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A Comparative Analysis of the Memory Functioning of Stress-Exposed Youth With and Without Posttraumatic Stress Disorder

by

Anastasia Elizabeth Yasik

A dissertation submitted to the Graduate Faculty in Educational Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1998

This manuscript has been read and accepted for the Graduate Faculty in Educational Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

A Comparative Analysis of the Memory Functioning of Stress-Exposed Youth With and Without Posttraumatic Stress Disorder

by

Anastasia Elizabeth Yasik

Advisor: Professor Philip A. Saigh

This study compared the Wide Range Assessment of Memory and Learning (WRAML) scores of urban youth with PTSD to the WRAML scores of stress-exposed urban youth without PTSD. A total of 131 youths were referred from Bellevue Hospital clinics subsequent to exposure to a variety of traumatic events (e.g., physical assaults, sexual assaults, motor vehicle accidents, fires). Youth with a positive history for child abuse or neglect were excluded. In order to control for the potentially confounding effects of comorbidity, youth meeting criteria for ADHD, conduct disorder, major depression, substance dependence, and schizophrenia were excluded. Similarly, youth with a documented head trauma, use of psychopharmacological agents, or mental retardation were also excluded. This process led to the identification of 16 youth with PTSD and 19 youth without PTSD. Statistical analyses revealed that there were no significant

differences between comparison groups with regard to gender, ethnicity, age, and SES.

Separate ANOVAs for the four WRAML Index scores were performed. These analyses revealed significant group differences on the General Memory and Verbal Memory Indexes. Youth with PTSD scored significantly lower on the General Memory and Verbal Memory Indexes compared to stress-exposed youth without PTSD. Whereas statistically significant differences were not observed on the Visual Memory and Learning Indexes, clinically significant impairment on these Indexes was observed among youth with PTSD. Finally, three separate MANOVAs were performed to examine for group differences across the WRAML subtests. These analyses failed to reveal significant group differences across the nine WRAML subtests. As such, this study indicates that PTSD is associated with discrete patterns of memory impairment in youth. A discussion of the observed results with reference given to clinical and theoretical implications is presented. Finally, the potential limitations with reference given to implications for future research are addressed.

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Table of Contents

List of Tables

List of Figures

Chapter 1

History of Posttraumatic Stress Disorder

Throughout the centuries individuals have been subjected to numerous forms of stressful experiences such as accidents, wars, natural as well as industrial disasters, and criminal victimization. Prior to the establishment of posttraumatic stress disorder (PTSD) as a diagnostic classification by the American Psychiatric Association (APA) in 1980, a number of authors chronicled the emotional effects of exposure to major stressors. One of the earliest records denoting the emotional effects of stress exposure can be found in the 1667 diary of Samuel Pepys. In this autobiographical account, Pepys writes of the difficulties he experienced six months after witnessing the Great Fire of London. Pepys remarked that

> it is strange to think how to this very day I cannot sleep a night without great terrors of the fire; and this very night could not sleep to almost two in the morning through great terrors of the fire (quoted in Daly, 1983, p. 66).

With the onset of World Wars I and II, an increased number of individuals were exposed to traumatic incidents. In World War I,

terms such as "shell shock" and "soldier's heart" were utilized to describe the consequences of military conflict (Davidson, 1996). In his text Shell-Shock and Other Neuropsychiatric Problems, Ernest Southard (1919) presented over 500 case histories of men experiencing various emotional consequences of war-related traumas. For example, in one case study a 28-year-old infantry sergeant reported that "Shells dropped on the dug-out and killed the other chaps. I have not slept properly since this. If I go to sleep, I wake up seeing people killed, shells dropping and all kinds of horrid dreams about the war" (Southard, 1919, p. 446). In addition, the sergeant presented with a strong startle reaction as he was said to "jump at the least sound" (Southard, 1919, p. 446).

It is of interest to note that reference to the psychiatric morbidity evidenced by children exposed to criminal victimization was also reported prior to the Second World War. Bender and Blau (1937) examined sixteen children at the Children's Ward of the Psychiatric Division of Bellevue Hospital who had had sexual relations with adults. The authors made specific reference to feelings of fear, avoidance, irritability, nightmares, trauma reminiscent re-enactments, and hypervigilance. In some cases,

academic impairment was also indicated. For example, Bender and Blau (1937) reported that a nine year old black female's "scholastic achievements became so backward that she was placed in an ungraded class for children of defective intelligence" (p. 505).

In Men Under Stress, Grinker and Spiegel (1945) presented a series of clinical case studies that exhibited neurotic reactions to combat stress. The case of a 23-year-old fighter bomber pilot who narrowly escaped death on two occasions is descriptive of these reactions. Grinker and Spiegel (1945) reported that

> he pulled out of his dive too low and his plane was caught in the explosion of his own bomb. The concussion wave tossed up his plane, which was also hit and partially disabled.....While strafing an enemy troop concentration in a narrow valley, he became so intent on demolishing all the men and vehicles in the area that he did not notice the mountain looming up in his line of flight....He brought back his aircraft from the mission without difficulty but now was seriously upset.....He would lie awake at night, tense and anxious, and think about flying. He kept seeing the mountain suddenly flash in front of his field of vision. If he fell asleep, he dreamed that his plane had been disabled and was falling, and that, although he struggled in terror, he could not get out of it. During the day, when he was at leisure, it was impossible to relax. He stopped playing cards with his friends because he could not concentrate (pp. 86-87).

Whereas a great majority of literature during World War II recorded the symptoms of adults exposed to war-related stressors

(Saigh, 1992), several researchers (e.g., Bodman, 1941; Mercer & Despert, 1943) examined the psychiatric morbidity of children who were exposed to comparable stressors. In 1941, Frank Bodman, the Deputy Director of the Bristol Child Guidance Clinic, reported on the findings of a survey examining the incidence of "strain" following the British air-raids on 8,000 British school children ranging in age from five to fourteen years. It was observed that 4% presented with psychological (e.g., nightmares, war-related fears, psycho-physiological reactivity, avoidance, aggressive behaviors) or psychosomatic (e.g., headaches, enuresis, encopresis, indigestion) symptoms. Given that this survey was conducted during a time when raids were still occurring, Bodman conducted a follow-up study with 54 children (age range 2 months to 12 years) who had been evacuated from the Children's Hospital in Bristol. According to Bodman (1941), "soldiers were crunching through a litter of broken glass, fallen plaster, and blown-in black-out material, picking children out of cots and beds and, tucking them under their arms, running down the steps and dumping them pell-mell into the lorry" (p. 486). Up to two months later, 61% of these children showed symptoms that were attributed to the raids. Eleven percent evidenced symptoms seven

months afterwards. Shortly thereafter, Mercer and Despert (1943) examined the effects of the war on French children. These children were reported to suffer from increased heart rate, enuresis, nightmares, trauma-related recollections, memory impairment, and academic impairment.

Following the war, Carey-Trefzer (1949) followed 1,203 British school children who were exposed to war-related stressors such as air-raids, evacuation, change in family life, loss of schooling, and housing problems. Of these, 212 (17.6% of the sample) presented with "disturbances caused or aggravated by war experiences" (Carey-Trefzer, 1949, p. 556). Symptoms included irritability, concentration impairment, memory impairment, sleep disturbance, and avoidance behaviors. In addition, 30.6% of the affected youth experienced academic difficulties. Carey-Trefzer (1949) concluded that these impairments reflect "the degree to which emotional disturbances affect the capacity to learn" (p. 546).

Analogously, concentration and memory impairments in adults were chronicled within this period. In 1947, Wolf and Ripley examined 35 POWs who experienced trauma-related nightmares, blunted affect, irritability, psychosomatic symptoms, and difficulty

in thinking. Psychological assessment of a 35-year-old private in the Dutch Army indicated "defects predominantly in tests of memory, retention, and reasoning" (Wolf & Ripley, 1947, p. 189). Similarly, Etinger (1951) examined 227 Norwegian survivors of German concentration camps. Seventy-six percent of the survivors evidenced "impairment in memory, especially of recent events, impairment in the ability to concentrate, concreteness and poverty of thought and ideas" (Etinger, 1951, p. 141).

Bloch, Silber, and Perry (1956) explored the emotional reactions of 185 students attending a public school in Mississippi. On Saturday December 5, 1953, these youth were exposed to extreme stress when a tornado hit their community causing considerable damage. Forty-seven youth (25.4% of the sample) presented with mild to severe symptoms related to the tornado. Symptoms included trauma specific re-enactments (e.g., tornado games), irritability, hypervigilance, avoidance, and enuresis.

In 1970 Thygesen, Hermann, and Willanger described the results of a 23-year follow-up study which involved concentration camp survivors. One of the groups studied consisted of 312 former members of the Danish resistance movement. These individuals

reportedly had been experiencing difficulties in social readjustment due to health-related problems. Of these individuals, 59%, 85%, 64%, 20%, 49%, 56%, and 87% respectively presented with depressed mood, lability of affect, sleep disturbances, hypersensitivity to noise, nightmares, deterioration of concentration, and deterioration of memory. Thygesen et al. also observed that "memory of past events may well be intact, the difficulty arises in retention of new things" (1970, p. 84). In an effort to control for the potentially confounding effects related to the significant health-related problems noted above, the learning and retention of 52 former POWs who had not filed for compensation was assessed through a series of digit span, digit-learning, and word-pair tasks. Significant subaverage performance on measures of memory and concentration were observed among 44 of the subjects (84.6% of the sample).

Diagnostic Classification of Stress Reactions

Historically, the German nosologist Emil Kraepelin (1896) was the first mental health practitioner to effectively classify psychological disorders. As in the classification of medical conditions, Kraeplin's system outlined in his Textbook of Psychiatry was based on observed presenting symptoms (Sue, Sue, & Sue, 1990).

Within this context, Kraepelin utilized the term *Schrecneuroses* (i.e., fright neuroses) to refer to a clinical disorder characterized by "multiple nervous and psychic phenomena" that were evidenced "after accidents and injuries, particularly fires, railway derailments or collisions" (translated by Jablensky, 1985, p. 737).

In the postwar years, psychological trauma was recognized as a legitimate mental condition and the mental health needs of patients (especially war veterans) became the focus of greater attention. The US Veteran's Administration as well as other agencies began to treat stress-exposed veterans with emotional problems (Davidson, 1996; Saigh, 1998). Given the above, the APA listed gross stress reaction as a psychiatric diagnosis in the first edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-I; APA, 1952). Gross stress reaction was divided into civilian and combat subtypes evidenced after "severe physical demands or extreme stress, such as in combat or civilian catastrophe (fire, earthquake, explosion, etc.)" (APA, 1952, p. 40).

However, gross stress reaction was replaced by transient situational disturbance in the DSM-II (APA, 1968). This diagnosis was indicated "for more or less transient disorders of any severity

(including those of psychotic proportions) that occur in individuals without any apparent underlying mental disorders and that represent an acute reaction to overwhelming environmental stress" (APA, 1968, p. 48). If the disorder persisted following the removal of the stressor the diagnosis of adjustment reaction of childhood, adolescence, or adult life was indicated.

In 1974, Burgess and Holstrom used the term rape trauma syndrome to describe the development of characteristic symptoms experienced by women who had been sexually assaulted. Symptoms were based on self- reports by 92 adult women who were the victims of forcible rapes. Rape trauma syndrome was conceptualized as involving an acute and a long-term phase. The acute phase was characterized by physical trauma (e.g., general soreness, bruising), skeletal muscle tension, gastrointestinal irritability, genitourinary disturbance, and a wide range of emotional reactions (e.g., fear, humiliation, anger, self-blame). The long-term phase which typically began two to three weeks after the event included increased motor activity, nightmares, and development of phobias related to traumatic stimuli (e.g., sexual fears).

Given the limited coverage, lack of operational criteria, and

low reliability of the DSM-II diagnostic categories, the APA reformulated the manual and published the DSM-III in 1980 (Morey, Skinner, & Blashfield, 1986; Saigh, 1992). Revisions by the DSM-III Task Force provided specific diagnostic criteria to enhance the reliability of diagnostic classifications. The diagnostic category of posttraumatic stress disorder (PTSD) was introduced in the DSM-III. According to the DSM-III, PTSD could be diagnosed given the "development of characteristic symptoms following a psychologically traumatic event that is generally outside the range of usual human experience" (APA, 1980, p. 236). The characteristic symptoms for posttraumatic stress disorder included reexperiencing symptoms of the trauma, numbing/avoidance symptoms, and miscellaneous symptoms (e.g., sleep disturbance, guilt about surviving, memory or concentration impairment) (APA, 1980).

Despite the acceptability of the DSM-III to mental health practitioners, data began to emerge shortly after its publication in 1980 suggesting inconsistencies among a number of diagnostic sets. As such, revisions were initiated in 1983 and the DSM-III-R was published in 1987. Revisions addressed the consistency, clarity, and conceptual accuracy of the diagnostic criteria and systematic

descriptions of various disorders. While maintaining the diagnostic symptoms of PTSD as specified in the DSM-III, the DSM-III-R reorganized symptoms into three polymorphic symptom clusters: reexperiencing, numbing/avoidance, and psychophysiogical reactivity. In addition, specific reference to the development of PTSD in children was indicated.

Given that the diagnostic criteria that appeared in the DSM-III and DSM-III-R for the PTSD classification were intuitively established (i.e., data based field trials were not conducted), the DSM-IV work group for PTSD employed clinical and community based field trials (sponsored by the National Institute of Mental Health), an extensive review of the literature, and consideration of the outcomes of case-control research in deriving the diagnostic criteria for PTSD. According to the DSM-IV, PTSD is manifested by the development of characteristic symptoms following exposure to "an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others" (APA, 1994, p. 428). An additional diagnostic indicator introduced in the DSM-IV specifies that the disturbance causes clinically significant impairment in important areas of functioning

(e.g, academic impairment) (Saigh, Green, & Korol, 1996). The DSM-IV criteria for PTSD are presented in Table 1.

Table 1

DSM-IV Diagnostic Criteria for Posttraumatic Stress Disorder

A. The person has been exposed to a traumatic event in which both of the following were present:

(1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others

(2) the person's response involved intense fear, helplessness, or horror. **Note:** In children, this may be expressed instead bydisorganized or agitated behavior

B. The traumatic event is persistently reexperienced in one (or more) of the following ways:

(1) recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. **Note:** In young children, repetitive play may occur in which themes or aspects of the trauma are expressed.

Table 1 (cont.)

(2) recurrent and distressing dreams of the event. **Note:** In children, there may be frightening dreams without recognizable content.

(3) acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). **Note:** In young children trauma-specific reenactment may occur.

(4) intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event

(5) physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event

C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:

(1) efforts to avoid thoughts, feelings, or conversations associated with the trauma

Table 1 (cont.)

(2) efforts to avoid activities, places, or people that arouse recollections of the trauma

(3) inability to recall an important aspect of the trauma

(4) markedly diminished interest or participation in significant activities

(5) feeling of detachment or estrangement from others

(6) restricted range of affect (e.g., unable to have loving feelings)

(7) sense of foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)

D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following:

(1) difficulty falling or staying asleep

(2) irritability or outbursts of anger

(3) difficulty concentrating

(4) hypervigilance

(5) exaggerated startle response

E. Duration of the disturbance (symptoms in Criteria B, C, and D) is more than 1 month.

Table 1 (cont.)

F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:

Acute: if duration of symptoms is less than 3 months

Chronic: if duration of symptoms is 3 months or more

Specify if:

With Delayed Onset: if onset of symptoms is at least 6 months after the stressor

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Note: Criteria from the American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). Washington, DC: American Psychiatric Association. Reprinted with permission (see Appendix A).

Summary

Historically, it may be stated that children, adolescents, and adults exposed to extreme stress evidenced considerable psychiatric morbidity (e.g., hypervigilance, avoidance behavior, trauma-related recollections, intrusive thoughts, academic impairments, cognitive impairments). Inasmuch as a host of clinicians examined individuals

presenting with such symptomology, a number of different terms emerged to describe the psychological consequences of exposure to extreme stress. Although the DSM-III recognized PTSD as a clinical disorder in 1980, reference to the expression of symptoms in children or adolescents was not included in the diagnostic criteria. While the DSM-III-R made specific reference to the presentation of PTSD in youth, empirical evidence to substantiate revisions was not provided. Although the DSM-IV revisions were based on empirical field trials, it is of considerable importance to note that the DSM-IV PTSD field trial did not involve youth below the age of 15 years (Kilpatrick et al., in press). Indeed, relatively little is known about the expression of PTSD in youth (Saigh, 1998).

Chapter 2

Epidemiology of Child-Adolescent Posttraumatic Stress Disorder

Prevalence of Stress-Exposure

According to Saigh (1996), it is surprising that the publication frequencies regarding child-adolescent PTSD are limited given the prevalence of stress-exposure among American youth. Although juveniles accounted for one-tenth of the US population, one in four violent crimes involved a juvenile victim in 1992 (United States Department of Justice, 1994). Furthermore, approximately one-and-a-half-million youth ranging in age from 12 to 17 years were assaulted, robbed, or raped in 1992. Approximately 932 children were injured in motor vehicle crashes during each day of the 1995 calendar year (United States Department of Transportation, 1996). Analogously, over 8 million youth under the age of 15 made injury-related visits to hospital emergency rooms during 1992 (Burt, 1995).

With respect to survey research, Bell and Jenkins (1993) examined 536 students (age range 7 to 10 years) from three inner-city Chicago schools. Of these youth, 78%, 30%, and 26% reported

that they had witnessed a beating, stabbing, and shooting respectively. Similarly, 1,011 students from four high schools and two middle schools were surveyed. It was reported that 34.6%, 39.4%, and 23.5% respectively witnessed a stabbing, shooting, and killing. Of considerable importance is the degree to which these students were directly victimized. Youth reported being shot at (10.9%), threatened with a knife (22.7%) or gun (17%), stabbed (4.3%), shot (3.2%), and sexually assaulted (2.5%).

Given that young people are exposed to criminal violence and injury at inordinately high rates, it is important to understand that individuals who experience extreme stress may develop PTSD. Examined from the perspective of community sampling research, Giaconia and colleagues (1995) conducted the only investigation to determine the prevalence of PTSD among a community-based sample of youth. Their sample consisted of 386 adolescents who were participants in a longitudinal study from 1977 to 1990 (from the ages of 5 to 18 years). Administration of the NIMH Diagnostic Interview Schedule (Robins, Helzer, Cottler, & Goldring, 1989) revealed that 24 adolescents (6.3% of the total sample) met DSM-III-R criteria for PTSD. Of the 165 youth who had experienced a

qualifying stressor, 14.5% had PTSD.

