

POSTTRAUMATIC STRESS DISORDER SYMPTOMS AND SUBSTANCE USE  
FOLLOWING SEPTEMBER 11<sup>TH</sup>

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## TABLE OF CONTENTS

ABSTRACT .....	iv
LIST OF TABLES .....	v
INTRODUCTION.....	1
History.....	1
Criteria .....	3
Prevalence .....	4
Course .....	4
Risk Factors.....	5
Genetics.....	9
Comorbidity with Substance Abuse: Prevalence .....	10
Reasons for PTSD and Substance Comorbidity .....	10
Vietnam Veterans with PTSD and Substance Use Disorder.....	14
PTSD and Substance Use Disorder in Women .....	16
Reactions to Events Similar to September 11 <sup>th</sup> .....	17
Reactions to September 11 <sup>th</sup> .....	22
Media Effects on Disaster .....	28
Manmade vs. Natural Disasters.....	29
Hypotheses .....	31
METHOD .....	32
Participants .....	32
Materials.....	32
Procedure.....	34

RESULTS .....	35
DISCUSSION .....	43
REFERENCES.....	51
APPENDICIES .....	59
Appendix A .....	59
Appendix B .....	60
Appendix C .....	61
Appendix D .....	62
Appendix E.....	63

## ABSTRACT

The terrible events that unfolded on September 11, 2001 affected the entire world, especially people in the United States. This study assessed symptoms and correlates of posttraumatic stress disorder (PTSD) and examined substance use following the attack. There were 210 participants from the NY, NJ, and Conn. areas surveyed on the beach 8-10 months after 9/11. Participants were asked about their retrospective accounts and their current reports of symptoms and substance use. Results showed that people who were within a one-mile radius of the World Trade Center (WTC) on 9/11 had more frequent PTSD symptoms retrospectively and 8-10 months following the attack than people who were 45-60 miles away. There was a significant correlation between retrospective accounts of PTSD symptoms and substance use six months following 9/11. There was also a significant correlation between PTSD symptoms 8-10 months after 9/11 and substance use six months following 9/11. A t-test revealed that substance use in the six months after 9/11 was not significantly different from substance use in the six months before 9/11. Even 8-10 months after the terrorist's attacks of September 11, 2001 participants reported considerable psychological imbalance.

## LIST OF TABLES

Title	Page
1. Analysis of Variance for PTSD Symptoms One Week After 9/11 and Closeness to the Towers.....	36
2. Analysis of Variance for PTSD symptoms 8-10 months after 9/11 and Closeness to the Towers.....	38

## INTRODUCTION

The terrible events that unfolded on September 11<sup>th</sup> affected the entire world, but especially people in the United States. Some people might have responded by having nightmares, re-experiencing the event when awake and/or avoiding people, places and things that reminded them of the disasters that day. These are symptoms of posttraumatic stress disorder (PTSD). Currently, identifying who is at risk for developing symptoms of this disorder following the tragedy of September 11<sup>th</sup> is a question of importance. The assumption that people who were closest to the Twin Towers are more likely to develop these symptoms seems obvious. However, anyone who was watching the news that day at 9:30am saw the plane fly into the World Trade Center (WTC) and watched the WTC towers collapse live, and then repetitively on video.

There are certain factors that make people more vulnerable to developing PTSD following a traumatic event. These factors predispose individuals who saw the plane crash into the Towers to develop PTSD symptoms. Symptoms of PTSD can also lead to alcohol or drug use. According to the National Comorbidity Study (NCS), comorbidity of alcohol abuse/dependence and PTSD was 51.9% for men and 27.9% for women (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Comorbidity with drug abuse/dependence was 34.5% for men and 26.9% for women. Therefore, it is possible that people who have developed PTSD symptoms also have developed a substance abuse problem. First, the history and criteria of PTSD should be examined.

### History

The symptoms of posttraumatic stress disorder have been described as early as the writings of Homer and Cicero (Zweben, Clark, & Smith 1994). Even Freud thought

hysteria was the result of trauma (Yehuda & McFarlane, 1995). After rejecting this idea, he still differentiated developmental fixations from responses to trauma. PTSD was not added to the Diagnostic and Statistical Manual (DSM) until 1980, as a result of events following the Vietnam War. It was added in order to classify normal people who had a chronic condition following an extraordinarily traumatic event. Adding PTSD to the DSM III was both a political and social issue. It answered the question of how people so affected by trauma ought to be treated by the mental health field. Before it was added hundreds of VA hospitals offered self-help and peer counseling for the symptoms of this disorder. Since the VA hospital system is so uniform it was possible for researchers to study and establish and characterize the diagnostic criteria.

In previous Diagnostic and Statistical Manuals, PTSD was classified under different names. In the DSM I it was categorized as a gross stress reaction, to describe reactions to combat and civilian catastrophe, then in the DSM II it was referred to as transient situational disturbance. Both these terms were used to describe acute symptomatic distress following trauma; if prolonged it was considered anxiety or depressive neurosis.

In both the DSM III and the DSM III-R Criterion A for diagnosis of PTSD was exposure to a traumatic event “outside the range of human experience”. This statement lead to some controversy because sudden loss of a loved one, or sudden injury to a loved one, are not “outside the range of human experience”. Thus, in the DSM IV Criterion A was changed to experience of a traumatic event and also a response of intense fear, helplessness or horror (American Psychiatric Association, 2000). It is clear now that PTSD is not a normal response to stress but could be a progressive sensitization of

biological systems leaving the individual hypersensitive to a variety of stimuli (Yehuda & McFarlane, 1995).

### Criteria

According to the DSM IV-TR the essential feature of Posttraumatic Stress Disorder is the development of symptoms due to exposure to an extreme traumatic stressor involving actual or threatened death, serious injury, or threat to one's physical integrity; witnessing the death, injury, or threat to the physical integrity of another person; or discovering the unexpected or violent death, injury, serious harm or threat of death experienced by a family member or other close associate (American Psychiatric Association, 2000). The person's response to this event must be one of intense fear, hopelessness, or horror. The characteristic symptoms experienced following this kind of trauma include persistent re-experiencing of the event, persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness, and persistent symptoms of increased arousal. The symptoms must be present for more than one month, and cause a significant distress or impairment in social, occupational, or other important areas of functioning.

Three specifiers may be used for this disorder. The Acute specifier should be used when the duration of symptoms is less than 3 months. The Chronic specifier should be used when the duration of symptoms is 3 months or longer. The disorder may be more severe or longer lasting if the stressor is of human design, such as rape or torture. If at least 6 months have passed between the event and the onset of symptoms then the specifier With Delayed Onset should be used. The likelihood of developing the disorder may increase as the intensity of and physical proximity of the stressor increase.

## Prevalence

The Epidemiologic Catchment Area Study (ECA) lifetime prevalence rate of PTSD is 1.3% in the N.C. catchment (Helzer, Robins, & McEvoy, 1987). Breslau, Davis, Andreski, and Peterson (1991) found 11.3% of women and 6% of men had lifetime prevalence of PTSD. The NSC found lifetime prevalence of PTSD to be 7.8% (Kessler et al., 1995). The NSC also found that older cohorts for men, previously married women and married men (as compared to never married men) had higher lifetime prevalence rates. Studies of at risk individuals report variable results, with the highest rates (ranging between one-third and more than half of those exposed) found among survivors of military combat, and captivity, rape, and ethnically or politically motivated internment and genocide (American Psychiatric Association, 2000).

## Course

PTSD can occur at any age, including childhood. Usually, symptoms begin within the first three months after the event, but it could also surface several years after (American Psychiatric Association, 2000). Immediately after the trauma most people experience Acute Stress Disorder. The symptoms vary over time, e.g. sometimes sleeplessness, is high other times avoidant symptoms dominate. Half of people diagnosed with PTSD recover within three months, however, some people's symptoms can last 12 months or longer. Symptoms also might reoccur with reminders of the traumatic event, new traumatic events, or life stressors. In a study by Breslau et al., (1998) the results showed that 26% of PTSD cases remitted in 6 months, and 40% remitted by 12 months, after that point remission tapered off. More than one-third of PTSD cases lasted for longer than 60 months; the median time to remission was 24.9 months. The duration of

PTSD was longer for individuals who experienced trauma directly than those who learned about trauma or sudden death of a loved one.

### Risk Factors

Substance abuse might make a person more likely to experience a traumatic event. However, in the case of September 11<sup>th</sup> it is highly unlikely to be true. Almost everyone in the entire world was exposed to the traumatic event, on September 11<sup>th</sup>.

Not everyone who experiences trauma develops PTSD. People can be vulnerable to exposure to trauma itself or once exposed to trauma there are factors that make one vulnerable to developing PTSD. For instance, in a study by Breslau et al. (1991), the rate of PTSD after exposure was only about 24%. According to the DSM IV-TR severity, duration, and proximity are the most important factors affecting the likelihood of developing PTSD. There is growing evidence that a person's personality and behavioral characteristics influence a person's response to that event (Helzer et al., 1987). Perhaps personality and behavioral characteristics could also be protective factors.

Risk factors for being exposed to traumatic events include: black race, being separated/divorced or never married, and scoring high on measures of neuroticism, and extraversion (Breslau, Davis, & Andreski, 1995). Marginal factors include male sex and twelve or fewer years of education. The authors thought that 3 or more early conduct problems and family history of any psychiatric disorder or substance problem might be a risk but this was not shown in a 3-year follow up. They did find, however, that early misconduct and a family history of psychiatric disorder might be risk factors for exposure to traumatic events in childhood. The results of their study revealed an association between childhood exposure to trauma and multiple exposures. Also black race and

neuroticism were associated with multiple exposures, independent of childhood exposure. Blacks only had a higher liability to report traumatic events in adulthood but similar liability to report traumatic events in childhood when compared to whites. However, these results may simply be a product of reporting. People who were exposed to trauma at baseline were twice as likely to be exposed to trauma during the follow up period. Past exposure might increase the vulnerability to future exposure or it might predict future exposure because it represents additional risk factors that were not measured in the study.

The occurrence of exposure to trauma peaks at 16 to 20 years old (Breslau et al., 1998). The probability of assaultive violence declined after age 20 and continued to decline when people were in their 30's and 40's; and it remained low up to age 45 years. Unexpected death of a loved one was the only trauma to remain high after age 20 and it climaxed between ages 41 and 45 years old. The traumatic event that had the highest probability of leading to PTSD was assaultive violence. They also found that learning about traumatic events experienced by others had the lowest probability and that learning about the sudden death of a loved one had moderate probability of leading to PTSD. The single-most essential trauma as a cause of PTSD was sudden unexpected death of a loved one, with 31.1% of all PTSD cases attributable to an event of this type. The authors suggest the reason for this is the high prevalence of unexpected death of a loved one in the community and the moderate risk of PTSD associated with it. Assaultive violence was higher in nonwhites, people who had less than a college education, people in low socioeconomic status (SES), people who were previously married, and central-city residents. When race, education, and income were controlled the associations with marital status and place of residence disappeared. They also found that when all other

demographic factors were controlled, women's rate of PTSD was two-fold higher than men's.

