptoms included anxiety, difficulty sleeping, nightmares, difficulty concentrating, avoidance and irritability (Calderoni et al 2006).

How did the children of first responders react to the attacks of September 11? Were they more susceptible to develop more symptoms of PTSD than other children in New York City? Six months after the attacks, a study (Duarte et al 2006) tested this hypothesis. Following 9/11, a total of 8,236 public school children in NYC participated in a mental health study. When the occupations of parents were analyzed, results indicated that probable PTSD rates were highest amongst children whose parents worked as emergency medical technicians.
Another study (Wu et al 2006) conducted on 2,731 public high-school students in NYC six months after the attacks examined changes in alcohol and smoking. The use of drinking was linked to direct exposure to the WTC attack. Increase in alcohol use suggests that drinking was used as a means of coping with the disaster. Although smoking was not associated with exposure to the attacks, it was slightly associated with a higher level of PTSD symptoms.

A study (Balas and Guttman 2003) of 32 child psychoanalysts in the New York City area was conducted to determine the psychological impact of 9/11 on the 66 children they were treating. Not surprisingly, the children who reacted most severely were those who had lost a parent in the attacks, followed by those who witnessed the attacks at the WTC, followed by individuals displaced from home or school. Interesting vignettes illustrated the inner feelings and reactions of children to the terrorist attacks.

Emotions and reactions of children of different ages were reported in a study (Covell et al 2006) that analyzed data from Project Liberty counseling services. A total of 105,244 counseling visits by children and teens were analyzed. This adolescent population used drugs as a coping mechanism to deal with their anger, irritability, sadness, anxiety, and fear, including sleep and concentration difficulties. Elementary school children showed more signs of anxiety, isolation and withdrawal, concentration and memory problems than the adolescent population. In order to offer effective intervention programs, it is important to assess children’s reactions to traumatic events accurately.
A study (Chemtob et al. 2006) examined an uncommon variable as a potential indicator to the development of probable PTSD after 9/11. To determine the correlation between emotional reactions to the attacks and being right-handed or mixed-handed, a total of 47 preschool children from childcare centers near the WTC and their mothers were assessed. Twenty-five of the mothers were right-handed, and 22 reported being mixed handed with performing at least one task by the left hand. The study showed that mixed-handed mothers more than others reported significantly higher rates of emotional distress to the events of 9/11.

A total of 1,396 completed surveys by pediatricians in the tri state area (New York, New Jersey and Connecticut) were analyzed. The purpose of the study (Laraque et al. 2004) was to assess the impact of 9/11 on children. More than one third of pediatricians reported that they were seeing patients with at least one 9/11 related problem. Sixty-four percent noticed behavioral problems, 41 percent reported acute stress disorders and 26 percent identified PTSD-like symptoms in their patients as a direct outcome of the 9/11 attacks.

Fifty children were tested immediately after the attacks and 37 of them were re-tested a year later to determine their stress reactions to the terrorist attacks of September 11. Findings suggested that the acute stress felt in some children immediately after the attacks heightened their cardiovascular responses (Gump et al. 2005).

A study (Phillips et al. 2004) conducted in Washington DC examined responses of students (kindergarten through sixth grade) three months after the attacks. Forty-seven parent-child teams completed questionnaires to determine exposure and stress reactions three months after the
attacks. An interesting finding showed that parent reports, more than the children’s self-reports were negative reactions. In other words, parents’ assessment of the way their children reacted to the attacks seemed more negative than children perceived the situation.

One month after the attacks, 88 children and 51 parents in Massachusetts were interviewed in order to determine how they reacted to the events of September 11. Feelings of fear were the most common emotion expressed by the children. Some children were even afraid to attend school. Most of the students had heard about the attacks by the time they got home from school. School administrators attempted to protect the children and yet felt ill-prepared to handle the uncertainty. Similarly parents struggled with their own sense of shock and disbelief while they were feeling helpless in how to deal with their traumatized children (Beauchesne et al 2002).

In the aftermath of September 11, 48 mothers and their 11-year-old children were interviewed in a study (Hock et al 2004) conducted in Ohio to assess children’s reactions to the events of September 11. Sixty-seven percent of children reported fear and anxiety, and were able to articulate their emotions very clearly. Another finding was that the level of maternal fear was directly linked to the child’s anxiety. In other words, the higher fear levels in the mother tended to heighten the anxiety levels in the child.

Another study (Henry et al 2004) compared the reactions and trauma-related symptoms of parents and children living in Chicago, Illinois before (n=281) and after (n=53) September 11, 2001. No difference was found in the pre and post 9/11 measures in anxiety, depression and perceptions of safety. Parents and children, however, scored higher on measures of parental
supervision, tighter parental rules on safety issues when tested after September 11, 2001. In other words, as anxiety levels were heightened after the attacks, both parents and children alike understood the need for stricter parental rules.

A study (Lengua et al 2005) assessed the reactions of 151 children and their parents in Seattle, Washington to the events of September 11. Despite indirect exposure through media coverage, children were deeply affected with worries and PTSD-like symptoms. This study proved that national disasters such as 9/11 have the potential to illicit negative responses in children everywhere, demonstrating the vulnerability of children.

One hundred and forty-three children and their parents in Seattle, Washington were assessed to determine children’s coping styles before and after the disaster. Children who used avoidance as a coping style to the events of 9/11 generated high distress levels and PTSD-related symptoms. On the other hand, children who used active coping strategies and who were fully engaged instead of avoiding the situation may have experienced less distress. Findings demonstrated the importance of understanding the predictors of how children cope with a tragedy (Lengua et al 2006).