Whereas community data regarding the prevalence of PTSD among school-age populations has not been extensively examined, information relative to the prevalence of PTSD among traumatized youth has been systematically documented (Saigh et al., 1996). While the great majority of literature dealing with PTSD in adults has involved war-related studies, no single stressor has emerged to unify the study of child-adolescent PTSD (Foy, Madvig, Pynoos, & Camilleri, 1996). To date, researchers have examined the prevalence of PTSD among children and adolescents who were exposed to war-related stressors, criminal victimization (e.g., shooting, physical assault, sexual assault), as well as natural and industrial disasters. As such, this section will present an overview of the epidemiological data regarding PTSD in youth who have been exposed to the aforementioned stressors.

War-Related Studies

Within the context of the Cambodian conflict, a number of researchers (Kinzie, Sack, Angell, Clarke, & Ben, 1989; Kinzie, Sack, Angell, Manson, & Ben, 1986; Realmuto et al., 1992; Sack et al., 1994; Savin, Sack, Clarke, Meas, & Richart, 1996) have described the

psychiatric morbidity of Cambodian adolescents who emigrated to the United States after being exposed to extreme stress in Cambodia. Kinzie et al. (1986) administered the DSM-III version of the Diagnostic Interview Schedule (DIS; Robbins, Helzer, Croughan, & Ratcliff, 1981) to 40 Cambodian students and observed a PTSD point prevalence of 50%. Three years later, 27 of the original 40 youth were re-assessed (Kinzie et al., 1989). Of these youth, 13 (48%) met criteria for PTSD as measured by the DSM-III-R version of the DIS.

Similarly, Realmuto et al. (1992) administered the DSM-III-R version of the Reaction Index (Pynoos et al., 1987) to 47 Cambodian adolescents that were residing in Minnesota. Realmuto and his colleagues reported a PTSD point prevalence of 37%. Analogously, Hubbard, Realmuto, Northwood, and Masten (1995) administered the DSM-III-R version of the Structured Clinical Interview for the DSM (SCID; Spitzer & Williams, 1986) to 59 Cambodian refugees. The authors reported a 24% point prevalence and a 59% lifetime prevalence of PTSD.

In an effort to examine the long-term consequences of war-related traumas, Sack and colleagues (1994) administered the DSM-III-R version of the DICA to 209 Khmer adolescents residing in the

United States (13 years after stress-exposure). A PTSD point prevalence of 18.2% and lifetime prevalence of 21.5% were observed. Whereas older subjects were more likely to receive a PTSD diagnosis, PTSD was not diagnosed among subjects who were too young to recall the traumatic experiences.

Within the context of the Lebanese conflict, Saigh (1988) administered the Children's PTSD Inventory (Saigh, 1989b) to 92 Lebanese adolescents. Of this sample, 27 youth (29.3%) presented with symptoms warranting a diagnosis of PTSD. In a similar vein, Saigh (1989c) administered the Children's PTSD Inventory to 840 pre-adolescent Lebanese youth and observed a PTSD point prevalence of 32.5%.

More recently, Saigh, Mroueh, and Bremner (1997) examined the prevalence of PTSD among 95 non-referred Lebanese adolescents that were enrolled in six Lebanese secondary schools. The authors administered the Children's PTSD Inventory and the DSM-III-R Severity of Psychological Stress Scale: Children and Adolescents (APA, 1987) to these youth and determined that 30 subjects had been exposed to extreme war-related stress (mean interval between exposure and assessment was 4.2 years). Fourteen adolescents met

DSM-III criteria for PTSD representing 46.7% of the subjects that were exposed to extreme stress or 14.7% of the entire subject pool.

Criminal Victimization Studies

Pynoos and his colleagues (1987) conducted an analysis of the emotional morbidity of youth following a California school shooting incident. "On February 24, 1984, a sniper began firing from a second-story window across the street from an elementary school. He shot repeated rounds of high-powered ammunition at children on the playground" (Pynoos et al., 1987, p. 1058). During this incident the sniper who was armed with a semiautomatic weapon and two shotguns killed one child, wounded a staff member, and injured 13 children who were at the school playground. The prevalence of PTSD was assessed one (Pynoos et al., 1987) and fourteen (Nader, Pynoos, Fairbanks, & Frederick, 1990) months after the sniper attack. Children with varying degrees of exposure to the attack (i.e., on the playground, in the school, at home, or on vacation) were interviewed using the DSM-III version of the PTSD-Reaction Index. One month following the incident, 159 children were interviewed and 60.4% met criteria for PTSD (Pynoos et al., 1987). Fourteen months after the assault, Nader et al. (1990) interviewed 100 children and

observed PTSD among 29% of the sample. Non-significant effects for gender, age, and ethnicity were reported.

Pynoos et al. (1987) reported that the prevalence of PTSD was positively associated with the degree of stress-exposure. Of the children who were directly exposed to the incident, 94.3% had PTSD. In contrast, 88.9%, 44.2%, and 45.1% of the children who were respectively within the school building, at home, and on vacation met criteria for PTSD (Pynoos et al., 1987).

A similar traumatic incident occurred in 1988 when a woman with a psychiatric history opened fire on Chicago elementary school students. In the course of the assault, she killed a child and wounded six others. Posttrauma assessments of 64 children were effected by Schwarz and Kowalski (1991) eight to fourteen months following the shooting. In this instance the Reaction Index was used to effect DSM-III, DSM-III-R, and DSM-IV PTSD diagnoses. Conservative estimates indicated that 16% met DSM-III criteria, 8% met DSM-III-R criteria, and 9% met the anticipated DSM-IV criteria for PTSD.

While the aforementioned traumatic incidents appear to be isolated occurrences, it is important to recall that exposure to

violence is a common phenomenon within urban settings throughout the United States. In view of this, researchers have attempted to assess the development of PTSD among stress-exposed urban youth (Burton, Foy, Bwanausi, Johnson, & Moore, 1994; Fitzpatrick & Boldizar, 1993; Horowitz, Weine, & Jekel, 1995; Pennoyer & Ellenhorn, 1995). For example, Fitzpatrick and Boldizar (1993) administered the DSM-III-R version of the Post-Traumatic Stress Scale (Figley, 1989) to 221 African-American youth. Of these, approximately 85% witnessed and 70% personally experienced at least one violent act. Fifty-four subjects, or 27.1% of the sample, presented with symptoms warranting a PTSD diagnosis. Female gender was associated with a higher prevalence of PTSD.

A more recent study by Pennoyer and Ellenhorn (1995) examined 134 adolescents from two New York City public schools. Utilizing the DISC 2.4 PTSD module (Fisher, 1994) to formulate DSM-III-R PTSD diagnoses, 24% of the subjects were identified as meeting criteria for PTSD. While total community violence, witnessing violence, personal victimization, and victimization of family/friends were related to a diagnosis of PTSD, exposure to community violence was the strongest predictor of a subsequent

diagnosis. A nonsignificant relationship between PTSD and gender was reported.

In a related study, Burton et al. (1994) administered the DSM-III-R Symptom Checklist to 91 incarcerated male juvenile offenders who had been exposed to violent events. Twenty-four percent of the youth presented with PTSD. It is of interest to note that increased exposure (determined by the number of different violent events that were experienced) was significantly associated with a diagnosis of PTSD. The authors also reported that age, ethnicity, socioeconomic status, and gang membership were not predictive of PTSD status.

In a similar vein, Horowitz et al. (1995) interviewed 79 urban adolescent females and determined that 44.7%, 28.9%, and 82.9% had respectively seen someone shot, stabbed, or beaten. In addition, 10.5%, 11.8%, 27.6%, and 11.8% of the subjects reported being the victims of a shooting, stabbing, beating, or forced unwanted sexual contact. Sixty-seven percent of the subjects met DSM-III-R criteria for PTSD as measured by the PTSD Symptoms Scale (Foa et al., 1993). Increased exposure to trauma was related to the development of PTSD.

In a different context, McLeer, Deblinger, Atkins, Foa, and

Ralphe (1988) administered an author-devised DSM-III-R PTSD symptom checklist to a sample of sexually abused children and adolescents. Thirty-one subjects from a university-based outpatient psychiatric unit were interviewed. Of these, 12 were abused by their fathers, 8 were abused by a trusted adult, 6 were abused by an older child and 3 were abused by a stranger. In addition, one youth was abused by more than one perpetrator and one was abused by an unidentified perpetrator. Overall, 48.4% of the sample met criteria for PTSD. Seventy-five percent of those abused by a father, 25% of those abused by a trusted adult, 66.7% of those abused by a stranger, and 0% of those abused by an older child met criteria for PTSD. More recently, McCleer, Callaghan, Henry, and Wallen (1994) administered the K-SADS-E to 26 sexually abused children and found that 11 (42.3%) of these youth met criteria for PTSD.

Deblinger, McLeer, Atkins, Ralphe, and Foa (1989) administered an author devised DSM-III-R PTSD checklist to 58 youth who attended a university based child-adolescent inpatient psychiatric unit. The subject pool consisted of 29 physically abused and 29 sexually abused children. An overall PTSD point prevalence of 13.8% was reported. Deblinger and her colleagues reported that 20.7% and

6.9% of the respective sexually and physically abused cohorts met criteria for PTSD.

Also within the context of child abuse research, Merry and Andrews (1994) conducted an assessment of sexually abused youth that were recruited from child welfare agencies in New Zealand. The DSM-III-R version of the Diagnostic Interview Schedule for Children-2 (DISC-2; Shaffer, Fisher, Piacenti, Schwab-Stone, & Wicks, 1989) was administered to 66 children three to six months after stress exposure. In terms of PTSD prevalence, Merry and Andrews reported that 18.2% of their sample had PTSD.

In the only study involving preschool youth, Diamond, Saigh, and Fairbank (in press) administered the DSM-III Children's PTSD Inventory to 24 documented or suspected cases of physical abuse as denoted by the New York Social Services Law. Seventeen children or 70.8% of the referred youth met criteria for PTSD on two separate administrations of the Children's PTSD Inventory.

Disaster/Accident Studies

A number of researchers have examined the emotional morbidity that may occur after natural disasters such as earthquakes and hurricanes. For example, Bradburn (1991)

administered the DSM-III-R Reaction Index to 22 children six to eight months after the Loma Prieta, California earthquake. The authors went on to determine that 63% of the subjects met criteria for PTSD.

One and one-half years after the 1988 Armenian earthquake, Goenjian et al. (1995) administered the DSM-III-R Reaction Index to 218 youth who resided in three cities that were located at varying distances from the epicenter of the earthquake. The first cohort lived in Spitak, a city very near the epicenter that was virtually destroyed. In terms of traumatic stressors, 14% lost a parent, 25% lost a nuclear family member, and 90% experienced the loss of their homes. The second cohort resided in Gumri, a city 20 miles from the epicenter. In this instance 16% reportedly lost a parent, 31% lost a nuclear family member, and 76% lost their homes. The third cohort resided in Yerevan, a city 47 miles from the epicenter. These subjects were exposed to less traumatic events as none of them lost a parent, nuclear family member, or their homes. Of the combined sample, 65.1% met DSM-III-R criteria for PTSD. Although the youth from Spitak and Gumri reportedly experienced approximately similar percentages of parental and nuclear family member loss, Goenjian

and his colleagues reported that 95%, 71%, and 26% of the respective cohorts met criteria for PTSD.

Two and one-half years after the same earthquake, Najarian, Goenjian, Pelcovitz, Mandel, and Najarian (1996) conducted a similar study wherein the DSM-III-R DICA-R-A (Kaplan & Reich, 1991) was administered to three groups of children. The first group continuously resided in the city of Gumri. The second group were residents of Gumri that were relocated with their families to the less damaged city of Yerevan. The third group consisted of subjects who were permanent residents of Yerevan. Najarian and his colleagues determined that 30.6% of the current and former residents of Gumri met criteria for PTSD. It was also reported that only one of the Yerevan subjects (4% of the sample) had PTSD.

Shannon, Christopher, Lonigan, Finch, and Taylor (1994) administered the DSM-III-R version of the Reaction Index to 5,687 school children three months after Hurricane Hugo struck Berkeley County, South Carolina. Shannon et al. reported a 5.4% overall PTSD point prevalence. They also reported that females had significantly higher rates of PTSD (6.9%) than males (3.8%). In addition, younger children were at significantly greater risk for PTSD.

Similarly, Garrison, Weinrich, Hardin, Weinrich, and Wang (1993) administered an author developed DSM-III-R PTSD inventory to 1,264 adolescent students one year after Hurricane Hugo. Garrison and her colleagues determined that 11% of the subjects were not with their parents when the hurricane struck, 12% had to move out of their homes for at least a week, 4% had someone close to them injured during the storm, 10% were physically injured, and 71% experienced fear of injury during the hurricane. Despite these levels of stress-exposure, Garrison et al. reported a relatively modest PTSD prevalence rate of 5%. The authors also indicated that PTSD was significantly associated with female gender, a history of earlier exposure to extreme stress (i.e, abuse or assault), and being white.

Green and her colleagues conducted two investigations examining the point prevalence of PTSD among children who were exposed to a flood in West Virginia. Green et al. (1991) reanalyzed data that had been previously collected after the Buffalo Creek dam collapse. Green and her colleagues reviewed the case files (recorded two years after the incident) of 179 children and estimated that 32% of the overall sample met "probable" criteria for PTSD.

"Probable" diagnoses were effected as PTSD was not recognized as a psychiatric disorder when the data were collected. A higher frequency of PTSD was associated with female gender and a lower frequency was observed among younger subjects (age range 2 to 7 years) as compared to the older youth (age range 8 to 15 years).

Green and her colleagues (1994) went on to effect a 17-year retrospective analysis involving 99 (or 55.3%) of the original subjects whose ages ranged from 2-15 years when the dam collapsed. The DSM-III-R version of the SCID was used to assess lifetime and current morbidity. The investigators observed that 32% of the sample met full criteria for PTSD at some time during their lives and 7% continued to meet criteria for the condition. The observed point prevalence of PTSD among the Buffalo Creek subjects was not significantly different from the PTSD rate in a demographically matched cohort that was not exposed to the flood.

McFarlane (1987) conducted a longitudinal assessment of 808 Australian children who were exposed to a brush fire. In terms of reported exposure to traumatic events, 32% had sustained property damage; 25% of the fathers, 13% of the mothers, and 8% of the children had an intense exposure to the fire or came close to death;

27% were bereaved, and 25% of the children had been separated from their parents for up to three days after the fire. Modified DSM-III adaptations of Rutter's Parent Questionnaire (Rutter, Tizard, & Whitmore, 1970) and Teacher Questionnaire (Rutter & Graham, 1967) were administered 8 and 26 months after the fire. Parental ratings indicated PTSD point prevalence estimates of 52.8% and 57.2% during the first and second assessments respectively. Teacher ratings that were made during the same intervals denoted PTSD prevalence estimates of 29.5% and 26.3%.

Stoddard, Norman, and Murphy (1989) administered the child and parent versions of the DSM-III based DICA (Herjanic & Reich, 1982) to 30 pediatric burn victims. All of the subjects were electively hospitalized at a pediatric burn center for reconstructive surgery. Stoddard and his colleagues reported that the mean interval between burn injury and data collection was 8.9 years. Using a consensual diagnosis model that was based on child and parent DICA interviews as well as clinical interviews, Stoddard et al. reported a lifetime PTSD prevalence of 53.3% and a point prevalence of 6.7%.

With regard to accident research, Milgram, Toubiana, Klingman, Raviv, and Goldstein (1988) administered a Hebrew version of the

DSM-III Reaction Index to 410 Israeli seventh graders one week and 9 months after a catastrophic school bus accident. During the accident one of several buses that were on route to an outing was struck by a train. The accident claimed the lives of 19 children and 3 adults. Milgram and his colleagues examined 108 youth who witnessed the catastrophic aftermath of the accident from an accompanying school bus as well as 302 children that were on buses that had been stopped and diverted to the school. One week after the incident, an overall point prevalence of 57.1% was observed. The authors determined that 52.0% of the students who were at the scene of the accident and 58.6% of the students that were on the diverted buses had acute PTSD. Eight months later, 19.7% of the combined subjects evidenced PTSD.

Comorbidity of PTSD with other Psychiatric Disorders

With respect to psychiatric diagnoses, comorbidity refers to the co-occurrence of two or more psychiatric conditions in the same individual. Whereas information relative to comorbidity could have implications relevant to understanding the etiology, course, and treatment of PTSD (Fairbank, Schlenger, Saigh, & Davidson, 1995; Saigh, Yasik, Sack, & Koplewicz, in press), a number of studies to

date have examined the prevalence of comorbid conditions (e.g., substance abuse, major depression, and anxiety disorders) in adult patients with PTSD (Kulka et al., 1990). Considerably fewer studies have reported on the prevalence of comorbid conditions (e.g., attention deficit hyperactivity disorder (ADHD), conduct disorder (CD), and major depression) among children and adolescents with PTSD. Saigh et al. (in press) reported that only 17.6% of the 51 child-adolescent PTSD studies that they reviewed utilized structured clinical interviews to determine the prevalence of comorbid psychiatric diagnoses among youth with PTSD.

Kinzie and his colleagues (1986) administered the Schedule for Affective Disorders and Schizophrenia (SADS; Spitzer & Endicott, 1979) to Cambodian youth and determined that 85% met criteria for PTSD and unspecified affective disorders. Kinzie et al. (1986) also reported that 15% had panic disorder and 35% had unspecified anxiety disorders. Significantly, none of the subjects received a positive diagnosis for schizophrenia, drug or alcohol abuse, or antisocial conduct. Kinzie et al. (1989) also utilized the SADS and determined that 76.9% of the Cambodian subjects who meet criteria for PTSD also met criteria for an affective disorder. Comorbid panic

disorder was observed among 7.7% of the sample.

