Domains of Intellectual Functioning and Posttraumatic Stress Disorder Symptoms Among Traumatized Youth

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Submitted in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy
under the Executive Committee
of the Graduate School of Arts and Sciences

Columbia University

2019

ABSTRACT

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This investigation examined the association between *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (*DSM-IV*) posttraumatic stress disorder (PTSD; American Psychological Association, 1994) symptoms as measured by the *Children's PTSD Inventory* (*CPTSDI*; Saigh, 2003a) and the *Wechsler Intelligence Scale for Children, 3rd Edition* (*WISC-III*; Wechsler, 1991) scores of 78 traumatized children (mean age = 13.42 years, *SD* = 2.68 years). Child diagnostic interviews determined that the participants did not have major comorbid disorders and were not taking medications that could influence cognitive functioning. Significant inverse correlations were observed between the different symptom *CPTSDI* clusters and the *WISC-III* Verbal indices. Moreover, with the exception of the *WISC-III* Block Design subtest, nonsignificant correlations were observed between the *WISC-III* Performance measures and the *CPTSDI* symptom clusters. Theoretical and clinical implications are considered.

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ACKNOWLEDGEMENTS

With my dissertation now written and as I look forward to my final defense, I am overwhelmed with gratitude for the individuals without whom I am unsure I would have made it to this point. Each of these people, and a great many who are not mentioned, was an invaluable support throughout this journey. They helped me celebrate my successes and, perhaps more importantly, offered invaluable encouragement when my self-confidence or persistence seemed to waver.

The top of this list of thanks must be shared between my parents and my advisor, Professor Saigh. Without these three, I would surely not be in this position and would not have accomplished the feat that I have been working toward, to a greater or lesser degree, for the last thirteen years.

To Professor Saigh, I owe an enormous debt of gratitude for believing in me from Day One. He took a chance on an external admit and (I hope) never looked back. I can say without a shadow of doubt that Professor Saigh has helped make me into the budding academic, ever-striving researcher and clinician, and better human being that I am today after spending these five years under his wing. I am truly honored to be his last doctoral student and look forward to the many years of working together that are yet to come.

To my mom and dad, I owe everything. There are simply no words to express the gratitude in my heart each and every day. When I doubted myself, they reminded me that I can do anything I put my mind to. When I felt like I was falling apart, they were at the ready to put me back together. And when I realized that I could do the things, they never missed the chance to hug me and say, “We told you so.” Thank you for encouraging all my dreams and sacrificing so much to help me make this happen.

An immense amount of gratitude for my committee members must also be shared. Professors Block and Gushue, who were integral contributors to the process that culminated with this dissertation, deserve more thanks than I can share in this brief section. Their time, commitment, patience, and kindness cannot be overstated. Professor Block, in particular, has been one of my anchors throughout my doctoral experience. Ever since taking her class in my second year, she has been a resource to whom I have turned for intellectual guidance, emotional support, and a laugh when I most needed one. I am also thankful for the insights shared by Dr. Bremner and his willingness to take time from his busy schedule to participate in the final steps of this journey.

Professor Brassard, the fifth member of my committee, has been a tireless supporter of my academic and professional growth in addition to assuming this role. The opportunity to work with her in so many varied capacities has helped me to grow in countless ways. I am immeasurably grateful for her sincere investment in my future and for her office door always being open.

I would be remiss if I did not take this time to extend my thanks to at least of handful of other faculty members at Teachers College and beyond. Professor Peverly's support and the hours he spent helping me make sure my ducks lined up properly (despite never having a free moment to himself) afforded me invaluable direction, information, and reassurance. Similarly, Drs. Rivelis, Yanes-Lukin, Mufson, Stevens, Verdeli, and Ms. Mara Eilenberg have each been role models and support systems simultaneously. Without their guidance and, at times, nurturance, this journey would have been far more challenging, lonely, and lacking the focus that each of them helped me to hone. There are many other faculty members to whom I am grateful

and who have fueled my fire for teaching. I hope to follow in their steps in the suddenly not-so-distant future.

Finally, this graduate program has introduced me to the most wonderful, loving, brilliant people and reminded me that I am blessed to have had exceptional friends with me through it. I am certain that there are those not on the list but fully deserving of my acknowledgement. Elena, Anna, Ellis, Molly, Andy, Michelle, Missy, Zoe, Cheryl, Yun, Hillary, Alessandro, Dusty, Leah, Rachel, Imani, Taína, Ashley… thank you for being in my life. Thank you for understanding the craziness that *is* graduate school and sticking it out with me.

Chapter I

The History of Posttraumatic Stress Disorder

Although posttraumatic stress disorder (PTSD) was recognized as a psychiatric diagnosis in 1980 (American Psychiatric Association [APA]), accounts involving psychological distress following traumatic experiences have been reported for thousands of years. This chapter provides a description of psychological reactions to exceptional stress over time. Various examples of posttraumatic reactions are presented dating from ancient Sumerian cuneiform tablets to the most recent diagnostic criteria for PTSD as described in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (*DSM-5*, American Psychiatric Association, 2013) are presented.

Literature referenced in the current chapter was located with searches of PsychInfo and Google Scholar. Relevant terms were entered in these databases including: "Posttraumatic Stress Disorder," "trauma," "trauma exposure," "history of traumatic responses," "accounts of trauma reactions," "Soldier's Heart," "Da Costa syndrome," "shell shock," "Disordered Action of the Heart," "Gross Stress Reaction," "Transient Situational Disturbance," "World War I," "World War II," and "children." These search terms were combined in various ways to identify narrative and medical accounts, research publications, and the classification systems that addressed adverse reactions to traumatic events. An earlier chapter on the history of PTSD by Saigh and Bremner (1999) was also used as a reference.

Historical Accounts of Reactions to Trauma

Some of the earliest descriptions of posttraumatic responses can be found in the archeological relics of the ancient world. Cuneiform tablets, created in Ancient Sumeria two thousand years before Christ, chronicled the psychological aftermath of war (Ben-Ezra, 2010). In

particular, the tablets describe sleep disturbances and anxiety after raids that left "dead bodies… lying about" (Kramer, 1969, as cited in Ben-Ezra, 2010). Text from the *Lamentation of Ur* reads, "I, although, for that night I tremble, fled not before that night's violence… in my nightly sleeping place verily there is no peace for me" (Kramer, 1969, as cited in Ben-Ezra, 2010). Similar themes of nightmares and other intrusive symptoms, often paired with physiological reactivity, in the wake of traumatic events are recurrent in various Sumerian texts as well as narratives from other ancient cultures including Babylon, Greece, and Rome (Ben-Ezra, 2010).

Additional early evidence of traumatic stress reactions can be found in a number of classical texts. For example, Homer's the *Iliad* and the *Odyssey* contain various references of psychological responses to traumatic events. One such example from the *Iliad* describes Achilles's inability to sleep after his friend died in combat (e.g., "nor did sleep… lay hold of him, but he turned every this way and that," Homer, 1999, p. 563, as cited in Ben-Ezra, 2010).

In addition to these examples of posttraumatic reactions to war-based events, natural disasters and other types of civilian stressors have also been described in ancient texts. One example comes from the writings of Pliny the Younger, a Roman magistrate in the 1st century AD, who survived the eruption of Mount Vesuvius that killed his distinguished uncle. Ben-Ezra (2010) noted that he described feelings of detachment as he reflected on the loss of his uncle by observing, "…had I not delivered poor consolation in my mortal lot from the belief that the whole world was dying with me and I with it" (Pliny the Younger, 1969, as cited in Ben-Ezra (2010). Pliny the Younger's observations also included symptoms of hyperarousal, hopelessness, and disturbances in sleep (Ben-Ezra, 2010).

Another very famous example comes from the celebrated diary of Samuel Pepys (1667). Pepys, the first British Lord of the Admiralty, survived the Great Fire of London in 1666 and

kept a detailed record of his activities and observations. In particular, his diary recounted ongoing intrusive memories of the fire that interfered with his sleep almost six months after the event as he described, "… to this very day I cannot sleep a-night without great terrors of the fire" (Pepys, 1667). Similarly, Charles Dickens, the esteemed English writer, wrote about having experienced a railroad accident, which resulted in lasting psychological distress. Specifically, he represented that he was "…not quite right within, but believe it to be an effect of the railway…" (Dickens, 1865, as cited in Figley, 1989). Furthermore, Figley (1989) indicated that Dickens developed a phobia of railroad travel, suggesting persistent avoidance of the trauma-related stimuli.

Roughly 30 years after Dickens's account of the railway accident, Freud published *Heredity and the Aetiology of Neuroses* in 1896. Given this context, he described the lasting effects of exposure to traumatic experiences early in life (Wilson, 1994). According to Wilson (1994), Freud's initial formulation regarding the effects of external stressors included the notion that individuals repress memories of traumatic events, particularly those that involve abuse experienced in early childhood, as a means of avoidance. The result of this repression, according to Freud, was the emergence of "neurotic symptoms and behaviors" (Wilson, 1994, p. 683). Freud further theorized in *Heredity and the Aetiology of Neuroses* that prolonged, rather than acute, expressions of such symptoms were the result of psychological predisposing factors made evident by the "*agents provocateurs* which render manifest a neurosis that has previously been latent" (Freud, 2014, p. 11). In descriptions of his patients, Freud described posttraumatic responses involving sleep disturbances and nightmares regarding traumatic events, hyperarousal, and re-experiencing symptoms (Wilson, 1994). Although Freud ultimately shifted his focus to the effects of internal childhood experiences relative to social and sexual development, it is clear

that his early conceptualizations of traumatic reactivity paralleled many of the accounts that were seen throughout history and reflect aspects of the current symptoms of PTSD.

Around the same time, Emil Kraepelin developed what is largely regarded as the first systematic classification system for mental disorders (Kihlstrom, 2002). He used the term "Shreckneurose," which translates to "fright neurosis," in recognition of the "multiple nervous and psychic phenomenon arising as a result of severe emotional upheaval or sudden fright… it can be observed after serious accidents and injuries" (Kraepelin, 1896, as translated by Jablensky, 1985, p. 737). Additionally, Kraepelin referred to depressed mood, obsessive thoughts, rumination and somatic symptoms that may occur in the context of the disorder (Jablensky, 1985). It is worthy to note that Kraepelin's systematic approach to describing the etiology, course, and symptomology of psychiatric disorders prompted the American Psychiatric Association to adopt a similar model of categorical classification.

Accounts of Traumatic Reactions in Adult Populations

In addition to the historical references described above, the literature is rife with examples of individuals who documented psychological responses to combat. During the American Civil War, a physician treating soldiers observed somatic disturbances among those who were otherwise in adequate physical condition. Da Costa (1871) described such symptoms in one soldier as he reported that the man "got out of breath, could not keep up with his comrades, was annoyed with dizziness and… pain in the chest… though he appeared well and healthy" (p. 4). This particular solider, like many seen by Da Costa, reportedly continued to suffer from "irritability of the heart" (Da Costa, 1871, p. 4), which later became known as "Da Costa's Syndrome" or "Soldier's Irritable Heart" (Trimble, 1981). According to Da Costa (1871), the primary symptoms were largely induced by "hard field service… in the face of the

enemy" (pg. 23) and consisted of heart palpitations, chest pain, racing pulse, shortness of breath, and "nervous disorders" (p. 10) such as sleep disturbance and digestive problems.

Investigation of the psychological effects of combat on the wellbeing of soldiers, during and after service, surged during the First World War (WWI). Various terms emerged to categorize the psychological and physiological responses to the extreme stress of war such as "shell shock" (Myers, 1915), "war neuroses" (Weisenburg, 1920), and "disordered action of the heart" (Venning, 1919). Mott (1919) emphasized the role of both "physical shock" (i.e., proximity to a shell's explosion, physical trauma to the head, exposure to noxious chemicals, etc.) and "psychic shock." Lending support to his conceptualization, Mott (1919) detailed the experiences of a WWI lieutenant who spent five days behind enemy lines without food or water. After being rescued and hospitalized, the soldier described being "subject to dreams in which [he heard] these shells bursting and whistling through the air. [He] continually [saw his] sergeant, both alive and dead, and also [his] attempts to return… During the day, if [he sat] doing nothing in particular and [found himself] dozing, [his] mind seem[ed] to immediately fly back to France" (Mott, 1919, p. 127). In the same vein, Southard (1919) described the physical and psychological posttraumatic functioning of soldiers and veterans of WWI in his classic book, *Shell shock and other neuropsychiatric problems*. For example, Southard (1919) recorded the symptoms of "a tumultuous heart, … rapid tremor, and a variety of vasomotor disorders, such as blushing and paling, … exaggerated reflexes, emotionality, … and digestive troubles" without identifiable physical causes (Southard, 1919, p. 198).

Venning (1919) published a report on the etiology of a cardiac disorder among combat veterans. He referred to "Disordered Action of the Heart (D.A.H.)" or "Valvular Disease," in his study of 7,803 men treated at a medical facility in France. Venning (1919) suggested that, despite

exposure to gas warfare, "the strain, mental and physical, of warfare is the chief cause of the symptoms of D.A.H." (p. 339). Interestingly, in a comment on Venning's (1919) report, Culpin (1919) appeared to describe a delayed-onset variety of Disordered Action of the Heart and underscored the importance of one aspect of the strain of combat described by Venning (1919). He noted that the disorder may arise in cases "where physical strain was unimportant," emphasizing the impact of mental or psychological stressors on the subsequent development of symptoms, which he clarifies as "a manifestation of emotional disturbance and not a result of infection" (Culpin, 1919, p. 395). Furthermore, Culpin (1919) reported that "fears maintain the symptoms and the symptoms maintain [the] fears" (p. 395).

Further examinations of the adjustment and functioning of soldiers continued as World War II (WWII) unfolded. Two American authors examined the responses of service pilots exposed to severe combat stressors. Grinker and Spiegel (1945) described "combat neuroses" and made reference to the "breakdown of another normal individual's ability to deal with his mounting anxiety and hostility in an efficient manner" (p. 82). Specifically, they recounted the experience of a gunner whose plane plummeted into the English Channel, killing all but his pilot and himself. Although he escaped the crash without major physical injury, he subsequently reported that he "had difficulty falling asleep" due to "terrifying nightmares" in addition to changes in his appetite and "a growing feeling of dread… and a feeling of imminent catastrophe which kept him rigidly tense… constantly looking for an indication that his fears would be realized" once he was reassigned aboard another plane (Grinker & Spiegel, 1945, p. 92-93). In addition to their depiction of the combat neuroses of the aforementioned gunner, the authors also suggested that the presentation of symptoms, including depression, anxiety, hypervigilance and

arousal, aggression, and somatic reactions, may vary as a function of time, setting, and treatment (Grinker & Spiegel, 1945).

Analogously, Swank and Marchard (1947) detailed the combat reactions of soldiers, over the course of an eight-day period. Upon the soldiers' initial deployment, the authors noted increased somatic complaints, including heart palpitations or gastrointestinal discomfort, and reported spikes in anxiety, which were reported even before the men experienced combat directly (Swank & Marchard, 1947). Once the soldiers arrived on the front lines of battle, Swank and Marchard (1947) observed acute stress responses, which they referred to as "combat exhaustion." They reported that some soldiers were afraid of being left alone, had changes in appetite, fears of eating, and physiological hyperarousal symptoms such as sweating, trembling, and rapid pulse. After approximately one month of combat, the authors noted that many of the physiological arousal symptoms, which had dissipated after the soldiers became accustomed to life on the front lines, reappeared as fatigue set in (Swank & Marchard, 1947). They also noted that many of the soldiers presented with insomnia despite their exhaustion, and increases in irritability and restlessness, which persisted after their evacuation (Swank & Marchard, 1947).

In addition to the documented responses to combat-related trauma, natural disasters and other types of civilian exposure to severe stressors have also been examined. A seminal report from 1940s examined the psychological functioning of individuals who survived one of the deadliest fires in American history that killed almost 500 people (Saffle, 1993). Adler (1943) evaluated 46 patients treated at a local hospital for injuries stemming from the fire and concluded that the majority of patients presented with "symptoms of general nervousness and anxiety neuroses" (p. 1101), though many recovered by nine months post-trauma. With regard to the expression of those symptoms, Adler (1943) indicated that many patients experienced sleep

disturbances, hyperarousal, hypervigilance, negative alterations in mood, difficulty concentrating, and intrusive thoughts about the catastrophe. As may be seen, these civilian reactions to trauma closely reflect symptoms that were described among combat survivors.

Accounts of Response to Trauma in Youth Populations

Although reported relatively less frequently, children's functioning in the aftermath of traumatic events has been examined as well. In one of the first of these childhood trauma investigations, Bender and Blau (1937) evaluated 16 children who were sexually abused by adults and treated at Bellevue Hospital in New York. The authors observed that a number of the children demonstrated patterns of resilience after the abuse, while others evidenced impairments in academic and intellectual functioning, attention deficits and hyperactivity, avoidance in the form of repression, difficulty concentrating, restlessness, "unruly behavior" (p. 505), negative mood and aggression, and significant disturbances in relationships with children and adults (Bender & Blau, 1937).

Relatedly, Bodman (1941) described the reactions of British children who experienced air raids during the First World War. Of the 8,000 schoolchildren surveyed by a psychologist working with Bodman, approximately 300 demonstrated psychological or psychosomatic reactivity (Bodman, 1941). He noted that persistent psychological symptoms such as avoidance of memories of the raids, increased physiological reactivity, nightmares, "general nervousness, trembling, crying, and aggressive behaviour" (Bodman, 1941, p. 486) were frequently observed in younger children. In contrast, older youth evidenced greater psychosomatic symptoms such as headaches, disordered eating habits, enuresis and encopresis, and indigestion (Bodman, 1941). Despite the children's varied pathological responses after they experienced the air raids, Bodman (1941) made reference to the children's resilience. In this context, he observed, "The most

striking finding of this survey is the extraordinary toughness of the child, and his flexibility in adapting to potentially threatening situations" (p. 488).

Analogously, Mercier and Despert (1943) examined the adjustment of French children who displayed anxious reactions after experiencing war-related stressors. Within this context, Mercier and Despert (1943) referred to negative beliefs about the future and world. They presented a case example wherein a child stated, "When I am 26 I will have been killed at war a long time ago" (p. 267). Mercier and Despert (1943) also reported that the children evidenced persistent fears of death, disruptions in memory, and somatic symptoms.