Risk factors for developing PTSD, once exposed to trauma include: female sex, neuroticism, early separation from parents, family history of anxiety, depression, psychosis, and Antisocial personality disorder, history of childhood physical and /or sexual abuse, repeated traumatic experiences, lower IQ, having a parent who survived the Holocaust, and family instability (McNally, 2001).

The personality characteristic that is associated most with being a risk factor for PTSD is neuroticism. The correlation between high neuroticism scores and PTSD symptoms has been found in numerous studies; however, there are several possible interpretations of this finding (Breslau et al., 1995; Casella & Motta, 1990; McFarlane, 1988; Lauterbach & Vrana, 2001). One possibility is that neuroticism exaggerated the impact of the event (Lauterbach & Vrana, 2001). Low levels of neuroticism have been found to act as a buffer against developing PTSD even after experiencing high levels of stress (Casella & Motta, 1990). Often when under stress people respond in habitual ways. When under stress people scoring high in neuroticism, might be expected to respond as they have in the past, by becoming anxious, nervous, and depressed (Lauterbach & Vrana, 2001). Another hypothesis is that experiencing a traumatic event can change one's personality characteristics (McFarlane, 1988).

Breslau et al., (1991) found that a pre-existing diagnosis of anxiety (excluding phobia) or affective disorder increased the risk for developing PTSD 2.46 times. Shalev, Peri, Canetti, and Schreiber (1996) found similar results; participants who developed PTSD had more severe depression, anxiety, and intrusive symptoms at the 1-week

assessment. They also found that the type of trauma had no significant effect on outcome measurements, after 6-months. Not only was low education a risk factor for developing PTSD but also so was negative parenting behavior and parental poverty.

Escobar et al.(1983) found in Hispanic Vietnam veterans that the lower the social support the higher the PTSD symptoms. These veterans reported more negative relationships than the control group. Also the less acculturated subjects reported significantly more symptoms than those who were more acculturated.

Females with precombat abuse histories reported more PTSD symptomology in response to combat trauma than did females without precombat abuse histories and male veterans of either precombat abuse status (Engel et al., 1993). Possible reasons for this distinction include, chronic PTSD due to the initial abuse which is exacerbated by combat exposure, PTSD vulnerability due to the initial abuse that is at heightened risk upon exposure to combat, or an association of precombat abuse with another characteristic that is also associated with more PTSD symptoms after exposure to trauma. Also they found that fathers' negative parenting was predictive of PTSD symptom severity at lower levels of combat exposure.

Dissociation during an event is also a risk factor for developing PTSD (Marmar et al., 1994). Also dissociating during trauma was positively associated with level of war zone stress exposure and total score on the Dissociative Experiences Scale. It is also largely unassociated with measures of general psychopathology. Higher levels of dissociation lead to higher levels of posttraumatic symptoms years later (Zweben et al., 1994). Adults who dissociate during trauma might have experienced childhood or adolescent trauma which lowered their threshold for dissociation. Shalev et al. (1996)

found that peritraumatic dissociation predicted a diagnosis of PTSD 6 months after the event more than the contribution of other variables and explained 29.4% of the variance of PTSD symptom intensity. After education, age, event severity, and immediate response variables were controlled, scores on the Peritraumatic Dissociation Experiences Questionnaire remained significant. The results of the study suggest that avoidance occurs precisely when extinction fails.

Alterations of the hypothalamic-pituitary-adrenal (HPA) axis are found in PTSD patients (Yehuda, Resnick, Kahana, & Giller, 1993). PTSD patients show evidence of highly sensitized HPA axes characterized by increased negative feedback regulation and decreased basal cortisol levels when compared to other patients without PTSD who have been through the similar trauma. Similar abnormalities of the sympathetic nervous system and other neuromodulatory systems have been revealed as alterations of PTSD. There are biological changes following the exposure to trauma that are not necessarily due to the traumatic event; these changes are associated with the symptoms of PTSD.

### Genetics

There is evidence of a heritable factor to the transmission of PTSD (American Psychiatric Association, 2000). A first-degree relative with a history of depression is related to an increased vulnerability to developing PTSD.

True et al. (1993) found that PTSD has a higher concordance in Vietnam era Veteran MZ twins than DZ twins; the correlations are approximately double for MZ twins. After adjusting for differences in combat exposure; he found that heritability accounted for 13%-30% for symptoms in the reexperiencing cluster; 30%-34% for symptoms in the avoidance cluster and 28%-32% in the arousal cluster. Combat exposure

is a strong predictor of the reexperiencing cluster and the avoidance of activities symptom. Shared environment did not contribute to PTSD development with the exception of a modest contribution to the symptom “painful memories”.

#### Comorbidity with Substance Abuse: Prevalence

People with PTSD are twice as likely to have some other psychiatric disorder than those without PTSD (Helzer et al., 1987). The risk ratio between PTSD and drug abuse and dependence in the ECA for men was 5.0, and 1.4 for women. For alcoholism the risk ratio for women was 2.8 and 1.9 for men. A lifetime history of another psychiatric disorder was 88.3% in men and 79% in women with lifetime PTSD (Kessler et al., 1995). According to the NCS comorbidity of PTSD with alcohol abuse/dependence for men was 51.9% and 27.9% for women. PTSD and comorbidity with drug abuse/dependence was 34.5% for men and 26.9% for women, according to the NCS. NCS results suggest that PTSD was primary more often than not in affective disorders and substance use disorders. Keane and Wolfe (1990) reported the comparative rates of lifetime comorbidity with combat-related PTSD and substance abuse to be 73% according to the RTI-VA study and 84% in the Boston PTSD Center clinical program.

#### Reasons for PTSD-Substance Abuse Comorbidity

Substance abuse might make a person more likely to experience a traumatic event. There is strong relationship between cocaine and opioid use and reports of trauma, especially physical attack (Zweben et al., 1994). Alcoholics are more likely to report combat trauma. Interestingly, marijuana users are just as likely to experience traumatic events as other drug users but they are less likely to meet criteria for PTSD. Perhaps if the

onset of alcohol or drug abuse/dependence precedes PTSD, maybe abuse/dependence is a premorbid vulnerability to PTSD.

Substance abuse might also make a person more susceptible to developing PTSD once exposed to trauma. It could be that PTSD is responsible for substance abuse, perhaps as self-medication. The self-medication hypothesis is supported by the NCS study (Kessler et al., 1995). They found that PTSD symptoms preceded substance abuse, at least among women. Bremner, Southwick, Darnell and Charney (1996) conducted a study on men who were in Vietnam and came to the same conclusion, that PTSD preceded substance abuse. Breslau, Davis, Peterson, and Schultz, (1997) also found that PTSD symptoms increased risk for first onset of alcohol abuse. Substance abuse usually proceeds fairly shortly after the onset of PTSD symptoms; in some cases it might even seem simultaneous. All of these results do not necessarily mean that these individuals are self-medicating, but it does seem likely. Only one study disagrees with these results.

The ECA study suggests that substance abuse precedes PTSD symptoms (Helzer et al., 1987). There are problems, however, of how the temporal data were collected for this study but the findings do suggest that alcohol and drug abuse are risk factors for being exposed to trauma. For instance, one study found that 41% of recent rape victims reported alcohol use proximal to the time of attack (Resnick, Yehuda, & Acierno, 1997). There is one similar problem with all these studies, they are all retrospective and rely on the subjects memory of onset for both substance abuse and PTSD symptoms. It is found that self-medication may actually increase or exacerbate PTSD symptoms, such as sleep disturbance or exaggerated startle, through psychological and physiological mechanisms (Stewart, Pihl, Conrod, & Dongier, 1998).

In the Bremner et al. (1996) study they found that the drugs of choice for PTSD patients were alcohol, heroin, marijuana, and benzodiazepines. These drugs are helpful for dampening arousal symptoms, responses to stress, help reduce avoidance of trauma reminders, to block emotional experiences, and to dampen their excessive conscious recollections of the event (Stewart et al., 1998). They also found that hyperarousal symptoms were generally the first to develop, this could be a possible reason for arousal dampening drugs being more preferable in the beginning and eventually becoming an addiction. The one drug that most patients seemed to avoid was cocaine. Cocaine increases arousal symptoms making their PTSD symptoms worse (Bremner et al., 1996). It does, however, affect numbing symptoms, creating sensations that are otherwise blunted.

Substance abuse might prolong PTSD by preventing habituation to traumatic memories or preventing one from working through the traumatic event (Stewart et al., 1998). If patients are continuously taking drugs or alcohol to reduce symptoms than they will never be able to reduce the symptoms. It has been hypothesized that PTSD is a cyclic disorder (Bremner et al., 1996). This suggests that intrusion and avoidant symptoms alternate periodically. Once the symptoms of both disorders are established, a vicious cycle begins where one disorder serves to sustain the other (Stewart et al., 1998). People experience PTSD symptoms, for example flashbacks, so they self-medicate with alcohol or another drug. Then whenever the drug begins to wear off and the symptoms begin to emerge again they start using their drug of choice again. It has been found that intoxication and withdrawal may actually increase PTSD symptoms, such as sleep disturbances.

Withdrawal symptoms from substances might be misinterpreted by PTSD patients as increased symptoms of PTSD might remind patients of trauma which in turn motivates them to continue substance use in order to suppress this increased arousal (Stewart et al., 1998). For instance, alcohol-withdrawal-induced intensification of startle could increase drinking in comorbid PTSD alcoholic patients. Stasiewicz and Maisto's (1993) behavioral theory of addiction suggests that negative emotional responses like those of PTSD patients motivate drug and alcohol consumption, which is reinforced by eliminating the negative emotional response. This will lead to an increased probability of drug and/or alcohol consumption under similar conditions.

There have been studies done that compare PTSD patients with and without comorbid substance abuse. These studies suggest that level of prior trauma exposure and current level of PTSD symptoms (especially arousal symptoms) may be what distinguishes those who develop substance abuse and those who do not (Stewart et al., 1998). Saladin, Brady, Dansky, and Kilpatrick (1995) conducted a study to examine the possible reasons for developing a substance use disorder comorbid with PTSD. They found that participants with PTSD and substance use disorder had significantly more symptoms in the avoidance and arousal clusters than the PTSD only group. Also the alcohol dependent group had more arousal symptoms than the cocaine dependent group. There were a greater number of people in the PTSD and substance use disorder group who were black, single and unemployed. In the PTSD and substance use disorder group there was significantly higher prevalence of physical assault, sexual molestation, and rape. PTSD and substance use disorder individuals reported more symptoms of feeling detached from others, hypervigilance, exaggerated startle, and distress elicited by event

cues, as compared to the PTSD only group. Although not significant, alcohol-dependent people were more likely to report physiological reactivity to trauma reminder and restricted range of effect. Cocaine-dependent individuals reported more avoidance of activities and flashbacks, although this was not statistically significant either.