Sack et al. (1994) administered the DSM-III-R Kiddie Schedule for Affective Disorders and Schizophrenia for School Age Children (K-SADS; Puig-Antich, Orvaschel, Tabrinzi, & Chambers, 1980) to a sample of Cambodian youth with PTSD as well as a cohort of stress-exposed PTSD negatives. Their analysis established that the youth with PTSD had a significantly greater prevalence of depressive disorders (62% vs. 27%), unspecified anxiety disorders (22% vs. 6%) and overanxious disorder (11% vs. 3%). In addition, 10.5% of the youth with PTSD met criteria for panic disorder. Similarly, 10.5% met criteria for PTSD and CD. In a six-year follow-up, Sack et al. (1993) also employed the K-SADS-E and reported that Cambodian subjects with PTSD did not meet criteria for CD, substance-related disorders, or major psychoses. Sixty percent of the subjects with PTSD also met criteria for major depression and 15% met criteria for unspecified anxiety disorders. Clarke, Sack, Ben, Lanham, and Him (1993) reported that 13.5% of their sample of Cambodian youth with PTSD also met criteria for major depression as generated through DICA-R diagnoses.

Also within the context of the Cambodian conflict, Hubbard et

al. (1995) used the SCID to assess for comorbid diagnoses among youth with PTSD. Major depression, generalized anxiety disorder, and social phobia were respectively evidenced among 21% of youth with PTSD. Somatoform pain was evidenced among 29% of the sample.

Using the K-SADS-E, McLeer et al. (1994) reported that 23.1% of the sexually abused youth had PTSD and ADHD; 15.4% had PTSD and CD; and 11.5% had PTSD, ADHD, and CD. Similar clusters were not observed among a psychiatric comparison group. The authors also reported that PTSD was not the most frequently diagnosed disorder among the sexually abused subjects as 46.0% met diagnostic criteria for ADHD.

Merry and Andrews (1994) employed the DISC-2 and reported that only two of twelve subjects or 16.7% of the sample had PTSD without a comorbid condition. On the other hand, 83% of the subjects with PTSD also meet the criteria for at least one other psychiatric condition. Separation anxiety was evidenced among 41.6% of the youth with PTSD. Twenty-five percent of the youth with PTSD met criteria for oppositional defiant disorder. Similarly, 25% met criteria for ADHD. Major depression was denoted in 16.7% of the youth with PTSD. Overanxious disorder, functional enuresis and

depressive disorder (NOS) were noted among 8.3% of the PTSD sample. In a similar study, Diamond et al. (in press) utilized the Parent version of the Diagnostic Interview for Children and Adolescents - Revised (DICA-R-P; Reich, Shayka, & Taibleson, 1991) to examine comorbidity among 17 physically abused preschool youth who meet criteria for PTSD. One (5.8%) met criteria for ADHD and another subject (5.8%) met criteria for a speech disorder.

Summary

Given this literature, it is apparent that exposure to extreme stress was not sufficient to induce PTSD in most youth. However, it is also apparent that the majority of stressors were capable of inducing PTSD among a subset of the subjects. It should also be observed that there is a great degree of variability with respect to the reported prevalence estimates for child-adolescent PTSD. Examined across stressor categories, the prevalence of PTSD ranged from 5.0% to 95%. Table 2 presents an overview of the epidemiological data relative to child-adolescent PTSD by stressor category.

The reported variability may stem from the different assessment methods utilized to effect diagnoses. In addition, the

type and severity of stressor experienced present as significant risk factors in the development of PTSD (Saigh et al., in press). As such, variability among studies may be attributable to differences with respect to type and severity of stressor experienced by the subjects.

Although few studies have examined for comorbid conditions among youth with PTSD, the extant literature suggests that psychiatric conditions such as ADHD, CD and affective disorders (e.g., major depression) are frequently comorbid with PTSD. Table 3 presents an overview of the data regarding the prevalence of comorbid psychiatric conditions among youth with PTSD. Given that comorbid conditions may significantly influence our understanding of the expression of PTSD (Barrett, Green, Morris, Giles, & Croft, 1996), the need for further research that controls for the potentially confounding effects of comorbid psychiatric conditions is apparent.

Table 2
Prevalence of Child-Adolescent PTSD

Study	Measure	Subjects: Gender	Subjects: Age	Elapsed Time	PTSD Prevalence
Cambodian Conflict					
Kinzie et al., 1986	DSM-III DIS	25 males; 15 females	mean age = 17 years	mean = 2.5 years	50%
Kinzie et al., 1989	DSM-III-R DIS	16 males; 11 females	mean age = 20 years	mean = 5.5 years	48%
Realmuto et al., 1992	DSM-III-R Reaction Index	37 males; 10 females	mean age = 17.5 years	Not reported	37%
Hubbard et al., 1995	DSM-III-R SCID	29 males; 30 females	mean age = 20 years	15 years	24% Point prevalence 59% Lifetime prevalence
Sack et al., 1994	DSM-III-R DICA	104 males; 105 females	13-25 years	13 years	18.2% Point prevalence 21.5% Lifetime prevalence
Lebanese Conflict					
Saigh, 1988	DSM-III Children's PTSD Inventory	42 males; 50 females	13 years	Not reported	29.3%
Saigh, 1989c	DSM-III Children's PTSD Inventory	403 males; 437 females	9-12 years	1-2 years	32.5%
Saigh et al., in press	DSM-III Children's PTSD Inventory	48 males; 47 females	mean age = 17.5 years	mean = 4.2 years	46.7% stress exposed 14.7% overall sample

Table 2 (cont.)

Terrorist Acts					
Pynoos et al., 1987	DSM-III Reaction Index	80 males; 79 females	5-13 years	1 month	60.4%
Nader et al., 1990	DSM-III Reaction Index	100 youth; Gender not reported	Not reported	14 months	19.0%
Schwarz & Kowalski, 1991	DSM-III,DSM-III-R & DSM-IV Reaction Index	32 males; 32 females	5-14 years	8-14 months	16% DSM-III 8% DSM-III-R 9% DSM-IV
Criminal Victimization					
Fitzpatrick & Boldizar, 1993	DSM-III-R Purdue PTSD Scale	102 males; 119 females	mean age = 11.9 years	Not reported	27.1%
Horowitz et al., 1995	DSM-III-R PTSD Symptoms Scale	79 females	12-21 years	Not reported	67%
Burton et al., 1994	DSM-III Symptom Checklist	91 male offenders	mean age = 16 years	Not reported	24.2%
Pennoyer & Ellenhorn, 1995	DSM-III-R DISC 2.4	63 males; 71 females	mean age = 15 years	Not reported	23.9%
Sexual &/or Physical Abuse					
McLeer et al., 1988	DSM-III-R Author devised interview	6 males; 25 females	mean age = 8.4 years	Not reported	48.4%

Table 2 (cont.)

Deblinger et al., 1989	DSM-III-R Author devised interview	46 male; 41 females	mean age = 8.8 years	Not reported	13.8%
Merry & Andrews, 1994	DSM-III-R DISC -2	11 males; 55 females	mean age = 8 years	3-6 months	18.2%
McLeer et al., 1994	DSM-III-R K-SADS-E	17 males; 9 females	mean age = 9 years	Not reported	42.3%
Diamond et al., in press	DSM-III Children's PTSD Inventory	14 males; 10 females	mean age = 4.98 years	mean = 6 months	70.8%
Earthquakes					
Bradburn, 1991	DSM-III-R Reaction Index	12 males; 10 females	10-12 years	6-8 months	63%
Goenjian et al., 1995	DSM-III-R Reaction Index	82 males; 136 females	mean = 13 years	1.5 years	95% Hi-Impact 71% Moderate-Impact 26% Lo-Impact
Najarian et al., 1996	DSM-III-R DICA-R-A	37 males; 37 females	11-13 years	2.5 years	30.6% Moderate-Impact 5.0% Lo-Impact
Hurricanes					
Shannon et al., 1994	DSM-III-R Reaction Index	2787 males; 2900 females	9-19 years	3 months	5.4%

Table 2 (cont.)

Garrison et al., 1993	DSM-III-R Author devised interview	600 males; 664 females	11-17 years	1 year	5.0%
Dam Collapse					
Green et al., 1991	Author devised checklist	179 youth; Gender not reported	2-15 years	2 years	37% "Probable" PTSD
Green et al., 1994	DSM-III-R SCID	38 males; 61 females	19-32 years	17 years	32% Lifetime Prevalence 7% Point Prevalence
Fires					
McFarlane, 1987	DSM-III Rutter Parent & Teacher Questionnaire	427 males; 381 females	mean age = 8.2 years	8 & 26 months	52.8% at 8 months (Parent) 57.2% at 26 months (Parent) 29.5% at 8 months (Teacher) 26.3% at 26 months (Teacher)
Stoddard et al., 1989	DSM-III DICA	13 males; 17 females	mean age = 13.3 years	8.9 years	53.3% Lifetime prevalence 6.7% Current prevalence 26.7% Subthreshold PTSD
School Bus Accident					
Milgram et al., 1988	DSM-III Reaction Index	Gender not reported	Grade 7	1 week & 9 months	57.1% at 1 week 52.0% direct witness 58.6% diverted buses 19.7% at 9 months

Table 3
Prevalence of Comorbid Psychiatric Diagnoses with PTSD

Study	Diagnostic Measure	Comorbid Psychiatric Diagnoses	Prevalence of Comorbidity with PTSD
War-Related PTSD			
Kinzie et al., 1986	DSM-III SADS	Affective disorder Panic disorder Unspecified anxiety disorders Schizophrenia Substance abuse (drug or alcohol) Antisocial conduct	85.0% 15.0% 35.0% 0.0% 0.0% 0.0%
Kinzie et al., 1989	DSM-III-R SADS	Affective disorder Panic disorder	76.9% 7.7%
Sack et al., 1994	DSM-III-R K-SADS-E	Depressive disorder Unspecified anxiety disorders Overanxious disorder Panic disorder Conduct disorder (CD)	62.0% 22.0% 11.0% 10.5% 10.5%
Sack et al., 1993	DSM-III-R K-SADS-E	Major depression Anxiety disorders CD Substance abuse (drug or alcohol) Schizophrenia	60.0% 15.0% 0.0% 0.0% 0.0%
Hubbard et al., 1995	DSM-III-R SCID	Major depression Generalized anxiety disorder Social phobia Somatoform pain	21.0% 21.0% 21.0% 29.0%
Clarke et al., 1993	DSM-III-R DICA-R	Major depression	13.5%

Table 3 (cont.)

Crime-Related PTSD			
McLeer et al., 1994	DSM-III-R K-SADS-E	Attention Deficit-Hyperactivity disorder (ADHD)	23.1%
		CD	15.4%
		Both (ADHD & CD)	11.5%
Merry & Andrews, 1994	DSM-III-R DISC-2	Separation anxiety	41.6%
		Oppositional defiant disorder	25.0%
		ADHD	25.0%
		Major Depression	16.7%
		Overanxious disorder	8.3%
		Functional Enuresis	8.3%
		Depressive disorder - NOS	8.3%
Diamond et al., in press	DICA-P	ADHD	5.8%
		Speech Disorder	5.8%

Chapter 3

Validity of the Posttraumatic Stress Disorder Classification Among Youth

Investigators have frequently expressed concerns about the differential validity of the PTSD classification (Goodwin & Guze, 1984; Saigh, 1992). Whereas the DSM-III PTSD classification was established on an intuitive basis (Saigh, 1992), it must be acknowledged that a great deal of effort has been afforded to exploring the differential validity of the classification. To date, a number of investigations have examined the differential validity of the PTSD classification among stress-exposed adults (e.g., Vietnam veterans or rape victims) who developed or failed to develop PTSD. While these reports indicate that adults with PTSD have higher levels of self-reported fear and anxiety (Fairbank, Keane, & Malloy, 1983) as well as elevated psychophysiological ratings on exposure to trauma-reminiscent stimuli (Blanchard, Kolb, Gerardi, Ryan, & Pallmeyer, 1986), appreciably fewer studies have involved traumatized children and adolescents.

In view of the above, research which addresses the differential validity of the PTSD classification with respect to

children and adolescents will be reviewed. In the main, the majority of this literature has focused on the affective and behavioral correlates of PTSD. In contrast, appreciably fewer studies have examined the academic and cognitive correlates of PTSD in youth. Analogously, the psychophysiological functioning of youth with PTSD has not been extensively explored. These areas will be addressed respectively. Given the dearth of information relative to cognitive impairments among stress-exposed youth with and without PTSD, relevant adult literature will also be reviewed.

Anxiety

Working against the background of the Lebanese conflict, Saigh (1988) administered the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978) and the Test Anxiety Inventory (TAI; Spielberger, 1980) to three groups of 13-year-old Lebanese adolescents with PTSD, test phobia, and a non-clinical control group. Saigh (1988) determined that the RCMAS scores of the PTSD group were significantly greater than the scores of the clinical and non-clinical comparison groups. As one would expect, the test phobic adolescents had significantly higher TAI scores than both the non-clinical control group and the PTSD subjects.

In a related work, Saigh (1989c) administered the RCMAS to three groups of pre-adolescent Lebanese youth (i.e., PTSD, test phobia, and non-clinical controls). Saigh reported that the RCMAS scores of the PTSD subjects were significantly higher than the scores of the comparative cohorts. In both investigations, females with PTSD had significantly higher RCMAS scores than males (Saigh, 1988, 1989c).

Saigh (1989a) conducted a follow-up study with a sample of Lebanese children. In keeping with the results of earlier Lebanese studies involving pre-adolescents (Saigh, 1989c) and older youth (Saigh, 1988), the younger subjects had significantly greater RCMAS scores than the test phobic and non-clinical control groups. In contrast to findings with older Lebanese youth, a nonsignificant gender effect was observed.

Similar findings have been reported within the context of research involving youth who were sexually abused. Wolfe, Sas, and Wekerle (1994) compared the RCMAS and the Sexual Abuse Fear Evaluation (SAFE; Wolfe & Wolfe, 1986) scores of Canadian youth who were sexually abused. The authors determined that the RCMAS and SAFE scores of children with PTSD were significantly greater

than the scores of sexually abused youth without PTSD. Information regarding variations by gender was not reported. Haviland, Sonne, and Woods (1995) reported a significant correlation (r = .70) between PTSD status and the RCMAS scores of physically and sexually abused adolescents.

Within the context of disaster research, Lonigan, Shannon, Taylor, Finch, and Sallee (1994) administered the RCMAS to hurricane exposed youth. Lonigan and colleagues reported that 91% of the children with PTSD had RCMAS scores that were significantly greater than the median RCMAS score for a school-based population which included stress-exposed youth without PTSD as well as youth without stress exposure. Information regarding gender and age effects was not reported.

Whereas the aforementioned reports indicate that youth with PTSD have greater self-report anxiety scores than stress-exposed youth without PTSD, several studies have failed to denote significant differences between the anxiety estimates of traumatized youth with and without PTSD. Adam, Everett, and O'Neal (1992) reported that the RCMAS did not discriminate between PTSD positive and negative children who had been sexually and or

physically abused. More recently, McLeer et al. (1994) determined that the RCMAS scores of sexually abused children with PTSD were not significantly greater than the RCMAS scores of sexually abused children without PTSD.

In a similar vein, investigators have used similar self-report inventories and failed to denote significant differences between youth with and without PTSD. McLeer et al. (1988) administered the State Trait Anxiety Inventory (STAIC; Spielberger, 1973) to sexually abused youth and reported that the scores of sexually abused children with PTSD were not significantly different than the STAIC scores of abused children that did not meet criteria for the disorder. In a similar vein, McLeer Deblinger, Henry, and Orvaschel (1992) administered the STAIC and RCMAS to a hospital-based sample of sexually abused children. Data analysis failed to reflect significant differences when the STAIC and RCMAS scores of the abused PTSD positives and negatives were compared. Wolfe et al. (1994) also reported that the Fear Survey Schedule for Children-Revised (FSSC-R; Ollendick, 1983) scores of sexually abused children with PTSD were not significantly greater than the scores of sexually abused youth without PTSD.

Depression

Within the context of war-related research, Saigh (1988) administered the Children's Depression Inventory (CDI; Kovacs, 1981) to a sample of Lebanese adolescents. Data analysis determined that subjects with PTSD had significantly greater CDI scores than phobic and non-clinical control groups. Additional research involving pre-adolescent Lebanese youth (Saigh, 1989c) revealed that subjects with PTSD had significantly higher CDI scores than phobic and non-clinical comparison groups. Data analyses further determined that the CDI scores of the female PTSD subjects were significantly greater than the scores of the males with PTSD (Saigh, 1988, 1989c). With regard to youth between the ages of 6 to 8 years, Saigh (1989a) reported that subjects with PTSD had significantly greater CDI scores than the phobic and non-clinical control groups. In this instance, a nonsignificant gender effect was observed among this sample with females having higher scores than males.

Haviland et al. (1995) reported a significant correlation (r = .64) between PTSD status and the CDI ratings of American adolescents who were physically and or sexually abused. Similar

results were obtained by Goenjian et al. (1995) who examined the aftermath of the Armenian earthquake. These investigators determined that the level of PTSD symptomology was significantly related (r = .55) to ratings of depressive symptoms on the Depression Self Rating Scale (DSRS; Asarnow & Carlson, 1985).

In contrast, McLeer et al. (1988) reported that the CDI scores of sexually abused children with PTSD did not significantly differ from the CDI scores of abused children who did not meet criteria for the disorder. In a follow-up study involving sexually abused children, McLeer et al. (1992) also determined that the CDI did not differentiate between PTSD positives and negatives. In a similar vein, Adam et al. (1992) indicated that the CDI and the Children's Depression Scale Revised (CDSC-R; Pozanski, Cook, & Carroll, 1979) did not differentiate between sexually abused PTSD positives and negatives. Likewise, Wolfe et al. (1994) reported that the CDI scores of sexually abused Canadian youth with and without PTSD were not significantly different.

Behavioral Ratings

Saigh (1988) compared the teacher-derived Conners Teacher Rating Scale (CTRS; Conners, 1969) total scores of three groups of

Lebanese adolescents. Data analysis determined that the subjects with PTSD had significantly higher CTRS scores than phobic and non-clinical control groups. Research involving pre-adolescent Lebanese youth (Saigh, 1989c) also revealed that subjects with PTSD had significantly higher CTRS scores than test phobic and non-clinical comparison groups. With regard to younger children, Saigh (1989a) reported that subjects with PTSD had significantly greater CTRS scores than phobic and non-clinical control groups. In all three investigations, statistical analyses revealed non-significant gender effects.

Also within the context of behavioral ratings, McLeer et al. (1988) compared parent-derived Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983) scores of sexually abused American children with and without PTSD. Their results determined that the PTSD group had significantly greater scores on the Internalizing and Externalizing scales of the CBCL relative to the scores of abused youth without PTSD. Information involving the possibility of variation by gender was not reported. McLeer and her coauthors did not provide information regarding potential differences between groups on specific CBCL indices (e.g., Anxious/Depressed or

Attention Problems).