A study (Whalen et al 2004) conducted in California investigated the impact of the terrorist attacks on 171 adolescents. Most adolescents reported signs of distress and behavioral changes in every day activities as a result of the attacks. When asked about their reactions to 9/11, the adolescents reported elevated distress, anxiety and sadness levels. When their attention was not directly drawn to 9/11 issues, however, no difference in mood or in daily functioning was noted.
A study (Levine et al. 2005) compared the memories of adolescents and parents recorded in two time intervals taken at three and at eight months after the attacks. The study appraised the emotions of 409 adolescents and their parents in California of how they felt when they first heard of the terrorist attacks. Adolescents recalled feeling less negative emotionally than parents. Overall, adolescents’ appraisal of the events of 9/11 was less serious, and their outlook for the future tended to be more optimistic than their parents.

When 500 ninth grade adolescents in Northern California were surveyed one month after September 11, their fear of dying from such causes as tornados and earthquakes was substantially higher than adolescents assessed before the attacks. This study (Halpern-Felsher and Millstein 2002) showed that the psychological trauma of September 11 was not limited to the immediate vicinity of the attacks.

Another study (Kennedy et al. 2004) conducted in California assessed the impact of television coverage of the attacks on 40 children and their mothers. Sixty-eight percent of mothers and 38% of children reported stress symptoms following the attacks. Findings suggest that high distress levels were not limited to those in close proximity to the attacks, and that high distress levels were associated with exposure to the events through television.

The impact of media exposure to the 9/11 events was investigated by surveying 179 students (ages 5-11 years) from four elementary schools in the Southeast. Several psychological instruments were used to verify the extent of PTSD symptoms in the children. Findings
consistently demonstrated that students who saw the events on television, the Internet, or in printed media were traumatized as evidenced in elevated PTSD symptoms. This study (Saylor et al 2003) substantiates the strong association between media exposure to acts of violence and the psychological vulnerability of children. Furthermore, it demonstrates the importance of parents’ responsibility in monitoring television viewing when children are present.

A study assessed the impact of September 11 on 406 African American adolescents in Georgia. Three months after the attacks, this study (Barnes et al 2005) revealed that 10% of the high school students reported PTSD type symptoms. This low rate suggests that the majority of children were not highly distressed by (indirect exposure) watching the events on television from a distance.

A study conducted on 973 adolescents and teachers in Wisconsin four months after the attacks revealed that symptoms of stress and anxiety were present in this population. In spite of the fear and anger expressed by this population over the attacks, the students demonstrated a sense of resiliency and sought to find new meaning in their lives (Noppe et al 2006).

School counselors throughout the country were faced with unimaginable challenges in finding ways to help students cope with the traumatic events of September 11. To assess the reactions of K-12 students to the September 11 attacks, 99 school counselors completed questionnaires. Results of the study (Auger et al 2004) demonstrated that students in the Midwest were highly impacted by the attacks. The most affected were those students who had a parent in the military or had a parent whose occupation necessitated frequent airplane travel.
Impact on College Students

Flashbulb memories (vivid traumatizing memories) of three days in a row were examined using 100 college students in NYC. Consistent recollections were made of the events of 9/11 and 9/12. However recollections of the events of 9/10 were not consistent. This suggested that vivid flashbulb memories of the events of September 11 were formed and embedded in people’s minds (Paradis et al 2004).

A special issue of *Applied Cognitive Psychology*, November/December 2003 was dedicated to ten articles about “Memory and Cognition for the Events of September 11”. Kathy Pezdek, guest editor of this special issue, wrote a study (Pezdek 2003) comparing the event memory and the autobiographical memory of 9/11. Seven weeks after 9/11 three samples of college students from Manhattan (n=275), California (n=167), and Hawaii (n=127) completed questionnaires. How accurately did the students remember the stressful events of September 11? Results confirmed the hypothesis that college students in NYC were more involved and rated the event as more stressful than students in other states. As a result, they remembered the event more accurately than other students. On the other hand, their memories of how they personally first heard about the attacks (the autobiographical memories) were less accurate. In contrast, the findings in the California and Hawaii students revealed that these students were more attached to the autobiographical memories than the event itself. Therefore, they had more accurate and detailed accounts of autobiographical memories.
Another study (Bonanno et al 2004) researched the ability of 101 NYC college students to adapt to the traumatic effects of the terrorist attacks. Is it better to suppress or enhance emotions? The study tested the hypothesis that successful adaptation does not necessarily depend on which method is used, but rather the usage of both techniques in a flexible manner depending on the situation. Findings suggested that both expressing and concealing emotions could serve as good adaptors depending on the nature of the stress. Students who were capable of using both techniques of expressing and suppressing emotions over the two years of the study demonstrated less distress and better adaptation to the September 11 trauma.

A total of 620 college students enrolled in two colleges in the Northeast were assessed in terms of their levels of anxiety about workplaces and future employment plans upon graduation. This study (Bosco and Harvey 2003) revealed some interesting findings in how students were reconsidering their future workplaces in assuring that their new employers have taken the necessary steps to provide safe buildings. When seeking jobs, the students showed a higher interest in work sites away from downtown areas, less interest in working in skyscrapers, and more interest in telecommuting.

Stress responses to the traumatic events of 9/11 were compared in 91 college students in NYC to 123 college students in Ohio. The purpose of this study (Callahan et al 2005) was to assess the stress from terrorism on a population of college students residing far from the site of the attacks. The difference in stress responses between the two groups was very slight, suggesting that the students in the Midwest perceived the events of 9/11 equally as traumatizing as did the NYC group of students. When stress responses were evaluated eight months after the attacks, the study
found that although stress levels decreased somewhat over time, some students continued to experience high stress levels.

Five hundred and twenty-eight college students in Western New York State were assessed one month and three months after the attacks. Participants were asked to report on their symptoms using a revised instrument that better detects the complex factors surrounding PTSD than the DSM-IV assessment tool normally used to measure PTSD. Findings indicated that this new scale was an effective tool to measure a complexity of factors involved in the diagnosis of PTSD as a result of the events of September 11 (Baschnagel et al 2005).

Shapiro (2006) studied the flashbulb memories, the unforgettable and emotionally negative type of recollections by 61 students in a university in Kansas. Two years after the attacks, participants were able to recall their memories as vividly and with the same level of detail as they did in the earlier three time periods in which they were assessed.