In a related study, Carey-Trefzer (1949) described the functioning of British children who survived air raids and other war-related stressors in London during WWII. She reported that they experienced psychosomatic symptoms like vomiting and diarrhea as well as persistent fear, sleep disturbances, enuresis and encopresis, disruptions in speech, and aggressive or inhibited behaviors that represented a divergence from their previous functioning (Carey-Trefzer, 1949). In addition, academic impairments were also observed; however, these scholastic difficulties disappeared when the children's psychiatric symptoms remitted. Moreover, Carey-Trefzer (1949) noted, "Bombings and changes in the family life have been responsible for a greater number of disturbances, but that these have proved a tendency to clear once the disturbing factor was removed" and "children who were previously nervous seem to have been more easily affected by... the damaging factors" (p. 556).

The first effort to formally identify and classify psychiatric illness was undertaken by the American Psychiatric Association (APA) within the context of the initial *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-I*) in 1952. This manual was developed as an effort to provide a consistent nomenclature that was "urgently needed" (APA, 1952, p. viii),

particularly by psychiatrists working with the significant number of WWI and WWII veterans. It is important to observe that the *DSM-I* made reference to "Gross Stress Reactions" and described this as the response of a "normal personality" to "conditions of great or unusual stress" (i.e., "situations in which the individual has been exposed to severe physical demands or extreme emotional stress, such as in combat or in a civilian catastrophe" (APA, 1952, p. 40). The *DSM-I* specified that Gross Stress Reaction should only to be used as temporary diagnosis during the acute period after exposure to exceptional stress. In cases of persistent pathological reaction, a separate diagnosis based on the ongoing symptom presentation was said to be warranted, as the acute response was presumed to remit. Although the *DSM-I* (APA, 1952) acknowledged that individuals might develop dysfunctional reactions to a traumatic event, it lacked operationally defined criteria, which limited its diagnostic reliability.

The 1950s and 1960s were marked by a good deal of pioneering research involving the psychological adjustment of civilians who were exposed to natural or industrial disasters (Saigh & Bremner, 1999). Within this context, Bloch, Silber, and Perry (1956) investigated the psychological wellbeing of children following the 1953 Vicksburg Mississippi tornado. The authors reported that while the majority of children appeared emotionally stable, the children who children exhibited impairments were often those closer to tornado's path. Within this group, the children tended to be anxious upon separation from parents, experienced nightmares or terrors, avoided reminders of the disaster, evidenced alterations in mood and irritability, and displayed exaggerated startle responses (Bloch et al., 1956). Additional accounts of distress related to traumatic, peacetime events can be found in the writings of Friedman and Linn (1957) who described reactions of those who survived the 1956 sinking of an Italian ocean-liner, the

Andrea Doria, and Bennet (1968) who detailed the lasting psychological consequences among individuals affected by severe flooding in Bristol, England.

Beyond these accounts of the traumatic stress reactions of civilians, a number of studies involving veterans of the World Wars and the Korean War emerged after the publication of the *DSM-I* (APA, 1952). In a 1954 publication, Glass described the development of interventions delivered in the combat zones to servicemen who had been identified as "mental casualties" in WWI, WWII, and the Korean War (p. 725).

Also within the context of the 1950s and 1960s, Noble, Roudebush, and Price (1952) described the reactions of Korean War veterans who had been hospitalized with combat-related somatic injuries. These authors reported that the servicemen evidenced exaggerated startle responses and sleep disturbances. Similarly, Temperau (1956) assessed US airmen who developed fears about flying after traumatic incidents. He noted that the airmen displayed alterations in mood and interpersonal functioning, somatic symptoms, and restlessness. Additionally, Archibald, Long, Miller, and Tuddenham (1962) described long-term stress reactions of veterans from WWII. In a departure from the course of disorder as depicted in the *DSM-I* (APA, 1952), these authors concluded that sleep disturbances, heightened startle reactions, changes in mood, and somatic symptoms were evident by some veterans 15 years after combat (Archibald et al., 1962).

Outside the realm of combat-exposed adults, the reactions of individuals imprisoned in concentration camps and persecuted by Nazis during WWII were also conducted. Eitinger (1962) described concentration camps survivors who displayed decreased concentration, sleep disturbances, intrusive memories, fatigue, and mood changes including increased irritability and anxiety. Chodoff (1963) also observed sleep disturbance, recurrent and intrusive memories of the

traumatic experiences, fatigue, irritability, hyperarousal, depressed thoughts, and somatic issues including headaches, rapid heart rates, and gastrointestinal complaints among concentration camp survivors. Interestingly, Chodoff (1963) explained that, while his subjects were not acquainted, their psychological responses were "very similar, almost stereotyped syndrome[s]" (p. 37), which he attributed to their comparable experiences of maltreatment perpetrated by the Nazis.

Owing in part to the release of the 8th edition of the manual for the *International Classification of Diseases* (*ICD-8*), with which the *Diagnostic and Statistical Manual of Mental Disorders* was intended to correspond, the second edition of the American Psychiatric Association's manual (*DSM-II*) was published in 1968 (APA, 1968). In this version, Gross Stress Reaction was replaced with Transient Situational Disturbances (APA, 1962). As in the case of the *DSM-I*'s Gross Stress Reaction classification, Transient Situation Disturbances were defined as occurring in otherwise normal individuals or those "without any apparent underlying mental disorders" (APA, 1968, p. 48) that emerge in response to a specific stressor. Again, the diagnosis was only indicated as an acute response to a stressor, such that removal of the stressor should alleviate the symptoms otherwise another diagnosis is warranted. Unlike the *DSM-I* (APA, 1952), however, the *DSM-II* (APA, 1968) differentiated the type of disturbance based on the stage of development in which it presented (e.g., adjustment reaction of infancy vs. childhood, etc.). Nevertheless, the lack of operational criteria remained problematic in the second iteration of the manual as it failed to define "overwhelming environmental stress" or actual symptoms in operational terms.

Research aimed at clarifying the psychological impact of combat continued following the publication of the *DSM-II* (APA, 1968) during the Vietnam War. For example, Lumry,

Cedarleaf, Wright, and Braatz (1970) reported that a majority of Vietnam veterans in treatment at Veterans Administration (VA) hospitals experienced significant interpersonal conflict and dissatisfaction, especially within their families. Within this context, Horowitz and Solomon (1975) evaluated veterans who were in psychiatric treatment at VA hospitals. They identified evidence denoting delayed expression of response to exceptional stress. These authors also reported that over time, some veterans developed sleep and mood disturbances, re-experiencing symptoms, or interpersonal dysfunction (Horowitz & Solomon, 1975). Further evidence of the difficulties that were faced by Vietnam veterans comes from the work of Strayer and Ellenhorn (1975). Their analysis of interviews conducted with discharged veterans suggested that depression, guilt, hostility and difficulties acclimating to civilian life were frequently experienced (Strayer & Ellenhorn, 1975).

Additionally, Burgess and Holstrom (1974) investigated what they referred to as "rape trauma syndrome" (p. 982). Upon interviewing emergency room patients who reported having been raped, the authors determined that acute and persistent effects were apparent (Burgess & Holstrom, 1974). The acute phase of symptom expression consisted of changes in mood, such as increases in anxiety, fear, and anger, and somatic disturbances like nausea and tension in muscles. The persistent presentation included nightmares and avoidance of reminders of the trauma (Burgess & Holstrom, 1974).

Studies involving childhood reactions to exceptional stress were relatively infrequent as compared to those of adults. In one of the few publications during this period, Lacey (1972) examined the reactions of children in Aberfan, a town in Wales that was devastated by a mining accident. Not surprising given that the majority of those killed were children, almost all of the children interviewed by Lacey (1974) knew individuals who died when a tip complex tumbled

down a mountain and into town, destroying a school among other buildings. The children suffered from sleep disturbances, social isolation, and enuresis (Lacey, 1972). They also displayed "nervousness" and an "unwillingness to go out and play" (Lacey, 1972, p. 259).

Posttraumatic Stress Disorder

Diagnostic and Statistical Manual of Mental Disorders Third Edition* (*DSM-III, APA, 1980). Under the auspices of the late Columbia University psychiatrist Robert Spitzer, M.D., the third revision of the *DSM-III* was published in 1980. In a departure from the previous editions of the manual, the *DSM-III* (APA, 1980) presented clear, descriptive, atheoretical diagnostic categories, and information about associated features, course and subtypes, age of onset, prevalence rates and other valuable information (Brett, Spitzer, & Williams, 1988). It is of interest to note that Spitzer appointed a panel of experts to review and evaluate empirical data regarding many disorders and conditions and that concerted effort was made to provide operational terms. These efforts served to significantly increase the reliability of the disorders that were included in the *DSM-III* (Saigh & Bremner, 1999). With regard to the presentation of symptoms following a traumatic stressor, Spitzer initiated a committee to examine so-called "Reactive Disorders," as a result of concern in the field about his plans to retain *DSM-II*'s "transient situational disturbances" (Scott, 1990). Ultimately, the meetings of these work groups led to the formal recognition of posttraumatic stress disorder (PTSD) as a psychiatric classification based on comprehensive review of clinical literature.

The *DSM-III* indicated that the disorder must be induced the existence of a recognizable stressor that would evoke significant symptoms of distress in almost everyone" (APA, 1980, p. 238). The *DSM-III* further indicated that the syndrome:

> is generally outside the range of such common experiences as simple bereavement, chronic illness, business losses, or marital conflict. The trauma may be experienced alone (rape or assault) or in the company of groups of people (military combat). Stressors producing this disorder include natural disasters (floods, earthquakes), accidental man-made disasters (car accidents with serious physical injury, airplane crashes, large fires), or deliberate man-made disasters (bombing, torture, death camps). Some stressors frequently produce the disorder (e.g., torture) and others produce it only occasionally (e.g., car accidents). Frequently there is a concomitant physical component to the trauma, which may even involve direct damage to the central nervous system (e.g., malnutrition, head trauma). The disorder is apparently more severe and longer lasting when the stressor is of human design. The severity of the stressor should be recorded and the specific stressor may be noted on Axis IV (p. 26). (APA, 1980, p. 236).

The *DSM-III* further clarified the associated symptoms emerging after exposure to a traumatic event, as delineated above, in three clusters. First, the re-experiencing cluster (B) indicated that individuals must report recurring intrusive recollections or dreams of the event, or be given to "sudden[ly] acting or feeling as if the traumatic event were reoccurring, because of an association with an environmental or ideational stimulus" (APA, 1980, p. 238). Second, to meet criteria that person must also report symptoms related to numbed responsivity or diminished involvement in the world that began after the traumatic event (Cluster C). These symptoms may present as decreased interest in "significant activities" or relationships with others, or as "constricted affect" (APA, 1980, p. 238). Third, the PTSD symptom criteria included two symptoms from Cluster D, which included hyperarousal or heightened startle

response, disturbances in sleep, survivor's guilt, impaired memory or concentration, and avoidance of situations or activities that are reminiscent of the traumatic event and cause an "intensification of symptoms" (APA, p. 238).

A number of studies were published that examined the validity of the *DSM-III* PTSD diagnosis (APA, 1980), particularly in veterans and other groups affected by war. Penk and his colleagues (1981) assessed the psychological adjustment of Vietnam combat-exposed veterans relative to the adjustment of non-combat exposed veterans. Results indicated that combat veterans experienced significantly more adjustment difficulties than non-combat veterans (Penk et al., 1981). Although the two groups did not differ with reference to post-war adjustment, as evidenced by scores on the *Minnesota Multiphasic Personality Inventory* (*MMPI*; Hathaway & McKinley, 1943), greater psychosocial difficulties were reported by the combat exposed veterans (Penk et al., 1981).

A similar evaluation of the diagnostic validity of the *DSM-III* PTSD classification (APA, 1980) was conducted by Zimering, Caddell, Fairbank, and Keane (1993) with a sample of Vietnam War veterans. In this case, the researchers administered a structured interview based on the *DSM-III* PTSD criteria, the *Jackson PTSD Structured Interview* (Keane, Malloy, & Fairbank, 1985), and selected *MMPI* (Hathaway & McKinley, 1943) scales to veterans with PTSD and "well-adjusted combat veterans" (Zimering et al., 1993, p. 327). Zimering and his colleagues (1993) reported that veterans with PTSD differed from those without the diagnosis in all areas of functioning evaluated (i.e., physiological arousal, emotional numbness, concentration, and intrusive thoughts) with the exception of memory, indicating support for the validity of PTSD as a diagnostic category.

Saigh (1988) conducted one of the few prospective investigations in the literature that

assessed psychological adjustment before and after exposure to a traumatic event. A sample of Lebanese college students at the American University in Beirut initially filled out the *Test State Trait Anxiety Inventory* (*STAI*; Spielberger, 1980), *Beck Depression Inventory* (*BDI*; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and *Rathus Assertiveness Schedule* (*RAS*; Rathus, 1973) as part of a psychometric study. At the time of the administration of these measures, Beirut had not experienced a major confrontation in 15 months. Shortly after initial data collection, the militia began an attack and many areas of the city were heavily shelled, which resulted in the closure of many businesses and public offices as people took shelter from the shelling.

Eleven students were retested 8 days, 37 days, and 8 months after the initial assessment and after the bombardment had ceased (Saigh, 1988). Although the majority of respondents reported higher levels of anxiety and depression as well as lower levels of assertion eight days after the trauma, Saigh (1988) observed that the estimates of PTSD at 37 and 316 days after the traumatic events were not significantly different than the estimates observed 63 days before the trauma. Interestingly, only one of the students developed chronic posttraumatic stress disorder as indicated by the *DSM-III* (APA, 1980).

A number of additional studies examined the expression of PTSD in children. One such study, undertaken by Saigh (1989a), was conducted with a sample of children from Lebanon who were between 9 and 12 years of age. Saigh (1989a) used the *DSM-III* version (APA, 1980) of the *Children's PTSD Inventory* (Saigh, 1987) and clinical interviews to identify 231 children with PTSD, 32 children with simple phobia, and 35 controls (1989a). Participants marked the *Revised Children's Manifest Anxiety Scale* (*RCMAS*; Reynolds & Richmond, 1978), *Children's Depression Inventory* (*CDI*; Kovacs, 1981), and their teachers completed the *Conners Teacher Rating Scale* (*CTRS*; Conners, 1969). PTSD cases evinced markedly higher *RCMAS*, *CDI*, and

CTRS scores than their phobic and non-phobic peers. Analogously, the *RCMAS* and *CDI* scores of the phobia cases were appreciably greater than the control groups. On the other hand, the *CTRS* scores of the test phobia and control groups were not significantly different. These outcomes provided an early source of evidence that supported the validity of the *DSM-III* classification as applied to children.

A related study by Saigh, Mroueh, and Bremner (1997) also sought to determine whether trauma-exposure is associated with academic deficits or academic deficits are specifically associated with PTSD. In order to address these questions, the *DSM-III* version of the *Children's PTSD Inventory* (Saigh, 1989) and the *Metropolitan Achievement Test* (*MAT*, Prescott, Balow, Hogan, & Fair, 1988) were administered to three groups of Lebanese students. The first group met diagnostic criteria for PTSD. The second group had been exposed to similar traumatic events and did not meet criteria for PTSD, while the third group had not been exposed to trauma. Data analysis using IQ scores from the *Lebanese General Ability Scale* (*LGAS*, Saigh, 1986) as a covariate determined that the *MAT* scores of the PTSD group were significantly lower than the scores of the traumatized group without PTSD and the controls. Nonsignificant differences were evident when the scores of the traumatized group without PTSD and controls were compared (Saigh et al., 1997). These findings served to add to the scientific evidence supporting the validity of the *DSM-III* PTSD classification (APA, 1980) of children.

***Diagnostic and Statistical Manual of Mental Disorders Revised Third Edition* (*DSM-III-R, APA, 1987*).** Shortly after the publication of the *DSM-III* (APA, 1980), plans to revise the diagnostic classification system were initiated, ultimately resulting in the release of the *DSM-III-R* (APA, 1987). In the revision, the PTSD symptom criteria were refined in a number of ways. Criterion A, defining traumatic events, indicated such events as those that are "psychologically

distressing" and "outside the range of normal experience" (APA, 1987, p. 247). Furthermore, the *DSM-III-R* added the experience of having close others (children, spouses, or other close friends and family members) threatened, the loss of "one's home or community", and seeing someone else seriously injured or killed to the list of potential traumatic stressors (APA, 1987, p. 247), whereas the previous edition limited the definition to an event that would cause distress in "almost everyone" (APA, 1980, p. 238).

In comparison to the three re-experiencing symptoms indicated in the *DSM-III*, the *DSM-III-R* amended the second criterion (B) to require that at least one of four possible symptoms be endorsed. Those symptoms slightly modified the three from the previous edition, recurrent, intrusive, and distressing recollections or dreams of the event, sudden acting or feeling as if the event were recurring (i.e., flashbacks or hallucinations), but added a new symptom of intense distress when exposed to events that "symbolize or resemble an aspect of the traumatic event, including anniversaries of the trauma" (APA, 1987, p. 249). Also expanded was Cluster C, which described symptoms relating to numbing or avoidance. In particular, the *DSM-III-R* specified that three of the following seven symptoms be present to meet criteria: avoidance of thoughts or feelings related to the trauma, avoidance of activities that triggered memories of the event, impaired memory for an "important aspect of the trauma", loss of interest in activities, "feelings of detachment or estrangement from others", constricted affect, and the "sense of a foreshortened future" (APA, 1987, p. 249). As can be seen, the *DSM-III-R* (APA, 1987) added symptoms of avoidance to the initial three delineated in the *DSM-III* (i.e., loss of interest in activities, detachment/estrangement from others, and constricted affect; APA, 1980, p. 238). Cluster D, formerly a collection of more unclearly defined symptoms of changes in patterns of arousal, was revised and clarified. In the *DSM-III-R* (APA, 1987), the fourth cluster noted the

contained symptoms as relating to increased arousal occurring after the traumatic event. Of the following six symptoms, the criteria required the presence of at least two: difficulties in sleeping, "irritability or outbursts of anger", concentration impairments, hypervigilance, "exaggerated startle response," and physiological reactivity to events reminiscent of the trauma. The *DSM-III-R* (APA, 1987) also indicated that symptoms be present for at least one month and allowed for a delayed onset specifier for individuals whose symptoms do not emerge until six months after the event.