In a follow-up study, McLeer et al. (1994) reported that parent-rated CBCL Externalizing scores of males with PTSD were significantly greater than the Externalizing scores of sexually abused male youth who did not meet criteria for PTSD. The authors also reported that the CBCL Externalizing and Internalizing scores of sexually abused females with PTSD were significantly greater than the scores of abused females without PTSD. Information involving differences between genders or potential differences on specific subtests of the CBCL was not reported.

Viewed from a different perspective, Giaconia et al. (1995) administered the Youth Self-Report (YSR; Achenbach & Edelbrock, 1983) to a community-based sample of adolescents. The authors reported that youth with PTSD reported significantly more behavioral problems relative to youth with a PTSD negative diagnosis. Adolescents with PTSD evidenced significantly higher scores on the Total Problems and Interpersonal Problems scales of the YSR. Furthermore, it was indicated that the PTSD positive subjects were more likely to evidence clinically significant internalizing and externalizing problems as measured by the YSR.

In the only study to examine the differential validity of the PTSD classification among preschool youth, Diamond et al. (in press) examined teacher-derived CBCL ratings of three groups of children (i.e., PTSD, ADHD, non-clinical controls). Data analysis determined that the Withdrawn and Internalizing scores of the PTSD group were significantly greater than the scores of the ADHD group. It was also observed that the Aggression and Externalizing scores of the ADHD group were significantly greater than the scores of the control group. Given that PTSD is an anxiety disorder characterized by a number of internalizing symptoms and ADHD is a disorder of childhood and adolescence characterized by inattention, hyperactivity, and impulsivity, the authors hypothesized that the PTSD subjects would evidence more withdrawn behaviors and that the ADHD subjects would evidence more acting out behaviors. The significant PTSD-ADHD differences that were observed on the Withdrawn and Internalizing scales were viewed as supportive of this hypothesis. The authors also reasoned that the nonsignificant PTSD-ADHD differences on the Aggression and Externalizing scales were also supportive of the underlying nosology as both disorders are partially indicated by disruptive symptoms. It is of interest to

note that these observations were not confounded by the expression of additional forms of psychopathology as a number of preschool children with comorbid conditions were systematically excluded from the study.

Whereas the aforementioned investigations were associated with significant variations between different comparison groups, Kiser, Heston, Millsap, and Pruitt (1991) failed to observe significant differences between the parent-rated CBCL scores of sexually and or physically abused youth with and without PTSD. In a similar vein, Wolfe et al. (1994) indicated that parent or guardian-rated CBCL Internalizing and Externalizing scores of sexually abused Canadian children with and without PTSD were not significantly different. Adam et al. (1992) also failed to denote significant CBCL differences between sexually abused youth as a function of PTSD status. Information regarding potential variations between trauma groups on specific indices of the CBCL was not considered.

Academic Functioning

Whereas historical reports have noted academic impairment in youth exposed to traumatic events who present with symptoms of PTSD (Bender & Blau, 1937; Carey-Trefzer, 1949; Mercer & Despert,

1943), very few studies have examined academic impairments among youth who meet the diagnostic criteria for PTSD. Clarke et al. (1993) administered the Peabody Picture Vocabulary Test - Revised (PPVT-R; Dunn & Dunn, 1981) and the Vocabulary subtest of the Stanford-Binet Intelligence Scale - 4th ed. (Thorndike, Hagen, & Sattler, 1986) to Cambodian adolescents. A significant group difference was noted on the PPVT-R but not on the Stanford-Binet Vocabulary subtest. The mean PPVT-R score of youth with PTSD was significantly lower than the mean score of youth without PTSD.

With regard to academic achievement, Shannon et al. (1994) examined school performance among youth exposed to the effects of Hurricane Hugo. Three months after the event, youth were asked to rate their school performance before and after the hurricane occurred. Whereas 51% of youth with PTSD reported that they had experienced lower marks at school, 28% of the youth without PTSD reported a comparable decline. More recently, Sack and his colleagues (1995) examined the academic functioning of 206 Cambodian youth (age range 13 to 25 years) 12 years after they immigrated to the United States. These investigators compared the grade point averages of the Cambodian youth with and without PTSD

and observed that the averages of the two groups were not significantly different. Although these studies employed a case-control methodology, standardized assessment of academic achievement was not performed.

In contrast, Saigh et al. (1997) administered the Vocabulary, Reading, Mathematics, Spelling, Language, and Science subtests of the Metropolitan Achievement Test (MAT; Prescott, Balow, Hogan, & Farr, 1988) to three groups of Lebanese adolescents (i.e., PTSD positives, PTSD negatives, and non-traumatized controls). Subjects also received an administration of the Lebanese General Ability Scale (LGAS; Saigh, 1986) to achieve an estimate of intellectual ability. Data analysis using LGAS IQs as a covariate determined that the MAT scores of the PTSD subjects were significantly lower than the scores of the stress-exposed PTSD negatives and non-clinical controls. No significant differences were observed when the MAT scores of the stress-exposed PTSD negatives and controls were compared. Saigh et al. (1997) reasoned that as stress-exposed youth without PTSD did not demonstrate comparable academic deficits, impaired academic achievement is clearly associated with the development of PTSD.

Cognitive Functioning

Although historical accounts denote the negative consequences of stress exposure on cognitive functioning of stress-exposed adults as well as youth (Carey-Trefzer, 1949; Etinger, 1951; Mercer & Despert, 1943; Thygesen et al., 1970; Wolf & Ripley, 1947), few studies have systematically examined the cognitive performance of stress-exposed individuals with and without PTSD. Furthermore, almost all of the studies that explored the association between cognitive functioning and PTSD employed adult samples (Barrett et al., 1996; Bremner, Randall, et al., 1995; Bremner et al., 1993; Dalton, Pederson, & Ryan, 1989; Sutker, Vasterling, Brailey, & Allain, 1995; Yehuda et al., 1995; Zimering, Caddell, Fairbank, & Keane, 1993).

Whereas PTSD validity studies have not systematically examined cognitive impairments among children and adolescents with PTSD, some information has been attained within the context of child-adolescent PTSD treatment studies. Saigh (1987a, 1987b, 1987c) conducted several single-case studies utilizing in vitro flooding to effectively treat Lebanese youth with PTSD. Examined comprehensively, these studies indicated that youth with PTSD

demonstrated significant post-treatment gains on the WISC-R Digit Span and Coding subtests (measures of short-term memory and concentration) after ten to twelve flooding sessions.

With respect to clinical interviews, Saigh et al. (1997) analyzed responses to the Children's PTSD Inventory and reported that 91.7% of youth with PTSD endorsed an item indicating "Difficulty remembering things or paying attention in class" (Saigh, 1989b, p. 9). In contrast, this item was endorsed by 33.3% of stress-exposed youth without PTSD and 13.3% of non-clinical controls. Analogously, adult PTSD studies have also indicated that individuals with PTSD report concentration and memory impairments (McFarlane, 1988). McFarlane administered an author devised structured interview reflective of the DSM-III criteria for PTSD to 43 firefighters (9 met criteria for PTSD and 34 failed to do so). Individuals with PTSD reported significantly more memory disturbances compared to subjects without PTSD (44% vs. 6%). Similarly, concentration impairments were reported by 56% of those with PTSD and 0% of those without PTSD.

Dalton et al. (1989) administered a comprehensive battery of psychological tests to 100 male Vietnam veterans with PTSD and

evaluated their performance relative to that of normative samples. The Wechsler Adult Intelligence Scale - Revised (WAIS-R; Wechsler, 1981), Stroop Color-Word Test (Golden, 1978), Rey Auditory-Verbal Learning Test (Query & Megran, 1983), Benton Visual Retention Test (Benton, 1974), Temporal Orientation (Benton, Hamsher, Varney, & Spreen, 1983), Serial Digit Learning (Benton et al., 1983), Shipley-Verbal Learning (Paulson & Lin, 1970), and the Trail Making Test (Parts A and B; Davies, 1968) were administered. Results indicated that veterans with PTSD performed within normal limits (as denoted by national norms) on the Rey Auditory-Verbal Learning Test, Serial-Digit Learning, Temporal Orientation, Shipley-Verbal Learning, and the Trail Making Test Part A. In contrast, veterans with PTSD evidenced slight decrements on the WAIS-R Digit Span and Digit Symbol subtests (measures of short-term memory and concentration).

Impaired cognitive flexibility was observed as the veterans with PTSD demonstrated slower performance on Trail Making Test Part B. This group of veterans also evidenced impaired visual memory as denoted by reduced performance on the Benton Visual Retention Test. On the Stroop Color-Word Test (a measure of

cognitive interference), Veterans with PTSD demonstrated slightly lower than normal performance on the word and color-word tasks. Given Dalton et al.'s (1989) findings, it appears that PTSD may be associated with impaired cognitive functioning. However, these findings should be tempered with the realization that this investigation did not include a comparison sample of stress-exposed individuals without PTSD or a non-clinical control group.

McNally and colleagues conducted a series of studies comparing the performance of individuals with and without PTSD on a modified Stroop Color-Naming paradigm (Kaspi, McNally, & Amir, 1995; McNally, Amir, & Lipke, 1996; McNally, English, & Lipke, 1993; McNally, Kaspi, Riemann, & Zeitlin, 1990). Vietnam veterans with PTSD evidenced significantly greater cognitive interference for combat-related words than for neutral words, positive words, or words related to symptoms of another anxiety disorder (e.g., obsessive thoughts) as compared to veterans without PTSD. Analogously, Foa, Feske, Murdock, Kozak, and McCarthy (1991) and Cassiday, McNally, and Zeitlin (1992) reported that rape victims with PTSD evidenced significantly more interference when presented with rape-related words relative to the performance of

rape victims without PTSD. Similar findings have also been noted in individuals who developed PTSD after involvement in motor vehicle accidents (Bryant & Harvey, 1995). Collectively, these studies indicate greater cognitive impairment associated with a diagnosis of PTSD.

Zimering et al. (1993) examined the concentration and memory functioning among 32 Vietnam veterans (16 with PTSD and 16 without PTSD) by administering a sustained attention task (i.e., identification of target letters) and a short-term verbal memory task including the Wechsler Memory Scale logical component (Wechsler, 1945) and Barbizet and Cany's (1968) memory battery. During the control condition, subjects listened to classical music prior to completing the experimental tasks. In the experimental or combat condition, subjects listened to an audiotape of combat sounds (e.g., automatic rifle and machine gun fire) prior to completing the two tasks. Concentration impairment was noted for the veterans with PTSD in both the control and combat conditions. Veterans with and without PTSD evidenced equal performance on the short-term verbal memory task in both conditions. As such, validating evidence for concentration impairment was evidenced. On

the other hand, memory impairment was not observed among the PTSD cohort. It is of some interest to note that the authors reported that only one aspect of memory (i.e., verbal memory) was assessed. It is also important to note that subjects with potentially confounding psychiatric conditions were not excluded from the study.

In a similar vein, Gurvits, Lasko, Schachter, Kuhne, Orr, and Pitman (1993) compared the cognitive performance of 27 Vietnam veterans with PTSD to that of 15 veterans without PTSD. Veterans were excluded for alcohol or drug dependence, use of psychotropic medications, history of head trauma, neurological disorder, and psychotic disorders. In contrast, veterans with other psychiatric disorders (e.g., major depression, dysthymia, phobic disorders) were not excluded. Veterans completed the DSM-III-R SCID, WAIS-R, Wechsler Memory Scale - Revised (WMS-R; Wechsler, 1987), Wisconsin Card Sorting Test (WCST; Berg, 1948), and the Trail Making Test. Whereas Veterans with PTSD scored lower on all measures of cognitive functioning, data analyses failed to reveal statistically significant differences.

McNally and Shin (1995) examined the Shipley Institute for

Living Scale (Zachary, 1991) estimated IQs of 105 Vietnam veterans. Veterans completed the DSM-III-R version of the SCID, the Mississippi Scale for Combat Related PTSD (Keane, Caddell, & Taylor, 1989), and the Combat Exposure Scale (Keane et al., 1989). Data analyses with the Mississippi Scale scores as the dependent variable denoted a significant negative correlation (r = -.35) between PTSD symptoms and estimated IQ. Controlling for the potentially confounding effects of education level and degree of combat exposure did not reduce this correlation. McNally and Shin went on to report that "relatively high intelligence may protect against the development of chronic PTSD" (1995, p. 937).

Sutker et al. (1995) examined three domains of neuropsychological functioning (i.e., learning and memory; attention and mental tracking; and executive functioning) of 108 former WWII and Korean Conflict POWs who were assessed for symptoms of PTSD utilizing the Keane, Malloy and Fairbank (1984) PTSD scale. It should be noted that this scale is a Likert-type inventory and that it does not yield categorical diagnoses (i.e., PTSD positive or PTSD negative diagnoses). It should also be noted that subjects with medical conditions (e.g., severe head trauma, history of neurosurgery, seizure

disorders, current alcohol dependence) that might impede performance on cognitive measures were excluded. The authors indicated that "impairments in the three cognitive domains were correlated with scores on the PTSD and depression measures" (Sutker et al., 1995, p. 121). Multiple regression analyses indicated that PTSD was significantly related to deficits in attention and mental tracking as denoted by performance on the WMS-R Digit Span and Visual Memory Span subtests as well as the Trail Making Test. PTSD was also significantly related to impaired executive functioning as determined by performance on the Category Test (Halstead, 1947) and the WCST. PTSD as well as learning and memory impairments were significantly related to weight loss severity experienced by the former POWs. In contrast, PTSD was not significantly related to deficits in learning and memory as determined by performance on the Logical WMS-R.

Utilizing a rigorous case-control methodology, Bremner and colleagues (Bremner et al., 1993; Bremner, Randall, et al., 1995) examined the short-term memory of Vietnam veterans with PTSD relative to comparison subjects without a history of combat exposure. PTSD diagnoses were rigorously effected as diagnoses

were based on administrations of the DSM-III-R SCID PTSD module and the Mississippi Scale for Combat-Related PTSD as well as psychiatrically derived clinical diagnoses. In addition, subjects with a history of psychotropic medications, meningitis, traumatic brain injury, neurological disorders, HIV positive status, current alcohol or substance abuse, schizophrenia, or foreign bodies (e.g., shrapnel) precluding the use of magnetic resonance imaging (MRI) were excluded. Subjects were also matched on factors that might influence performance on a memory task (e.g., weight, SES, years of alcohol abuse).

Bremner et al. (1993) administered the WAIS-R Arithmetic, Vocabulary, Picture Arrangement and Block Design subtests to 26 Vietnam veterans with PTSD and 15 healthy controls. Portions of the Russell (1975) revision of the WMS (i.e., logical and figural memory) and Selective Reminding Test (SRT; Hannay & Levin, 1985) (i.e., verbal and visual tasks) were also administered. Subjects did not differ significantly on the WAIS-R estimated Verbal, Performance and Full Scale IQs. Significant effects were noted on the WMS logical (verbal) memory component. Subjects with PTSD scored 44% lower on immediate recall and 55% lower on delayed recall relative to

healthy controls. Although not significant, subjects with PTSD scored slightly lower on the figural (visual) memory component of the WMS than comparison subjects. Further data analysis indicated a significantly negative correlation (r = -.62) between the level of PTSD symptomology and percent retention on the WMS figural memory component. Veterans with PTSD also evidenced significantly greater impairment on the SRT. Bremner et al. concluded that "patients with PTSD in this study scored lower on neuropsychological tests of memory than did comparison subjects matched for variables that could affect memory" (1993, p. 1017).

Yehuda et al. (1995) administered the WAIS-R and the California Verbal Learning Test (CVLT; Delis, Kramer, Kaplan, & Ober, 1987) to 20 male combat veterans with PTSD and 12 non-combat exposed males. Subjects with other psychiatric conditions, as well as subjects who were using illicit drugs were excluded. Subjects receiving medications, as well as subjects with a history of head trauma or loss of consciousness were also excluded. The subjects did not significantly differ on WAIS-R subscales as well as the initial and cumulative trials of the CVLT. However, impaired performance was demonstrated by veterans with PTSD on the short-

delay free recall and the long-delay free recall of the CVLT.

Recently, Barrett et al. (1996) conducted an elaborate study to examine impairments in cognitive functioning related to PTSD and other psychiatric conditions. The sample consisted of 2,441 Vietnam veterans who were assessed for the presence of PTSD and other psychiatric conditions. The WAIS-R, CVLT, Rey-Osterrieth Complex Figure test (Osterrieth, 1944), and WCST were administered. Veterans with PTSD and other comorbid conditions evidenced significantly lower cognitive performance on all measures than veterans with only a diagnosis of PTSD. Similar to the findings of Yehuda et al. (1995), a significant effect for PTSD status was noted on the short-delay free recall of the CVLT. Once adjustments were made for demographic and military factors, a non-significant difference was observed on the short-delay free recall of the CVLT. As such, this study represents the importance of controlling for comorbid psychiatric disorders as well as other demographic variables when analyzing cognitive impairments associated with PTSD. Given these findings, one may seriously question whether PTSD is associated with cognitive impairments if comorbid conditions are systematically excluded.

Following the Persian Gulf-War, Vasterling, Brailey, Constans, and Sutker (1998) compared the cognitive performance of veterans with PTSD (n = 18) and veterans without psychiatric diagnoses (n = 24). These veterans completed the WCST, AVLT, Stroop Color-Word Test, Continuous Performance Test (CPT; Conners, 1992), Continuous Visual Memory Test (CVMT; Trahan & Larrabee, 1988), and WAIS-R Digit Span and Arithmetic subtests. Data analyses revealed that veterans with PTSD evidenced significantly lower scores on the total recall and short-delay recall trials of the AVLT and CVMT. Veterans with PTSD also evidenced impaired performance on the CPT and the WAIS-R Arithmetic subtest. On the other hand, a non-significant difference was noted on the Stroop, WCST, and WAIS-R Digit Span subtest.

Psychophysiological Functioning

Examined from a neuroanatomical perspective, Bremner, Randall, et al. (1995) measured hippocampal volume of veterans with PTSD and healthy controls. MRI based measurements revealed a significant difference in the right hippocampal volume and a nonsignificant difference for left hippocampal volume. Whereas the right hippocampus of PTSD patients was 8% smaller than that of the

healthy controls, the left hippocampus was 3.8% smaller. A significant positive correlation (r = .64) was reported between hippocampal volume and percent retention on the WMS logical component among patients with PTSD. The authors also indicated that this corresponds with findings from neuropsychological studies that reported deficits in short-term memory on the WMS related to reduced hippocampal volume following neurosurgical procedures or epileptic seizures (Delaney, Rosen, Mattson, & Novelly, 1980; Lencz et al., 1992).