Another study (Weaver III and Krug 2004) was conducted to examine flashbulb memories using a sample of 421 college students in Baylor University, Illinois. Flashbulb memories of the event reported in all time frames, including one year following the attacks, were consistently the same and as vividly described as they were in the first week after the attacks.

When 54 students at Duke University, North Carolina were tested for their flashbulb memories on September 12, 2001 and then again at one, six, and 32 weeks thereafter, findings of this study
demonstrated that vivid memories of the event stayed the same. Findings consistently indicated that flashbulb memories do not decline over time (Talarico and Rubin 2003).

When 228 college students in Kentucky were assessed one month after the attacks, students showed signs of secondary traumatic stress disorder (STSD). STSD, similar to PTSD, can be triggered by extreme traumatic events occurring at a distance and being viewed on television. Certain personality traits and other factors played a role in determining which individuals developed STSD, and how students coped with psychological distress (Woodward et al 2005).

Wayment (2006) examined how attachment styles influenced people in coping with a national tragedy. A total of 314 college students in Arizona completed questionnaires soon after the catastrophic events of 9/11. Respondents with secure attachment styles, in general, seemed more empathetic for the bereaved. Conversely, those who scored low on attachment scales and were less comfortable with closeness became less empathetic towards those who lost family members in the September 11 attacks.

A Midwest study (Coryn et al 2004) examined responses of 301 college students in four time intervals over a 19 period following the attacks. The purpose of the study was to assess how anxiety, patriotism and prejudice levels changed over the time period. Findings demonstrated that levels of anxiety about terrorism were positively associated with prejudice against Arabs. Prejudice and anxiety levels decreased significantly over the latter months of the study, but patriotism for America remained constant in the duration of the study.
Attention deficit disorders’ scores of 149 college students in Illinois measured at one to five weeks after 9/11 were compared to scores of 320 college students five months prior to the terrorist attacks. The attention deficit scale tested such cognitive responses to stress as distraction, confusion and disorganization. Respondents tested after 9/11 scored higher on the attention deficit scales compared to the college students tested before 9/11. Findings of this study (Piiparinen and Smith 2003) suggested that the higher scores in attention deficit were strongly related to the stress reactions of students following the events of September 11, 2001.

In order to test the hypotheses further, one year after the attacks, another comparable study (Piiparinen and Smith 2004) using the same methodology tested 129 college students. In this newly tested sample, scores returned to the normal lower rates measured before September 11. This finding confirms that the temporary elevation in attention deficit scores was a direct result of the terrorist attacks.

Two months after the attacks, a study (Plante and Canchola 2004) using a sample of 97 college students in a private catholic university in California was conducted to examine the relationship between religious faith and coping with the disaster. A surprising finding emerged. Strong religious faith was not associated with better coping. Students relied more heavily on social support to cope with the stress related to the fear from terrorism than they did on their religious faith.

Questionnaires of college students from three universities in Albany, New York (n=507), Augusta, Georgia (n=336), and Fargo, North Dakota (n=526) were analyzed to assess the rate and level of PTSD, acute stress disorder (ASD) and depression following the terrorist attacks.
(Blanchard et al 2004). In the first two weeks after 9/11, a significant rate of ASD and PTSD-type symptoms were reported in all three samples. However, the Albany group rated at a more elevated level of symptoms than the other two college samples, suggesting that geographical proximity to the site of the disaster was an important predictor of more severe reactions. The rates for PTSD were similar in men and women. The finding of identical rates of PTSD in men and women supports findings in an earlier study by Galea et al, 2002. Levels of depression were not significantly different in the three sites. When the same study was duplicated on an identical population one-year later, proximity to NYC continued to be an important predictor of elevated stress levels (Blanchard et al 2005).

Another study (Liverant et al 2004) examined the responses of 178 college students living in Boston, Massachusetts, to the events of September 11. Most of the students seemed significantly impacted by the tragedy, when assessed two months after the attacks. However, when anxiety levels were examined four months after the attacks, the levels of anxiety had subsided. The reduction of anxiety symptoms over time may reflect optimism and resiliency in coping skills in these young college students.

In the immediate aftermath of September 11, 420 college students attending three different colleges in South Carolina were assessed to determine the levels of probable PTSD over time. Findings showed that responses to the events of 9/11 changed from the acute levels in the first 24 hours to less intense levels as time progressed. This finding demonstrated that students altered their coping strategies over time in order to reduce stress levels caused by the events of September 11, 2001 (DeRoma et al 2003).
A sample of 136 students drawn from two colleges in the Southeast was studied to determine the benefit of indirect exposure to the traumatic events of September 11. In the first two weeks and again at 10 weeks after the attacks, participants filled out questionnaires used to measure levels of perceived benefits from having witnessed the traumatic events on television. Several character strengths and positive benefits from having experienced the trauma included gratitude, hope, kindness leadership, love, spirituality and teamwork. Findings suggested that indirect exposure to the events of 9/11 had a positive effect on some students in the immediate aftermath of the attacks. The study showed that over time, the positive perceived benefits declined (Swickert et al 2006).

Did indirect exposure to the events of 9/11 cause more severe reactions in those who had experienced crime in the past as compared to those who were not victims of crime? This hypothesis was tested on 415 college students in several universities in the Southeast (Saylor et al 2006). Upon testing the students, findings showed that those students who were previously exposed to crime were more likely to have manifested PTSD symptoms after media exposure to the events of September 11, 2001.

A total of 219 African American college students in a university in Louisiana were assessed for stress levels related to 9/11. The majority of students expressed high distress levels and academic problems in response to the events of September 11 (Murphy et al 2003).
Another study (Cardenas et al 2003) investigating the prevalence of PTSD was conducted on 305 college students in Ohio. Students attending Cleveland State University were forced to evacuate the school because United Airlines Flight 93 circled around Cleveland before it crashed in a field in Shanksville, Pennsylvania on September 11. The prevalence of PTSD in this group of college students was identical to the results indicated in national studies conducted by Schuster, et al., 2002; and Galea, et al, 2003. Contributors to elevated levels of PTSD and major depressive disorder included factors, such as being female, single, less educated and having prior traumatic experience or mental health problems.