The *DSM-III-R* (APA, 1987) also recognized aspects of PTSD symptom presentation specific to age, noting the ways that children's reactions to trauma may manifest. Specifically, the revision represented that children may reenact themes or other aspects of the traumatic event through repetitive play, regress to an earlier developmental stage, exhibit sleep disturbances in the forms of distressing dreams that are subsequently generalized, or display pessimistic attitudes toward their future (APA, 1987; Brett et al., 1988).

Additional investigations of post-traumatic responses were also conducted with samples of sexually and physically abused children. Analysis of these populations consistently demonstrated PTSD symptoms, as defined by the *DSM-III-R* (APA, 1987), after experiences of abuse (Deblinger, McLeer, Atkins, Ralphe, & Foa, 1989; McLeer, Deblinger, Henry, & Orvaschel; 1992; Pelcovitz et al., 1994).

***Diagnostic and Statistical Manual of Mental Disorders – IV and IV-TR*.** The fourth edition of the *Diagnostic and Statistical Manual* was published in 1994 after another series of significant revisions. To further refine the classification system, a review of empirical evidence was conducted beginning in 1988 (APA, 1994; Davidson & Foa, 1993). Moreover, clinical trials were performed to clarify the manifestations of symptoms and their course, prevalence of

disorders, and the ways in which disorders are related to each other (Kilpatrick, Resnick, & Freedy, 1993; Saigh & Bremner, 1999).

The primary modification to the PTSD diagnosis involved a revised definition of what constitutes a traumatic event. Whereas the *DSM-III-R* conceptualized a qualifying event as being beyond the range of normal experiences (APA, 1987), in the *DSM-IV* traumatization was said to be indicated if an individual "experienced, witnessed, or has been confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity to oneself or others" (APA, 1994, p. 428). Additionally, the *DSM-IV* specified that a person's response to such an event must be characterized by "intense fear, helplessness, or horror," which in children may appear as "disorganized or agitated behavior" (APA, 1994, p. 428).

Modifications to the symptom clusters were also present in the *DSM-IV* (APA, 1994). The re-experiencing cluster (B) maintained the four symptoms identified in the previous edition, but added a fifth symptom, which was included in the hyperarousal cluster (Criterion D) in the *DSM-III-R*: "physiological reactivity on exposure to internal or external events that symbolize or resemble an aspect of the traumatic event" (APA, 1994, p. 428). Additionally, the *DSM-IV* addressed the manifestations of re-experiencing symptoms in youth such that children may report nightmares without identifiable content and may engage in trauma-specific reenactment as part of acting or feeling as if the event were recurring. Descriptions of symptoms within the avoidance/numbing cluster (C) were also expanded in the *DSM-IV* (APA, 1994). Whereas the *DSM-III-R* (APA, 1987) defined these symptoms in general terms, the *DSM-IV* specified that efforts to avoid the reminders of the trauma include conversations, as well as places or people that are associated with the event or trigger recollections (APA, 1994). Beyond the relocation of

the sixth symptom of hyperarousal (Cluster D) to the re-experiencing cluster (B), no amendments to the Cluster D, symptom duration, or the delayed onset specifier were made in the fourth edition of the *DSM* (APA, 1994). However, the *DSM-IV* (APA, 1994) included additional durations specifiers, acute (criteria met for less than three months) and chronic (criteria met for three months or longer).

The *DSM-IV* also provided a description of other mental disorders that are frequently comorbid with PTSD such as panic disorder, agoraphobia, obsessive-compulsive disorder, social and specific phobia, depression, somatization disorder, and substance-related disorders (APA, 1994). As research indicated that a significant percentage of individuals with PTSD also met criteria for substance abuse and depression, relative to those without PTSD (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995), attention to the pathologies that present most often in populations with PTSD was clearly warranted.

The text revision of the *DSM-IV*, released six years later, included information about the increased vulnerability to PTSD after experiencing a traumatic event in those with a family history of depression (APA, 2000). Otherwise, the diagnostic criteria delineated in the *DSM-IV* (APA, 1994) were retained in the *DSM-IV-TR* (APA, 2000).

Studies of veterans and survivors of other war-related traumas continued following the publication of the *DSM-IV* (APA, 1994). For example, Jamil, Nassar-McMillan, and Lambert (2004) examined veterans of the Iraqi Gulf war and veterans with PTSD to those without PTSD, As based on administrations of the *PTSD Checklist-Military Version* (Weathers, Litz, Herman, Huska, & Keane, 1993), the authors observed that veterans with PTSD exhibited increased depression and panic anxiety relative to the comparative cohort.

The validity of PTSD in the *DSM-IV* (APA, 1994; 2000) was also considered by Golier et al. (2002) who evaluated the memory and intellectual functioning of individuals with PTSD who lived through the Holocaust, survivors without PTSD, and a nonclinical comparison group without Holocaust trauma exposure or other psychopathologies as determined with the *Structured Clinical Interview for DSM-IV Axis-I Disorders* (*SCID*; First, Spitzer, Gibbon, & Williams, 1997). A comparison of performance on various memory tasks suggested that adults with PTSD, diagnosed using the *Clinician-Administered PTSD Scale* (Blake et al., 1995) and the *SCID* (First et al., 1997), scored significantly lower on a measure of explicit memory than both comparison groups (Golier et al., 2002). Furthermore, the Holocaust survivors without PTSD did not differ from the nonclinical controls (Golier et al., 2002).

Further investigation of the validity of PTSD diagnoses, as defined by the *DSM-IV* (APA, 1994; 2000), in youth was reported as well. The Saigh Bellevue studies (1988-2016) contributed to this effort. These studies used stringent inclusion and exclusion criteria to identify groups of children with PTSD, traumatized children without PTSD, and healthy controls (Saigh, Yasik, Oberfield, Halamandaris, & McHugh, 2002; Saigh, Yasik, Oberfield, & Halamandaris, 2008; Saigh, Yasik, Oberfield, Halamandaris, & Bremner, 2006; Saigh et al., 2016; Yasik, Saigh, Oberfield, & Halamandaris, 2007; Yasik, Saigh, Oberfield, Halamandaris, & Wasserstrum, 2012). The diagnostic status of each group was determined using multiple administrations of the *DSM-IV* versions of the *Children's PTSD Inventory* (Saigh, 2003) and the *Diagnostic Interview for Children and Adolescents, Revised* (*DICA-R*; Reich, Leacock, & Shanfield, 1995) such that cases with comorbid disorders were excluded and the control group consisted of nonclinical cases. Using this framework, Saigh and his colleagues determined that youth with PTSD had significantly lower scores on the *Piers Harris-2* (Piers & Herzberg, 2002), *Wechsler Intelligence*

Scale for Children – III (Wechsler, 1991), and *Wide Range of Learning and Memory Scale* (*WRAML*; Sheslow & Adams, 1990) relative to traumatized PTSD negatives and controls (Saigh et al., 2002; 2006; 2008; Yasik et al., 2007). These authors reported that the scores of traumatized children without PTSD and the non-clinical control group did not differ on the aforementioned measures. Saigh and his colleagues also established that children with PTSD had significantly higher scores on the *Revised Children's Manifest Anxiety Scale* (*RCMAS*; Reynolds & Richmond, 1978), *Child Behavior Checklist* (*CBCL*; Achenbach, 1991), *State Trait Anger Expression Inventory* (*STAI*; Spielberger, 1996), and the *Junior Eysenck Personality Inventory* (*JEPI*; Eysenck, 1965), relative to traumatized youth without PTSD and healthy controls (Saigh et al., 2002; 2016; Saigh, Yasik, Oberfield, & Halamandaris, 2007; Yasik, Saigh, Oberfield, Halamandaris, & Wasserstrum, 2012). These authors also consistently observed that the scores of traumatized PTSD negatives and controls did not significantly differ.

Overall, the Saigh-Bellevue investigations indicated that PTSD in childhood and adolescence is associated with increased psychiatric morbidity on multiple norm-referenced, non-diagnostic tests among youth with PTSD and that trauma exposure without PTSD was not marked by increased psychiatric morbidity.

***Diagnostic and Statistical Manual of Mental Disorders – 5*.** Nineteen years after the text revision of the *DSM-IV* (APA, 1994) was published, the American Psychiatric Association released the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*, APA, 2013a). The *DSM-5* was designed as a "paradigm shift toward a dimensional approach" to the classification of psychopathology, rather than the categorical system that had largely represented the approach to diagnosis in prior iterations (M. First, M.D., personal communication, October 20, 2016). Additionally, an emphasis was placed on classifying

disorders based on their biological phenomenology rather than their clinical expression (Nemeroff et al., 2013). Proposed changes to diagnostic criteria as they appeared in *DSM-IV-TR* (APA, 2000) were reportedly to be based on a review of empirical data, which were then reviewed by 13 work groups and a task force consisting of experts in "psychiatric treatment, research, and epidemiology" (APA, 2014). The revision process resulted in significant changes to both the organizational structure of the manual and many of the diagnostic criteria contained therein.

Posttraumatic stress disorder, formerly listed in the *DSM-IV-TR* section of Anxiety Disorders (APA, 2000), now appears with Reactive Attachment Disorder, Disinhibited Social Engagement Disorder, Acute Stress Disorder, and Adjustment Disorder in a section entitled "Trauma and Stressor-Related Disorders" (APA, 2013a). Additionally, the PTSD symptom criteria were significantly modified, with the full list presented in Table 1.1. Whereas the *DSM-IV-TR* defined a traumatic event as that which is directly experienced or witnessed by an individual (APA, 2000), the APA's 2013 *DSM-5* incorporated learning about a close friend or family member having experienced a trauma (*DSM-5* Criterion A3) and repeated indirect exposure to traumatic events as in the case of first responders or police officers (*DSM-5* Criterion A4). Additionally, the *DSM-5* explicitly references sexual violence as events that may lead to the development of posttraumatic stress (APA, 2013a). Further, the *DSM-IV-TR* specified in Criterion A2 that emotions evoked by the traumatic event, namely fear, helplessness, and/or horror, which was eliminated from the criteria defining a trauma in the *DSM-5* as it reportedly was not useful in predicting the emergence of PTSD symptoms (APA, 2000; 2013a; 2013b).

In contrast to the three symptoms clusters delineated in the *DSM-IV-TR* (i.e., Criterion B: re-experiencing; Criterion C: avoidance/numbing; Criterion D: hyperarousal; APA, 2000), the

DSM-5 specifies four clusters (APA, 2013a). Beyond changes in phrasing, the re-experiencing symptom cluster remains largely the same as Criterion B in the *DSM-5* (APA, 2013a). Analogously, the hyperarousal symptom cluster described in the *DSM-5* contains each of the symptoms noted in Criterion D of the previous edition (*DSM-IV-TR*, APA, 2013a). However, an additional symptom, reckless and self-destructive behavior, is also included within the hyperarousal and reactivity cluster (Criterion E; APA, 2013a).

The symptoms within the avoidance and numbing cluster in the *DSM-IV-TR* (Criterion C; APA, 2000) were reorganized into two distinct clusters in the *DSM-5*: avoidance (Criterion C) and negative alteration in cognitions and mood (Criterion D; APA, 2013a). Avoidance of internal and external reminders of the traumatic event fall within Criterion C, which requires that at least one of those avoidance symptoms be present to meet the diagnostic threshold. The new cluster (Criterion D) addressing changes in thought and mood includes each of the remaining symptoms from the *DSM-IV-TR*'s cluster C (APA, 2000), with two additional symptoms: "persistent, distorted cognitions about the cause or consequences of the traumatic event(s) that lead the individual to blame himself/herself or others" (Criterion D3) and "persistent negative emotional state" (Criterion D4; APA, 2013, p. 272). Individuals must evidence two or more of these symptoms for the diagnosis of PTSD to be warranted (APA, 2013a).

To further clarify the nature of these symptoms, an additional criterion (H) was added to the PTSD diagnostic criteria in the *DSM-5*, which specifies that the stress aforementioned symptoms are not related to the effect of a medication, alcohol, or a medical condition (APA, 2013a). As in the *DSM-IV-TR* (APA, 2000), the *DSM-5* indicates that symptoms must be present for a minimum of one month (Criterion F) and cause distress or impairments in social, occupational, or other functioning (Criterion G; APA, 2013a).

An additional departure from the criteria delineated in the *DSM-IV-TR* (APA, 2000) is found in the specifiers for PTSD. Previously, the duration (e.g., acute or chronic) and delayed onset of the disturbance were specified if applicable for diagnosis (APA, 2000). In the *DSM-5* (APA, 2013a), depersonalization and derealization were included for cases presenting with symptoms of dissociation while the acute and chronic duration specifiers were removed. With regard to delayed emergence of symptoms, the specifier of "delayed expression" replaced "delayed onset" (APA 2013a; 2000). Whereas the "delayed onset" specifier indicated that symptoms did not appear until six or more months after the trauma, "delayed expression" is attached to a PTSD diagnosis when full symptom criteria were not met until six months after exposure, although some symptoms may have been present prior to that point (APA, 2013a).

Beyond the general revisions to the PTSD symptom criteria described above, the *DSM-5* specifically addresses the symptoms as they present in children younger than six-years-old (APA, 2013a). Although most of the symptoms are defined in terms of their manifestations given the child's developmental stage (e.g., intrusion/re-experiencing or diminished interest symptoms manifesting in play, temper tantrums as the types of angry outbursts, etc.), there are two key distinctions. Firstly, these criteria differ from those of older populations in that the traumatic event, as described in Criterion A, must be experienced or witnessed directly, or learned about as having occurred to a primary caregiver (APA, 2013a). Secondly, Criterion C for children aged six or younger includes both combines the avoidance symptom cluster (Criterion C) and negative alterations in cognitions and mood cluster (Criterion D; APA, 2013a).

Table 1.1

DSM-5 *(APA, 2013) Diagnostic Criteria for Posttraumatic Stress Disorder: 309.81*

1. Exposure to actual or threatened death, serious injury, or sexual violence in one (or more) of the following ways:
    1. Directly experiencing the traumatic event(s).
    2. Witnessing, in person, the event(s) as it occurred to others.
    3. Learning that the traumatic event(s) occurred to a close family member or close friend. In cases of actual or threatened death of a family member or friend, the event(s) must have been violent or accidental.
    4. Experiencing repeated or extreme exposure to aversive details of the traumatic event(s) (e.g., first responders collecting human remains; police officers repeatedly exposed to details of child abuse). **Note:** Criterion A4 does not apply to exposure through electronic media, television, movies, or pictures, unless this exposure is work related.

2. Presence of one (or more) of the following intrusion symptoms associated with the traumatic event(s), beginning after the traumatic event(s) occurred:
    1. Recurrent, involuntary, and intrusive distressing memories of the traumatic event(s). **Note:** In children older than 6 years, repetitive play may occur in which themes or aspects of the traumatic event(s) are expressed.
    2. Recurrent distressing dreams in which the content and/or affect of the dream are related to the traumatic event(s). **Note:** In children, there may be frightening dreams without recognizable content.
    3. Dissociative reactions (e.g., flashbacks) in which the individual feels or acts as if the traumatic event(s) were recurring. (Such reactions may occur on a continuum, with the most extreme expression being a complete loss of awareness of present surroundings.) **Note:** In children, trauma-specific reenactment may occur in play.
    4. Intense or prolonged psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event(s).
    5. Marked physiological reactions to internal or external cues that symbolize or resemble an aspect of the traumatic event(s).

3. Persistent avoidance of stimuli associated with the traumatic event(s), beginning after the traumatic event(s) occurred, as evidenced by one or both of the following:
    1. Avoidance of or efforts to avoid distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s).
    2. Avoidance of or efforts to avoid external reminders (people, places, conversations, activities, objects, situations) that arouse distressing memories, thoughts, or feelings about or closely associated with the traumatic event(s).

4. Negative alterations in cognitions and mood associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two (or more) of the following:
    1. Inability to remember an important aspect of the traumatic event(s) (typically due to dissociative amnesia and not to other factors such as head injury, alcohol, or drugs).
    2. Persistent and exaggerated negative beliefs or expectations about oneself, others, or the world (e.g., "I am bad," "No one can be trusted," "The world is completely dangerous," "My whole nervous system is permanently ruined").
    3. Persistent, distorted cognitions about the cause or consequences of the traumatic event(s) that lead the individual to blame himself/herself or others.
    4. Persistent negative emotional state (e.g., fear, horror, anger, guilt, or shame).
    5. Markedly diminished interest or participation in significant activities.
    6. Feelings of detachment or estrangement from others.
    7. Persistent inability to experience positive emotions (e.g., inability to experience happiness, satisfaction, or loving feelings).

5. Marked alterations in arousal and reactivity associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two (or more) of the following:
    1. Irritable behavior and angry outbursts (with little or no provocation) typically expressed as verbal or physical aggression toward people or objects.
    2. Reckless or self-destructive behavior.
    3. Hypervigilance.
    4. Exaggerated startle response.
    5. Problems with concentration.
    6. Sleep disturbance (e.g., difficulty falling or staying asleep or restless sleep).

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

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

8. The disturbance is not attributable to the physiological effects of a substance (e.g., medication, alcohol) or another medical condition.

Specify whether:

With dissociative symptoms: The individual's symptoms meet the criteria for posttraumatic stress disorder, and in addition, in response to the stressor, the individual experiences persistent or recurrent symptoms of either of the following:

1. **Depersonalization:** Persistent or recurrent experiences of feeling detached from, and as if one were an outside observer of, one's mental processes or body (e.g., feeling as though one were in a dream; feeling a sense of unreality of self or body or of time moving slowly).

2. **Derealization:** Persistent or recurrent experiences of unreality of surroundings (e.g., the world around the individual is experienced as unreal, dreamlike, distant, or distorted). **Note:** To use this subtype, the dissociative symptoms must not be attributable to the physiological effects of a substance (e.g., blackouts, behavior during alcohol intoxication) or another medical condition (e.g., complex partial seizures).

Specify if:

With delayed expression: If the full diagnostic criteria are not met until at least 6 months after the event (although the onset and expression of some symptoms may be immediate).

[1]

From the initiation of the revision process, through its eventual publication, and in the years since its release, reactions to the *DSM-5* (APA, 2013a) and its changes varied widely. With regard to PTSD specifically, some suggest that removing the diagnosis from the group of anxiety and related disorder to a category based on the experience of trauma "reflects a deeper understanding of the heterogeneous symptom presentation of stress-related conditions" (Nemeroff et al., 2013, p. 5), while others suggest that the decision "negates the role of fear and anxiety in PTSD" (Zoellner, Rothbaum, & Feeny, 2011, p. 854).