Gurvits et al. (1996) also assessed the hippocampal volume of Vietnam veterans (7 with PTSD and 7 without PTSD). Veterans were excluded for organic mental disorders, psychotic disorders, alcohol or substance dependence, neurological disorders, significant head trauma, and use of psychotropic medications. PTSD diagnoses was based on an administration of the DSM-III-R Clinician Administered PTSD Scale (CAPS; Blake et al., 1995). A significant degree of comorbidity was noted on the SCID as four (56%) veterans with PTSD and two (28%) without PTSD met criteria for major depression. All veterans underwent MRI procedures and completed the Benton Visual Retention Test, WMS-R, and WAIS-R. PTSD positives scored lower

than PTSD negatives on all measures; however, this was not a statistically significant difference. On the other hand, the left and right hippocampal volumes were found to be significantly lower in PTSD positives. The significant difference for the left hippocampus remained even after controlling for combat exposure.

Given the above, it is of considerable interest to note that brain regions which involve memory functions (e.g., hypothalamus, hippocampus, and amygdala) also serve a role in modulating stress responses (Bremner, Krystal, et al., 1995). Increased norepinephrine in brain regions related to memory functions has been observed on exposure to extreme stress in laboratory animals (Glavin, 1985; Tsuda & Tanaka, 1985; Sapolsky, Uno, Rebert, & Finch, 1990). Similar increases in norepinephrine levels have been demonstrated in humans who were exposed to laboratory induced stress (Blanchard, Kolb, Prins, Gates, & McCoy, 1991; Giller et al., 1990; Kosten, Mason, Giller, Ostroff, & Harkness, 1987; Yehuda, Southwick, Giller, Xiaowan, & Mason, 1992).

Blanchard et al. (1991) compared the plasma norepinephrine levels and heart rate of Vietnam veterans with PTSD (n = 15) and without PTSD (n = 6). These veterans were exposed to a three-

minute audiotape depicting combat sounds (e.g., AK-47 firing, screams, helicopters). Blood plasma norepinephrine levels were monitored prior to auditory stimulation (i.e., 5 minutes) and post-stimulation (i.e., 1, 3, 5, 7, and 10 minutes). Veterans with PTSD demonstrated a significant (30%) increase in plasma norepinephrine levels post-stimulation as well as increased heart rate relative to veterans without PTSD. Other investigators have utilized 24-hour urinary excretion of catecholamines (dopamine, epinephrine, norepinephrine) and observed increased levels in veterans with PTSD relative to patients with major depression, bipolar disorder, and schizophrenia (Giller et al., 1990, Kosten et al., 1987).

Whereas studies employing physiological measures related to PTSD have primarily focused on adults, preliminary evidence has suggested similar physiological responses among stress-exposed youth (DeBellis, Lefter, Trickett, & Putnam, 1994). DeBellis et al. obtained 24-hour urinary catecholamine levels among 20 sexually abused and 20 non-abused female adolescents. Sexually abused females demonstrated significantly elevated catecholamine levels compared to non-abused females. Although only one of the 20 abused females warranted a diagnosis of PTSD, DeBellis et al. suggest that

these results "resemble the psychobiology of PTSD" (1994, p. 324). Interestingly, Goenjian et al. (1996) indicated that adolescents who developed PTSD after the 1988 Armenian earthquake also demonstrated neuroendocrine alterations.

Summary

Examined comprehensively, it may be said that war-related studies have consistently reported that youth with PTSD had significantly higher self-reported anxiety and depression estimates relative to the scores of clinical and non-clinical controls (Saigh, 1988, 1989a, 1989c). On the other hand, victimization and disaster-related studies have produced less conclusive results. Whereas some studies have reported significantly higher levels of anxiety and depression among youth with PTSD (Goenjian et al., 1995; Haviland et al., 1995; Lonigan et al., 1994; Wolfe et al., 1994), others failed to do so (Adam et al., 1992; McLeer et al., 1988, 1992, 1994; Wolfe et al., 1994).

With respect to academic impairment, preliminary investigations indicate that PTSD may be associated with significant deficits in these areas of functioning (Clarke et al., 1993; Sack et al., 1995; Saigh et al., 1997; Shannon et al., 1994).

Although information involving the cognitive functioning of stress-exposed youth has not been systematically explored, preliminary evidence within the context of child-adolescent PTSD treatment literature suggests concentration and short-term memory impairments among youth with PTSD (Saigh, 1987a, 1987b, 1987c). Similarly, analysis of child-adolescent as well as adult clinical interviews indicates that individuals with PTSD report significantly more concentration and memory impairments than stress-exposed PTSD negatives and non-clinical controls (McFarlane, 1988; Saigh et al., 1997).

Given the limited information that is available regarding the cognitive functioning of stress-exposed youth, it is of interest to note that studies have recently examined the cognitive functioning of adults with and without PTSD. In the main, these studies suggest that PTSD is associated with greater cognitive interference (Kaspi et al., 1995; McNally et al., 1996; McNally et al., 1993; McNally et al., 1990), impaired cognitive flexibility (Dalton et al., 1989), as well as concentration and memory impairments (Bremner et al., 1993; Bremner, Randall, et al., 1995; Dalton et al., 1989; Vasterling et al., 1998; Zimering et al., 1993). On the other hand, four of the adult

PTSD validity studies failed to find a significant association between PTSD and cognitive impairment (Barrett et al., 1996; Gurvits et al., 1993, 1996; Sutker et al., 1995). Adult PTSD studies have also examined the relationship between PTSD and psychophysiological functioning (Blanchard et al., 1991; Giller et al., 1990; Kosten et al., 1987; Yehuda et al., 1992). These studies suggest physiological responses to stress may be associated with cognitive impairments (Bremner, Randall, et al., 1995).

In view of these points, it is apparent that PTSD may be associated with cognitive impairments. However, it is important to recognize that a number of potentially confounding variables could influence the interpretation of the reported findings. The adult PTSD studies reviewed differ on significant factors such as the presence of comorbid psychiatric conditions, subject demographic variables (e.g., SES and educational level), presence of comparison subjects, as well as the assessment measures that were employed. As such, the observed results should be viewed as preliminary. Further investigation that controls for these factors while assessing the cognitive performance of individuals with and without PTSD is strongly recommended.

Chapter 4

Methodology

In this chapter the statement of the problem and purpose of the study will be presented. In addition, the research design, diagnostic measures, participant selection procedures, participant characteristics, experimental procedures, dependent variable, and covariate will be reported. Finally, the rationale and research hypotheses will be discussed.

Statement of the Problem

Viewed theoretically, it is of considerable interest to note that the diagnostic criteria that appeared in the DSM-III and DSM-III-R for the PTSD classification were intuitively established (i.e., data based field trials were not conducted). Moreover, the DSM-IV (APA, 1994) PTSD field trial did not involve subjects below the age of 15 years (Kilpatrick et al., in press). As such, this study represents an initial test of the differential validity of the DSM-IV PTSD classification as it applies to children and adolescents. Inasmuch as literature regarding cognitive impairment relative to child-adolescent PTSD has not been systematically explored, this study is one of the first to examine the cognitive functioning of

stress-exposed youth with and without PTSD.

Purpose of the Study

This study compared the Wide Range Assessment of Memory and Learning (WRAML; Sheslow & Adams, 1990) scores of urban youth with PTSD to the WRAML scores of stress-exposed urban youth without PTSD. As such, this study provides a multi-faceted examination of memory functions among stress-exposed youth with and without PTSD as denoted by the various subtests of the WRAML (e.g., Picture Memory, Story Memory, Verbal Learning).

Research Design

This study utilized a case-control research design. In this design "individuals with a particular condition or disease (the cases) are selected for comparison with a series of individuals in whom the condition or disease is absent (the controls)" (Schlesselman & Stolley, 1982, p. 14). Selected stress-exposed youth constituted two groups. Given the confounding effects of comorbidity (Barrett et al., 1996), youth with co-morbid diagnoses (i.e., ADHD, conduct disorder, major depressive disorder, substance dependence, and psychotic symptoms) were excluded from the study. Youth taking psychostimulant medications which may impede

performance on a memory task as well as youth with a history of a significant head trauma were also excluded from the study. Figure 1 presents a schematic representation of the research design.

Diagnostic Measures

Children's PTSD Inventory The Children's PTSD Inventory (Saigh, 1997) was developed on the basis of the DSM-IV criteria for PTSD. The instrument was constructed by P. Saigh, Ph.D. with the active collaboration of a number of scientists who served on the DSM-IV PTSD advisory group. The instrument consists of five subtests that are scored on a dichotomous basis (i.e., 1 for presence and 0 for absence of symptoms). Following a preface that provides examples of traumatic incidents that youth may encounter, the first subtest presents 12 questions that assess for exposure to extreme stress and situational reactivity. The second subtest consists of 11 questions that denote the presence or absence of reexperiencing symptoms (e.g., "Are you having a lot of upsetting thoughts about what happened?"). The third subtest lists 16 questions involving avoidance and numbing symptoms (e.g., "Are you trying not to think about what happened?"). The fourth subtest presents seven questions denoting increased arousal (e.g., "Since this happened have

you been getting very angry?") and the fifth subtest lists five questions involving significant distress (e.g., "Have you been having more problems with your teachers since this happened?"). The instrument yields the following diagnoses: Negative PTSD, Acute PTSD, Chronic PTSD, Delayed Onset PTSD, and No Diagnosis (i.e., insufficient information to formulate a diagnosis). For this study the categories Acute PTSD, Chronic PTSD and Delayed Onset PTSD were considered as PTSD positive cases. Cases receiving a "No Diagnosis" were excluded.

Currently, the reliability and validity of the DSM-IV version of the Children's PTSD Inventory are being explored. In terms of interrater reliability with a preliminary sample of 46 consecutive stress-exposed cases (Saigh et al., 1998), 100% interrater agreement (kappa =1.00) was observed. Preliminary data indicated a kappa coefficient of .87 between clinician derived diagnoses and diagnoses that were obtained utilizing the Children's PTSD Inventory. Further data analyses indicated a sensitivity of .92, a specificity of .91, and an overall diagnostic efficiency of .91. A positive predictive power of .92 and a negative predictive power of .91 were also noted. Internal consistency was calculated for the

Figure 1: Schematic representation of the research design.

Dependent Variable	**Experimental Groups**	
Wide Range Assessment of Memory and Learning	PTSD Positive ($\underline{n}$ = 16)	Stress-Exposed PTSD Negative ($\underline{n}$ = 19)
Index Scores: General Memory Index Verbal Memory Index Visual Memory Index Learning Index		
Verbal Memory Subscales: Number/Letter Memory Sentence Memory Story Memory		
Visual Memory Subscales: Finger Windows Design Memory Picture Memory		
Learning Subscales: Verbal Learning Visual Learning Sound Symbol		

total Children's PTSD Inventory and the subscales. For the total Children's PTSD Inventory alpha = .95. The alpha coefficients for the reexperiencing, avoidance, increased arousal, and impairment subscales were .90, .89, .81, and .67 respectively.

Diagnostic Interview for Children and Adolescents - Revised The Diagnostic Interview for Children and Adolescents - Revised (DICA-R; Reich, Leacock, & Shanfeld, 1995) is a structured clinical interview that presents a series of modules indicative of the DSM-IV diagnostic criteria for disorders that are evident in childhood or adolescence. For youth ranging in age from 8 to 12 years the Children's version (DICA-R-C) was administered. For youth ranging in age from 13 to 17 years the Adolescent version (DICA-R-A) was administered. For the purpose of the current study, the DICA-R ADHD, conduct disorder, mood disorders, substance-related disorders, and psychotic symptoms modules were used to identify co-morbid conditions.

Whereas the reliability and validity of the recently developed DSM-IV DICA-R is currently under investigation, previous data on the DSM-III version of the DICA indicates adequate reliability and validity (Welner, Reich, Herjanic, Jung, & Amado, 1987). Welner et

al. examined inter-interviewer agreement for 27 inpatient cases ranging in age from 7 to 17 years. Utilizing the DICA-C inter-interviewer kappa coefficients of .90, 1.00, and 1.00 were respectively reported for affective disorders, ADHD, and conduct disorder modules. Welner et al. proceeded to compare inpatient chart diagnoses with those obtained on the first administration of the DICA-C and reported kappa coefficients of .52, .50, and .43 for the affective disorders, ADHD, and conduct disorder modules.

Social Status Measure

Hollingshead Four Factor Index of Social Status The Hollingshead Four Factor Index of Social Status (Hollingshead, 1975) was utilized to determine the socioeconomic status (SES) of the subjects. The status score of an individual or a nuclear family unit is estimated by combining information on education, occupation, and marital status. Computed scores may range from a high of 66 to a low of 8, with higher scores indicative of higher SES. Scores may be grouped into five social strata. Appendix B presents the Hollingshead demographic questionnaire.

Participant Selection

One hundred and thirty-one youth (age range: 8-17 years) from

the Bellevue Hospital Adolescent Clinic, the Pediatric Consultation-Liaison Psychiatry Clinic, and the Pediatric Crime Victim's Program were referred to the principal investigator. Youth who reportedly experienced, witnessed, or were confronted with an event or events (e.g., sexual assaults, physical assaults, accidents) that involved actual or threatened death or serious injury, or a threat to their personal physical integrity or the physical integrity of others comprised the sampling pool. To be included in the study, participants must have been exposed to extreme forms of stress at least 30 days before the testing occurred.

After informed consent (see Appendixes C and D) of the participants and their parents/guardians was obtained, the parents completed the Hollingshead demographic questionnaire. Each youth received a single clinical interview by one of three highly experienced psychiatrists (R. Oberfield, M.D.; P. Halamandaris, M.D.; S. Inamdar, M.D.) and a psychologist (P. Saigh, Ph.D.). The interviewers questioned referred youths and clinically determined if they met DSM-IV diagnostic criteria for PTSD. The referred cases went on to receive two separate administrations of the Children's PTSD Inventory (Saigh, 1997) by two examiners (doctoral psychology

students including the principal investigator). In the event of a disagreement between the clinical diagnoses and the examiner derived Children's PTSD Inventory diagnoses (agreement was evident on 42 of 46 cases with an overall kappa of .86), case conferences were conducted and a consensual diagnosis was formulated. Two case conferences resulted in consensual PTSD Positive diagnoses and two resulted in consensual PTSD Negative diagnoses.

In order to control for the potentially confounding effects that are associated with comorbidity, the examiners also administered the Diagnostic Interview for Children and Adolescents - Revised (DICA-R; Reich, Leacock, & Shanfeld, 1995) ADHD, major depression, conduct disorder, substance dependence, and schizophrenia modules. Youth meeting criteria for these disorders were excluded from the study. Specifically, seven youth (5.3%) were excluded as they met the DSM-IV diagnostic criteria for major depression. Two youths (1.5%) were excluded for conduct disorder, one youth (0.7%) for ADHD, and three youths (2.3%) for substance dependence. Of the youths interviewed, no youth presented with psychotic symptoms. One referred youth (0.7%) was excluded due to selective mutism. Two youths (1.5%) were excluded to control for the presence of

potentially confounding mental retardation. Given that two youths (1.5%) had a documented history of familial abuse or neglect these individuals were excluded. As a head trauma could significantly interfere with performance on a memory task, eight youth (6.1%) were excluded due to loss of consciousness or significant head trauma. Two youths (1.5%) were excluded as they were unable to recall the traumatic event. Similarly as certain psycho-pharmacological agents could influence cognitive functioning, two youths (1.5%) taking medications (i.e., Prozac, Tenex) were excluded. All in all, 30 referred individuals (22.9%) did not participate because they met one of the exclusionary conditions.

In a similar vein, the parents of 32 referred youths, 24.4% of the referred cases, elected against participation and their children were not examined. The parents of 26 cases (19.8%) could not be contacted because they had moved or had their telephones disconnected. One youth (0.7%) who had agreed to participate became uncooperative and testing had to be terminated. One youth (0.7%) could not be examined because English was not his primary language. Three youths (2.3%) were excluded due to ongoing legal complications. Of the youth referred, three (2.3%) were below the

minimum age (i.e., 8 years) and these cases were also excluded.

Based on the aforementioned selection process, 35 youth (26.7% of referred cases) participated in this study. Table 4 presents criteria for establishing the experimental groups. Below is a description of the participants for each experimental group.

Participants

PTSD Positives

Sixteen youths (age range 9 years 4 months to 17 years 4 months) met criteria for PTSD as described above. Six (37.5%) participants were sexually assaulted (e.g., a 16 year old male reported that "He came onto me, kissing me. I said 'No'. He started to take off my clothes. He entered me and he raped me."). Six (37.5%) were physically assaulted (e.g., a 16 year old female reported "My boyfriend punched me on my face. My face was swollen and bruised. He threatened me with a knife."). Two participants (12.5%) were smoke inhalation victims (e.g., a 9 year old female reported that "My mother and I were crossing the street when this big top (a man hole cover) flew up like a flying saucer and we were breathing gas."). A nine year old male (6.25%) was involved in an attempted abduction in which he reported "the man was in a red van with a greenish stripe.

Table 4
Criteria to Establish Experimental Groups

Group	n	Stress-Exposure[1]	PTSD Diagnosis[2]	Comorbid Diagnoses[3]	Head Trauma[4]	Psychopharmacological Medications[5]
PTSD Positive	16	Yes	Acute PTSD, Chronic PTSD, or Delayed-Onset PTSD	None	None	None
PTSD Negative	19	Yes	PTSD Negative	None	None	None

1 Includes sexual assault, physical assault, or accidents.
2 Two clinican and two Children's PTSD Inventory diagnoses.
3 As determined by administrations of DICA-R ADHD, conduct disorder, major depressive disorder, substance dependence, and psychotic symptoms modules.
4 As determined by review of medical records (e.g., CAT scan, EEG readings).
5 As determined by review of medical records and consultation with psychiatrist.

He told me to get in". One youth (6.25%) developed PTSD after being involved in a motor vehicle accident (e.g., a 16 year old female reported that "I was walking on the sidewalk, walking to dance school, and a cab came along and didn't try to stop....I tried to run away and it hit me.").