As part of an ongoing longitudinal study on psychiatric disorders, 730 college students in North Carolina were assessed for their stress reactions to the terrorist attacks. The prevalence of substance use and substance abuse disorder increased significantly in women and decreased in men following the attacks. This study (Costello et al 2004) demonstrated strong gender differences. Unlike other studies, this study showed that men developed a higher rate of probable PTSD compared to women as a result of the terrorist attacks.

A total of 440 college students in North Carolina were assessed two weeks pre and post the 9/11 attacks in order to determine how they were effected as related to death anxiety. When scores were compared, no significant difference was found in their anxiety about death. However, an enhanced concern about personal and family safety was evidenced in some students following September 11 (Campbell and Felts 2004).
Another study (MacGeorge et al 2004) examined the impact of social support on stress levels in 666 college students in Eastern universities. Even though this sample of students was not directly exposed to the attacks, students who exhibited high stress levels manifested more significant depression-like symptoms and physical ailments. Students who sought the help of others, including a strong social network of family and friends, encountered less psychological and physical symptoms as a result of September 11.

Three months after the attacks, a sample of 457 college students attending classes at universities in Nevada, Pennsylvania and Washington were assessed to determine how hope and spirituality influenced the levels of depression and anxiety experienced as a direct outcome of terrorism. Findings in this study (Ai et al 2005a) suggested that hope and spirituality had a positive effect on reducing levels of psychological distress. Furthermore, spirituality gave the students a new meaning and appreciation of life and made them stronger individuals. To ensure that improvements in mental health occurred, data was analyzed in a second study (Ai et al 2005b) one year later. Approximately 75% of the students believed that praying in private was important in their lives and helped them cope to the catastrophic events of 9/11. The study confirmed the hypothesis that students who used prayer as a coping mechanism showed better psychological adjustment a year after the attacks. In a third study (Ai et al 2006) using the same sample of students, it was discovered that participants who experienced high levels of negative emotion were mostly those who knew someone who died in the attacks or had prior traumatic experience. These students were also at the highest risk to develop PTSD symptoms. Regardless of the mitigating factor for PTSD, when the role of optimism was examined, it was determined
that those students who scored high on the optimism scale were also less likely to score high on
the PTSD scales.

Two hundred and forty-three college students at the University of South Alabama participated in
a study measuring aggression scores. Test dates occurred over a span of two years: on the day
before the attacks, the day of the attacks, a week later, a month later, a year later and then two
years later. Results showed that aggression scores increased significantly on the afternoon of
September 11, 2001. Scores dissipated somewhat a week later, and climbed up again at the one-
year anniversary. At the two-year anniversary, aggression scores leveled off to an intermediate
level and did not return to the peak levels that were scored on 9/11 or on the first anniversary.
The passage in time could have dissipated the aggression scale. This study demonstrated how
attitudes and perceptions changed in the immediate aftermath of September 11 (Argyrides and
Downey 2004).

Forty-six college students in Michigan participated in a study (Fredrickson et al 2003) conducted
in the wake of 9/11 and a few weeks following the attacks in order to test the following two
hypotheses: “resilient people are buffered from depression by positive emotions” and “resilient
people thrive through positive emotions”. Findings proved that when such positive emotions as
gratitude and love existed during crisis, these feelings buffered depressive symptoms. Resilient
students had less signs of depression, were grateful for their own safety, counted their blessings
and thrived despite the adversity.
A total of 83 college students in California participated in a study (Kaiser et al 2004). The relationship between students’ beliefs in a “just world” and the desire for revenge against the terrorists was assessed prior to the attacks and two months after the attacks. Findings suggested a strong causal relationship between beliefs in a just world prior to the attacks and elevation in depressive symptoms and revengeful thoughts against the attackers after September 11.

(Nixon and Nishith 2005) The psychological impact of 9/11 on a sample of 133 college students in Missouri was examined one month after the attacks. The post disaster depressive and acute traumatic symptoms that emerged were directly associated with prior interpersonal trauma. Students who had experienced prior trauma exhibited more negative psychological distress over the events of September 11.

**Impact on ethnic groups**

Many of the earlier studies included in this article contain brief demographic information about different races and cultures related to their reactions and coping skills to the events of September 11. In the studies discussed in this section, however, the entire research is focused on ethnic variables.

Manhattan’s Chinatown was traumatized and deeply impacted financially and psychologically by the terrorist attacks because of its geographic proximity to the World Trade Center. The Federal Emergency Management Agency (FEMA) designated this area as the most severely affected area in NYC. The entire area was virtually shut down for four months after the attacks. Eighty-
percent of the Chinese American population had witnessed the attacks. In May 2002, 77
displaced Chinese workers were interviewed to determine their psychological impact (Thiel de
Bocanegra and Brickman 2004). One third of the sample showed signs of depression, and 21%
exhibited PTSD-type symptoms. Very few Chinese workers utilized mental health services,
however. A similar study (Thiel de Bocanegra et al 2006) was conducted in March 2003 using
148 Chinese immigrants who had lost their jobs as a result of the attacks to assess levels of
PTSD, depression, the use of prescription drugs and health care utilization. A majority of the
immigrants sought medical attention from a physician following 9/11. Approximately 50% of
this population exhibited symptoms of elevated PTSD and depression. Individuals with higher
levels of PTSD were more likely to see a physician and to use prescription drugs. As in the
previous study, only 4% of this vulnerable group sought the help of a therapist. This finding
suggests that Chinese Americans are more likely to visit primary care physicians in lieu of
therapists for issues related to mental health. Being informed that the Chinese American
community tends to underutilize mental health services should, in the future, warn health care
providers to assure that the needs of this immigrant population are being met.