#### Vietnam Veterans with PTSD and Substance Use Disorder

A lot of the research on PTSD and PTSD and substance use disorder has been done on Vietnam veterans. It is estimated that between one-third and three-quarters of Vietnam veterans being treated for PTSD can also be diagnosed with comorbid alcohol abuse (Satel, Becker, & Dan, 1993). Booth, Loveland Cook, & Blow (1992) conducted a study on patients who, against medical advice, left an alcoholism treatment program in a VA hospital. They found that only 9.7% of these patients had coexisting PTSD.

PTSD was the first disorder to develop in veterans after returning from Vietnam (Bremner et al., 1996). PTSD was followed by generalized anxiety disorder and alcoholism, and later by depression, phobias and panic disorder. The veterans in Bremner et al.'s (1996) study experienced an increase in PTSD symptoms over the first few years and then a plateau. The average individual experienced five symptoms during Vietnam, 11 symptoms within 2 years after Vietnam, 12 symptoms within 4 years after Vietnam, then there was a gradual increase until the time of the study, when there was an average of 15 symptoms. This study asked the participants to report the first of their symptoms to develop. Sixty-three percent reported a symptom from the hyperarousal cluster as the first symptom, 32% reported a symptom from the avoidant cluster as the first, and 5% reported a symptom from the intrusive cluster as the first. The findings from the study

suggest that PTSD symptoms are chronic and unremitting, not a cyclic course of intrusions and avoidance.

McFall, Mackay, and Donovan (1990) found that Vietnam-theater veterans with PTSD had more severe drug and alcohol abuse problems than theater veterans without PTSD. They also found that these veterans were at a higher risk for having both alcohol and drug abuse. The easily available drugs in Southeast Asia and the social disapproval that they were confronted with when they returned home might be factors that contributed to their substance abuse patterns. This study found that the severity of PTSD was more strongly associated with drug abuse than alcohol abuse. We can guess that Vietnam-theater veterans used drugs for anxiolytic effects while in combat and continued to rely on them afterwards in order to self medicate for PTSD. Drug abuse may be used for avoidance and emotional numbing. Possibly, PTSD patients with avoidance and/or numbing symptoms might use drugs to create sensations that are otherwise blunted, using cocaine for instance. However, Bremner et al.(1996) found that patients reported that alcohol, heroin, marijuana, opiates, and benzodiazepines were helpful for their PTSD symptoms. Cocaine is not included in this list because it tends to increase patients' anxiety and paranoia.

Saxon et al. (2001) recently conducted a study and found that veterans with PTSD reported a greater variety of traumas; more serious current legal problems; a higher lifetime use of alcohol, cocaine, and heroin; higher recent expenditures on drugs; more psychiatric symptoms; and worse general health. Veterans who screened positive for PTSD had a greater lifetime use of alcohol, heroin, and cocaine but did not differ significantly for lifetime use of other substances when compared to veterans who were

not diagnosed with PTSD. However, those who did have PTSD did report higher rates of drug treatment.

For men combat is the traumatic event most likely to lead to PTSD, according to the NCS (Kessler et al., 1995). For Vietnam veterans, witnessing someone being severely injured or killed was the traumatic event that most frequently leads to PTSD (Saxon et al., 2001).

#### PTSD and Substance Use Disorder in Women

Women are more likely than men to have been physically or sexually abused; they also report experiencing more traumatic events in their lifetime than men (Brown, Ricupero, & Stout, 1995). A study by Brown, Ricupero, and Stout (1995) found that exposure to trauma and its psychological aftereffects are common across socioeconomic levels. PTSD participants reported more admissions to inpatient substance abuse facilities than non-PTSD participants. If their trauma is not targeted PTSD substance abusers tend to have higher relapse rates and need more intensive treatment.

Brown, Stout, and Mueller (1996) found that women with PTSD and substance use disorder relapse quicker than non-PTSD women. The women were given the Brief Symptom Inventory, Structured Clinical Interview for the DSM-III-R, Clinician Administered PTSD Scale, Life Stressor Checklist, and Time Line Follow-Back. Psychiatric distress was not found to be a significant predictor of relapse, in contrast to current PTSD status. Forty-two percent of the women in this study met the criteria to be diagnosed with PTSD. These women were significantly more likely to have been sexually abused than women without PTSD but not more likely to be physically abused. In fact all the women diagnosed with PTSD had experienced sexual assault.

Breslau et al. (1997) found that PTSD signaled a significantly increased risk for first onset for alcohol abuse/dependence. They found that the lifetime comorbidity with PTSD and alcohol abuse/dependence was 21.6%, with marijuana abuse/dependence 7.2%, with cocaine abuse/dependence 3.6%, and with any illicit drug abuse/dependence 13.5%. All of these percentages were lower for the individuals without PTSD. NCS suggests that rape is most often responsible for PTSD in women (Kessler et al., 1995).  
Reactions to Events Similar to September 11<sup>th</sup>

One comparable event in our history happened in January 1986. On January 28, 1986, most children who were in school at the time watched as the Challenger launched and 73 seconds later exploded. Many people watched the explosion live on television, as many did on 9/11. There have been many studies done on this incident; Terr et al.'s (1996, 1997, & 1999) studies are especially interesting. They looked at three groups of children, those who were at Cape Canaveral, those on the East Coast who watched on TV, and those on the West Coast who heard about the explosion. It is important to note that the children who were at Cape Canaveral and those in the television-watching group had no significant differences in memory, so these two groups were pooled. The only difference between these groups was that the children at Cape Canaveral actually accepted what happened as reality with less delay than the East Coast children. One adolescent said that being there made it more believable. Terr et al. (1999) concluded that for children raised on television, the immediacy of TV is almost as real as being there. This most likely, will also be true in reference to September 11<sup>th</sup>; fifteen years later television is even more prominent in people's lives.

Each child participated in a 45 minute structured interview consisting of 298 items of the authors' own design. The questions covered background, health, past traumatic experiences, responses to the Challenger, memory, behavioral and physical problems, and symptoms of PTSD. Children were interviewed in 1986 and 1987; the children who were interviewed only in 1987 did not display any significant differences in memories from the children who were interviewed both years or only in 1986. They also asked the children about traumatic events in their own lives (e.g. sexual abuse). Of the 27 children who did have personal traumas none of them showed any differences in their memories of the Challenger. They were, however, more resistant to Challenger-related symptoms. For example, none of them had Challenger-related behavior reenactments and few reported Challenger-related fears.

In Terr et al.'s 1997 study they looked at the children's thinking patterns. There were six similar thought patterns; denial, avoidance of thought, fantasies, omens, paranormal phenomena, and negative attitudes toward the world's future. In 1986 a large amount of the students acquired further information on the Challenger, on their own. This pattern was still seen in 1987, by 72% of the students. A small minority of children felt that they were thinking about the Challenger too much. Some even avoided Challenger-related talk. The children on the East Coast tended to day dream a bit more than the West Coast children. The themes of these fantasies were similar, however. The three dominant themes were, dying, reunion, and prevention. After the disaster children, especially adolescents became more negative about technology, the media, space, the U.S. and the world. Beside this sense of foreshortened future and recurrent recollections of the event, these children reported other PTSD symptoms. For example, a large amount of latency

children and a minor portion of adolescents participated in posttraumatic play (e.g. drawings, writings, poetry with Challenger themes). Another example was withdrawing from people, there was a small amount of East Coast children who displayed this symptom. Larger portions of the children were afraid to be alone, 5-7 weeks after the event, however. Also children had Challenger-related fears, of explosions, fires, airplanes, etc. Latency children and the East Coast children had more PTSD symptoms than adolescents or West Coast children. In general, the more emotionally concerned someone is the less inconsistent are their memories and the more they exhibit coping patterns.

Another aspect that seems to affect people's reaction to national traumatic events is death rates. This is because more people were exposed to the threat of death and bereavement over the loss of lives leads to post-disaster stress (Sprang, 1999). Considering the enormous amount of lives lost on September 11<sup>th</sup>, it is probably safe to say that the entire country mourned and all felt threatened. This means that every part of the country felt stress not only on that day but for days, weeks, even months later.

Sprang (1999) conducted a study on post-disaster stress following the Oklahoma City bombing. She surveyed three groups of people: those with high exposure to the bombing, those with low exposure and those who live in Lexington, Kentucky. The Traumatic Experiences Inventory (TEI) was used to measure post-disaster stress. The TEI is a 25 item measure of the occurrence, intensity, and duration of post-trauma symptoms of increased arousal, re-experiencing, avoidance, and feelings of victimization. The Structured Clinical Interview for DSM-IV/PTSD module was also used because the cutoff ranges for the TEI have not been empirically established. She found that the two

Oklahoma City groups had higher post-disaster disturbance than the Lexington group. The high exposure Oklahoma City group's reports also differed significantly from the other two groups in the level of PTSD reported. Proximity proved to be a distinguishing factor in determining the occurrence of PTSD. Interestingly there was not a difference between these three groups' immediate response scores, although at the time of the study, 6 months after the bombing, the Oklahoma City groups had higher distress levels. This suggests that the Lexington group's reaction was moderate and time limited while the Oklahoma City groups' reactions were more consistent, 6 months later, with their initial response scores. The reports of the Oklahoma City bombing were all over the news and radio after the tragedy, so the whole country was constantly exposed, which could explain the Lexington group's distress. She suggests that the longer-term distress might be due to the individual's interpretation of the event and the extent to which the person felt personally affected by this unpredictable, uncontrollable event. The same should be true with the tragedy of September 11<sup>th</sup>, people all over the country would probably have the same initial response rates but the people of New York would probably have higher levels of distress. Even months after the event because they probably felt the most personally affected and victimized compared to the rest of the country.

According to O'Shea (2001) prolonged symptoms of PTSD are associated with prior physical or psychiatric problems, poverty, repeated assault, and cultural factors. He also suggests that one should consider personality, proximity, and social support, when diagnosing PTSD. It has also been noted that people who rescue others are vulnerable to developing PTSD. This statement suggests that all of the rescue workers of September

11<sup>th</sup> are vulnerable to developing PTSD; especially since the rescue efforts were still continuing months after the tragedy.