Stress-Exposed PTSD Negatives

Nineteen youths (age range 9 years 0 months to 17 years 11 months) were stress-exposed but did not met DSM-IV criteria for PTSD as described above. None of the participants in this group reported being sexually assaulted. On the other hand, 6 youth (31.57%) were physically assaulted (e.g., a 17 year old male reported "I was just rushed by eight people. They took my watch, punched me in the nose and deviated my septum. I kept getting hit and punched....I was just left bleeding like a faucet."). Two female participants (10.5%) had been attacked by dogs (e.g., a 9 year old reported that "The dog broke her muzzle. The dog bit me on both legs and tried to bite my private area but I pushed him away. I saw blood...but she wouldn't let go.") Two participants (10.5%) were smoke inhalation victims (e.g., an 11-year-old female reported that "I got on top of an air vent. It was hot. The top of the vent went up ..... I went up in the

air and fell down."). Seven youths (36.8%) were involved in motor vehicle accidents (e.g., one youth reported that "A taxi hit me, the bumper hit my low calf. I fell to my side."). Two youths (10.5%) injured their hands in accidents (e.g., a 9 year old male reported that "I slipped and my hand went all the way down...It wouldn't come out. The only thing left was the bone.").

Based on a series of analyses, the demographic characteristics of the two groups did not significantly differ. Table 5 presents the means and standard deviations for the comparison groups for age.

Table 5

Age of Participants by Comparison Group

	Group					
	Overall (N = 35)		PTSD Positive (n = 16)		PTSD Negative (n = 19)	
	Mean	SD	Mean	SD	Mean	SD
	14.05	2.66	14.18	2.63	13.93	2.76

A t-test revealed no significant differences between the groups with respect to mean age, t (33) = .27, p = .78.

Table 6 presents information regarding the group composition with respect to gender and ethnicity.

Table 6

Gender and Ethnicity of Participants by Comparison Group

	Group		
	Overall (N = 35)	PTSD Positive (n = 16)	PTSD Negative (n = 19)
Male	17 (48.6%)	8 (50.0%)	9 (47.4%)
Female	18 (51.4%)	8 (50.0%)	10 (52.6%)
African-American	5 (14.3%)	1 (6.3%)	4 (21.1%)
Asian	4 (11.4%)	1 (6.3%)	3 (15.8%)
Caucasian	5 (14.3%)	1 (6.3%)	4 (21.1%)
Hispanic	20 (57.1%)	12 (75.0%)	8 (42.1%)
Other	1 (2.9%)	1 (6.3%)	0 (0.0%)

Chi-square analyses revealed no significant differences between the PTSD positive and PTSD negative groups with respect to gender, $X^2(1, N = 35) = .024$, $p = .877$, and ethnicity, $X^2(4, N = 35) = 6.18$, $p = .185$.

Table 7 presents information regarding the SES level of

participants as based on parental responses to the Hollingshead *demographic questionnaire.*

Table 7

Hollingshead Socioeconomic Status by Comparison Group

	Group		
	Overall (N = 35)	PTSD Positive (n = 16)	PTSD Negative (n = 19)
Class I	5 (14.3%)	1 (6.3%)	4 (21.1%)
Class II	6 (17.1%)	3 (18.8%)	3 (15.8%)
Class III	9 (25.7%)	3 (18.8%)	6 (31.6%)
Class IV	7 (20.0%)	4 (25.0%)	3 (15.8%)
Class V	8 (22.9%)	5 (31.3%)	3 (15.8%)

A chi-square analysis revealed no significant differences, between comparison groups based on the Hollingshead scores, $X^2(4, N = 35) = 3.209$, $p = .523$.

Experimental Procedure

Youth who met full criteria for inclusion in the research project as determined by a series of clinical interviews described

above were administered the WRAML by the principal investigator according to standardized administration procedures. In addition, the parents/guardians completed the Hollingshead (1975) demographic questionnaire (see Appendix B). Following data collection, parents and subjects were provided appointments to meet with Richard Oberfield, M.D. or Phill Halamandaris, M.D. In the course of these meetings they were advised of the presence or absence of a psychiatric disorder (i.e., PTSD, ADHD, conduct disorder, major depression, substance dependence, psychotic symptoms). In addition, the outcome of the psychological testing was explained to parents and the participating youth. In the event that a psychiatric disorder was apparent, the parents and youth were referred to relevant clinics at Bellevue Hospital or metropolitan area hospitals. In addition, all participants were encouraged to contact the Pediatric Psychiatry Unit of Bellevue Hospital if further assistance was required.

Dependent Variable

Wide Range Assessment of Memory and Learning

(WRAML; Sheslow & Adams, 1990). The WRAML is an individually administered, standardized, clinical instrument intended to evaluate

the ability of school-age children to actively learn and memorize a variety of information. The WRAML consists of nine subtests, each indicating a norm-referenced score, which yield indices for Verbal Memory, Visual Memory, and Learning. The combined scores of the nine subtests also yield a General Memory Index. Scaled and standard scores allow performance comparisons based on age. Four delayed recall subtests and a delayed recognition task may be utilized to examine the quality of recall and to compare retrieval difficulties with memory weakness.

The Verbal Memory scale consists of the Number/Letter, Sentence Memory, and Story Memory subtests. The Number/Letter subtest requires the examinee to repeat a random mix of numbers and letters that are verbally presented by an examiner. On the Sentence Memory subtest the examinee is required to repeat sentences of increasing complexity that were verbally presented by an examiner. For the Story Memory subtest the examinee is asked to recall as many parts of two stories read aloud by an examiner. These subtests permit a comparison between rote memorization and memorization of information of increasing semantic complexity.

The Visual Memory scale consists of the Finger Windows,

Design Memory, and Picture Memory subtests. Similar to the Verbal Memory subtests, the Visual Memory subtests consist of rote memorization tasks to more meaningful memorization tasks. The Finger Windows subtest requires the examinee to repeat a rote visual sequence that was demonstrated by an examiner. For the Design Memory subtest the examinee is presented with a design (5 second duration) and then asked to draw the design after a 10 second delay. The examinee is presented with a total of four designs to reproduce from memory. On the Picture Memory subtest the examinee is first shown a complex picture (10 second duration) and then shown a similar picture in which elements have been changed or added. The examinee is asked to mark the parts of the picture that have been changed or added.

The Learning scale consists of the Verbal Learning, Visual Learning, and Sound Symbol subtests which assess the examinee's ability to learn new material over a series of trials. Using a free-recall paradigm over four trials, the Verbal Learning subtest evaluates the examinee's ability to learn a list of 16 non-related words. On the Visual Learning subtest, the examinee is first presented with 14 designs located on a stimulus board. Then the

examinee is asked to recall the location of each design. The Sound Symbol subtest "is a paired-associate task requiring the learner to recall sounds associated with various abstract figures" (Sheslow & Adams, 1990, p. 12).

The WRAML was normed and standardized on a sample of 2,363 children from 5 years to 17 years and 11 months. The General Memory Index has a coefficient alpha of .96. Coefficient alphas of .93, .90 and .91 are reported for the Verbal Memory, Visual Memory, and Learning Indices respectively. For the Number/Letter, Sentence Memory, and Story Memory subtests coefficient alphas of .87, .87, and .86 were reported. Coefficient alphas of .81, .85, and .80 were reported for the Finger Windows, Design Memory, and Picture Memory subtests respectively. For the Verbal Learning, Visual Learning, and Sound Symbol subtests coefficient alphas of .78, .88, and .90 were reported (Sheslow & Adams, 1990).

Sheslow and Adams (1990) present evidence for criterion related validity via correlations with other measures of memory abilities. The WRAML correlates highly with the McCarthy Memory Index (r = .90) and the Stanford-Binet Short Term Memory Index (r = .80). Construct validity was observed through positive but moderate

correlations with measures of cognitive ability and academic achievement. Whereas the WRAML correlates with the WISC-R (r = .56), the correlation indicates that the WRAML is not simply a measure of cognitive ability in general but is specific to memory abilities.

Hypotheses and Rationale

Recently, case-control studies have been conducted which compared the cognitive functioning of combat veterans with PTSD to combat veterans without PTSD or non-combat exposed controls. In addition, studies have relied increasingly on the use of standardized measures of functioning such as the WMS. Inasmuch as literature regarding cognitive impairment relative to child-adolescent PTSD has not been explored, hypotheses are based primarily on adult studies which have employed a case-control research design.

Research conducted by Bremner and colleagues (Bremner et al., 1993; Bremner, Randall, et al., 1995) determined that Veterans with PTSD scored significantly lower than non-combat exposed males without PTSD on standardized measures of memory. As such, it was anticipated that youth with PTSD would also evidence memory impairments relative to youth without PTSD. More specifically, the

following hypothesis was examined.

HO1: The WRAML General Memory Index Scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

Analogously, Vietnam veterans with PTSD have demonstrated decreased right hippocampal volume compared to matched comparison subjects without PTSD (Bremner, Randall, et al., 1995). It is of interest to note that studies have reported a relationship between stress-exposure and alterations in the hippocampus which serves an important role in learning and memory. The reduced hippocampal volume has been associated with deficits in verbal recall as measured by the Percent Retention on the Logical Memory Component of the WMS (Bremner, Randall, et al., 1995). In view of these points, the following hypotheses were evaluated.

HO2: The WRAML Verbal Memory Index scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

HO3: The WRAML Story Memory subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

HO4: The WRAML Sentence Memory subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

Youth with PTSD have shown improvement on the WISC-R Digit Span subtest subsequent to effective flooding trials (Saigh, 1987a, 1987b, 1987c). Dalton et al. (1989) also reported that veterans with PTSD scored below normal limits on the WAIS-R Digit Span. In view of the degree of similarity between the WISC-R and WAIS-R Digit Span subtests and the Number/Letter subtest of the WRAML, the following hypothesis was evaluated.

HO5: The WRAML Number/Letter subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

Bremner et al. (1993) and Bremner, Randall, et al. (1995) reported that veterans with PTSD scored lower than matched subjects without PTSD on the Wechsler Figural Memory component (an index of visual recall). In addition, Dalton et al. (1989) reported that veterans with PTSD evidenced impaired visual memory as denoted by below average performance on the Benton Visual

Retention Test. In effect, deficits in visual memory appear to be associated with PTSD. As such, the following hypotheses were predicted.

HO6: The WRAML Visual Memory Index scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

HO7: The WRAML Picture Memory subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

HO8: The WRAML Design Memory subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

HO9: The WRAML Finger Windows subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

Whereas Barrett et al. (1996) indicated that veterans with PTSD exhibit significant impairment on the immediate recall subtests of the CVLT, Yehuda et al. (1995) indicated impairment on the short-delay recall task of the CVLT. Analogously, Bremner and colleagues (Bremner et al., 1993; Bremner, Randall, et al., 1995)

reported a significant difference on the verbal as well as visual tasks of the Selective Reminding Test which employs a free-recall learning format. As such, it appears that individuals with PTSD may evidence an inability to learn visual and verbal material. In view of these points, the following hypotheses were evaluated.

HO10: The WRAML Learning Scale Index scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

HO11: The WRAML Verbal Learning subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

HO12: The WRAML Sound Symbol subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

HO13: The WRAML Visual Learning subscale scores of the stress-exposed PTSD negative group will significantly exceed the scores of the PTSD positive group.

Chapter 5

Results

In this chapter the data analysis procedures and results will be presented. Descriptive statistics regarding the scores of the two experimental groups on the four WRAML Indexes and nine subtests will be reported. Additionally, the results of univariate F tests utilizing WRAML Index scores as the dependent variables will be reported. Finally, the results of three separate MANOVAs for the subtests of the WRAML Verbal, Visual, and Learning Indexes will be reported.

Initially, WRAML raw scores were converted to standard scores based on the procedures outlined in the WRAML Administration Manual (Sheslow & Adams, 1990). Mean scores and standard deviations for the four WRAML Index and nine subtest scores of the two experimental groups were calculated. Table 8 presents the means and standard deviations for each of the WRAML Index scores per comparison group.

Given that the WRAML General Memory, Verbal Memory, Visual Memory, and Learning Index scores are not orthogonal, a univariate F test was performed to test for General Memory Index score

Table 8

Means and Standard Deviations for WRAML Index Scores

	PTSD Positive (n = 16)		PTSD Negative (n = 19)	
WRAML Index	Mean	SD	Mean	SD
General Memory	84.37	13.27	95.53	16.43
Verbal Memory	83.31	14.69	93.05	14.04
Visual Memory	93.75	12.18	101.31	13.76
Learning	87.94	13.68	96.31	16.79

differences. Based on prior evidence of group differences on verbal memory tests (Bremner et al., 1993; Bremner, Randall, et al., 1995), a univariate F test was performed to test for group differences on the Verbal Memory Index score. Similarly, separate univariate F tests were performed to test for group differences between PTSD positives and stress-exposed PTSD negatives on the Visual Memory Index and Learning Index. The results of these analyses are presented in Table 9.

Table 9

Univariate Analysis of Variance Results for WRAML Index Scores

WRAML Index	MS Error	*F* (1, 33)	*p*
General Memory	227.23	4.75	.036*
Verbal Memory	205.65	4.87	.034*
Visual Memory	170.76	2.91	.097
Learning	239.06	2.55	.119

*$p < .05$

As may be noted from Table 9, significant group differences were apparent on the General Memory and the Verbal Memory Index scores of the WRAML. Given the significant differences on the General Memory and Verbal Memory Index scores, the means presented in Table 8 were examined to reveal the direction of group differences. Youth with PTSD had significantly lower General Memory Index scores relative to stress-exposed youth without PTSD. Similarly, the Verbal Memory Index scores of the PTSD positives were significantly lower than the scores of the PTSD negatives. As

such, Hypotheses 1 and 2 were supported. In contrast, non-significant differences were apparent on the Visual Memory and Learning Index scores. As the PTSD positive group did not perform significantly lower than the PTSD negative group on the Visual Memory and Learning Index scores, Hypotheses 6 and 10 were rejected.

The next set of analyses examined for group differences among the nine subtests of the WRAML. Table 10 presents the means and standard deviations for each of the WRAML subtest scores per comparison group. Given the structure of the WRAML (i.e., Verbal Memory, Visual Memory, Learning Indexes), three MANOVAs were performed to examine for group differences among the verbal memory (i.e., Story Memory, Sentence Memory, Number/Letter), visual memory (i.e., Picture Memory, Design Memory, Finger Windows), and learning subtests (i.e., Verbal Learning, Sound Symbol, Visual Learning).

The first MANOVA revealed no significant differences between the PTSD positive and PTSD negative groups on the three WRAML verbal memory subtests based on a Wilks Lambda test, F (3, 31) = 2.19 , p = .110. As such, Hypotheses 3, 4, and 5 were rejected. The

Table 10

Means and Standard Deviations for WRAML Subtest Scores

	PTSD Positive (n = 16)		PTSD Negative (n = 19)	
WRAML Subtest	Mean	SD	Mean	SD
Number/Letter	7.56	2.83	8.89	2.76
Sentence Memory	5.94	3.23	8.53	2.93
Story Memory	8.19	1.90	9.37	2.36
Finger Windows	10.31	1.89	11.26	3.11
Design Memory	8.31	3.36	10.16	2.52
Picture Memory	8.69	1.81	9.16	2.57
Verbal Learning	8.75	2.59	10.00	3.46
Visual Learning	8.50	2.71	9.68	2.58
Sound Symbol	7.37	2.12	8.68	3.13

second MANOVA revealed no significant differences on the three WRAML visual memory subtests based on a Wilks Lambda test, F (3, 31) = 1.29, p = .296. Given that the scores of the PTSD positive group did not significantly differ from the scores of the PTSD

negative group on the three visual memory subtests, Hypotheses 7, 8, and 9 were rejected. Similarly, the third MANOVA revealed that there were no significant differences between groups on the three WRAML learning subtests based on a Wilks Lambda test, F (3, 31) = .92, p = .442. As the scores of the PTSD positive group did not significantly differ from the scores of the PTSD negative group on the three learning subtests, Hypotheses 11, 12, and 13 were rejected. Table 11 presents the results of univariate F tests for the nine subtests of the WRAML.

Table 11

Univariate Results for WRAML Subtests

WRAML Subtest	MS Error	*F* (1, 33)	*p*
Number/Letter	7.38	2.09	.158
Sentence Memory	9.44	6.16	.018
Story Memory	4.69	2.58	.118
Finger Windows	6.88	1.14	.293
Design Memory	8.60	3.44	.073
Picture Memory	5.09	.38	.543
Verbal Learning	9.61	1.41	.243
Visual Learning	6.97	1.74	.195
Sound Symbol	7.39	2.01	.165

Chapter 6

Conclusions

In this chapter the purpose and results of the study will be briefly summarized. A discussion of the observed results including both theoretical and clinical implications will also be presented. In addition, potential limitations of the study will be addressed with reference given to implications for future research in the area of child-adolescent psychopathology.

Summary

This study compared the WRAML scores of urban youth with PTSD to the WRAML scores of stress-exposed urban youth without PTSD. A total of 131 youth were referred from Bellevue Hospital clinics subsequent to exposure to a variety of traumatic events (e.g., physical assaults, sexual assaults, motor vehicle accidents, fires). Youth with a positive history for child abuse or neglect were excluded. In order to control for the potentially confounding effects of comorbidity, youth meeting criteria for ADHD, conduct disorder, major depression, substance dependence, and schizophrenia were excluded. Similarly, youth with a documented head trauma, use of psychopharmacological agents, or mental retardation were also

excluded. In sum, 35 youth (16 youth with PTSD; 19 youth without PTSD) participated in this study. Statistical analyses revealed no significant differences between comparison groups with regard to gender, ethnicity, age, and SES.

Separate ANOVAs for the four WRAML Index scores were performed. These analyses revealed significant group differences on the General Memory and Verbal Memory Indexes. Youth with PTSD scored significantly lower on the General Memory and Verbal Memory Indexes compared to stress-exposed youth without PTSD. Whereas youth with PTSD scored lower on the Visual Memory and Learning Indexes relative to stress-exposed youth without PTSD, these differences were not statistically significant. Finally, three separate MANOVAs were performed to examine for group differences across the WRAML subtests. These analyses failed to identify significant group differences across the nine WRAML subtests.