Given the disagreement within the field of trauma researchers and clinicians, it is not surprising that disagreement about the revisions to the PTSD symptom clusters in the *DSM-5* (APA, 2013a) emerged as well. Friedman (2013) argued that the symptom criteria for PTSD in the *DSM-5* (APA, 2013a) are improved from the previous edition, citing higher test-retest reliability estimates, confirmatory analysis results lending support to the reorganized symptom clusters over the clusters as they appeared in the *DSM-IV-TR* (APA, 2000), and comparable prevalence rates. On the other hand, Brewin (2013) suggested that *DSM-5* criteria for PTSD are problematic for clinicians and researchers for a number of reasons. Specifically, he referred to their significantly greater complexity relative to other disorders included in the manual, the

[1] American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (pp. 271-274). Washington, DC: Author.

overlap in symptoms with other diagnoses, the high number of symptoms required to meet diagnostic threshold, and the overemphasis on avoidance and numbing symptoms which often emerge in response to non-traumatic stressors (Brewin, 2013).

The broad consequences of revisions to classifications of mental disorders in the *DSM-5* (APA, 2013a) have yet to be fully understood. Despite that, it is clear that disordered reactions to experiences of fear and trauma have been examined throughout history and across varied systems of classification. Although the defining characteristics of these reactions have been modified, particularly over the last century, the recognition that individuals may develop impairments after facing a traumatic ordeal has long been evident. It may also be said that while there is a great deal of evidence to support the differential validity of the PTSD classification as it was presented in the *DSM-III* (APA, 1980)*, DSM-III-R* (APA, 1987), and *DSM-IV* (APA, 1994; 2000), much less is known about the validity of the *DSM-5* (APA, 2013a) and its publication was not warmly received by the scientific community. It is anticipated that future research may serve to address the relative validity of the *DSM 5* PTSD classification (APA, 2013a). It is relevant to recall, "A disorder is empirically validated by determining its relationship to other variables… Of particular concern is the differential validity; two putatively separate disorders ought not to be related in the same way to the same variable" (Quay & Werry, 1986, p. 37).

Chapter II

Child and Adolescent Trauma and PTSD:

Epidemiology, Risk Factors, and Comorbidity

Epidemiology involves the "study of health and morbidity" (Saigh, Yasik, Sack, & Koplewicz, 1999, p. 18) and investigates illnesses, factors that contribute to their development, and rates of illness occurrence (including psychiatric disorders). In addition, this branch of science estimates the frequency, severity, and duration of health-related issues to provide valuable information regarding the "nature and scope" of such disorders (Saigh, Green, & Korol, 1996, p. 112). Within this chapter, a summary of the literature regarding frequency and prevalence of trauma exposure and posttraumatic stress disorder in child and adolescent populations will be presented, along with a review of the risk factors and frequently comorbid disorders.

The literature described herein was obtained through searches of PubMed, the Web of Science, PsycInfo, and ScienceDirect databases. Search terms included "posttraumatic stress disorder," "PTSD," and "trauma," as well as "child," "adolescent," "youth," and "pediatric" to specify the target population. The articles considered for subsequent review included participants between the ages of 2 and 22 years of age. "Epidemiology," "rates," "prevalence," and "comorbidity" were also entered into the aforementioned databases. Examples of specific avenues for trauma exposure used in the search included "war," "disaster," "assault," "attack," "earthquake," "fire," "hurricane," and "victimization."

An additional factor determining the inclusion of studies was the utilization of reliable and valid diagnostic instruments to assess trauma history and PTSD. Studies addressing trauma exposure were included within the present review of literature if and only if the researchers

referenced traumatic events as defined by editions of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*; American Psychological Association [APA], 1980; 1987; 1994; 2000; 2013).

Furthermore, in order to obtain accurate estimates of PTSD, structured interviews containing items corresponding to the PTSD diagnostic criteria as indicated in the *DSM–III* (1980), *DSM-III-R* (1987), *DSM –IV* (1994), *DSM-IV-TR* (2000) or *DSM-5* (2013) were utilized in the included studies. As based on reviews that identified reliable and valid measures of pediatric PTSD (Dyregrov & Yule, 2006; Ohan, Myers, & Collett, 2002; Hawkins & Radcliffe, 2005), literature that used the following structured interviews were included: the *Anxiety Disorder Interview Schedule for DSM-IV* (*ADISC-C;* Silverman & Albano, 1996), the *Children's PTSD Inventory* (*CPTSDI*; Saigh, 1987; 1998; 2003a; 2003b), *Children's Structured Clinical Interview for DSM-IV* (*KID-SCID*; Matzner, Silva, Chowdhury & Nastasi, 1997), the *Composite International Diagnostic Interview* (*CIDI*; World Health Organization, 1997a; 1997b; Kessler & Üstün, 2004), the *Child and Adolescent Psychiatric Assessment* (*CAPA*; Angold & Costello, 2000), the *Clinician Administered PTSD Scale for Children and Adolescents* (*CAPS-CA*; Nader et al., 1996), the *Diagnostic Interview Schedule for Children and Adolescents* (*DICA*; Herjanic & Reich, 1982; Kaplan & Reich, 1991; Reich & Welner, 1988) and the *DICA-R* (Reich, Leacock, & Shanfield, 1994), the National Institute of Mental Health (NIMH) *Diagnostic Interview Schedule* (*DIS*; Robins, Helzer, & Croughan; 1982), the *National Women's Survey (NWS) PTSD Module* (Kilpatrick, Resnick, Saunders, & Best, 1989), the *Posttraumatic Stress Disorder Interview* (*PTSD-I*; Watson, Juba, Manifold, Kucala, & Anderson, 1991), the *Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children* (*K-SADS*; Kaufman,

Birmaher, Brent, Ryan, & Rao, 2000; Puig-Antich, 1983), and the *Structured Clinical Interview for DSM-IV* (*SCID*; First, Gibbon, Williams, & Spitzer, 1996).

Of the more than 4,000 hits using these terms, fifty-seven articles were deemed relevant by the author and one independent reviewer of the literature. Additionally, a classic chapter by Saigh et al. (1996) on child and adolescent epidemiology presented additional research studies that were considered for inclusion in the present chapter.

Trauma and PTSD in the General Adult Population

The literature reviewed consistently indicated that exposure to traumatic events occurs with great regularity (Breslau, Davis, Andreski, & Peterson, 1991; Breslau et al., 1998; Kessler et al., 1995). Kessler and colleagues (1995) reported findings generated from the National Comorbidity Survey. These authors evaluated a representative sample of 5,877 adults between the ages of 15 and 45 in the United States. The survey, conducted by trained interviewers, included administrations of the *Composite International Diagnostic Interview* (*CIDI*; World Health Organization [WHO], 1990), which uses diagnostic criteria that parallel the *Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition* (*DSM-III-R*; APA, 1987). Their findings suggested that 60.7% of men and 51.2% of women in the United States experienced a trauma during their lifetime, with 7.8% of sampled individuals reporting having met PTSD criteria at some point in their lives (Kessler et al., 1995). Among those with a lifetime PTSD diagnosis, the rates of women twice exceeded those of men (Kessler et al., 1995). In a more recent and second iteration of the National Comorbidity Survey, Kessler and colleagues (2005) concluded that 8.7% of the sample of 9,282 participants met criteria for PTSD, as determined through administrations of an updated survey version of the *Composite International*

Diagnostic Interview (*CIDI;* Kessler & Üstün, 2004), which utilized diagnostic criteria from the *DSM-IV-TR* (APA, 2000).

In a related study, Kilpatrick and colleagues (2013) utilized the *Diagnostic and Statistical Manual of Mental Disorders –Fifth Edition* (*DSM-5*; APA, 2013) based *National Stressful Events Survey* (Kilpatrick, Resnick, Baber, Guille, & Gros, 2011) to conduct telephone surveys of a nationally representative sample of 2,953 adults. Their findings indicated that almost 90% of individuals surveyed experienced at least one traumatic event. Other researchers interested in the rates of trauma-exposure among women in the United States found that, based on responses to the *National Women's Study PTSD Module* (Kilpatrick et al., 1989) collected using phone surveys, 69% of 4,008 female participants reported one or more traumatic event experiences (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Despite the abundance of trauma-exposure in the sample that was surveyed, lifetime prevalence of PTSD among females was about 12%. Taken together with the Kilpatrick et al. (2013) and Kessler et al. conclusions (1995; 2005), this body of research suggests that exposure to trauma is a common experience over the course of the lifetime, though the lifetime prevalence of PTSD is consistently lower.

Various researchers have investigated PTSD prevalence and trauma exposure among different communities in the United States. For example, based on a sample of adults in Detroit that were assessed using the *Diagnostic Interview Schedule for the DSM-IV* (*DIS-IV*; Robins et al., 1995), Breslau et al. (1998) determined that almost 90% of individuals in their sample of 2,181 adults reported that they were exposed to at least one traumatic event. Despite the high rates of traumatic events across the lifetime in this study, the reported lifetime prevalence of PTSD was 9.2% (Breslau et al., 1998). As is evident from the studies that were reviewed, a significant portion of the population has experienced or will at some point experience a traumatic

event; fortunately, however, few of those individuals develop PTSD subsequently (Breslau et al., 1998; Keane, Marx, & Sloan, 2009; Kessler et al., 1995; 2005; Kilpatrick et al., 2013; Saigh, 1992).

Trauma Exposure in Youth Populations

A number of national or large-scale investigations have examined the rates of trauma exposure among child and adolescent populations. For example, Baum (2005) analyzed data from a survey examining crime victimization of children 12 years of age or older. The results revealed that children between the ages of 12 and 17 were over twice as likely to be victims of violent crimes (e.g., physical and sexual assault, rape, and robbery). These findings were echoed in the work of Fitzpatrick and Boldizar (1993). In their study of 227 individuals, participants between the ages of 12 and 19 were twice as likely to have been victimized relative to adults over the age of 25 years (Fitzpatrick & Boldizar, 1992). Similarly, violent crime statistics from the Justice Department (2006) showed that the rates of these experiences are higher for adolescents and young adult groups than all other age groups.

Information regarding the specific types of traumatic events has also been reported in the literature. For example, Kilpatrick and Saunders (1997) surveyed a nationally representative sample of 4,023 individuals. These authors reported that 25% of adolescents, between the ages of 12 and 17 years, experienced at least one event involving physical and/or sexual assault. They also reported that approximately 40% of their sample endorsed having witnessed violence. Similarly, in an epidemiological review of literature, Norris and Slone (2013) determined that approximately one quarter of individuals will have experienced at least one traumatic incident by the time they reach adulthood.

Other national studies have been conducted to assess the rates of child and adolescent victimization experiences. For example, two studies by Finkelhor and colleagues (2005; 2009) examined the rates of youth exposure to abuse, violence, and crimes with telephone surveys completed by the child or adolescent and his/her caregiver. All caregivers provided demographic information. Participants completed the *Juvenile Victimization Questionnaire* (*JVQ*; Hamby, Finkelhor, Ormrod, & Turner, 2004). The caregivers of children (n = 2,030) younger than ten years were interviewed to ascertain information regarding trauma exposure and demographic information, while children older than ten years were interviewed about their trauma history directly. The first of those studies indicated that 71% of the children in the sample experienced some type of victimization (e.g., maltreatment; peer/sibling victimization; robbery, witnessed or direct; physical/sexual assault or violence; etc.), as indicated by self or parent-report (Finkelhor, Ormrod, Turner, & Hamby, 2005). The more recent investigation utilized the same procedures with a larger sample (n = 4,549) and observed that over 60% of the sampled youth reported being victimized within the year of their interview (Finkelhor, Turner, Ormrod, & Hamby; 2009). Additionally, both studies concluded that one in ten of the children and adolescents sustained physical injuries as a result of the incident (Finkelhor et al., 2005; 2009).

Research involving a sample of students in Chicago yielded dramatic rates of youth who reported having witnessed violence (Bell & Jenkins, 1993). Specifically, three quarters of the sample of 1,035 students, between the ages of 10 and 19 years, reported witnessing a serious crime, while 45% had seen such an incident more than once (e.g., robbery, stabbing, shooting and/or killing; Bell & Jenkins, 1993). Moreover, direct victimization experiences were endorsed by more than half of the students (Bell & Jenkins, 1993). Other investigations involving urban youth exposure to traumatic stressors have been conducted at outpatient mental health clinics. In

one such study that was conducted by Silva and colleagues (2000), 59% of the 100 participants who completed the *Children's Structured Clinical Interview for DSM-IV* (*KID-SCID*; Matzner et al., 1997) reportedly experienced at least one trauma (e.g., physical/sexual abuse by an adult, witnessing interpersonal violence, being robbed/mugged, serious injuries, etc.).

Luthra et al. (2009) conducted a similar study that involved 157 trauma-exposed children, aged 8 to 17 years, in New York City. Based on administrations of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV;* APA, 1994) based *Kiddie-Schedule for Affective Disorders and Schizophrenia* (*K-SADS*; Kaufman et al., 1997), it was reported that 45% percent of the sample experienced at least one traumatic event. These findings are generally consistent with the outcomes that were reported by Boney-McCoy and Finkelhor (1995) based on their examination of 2,000 youth between the ages of 10 and 16 years. These authors determined that approximately 35% of the children in their sample were victimized at least once, with male respondents most commonly reporting physical assaults and females experiencing more sexual assaults. Relatedly, Lloyd and Turner (2003) surveyed 1,803 individuals between the ages of 18 and 23 years who were living in the Miami metropolitan area. Using the *Composite International Diagnostic Interview* (*CIDI;* WHO, 1990), the authors found that lifetime exposure to stressors, including those that constituted traumatic events as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (*DSM-IV-TR*; APA, 2000), varied from 1-40% (Lloyd & Turner, 2003).

Longitudinal Research.

In divergence from the previously described community sample research, Costello and colleagues (2002) used a longitudinal research design to investigate the rates of trauma-exposure among a cohort of 1,402 youth, aged 9, 11, or 13 years, who lived in rural areas of North

Carolina. Based upon findings generated through annual reevaluations, the authors determined that 25% of participants endorsed having experienced an extreme stressor as defined by the *Life Events Interview* (Angold & Fisher, 1999), which is based on the *DSM-IV* PTSD criteria (APA, 1994). The vast majority of respondents reportedly experienced only one traumatic event (72%), though an additional 18% reported exposure to two extreme stressors and 10% experienced three or more exposures (Costello, Erkanli, Fairbank, & Angold, 2002).

A similar longitudinal investigation was conducted Copeland and colleagues (2007). In this case, 1,420 children, some of whom were also participants in the rural North Carolina sample described above. Using the *Child and Adolescent Psychiatric Assessment* (*CAPA*; Angold & Costello, 2000), which defines a traumatic event in accordance with the *DSM-IV* PTSD criteria (APA, 1994), more than two thirds of the youth sampled reported at least one traumatic experience by the age of 16 years (Copeland, Keeler, Angold, & Costello, 2007). The authors also noted that trauma exposure during adolescence was more common than trauma exposure during earlier years (Copeland et al., 2007). In a related effort, Breslau, Lucia, and Alvarado (2006) interviewed 713 seven-year-olds using the *NIMH Diagnostic Interview Schedule, Version III-R* (*DIS-III-R*; Robins, Helzer, Cottler & Goldring, 1989). These authors observed that over three-quarters of the sample reported that they experienced at least one traumatic event by the time of their interview (Breslau et al., 2006).

In a similar vein, Breslau et al. (2004) assessed a sample of 2,311 children at the age of six years and then re-assessed over half of the participants fifteen years after the initial data collection. The authors found, as based on administrations of the PTSD Module from the *DSM-IV* (APA, 1994) based *Composite International Diagnostic Interview Version 2.1* (*CIDI 2.1;* WHO, 1997) that over 82% of participants experienced at least one traumatic event (Breslau et

al., 2004). Astoundingly, only about 16% of that group reported exposure to a single event, while almost 60% experienced four or more traumatic incidents (Breslau et al., 2004).

PTSD Prevalence in Youth Populations

Children and adolescents are frequently exposed to widespread traumatic incidents, such as mass shootings, natural disasters, or terrorist attacks. Since the school shooting at Columbine High School in 1990, there have been at least 50 similar incidents in the United States (Pearle, 2016). In recent months, there have been multiple devastating hurricanes and earthquakes that resulted in the loss of life and property. In light of the frequency of these events, as well as the prevalence of trauma exposure within the previously described research, PTSD rates after these different types of trauma exposures are reported below.

Examined within this context, the initial National Comorbidity Study provided data regarding the prevalence of PTSD among adolescents and young adults aged 15 to 24 years. Specifically, Kessler and colleagues (1995) created subgroups of participants based on age range from within a larger sample of respondents (n = 5,877). Within that younger subsample, more than 10% of females and approximately 3% of males met criteria for a *DSM-III-R* (APA, 1987) PTSD diagnoses during their lifetime. Kilpatrick and colleagues (2003) also found that female participants evidenced higher rates of PTSD than males based on a reexamination of the survey responses described by Kilpatrick and Saunders (1997). Kilpatrick et al. (2003) estimated that just over 6% of female respondents and approximately 3% of male respondents met *DSM-IV* criteria for PTSD (APA, 1994).

In the previously referenced study by Fitzpatrick and Boldizar (1993), the authors investigated the rates of PTSD among youth who were between the ages of 7 and 18 years (n = 221). Based on administrations of a revised version of the *Purdue Post-Traumatic Stress Scale*

(Figley, 1989), which corresponds to the *DSM-III-R* PTSD symptom criteria (APA, 1987), 27% of sample evidenced sufficient symptoms to meet the diagnostic threshold for PTSD (Fitzpatrick & Boldizar, 1993).

More recent research by Merikangas and colleagues (2010) examined National Comorbidity Survey-Adolescent Survey (NCS-ASR; Kessler et al., 2009) data to determine the prevalence of PTSD among 10,123 youth aged 13 and 17 years. The results of their analyses indicated that almost 5% of the total sample met criteria for PTSD as based on an administration of a modified version of the *DSM-IV (*APA, 1994) based *Composite International Diagnostic Interview* (*CIDI;* Merikangas, et al., 2009). The greatest prevalence rates were evident among youth aged 17 to 18 years (Merikangas et al., 2010).