Joseph, Yule, Williams, and Hodgkinson (1993) conducted a study on increased substance use following the Herald of Free Enterprise disaster. In March 1987, a passenger and freight ferry, the Herald of Free Enterprise, capsized shortly after leaving the harbor. The ship had 600 passengers on board, 193 died. Questionnaires were sent out to survivors, who were then requested to send them back to Kent Social Services. The questionnaires included the General Health Questionnaire (GHQ-28) and the Impact of Events Scale (IES). The GHQ-28 is a 28-item measure of psychiatric well being which asks participants to rate how their health has been over the past few weeks compared to usual. The IES is a measure of intrusive and avoidant symptoms of PTSD. Several questions were asked about changes in substance use in the six months immediately following the disaster and the last six months. The results show that the survivors used both prescribed and non-prescribed substances to alleviate their distress. In the immediate aftermath of the event the majority of people's consumption of substances increased. Although, their use of substances decreased during the next 18 months, the use of cigarettes and alcohol in particular remained at higher levels in comparison with other substances. This could be a reflection of the easier accessibility of these drugs compared to prescribed drugs. Substance use might remain high after posttraumatic symptoms have remitted because of their addictive nature. The authors conclude that increased use of substances is a common response to trauma, which is associated with greater psychological distress.

There were 73 subjects in this study, which is only about 18% of the survivors. The representativeness of this sample is unknown. It could be that more distressed survivors were more likely to respond to the questionnaire or those who were severely distressed did not respond.

#### Reactions to September 11<sup>th</sup>

Galea et al. (2002) conducted a study between October 16 and November 15, 2001 to assess PTSD and depression, due to September 11<sup>th</sup>, in individuals living in Manhattan. Only people living south of 110<sup>th</sup> St. were included in the study. The authors used a telephone interview to collect their data. The 1008 participants were asked about demographic characteristics, where they lived before 9/11, and their location during the attacks. They were also asked about social support, and if they experienced any of eight stressful events in the previous year. PTSD was assessed with the PTSD questionnaire from the National Women's Study, which is a modified version of the Diagnostic Interview Schedule for PTSD. Statistical analysis revealed the predictors of PTSD were Hispanic ethnicity, two or more prior stressors, a panic attack during or shortly after the events, residence south of Canal Street, and loss of possessions due to the events. The authors suggest that the prevalence of PTSD was higher among people who were living south of Canal St. and those who lost possessions than among people with less direct exposure.

Schuster et al. (2001) used random digit dialing for a nationally representative sample survey conducted three to five days after September 11<sup>th</sup>. Five hundred sixty participants were surveyed across the country. Interviewers conducted computer-assisted telephone interviews asking about the amount of time spent watching television coverage

of the attacks on 9/11. Participants were asked 5 questions about symptoms of stress taken from the 17-question Posttraumatic Stress Disorder Checklist. Participants were also asked about their children's television watching and their children's stress symptoms using 5 questions from the Diagnostic Interview Schedule for Children Version IV.

Results showed that 44% of U.S. adults surveyed reported at least one of the five stress symptoms since September 11<sup>th</sup>. On 9/11 adults watched television coverage for a mean of 8.1 hours. The authors found that extensive television watching was associated with a substantial stress reaction. Parents reported that 35% of their children had at least one stress symptom and 47% were worried about their safety or the safety of loved ones. Children watched a mean of 3.0 hours of television coverage on 9/11.

The authors conclude that although the rates of stress reactions were highest among subgroups previously found to have high rates of trauma related stress symptoms after disaster (e.g. women, nonwhites, and people with pre-existing psychological problems), they did find high rates of substantial stress reactions in all subgroups. Often disasters can have an effect on people who were not present especially those who had a loved one or acquaintance harmed but others who may personalize the event and think of themselves as potential victims can also develop stress symptoms. The possibility of personalizing the September 11<sup>th</sup> attacks and/or thinking one might be a potential victim is high. The authors found the highest rates of stress among people who were closest to New York but others throughout the country also reported substantial stress reactions.

The authors found that the level of stress was associated with the extent of television watching. One possible reason for this is that the magnitude of the event was uncertain and the television provided information of what to do and whether or not the

situation posed a personal threat; therefore TV may have served as a way of coping. For others television might have exacerbated or caused stress, especially with repeated viewing of terrifying images.

The Department of Health and Human Services conducts the National Household Survey of Drug Abuse (NHSDA) each quarter, which is supported by the Substance and Mental Health Services Administration (SAMHSA, 2003). This study is different than any of the others mentioned because there was data collected before 9/11, with which it could be compared. The survey uses a combination of computer-assisted personal interviewing conducted by the interviewer and audio computer-assisted self-interviewing. The study compared people in the NYC area, NY Consolidated Statistical Metropolitan Area (NY CMSA) and the combined CMSAs of Los Angeles, Detroit, and Chicago, referred to as C-CMSA. The 9/11 attacks happened at the end of the third quarter so the first three quarters of 2001 were compared to the fourth quarter. They were also compared to the four quarters of 2000.

There were no changes in the rates of illicit drug use in NYC or NY CMSA after the attacks among people aged 12 or older. For males the prevalence of past month marijuana use increased during the fourth quarter. For females the frequency of past month marijuana use decreased during 2001. There was no significant difference overall for illicit drug use in C-CMSA, however, the rate of marijuana use increased significantly between the first three quarters and the fourth quarter.

There were no changes in NYC and C-CMSA for prevalence of alcohol use among people aged 12 or older. In NY-CSMA there was a significant increase in alcohol

use for those aged 18 or older during 2001. There was a small increase in mean number of binge days among past month drinkers for males.

In NYC, NY CMSA and C-CMSA there were no statistically significant increases or decreases following September 11<sup>th</sup> in the proportion of adults classified with distress or a disorder. In NYC the mean number of disorder symptoms among persons with disorders for adults aged 18 or older was lower in the fourth quarter of 2001 compared with the first three quarters.

Schlenger et al. (2002) used a web-based epidemiological survey of a nationally representative cross-sectional sample using the PTSD Checklist and the Brief Symptom Inventory administered 1 to 2 months following 9/11. There were 2273 participants, including oversamples in New York City, Washington, DC, and other metropolitan areas such as, Boston and Chicago. Surveys were sent out via email on October 12, 2001 and the field period continued through November 12, 2001.

Additional questions that were asked were whether or not the participant was in the WTC, Pentagon, or surrounding buildings; had they seen any of the crash sites in person; or could they see smoke from the WTC or the Pentagon. They also assessed if the participants knew anyone injured or who was still missing, and asked their relationship to that person. Indirect exposure was assessed by inquiring about the amount of time spent watching television and specific elements of the content viewed, such as the Towers collapsing, or people jumping or falling out of the WTC. The PTSD Checklist is a 17-item scale that is used to indicate the degree to which participants have been bothered by each of the specific PTSD symptoms during the past month (“not at all” to “extremely”). The Brief Symptom Inventory is an 18-item scale that provides brief descriptions of 18

psychological or somatic symptoms that are rated on from “not at all” to “extremely” in terms of how much each has distressed the participant during the past 7 days. Participants with children under 18 years old were asked whether or not the child was upset by the events. If they were then the parents were asked about 3 specific distress symptoms: difficulty sleeping; being irritable, grouchy, or easily upset; and fearing separation from parents.

The results suggest that geographic proximity to the Towers was significantly related to the prevalence of probable PTSD. This was also significantly associated with the number of hours spent watching TV on 9/11 and the following few days and with the number of different kinds of traumatic events participants reported seeing. Only sex, age, having been in the WTC or surrounding buildings at the time of the attack, and number of hours of TV coverage watched per day were significantly associated with PTSD symptoms.

The authors found that 11.6% of the U.S. population was experiencing clinically significant distress. This distress was higher in New York City, Washington, DC, and other metropolitan areas than in the remainder of the U.S., these differences were not significantly different. The associations with having family, friends, or coworkers injured or killed in the attacks; of being in or having a close family member or loved one in the military; or of the TV content index were not significantly different either.

The highest number of households that reported at least one child was upset by the events was in the New York City area, followed by the other metropolitan area, Washington, DC, and the rest of the U.S. However, these differences were not

significantly different. The distress symptom reported most for children was irritable, grouchy, or easily upset.

Vlahov et al. (2002) examined increased use of cigarettes, alcohol, and marijuana among Manhattan, New York residents after 9/11. They used random digit dialing of households south of 110<sup>th</sup> street in Manhattan between October 16 and November 15, 2001. For each of the three substances the participants were asked: have they ever used the substance before, how much did they use during the week before 9/11, and how many times they had used the substance the week before the survey was conducted. They also asked about eight traumatic events that the participants could have experienced in the year before the 9/11 attack. They assessed the experience of 9/11 by asking: whether the participant had witnessed the attack, whether they were afraid for their lives, whether friends or family were killed during the attack, whether the participant was displaced from home, whether they were involved in the rescue effort, and whether they had lost a job or possessions as a result of the attack. The participants were also asked about the type and quantity of media exposure they experienced. PTSD was measured using a modified version of the Diagnostic Interview Schedule measure based on the DSM-IV.

The results suggest a substantial increase in substance use in Manhattan after 9/11. People who reported an increase in substance use also had a higher prevalence of current PTSD and of current depression than did persons who did not increase their use of these substances. People who reported an increase in cigarette and marijuana use were more likely to have both PTSD and depression. People who reported increased alcohol use were more likely to have depression only. The authors found an association between increases in cigarette and marijuana smoking and current PTSD and one between alcohol

consumption, cigarette smoking, and depression. People who were living closer to the WTC were more likely to increase cigarette use when other covariates were controlled for.

#### Media Effects on Disaster

There are two predictors of how much media coverage a disaster is going to receive according to Adams (1986). These predictors are the logarithm of estimated disaster deaths and the geographic proximity of the disaster to New York City (Adams, 1986). The number of deaths is easy to communicate, verify, and compare to other disasters. The number of deaths might be a heuristic used to gauge the importance of a disaster (Simon, 1997). The tragedy of September 11th meets both of these requirements for massive media coverage. The tragedy received so much media coverage that most television stations did not show commercials for four days. This came with a price tag of between \$200 million and \$300 million in losses for the industry (McClellan, 2001). This was an afterthought, though; the media felt the need to keep the public informed 24 hours a day. Even TV stations that usually do not show news did show news, including MTV and Home and Garden television (Higgins, 2001). According to the Nielsen Media Research, the level of homes using television jumped 13% nationally (Higgins, 2001). In New York 76% of households were tuned into news coverage while almost 74% of households in Washington-area homes were tuned in to the coverage.

Research has shown that media coverage of violence and brutality creates fear in individuals who have not been directly exposed to such violence and are not in immediate personal threat (Slone, 2000). However, most of these studies have only focused on coverage of criminal violence. The emotional impact of media coverage of terrorism is

virtually unexplored. Slone (2000) conducted a study on Israeli adults. She showed half the participants film clips of terrorist threats to the country the other half watched news clips from relevant Israeli national television. Each of the participants was given a questionnaire, which included a state anxiety questionnaire, in which the second half of this form was filled out after watching the film. She found that the anxiety levels were significantly higher for participants that watched the terrorists' film clips. This suggests that television pulls the viewer into events, which could invoke an emotional response even if one is completely removed from the event in both time and space (Lee, 1990).