Discussion

The significant differences that were noted between the WRAML Index scores of PTSD positives and stress-exposed PTSD negatives provide empirical support for the differential validity of the DSM-IV PTSD classification as applied to children and

adolescents. While controlling for a number of significantly confounding comorbid disorders and conditions, it was observed that PTSD was associated with discrete patterns of memory impairment in youth.

Compared to stress-exposed youth without PTSD, youth with PTSD evidenced global memory deficits as indicated by significantly lower performance on the WRAML General Memory Index. Specifically, youth with PTSD scored 12% lower on the General Memory Index of the WRAML as compared to stress-exposed PTSD negatives. Whereas PTSD positives scored more than one standard deviation below the mean, PTSD negatives scored within normal limits.

Furthermore, verbal memory deficits were noted as PTSD positives evidenced significantly lower scores on the WRAML Verbal Memory Index. PTSD positives scored 11% lower than the PTSD negatives on this index. It is also of importance to note that whereas youth with PTSD scored in the below average range, youth without PTSD scored within normal limits. As such, it is apparent that verbal memory deficits were associated with PTSD in youth.

These findings are in keeping with a good deal of the clinical

literature involving the assessment and treatment of PTSD. Within the context of clinical interviews, individuals with PTSD have reported significantly greater concentration and memory impairments than stress-exposed PTSD negatives and non-clinical controls (McFarlane, 1988; Saigh et al., 1997). It is to be recalled that 91.7% of youth with PTSD in the Saigh et al. (1997) study reported memory and attention difficulties. Similarly, a series of child-adolescent single-case studies utilizing in vitro flooding conducted by Saigh (1987a, 1987b, 1987c) revealed significant post-treatment improvement on measures of short-term verbal memory and concentration.

Although the current analyses failed to reveal statistically significant findings at the verbal subtest level, it is important to recall that the Verbal Memory Index is comprised of scores from the Story Memory, Sentence Memory, and Number/Letter Memory subtests. Given the significant difference on the Verbal Memory Index and the observed performance of PTSD positives on the Verbal Memory subtests, a trend towards significance is clearly apparent. Youth with PTSD consistently had lower scores than stress-exposed youth without PTSD on the Verbal Memory subtests. For example, the

performance of PTSD positives on the Sentence Memory subtest was 30% lower than that of PTSD negatives. Similarly, youth with PTSD scored 15% and 13% lower on the Number/Letter and Story Memory subtests respectively.

It is of interest to recall that researchers have administered the Logical Memory Component of the WMS (analogous to the WRAML Story Memory subtest) and Digit Span subtests (analogous to the WRAML Number/Letter subtest) to assess verbal memory performance of traumatized adults. Whereas Zimering and colleagues (1993) and Gurvits and colleagues (1996) failed to observe significant differences between PTSD positives and PTSD negatives on the WMS, Bremner and colleagues (Bremner et al., 1993; Bremner, Randall, et al., 1995) reported significant differences between the scores of PTSD positives and healthy controls. Dalton et al. (1989) and Sutker et al. (1995) also reported significant impairment on digit span tasks. On the other hand, Gurvits et al. (1993) and Vasterling et al. (1998) failed to do so.

It is important to note that none of the aforementioned studies accounted for the potentially confounding effects of comorbid psychiatric conditions (Bremner et al., 1993; Dalton et al., 1989;

Gurvits et al., 1993; Gurvits et al., 1996; Sutker et al., 1995; Vasterling et al., 1998; Zimering et al., 1993). Furthermore, it is particularly relevant to note that the DSM-IV indicates that individuals with major depressive disorder "may appear easily distracted or complain of memory difficulties" (APA, 1994, p. 322). In addition, recent empirical findings indicate that individuals who present with PTSD and other comorbid psychiatric conditions evidence significantly greater cognitive impairments than individuals with non-comorbid PTSD (Barrett et al., 1996). As such, this study is one of the first studies to report evidence that verbal memory deficits are specifically associated with PTSD.

As in the case of the Verbal Memory subtests, youth with PTSD consistently scored lower than youth without PTSD on the Visual Memory subtests. Youth with PTSD scored 8.5%, 19%, and 6% lower on the Finger Windows, Design Memory, and Picture Memory subtests respectively. Although these differences are not as pronounced as the ones that were observed for the Verbal Memory subtests, Gurvits et al. (1993, 1996) indicated that veterans with PTSD scored from six to eight percent lower than non-clinical controls on the WMS-R Visual Memory Index. Similarly, Bremner et al. (1993) reported that

veterans with PTSD scored lower than healthy controls on the WMS-R Figural Memory Component. In these studies, the group differences were not statistically significant.

While the group comparison for the Learning Index was not statistically significant, it appears that these differences may reflect clinically significant differences in memory performance. Kazdin (1992) observed in this context that "evaluating the extent to which individuals perform at or within the normative range is the most commonly used method of evaluating clinical significance" (p. 350). Whereas youth with PTSD consistently evidenced below average performance on the WRAML Learning Index, the PTSD negative cohort performed well within normal limits. Indeed, one could argue that the PTSD positive group experienced clinically significant learning impairments. PTSD positives scored 12.5% and 13% lower than PTSD negatives on the Verbal and Visual Learning subtests respectively. When challenged with a cross-modal learning task (i.e., Sound Symbol subtest), the PTSD group scored 16% lower than the PTSD negative group.

While the current results are not in keeping with the results of a number of adult PTSD studies which suggest that individuals with

PTSD evidenced significantly lower performance on learning tasks relative to non-clinical controls (Barrett et al., 1996; Bremner et al., 1993; Vasterling et al., 1998; Yehuda et al., 1995), it must be stressed that only one of these studies controlled for the potentially confounding effects of comorbid psychiatric conditions (Yehuda et al., 1995). Although the Yehuda et al. study noted significant differences on the California Verbal Learning Test delayed recall, it did not reveal significant differences on the cumulative learning trial (similar to the WRAML Learning subtest scores). As such, the extent of learning impairments that have been specifically associated with PTSD has not been clearly established.

It may also be said that the limited sample did not provide sufficient power to reveal statistically significant differences between PTSD positives and PTSD negatives. Given a larger sample size this study may have determined that visual memory and learning impairments are specifically associated with PTSD.

Significance of the Study

Viewed theoretically, it is of considerable interest to recall that the PTSD diagnostic criteria that appeared in the DSM-III (APA, 1980) and DSM-III-R (APA, 1987) were intuitively established (i.e.,

data based field trials were not conducted). Moreover, the DSM-IV (APA, 1994) PTSD field trial did not involve subjects below the age of 15 years (Kilpatrick et al., in press). As such, this study presented an initial test of the differential validity of the DSM-IV PTSD classification as it applies to children and adolescents. In effect, this study is the first study to examine the memory functioning of stress-exposed youth with and without PTSD. This study presents previously unreported evidence for verbal memory deficits associated with PTSD in youth. Moreover, this study offers preliminary evidence regarding impaired visual memory and learning abilities among youth with PTSD.

Within a clinical context, this study has implications for current and future practice. It is important to note that the participants received a complete psychiatric evaluation by one of three psychiatrists and a psychologist. Following a series of clinical interviews and a standardized assessment, the participants and their parents/guardians were verbally advised of the outcome of these evaluations. In the event that a psychiatric disorder was apparent, the parents and youth in question were referred for treatment. The provision of these services may serve to offset the

serious consequences that are associated with PTSD.

As the current findings suggest memory impairments are specifically associated with PTSD in youth, it is important to recall that concentration and memory are predictive of academic achievement (Swanson, 1994). Analogously, research indicates that youth with PTSD evidence significantly lower academic achievement than youth without PTSD (Saigh et al., 1997). As such, it is important to note Saigh et al.'s observation that individuals (e.g., parents, teachers) who intitiate requests for psychological evaluations due to observed academic difficulties "may not be aware of the emotional problems (e.g., trauma-related thoughts) that students with PTSD may experience" (1997, p. 435). In view of these points, the need to provide comprehensive assessment and treatment focusing on all aspects of functioning (e.g., academic, affective, and cognitive) is clearly apparent.

Future Directions

Whereas the present study failed to denote significant differences on the WRAML subtests, the PTSD positive group consistently evidenced lower scores across each of these measures. Given the limited sample and as Cohen's (1992) power analysis

indicates that 26 subjects per group are necessary to denote significant differences at $p < .05$ level (assuming a large effect size), it may be argued that a larger sample may have generated sufficient power to identify additional significant variations. As such, it is recommended that future case-control research employ larger samples.

Although the present study permitted a comparison of stress-exposed youth with and without PTSD, it did not provide a comparative analysis of the memory functioning of youth with PTSD, stress-exposed youth without PTSD, and non-traumatized controls. Further investigations should be effected utilizing these cohorts. This would permit researchers to compare the consequences associated with general stress-exposure to those associated with PTSD.

Given the degree of comorbidity that is associated with PTSD (Saigh et al., in press), future research should strive to compare youth with PTSD to youth with other psychiatric disorders (e.g., ADHD, major depression) as well as to youth presenting with PTSD and other comorbid conditions (e.g., ADHD, major depression). This would further our understanding of impairments across diagnostic

categories. In addition, the inclusion of comorbid cases would afford a better basis for understanding functional impairments that may be specifically associated with PTSD.

Certainly the results must be tempered with the realization that this sample represents a select group. Although no significant differences were observed between the comparison groups with regard to ethnicity and SES, the sample is highly representative of inner-city populations. For example, 57.1%, 14.3%, 14.3%, 11.4% and 2.9% of the youths were from Hispanic, African-American, Caucasian, Asian, and other ethnic backgrounds. In addition, the sample was primarily comprised of youth from the lower to mid SES levels. As such, the external validity of the study may be limited to youth from similar demographic backgrounds. Given these points, researchers should attempt to replicate these findings with different populations of stress-exposed youth.

It is of interest to recall that reduced hippocampal volume was associated with deficits on the WMS (Bremner, Randall, et al., 1995) and that the hippocampus has been implicated in modulating an individuals response to stress (Bremner, Krystal, et al., 1995). Whereas studies employing physiological measures of PTSD have

primarily employed adult samples (Blanchard et al., 1991; Giller et al., 1990; Kosten et al., 1987; Yehuda et al., 1992), preliminary evidence suggests that stress-exposed youth evidence similar forms of reactivity (DeBellis et al., 1994). As such, future research should strive to compare youth with and without PTSD on a battery of neuroanatomical, neuropsychological, and physiological measures.

Appendixes

Appendix A: APA Permission for Citation

Appendix B: Hollingshead Demographic Questionnaire

Appendix C: City University of New York - Graduate School and University Center Consent Form

Appendix D: New York University - Bellevue Hospital Consent Form

AMERICAN PSYCHIATRIC ASSOCIATION
1844

1400 K Street, N.W.
Washington, D.C. 20005
Telephone: 202.682.6000
Fax: 202.682.6114

Appendix A

May 30, 1997

Anastasia E. Yasik, BA
120 West 44th St. (#1104)
New York, NY 10036

Dear Ms. Yasik:

I am responding to your recent request to reprint **diagnostic criteria for Posttraumatic Stress Disorder** from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.

Permission is **granted** under the following conditions:

- Permission is nonexclusive and limited to the single use specified in your letter;
- Use is limited to the English language only; and
- Permission must be requested for subsequent uses (including subsequent editions)

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Sincerely,

Ronald E. McMillen

Ronald E. McMillen
Director of Publications & Marketing

Enclosure

Appendix B

Parent Questionnaire

Directions

If you are married and living with your spouse, please proceed to page 2.

If you are separated or divorced and employed, please proceed to page 3.

If you are separated or divorced and receiving support payments from your present or former spouse, please proceed to page 4.

If you are widowed and living on the income of your spouse's estate, please proceed to page 5.

If you are widowed and not living on the income of your spouse's estate, please proceed to page 6.

If you are single please proceed to page 7.

Fill out this section only if you are married and living with your spouse.

Your Name: First: _____ Last: _____
Name of Student: First: _____ Last: _____
Phone Number: (___) ___ - ____(Home) (___) ___ - ____(Work)

Please respond to the following questions by placing an **X** on the line next to the response that is most appropriate for you. Be sure to mark only one response after each sentence.

1. My gender is ____ male ____ female.

2. My child's ethnicity is: __White, non-Hispanic; __Hispanic; ___African American; ___Puerto Rican; __American Indian; __Other (please specify) _____

3. I am currently employed. ____ Yes ____ No

4. My spouse is currently employed. ____ Yes ____ No

5. My current job title is: _____

6. My spouse's current job title is: _____

7. Currently, I am retired. ____ Yes ____ No
   My previous occupation was: _____

8. Currently, my spouse is retired. ____ Yes ____ No
   My spouse's occupation was: _____

9. The highest level of schooling I have completed is:
   - ____ less than 7th grade.
   - ____ junior high school (9th grade).
   - ____ some high school (10th or 11th grade).
   - ____ high school graduate.
   - ____ some college or specialized training.
   - ____ college or university graduate.
   - ____ graduate degree.

10. The highest level of schooling my spouse has completed is:
    - ____ less than 7th grade.
    - ____ junior high school (9th grade).
    - ____ some high school (10th or 11th grade).
    - ____ high school graduate.
    - ____ some college or specialized training.
    - ____ college or university graduate.
    - ____ graduate degree.

Fill out this section only if you are separated or divorced and employed.

Your Name: First: _____ Last: _____
Name of Student: First: _____ Last: _____
Phone Number: (___) ___-____(Home) (___) ___-____(Work)

Please respond to the following questions by placing an **X** on the line next to the response that is most appropriate for you. Be sure to mark only one response after each sentence.

1. My gender is ____ male ____ female.

2. My child's ethnicity is: __White, non-Hispanic; __Hispanic; ___African American; ___Puerto Rican; __American Indian; __Other (please specify) _____

3. I am currently employed. ____ Yes ____ No

4. My current job title is: _____

5. Currently, I am retired. ____ Yes ____ No

   My previous occupation was: _____

6. The highest level of schooling I have completed is:

   ____ less than 7th grade.
   ____ junior high school (9th grade).
   ____ some high school (10th or 11th grade).
   ____ high school graduate.
   ____ some college or specialized training.
   ____ college or university graduate.
   ____ graduate degree.

Fill out this section only if you are separated or divorced <u>and</u> receiving support payments from your present or former spouse.

Your Name: First: _____ Last: _____
Name of Student: First: _____ Last: _____
Phone Number: (___) ___-____(Home) (___) ___-____(Work)

Please respond to the following questions by placing an **X** on the line next to the response that is most appropriate for you. Be sure to mark only one response after each sentence.

1. My gender is _____ male _____ female.

2. My child's ethnicity is: __White, non-Hispanic;
__Hispanic; ___African American; ___Puerto Rican;
__American Indian; __Other (please specify) _____

3. I am currently employed. _____ Yes _____ No

4. My (present/former) spouse is currently employed._Yes _No

5. My current job title is: _____

6. My (present/former) spouse's current job title is:_____

7. Currently, I am retired. _____ Yes _____ No
My previous occupation was: _____

8. Currently, my (present/former) spouse is retired._Yes _No
My spouse's occupation was: _____

9. The highest level of schooling I have completed is:
   - _____ less than 7th grade.
   - _____ junior high school (9th grade).
   - _____ some high school (10th or 11th grade).
   - _____ high school graduate.
   - _____ some college or specialized training.
   - _____ college or university graduate.
   - _____ graduate degree.

10. The highest level of schooling my spouse has completed is:
   - _____ less than 7th grade.
   - _____ junior high school (9th grade).
   - _____ some high school (10th or 11th grade).
   - _____ high school graduate.
   - _____ some college or specialized training.
   - _____ college or university graduate.
   - _____ graduate degree.

Fill out this section only if you are widowed and living on the income of your spouse's estate.

Your Name: First: _____ Last: _____
Name of Student: First: _____ Last: _____
Phone Number: (___) ___-____(Home) (___) ___-____(Work)

Please respond to the following questions by placing an **X** on the line next to the response that is most appropriate for you. Be sure to mark only one response after each sentence.

1. My gender is ____ male ____ female.

2. My child's ethnicity is: __White, non-Hispanic; __Hispanic; ___African American; ___Puerto Rican; __American Indian; __Other (please specify) _____

3. I am currently employed. ____ Yes ____ No

4. My spouse was employed. ____ Yes ____ No

5. My current job title is: _____

6. My spouse's job title was: _____

7. Currently, I am retired. ____ Yes ____ No

   My previous occupation was: _____

8. The highest level of schooling I have completed is:

   ____ less than 7th grade.
   ____ junior high school (9th grade).
   ____ some high school (10th or 11th grade).
   ____ high school graduate.
   ____ some college or specialized training.
   ____ college or university graduate.
   ____ graduate degree.

9. The highest level of schooling my spouse had completed is:

   ____ less than 7th grade.
   ____ junior high school (9th grade).
   ____ some high school (10th or 11th grade).
   ____ high school graduate.
   ____ some college or specialized training.
   ____ college or university graduate.
   ____ graduate degree.

Fill out this section only if you are widowed and <u>not</u> living on the income of your spouse's estate.

Your Name: First: _____ Last: _____
Name of Student: First: _____ Last: _____
Phone Number: (___) ___ - _____ (Home) (___) ___ - _____ (Work)

Please respond to the following questions by placing an **X** on the line next to the response that is most appropriate for you. Be sure to mark only one response after each sentence.

1. My gender is _____ male _____ female.

2. My child's ethnicity is: __White, non-Hispanic; __Hispanic; ___African American; ___Puerto Rican; __American Indian; __Other (please specify) _____

3. I am currently employed. _____ Yes _____ No

4. My current job title is: _____

5. Currently, I am retired. _____ Yes _____ No

   My previous occupation was: _____

6. The highest level of schooling I have completed is:

   _____ less than 7th grade.
   _____ junior high school (9th grade).
   _____ some high school (10th or 11th grade).
   _____ high school graduate.
   _____ some college or specialized training.
   _____ college or university graduate.
   _____ graduate degree.

Fill out this section only if you are single.

Your Name: First: _____ Last: _____
Name of Student: First: _____ Last: _____
Phone Number: (___) ___-____(Home) (___) ___-____(Work)

Please respond to the following questions by placing an **X** on the line next to the response that is most appropriate for you. Be sure to mark only one response after each sentence.