Giaconia et al. (1995) examined 18-year-old youth (*n* = 384), residing within the northeastern United States, using the *Diagnostic Interview Schedule-III-Revised* (*DIS-III-R;* Robins et al., 1989) to assess the prevalence of PTSD. The authors determined that approximately 6% of participants met criteria for PTSD. Likewise, Cuffe and colleagues (1998) administered the *DSM-IV* (APA, 1994) based *Schedule for Affective Disorders and Schizophrenia for School-Aged Children* (*K-SADS*; Chambers et al., 1985) to 490 participants, aged 16 to 22 years, who endorsed that they had experienced a traumatic event. These authors reported that 3% of females and 1% of the males met criteria for PTSD (Cuffe et al., 1998).

Lloyd and Turner (2003) also examined PTSD rates in the survey of 1,803 individuals, aged 18 to 23 years, living in the Miami metropolitan area. Using the *DSM-IV* based (APA, 1994) *Composite International Diagnostic Interview* (*CIDI*; WHO, 1990), the authors determined that lifetime exposure to traumatic events varied from 1-40%. The lifetime PTSD point prevalence rate was 11.5%, with estimates for females surpassing males (15.5% and 7.5%,

respectively). Similarly, in the previously referenced and study of New York City youth, Luthra and colleagues (2009) determined that 19% of the total sample of 157 trauma-exposed children and adolescents met criteria for PTSD based on *DSM-IV* criteria (APA, 1994).

Two of the longitudinal studies described in the previous section also reported prevalence rates of PTSD. Breslau and her colleagues' (2004) assessment of 1,698 participants, aged 20 to 22 years who were examined 15 years after the initial data collection, revealed that nearly 9% of the sample met criteria for PTSD at some point during their lives. Similar rates were observed in the later study by Breslau et al. (2006), such that 8.3% of the trauma-exposed sample of 17-year-old participants (n = 713) met the PTSD diagnostic threshold as determined by the *DIS-III-R* (Robins et al., 1989).

Examined comprehensively, ten studies were reviewed wherein PTSD prevalence estimates ranged from 1% to 40%. Considered *in toto*, the outcomes of the community study samples in the United States parallel findings from the nationally representative samples in that PTSD develops after traumatic events in the minority of individuals who experience them.

Trauma Type and Child PTSD

The subsequent section of the chapter explores the rates of PTSD in response to different types of traumas including victimization (i.e., physical and sexual abuse, neglect, etc.), war experiences, natural disasters, and accidental harm or injury.

Victimization Studies

With regard to the psychological outcomes of sexual abuse, McLeer, Callaghan, Henry and Wallen (1994) assessed two matched samples of youth between the ages of 6 and 16 years. One sample had a history of sexual abuse (n = 26) and the second sample consisted of a nonclinical control group (n = 23). McLeer and her colleagues administered the *DSM-III-R*

based (APA, 1987) *Schedule for Affective Disorders and Schizophrenia for School-Age Children, Epidemiological Version* (*K-SADS-E*; Orvaschel, Puig-Antich, Tabrizi, & Johnson, 1982) and observed that 42% of the abused youth met criteria for PTSD. Significantly fewer (8.7%) participants in the control group met criteria for the disorder (McLeer et al., 1994). Interestingly, the abused and control groups did not differ with reference to the rates of other psychiatric disorders, with attention deficit-hyperactivity disorder (ADHD) being the most frequent diagnosed in both samples (McLeer et al., 1994).

In a related effort, Merry and Andrews (1994) administered the *DSM-III* based (APA, 1980) *Diagnostic Interview Schedule for Children* (*DISC*; Shaffer, Fisher, Piacenti, Schwab-Stone, & Wicks, 1989) to 66 sexually abused children aged 6 to 16 years. These authors determined that almost 19% of the sample who experienced sexual abuse met criteria for PTSD one year after their reported experiences. More recently, Broman-Fulks and colleagues (2007) examined data from the National Survey of Adolescents (NSA) to assess the rates of PTSD within the sample of participants with a reported history of sexual victimization. Using the *DSM-IV* based (1994) *NWS PTSD Module* (Kilpatrick et al., 1989) with modifications, the authors determined that between 13 and 24% of the youth that were sampled met criteria for PTSD. Moreover, despite nonsignificant differences based on the time elapsed between trauma exposure and disclosure, those who did not disclose at all evidenced the highest rates of the disorder (Broman-Fulks et al., 2007).

Other researchers have investigated the differential impact of trauma exposure, based on the type of abuse, on the rates of PTSD. Ackerman and colleagues (1998) utilized the *DSM-IV* based (APA, 1994) *Diagnostic Interview for Children and Adolescents* (*DICA;* Reich & Welner, 1988) to determine PTSD diagnostic status among a sample of children, between the ages of 7

and 12 years, in Arkansas. The sample consisted of three groups, categorized according to whether they were victims of sexual abuse (n = 127), physical abuse (n = 43), or had experienced both (n = 34) types of abuse. Ackerman et al. (1998) reported that approximately 55% of children with a history of sexual and physical abuse met PTSD criteria based on the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition* (*DSM-III*; APA, 1980). Lower rates were observed among youth victims of either form of abuse in isolation (Ackerman et al., 1998). Despite the lower prevalence relative to the combined abuse experiences, nearly 32% of the sexually abused group and 25% of the physically abused group evidenced PTSD (Ackerman et al., 1998).

Silva et al. (2000) conducted a similar investigation that examined the rate of PTSD among 100 youth, aged 3 to 18 years who experienced sexual abuse, physical abuse or witnessed violence in their homes. Diagnostic status was based on administrations of the *Structured Clinical Interview for DSM-IV Disorders* (*KID-SCID*; Matzner, Silva, Chowdry, & Nastasi, 1997). The authors observed that 21%, 15%, and 17% of the youth who were physically abused, sexually abused, or who had witnessed domestic violence, respectively, met criteria for PTSD

The previously described longitudinal study by Breslau et al. (2004) also compared rates of PTSD based on different types of victimization. Within their sample of 2,311 adolescents aged 20 to 22 years, rape victims evidenced the highest rates of PTSD at over 46%, while 29% of the youth who experienced other forms of sexual assault met criteria for the disorder (Breslau et al., 2004). Other victimization experiences included torture, being badly beaten, stabbed or shot, and threatened with a weapon and/or having been mugged. Of those who reported these traumatic experiences, PTSD was indicated among 20% of tortured youth, 13% of youth who were badly

beaten, 9% of the victims who were shot or stabbed, and approximately 4% of those who were mugged and/or threatened with a weapon (Breslau et al., 2004).

A similar study investigated the prevalence of PTSD among 84 youth aged 11 to 17 years who experienced sexual and/or physical maltreatment, neglect, and neglect in combination with sexual and/or physical maltreatment (Wechsler-Zimring & Kearney, 2011). Using the *DSM-IV* based (APA, 1994) *Children's PTSD Inventory* (*CPTSDI*; Saigh, 2003a), these authors determined that the groups in their sample did not significantly differ in terms of PTSD prevalence. Overall, almost 90% of the participants met *DSM-IV* criteria for PTSD (APA, 1994; Wechsler-Zimring & Kearney, 2011). However, the adolescents who experienced neglect, in the absence of other maltreatment, endorsed fewer symptoms of distress relative to the comparison groups (Wechsler-Zimring & Kearney, 2011).

Researchers have also examined rates of PTSD following maltreatment in general. In this context, Famularo and colleagues (1994) assessed 109 children between the ages of 2 and 12 years who had been legally removed from parental custody due to maltreatment. Based upon administrations of the *DSM-IV* based (APA, 1994) *Diagnostic Interview for Children and Adolescents* (*DICA;* Reich & Welner, 1990), over 35% of the children met criteria for PTSD (Famularo et al., 1994). A related study by Linning and Kearney (2004) utilized the *Children's PTSD Inventory* (*CPTSDI*; Saigh, 2003a) to examine the rates of PTSD among 55 maltreated youth, aged 8 to 16 years, who were living in homeless shelters at the time of the investigation. The authors reported that more than 67% of the children had a PTSD diagnosis (Linning & Kearney, 2004).

School Violence Studies. Rates of PTSD have also been investigated in the aftermath of school shootings. Vila and colleagues (1999) investigated child reactions following violence at a

school in France. In this case, twenty-six elementary students, aged six to nine years, were held hostage by a gunman. Using an unpublished French version of the *DSM-V* based (APA, 1994) *Kiddie-Schedule for Affective Disorders and Schizophrenia-Lifetime Version* (*K-SADS-L*; Vila, Porche, Luc-Michen, & Mouren-Simeoni, 1999), the authors assessed the rates of PTSD among the students that were held hostage and 22 students who attended the school and were not held as hostages (Vila et al., 1999). Two months after the incident, twenty-seven percent of the students who had been held as hostages met criteria for PTSD (Vila et al., 1999). However, after 18 months, less than one percent of those 26 students met full PTSD criteria (Vila et al., 1999). Among the comparison sample of students, two of the 22 students (9%) endorsed sufficient symptoms to meet criteria for PTSD via indirect exposure immediately following the incident, and another child developed PTSD six months after the initial evaluation (Vila et al., 1999).

Table 2.1 presents the prevalence estimates of PTSD among the criminal victimization studies that were reviewed. As may be noted, PTSD rates ranged from 13% to approximately 90%.

Table 2.1

PTSD Prevalence Rates in Youth Following Criminal Victimization

Study	Participants		Age Range (years)	Measure(s)	Elapsed Time	PTSD Prevalence
	M	F				
Ackerman et al. (1998)	73	131	7-13	*DICA-R*	> 4 weeks	Only Sexual Abuse: 31.8%
Breslau et al. (2004)	1,698 adolescents		21	*CIDI 2.1*	Not Reported	15.1%

Study	Participants		Age Range (years)	Measure(s)	Elapsed Time	PTSD Prevalence
Broman-Fulks et al. (2007)	70	251	Mean Age: 15.2	*NWS*	Not Reported	Non-Disclosure Group: 24% Short-Delay Discloser Group: 22% Long-Delay Discloser Group: 13%
Famularo et al. (1996)	48	69	6-12	*DICA-C-R*	Not Reported	35.8%
Linning & Kearney (2004)	22	33	8-17	*CPTSDI*	2 years	67.3%
Luthra et al. (2009)	91	66	8-17	*K-SADS*	Not Reported	19%
Merry & Andrews (1994)	11	55	6-16	*DISC*	12 months	18.9%
McLeer et al. (1993)	96 children		6.16	*K-SADS-E*	Not Reported	42.3%
Silva et al. (2000)	39	20	Mean age: 9.9	*Kid-SCID*	Not Reported	Domestic Violence: 17% Sexual Abuse: 21% Witness Domestic Violence: 17% Total Sample: 22%
Vila et al. (1999)	14	12	6-9.5	*K-SADS-L*	Initial: 2 months Follow-up: 18 months	Initial: 27% Follow-up: 3.84%
Wechsler-Zimring & Kearney (2011)	37	46	11-17 Mean Age: 14.5	*CPTSDI*	Not Reported	89.3%

Natural Disaster Studies

Children and adolescents have experienced natural disasters across the world. Many of these disasters involved significant destruction, loss of life, and frequently were associated with The United Nations (2014) estimated that in the years since 1994, over a million people across the globe were killed by natural disasters such as hurricanes, tornados, floods, and earthquakes, while over four billion suffered other negative consequences. The following sections of the chapter describe investigations that estimated the prevalence of PTSD following disasters.

Hurricanes and Floods. Scheeringa and Zeanah (2008) examined the effects of Hurricane Katrina on children living in New Orleans in 2005. Katrina was one of the most devastating hurricanes to hit the United States and resulted in the death of over 1000 individuals in Louisiana (Jonkman, Maaskant, Boyd, & Levitan, 2009). The storm also led to the forced relocation of almost the entire city of New Orleans. Scheeringa and Zeanah (2008) interviewed 70 preschool children and their caregivers using the *DSM-IV-TR* based (APA, 2000) *Diagnostic Interview Schedule* (*DIS*; Robins et al., 1981). Within this context, 34% reported that they were unable to evacuate prior to the storm's arrival and more than 45% of the parents and children reported having been temporarily separated from each other during the crisis (Scheeringa & Zeanah, 2008). Altogether, the authors found that almost 16% of the preschoolers met criteria for PTSD (Scheeringa & Zeanah, 2008).

Research examining PTSD rates among youth populations affected by the flooding of the Missouri and Mississippi Rivers have also provided prevalence estimates. In this context, Earls, Smith, Reich, and Jung (1998) interviewed a sample of 20 parent-child dyads living in the St. Louis area who had to evacuate from their homes due to the flooding that occurred between 1982 and 1983. Based on administration of the *DSM-III* (APA, 1980) version of the *Diagnostic*

Interview for Children and Adolescents (*DICA*; Herjanic & Reich, 1982), the researchers reported that none of the 39 children that were examined (age range: 6 to 17 years) met criteria for PTSD (Earls et al., 1998).

Earthquakes. In 1988, Armenia experienced a 6.9 magnitude earthquake that killed over 25,000 people in addition to resulting in the relocation of thousands more. Within this context, Najarian, Goenjian, Pelcovitz, Mandel, and Najarian (1996) interviewed three groups of children, aged 11 to 13 years, who were categorized according to their proximity to the earthquake's epicenter. Those nearest the epicenter (n = 25) witnessed catastrophic destruction and death around their homes, while others (n = 28) were relocated to hotels and other temporary housing locations outside the directly impacted region immediately after the earthquake. A third group (n = 25) resided outside the earthquake's zone of impact and was not exposed to related traumatic events (Najarian et al., 1996). Based upon administrations of the *DSM-IV*-based (APA, 1994) PTSD module from the *Diagnostic Interview for Children and Adolescents* (*DICA*; Kaplan & Reich, 1991) that was administered two and a half years after the earthquake, the authors determined that 32% of the first and most trauma-exposed group met criteria for PTSD (Najarian et al., 1996). Fewer relocated children (28%) from the second group evidenced PTSD, while only 4% of the comparison group met criteria for the disorder (Najarian et al., 1996).

The prevalence of PTSD was also examined among samples of Chinese youth who survived an 8.0 magnitude earthquake in 2008. This incident led to the death of more than 700,000 individuals and led to the separation of thousands of children from their caregiver. Within this context, Ma and colleagues (2010) examined the prevalence of PTSD among a sample of 3,208 adolescents aged 12 to 18 years, who lived in counties surrounding the earthquake's epicenter. Six months after the event, the authors assessed participants whose

responses to screening tools indicated that they had elevated PTSD symptoms as measured by the *Kiddie-Schedule for Affective Disorders and Schizophrenia – Present and Lifetime Version* (*K-SADS-PL;* Kaufman et al., 2000). Results at the diagnostic level indicated that 2.5% of met full criteria for PTSD (Ma et al., 2010).

A second study investigated PTSD rates among 34 children between the ages of 9 and 16 years who were relocated after the same earthquake (Yang et al., 2014). The researchers evaluated participants at two time periods (at four and 12 months after the earthquake). In this case, the *DSM-IV* based (APA, 1994) *Kiddie-Schedule for Affective Disorders and Schizophrenia – Present and Lifetime Version* (*K-SADS-PL;* Kaufman et al., 2000) was used to formulate diagnoses. At the first assessment, six percent of the relocated youth met criteria for PTSD but one year after the earthquake, only 12.5% of the sample with who were initially diagnosed with PTSD continued to meet criteria for the disorder (Yang et al., 2014).

Tornadoes. Adams and colleagues (2014) investigated the prevalence of PTSD following tornadoes that occurred in United States during the spring of 2011. Their sample, which consisted of 2,000 youth between the ages of 12 and 17 years who lived no more than five miles from the locations where the tornadoes touched down (i.e., Alabama and Missouri). Ninety percent of these youth were physically present during the storms and almost 75% reported that they were highly concerned about their personal safety and the safety of family members (Adams et al., 2014). Based on the *DSM-IV* (APA, 1994) based PTSD module from the National Survey of Adolescents (Kilpatrick et al., 2003), almost 7% of the adolescents met criteria for PTSD (Adams et al., 2014).

Table 2.2 presents the prevalence estimates of PTSD among the natural disaster studies that were reviewed. As may be noted, PTSD rates ranged from 0 to 33%.

Table 2.2

PTSD Prevalence Rates in Youth Victims of Natural Disasters

Study	Participants M	Participants F	Age Range (years)	Measure(s)	Elapsed Time	PTSD Prevalence
Adams et al. (2014)	982	1,018	12.17	*PTSD Module from the NSA*	8.8 months (SE: 2.6 months)	6.7%
Earls et al. (1998)	16	16	6-17	*DICA*	1 year	0%
Ma et al. (2000)	1536	1671	12-18	*K-SADS*	6 months	2.5%
Najarian et al. (1996)	37	37	11-13	*DICA-R*	2.5 years	Earthquake City: 33% Relocated: 28% Low Exposure: 4%
Scheeringa & Zeanah (2008)	40	30	3-6	*DIS*	Not Reported	15.7%
Yang et al. (2014)	523 children & adolescents		9-17	*K-SADS-PL*	4 & 12 months	4 months: 6% 12 months: <1%

Accident Studies

Vast numbers of youth experience traumatic incidents as a result of serious accidents. Various studies have examined the rates of PTSD in children and adolescents following such events. For example, Stallard and colleagues (1998) administered the *DSM-IV* (APA, 1994) based *Clinician Administered PTSD Scale for Children and Adolescents* (*CAPS-C*; Nader et al., 1996) to a sample of 119 English children, between the ages of 5 and 18 years, who were involved in motor vehicle accidents. Results indicated that 34% of the sample met criteria for PTSD when assessed 40 days after the accident (Stallard, Velleman, & Baldwin, 1998). Stallard and colleagues (2001) also conducted a similar involving 97 children who had been in motor vehicle accidents and ranged in age from 7 and 18 years. These authors also administered the

DSM-IV (APA, 1994) based *Clinician Administered PTSD Scale for Children and Adolescents* (*CAPS-C*; Nader et al., 1996) to the participants and it was reported that approximately 37% met criteria for PTSD six weeks their accident (Stallard, Velleman, Langsford, & Baldwin, 2001).