Another study that examined reactions to the Oklahoma City bombing was conducted by Pfefferbaum et al. (1999) with middle and high school students from the Oklahoma City area. Each of the students was given the clinical needs assessment instrument 7 weeks after the bombing. This assessment was designed specifically for the 1995 Oklahoma City bombing to include measures of exposure (physical, emotional, by means of television), initial response to the explosion, and posttraumatic stress and other symptoms present at the time of administration. They found that when exposure status, gender, ethnicity, grade level, and television exposure were entered into a stepwise regression analysis, the primary predictor of PTSD symptoms was television exposure. This suggests that the media plays a role in sustaining PTSD stress symptoms.

#### Manmade vs. Natural Disasters

Baum (1991) suggests that in contrast with natural disasters, such as hurricanes, manmade disasters may be especially psychologically toxic. This is because they are unpredictable, lack a clear "low point" at which "the worst is over" and people can focus

on healing and rebuilding, and knowledge of how to deal with the event and its aftermath is limited. All were present in the September 11<sup>th</sup> attack.

The events that last the longest have the greatest psychological impact (Ursano, McCaughey, & Fullerton, 1994). In terms of September 11<sup>th</sup> the actual event did not last long but the aftereffects have, such as, anthrax, media coverage, and the war on terrorism. The psychological impact of an event is influenced by loss of family, friends, income, and community and physical injury. These experiences can endure for weeks, months, even years, affecting all areas of one's life. Manmade trauma may create the highest level of psychological impact and terror because of the loss of safety and trust in one's environment. The intensity and duration of terror in a traumatic event is overwhelming. The September 11<sup>th</sup> tragedy has all of these aspects, meaning it had a great psychological impact.

Another aspect that affects whether or not an event will have a severe psychological impact is if people have adequate warning (Bell, Greene, Fisher, & Baum, 2001). Also, it is a question of how prepared a community is for disaster. The extent to which communities are prepared, how they conduct pre- and post- disaster procedures, are able to unite as a community, and rebuild quickly affect the impact a disaster has on an individual. Obviously, the 9/11 attack could not have been prepared for, however, the rebuilding did start quickly after the disaster and the U.S. did pull together by donating blood, money, and time. One would expect reactions to be more extreme when people are exposed to extreme life threat.

A great deal of uncertainty is involved with this event, which makes it hard to assess the point at which things begin to improve which means the worst is not over

quickly. Human-made disasters are thought to threaten one's feeling of control more than natural disasters because one normally has a good deal of control of his/her environment. This might also affect our perception of control in the future, which may lead to stress. Natural disasters may begin very quickly but they can be forecast to some extent. Natural disasters do not last long so rebuilding and recovery can start quickly and once they are complete a sense of closure can be obtained. Manmade disasters cannot be predicted, one can not predict the collapse of something that is not ever supposed to collapse in the same way one would forecast a hurricane.

### Hypotheses

This study hypothesizes that people on Long Island will report frequent symptoms of PTSD in retrospective ("seven days after September 11<sup>th</sup>") account but people who had a loved one hurt or injured in the attack will 8-10 months after September 11<sup>th</sup>, report more frequent PTSD symptoms. Also, people in NY who were in closer proximity to the WTC will report more frequent and intense PTSD symptoms approximately 8-10 months later because they were closer to the attack and will feel more like they have lost control over their environment, as suggested by Bell et al. (2001).

Another hypothesis is that people who avoided watching tragedy related television or those who only watched as much TV as they normally would have will report less frequent PTSD symptoms in both the current and retrospective reports, since watching tragedy related television often is associated with more frequent PTSD symptoms. As stated before, Pfefferbaum et al. (1999) suggests that for people raised on television, watching the disaster on television is as real as being there.

The final hypothesis is that self-reported substance use will show an increase between the retrospective account to the current report. This hypothesis is based on the suggestion of Joseph et al. (1993) that increased use of substances is a common response to trauma, which is associated with greater psychological distress. People who are using more substances will also be more likely to have more frequent PTSD symptoms.

## METHOD

### Participants

Participants were recruited from Robert Moses and Ocean Bay Park beaches on Long Island, N.Y. People from NY, NJ, and CT were included in the study. There were 302 surveys distributed. Each participant was asked what day of the week 9/11 happened and at what time of day the first plane hit in order to test retrospective memory. If he/she did not answer correctly the survey was not used. There were 210 surveys included in the analysis. The surveys were distributed to people over the age of 18.

### Materials

NEO-FFI. Only two of the five personality factors of the Neuroticism Extroversion Openness Five Factor Inventory (NEO-FFI) were used in this study, neuroticism and extraversion (see Appendix A). It is a 24-item survey with 12 extraversion and 12 neuroticism (N) questions. The part of the NEO-FFI that was used assesses neuroticism vs. emotional stability and extraversion. Neuroticism is a risk factor of being exposed to trauma and of developing PTSD after being exposed. Extraversion is only a risk factor of being exposed to traumatic events (Bresalu, Davis, & Andreski, 1995). Also neuroticism was used because it represents an individual's tendency to experience psychological distress (Costa & McCrae, 1992). A high standing on N is a

feature of most psychiatric conditions. Extraversion underlies a number of traits: sociability, activity, and the tendency to experience positive emotions. The reported reliabilities for neuroticism and extraversion are 0.94 and 0.87, respectively. These measures were used to determine if a subject was vulnerable to developing PTSD.

QFI. A modified version of the Quantity Frequency Index (QFI) was used in order to determine the participants' use of alcohol and drugs both before and after September 11<sup>th</sup> (see Appendix B). Frequency of use was determined by a 0-6 point scale: 0= Never, 1= 1-2 times in the last three months, 2= once per month, 3= once every two weeks, 4= once per week, 5= 2-4 times per week, and 6= almost everyday. This was used to determine if the participant's substance use increased, decreased, or remained the same after September 11<sup>th</sup>.

Impact of Events Scale-Revised. The Impact of Events Scale-Revised (IES-R) was used in order to determine the frequency of PTSD symptoms for the participant. The IES-R asks the participant to indicate how distressing each difficulty had been for him/her during the seven days following 9/11 and now, 8-10 months later. The IES-R has a five-point scale ranging from not at all to extremely distressed about the PTSD symptoms (See Appendix C). The internal consistency for the IES-R for each subscale was Intrusion = 0.87, Avoidance = 0.85, and Hyperarousal =0.79 (Weiss & Marmar, 1997). The test-retest correlation coefficients for each subscale were Intrusion = 0.94, Avoidance = 0.89, and Hyperarousal = 0.92.

Other Questions. Questions were asked to determine the participants' proximity to the Towers, knowing someone killed or injured in the attack, if so how close they were to that person, how much tragedy-related television the person watched, and general

demographic questions (see Appendix D). Television related questions included: although I had the opportunity, I avoided 9/11-related TV the first 4 days after the attack, during the 2 weeks following 9/11, I chose not to watch TV because I didn't want to see more about 9/11, during the 2 weeks following 9/11, I watched a lot of TV to find out more information about 9/11, and during the 2 weeks following 9/11, I watched TV but not TV about 9/11. Each of these statements were scored on a five point scale from strongly disagree to strongly agree. Distance from the WTC was assessed on a five point scale: 1= 1 mile radius, 2= 1-15 mile radius, 3= 15-30 mile radius, 4= 30-45 mile radius, and 5= 45-60 mile radius

. The participants were asked of the people they knew who died as a result of 9/11, the person they had the greatest emotional tie to was: 1= did not know anyone, 2= an acquaintance, or 3= a friend/family member. The same question was asked about people who were injured as a result of 9/11.

#### Procedure

New York was chosen because people who live and work in the tri-state area were the closest to the tragedy and also most likely to know someone involved with the Towers.

The author distributed the surveys at the beach on Long Island. The surveys were distributed at Robert Moses Beach and Ocean Bay Park. The participants were asked if they live in NY, NJ, or CT year round to avoid giving surveys to tourists or people who only live there for the summer. The script read as follows, " I was wondering if you would like to help me out. My name is Heather Nevins and I am working on my masters in Substance Abuse Treatment. For my thesis I need to find 300 people to fill out my

survey. It will only take 10 to 15 minutes to fill out and it is completely anonymous.

Would you like to help me out? “ If the person/people agreed to fill out the survey the author let them know that she would be back in 15 minutes to collect the survey(s). She also told them where she would be if they had any questions.

## RESULTS

### Demographics

The mean age of the participants was 37.67 ( $SD= 12.57$ ), with a minimum age of 18 and a maximum age of 79. About 68.6% of the participants were female and 31.4% were male. Most of the sample was Caucasian (87.1%), 1.4% were Black, 1.4% were Asian, 5.7% were Hispanic, 2.4% were Other, and 1.9% did not report race. More than half of the participants were married (52.9%), 4.8% were divorced, 0.5% were separated, 37.6% were single, 1% were widowed, and 3.3% did not report marital status. Almost half of the participants had a college education (48.6%), 21.4% had more than a college education, .5% had less than a High School education, 10.5% had a High School education, 14.8% had some college education, and 4.3% did not report their education level.

### PTSD Symptoms and Closeness to the Towers

An ANOVA revealed a significant effect for closeness to the Towers and PTSD symptoms one week after 9/11,  $F(4, 196)= 3.44$ ,  $p < 0.01$ ,  $MSE= 933.88$  (see Table 1). A Tukey HSD post hoc test revealed that the only significant effect was between people within a one-mile radius ( $M= 66.17$ ,  $SD= 14.53$ ) on 9/11 and those who were 45-60 miles away ( $M= 52.35$ ,  $SD= 15.04$ ), with the people within a one-mile radius having more frequent PTSD symptoms. An ANCOVA with neuroticism and extroversion covaried

Table 1

Analysis of Variance for PTSD Symptoms One Week After 9/11 and Closeness to the Towers

Tests of Between-Subjects Effects				
Source	df	Mean Square	F	Sig.
Corrected Model	4	933.88	3.44	.010
Intercept	1	537519.37	1982.52	.000
CLOSENESS	4	933.88	3.44	.010
Error	196	271.12		
Total	201			
Corrected Total	200			

Note. Closeness = closeness to the Towers on 9/11.

a Computed using alpha = 0.05

b R Squared = 0.07 (Adjusted R Squared = .05)

out revealed a significant effect for closeness,  $F(4, 194) = 2.56, p < 0.04, \text{MSE} = 677.71$ , which uncovered the same group differences as the ANOVA. It also revealed a significant effect for neuroticism,  $F(1, 194) = 6.37, p < 0.01, \text{MSE} = 1685.96$ , such that people who score higher on the neuroticism scale were more likely to report more frequent PTSD symptoms.