Ten months after the attacks, five focus groups using 51 elderly Chinese Americans were
conducted. Given that all of the participants had witnessed the attacks, they all suffered from
intense fear, shock, disbelief and sadness. Some of the immigrants voiced their disillusionment in
ever finding peace and security in America after the attacks. Others explained that they preferred
relying on their own informal social networks for support rather than seeking mental health
services. Reluctance to seek psychological services by the Chinese community seems to be
consistent with other findings in the literature (Chung 2003).
Another study (Chen et al 2003) using 555 residents from Manhattan’s Chinatown compared the short and long-term psychological impact of September 11. Two weeks after the attacks, findings revealed that 88% of residents in this community had suffered from at least one psychiatric disorder. Five months after the attacks, even though the distress levels had declined considerably, more than half continued showing signs of permanent emotional distress. In general, distress levels were the same for both men and women. However, middle aged, individuals seemed to score higher in emotional distress than the younger or older generations. The economic burden on this age group could have been the mitigating factor for the higher level of emotional distress.

In a sample of 2,368 NYC residents, Adams and Boscarino (2005b) tested the hypothesis of whether Hispanic and African Americans suffered more from poor psychological and physical health than Whites in the period following September 11. Unlike most findings in the literature, this study found no significant differences between the severity of PTSD, depression and mental health in general in the Latino and African American populations as compared to the Whites. The only noticeable difference was found in the slightly elevated scales in panic attacks in the African American and Puerto Rican populations.

Another small study (Constantine et al 2005) using 24 participants examined the coping responses to the WTC attacks by the Asian, Black and Hispanic populations in NYC. Several similarities and unique coping techniques across the groups emerged. All participants reported feelings of depression, sadness and anger and they all expressed seeking support from family and friends. Another similarity used as a coping mechanism across cultural groups was praying and
attending religious services. The biggest difference between the groups, however, was the issue of privacy expressed by the Asian respondents. Only the Asian participants preferred grieving in private because they did not want to burden others with their problems. In national traumas such as 9/11, it is important that psychologists are aware of cultural differences so that they can reach out to these communities in acceptable ways.

Six months after the attacks, a representative sample, comparable demographically to the U.S. Census of NYC metropolitan area, 2,616 residents’ ethnicities were assessed. Consistent with another study by Galea et al. 2002, the prevalence of PTSD was highest amongst Hispanic Americans (9.6%). PTSD prevalence rates for non-Hispanic groups after the attacks were: Blacks at 7%, Whites at 4.6%, Asians at 4.4% and other ethnic groups at 6.2%. Results of this study (Galea et al 2004) indicate that of all Hispanics in this study, individuals of Dominican or Puerto Rican heritage were more likely than other Hispanics or non-Hispanic groups to report probable PTSD symptoms. The factors that accounted for the higher rates of PTSD in the two Hispanic sub-groups may have been related to: lower incomes, lower social support, being younger, greater exposure to the attacks, and having experienced a panic attack upon initially hearing about the traumatic event.

A sample consisting of 110 Hispanic immigrants in Miami, Florida participated in a study two to three months after the attacks to determine the severity of PTSD. Despite the distance from the site of the attacks, 14% reported PTSD-type symptoms. Individuals who had experienced war violence in their country of origin exhibited more severe PTSD symptoms. This finding is
consistent with a study by Galea and colleagues in 2002 revealing a high prevalence of PTSD amongst the Hispanic population soon after the terrorist attacks (Pantin et al 2003).

In a small sample, 18 Arab American couples living in the New York/New Jersey area were interviewed following the attacks. Results show that Arab Americans had many struggles; making sense of the attacks, grieving the loss of family and friends, and coping with the backlash against them. The struggle for identity seemed to be a strong theme. Christian Arabs attempted to distinguish themselves from Muslim Arabs, and the Muslim group struggled to separate themselves from the extremists. Despite the difficulties they faced, due to their strong family ties and social networks, the Arab American couples in this study (Betin and Allen 2005) showed resiliency and coped well in the face of adversity.

Three weeks after the attacks, a study (Farrag and Hammad 2005) assessed the impact of September 11 on 518 Arab Americans in southeast Michigan. The study revealed that over 54% of the participants showed major distress reactions. A positive correlation was presented between the amount of television exposure and the distress levels. Approximately 28% sought help from medical centers in order to cope with the trauma of September 11.

A qualitative study (Krupnik et al 2005) using nine Russian immigrants in Boston, Massachusetts assessed their reaction to media exposure to the events of September 11. Five months after the attacks, interviews revealed a myriad of disturbing emotions such as depression, helplessness, anxiety, insecurity, anger and bitterness. Upon immigrating to America, this group learned to adjust to new values and beliefs. When faced with the traumatic events of September
11, having developed the skills to cope with tremendous changes gave them the advantage to cope with adversity and show resiliency.

Another study (Kinzie et al 2002) evaluated refugees from five countries (Bosnia, Cambodia, Laos, Somalia and Vietnam) living in Portland, Oregon. Nine hundred refugees were enrolled in a psychiatric clinic. The tragic events of 9/11 gave clinicians in this clinic a unique opportunity to study how this previously traumatized group reacted. All the refugees in this study had suffered from massive traumas and wars in their countries of origin. As hypothesized, refugees exposed to the new traumatic events of 9/11 reacted severely. Regardless of ethnicity, all PTSD patients demonstrated extreme reactions to the events of 9/11. The most negative responses emanated from the Bosnian and Somalian patients with PTSD. It is possible that the severe reactions of the two ethnic groups were related to the recent atrocities they had suffered in their homelands. Other factors that may have contributed to the severe sense of vulnerability in the two ethnic groups may be associated with being Muslim and being geographically close to Afghanistan and the Middle East. This study successfully demonstrated how re-exposure to new trauma exacerbated PTSD symptoms.

**Impact on the international community**

As the horrors of the events of 9/11 unfolded on television world wide, everyone watched with shock and disbelief. A study (Austin et al 2003) carried out in Ontario, Canada examined all Ontario Health Insurance Plan (OHIP) claims submitted between January 1993 and December 2001 to determine if general practitioners and family physicians in Ontario encountered an
increase in anxiety-related doctors’ visits. Findings showed that there was no impact on the rate of anxiety-related doctors’ visits in residents living in Ontario as a result of the terrorist attacks and subsequent anthrax threats.