A related study examined PTSD rates after motor vehicle accidents among American children aged 7 to 16 years who had sustained physical injuries (Keppel-Benson, Ollendick, & Benson, 2002). Using the *Diagnostic Interview for Children and Adolescents-Revised* (*DICA*; Reich & Welner, 1990), the authors reported an overall 14% prevalence rate of PTSD based on the *DSM-III-R* criteria (APA, 1987). Another study involving 143 children who were injured in motor vehicle accidents utilized the same diagnostic instrument to assess PTSD at two and six months after the accident (Zink & McCain, 2003). Of the sample of children that were examined, (age range: 4 to 8 years), eighteen percent met PTSD criteria two months after the reported accidents. Four months later, 30% of the children who initially evidenced PTSD continued to meet criteria (Zink & McCain, 2003).

Examined from a different perspective, Yule and his colleagues (2000) examined a sample of 400 British youth after their holiday ship sank off the coast of Greece. Between five and eight years after the sinking, the researchers assessed 217 of the students, who ranged in age from 11 to 18 years at the time of the accident, using the *DSM-IV* based (APA, 1994) *Clinician Administered PTSD Scale* (*CAPS*; Blake et al., 1990). Results indicated that nearly 52% of the sample met criteria for PTSD at some point after the incident and that the majority developed PTSD within six months of the sinking of the ship (Yule et al., 2000).

Table 2.3 presents the prevalence estimates of PTSD among the accident studies that were reviewed. As may be noted, PTSD rates ranged from 14% to 51.7%.

Table 2.3

PTSD Prevalence Rates Among Accident Victims

Study	Participants M	Participants F	Age Range (years)	Measure(s)	Elapsed Time	PTSD Prevalence
Keppel-Benson et al. (2002)	29	21	7-16 Mean Age: 11.6	*DICA-R*	Not Reported	14%
Stallard et al. (1998)	68	51	5-18	*CAPS-C*	40 Days	34.5%
Stallard et al. (2001)	52	45	7-18 Mean Age: 14.6	*CAPS-C*	6 months	37.1%
Yule et al. (2000)	217 survivors		Not Reported	*CAPS-c*	5-8 years	51.7%
Zinc & McCain (2003)	85	58	4-18	*DICA-R*	2 & 6 months	22%

War-Related PTSD Studies

As child and adolescent populations are frequently exposed to traumatic stressors related to war, studies investigating the psychological outcomes of such experiences have also been conducted. The following section details a number of these studies, categorized according to the nations and related conflicts in which they were situated.

Lebanon. Between 1975 and 1990, Lebanon's Civil War claimed the lives of approximately 150,000 individuals, including military and non-military casualties ("Casualties of Mideast Wars," 1991). Up to one million people were also forced to flee the country during this time period, with many displaced from their homes as recently as 2012 ("Casualties of Mideast Wars," 1991). Children and adolescents were among those who were psychologically affected by the conflict and research has been conducted to examine the impact of the war on this population. Specifically, Saigh (1988) assessed 92 adolescents, aged 13 years, who were attending English-speaking schools while bombings and other attacks were underway. Using the

DSM-III (APA, 1980) based *Children's PTSD Inventory* (*CPTSDI*; Saigh, 1987), the author reported a PTSD point prevalence rate of 29.3% (Saigh, 1988). The following year, Saigh (1989) administered the same measure to a larger sample (n = 840) of children and adolescents who ranged in age from 9 to 12 years. Youth who demonstrated emotional distress following exposure to war related events were referred to the study by various professionals (e.g., physicians, aid workers, mental health professionals, teachers, etc.). Saigh (1989) went on to observe that chronic PTSD was evident among 27.5% of the cases that were examined.

Similar rates of PTSD were reported among a sample of Lebanese 386 children who experienced an intense campaign of air raids and bombings that lasted 15 days and resulted in the displacement of hundreds of thousands of people. Based on administrations of the *DSM-IV* based (APA, 1994) *Diagnostic Interview Schedule for Children and Adolescents-Revised* (*DICA-R*; Reich et al., 1995), Karam and colleagues (2000) determined that approximately 24% of the youth that were sampled met criteria for PTSD.

Israeli and Palestinian Studies. Since 1948, when Israel gained its independence, this region has been characterized by significant conflict with residents experiencing a variety of war-related stressors. An examination of the psychological consequences of these stressors on youth populations was conducted by Khamis (2005). In this context, the investigators assessed 1,000 adolescents between the ages of 12 and 16 years who lived in East Jerusalem and the West Bank. The majority of these children (almost 55%) reported exposure to at least one traumatic event as defined by the *DSM-IV* (APA, 1994). These incidents included personal injury, death of close relative, destruction of the family home, and/or imprisonment and abuse (Khamis, 2005). Among the traumatized youth, administrations of the *Structured Clinical Interview for DSM-IV*

(*SCID*; First et al., 1996) indicated that over 62% met criteria for criteria for PTSD comprising approximately 34% of the full sample of youth (Khamis, 2005).

In a related study involving 229 Palestinian adolescents between the ages of 15 and 19 years who were living in refugee camps, trauma exposure was common (Elbedour, Onwuegbuzie, Ghannam, Whitcome, & Hein, 2007). Based on assessments using the *Posttraumatic Stress Disorder Interview* (*PTSD-I*; Watson et al., 1991), which utilizes *DSM-IV* symptom criteria (APA, 1994), almost 69% of the sample evidenced PTSD (Elbedour et al., 2007). The traumatic events reported by this group of youth included witnessing the deaths of friends or family members, having their homes destroyed, or even being shot themselves (Elbedour et al., 2007). Several studies have also reported child psychological reactions to traumatic events among Israeli children (Laufer & Solomon, 2009; Pat-Horenczyk et al., 2007; Solomon & Lavi, 2005). However, these studies did not employ one of *DSM*-based structured interviews that were specified as being reliable and valid at the beginning of this chapter and were not reviewed.

Cambodia. In 1975, the Pol Pot regime assumed control of Cambodia and subjected its people to various atrocities ("Cambodia's Brutal Khmer Rouge regime," 2014). Families were displaced, with some members forced into work camps, and starvation occurred with regularity due to the conditions and poor distribution of food. Torture and execution were also used as strategies of control by the government. Over the course of a few years, thousands of Cambodians were killed or died. Individuals who were able to flee the country were also exposed to exceptional stressors. With these points in mind, Sack and colleagues (1994) administered the *DSM-III-R* based (APA, 1987) *Kiddie-Schedule for Affective Disorders and Schizophrenia-Epidemiological Version* (*K-SADS-E*; Puig-Antich, 1983) to a sample of 13 to 25-year-old

refugees (n = 209) living on the West Coast of the United States. Although the participants had lived in the U.S. for an average of 8.3 years, the prevalence of current PTSD in the sample was 18.2%, with a lifetime prevalence of 21.5% (Sack et al., 1994).

A similar study was conducted with a sample of Cambodian refugees who were living at a camp near the border between Thailand and Cambodia (Savin, Sack, Clarke, Meas, & Richart, 1996). Conditions in the camp were said to be poor and rape, assault, theft, extortion, and other forms of violence were frequently evident (Savin et al., 1996). As such, among the 99 adolescents in the sample, who ranged in age from 18 to 25 years, over 31% met criteria for PTSD based on administrations of the *DSM-III-R* (APA, 1987) based *Diagnostic Interview for Children and Adolescents* (*DICA*; Welner et al., 1987). Furthermore, the lifetime prevalence of PTSD was 37.3% (Savin et al., 1996). Despite the conditions at the camp, the authors noted that PTSD was significantly related to Pol Pot-induced traumas, rather than the stressful events that were experienced by participants since or while fleeing Cambodia (Savin et al., 1996).

Rwanda. As many as one million people were killed as a result of the conflict between Hutus and Tutsis during the Rwandan genocide of 1994 (Schaal & Helbert, 2006). Within this context, it was not uncommon for family members to kill one another. It was also reported that teachers murdered their students, children killed other children, and husbands murdered their wives (Schaal & Helbert, 2006). Many children were left without parents or caregivers, which led to over 300,000 children living with their eldest sibling who assumed the role of the head of household (Schaal & Helbert, 2006). Given the widespread exposure to traumatic events, Schaal and Helbert (2006) examined the prevalence of PTSD among a sample of 68 Rwandan orphans. Of these children, who ranged in age from 13 to 23 years and were living in orphanages or homes with a child as the head-of-household, 44% met *DSM-IV* PTSD criteria (1994), as

indicated by administrations of the PTSD module of the *Composite International Diagnostic Interview* (*CIDI*; WHO, 1997). Ninety-seven percent of the participants reportedly saw dead bodies, some mutilated. It was also reported that 88% of the participants had been personally attacked, 77% had witnessed a violent murder, and 44% saw their parents being killed (Schaal & Helbert, 2006).

The Sudan. Civil war and famine have resulted in the deaths of between one and two million individuals and displacement of over three million Sudanese over the last 35 years (World Peace Foundation, 2015). Against this background, Peltzer (1999) assessed 56 children between 6 and 12 years of age who were separated from their parents or caregivers and had experienced severe hunger or thirst. The children were assessed for PTSD using the *DSM-III-R* (APA, 1987) based *Children's PTSD Inventory* (*CPTSDI*; Saigh, 1989) while they were residing in a Ugandan refugee camp. Peltzer (1999) subsequently determined that 20% of children met PTSD criteria.

Table 2.4 presents the prevalence estimates of PTSD among war-related studies that were reviewed. As may be noted, the research examining the effects war-related stressors on PTSD development in youth populations indicated that PTSD prevalence rates varied from 18% to approximately 69%.

Table 2.4.

PTSD Prevalence Rates in Youth Exposed to War-Related Traumas

Study	Participants		Age Range (years)	Measure(s)	Elapsed Time	PTSD Prevalence
	M	F				
Israel-Palestine Conflict						
Elbedour et al. (2007)	121	108	Mean Age: 17.13	*DSM-IV* based *CPTSDI*	Not Reported	68.90%

Study	Participants M	Participants F	Age Range (years)	Measure(s)	Elapsed Time	PTSD Prevalence
Israel-Palestine Conflict						
Khamis (2005)	523	477	Mean Age: 14.8	*SCID*	Not Reported	62.30%
Lebanon						
Karam et al. (2000)	386 children and adolescents		Not Reported	*DICA-R*	Not Reported	24.10%
Saigh (1998)	42	50	13	*DSM-III* based *CPTSDI*	Not Reported	29.30%
Saigh (1989)	403	437	9-12	*DSM-III* based *CPTSDI*	1-2 years	32.50%
Southeast Asia						
Sack et al. (1994)	104	105	Mean Age: 19.8	*K-SADS*	13 years	Point: 18.2% Lifetime: 27.3%
Savin et al. (1996)	89	10	18-25	*K-SADS*	10 years	Point: 31.3% Lifetime: 27.3%
Africa						
Peltzer (1999)	56 children		6-12	*DSM-III* based *CPTSDI*	Not Reported	20%
Schaal & Helbert (2006)	33	33	Mean Age: 15.23	*CIDI*	10 years	44%

PTSD and Comorbid Disorders

Adult Studies

Various epidemiological research studies of adult populations have provided evidence that PTSD frequently co-occurs with other psychiatric illnesses (Brady, Killeen, Brewerton, & Luccirini, 2000; Kulka et al., 1990). In fact, Kessler and colleagues' analysis of data from the National Comorbidity Study (1995) indicated that almost 80% of women with a PTSD diagnosis also met criteria for at least one other psychiatric disorder, with men's rates of comorbidity exceeding those of women (over 88%). Major depressive disorder (MDD) was reportedly the

most commonly co-occurring illness for both women and men, such that MDD was observed in almost 49% of women with a lifetime PTSD diagnosis and about 48% of men (Kessler et al., 1995). Additionally, more than half of the men (51.9%) with a history of PTSD also met criteria for alcohol abuse, while approximately 28% of women with a positive PTSD history abused alcohol (Kessler et al., 1995). Of note, PTSD diagnoses frequently preceded co-occurring MDD and alcohol abuse (Kessler et al., 1995).

Youth Studies

Among the literature reviewed, comorbidity was infrequently assessed within child and adolescent samples. However, the studies that did examine disorders that co-occurred with PTSD among youth have found high rates of comorbid mood disorders, particularly anxiety and depressive disorders, and substance use. With regard to additional psychiatric disorders in general, Ackerman et al. (1988) noted that nearly 90% of participants assessed met criteria for at least one co-occurring psychiatric *DSM-III* disorder (APA, 1980). Similarly, Perkonigg, Kessler, Storz, and Wittchen (2000) reported that 87.5% of the participants sampled met *DSM-IV* (APA, 1994) criteria for at least one comorbid disorder. Furthermore, Perkonigg and colleagues (2000) reported that almost 78% of the German children diagnosed with PTSD also evidenced two or more *DSM-IV* disorders (APA, 1994). Although these are only two studies, the extremely high rates of comorbidity observed underscore the importance of understanding the mental disorders that commonly occurring with PTSD.

As evidenced among older populations (Kessler et al., 1995), MDD and other depressive disorders were frequently diagnosed in youth. For example, Ackerman and colleagues (1988), who assessed child victims of physical and/or sexual abuse, noted significant comorbidity between PTSD and MDD, along with dysthymia, per the *DSM-III* (APA, 1980). Giaconia et al.

(2005) provided more specific information such that approximately 42% of the sample of adolescents with *DSM-III-R* (APA, 1987) PTSD also met criteria for MDD. Another study involving maltreated youth revealed that youth with PTSD were over 35% more likely to meet *DSM-IV* criteria (APA, 1994) for MDD, relative to a comparison group of maltreated children and adolescents without PTSD (Linning & Kearney, 2004). Preschool children with PTSD also evidenced high rates of comorbid MDD, with almost 43% meeting *DSM-IV-TR* diagnostic criteria (APA, 2000) in the study by Scheeringa and Zeanah (2008).

Even more information regarding the occurrence of mood disorders with PTSD came from the study of German youth that was conducted by Perkonigg and colleagues (2000). The authors in this case indicated that over 56% of their sample evidenced MDD and 50% met *DSM-IV* criteria (APA, 1994) for dysthymia, both of which occurred after the onset of PTSD (Perkonigg et al., 2000). Additionally, bipolar disorder was observed after PTSD was diagnosed in 40% of the sample of adolescents (Perkonigg et al., 2000).

Still higher estimates of comorbid MDD were observed in studies involving Cambodian youth who relocated as a result of the Pol Pot regime. Sack et al. (1993) noted that 60% of the adolescents with PTSD also met *DSM-III* criteria (APA, 1980) for MDD, while a related study revealed that Cambodian refugees with PTSD were 3.5 times more likely to meet *DSM-III* (APA, 1980) diagnostic criteria for a depressive disorder (Sack et al., 1994). A similar study also revealed high rates of comorbid depression in Cambodian refugees with PTSD, such that 21% also met *DSM-III-R* criteria (APA, 1987) for MDD (Hubbard, Realmuto, Northwood, & Masten, 1995).

As mentioned above, anxiety disorders were also evident among youth diagnosed with PTSD. Specifically, PTSD and comorbid *DSM-IV* diagnoses (APA, 1994) of simple phobia or

social phobia were reported at 85.7% and 75% respectively in the study of German youth that was conducted by Perkonigg et al. (2000). Additionally, the authors noted that 80% of youth were diagnosed with panic disorder with agoraphobia and 75% were diagnosed with panic disorder in the absence of agoraphobia during the same year they received a PTSD diagnosis (Perkonigg et al., 2000). Preschool children with PTSD demonstrated high rates (21.2%) of concurrent separation anxiety as defined in the *DSM-IV-TR* (APA, 2000; Scheeringa & Zeanah, 2008). Similarly, Linning and Kearney (2004) observed a significant association between *DSM-IV* (APA, 1994) PTSD and both generalized anxiety disorder (GAD; 48.6%) and panic disorder with (80%) and without agoraphobia (75%) in the sample of maltreated youth.

Co-occurring anxiety disorders were also observed among Cambodian refugees with PTSD. Specifically, Sack and colleagues (1994) found that the youth with PTSD were 4.3 times as likely to meet criteria for a *DSM-III-R* (APA, 1987) anxiety disorder, while Hubbard et al. (1995) observed that 21% of the Cambodian refugees in their sample were also diagnosed with GAD based on the *DSM-III-R* (APA, 1987).

High rates of comorbid substance use disorders have also been reported in the literature. For example, Giaconia et al. (2005) observed that more than half of the sample of older adolescents with PTSD developed substance abuse and/or alcohol dependence based on *DSM-III-R* criteria (APA, 1987). Similar *DSM-IV* (APA, 1994) based rates were noted in the sample of German adolescents as well. In particular, among adolescents with PTSD, 75% met criteria for drug abuse, over 72% met criteria for nicotine dependence, and more than 55% evidenced alcohol abuse (Perkonigg et al., 2000). Interestingly, none of the youth that were assessed in the Hubbard et al. (1995) research involving Cambodian refugees met criteria for a substance use disorder.

With regard to other co-occurring disorders, somatoform disorder was noted in two studies. Perkonigg and colleagues (2000) found that over 66% of the sample of the German adolescents that were sampled met *DSM-IV* criteria (APA, 1994) for somatoform disorders prior to the onset of PTSD. Somatoform pain disorder was also observed as a concurrent *DSM-III-R* diagnosis (APA, 1987) among the 29% of the female Cambodian refugee participants in the Hubbard et al. (1995) study. Eating disorders were also evidenced as preceding PTSD among the German youth assessed by Perkonigg et al. (2000), as 80% of the sample met *DSM-IV* criteria (APA, 1994) for an eating disorder.

Lastly, disorders related to attention, hyperactivity, and disruptive behaviors were also found to occur alongside PTSD. McLeer and colleagues (1993) observed that approximately 23% of the sexually abused youth with PTSD also met *DSM-III-R* criteria (APA, 1987) for attention deficit hyperactivity disorder (ADHD), about 15% evidenced concurrent conduct disorder (CD), and over 11% of the sample met criteria for PTSD, ADHD, and CD. Among a sample of preschool children, Scheeringa and Zeanah (2008) found that over 60% of the children with PTSD also met *DSM IV-TR* criteria (APA, 2000) for oppositional defiant disorder (ODD) and a third of the sample met the diagnostic threshold for ADHD.

As may be seen in Table 2.5, depressive and anxiety disorders are highly comorbid with PTSD among youth and, while less frequently reported, neurodevelopmental and externalizing disorders have also been noted.