An ANOVA revealed a significant effect for closeness to the Towers and PTSD symptoms 8-10 months after 9/11,  $F(4, 196) = 2.80, p < 0.03, \text{MSE} = 389.57$  (see Table 2). However, a Tukey HSD post hoc test reveal a near significant effect,  $p < 0.06$ , only for the difference between people within a one-mile radius ( $M = 47.33, SD = 11.52$ ) at the time of the tragedy and those who were 45-60 miles away ( $M = 39.06, SD = 10.36$ ) from the Towers. An ANCOVA with neuroticism and extroversion covaried out revealed that there was no significant effect for closeness to the Towers,  $F(4, 194) = 1.93, p < 0.11, \text{MSE} = 251.20$ . It also showed a significant effect for neuroticism,  $F(1, 194) = 16.46, p < 0.01, \text{MSE} = 2146.38$ . This was due to neuroticism being a reporting bias; people who score higher on neuroticism were more likely to report more frequent PTSD symptoms.

#### PTSD Symptoms and Knowing Someone who Died

An ANOVA was run for PTSD symptoms one week after 9/11 and knowing someone who died in the tragedy. This ANOVA revealed that there was no significant effect,  $F(2, 200) = 2.42, p < 0.09, \text{MSE} = 661.81$ . An ANCOVA, covarying out neuroticism and extroversion also revealed no significant effect for knowing someone who died 9/11 and PTSD symptoms one week afterwards,  $F(2, 198) = 1.41, p < 0.25, \text{MSE} = 375.10$ . It also showed a significant effect for neuroticism,  $F(1, 198) = 6.52, p <$

Table 2

Analysis of Variance for PTSD symptoms 8-10 months after 9/11 and Closeness to the Towers

Tests of Between-Subjects Effects				
Dependent Variable: PTSD after Total				
Source	df	Mean Square	F	Sig.
Corrected Model	4	389.56	2.77	.03
Intercept	1	285906.09	2039.82	.000
CLOSENESS	4	389.56	2.77	.03
Error	196	140.16		
Total	201			
Corrected Total	200			

Note. Closeness = closeness to the Towers on 9/11  
 a Computed using alpha = 0.05  
 b R Squared = .05 (Adjusted R Squared = 0.03)

0.01,  $MSE= 1740.41$ , such that people who scored higher on the neuroticism scale were more likely to report more frequent PTSD symptoms regardless of knowing someone who died in the tragedy.

An ANOVA was run on PTSD symptoms 8-10 months after 9/11 and knowing someone who died in the tragedy. This ANOVA revealed a significant effect,  $F(2, 200)= 3.89$ ,  $p < 0.02$ ,  $MSE= 540.51$ . Interestingly, a Tukey HSD post hoc test revealed that people who did not know anyone who died on 9/11 ( $M= 44.34$ ,  $SD= 11.60$ ) had more frequent PTSD symptoms 8-10 months later than did people who had a family member or friend die ( $M= 38.88$ ,  $SD= 11.56$ ). When an ANCOVA was run and neuroticism and extroversion were covaried out there was no significant effect for knowing someone who died and PTSD symptoms 8-10 months after 9/11,  $F(2, 198)= 2.41$ ,  $p < 0.09$ ,  $MSE= 319.17$ . It also showed a significant effect for neuroticism,  $F(1, 198)= 11.73$ ,  $p < 0.01$ ,  $MSE= 1552.63$ , such that people who had higher neuroticism scores were more likely to report more frequent PTSD symptoms. This explains the original effect; people who scored high on the neuroticism scale were more likely not know anyone who was killed in the tragedy.

#### PTSD Symptoms and Knowing Someone who was Injured

An ANOVA revealed a significant effect for PTSD symptoms one week after 9/11 and knowing someone who was injured on 9/11,  $F(2, 193)= 3.90$ ,  $p < 0.02$ ,  $MSE= 1056.61$ . Interestingly, a Tukey HSD post hoc test revealed that people who did not know anyone injured ( $M= 61.18$ ,  $SD= 16.70$ ) had more frequent PTSD symptoms than people who had a family member or friend who was injured ( $M= 53.96$ ,  $SD= 15.94$ ) on 9/11. An ANCOVA with neuroticism and extroversion covaried out revealed no significant effect

for knowing someone injured on 9/11,  $F(2, 191) = 2.45$ ,  $p < 0.09$ ,  $MSE = 651.37$ . It also revealed a significant effect for neuroticism,  $F(1, 191) = 5.50$ ,  $p < 0.02$ ,  $MSE = 1463.59$ , people who scored higher neuroticism scores were more likely to report more frequent PTSD symptoms. This result explains the initial effect; people who scored higher on the neuroticism scale were more likely not to know anyone who was injured in the attack.

An ANOVA revealed a significant effect for PTSD symptoms 8-10 months after 9/11 and knowing someone who was injured in the tragedy,  $F(2, 193) = 4.03$ ,  $p < 0.02$ ,  $MSE = 554.86$ . Surprisingly, a Tukey HSD post hoc test revealed that there was a significant effect for people who knew a family member or friend ( $M = 43.98$ ,  $SD = 11.36$ ) who was injured and knowing an acquaintance ( $M = 44.21$ ,  $SD = 12.70$ ) who was injured, such that the people who had an acquaintance injured had more frequent PTSD symptoms 8-10 months after 9/11. When an ANCOVA was run covarying out neuroticism and extroversion, it revealed no significant effect of knowing someone injured in the attack,  $F(2, 191) = 2.22$ ,  $p < 0.11$ ,  $MSE = 294.21$ . It also revealed a significant effect for neuroticism,  $F(1, 191) = 9.22$ ,  $p < 0.01$ ,  $MSE = 1224.83$ , people with higher neuroticism scores were more likely to report more frequent PTSD symptoms. This explains previous effect such that people who had higher neuroticism scores were more likely to report knowing an acquaintance that was injured on 9/11.

#### Drug Use Before and After 9/11

A paired t-test did not reveal a significant difference between drug use six months before and after 9/11 ( $p = 0.83$ ). Another paired t-test did not show a significant difference between regular alcohol use six months before or after 9/11 ( $p = 0.37$ ). The same result

was found for heavy alcohol use ( $p = 0.30$ ) and tobacco use ( $p = 0.11$ ). These results indicate that substance use was stable.

#### PTSD Symptoms and Drug Use

A t-test revealed a significant effect for PTSD symptoms one week after 9/11 and drug use 6 months after 9/11 ( $p = 0.03$ ). A t-test also revealed a significant effect for PTSD symptoms 8-10 months after 9/11 and drug use 6 months after 9/11 ( $p = .01$ ). This suggests that as frequency of PTSD symptoms increases frequency of substance use also increases.

#### PTSD Symptoms and Television Watching

Correlations were run on PTSD symptoms the week after 9/11 and amount of 9/11 TV watched. These correlations revealed no significant difference. Correlations for PTSD symptoms 8-10 months after 9/11 and amount of 9/11 TV watched also revealed no significant difference.

#### PTSD Symptoms and Feelings of Life Endangerment

An ANOVA revealed a significant effect for PTSD symptoms one week after 9/11 and feeling as if one's life was in danger,  $F(4, 159) = 5.65$ ,  $p < 0.01$ ,  $MSE = 1260.39$ . A Tukey HSD post hoc test revealed that there was a significant effect such that people who agreed and strongly agreed had more frequent PTSD symptoms than those who strongly disagreed, disagreed, and were neutral to the statement.

An ANOVA did not reveal a significant effect for PTSD symptoms 8-10 months after 9/11 and feeling as if one's life was in danger,  $F(4, 158) = 1.27$ ,  $p < 0.28$ ,  $MSE = 54.08$ .

### PTSD Symptoms and Feeling Victimized

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and feeling victimized by the tragedy,  $F(4, 159) = 0.26$ ,  $p < 0.90$ ,  $MSE = 58.49$ . An ANOVA for PTSD symptoms 8-10 months after 9/11 and feeling victimized by the tragedy also did not reveal a significant effect,  $F(4, 158) = 1.02$ ,  $p < 0.40$ ,  $MSE = 43.49$ .

### PTSD Symptoms and Participation in the Rescue Effort

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and participating in the rescue effort,  $F(1, 159) = 1.27$ ,  $p < 0.26$ ,  $MSE = 282.77$ . An ANOVA for PTSD symptoms 8-10 months after 9/11 and feeling victimized by the tragedy also did not reveal a significant effect,  $F(1, 158) = 0.13$ ,  $p < 0.72$ ,  $MSE = 5.56$ .

### PTSD Symptoms and Watching the Towers Fall in Person

An ANOVA did reveal a significant effect for PTSD symptoms one week after 9/11 and watching the Towers fall live in person,  $F(1, 197) = 6.45$ ,  $p < 0.01$ ,  $MSE = 17.50$ , such that people who did not see the Towers fall live in person had more frequent PTSD symptoms. An ANOVA for PTSD symptoms 8-10 months after 9/11 and watching the Towers fall live in person also revealed a significant effect,  $F(1, 197) = 6.77$ ,  $p < 0.01$ ,  $MSE = 936.17$ , such that people who did not see the Towers fall live in person had more frequent PTSD symptoms.

### PTSD Symptoms and Watching the Towers Fall Live on Television

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and watching the Towers fall live on television,  $F(1, 197) = 0.53$ ,  $p < 0.47$ ,  $MSE = 142.90$ . An ANOVA for PTSD symptoms 8-10 months after 9/11 and watching the

Towers fall live on television also did not reveal a significant effect,  $F(1, 197) = 0.04$ ,  $p < 0.84$ ,  $MSE = 5.36$ .

#### PTSD Symptoms and Being Injured on 9/11

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and being injured in the attack,  $F(1, 197) = 1.79$ ,  $p < 0.18$ ,  $MSE = 486.33$ . An ANOVA for PTSD symptoms 8-10 months after 9/11 and being injured in the attack also did not reveal a significant effect,  $F(1, 197) = 2.69$ ,  $p < 0.10$ ,  $MSE = 371.79$ .

#### Gender Differences

An independent t-test did not reveal a significant difference for gender and drug use six months after 9/11 ( $p = 0.057$ ). An independent t-test did not show a significant difference for gender and PTSD symptoms one week after 9/11 ( $p = 0.551$ ). An independent t-test also did not indicate a significant difference for gender and PTSD symptoms 8-10 months after 9/11 ( $p = 0.824$ ).

Seventy surveys were not included in these results because the participant answered the question wrong about which day of the week or what time of day did 9/11 occur. The results of these data can be found in Appendix E. However, these results are similar to the results above. This is probably due to the small number of survey analyzed in the set.

### DISCUSSION

As was hypothesized, there was a significant effect for closeness to the Twin Towers on September 11<sup>th</sup>. People who were within a one-mile radius of the WTC had significantly more frequent PTSD symptoms in their retrospective account of one week afterwards than did those who were 45-60 miles away. This effect remained even after neuroticism and extroversion were covaried out.