1. My gender is ____ male ____ female.

2. My child's ethnicity is: __White, non-Hispanic; __Hispanic; ___African American; ___Puerto Rican; __American Indian; __Other (please specify) _____

3. I am currently employed. ____ Yes ____ No

4. My current job title is: _____

5. Currently, I am retired. ____ Yes ____ No

   My previous occupation was: _____

6. The highest level of schooling I have completed is:

   ____ less than 7th grade.
   ____ junior high school (9th grade).
   ____ some high school (10th or 11th grade).
   ____ high school graduate.
   ____ some college or specialized training.
   ____ college or university graduate.
   ____ graduate degree.

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Appendix C

PRINCIPAL INVESTIGATOR: Philip A. Saigh, Ph.D.
Telephone #: (212) 642-2271

TITLE OF RESEARCH STUDY: A Comparative Analysis of the Affective, Behavioral, and Cognitive Ratings of Stress Exposed Youth.

THE PURPOSE OF THE RESEARCH IS:

This study seeks to learn if youth who have been exposed to very stressful events such as physical assault, sexual assault, or serious accidents differ on a number of measures of emotional adjustment. This study also seeks to determine if depressed youth differ from stress exposed youth on different measures of functioning.

PARTICIPATION:

Your participation will involve 1-2 visits for a total of 5 hours. Your participation is voluntary and you are free to withdraw from the study at any time without penalty or loss of benefits.

DESCRIPTION OF PROCEDURES

To be included in the study, subjects must have been exposed to extreme forms of stress at least 30 days before the testing takes place or experience feelings of depression. Youth with histories of child abuse or neglect will not be included in the study. After informed consent of the subjects and their parents/guardians is obtained, the parents/guardians will be asked to complete a brief demographic questionnaire. Subjects will receive a single clinical interview by one of two highly experienced psychiatrists and a psychologist. Subjects will subsequently be referred to two examiners who will administer a series of questionnaires as well as measures of cognitive functioning including an intelligence and a memory test. The questionnaires are intended to determine if a youth has a particular psychiatric condition that may have been caused by his or her very stressful experience. The questionnaires will also serve to determine if a subject has a particular psychiatric condition that may have been caused by his or her very stressful experience. The questionnaires will also serve to determine if a subject has additional psychiatric conditions such as major depression, substance abuse, schizophrenia, or a conduct

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disorder. Some of the questionnaires also measure anxiety, depression, introversion-extraversion, dissociation, attitudes about the future, conduct, family relations, and self-concept. The intelligence test is intended to assess current intellectual functioning. The memory test is intended to determine the quality of short and long term memory.

POTENTIAL RISKS

Potential risk involves the possibility that some of the subjects may become anxious or upset while discussing their experiences. As such, all of the subjects will be debriefed following the clinical and structured interview sessions. If a subject continues to feel anxious or upset, S. Inamdar, M.D. or R. Oberfield, M.D. will provide needed assistance. If a subject reports previously undocumented experiences that involve abuse/neglect, the investigators would be obliged to report the information. Information involving mandatory reporting of child abuse/neglect and the potential outcome of such reports is described in the consent form.

POTENTIAL BENEFITS

A potential benefit to the subjects involves the opportunity to talk about adverse experiences and discuss their concerns and feelings with highly experienced clinicians. Psychological work-ups that are based on the interview data, psychological questionnaires, as well as the memory and intelligence tests will be performed. These work-ups will provide a clear benefit to the subjects as the subjects and their parents/guardians will be advised about the presence or absence of psychiatric disorders. Participants and parents/guardians will also be advised about the subject's self-reported anxiety, depression, future orientation, self-efficacy, self-concept, introversion-extroversion, family relations as well as intellectual and memory function. An additional clinical benefit will involve the provision of referrals to relevant clinics at Bellevue or metropolitan area hospitals. In addition, subjects will be reimbursed $20 per evaluation. Finally, the results of this study may benefit theory and practice inasmuch as we hope to determine if stress exposed youth with and without PTSD differ across a number of predictors as a function of the type of stressor that they experienced.

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DATA STORAGE/CONFIDENTIALITY.

Although all records will be kept in confidence, the investigators will advise the subjects (i.e., legal minors) and their parents/guardians about the results of the psychiatric examinations as well as the results that were obtained through the administration of the standardized psychological tests. A psychological work-up denoting the name and the clinical findings will be entered into the subject's hospital chart. As such, hospital staff that are not involved in the project will have access to the information that is contained in the psychological work-ups. Test results will be entered for storage in a secured computer file that will not reflect the identity of the subjects. The actual diagnostic results and test protocols will be stored in a locked cabinet that is located in the private office of the principal investigator.

If you have any questions regarding this research, you can call Professor Philip Saigh at (212) 642-2271. If you have any questions concerning your rights as a participant in this study, you can call Sponsored Research, Graduate School and University Center/CUNY at (212) 642-2059.

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Approved: September 15, 1997
Expires : October 16, 1998

Parent/Guardian Consent to Participate in the Research Project

I understand all the information pertaining to the research project described in the attached consent form. I understand that my child does not have to participate in this study and that my child may quit the study at any time for any reason. I understand that the results of the study may be published in a scientific magazine but the names of the children who participate will not be mentioned. I also understand that the test results will be shared with my child and me. I understand our rights and give my consent for my child to participate in this project.

Parent/Guardian Signature _____ Date _____

Child's Consent to Participate in the Research Project

I understand all the information pertaining to the research project described in the attached consent form. I understand that I do not have to participate in this study and that it is okay to quit the study at any time for any reason. I understand that the results of the study may be published in a scientific magazine but the names of the children who participate will not be mentioned. I also understand that the test results will be shared with my parents and me. I understand my rights and freely agree to participate in the study.

Child's Signature _____ Date _____

Appendix D

NEW YORK UNIVERSITY MEDICAL CENTER
AND
BELLEVUE HOSPITAL CENTER

INFORMED CONSENT TO PARTICIPATE IN RESEARCH

You are being asked to volunteer to be a subject in a research study. This form is designed to provide you with information about this study which you should know and understand as well as to answer any questions.

Project Director: Philip A. Saigh, Ph.D Dept. Psychiatry Tel # (212) 263-6205

TITLE OF RESEARCH STUDY: A Comparative Analysis of the Affective, Behavioral, and Cognitive Ratings of Stress Exposed Youth

SUBJECT PARTICIPATION: ____Inpatient/ __X__Outpatient/ ____Other

We expect to enlist the following number of subjects for this study: 120

Your participation will involve this many visits: 1-2

Each of these visits will take the following amount of time: 3hrs. and 2hrs.

THE PURPOSE OF THE RESEARCH IS :

This study seeks to learn if youth who have been exposed to very stressful events such as physical assault, sexual assault, or serious accidents differ on a number of measures of emotional adjustment. This study also seeks to determine if depressed youth differ from stress exposed youth on different measures of functioning.

THE FOLLOWING PROCEDURES WILL BE INVOLVED: (IF LIMITED TO DONATION OF BLOOD, LEAVE BLANK - SEE PAGE 2.)

See attached.

THE FOLLOWING PROCEDURES WILL BE INVOLVED: To be included in the study, subjects must have been exposed to extreme forms of stress at least 30 days before the testing takes place or experience feelings of depression. Youth with histories that involve child abuse or neglect will not be included in the study. After informed consent of the subjects and their parents/guardians is obtained, the parents/guardians will be asked to complete a brief demographic questionnaire. Subjects will receive a single clinical interview by one of two highly experienced psychiatrists and a psychologist. Subjects will subsequently be referred to two examiners who will administer a series of questionnaires as well as an intelligence and a memory test. The questionnaires are intended to determine if a youth has a particular psychiatric condition that may have been caused by his or her very stressful experience. The questionnaires will also serve to determine if a subject has additional psychiatric conditions such as major depression, substance abuse, schizophrenia, or a conduct disorder. Some of the questionnaires also measure anxiety, depression, introversion-extraversion, dissociation, attitudes about the future, conduct, family relations, and self-concept. The cognitive tests are intended to assess current intellectual functioning as well as cognitive interference. The memory test is intended to determine the quality of short and long term memory.

CONSENT TO PARTICIPATE IN RESEARCH (CONTINUED)

DONATION OF BLOOD: N/A cc. (equivalent to _____ ounces).
Frequency of withdrawal: _____. Total amount: _____. The potential risks of donating blood may occasionally include pain, bruising, fainting or a small infection at the puncture site.

THE POTENTIAL RISKS OR DISCOMFORTS TO YOU ARE: (IF LIMITED TO DONATION OF BLOOD, LEAVE BLANK)

See attached.

THERAPEUTIC OBJECTIVES (CHECK THE APPLICABLE CHOICE(S) BELOW):

X This research study includes procedures that may change the treatment you would otherwise receive. We hope the knowledge gained will be of benefit to you.

X This research study included procedures which may not give you immediate benefits. It is hoped the knowledge gained will be of benefit to others in the future.

___ This research study is planned to select by chance your treatment. It is not known if the treatment you will receive will be of benefit to you.

THE POTENTIAL BENEFITS TO YOU OR TO OTHERS ARE:

See attached.

THE POTENTIAL RISKS OR DISCOMFORT TO YOU ARE: Although all records will be kept in confidence, the investigators will inform you and your parents/guardians about the results of the psychiatric examinations as well as the results that were obtained through the administration of the anxiety, depression, future orientation, self-efficacy, self-concept, introversion-extraversion, conduct, dissociation, and family relations questionnaires as well as the measures of cognitive functioning. A psychological work-up denoting your name and the clinical findings will be entered in your hospital chart. As such, hospital staff that are not involved in the project will have access to the information that is contained in the psychological work-ups. You and your parents/guardians will be advised of the outcome of the clinical interviews and psychological testing. Finally, parents/guardians will receive a copy of your psychological work-up.

Testing will only occur if you and your parents/guardians sign the consent form. You will be allowed to withdraw from the study at any point without reprimand. Potential risk involves the possibility that some of the subjects may become anxious or upset while discussing their experiences. As such, all of the subjects will be debriefed following the interview sessions. If a subject continues to feel upset, highly experienced psychiatrists will provide needed assistance. If you report previously undocumented experiences that involve parental abuse/neglect, the researchers would be obliged to report the information. Should this occur, the Office of Child Welfare and/or other agencies within the City of New York may investigate the alleged abuse/neglect. Such actions could lead to a court hearing and to the placement of a subject in foster care.

THE POTENTIAL BENEFITS TO YOU OR OTHERS ARE: A potential benefit to subjects involves the opportunity to talk about very stressful experiences and/or feelings of depression. Youth will have an opportunity to discuss their concerns and feelings with highly experienced clinicians. Psychological work-ups that are based on the interview information and questionnaires as well as the intelligence and memory tests will be prepared. These work-ups will provide a clear benefit to the subjects as each will include information about the presence or absence of psychiatric disorders as well as information regarding each subject's anxiety, depression, future orientation, self-efficacy, self-concept, introversion-extraversion, conduct, dissociation, cognitive functioning, family relations, and memory. An additional clinical benefit will involve the provision of referrals to relevant clinics at Bellevue Hospital or metropolitan area hospitals. Furthermore, you will be reimbursed for your time and your travel expenses at the rate of $20 per evaluation. Finally, the results of this study may benefit scientific knowledge and clinical practice inasmuch as this study seeks to learn if youth who have been exposed to very stressful events such as physical assault, sexual assault, or serious accidents differ on a number of measures of emotional adjustment.

IF YOU DO NOT PARTICIPATE IN THE RESEARCH, YOU MAY RECEIVE THE FOLLOWING ALTERNATIVE TREATMENT (S):

You will be eligible to receive those services that are routinely provided by the Bellevue Adolescent Clinic, the Pediatric Consultation-Liaison Psychiatry Clinic, and the Pediatric Crime Victim's Program.

GENERAL CONDITIONS

1. Should you consent to participate in this research, your identity will be kept confidential within these limits: If investigational drugs and/or devices subject to U.S. Food and Drug Administration regulations are involved, it may be necessary for this consent form and other medical records to be reviewed by representatives of the F.D.A. and the agency providing the test substance and / or the Sponsor of the study. In addition, if your participation in this research is for treatment or diagnostic purposes, a copy of the informed consent documentation will be included in your medical record maintained by your treating physician or hospital, as applicable, and will be subject to New york State and federal regulations concerning confidentiality of medical records.

2. All forms of medical diagnosis and treatment --whether routine or experimental-- involve some risk of injury. In spite of all precautions, you might develop medical complications from participating in this study. If such complications arise, the researchers will provide emergency medical treatment and will assist you in obtaining appropriate follow-up medical treatment but this study does not provide compensation for additional medical or other costs, unless otherwise stated in 2.A. below.

2.A.

3. You will be told of any new findings that may influence your willingness to continue to participate in the research. Your participation in this study may be terminated by the Project Director if in his/her judgement it is inadviseable for you to continue.

4. If you would like to discuss your participation with an institutional representative who is not part of this study, please call the Administrator, Institutional Board of Research Associates, Telephone No. (212) 263-6705.

5. Should you agree to participate in this research you may change your mind at any time. Refusal to participate will not harm your relationship with the faculty and attending staff, nor will it prejudice your further treatment.

AGREEMENT TO PARTICIPATE

I have read the description of the research study and general conditions or it was read to me by:_____. Anything I did not understand was explained to me by:_____, any questions I had were answered by:_____. I certify that I am/ am not (circle one) participating in another research project at this time, and have discussed the implications of such activity with the project director(s) of this project. In consideration of this understanding, I voluntarily agree to participate in this research at _____NYUMC _____Bellevue Hospital_____Other (identify)_____
I will receive a copy of this Consent Form.

WHEN THE SUBJECT IS AN ADULT

_____/_____		_____/_____	
Print Name of Participant or Legal Representative	Date	Signature of Participant or Legal Representative*	Date
_____/_____		_____/_____	
Print Name of Person Obtaining Consent	Date	Signature of Person Obtaining Consent	Date
_____/_____		_____/_____	
Print Name of Witness	Date	Signature of Witness	Date

WHEN THE SUBJECT IS A CHILD

_____I have solicited the assent of the child. _____I have not solicited assent for the following reason(s):_____

_____
Signaure of Person Obtaining Consent

___I agree with the manner in which assent was solicited and given by my child and I agree to have my child participate in the study.

___Although my child did not or could not give his/her consent, I agree to have my child participate in the study.
I will be given a copy of this Consent Form.

_____/_____		_____/_____	
Print Name of Parent(s)**	Date	Signature of Parent(s)	Date
_____/_____		_____/_____	
Print Name of Participant	Date	Signature of Participant or Legal Representative	Date
_____/_____		_____/_____	
Print Name of Witness	Date	Signature of Witness	Date

*For subjects who may not be capable of providing informed consent the signature of a legal representative is required.
For children between the ages of 12 and 17, their signature is generally required in addition to that of the parent or legal representative.
**The signature of one parent is sufficient when the research is of minimal risk to the child, or when the research presents the prospect of direct benefit to the child. The signature of both parents is required when the research involves greater than minimal risk with no prospect of direct benefit to the child. The requirement for signature of both parents may be waived if one parent is deceased, unknown, incompetent, or not reasonably available, or when one parent has sole legal responsibility for the care and custody of the child.

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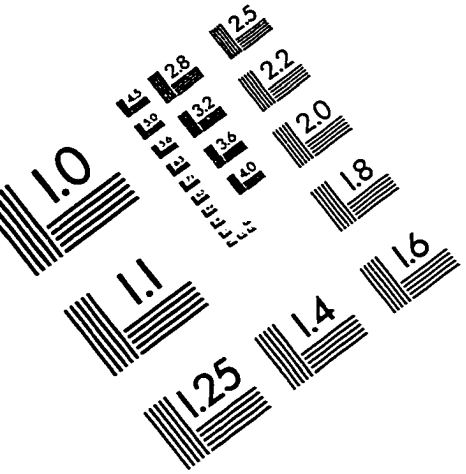
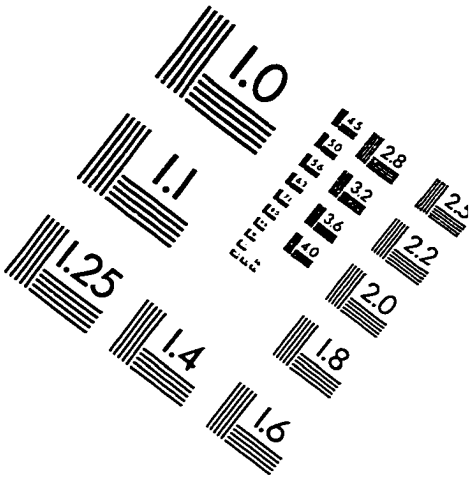
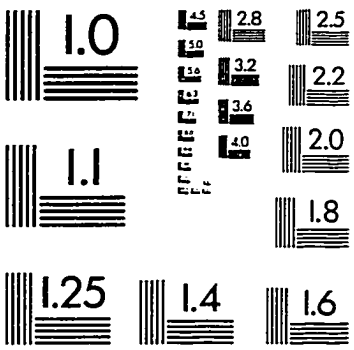
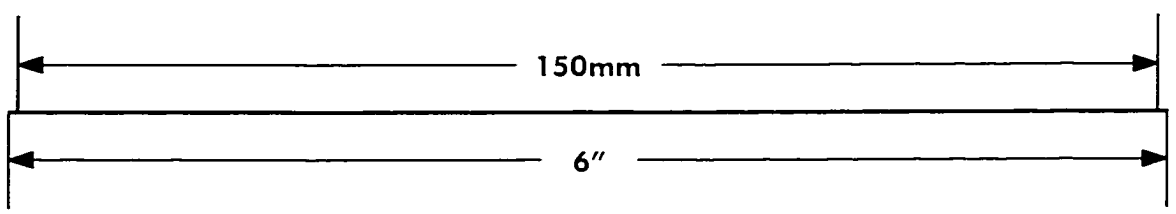
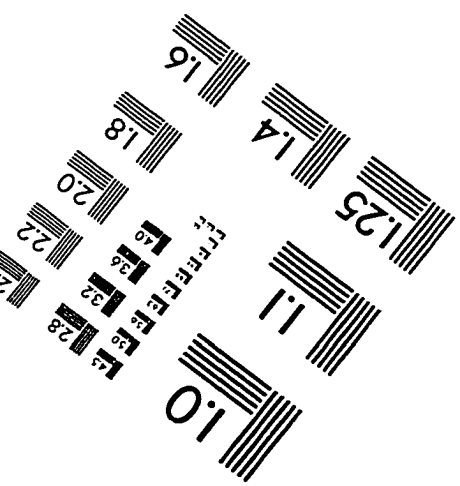
IMAGE EVALUATION
TEST TARGET (QA-3)











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