Table 2.5

Prevalence of Comorbid Diagnoses with PTSD

Study	Measures	Prevalence of Comorbidity
Giaconia et al. (2005)	*DIS-III-R*	Major Depressive Disorder: 41.7% Simple Phobia: 29.2% Social Phobia: 33.3% Alcohol Dependence: 45.8%

Study	Measures	Prevalence of Comorbidity
Hubbard et al. (1995)	*SCID-NP*	Major Depressive Disorder: 21% Generalized Anxiety Disorder: 21% Social Anxiety Disorder: 21% Somatoform Disorders: 29%
Linning & Kearney (2004)	*ADIS-C*	Major Depressive Disorder: 35.1% Panic Disorder: 18.4% Separation Anxiety Disorder: 35.1% ADHD: 35.1%
McLeer er al. (1994)	*K-SADS-E*	Panic Disorder: 18.4% ADHD: 15.1% ADHD & Conduct Disorder: 11.5%
Perkonigg et al. (2000)	*Munich CIDI*	Depressive Disorders: 68.5% Simple Phobia: 87.5% Social Phobia: 75% Panic Disorder With Agoraphobia: 80% Without Agoraphobia: 75% Somatoform Disorder: 66.7% Eating Disorders: 80% Substance Use/Dependence: 70.6%
Sack et al. (1993)	*K-SADS-E* *DSM-III DICA*	Major Depressive Disorder: 60%
Scheeringa & Zeanah (2008)	*DIS*	Oppositional Defiant Disorder: 60.6% ADHD: 33.3% Major Depressive Disorder: 42.9% Separation Anxiety Disorder: 22%

PTSD Risk Factors

A number of studies that were previously described provide information regarding several risk factors that have been associated with PTSD diagnoses. The following sections will summarize these findings.

Age

Numerous studies have indicated that older children were more likely than younger children to develop PTSD (Khamis, 2005; Kilpatrick & Saunders, 1997; Merikangas et al., 2010;

Perkonigg et al., 2000; Sack et al., 1994). On the other hand, nonsignificant differences were associated with age in the study of youth survivors of tornadoes in the United States (Adams et al., 2014), earthquakes in China (Yang et al., 2011), car accidents (Zink & McCain, 2003), and the Rwandan genocide survivors (Schaal & Helbert, 2006).

Large-scale surveys of adolescents indicated that older adolescents, as compared to younger counterparts, were more likely to develop PTSD after trauma exposure (Kilpatrick & Saunders, 1997; Merikangas et al., 2010). Specifically, Kilpatrick and Saunders (1997) observed that PTSD rates were lower among children between the ages of 12 and 13 years, as compared to rates among youth who were 16 and 17 years old. Beyond the group difference that were noted, the authors also indicated that the older group was more than three times as likely to develop PTSD than the younger group of children (Kilpatrick & Saunders, 1997). More recently, Merikangas and colleagues (2010) reported similar findings based on the National Comorbidity Study of Adolescents.

International studies have reported similar findings. In the research with Palestinian adolescents, Khamis (2005) reported that PTSD rates were significantly higher among older participants. Older age was also associated with a greater likelihood of developing PTSD among Cambodian adolescent refugees (Sack et al., 1994). Perkonigg and colleagues (2000) reported that PTSD in German children below the age of 11 was highly uncommon, though they also indicated that youth who reported experiencing a traumatic event prior to age 12 years were at greater risk of subsequent PTSD. Some authors speculated that the increased risk of PTSD in older youth may be related to the memories of traumatic experiences, which younger children are less likely to possess (Sack et al., 1994).

Gender

Across the majority of the studies that were reviewed, females were more likely than males to develop PTSD after trauma exposure, both nationally and internationally (Adams et al., 2014; Breslau et al., 2004; 2006; Cuffe et al., 1998; Giaconia et al., 1995; Hubbard et al., 1995; Kessler et al., 1995; Linning & Kearney, 2004; Ma et al., 2011; Merikangas et al., 2010; Merry & Andrews, 1994; Perkonigg et al., 2006; Schaal & Helbert, 2006; Stallard et al., 1998). One study reported that male youth were more likely than females to develop PTSD after war-related trauma among Palestinians, such that nearly 59% of males and about 41% of females met criteria for PTSD (Khamis, 2005). Additionally, nine of the reviewed studies found nonsignificant differences in youth PTSD between genders (Ackerman et al, 2011; Broman-Fulks et al., 2007; Luthra et al., 2009; Sack et al., 1994; Saigh, 1988; 1989; Scheeringa & Zeanah, 2008; Silva et al., 2000; Vila et al., 1999).

Of the studies indicating a greater prevalence of PTSD among females, authors have estimated that girls were from four (Giaconia et al., 1994) to 14 times (Cuffe et al., 1998) more likely to develop PTSD relative to males. More recently, Lloyd and Turner (2003) reported more than twice as many female adolescents met *DSM-IV* criteria for PTSD (APA, 1994) as compared to males, with rates of 15.5% and 7.5% respectively. Internationally, research on Cambodian refugees (Hubbard et al., 1995), Rwandan genocide survivors (Schaal & Helbert, 2006), and German adolescents (Perkonigg et al., 2000) indicated that females were significantly more likely than males to meet criteria for PTSD. Various suggestions to explain these gender differences have been posited by researchers based upon their data. For example, Breslau et al. (2004) concluded that female adolescents who were living in urban areas were more frequently victims of assault than males. Further, female youth were more likely to develop PTSD subsequent to experiencing assault, but not more likely to have PTSD after other types of

traumatic experiences. On the other hands, Perkonigg and colleagues (2000) and Giaconia et al. (1995) determined that female youth were more likely to develop PTSD despite males experiencing greater number of traumas, and no significant differences in the type or severity of the trauma in the latter.

Race and Ethnicity

Many of the studies that were reviewed in the current chapter utilized samples without sufficient variability in participants' race or ethnicity to detect significant differences in PTSD diagnoses based on these variables. However, large-scale studies have provided a modicum of insight into the risk for PTSD that was associated with racial and/or ethnic background. Despite the limited conclusions based on extant research, Rojas and Pappagallo (1999) cautioned that culture, race, and ethnicity can vary widely across studies and are important considerations for trauma and PTSD research.

With reference to the large epidemiological studies, Kilpatrick and Saunders (1997) reported that non-Caucasian youth evidenced higher rates of PTSD, both lifetime and current diagnoses, relative to Caucasian adolescents. However, when the number and severity of traumatic experiences and family factors, such as drug and alcohol problems were statistically controlled, the differences were no longer significant (Kilpatrick & Saunders, 1997). In a subsequent analysis of the same data, Hispanic youth without major comorbid diagnoses were more than four times as likely to develop PTSD relative to non-Hispanic, white adolescents (Kilpatrick et al., 2003). Furthermore, Black adolescents were two and a half times as likely to develop PTSD compared to white, non-Hispanic youth (Kilpatrick et al., 2003). Interestingly, the likelihood of Black adolescents meeting criteria for comorbid diagnoses with PTSD was less than that of the rates that were evident among white adolescents (Kilpatrick et al., 2003).

Different Avenues of Trauma Exposure

The existing literature suggests that the type and nature of traumatic events may relate to the likelihood of developing PTSD. The literature consistently indicates that youth who were raped or sexually assaulted were at the greatest risk for development of PTSD (Kilpatrick et al., 2013; Luthra et al., 2009). Relatedly, Breslau and colleagues (2004) determined that youth who were physically assaulted evidenced the highest prevalence of PTSD, based on the *DSM-IV* (APA, 1994), at a rate of 15%. In contrast, 9% of participants who reported learning of a death that was unexpected, over 6% of those who were injured a means other than assault, and 2% of youth who learned about a relative's traumatic event met criteria for PTSD (Breslau et al., 2004).

Similar findings regarding the likelihood of developing PTSD after experiencing an interpersonal trauma were reported by Luthra et al. (1999) and by Kilpatrick et al. (2013). Luthra and colleagues (1999) reported that PTSD diagnoses were significantly related to experiences of abuse, learning about a traumatic event, and witnessing domestic violence. Kilpatrick et al. (2013) similarly found that direct experiences of physical or sexual violence and witnessing violence were related to an increased rate of PTSD. These results are also consistent with the conclusions that were generated in an elegant and methodically rigorous meta-analysis examining the rates of PTSD in youth that was performed by Alisic et al. (2014). These authors determined that interpersonal traumatic events were associated with a 25.2% odds of developing PTSD whereas the odds of PTSD after non-interpersonal trauma was 9.7%.

Intensity and Frequency of Traumatic Exposure

Research addressing the differential rates of PTSD based on the proximity to a traumatic event (e.g., earthquake epicenter, front lines of wars, etc.), which may serve as a proxy for that event's intensity, has been mixed. With regard to natural disasters, the Armenian study that

compared youth who lived nearest to an area most severely impacted by an earthquake demonstrated higher rates of PTSD than did those who were further away from it (Najarian et al., 1995). In contrast, Scheeringa and Zeanah's (2008) research involving preschool children who were or were not evacuated from New Orleans during Hurricane Katrina revealed that there were no significant differences between groups relative to having a PTSD diagnosis.

Similarly conflicting findings were observed in research examining rates of PTSD among children directly or more distally affected by terrorist-type attacks. For example, the study involving two groups of French schoolchildren found that children who were held hostage at gunpoint evidenced higher rates of PTSD relative to children who attended the same school, but were not taken hostage (Vila et al., 2000). On the other hand, Saigh, Yasik, Mitchell, and Albright (2011) assessed two groups of preschool students after the September 11th terrorist attack on the World Trade Center. No differences in the rates of probable PTSD (based on a parent-report form closely aligned with the *DSM-IV* criteria; APA, 1994) were observed between the group of children who lived within close proximity to the Twin Towers on September 11, 2001 and the second group that lived more than one mile away, as the prevalence of PTSD was 0% across the samples (Saigh et al., 2011). It is important to note, however, that the number of traumatic events experienced by the preschoolers was positively correlated with the number of PTSD symptoms, despite the lack of probable PTSD diagnostic status (Saigh et al., 2011).

With regard to the frequency of traumatic events, Ford and colleagues (2010) analyzed the data from the National Survey of Adolescents and determined that youth who experienced more than one traumatic event were three times more likely to develop PTSD relative to those who experience one event. Schaal and Helbert (2006) reported similar findings such that the greater the number of war-related traumatic events and the higher the intensity of traumas that

were experienced by youth in Rwanda, the greater the risk for PTSD. Relatedly, Ackerman and colleagues (1998) noted that youth who experienced both sexual and physical abuse were at greater risk of developing PTSD relative to adolescents who experienced only physical or only sexual abuse. With regard to natural disasters, Adams and colleagues (2014) found that previous exposure to a traumatic event was the greatest predictor of developing PTSD after surviving a tornado.

Child Characteristics

The literature reviewed in the present chapter provides some support for the *DSM-5* (APA, 2013) observation that pre-morbid factors, including those present prior to trauma exposure, may be implicated in the development of PTSD. In consideration of these findings, it is important to note that the majority of these studies employed a cross-sectional design. As such, pre-trauma diagnoses were assessed retrospectively. Among these studies, Vila and colleagues (1999) indicated that French children who developed PTSD after being held hostage at gunpoint were more likely to have had a psychiatric disorder prior to the traumatic event. Perkonigg et al. (2000) reached similar conclusions based on their study of German youth; specifically, participants that met criteria for a depressive disorder were more likely to also evidence PTSD. Furthermore, female youth with diagnosed social phobia prior to being raped were significantly more likely to develop PTSD subsequently (Perkonigg et al., 2000).

In the United States, Silva and colleagues (2000) reported that preexisting anxiety disorders increased the likelihood of developing PTSD following exposure to a trauma. The authors also observed a negative correlation between IQ and PTSD diagnoses, such that lower IQ was associated with greater risk of PTSD. Specifically, children with high IQ scores (at or above 115 on the *Wechsler Intelligence Scale for Children-Revised* (*WISC-R*; Wechsler, 1972) were

less likely to develop PTSD relative to youth with lower scores (Silva et al., 2000). In a similar vein, Saigh et al. (2006) reported that children with PTSD scored significantly lower on the *Wechsler Intelligence Scale for Children – Third Edition* (*WISC-III*; Wechsler, 1991) than both children who were traumatized but did not develop PTSD and a non-clinical control group.

One of the reviewed studies provides sheds light on the effects of pre-existing psychological disorders and post-traumatic responses. Breslau and colleagues (2006) employed a longitudinal design to assess children at age 6 and again at age 17. The authors concluded that the existence of a *DSM-III-R* (APA, 1987) anxiety disorder and externalizing behaviors, as reported by teachers, at six years old increased the chances of developing PTSD after a traumatic event (Breslau et al., 2006).

Parental Characteristics

Among the studies reviewed, characteristics of parents have also been identified as risk factors for PTSD in youth, particularly in terms of parental psychopathology. For instance, Famularo and colleagues (1994) determined that children whose mothers had PTSD were more likely to meet criteria for the disorder. Relatedly, Scheeringa and Zeanah (2008) identified a positive correlation between the number of PTSD symptoms endorsed by a parent or caregiver with those of the child examined. More generally, anxiety symptoms among the parents of Palestinian refugees were also related to a higher frequency of PTSD symptoms among children (Khamis, 2005). Parental substance abuse has also been linked to PTSD in their offspring. Specifically, Kilpatrick and Saunders (1997) and Linning and Kearney (2007) indicated that children whose parents struggled with alcohol and substance abuse were at increased risk of developing PTSD.

Chapter Summary

As is evident based on the present review of epidemiological research on PTSD and trauma exposure, children and adolescents frequently experience stressors related to criminal victimization, including school violence incidents; natural disasters such as hurricanes, floods, earthquakes, and tornados; motor vehicle accidents, and war-related stressors. Importantly, despite the regularity of these experiences, only a minority of children develop PTSD. Across the studies that were considered, PTSD prevalence rates ranged from 0% to 89.3%. For youth exposed to trauma through victimization, between 15% and 89.3% of children and adolescent met PTSD criteria while between 0 and 33% of youth who survived natural disasters evidenced the disorder. With regard to accidents, PTSD prevalence ranged from 14% to almost 52%. Finally, between approximately 18% and 69% of youth exposed to war-related traumatic events met criteria for PTSD.

The discrepancies regarding the prevalence of PTSD may be due to several factors. In particular, variation in the measures utilized to assess the disorder, distinct demographic characteristics of the youth sample, and stressor severity or frequency of experienced traumas may explain an amount of the variation. Furthermore, given that the studies reviewed utilized differing criteria to determine diagnoses, rates may have varied as a function of having employed the *DSM-III* (APA, 1980), *DSM-III-R* (APA, 1987), *DSM-IV* (APA, 1994), or *DSM-IV-TR* (APA, 2000) PTSD criteria to estimate prevalence. It largely remains to be seen how the *DSM-5* (APA, 2013) diagnostic criteria will affect the prevalence rates of pediatric PTSD in future research.

Of note, the studies included in the present literature review utilized gold-standard diagnostic instruments (Cohen, 1998). Each of the structured interviews administered to

participants closely adhered to the corresponding *DSM* diagnostic criteria. However, it is possible that PTSD rates may have varied as a function of test reliability and validity and this in turn may have contributed the variability in PTSD prevalence rates.

The studies reviewed also suggest that PTSD often co-occurs with other psychiatric disorders. This finding is worth highlighting as the high frequency of comorbid disorders may confound results of research on PTSD and related conclusions. With regard to other individual-level characteristics as risk factors for PTSD, the literature that was reviewed provided mixed conclusions. For example, older age among youth samples was related to increased risk for PTSD in five studies (Khamis, 2005; Kilpatrick & Saunders, 1997; Merikangas et al., 2010; Perkonigg et al., 2000; Sack et al., 1994), while no significant age differences were found in three studies (Adams et al., 2014; Schaal & Helbert, 2006; Zink & McCain, 2003). The vast majority of studies that were reviewed also noted that female youth were more likely to develop PTSD (e.g., Adams et al., 2014; Breslau et al., 2004; 2006; Cuffe et al., 1998; Giaconia et al., 1995; Hubbard et al., 1995; Kessler et al., 1995; Linning & Kearney, 2004; Ma et al., 2011; Merikangas et al., 2010; Merry & Andrews, 1994; Perkonigg et al., 2006; Schaal & Helbert, 2006; Stallard et al., 1998)

The type, intensity, and frequency of trauma exposure were also related to the risk of having PTSD. Traumas that were interpersonal in nature (e.g., rape, assault, etc.) were associated with an at increased risk for PTSD (Breslau et al., 2004; Kilpatrick et al., 2013; Luthra et al., 2009). In addition, the intensity and frequency of trauma exposure was associated with an increased risk for PTSD (Najarian et al., 1995, Ackerman et al., 1998; Ford et al., 2010; Schaal & Helbert, 2006).

The relative contribution of race or ethnic factors on PTSD develop remains inconclusive after the present review and suggests that these findings be interpreted with caution, as described above. In contrast, more decisive patterns were found with regard to child characteristics such as intelligence and pre-trauma psychiatric disorders. Specifically, three studies indicated that lower intelligence was associated with greater risk or likelihood of developing PTSD after a traumatic event (Breslau et al., 2006; Saigh et al., 2000; Silva et al., 2000) and four studies linked a history of anxiety, depressive, or externalizing disorders with subsequent PTSD development (Breslau et al., 2006; Perkonigg et al., 2000; Silva et al., 2000; Vila et al., 1999). Relatedly, characteristics of the parents were found to be related to children's development of PTSD as two studies identified parental substance abuse or alcohol (Kilpatrick & Saunders, 1997; Linning & Kearney, 2004) and two identified parental/caregiver PTSD (Famularo et al., 1994; Sack et al., 1993) as risk factors for children's PTSD.

Lastly, the type of trauma exposure was related to PTSD rates. Traumas that were of an interpersonal nature (e.g., rape, assault, etc.) placed individuals at an increased risk for PTSD (Breslau et al., 2004; Kilpatrick et al., 2013; Luthra et al., 2009).Taken together, the present literature suggests that future research investigate the occurrence of trauma exposure and subsequent PTSD with attention to the type of traumatic event as well as the age, gender, personal and parental characteristics of the children and adolescent participants in order to better understand this complex relationship.