Participants' reports 8-10 months later of PTSD symptoms also revealed a significant effect. However, a post hoc test revealed that there was only a nearly significant difference, such that people who were within a one-mile radius of the Towers had more frequent PTSD symptoms than those that were 45-60 miles away. Once neuroticism and extroversion were covaried out there was no significant effect for closeness to the Towers, suggesting that people who scored higher on the neuroticism scale were more likely to report more frequent PTSD symptoms.

People who were closer to the WTC reported more frequent PTSD symptoms perhaps because it was their surroundings that were attacked; therefore they felt more victimized than the people who were further away. As Bell et al. (2001) suggested the people who were within a one-mile radius felt more like they had lost control over their surroundings, which helped to sustain their PTSD symptoms. Galea et al. (2002) found a similar result in their study conducted eight weeks after 9/11. Their survey showed that the prevalence of PTSD was higher among the participants who were most directly exposed to the attacks. Vlahov et al. (2002) also found that proximity to the WTC was significantly related to the prevalence of probable PTSD.

There was no significant effect in retrospective PTSD symptoms of the seven days following 9/11 and knowing someone who died in the attack. However, there was a significant effect for current report of PTSD symptoms and knowing someone who died in the tragedy. This result is understandable because everyone was affected by the attack right after 9/11. Surprisingly, though the people who did not know anyone who died in the attack had more frequent PTSD symptoms than those who had a family member or friend die. However, this effect disappeared when neuroticism and extroversion were

covariates were controlled for, which suggests the people who scored higher on the neuroticism scale were more likely not to know anyone who was killed in the tragedy.

Vlahov et al. (2002) found that the prevalence of probable PTSD was higher among those who reported that family, friends, or coworkers were killed or injured in the attacks and among those who reported being in the military or having close family members or loved ones in the military, however this difference was not statistically significant. In the Galea et al. (2002) study, they found that knowing someone killed in the attacks did not affect people's PTSD symptoms but did affect whether or not people had depression. They found that factors associated with grief, such as loss of a loved one, increased the likelihood of depression, a finding that is consistent with the results of previous research. The people in this study who lost a loved one are more likely to be suffering from depression than PTSD.

This study also examined retrospective account of PTSD symptoms one week after 9/11 and knowing someone who was injured in the attack. An analysis of variance revealed a significant effect such that people who did not know anyone who was injured suffered more frequent PTSD symptoms than people who knew a family member or friend who was injured in the attack. However, this effect disappeared after the covariates neuroticism and extroversion were removed, suggesting that people with higher neuroticism scores were more likely not to know anyone who was injured in the attack.

Current report of PTSD symptoms and knowing someone who was injured revealed that people who knew an acquaintance who was injured had more frequent PTSD symptoms than people who had a family member or friend injured. Again this effect was eliminated when the covariates, neuroticism and extroversion, were removed.

This suggests again that people who scored higher on the neuroticism scale were more likely to know an acquaintance that was injured on 9/11.

One may speculate on why this result was found, for example perhaps people who had a family member or friend injured were more likely to seek psychological help, but there is no concrete evidence in this study to support this hypothesis. An additional possibility is that having a family member or friend injured could be a factor associated with grief, making it more likely for the person to be experiencing depression than PTSD (Galea et al., 2002).

Substance use six months before 9/11 and six months after were highly correlated suggesting stable use. Tobacco, heavy alcohol, and regular alcohol use were also highly correlated, suggesting stable use. Results revealed that participants reported no significant difference between drug use six months before or after September 11<sup>th</sup>. The same result was found for tobacco, heavy alcohol, and regular alcohol use when each was analyzed separately. This finding is in agreement with the findings of the NHSDA study (SAMHSA, 2003). The study found no significant change in illicit drug use in NYC or NY-CMSA for people 12 or older. There was no significant difference in alcohol use for people 12 or older in NYC. However, there was a significant increase in alcohol use for people 18 or older in the NY-CMSA. The differences in reporting are probably due to this survey being retrospective and the NHSDA study data being collected quarterly.

It was found that drug use six months after 9/11 and PTSD symptoms both one week after and 8-10 months after were significantly correlated. This is consistent with past research (Bremner et al., 1996, Breslau et al., 1997, Kessler et al., 1995, Stewart et al., 1998, & Vlahov et al., 2002). Vlahov et al. (2002) suggest that people who report an

increase in substance use also have a higher prevalence of current PTSD and current depression in comparison with people who did not increase their use of substances. Most of past research has found that substance abuse usually proceeds fairly shortly after the onset of PTSD symptoms. Stewart et al. (1998) suggest that substance abuse may prolong PTSD by preventing habituation to traumatic memories or preventing one from working through the traumatic event. Perhaps this is one of the causes of people still experiencing PTSD symptoms 8-10 months after the attack.

PTSD symptoms were not affected by television watching. Most likely people watched 9/11 related television in order to find out more information. According to Terr et al. (1999) watching television is as real as being there. However, Schuster et al. (2001) suggest that television might have been used as a method of coping for some people because TV provided information about what to do and whether there was a potential personal threat. This is consistent with threat-appraisal models of coping and stress. The threat-appraisal model states that although coping does come from emotion and is often directed at the regulation of emotional distress, it also examines initial appraisal of harm, threat, or challenge and can modify the appraisal, which in return will change the emotional reaction. People watching television appraised the situation as not threatening to them and therefore changed their emotional reaction, which could have lead to PTSD symptoms.

According to Ahern et al. (2002) people who watched television images of the attack frequently (e.g., seeing people fall or jump from the Towers) and were directly affected by the attack (e.g., had a love one killed) were more likely to develop PTSD and depression than those who did not. Among those who were not directly affected by the

attack there was no association with frequency of disaster related television image watching and PTSD and depression. It is likely in this study that there was no significance between television viewing and PTSD symptoms because many of the participants were not directly affected by the attack.

Neuroticism was found to have a significant effect on PTSD symptoms and closeness to the WTC and PTSD symptoms and knowing someone who died or was injured. This finding is consistent with past research (Breslau et al., 1995; Casella & Motta, 1990; McFarlane, 1988; Lauterbach & Vrana, 2001). Neuroticism has been found to be a risk factor for developing PTSD once one is exposed to trauma (McNally, 2001). It suggests that people who scored higher on the neuroticism scale were more likely to report more frequent PTSD symptoms. There are several possibilities for this finding: neuroticism magnified the impact of the event; when under stress people respond in habitual ways; and experiencing a traumatic event can change one's personality characteristics (Lauterbach & Vrana, 2001; McFarlane, 1988).

One of the limitations of this study is that it was a retrospective account of people's experience of September 11<sup>th</sup>. This was attempted to be controlled by asking the participants to answer two factual questions about 9/11. The questions were: What day of the week did the 9/11 attack occur on and what time of day did the first plane hit. If either of these questions were answered wrong the survey was eliminated from the sample.

Since people filled out the survey on the beach perceived confidentiality could have also been a confound. Often groups of friends or families would fill out the survey at the same time. So people might have under reported drug use or PTSD symptoms for fear of their friends or family seeing their survey.

Other limitations have to do with sampling biased. There were about one-third more women in this study than men. Also there were significantly more Caucasian people in this study than any other race. Most likely these confounds are because of the study being conducted on the beach. Conceivably, these differences might have been eliminated if the study was conducted in another location, such as a park.

Finally the closeness to the Towers question on the survey was a limitation. The last option that people were given was 45-60 miles away, however, there were some participants who were further away than 60 miles away. This may have caused some variance in the data.

Future research should explore the relationship between PTSD symptoms and neuroticism. In this study neuroticism seemed to have a big effect on reporting of PTSD symptoms. Other studies have found neuroticism to be a risk factor for developing PTSD but recent studies have not taken neuroticism into account when analyzing their data. Further research can determine whether neuroticism affects reporting of PTSD symptoms and perhaps duration of symptoms.

Also television's effects on people's reactions to trauma should be explored. It should be examined whether television is used as a coping mechanism or does it help facilitate PTSD symptoms or depression. The variables that effect the development or lack of development should also be determined.

The horrible events that unfolded on September 11<sup>th</sup> affected the whole world, especially people in the New York area. The findings in this study are important because the need to know how people react to trauma is essential. Considering the ongoing threat of terrorist attacks, it is not unlikely that a tragedy like this one could happen again.

Knowing how people react to terrorist attacks will help to deal with it appropriately in the future.

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## APPENDICIES

A. Please decide how much you agree with the following statements. Write in the number that fits best. 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

- \_ 1. I am not a worrier.
- \_ 2. I like to have a lot of people around me.
- \_ 3. I often feel inferior to others.
- \_ 4. I laugh easily.
- \_ 5. When I'm under a great deal of stress, I sometimes feel like I'm going to pieces.
- \_ 6. I don't consider myself especially "light-hearted."
- \_ 7. I rarely feel lonely or blue.
- \_ 8. I really enjoy talking to people.
- \_ 9. I often feel tense and jittery.
- \_ 10. I like to be where the action is.
- \_ 11. Sometimes I feel completely worthless.
- \_ 12. I usually prefer to do things alone.
- \_ 13. I rarely feel fearful or anxious.
- \_ 14. I often feel as if I'm bursting with energy.
- \_ 15. I often get angry at the way people treat me.
- \_ 16. I am a cheerful, high-spirited person.
- \_ 17. Too often, when things go wrong, I get discouraged and feel like giving up.
- \_ 18. I am not a cheerful optimist.
- \_ 19. I am seldom sad or depressed.
- \_ 20. My life is fast-paced.
- \_ 21. I often feel helpless and want someone else to solve my problems.
- \_ 22. I am a very active person.
- \_ 23. At times I have been so ashamed I just wanted to hide.
- \_ 24. I would rather go my own way than be a leader of others.



C. Using the answers on the side write down how often you have used the following substances in the past 12 months and since September 11<sup>th</sup>.

	6 Months Before 9/11	6 Months After 9/11	
Caffeine	_____	_____	
Tobacco	_____	_____	
Heavy alcohol use ( $\geq 5$ drinks per past 3 months/ 3 months before 9/11 sitting) month	_____	_____	0=Never 1=1-2 in the
Regular alcohol use two weeks ( $> 5$ per sitting) week	_____	_____	2=once per 3=once every
Marijuana/Hashish per week	_____	_____	4=once per 5=2-4 times
Cocaine or Crack everyday	_____	_____	6=almost
Heroin	_____	_____	
Amphetamines (not prescribed)	_____	_____	
Barbiturates (not prescribed)	_____	_____	
Benzodiazapines (not prescribed)	_____	_____	
Other Tranquilizers ( “ “ )	_____	_____	
Hallucinogens	_____	_____	
Inhalants	_____	_____	

D. Age Race Occupation Gender M/F  
 Education Level  
 City of residence Is this where you lived 9/11 Yes No  
 Marital Status: Married Divorced Separated Single Widowed

Please answer the following questions.