A survey using 80 residents of Ottawa, Ontario, Canada appraised the reactions to the September 11 attacks from a positive perspective. Perceptions of threat and high distress levels may have contributed to such positive character changes as closeness to family and friends including re-examining priorities. When 40 of the participants were re-assessed 11 months after the attacks, the distress and threat levels remained high, and so did their stability and positive life changes. This study (Davis and Macdonald 2004) showed that threatening experiences could lead to personal growth in some individuals.

A questionnaire conducted out of Quebec, Canada, over the Internet studied the frequency of nightmares as a function of age and gender in a sample of 23,990 respondents. In general, women reported more monthly nightmares than men. This was true for all age groups younger than 60. After September 11, only young male respondents observed an increase in the frequency of nightmares. The post 9/11 nightmare frequency in young males remained high for a two-year period. Given that most of the victims and the perpetrators of the attacks of 9/11 were young males, this may have elicited more negative psychological emotions in this male population. This young group of males, mostly between the ages of 10 to 29 years old, may have also identified with the victims because they were mostly young male business, financial, government and military employees. Additionally, most of the rescue workers and emergency teams at the sites of the attacks were predominantly males. This study (Nielsen et al 2006) suggested that
young males might have reacted so extremely to the traumatic events of September 11 that they started experiencing nightmares.

In spring 2002, in a telephone survey of 122 residents diagnosed with panic attacks in Saskatchewan, Canada, participants were studied to measure the psychological impact of the terrorist attacks. The study (Asmundson et al 2004) indicated that despite the distance from the attacks, those with panic disorders were more adversely affected than those who did not have this diagnosis. This study suggested that viewing the traumatic events of September 11 might have lasting psychological effects.

Several international studies focused on the impact of memories as related to the events of September 11. Smith and colleagues (2003) assessed the memory of 93 students from the University of Toronto, Canada, one week and then six months after the September 11 attacks regarding 9/11 events. The study compared memories for autobiographical information (memories surrounding how they first heard about the events) and the memories of the actual historical event. Similar to the Pezdek study in 2003, findings in this study demonstrated that students recalled more consistent autobiographical memories rather than information about the event itself. Even though students in this sample were not personally involved, they experienced high emotional levels nevertheless. At the six-month interval, the students recalled with greater detail how they first heard about the September 11 attacks.

Another Canadian study (Lee and Brown 2003) conducted at the University of Alberta focused on flashbulb memories. A total of 1,481 students were surveyed on the first day, and the tenth
day after the attacks, and 142 of the participants were surveyed again in April 2002. Because of
the two-hour time lag between NYC and Edmonton, Alberta, researchers were able to obtain
quick approval for this study and start testing large classes within a few hours of the attacks. As
expected, Lee and Brown discovered that distress levels and emotional arousal levels were
higher in the first sample as compared to the second sample. The authors explained
inconsistencies in interpreting results of delay of memories in the test and retest methodology.

A study (Tekcan et al 2003) conducted in Istanbul, Turkey, tested the autobiographical and event
memories of 483 respondents at three time intervals: three days, six months and one year after
the attacks. Findings were partially similar to findings by Pezdek in 2003 verifying that the rate
of personal involvement in the attacks provided different results in autobiographical and event
memories. Participants demonstrated consistent autobiographical memories in all time intervals.

A large study using 3,665 subjects residing in nine countries (546 from Belgium, 62 from
France, 296 from Italy, 683 from Japan, 716 from Romania, 55 from Switzerland, 348 from the
Netherlands, 191 from Turkey, and 768 from the United States) assessed group differences in
memories of the events and in the formation of flashbulb memories. In the immediate aftermath
of September 11, this major study (Luminet et al 2004), using questionnaires distributed in paper
and online, showed large differences between the U.S. and non-U.S. respondents. A high level of
flashbulb memories of how respondents first heard of the attacks was demonstrated in
participants from all countries. Participants from Turkey, however, differed the most from other
countries in terms of less surprise and shock, and higher levels of knowledge about the terrorist
groups. The authors gave several political, cultural and religious explanations for this difference.
Because the U.S. respondents rated the events as most important, had more detailed memory of the facts surrounding the attacks, and showed higher emotional reactions, the results indicated higher flashbulb memories in the U. S. sample.

Flashbulb memories of 9/11 events were compared between 34 college students (17 to 40 years of age) and 20 older adults (62 to 82 years of age) in a study (Wolters and Goudsmit 2005) conducted at Leiden University in the Netherlands. Participants were interviewed in two time intervals (two week and at two months after the attacks). This study concluded that flashbulb memories of the unforgettable event were present in both populations and in both time frames. As flashbulb memories of the event were reported in the same vivid manner, being older did not seem to be a factor.

Another study (Curci and Luminet 2006) compared flashbulb memories of 985 participants residing in six countries: Belgium (n=125, Italy (n=40), Japan (n=147), Romania (n=422), the Netherlands (n=131), and the USA (n=120). Long lasting, vivid, consistent and detailed memories of the accounts of the events of 9/11 seemed to have been consistently high amongst respondents in all countries. The process of how flashbulb memories are first formed and maintained consistently over time has important implications for scientists interested in this field.

Another study (Niedzienska 2004) using 59 college students in Poland, studied the accuracy of flashbulb memories. Using an interesting methodology, this study tested students’ recollections of how they first heard about the September 11 attacks, at three different intervals (in the first three weeks, in January 2002 and in June 2002). In a second experimental group, half of the
students attended a course on autobiographical memory. The study revealed that participants who attended the course recalled their memories more accurately, and yet seemed less confident that their descriptions of the accounts were more accurate than the group of students who did not attend the course.