What day of the week did the 9/11 attack occur on?

What time of day did the first plane hit? 8-9:30am 9:30-11am 11am-12: 30pm

Did you watch the Twin Towers fall LIVE in person? Yes No

Did you watch the Twin Towers fall LIVE on TV? Yes No

Were you injured as a result of the 9/11 attack? Yes No

Did you ever feel like your life was in danger during or after 9/11? Strongly Disagree  
 Disagree Neutral Agree Strongly Agree

Did you feel victimized by the tragedy? Strongly Disagree Disagree Neutral Agree  
 Strongly Agree

How close were you to the World Trade Center when the attack happened?

1= 1mile radius 2= 1-15 mile radius 3= 15-30 mile radius 4= 30-45 mile radius 5= 45-60  
 mile radius

Of the people you knew who died as a result of 9/11, the person you had the greatest  
 emotional tie to was:

1= did not know anyone 2= an acquaintance 3= a friend/family member

Of the people you knew who were injured as a result of 9/11, the person you had the  
 greatest emotional tie to was:

1= did not know anyone 2= an acquaintance 3= a friend/family member

Although I had the opportunity, I avoided 9/11 related TV the first 4 days after the attack:  
 Strongly Disagree Disagree Neutral Agree Strongly Agree

During the 2 weeks following 9/11, I chose not to watch TV because I didn't want to see  
 more about 9/11:

Strongly Disagree Disagree Neutral Agree Strongly Agree

During the 2 weeks following 9/11, I watched a lot of TV to find out more information  
 about 9/11:

Strongly Disagree Disagree Neutral Agree Strongly Agree

During the 2 weeks following 9/11, I watched TV but not TV about 9/11: Strongly  
 Disagree Disagree Neutral Agree Strongly Agree

Did you participate in the rescue effort? Yes No

E. Results from thrown out data:

## RESULTS

### Demographics

The mean age of the participants was 39.91 ( $SD= 14.53$ ), with a minimum age of 19 and a maximum age of 76. About 61.4% of the participants were female and 38.6% were male. Most of the sample was Caucasian (82.9%), 4.3% were Black, 5.7% were Asian, 4.3% were Hispanic, 2.9% did not report race. More than half of the participants were married (55.7%), 5.7% were divorced, 2.9% were separated, 30% were single, 4.3% were widowed, and 1.4% did not report marital status. Almost half of the participants had a college education (40%), 21.4% had more than a college education, 21.4% had a High School education, 12.9% had some college education, and 4.3% did not report their education level.

### PTSD Symptoms and Closeness to the Towers

An ANOVA did not reveal a significant effect for closeness to the Towers and PTSD symptoms one week after 9/11,  $F(4, 60)= 1.42$ ,  $p < 0.24$ ,  $MSE= 412.74$ . An ANCOVA with neuroticism and extroversion covaried out did not reveal a significant effect for closeness,  $F(4, 58)= 1.99$ ,  $p < 0.11$ ,  $MSE= 393.96$ . It did reveal a significant effect for neuroticism,  $F(1, 58)= 39.08$ ,  $p < 0.01$ ,  $MSE= 5945.01$ .

An ANOVA did not reveal a significant effect for closeness to the Towers and PTSD symptoms 8-10 months after 9/11,  $F(4, 61)= 0.24$ ,  $p < 0.91$ ,  $MSE= 42.07$ . An ANCOVA with neuroticism and extroversion covaried out revealed that there was no significant effect for closeness to the Towers,  $F(4, 59)= 0.30$ ,  $p < 0.88$ ,  $MSE= 45.41$ . It showed a significant effect for neuroticism,  $F(1, 59)= 10.39$ ,  $p < 0.02$ ,  $MSE= 1587.54$ .

### PTSD Symptoms and Knowing Someone who Died

An ANOVA was run for PTSD symptoms one week after 9/11 and knowing someone who died in the tragedy. This ANOVA revealed that there was no significant effect,  $F(2, 65) = 1.97, p < 0.15, \text{MSE} = 582.17$ . An ANCOVA, covarying out neuroticism and extroversion revealed a significant effect for knowing someone who died 9/11 and PTSD symptoms one week afterwards,  $F(2, 63) = 4.25, p < 0.02, \text{MSE} = 899.42$ . It also showed a significant effect for neuroticism,  $F(1, 63) = 27.00, p < 0.01, \text{MSE} = 5713.38$ , such that people who scored higher on the neuroticism scale were more likely to report more frequent PTSD symptoms regardless of knowing someone who died in the tragedy.

An ANOVA was run on PTSD symptoms 8-10 months after 9/11 and knowing someone who died in the tragedy. This ANOVA did not reveal a significant effect,  $F(2, 66) = 1.03, p < 0.36, \text{MSE} = 164.86$ . When an ANCOVA was run and neuroticism and extroversion were covaried out there was no significant effect for knowing someone who died and PTSD symptoms 8-10 months after 9/11,  $F(2, 64) = 1.97, p < 0.15, \text{MSE} = 286.70$ . It also showed a significant effect for neuroticism,  $F(1, 64) = 8.37, p < 0.01, \text{MSE} = 1219.89$ .

#### PTSD Symptoms and Knowing Someone who was Injured

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and knowing someone who was injured on 9/11,  $F(2, 63) = 0.17, p < 0.17, \text{MSE} = 581.15$ . An ANCOVA with neuroticism and extroversion covaried out revealed a significant effect for knowing someone injured on 9/11,  $F(2, 61) = 4.07, p < 0.02, \text{MSE} = 899.54$ . It also revealed a significant effect for neuroticism,  $F(1, 61) = 26.08, p < 0.01, \text{MSE} = 5757.33$ , people who scored higher neuroticism scores were more likely to report more frequent PTSD symptoms.

An ANOVA did not reveal a significant effect for PTSD symptoms 8-10 months after 9/11 and knowing someone who was injured in the tragedy,  $F(2, 64) = 1.11$ ,  $p < 0.34$ ,  $MSE = 200.31$ . When an ANCOVA was run covarying out neuroticism and extroversion, it revealed no significant effect of knowing someone injured in the attack,  $F(2, 62) = 2.03$ ,  $p < 0.14$ ,  $MSE = 316.63$ . It also revealed a significant effect for neuroticism,  $F(1, 62) = 9.07$ ,  $p < 0.04$ ,  $MSE = 1415.24$ .

#### Drug Use Before and After 9/11

A paired t-test did not reveal a significant difference between drug use six months before and after 9/11 ( $p = 0.43$ ). Another paired t-test did not show a significant difference between regular alcohol use six months before or after 9/11 ( $p = 0.37$ ). The same result was found for heavy alcohol use ( $p = 0.30$ ) and tobacco use ( $p = 0.11$ ). These results suggest that substance use remained stable throughout the year.

#### PTSD Symptoms and Drug Use

A t-test revealed a significant effect for PTSD symptoms one week after 9/11 and drug use 6 months after 9/11 ( $p = 0.01$ ). A t-test also revealed a significant effect for PTSD symptoms 8-10 months after 9/11 and drug use 6 months after 9/11 ( $p = .01$ ). This implies that as frequency of PTSD symptoms increases, frequency of substance use increases.

#### PTSD Symptoms and Television Watching

Correlations were run on PTSD symptoms the week after 9/11 and amount of 9/11 TV watched. These correlations revealed no significant difference. Correlations for PTSD symptoms 8-10 months after 9/11 and amount of 9/11 TV watched also revealed no significant difference.

### PTSD Symptoms and Feelings of Life Endangerment

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and feeling as if one's life was in danger,  $F(4, 40) = 1.62$ ,  $p < 0.69$ ,  $MSE = 459.63$ .

An ANOVA did not reveal a significant effect for PTSD symptoms 8-10 months after 9/11 and feeling as if one's life was in danger,  $F(4, 41) = 0.09$ ,  $p < 0.99$ ,  $MSE = 15.87$ .

### PTSD Symptoms and Feeling Victimized

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and feeling victimized by the tragedy,  $F(4, 40) = 0.91$ ,  $p < 0.47$ ,  $MSE = 257.76$ . An ANOVA for PTSD symptoms 8-10 months after 9/11 and feeling victimized by the tragedy also did not reveal a significant effect,  $F(4, 41) = 2.25$ ,  $p < 0.08$ ,  $MSE = 397.82$ .

### PTSD Symptoms and Participating in the Rescue Effort

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and participating in the rescue effort,  $F(1, 40) = 0.16$ ,  $p < 0.69$ ,  $MSE = 44.93$ . An ANOVA for PTSD symptoms 8-10 months after 9/11 and feeling victimized by the tragedy also did not reveal a significant effect,  $F(1, 41) = 1.77$ ,  $p < 0.19$ ,  $MSE = 34.84$ .

### PTSD Symptoms and Watching the Towers Fall Live in Person

An ANOVA did reveal a significant effect for PTSD symptoms one week after 9/11 and watching the Towers fall live in person,  $F(1, 62) = 3.83$ ,  $p < 0.06$ ,  $MSE = 1149.45$ , such that people who did not see the Towers fall live in person had more frequent PTSD symptoms. An ANOVA for PTSD symptoms 8-10 months after 9/11 and watching the Towers fall live in person did not reveal a significant effect,  $F(1, 63) = 2.23$ ,  $p < 0.14$ ,  $MSE = 335.99$ .

### PTSD Symptoms and Watching the Towers Fall Live on Television

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and watching the Towers fall live on television,  $F(1, 62) = 0.39$ ,  $p < 0.54$ ,  $MSE = 116.96$ . An ANOVA for PTSD symptoms 8-10 months after 9/11 and watching the Towers fall live on television also did not reveal a significant effect,  $F(1, 63) = 1.50$ ,  $p < 0.23$ ,  $MSE = 225.54$ .

#### PTSD Symptoms and Being Injured

An ANOVA did not reveal a significant effect for PTSD symptoms one week after 9/11 and being injured in the attack,  $F(1, 62) = 1.86$ ,  $p < 0.18$ ,  $MSE = 599.53$ . An ANOVA for PTSD symptoms 8-10 months after 9/11 and being injured in the attack did reveal a significant effect,  $F(1, 63) = 3.96$ ,  $p < 0.02$ ,  $MSE = 898.00$ .

#### Gender Differences

An individual t-test did not reveal a significant difference for gender and drug use six months after 9/11 ( $p = .360$ ). An independent t-test did not show a significant difference for gender and PTSD symptoms one week after 9/11 ( $p = .612$ ). An independent t-test also did not indicate that there was a significant difference for gender and PTSD symptoms 8-10 months after 9/11 ( $p = .165$ ).