At two weeks and again at eight months after the attacks, the consistency and accuracy of flashbulb memories in 32 Psychology students attending a university in Spain were tested. Even at the eight-month interval, students recalled details of the events, with a focus on the intense emotional reactions of how they felt when they initially heard about the terrorist attacks (Ferre Romeo 2006).

A study (Muhlberger et al 2005) using 174 participants in Germany examined the fear of flying following the events of September 11. When scores of the pre and post 9/11 fear of flying questionnaires were compared, scores of traumatic experiences were higher after September 11, but the results remained unaltered for fear of flying.

Two experimental studies (Dumont et al 2003) were replicated using 37 college students in Holland and 114 participants in Belgium. Participants who were deeply concerned about the event, who were able to identify themselves with the victims of 9/11, and to think of the victims as the “in-group”, were more likely to express feelings of fear and other negative emotions than individuals who categorized the victims as “out-group” members. In general, a strong correlation was found between the victims and reactions of fear and anger after a catastrophic event such as 9/11.
Did maternal stress levels during pregnancy due to television exposure to the events of 9/11 affect birth weights? A study (Smits et al 2006) conducted in the Netherlands compared the birth weights of 1,885 neonates who were in utero in September 2001, with the birth weights of 1,258 neonates who were in utero a year later. Result of this investigation showed that birth weights of infants born to mothers exposed to 9/11 were lower than the unexposed group, thus demonstrating that distress over 9/11 could have contributed to lower birth weights.

The distressing events of 9/11 and its effect on admissions to psychiatric hospitals were examined in a study (Haker et al 2004) in Switzerland. When data from hospital admissions was analyzed over a two-year period, the events of September 11 did not seem to have impacted psychiatric admissions.

Another study Rime et al (2005) examined the emotional fascination with pictures of the September 11 attacks. Eight months after 9/11, 152 female university students in Belgium were asked to write their innermost feelings while viewing pictures of the attacks on the WTC as they were being displayed on a large screen. Some reacted negatively and some were ambivalent, but the majority was still fascinated by the pictures eight months after the attacks.

Three weeks after the attacks, a study (Ray and Malhi 2005) conducted in India assessed the reaction of 406 adolescents to the terrorist attacks of 9/11. Despite the fact that the disaster occurred in a country so far away, adolescents were aware of the disaster and showed high levels
of stress. Consistent with other studies, higher stressful reactions were perceived in students who
watched television for longer periods of time.

A small study (Davidson et al 2005) used 24 college students and members from the general
public in Tasmania, Australia. Participants were evaluated to determine the intensity of
contextualizing imagery in dreams impacted by watching traumatic videos. The authors explain
contextualizing images in dreams as striking, powerful and compelling images that generate a
context for the emotion of the dream. Participants watched two 20-minute videos three day apart.
The first video was a psychology lecture, and the other showed video coverage from the time
that the two planes hit the World Trade Center to the collapse of the towers. When participants’
scores were analyzed 24 hours after viewing each of the videos, a significant increase in the
intensity in dream imagery occurred after watching the September 11 attacks on the World Trade
Center. This study suggested that a stressor, in this case an image on a screen, had the potential
to trigger such traumatic experiences as nightmares.

The impact of September 11 was investigated in a study (Taylor and Jenkins 2004) conducted on
30 psychiatric and 26 medical patients in a hospital in Melbourne, Australia. All subjects showed
adverse reactions to the attacks, while the patients with a pre-existing mental illness, exhibited
the most severe symptoms. This finding substantiates other studies demonstrating that the events
of September 11 exacerbated mental illness and, in particular those individuals with prior
psychiatric disorders.
Did suicide behavior change as a result of 9/11? Two international studies were conducted to investigate the impact of September 11 on suicide rates. When suicide data from the Dutch Central Bureau of Statistics was analyzed, the suicide rate increased in the eight-week period following the September 11 attacks. Additionally, a dramatic increase in attempted suicide cases was evident when hospital statistics were analyzed for a two-week period after the attacks (De Lange and Neeleman 2004).

The other international study on suicide and homicide rates was conducted in England and Wales. In the 12 week period before and after September 11, suicide and homicide rates in England and Wales were compared. This article (Salib 2003) showed that in the month following September 11 events, suicide rates in England and Wales decreased significantly. The rates in homicide stayed the same. The interpretation for the inverse effect on suicide rates after the traumatic events of 9/11 support Dukheim’s theory, “Le Suicide” published in 1897. The theory explains that external threats tend to form group cohesion, thus resulting in lower suicide rates. In other words, people in Wales and England felt so threatened by the events of 9/11 that society became more integrated, which in turn diminished the suicide rate. It is possible that the common threat to national security may have been less intensely felt in the Netherlands compared to England and Wales. This could account for the contrast in results in suicide rates between the two studies.

Over a three-month period, a total of 108 participants living in the United Kingdom were assessed to determine if an association existed between television exposure to 9/11 events and psychological effects. Findings showed that negative psychological effects emanating from
television exposure to 9/11 events coexisted simultaneously with such positive changes as placing more value to family and friends (Linley et al 2003).

Sheridan (2006) studied the level of discrimination reported by 222 Muslims in Great Britain following the events of September 11. Since the 19 hijackers of the 9/11 attacks practiced the Islam religion, this sample of a British Muslim minority group was subjected to abusive incidents of hatred and discrimination. The study demonstrated that levels of stereotypes and prejudice against Muslims worsened after 9/11. Subjects reported an 82.6% increase in the level of indirect discrimination and a 76.3% increase in overt discrimination.

Did values in security in adolescent and college students in Finland change after the September 11 attacks? In the first study conducted using four samples of 419 high school students, findings showed that scores in the value for security were significantly elevated on September 12, 2001 compared to scores before 9/11. The value for security leveled off when testing was conducted in subsequent samples. In the second study using 3 samples in 222 college students, the same findings were discovered in students’ values for security that were similarly heightened in the immediate aftermath of September 11. This two wave study demonstrated that the catastrophic events of September 11 altered the values for safety and security within this young population living far away from the site of the attacks (Verkasalo et al 2006).

**Impact on families of September 11**

The families who lost loved ones in the horrific terrorist attacks of September 11, not surprisingly, had the potential of experiencing more severe psychological distress. Yet, a sparse
amount of scientific research so far has been conducted to determine the short and long-term effects of this tragedy on families of September 11. Why have there been so few studies conducted on the families? Has the psychological impact on loss of lives to families been so well studied in past disasters? Or, could it be that researchers were sensitive and aware that family members were in shock, mourning the loss of their loved ones, and were not ready to participate in scientific studies?

Findings of a survey “Findings from a survey of 9/11- affected clients served by the American Red Cross September 11 Recovery Program” is posted on the Urban Institute web site in May 2006 at: http://www.urban.org/publications/411335.html. This report describes the successful American Red Cross intervention program to provide long term services to the families of September 11, disaster responders and injured. Five years after the attacks, this report found that two thirds of the 431 respondents who received mental health services were making progress, but were still dealing with grief issues in their recovery efforts.

Due to the scarcity of original research articles conducted on families, the author has selected two good descriptive articles written about intervention programs supporting September 11 families.

The first article (Boss et al 2003) is basically a description of the intervention measures taken, and does not provide original research methodology. It has been included in this bibliography because it provides a unique dimension about ambiguous loss. Twenty-four families of missing loved ones from union workers at Local 32 B-J at the WTC were invited to participate in a
community-based program to help them cope with ambiguous loss. The authors understood the depth of difficulties surrounding “missing persons”. Without finding a body, without proof of death, they realized the difficulty in finding closure. The authors acknowledged that the normal treatment and intervention principles used to treat such disorders, as PTSD and normal grief are not necessarily effective in helping individuals cope with ambiguous loss.

Another article (Webb 2005) described a support program for children who lost family members in the September 11 attacks. Most of the children had lost a parent in the attacks, and were reluctant to talk about the horrible event. This article discussed some of the unique circumstances of 9/11 such as delayed mourning, missing persons, confusion, shock, uncertainty and disbelief, and having to endure waiting for DNA identification to receive body parts. The author explained how the children suffered from traumatic grief. Traumatic bereavement is different from normal grief in that the individual is preoccupied with the terrible manner in which their loved one died (in actuality or in probability) at the same time as they are trying to come to terms with the loss itself. As a result, many of the children attending these bereavement sessions were unable to discuss their feelings or to grieve. The author discussed many of the challenges the group leaders faced in reaching out to the children.

A study (Brown and Goodman 2005) using 83 bereaved children (8-18 years of age) of lost uniformed service personnel during the attacks of 9/11 was conducted to assess the process of normal versus childhood traumatic grief. This study demonstrates the differences between the two types of grief. The children who lost parents in the World Trade Center attacks, were confronted with frightening images of how their parents perished, causing them to shut down
their thoughts. Additionally, children of servicemen who perished on September 11 were subjected to an excessive amount of public grief, including memorabilia, trophies, medals, quilts and portraits of their lost parents. The excessive cues about the deceased and the violent deaths may have forced these children to shut down and to avoid discussing the trauma and the deceased. On the other hand, children who lose parents in a “normal” death are better able to communicate and connect to the deceased parent and heal.

One hundred and eighty-four Asian Americans lost their lives on September 11, 2001. A study (Yeh et al 2006) investigated how 11 Asian Americans living in the NYC area, who had lost a family member, were coping with the tragedy. Four of the participants had lost a child, three had lost a sibling, three had lost a spouse, and one had lost a niece. By June 2002, none of the participants had seen a counselor. This finding is consistent with others showing that Asian Americans consistently underutilize psychotherapy services, and rely more heavily on family and friends for social support and healing during traumatic events.

Dr. Yuval Neria at Columbia University and the New York State Psychiatric Institute is conducting the most comprehensive longitudinal study currently in progress on the impact of those who lost a loved one, a friend or colleague in the September 11 attacks. This web-based, five-year longitudinal study, the “9/11 Grief Survey” started in 2004. When completed, this study promises to provide a greater understanding of traumatic grief and how best mental health professionals can respond to the needs of those who have lost loved ones in acts of terrorism. It is hoped that this kind of research is continued to follow how families will cope in the future.
CONCLUSION:

The aim of this five year review was to capture the major research articles in one location, thus giving the reader a deep understanding of the types of studies conducted by mental health professionals following the September 11 terrorist attacks. It did not come as a surprise to discover that researchers took this unprecedented opportunity to publish extensively on the psychological effects of this catastrophic event on segments of the population. An unexpected discovery, however, was the sparse amount of original research studies focused on families who lost loved ones on September 11.

As the literature indicates, the September 2001 terrorist attacks attributed to widespread emotional and psychological consequences that extended far beyond the immediate geographic areas where the terrorist attacks occurred. In the immediate aftermath of September 11, most subjects exhibited profound emotional distress and psychiatric difficulties, including PTSD symptoms. The likelihood of developing PTSD was dependent on many factors. Some major contributors included geographic proximity to the site of the attacks, direct exposure, knowing someone who perished in the attacks, number of hours of watching television and prior mental illness. Some of the characteristics associated with probable PTSD were being female, an immigrant, single and poor. Findings, however, are not consistent. Research findings showed that distress levels and adverse reactions were so excessive that they altered such behavior as smoking, alcohol consumption and drug use. As this investigation demonstrates, the events of September 11 altered virtually every aspect of human life. Examples of changes occurred in life style, habits, values in safety and security, perceptions and beliefs, and worker productivity including levels of functioning.
In order to understand the mental health impact of September 11, researchers studied subjects in most categories of the general population and in all age groups including college students, working groups, ethnic groups, patients, veterans, the military and the international community. With a sparse amount of studies focused on families of September 11, the author recommends the need to conduct new studies on families. In addition, more longitudinal studies on other segments of the population and in particular on the most vulnerable group, the children, need to be replicated to determine the long-term mental health effects of this massive catastrophic event and to provide intervention programs, where needed.
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