Chapter III

Youth PTSD Symptoms and Intellectual Functioning

The *Diagnostic and Statistical Manual of Mental Disorders, 4th edition* (*DSM-IV*; American Psychological Association [APA], 1994) conceptualized posttraumatic stress disorder (PTSD) as a unique pattern of symptoms that may be apparent following trauma exposure. These symptoms include re-experiencing traumatic events, avoidance and emotional numbing, increased physiological arousal, and significant functional impairment. Importantly, the field trials used to develop the *DSM-IV* PTSD criteria (APA, 1994) excluded participants below the age of 15 years (Kilpatrick, Resnick, & Freedy, 1993; Saigh & Bremner, 1999). The present chapter provides a review of the literature describing the relationship between PTSD symptoms and various aspects of intellectual functioning. Additionally, this chapter will explicate the limitations of previous research, provide a statement of the problem, present the purpose and need for this investigation, state testable hypotheses, describe the methodology and the data analysis procedures, and list potential limitations of the proposed study.

Several investigations have examined the association between PTSD and intellectual functioning. For instance, McNally and Shin (1995) administered the *Structured Clinical Interview for DSM-III-R Diagnoses* (*SCID*; Spitzer, Williams, Gibbon, & First, 1990), the *Mississippi Scale for Combat-Related Posttraumatic Stress Disorder* (Keane, Caddell, & Taylor, 1988) and the *Shipley Institute of Living Scale* (Zachary, 1991) to 55 male combat veterans with PTSD (age of participants was not reported). After controlling of the effects of trauma exposure, McNally and Shin (1995) reported a negative correlation between the severity of PTSD symptoms and intellectual performance score.

Relatedly, Vasterling, Brailey, Constans, Borges, and Sutker (1997) assessed combat veterans for *DSM-III-R* (APA, 1987) PTSD diagnoses using the *SCID* (Spitzer et al., 1990). Vasterling and her colleagues (1997) identified 18 veterans with PTSD and 23 veterans without PTSD (overall mean age of sample = 35 years), each of whom had participated in Operation Desert Storm. The authors also administered the *Wechsler Adult Intelligence Scale-Revised* (*WAIS-R*; Wechsler, 1981) to the veterans and reported that those with PTSD had significantly lower *WAIS-R* Verbal and Full Scale IQs relative to veterans without PTSD (Vasterling et al., 1997).

In a similar study, Vasterling et al. (2002) used the *Structured Clinical Interview for DSM-IV Axis I Disorders* (*SCID*; First et al., 1996) to identify 21 Vietnam War combat veterans with PTSD and 26 veterans without psychopathology (overall mean age of sample = 51 years). The authors did not refer to the presence of trauma-exposure in the group of veterans without PTSD. Vasterling and her colleagues (2002) administered the Information, Vocabulary, Digit Span, and Arithmetic subtests from the *WAIS-R* (Wechsler, 1981) to participants. These authors reported that veterans with PTSD scored significantly lower than those without PTSD on a variable combining scores from the Information and Vocabulary subtests. Additionally, Vasterling et al. (2002) reported that veterans with PTSD scored significantly lower on the Digit Span subtest as compared to the control group. No significant differences were identified between groups on the Arithmetic subtest (Vasterling et al., 2002).

Although the aforementioned research with adults suggests that lower intellectual functioning is related to having a PTSD diagnoses, other investigations have found evidence to the contrary. For example, Sutker, Bugg and Allain (1991) administered the National Institute of Mental Health's *Diagnostic Interview Schedule* (*DIS*; Robins, Helzer, Croughan, & Ratcliff,

1981) and a *DSM-III-R* PTSD structured interview to a sample of World War II and Korean Conflict veterans who had been held as prisoners of war (POW). The authors identified 121 veterans with PTSD (mean age = 64 years) and 40 without PTSD (mean age = 65 years; Sutker et al., 1991). Sukter and her colleagues (1991) administered the *WAIS-R* (Wechsler, 1981) to the sample and found nonsignificant differences between the Full Scale IQ scores of POW survivors with PTSD and those of the control group.

In another investigation involving combat veterans, Zalewski, Thompson, and Gottesman (1994) compared Vietnam veterans who met criteria for PTSD, as assessed by the *Diagnostic Interview Schedule, Version III-A* (*DIS-III-A*; Robins & Helzer, 1985), to veterans with generalized anxiety disorder and a control group of nonclinical veterans. There were 241 participants in each group (overall sample average age = 38 years; Zalewski et al., 1994). Zalewski and her colleagues (1994) administered the Block Design and Information subtests from the *WAIS-R* (Wechsler, 1981) and concluded that there were no significant differences in intellectual performance between the groups of veterans.

With regard to younger populations, Silva, Alpert, Munoz, Singh, Matzner, and Dummit (2000) identified 59 children between the ages of 3 and 18 years from outpatient referrals at an inner-city psychiatry clinic who reportedly experienced one or more traumatic events. In addition to using the *Structured Clinical Interview for DSM-IV Childhood Diagnoses* (*KID-SCID*; Hien, Matzner, First, Spitzer, Gibbon, & Williams, 1994) to diagnose PTSD, Silva et al. (2000) assessed intellectual functioning using the Information, Vocabulary, and Digit Span subtests (Silva, personal communication, 2005) from the *Wechsler Intelligence Scale for Children-Revised* (*WISC-R*; Wechsler, 1974). The authors reported that higher IQ scores were significantly associated with lower prevalence of PTSD (Silva et al., 2000).

Beers and De Bellis (2002) conducted a related investigation using a sample of 14 maltreated children with PTSD (average age = 11 years), diagnosed using the *Schedule for Affective Disorders and Schizophrenia for School-Aged Children-Present and Lifetime Version* (*K-SADS-PL*; Kaufman et al., 1997). Fifteen healthy, matched children were used as a control group (average age = 12 years). The authors administered the *WISC-III* (Wechsler, 1991) to the participants and found that children with PTSD had significantly lower scores on the Similarities subtest as compared to the control group (Beers & De Bellis, 2002).

In a follow-up to a prospective study, Breslau, Lucia, and Alvarado (2006) collected data from a sample of 17-year-old participants who received administrations of the *Wechsler Intelligence Scale for Children-Revised* (*WISC-R*; Wechsler, 1974) when they were six-years-old. The authors used the National Institute of Mental Health's *Diagnostic Interview Schedule-III-R* (*DIS-III-R*; Robins et al., 1989) and an algorithm based on the diagnostic criteria for PTSD in the *DSM-IV* (APA, 1994) to determine participants' history of trauma exposure and PTSD diagnostic status. Breslau and her colleagues (2006) identified 45 participants who met criteria for PTSD from the sample of 541 individuals who experienced at least one traumatic event prior to the data collection at age 17. The authors determined that children with *WISC-R* IQ scores that were one standard deviation or more above the population mean when they were six-years-old were significantly less likely to develop PTSD relative to children with IQ scores at or below the normative mean. As such, the authors concluded that higher IQ at age six served as a significant protective factor against the development of PTSD at age 17 (Breslau et al., 2006).

Using stringent exclusionary criteria to limit the influence of possible major confounding comorbid diagnoses, Saigh, Yasik, Oberfield, Halamandaris, and Bremner (2006) compared 25 children with PTSD to 50 traumatized children without PTSD and a control group of 36 children

without a history of trauma exposure (overall average age = 13). Diagnoses of PTSD were determined using the *Children's PTSD Inventory* (*CPTSDI*; Saigh, 2003a; 2003b) and the *Diagnostic Interview for Children and Adolescents-Revised* (*DICA-R*; Reich, Leacock, & Shanfield, 1995) was administered to assess for the presence of confounding comorbid disorders. The results indicated that *Wechsler Intelligence Scale for Children-III* (*WISC-III*; Wechsler, 1991) Full Scale, Verbal and Verbal Comprehension IQs of children with PTSD were significantly lower than those of traumatized children without a PTSD and the unexposed control group. The Saigh et al. (2006) research also found that children with PTSD scored lower than both comparison groups on the Vocabulary, Arithmetic, Comprehension, and Similarity subtests. Further, the Saigh et al. (2006) study indicated that there were no significant differences between groups on the *WISC-III* Performance IQ and all of the Performance Index subtests. Finally, the scores of traumatized children without PTSD and controls did not significantly differ across all measures.

Koenen, Moffitt, Poulton, Martin, and Caspi (2007) assessed 1,073 children at age three years and through adulthood using the Stanford-Binet (Terman & Merrill, 1960). The authors reported that higher IQ measured at age five was a protective factor as it significantly reduced the likelihood of developing PTSD at age 26 (Koenen et al., 2007), as measured by the *Diagnostic Interview Schedule for DSM-IV* (*DIS-IV*; Robins, Cottler, Bucholz, & Compton, 1995).

Although the aforementioned studies suggest that there is an association between PTSD and intellectual performance, far less is known about the relation between the symptoms of PTSD and specific domains of intelligence. One of the few studies that examined this relationship was conducted by Saltzman, Weems, and Carrion (2005). These authors

administered the *Clinician-Administered PTSD Scale for Children and Adolescents* (*CAPS-CA*; Nader, Kriegler, Blake, Pynoos, Newman, & Weather, 1996) and the *Wechsler Abbreviated Scales of Intelligence* (*WASI*; Wechsler, 1999) to identify a sample of 59 children and adolescents (average age = 11 years) who had been exposed to interpersonal violence. The authors reported significant negative correlations between the *WASI* Full Scale and Verbal IQs and PTSD symptoms of re-experiencing and functional impairment (Saltzman et al., 2005). Symptoms of avoidance and numbing and hyperarousal were not significantly associated with the *WASI* Verbal, Performance, and Full Scale IQs (Saltzman et al., 2005). Significant inverse correlations were also observed between functional impairment as measured with the *CAPS-CA* (Nader et al., 1996) and the *WASI* Performance IQ (Wechsler, 1999) scores.

In a more recent investigation, Kira, Lewandowski, Yoon, Somers, and Chiodo (2012) administered the frequency subscale from the *Clinician-Administered PTSD Scale* (Blake, Weathers, Nagy, Kaloupek, Klauminzer, Charney, & Keane, 1990) and the *Wechsler Intelligence Scale for Children-IV* (*WISC-IV*; Wechsler, 2003) to 390 trauma-exposed adolescents (average age = 14 years). Analyses revealed that the overall frequency of PTSD symptoms experienced by the adolescents was significantly negatively correlated with *WISC-IV* Perceptual Reasoning and Working Memory indices, as well as the Matrix Reasoning, Digit Span, and Block Design subtests. Additionally, Kira and his colleagues (2012) reported significant inverse correlations between the PTSD re-experiencing symptom cluster and the *WISC-IV* Full-Scale IQ, Perceptual Reasoning, and Working Memory indices, and with Digit Span and Block Design subtest scores. Significant negative correlations were also found between the avoidance and numbing PTSD symptom cluster and the *WISC-IV* Perceptual Reasoning and Working Memory indices. Avoidance and numbing symptoms were also reportedly negatively correlated with Matrix

Reasoning, Digit Span, and Block Design subtest scores (Kira et al., 2012). In contrast, the PTSD avoidance and numbness cluster was significantly positively correlated with scores on the Similarities and Letter-Number Sequencing subtest scores. The hyperarousal PTSD symptom cluster was also negatively correlated with the *WISC-IV* Perceptual Reasoning index and Digit Span and Block Design subtest scores (Kira et al., 2012).

Statement of the Problem

Seven of the ten studies reviewed determined that lower scores on different measures of intellectual functioning were negatively associated with PTSD at the diagnostic level (Beers & De Bellis, 2002; Breslau, et al., 2006; Koenen, et al., 2007; McNally & Shin, 1995; Saigh et al., 2006; Silva, et al., 2000; Vasterling, et al., 1997; Vasterling et al., 2002) and two investigation reported nonsignificant differences (Sutker et al., 1991; Zalewski, et al., 1994).

While the majority of the studies reported that PTSD was associated with lower intellectual function, information regarding the relation between PTSD symptom clusters, following exposure to traumatic events, and specific areas of intellectual ability is limited and inconsistent. This literature indicates that re-experiencing symptoms were negatively associated with overall intellectual ability and verbal intelligence (Kira et al., 2012; Saltzman et al., 2005). In addition, this body of reviewed literature suggests that perceptual reasoning and working memory were negatively associated with re-experiencing symptoms (Kira et al., 2012). Moreover, while Kira et al. (2012) indicated that avoidance and numbing symptoms were negatively associated with perceptual reasoning and working memory, Saltzman and his colleagues (2005) reported a nonsignificant association between the avoidance PTSD symptom cluster and intellectual ability. In a similar vein, although Kira et al. (2012) reported that hyperarousal symptoms were negatively associated with perceptual reasoning, Saltzman et al.

(2005) observed nonsignificant correlations between these variables. Finally, while Saltzman et al. (2005) determined that functional impairment symptoms related to PTSD were negatively correlated with verbal, performance, and overall mental ability, Kira et al. (2012) did not make reference to the inclusion of functional impairment in their analyses.

Although the Saltzman et al. (2005) and Kira et al. (2012) studies were among the first to examine the association between PTSD symptom clusters and domains of intelligence, methodological concerns are apparent. First, these investigations did not account for possible influence of comorbid disorders. This omission is clinically and theoretically significant as children with PTSD frequently present with comorbid disorders such as major depressive disorder (MDD), conduct disorder (CD), attention deficit hyperactivity disorder (ADHD), and substance dependence (Sack et al., 1994; Saigh et al., 1999; Scheeringa & Zeanah, 2008), and as these disorders have been associated with lower performance on measures of intelligence (Brown, Tapert, Granholm, & Delis, 2000; Hodges & Plow, 1990; Kalska, Punamaki, Makinen-Pelli, & Saarinen, 1999). As such, the relationship between different PTSD symptom clusters and intelligence as reported by Saltzman et al. (2005) and Kira et al. (2012) may have been influenced by potentially confounding comorbid disorders. In addition, the Saltzman et al. (2005) and Kira et al. (2012) studies did control for the influence of medications (e.g., nonbenzodiazepine sedative-hypnotic zolpidem tartrate; Kleykamp, Griffiths, McCann, Smith & Mintzer, 2012) that may have influenced performance on intelligence tests, which presents a threat to the external validity of the investigations.

Purpose of the Study

The present study seeks to identify associations between children's *DSM-IV* PTSD symptoms (APA, 1994) after exposure to a traumatic event and *WISC-III* (Wechsler, 1991)

scores by re-analyzing the data from the Saigh et al. (2006) investigations, with the addition of data that was more recently collected.

Theoretical Significance

Examination of the relationship between the *DSM-IV* PTSD symptom clusters and different aspects of intelligence as measured by the *WISC-III* may provide important insights about the specific areas of intellectual performance that may be negatively associated with symptoms that occur after experiencing a trauma. In effect, the present investigation may contribute to our theoretical understanding of the association between trauma exposure and PTSD symptoms in childhood and different facets of intellectual performance as assessed by the *WISC-III*.

Clinical Significance

Developing an understanding about potential intellectual deficits that traumatized children may experience is clinically relevant for a number of reasons. Given that psychological treatments for PTSD involve varying amounts of verbal interaction and as the efficacy of cognitive-behavioral interventions are based in part on participant characteristics (Ehlers, Clark, Hackman, McManus, & Fennell, 2005; Zayfert & Becker, 2014), information involving specific cognitive strengths and weaknesses may be of value in selecting a treatment of choice. For example, if deficits are identified in areas of verbal comprehension and not observed on performance measures, practitioners may wish to consider the use of interventions such as *in vitro* flooding in lieu of insight-oriented treatments that rely heavily on vocabulary and verbal processing.

Hypotheses and Rationale

This section of the chapter provides rationales for 67 hypotheses, which are presented in operational terms using *WISC-III* domains, indices, and subtest names and *CPTSDI* symptom clusters. The hypotheses are prefaced by specific rationales. Table 3.1 provides a summary of the hypothesized correlations.

Rationale 1

As noted above, the majority of reviewed studies identified an inverse relationship between PTSD diagnostic status and intellectual performance among adults (Vasterling et al., 1997; 2002) and children (Kira et al., 2012; Koenen et al., 2007; Saigh et al., 2006; Saltzman et al., 2005; Silva et al., 2000). Given that PTSD diagnoses depend on meeting prescribed thresholds for multiple symptom clusters, it is expected that the total number of PTSD symptoms will be inversely associated with overall intellectual functioning.

Hypothesis 1

There will be a significant inverse correlation between the number of symptoms endorsed on the *CPTSDI* and the *WISC-III* Full Scale IQ.

Hypothesis 2

There will be a significant inverse correlation between the number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Full Scale IQ.

Hypothesis 3

There will be a significant inverse correlation between the number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Full Scale IQ.

Hypothesis 4

There will be a significant inverse correlation between the number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Full Scale IQ.

Hypothesis 5

There will be a significant inverse correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Full Scale IQ.

Rationale 2

Several investigations have reported that participants with PTSD had significantly lower scores on verbal indices of intelligence (Beers & De Bellis, 2002; Saigh et al., 2006; Saltzman et al., 2005; Vasterling et al., 1997). Moreover, biological investigations have reported that verbal functions are associated with the left hippocampus (Sass et al., 1992; Scoville & Milner, 1957) and MRI studies have observed decreased volume in the same hippocampal region among adults with PTSD (Bremner et al., 2003; Gilbertson et al., 2002; Gurvits et al., 1996; Villarreal et al., 2002). As such, it is expected that the overall number of PTSD symptoms will be negatively associated with verbal ability.

Hypothesis 6

There will be a significant inverse correlation between the total number of PTSD symptoms on the *CPTSDI* and the *WISC-III* Verbal IQ.

Rationale 3

Among the studies reviewed, Saltzman et al. (2005) identified a significant inverse correlation between verbal intelligence and re-experiencing symptoms. Likewise, Kira et al. (2012) reported significant inverse correlations between the PTSD re-experiencing symptom cluster and the *WISC-IV* Full Scale IQ as well as the Working Memory Index. Accordingly, it is

expected that re-experiencing symptoms will be negatively associated with measures of verbal functioning.

Hypothesis 7

There will be a significant inverse correlation between the total number of re-experiencing symptoms on the *CPTSDI* and the *WISC-III* Verbal IQ.

Hypothesis 8

There will be a significant inverse correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Verbal Comprehension Index.

Hypothesis 9

There will be a significant inverse correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Information subtest scores.

Hypothesis 10

There will be a significant inverse correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Similarities subtest scores.

Hypothesis 11

There will be a significant inverse correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Arithmetic subtest scores.

Hypothesis 12

There will be a significant inverse correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Vocabulary subtest scores.

Hypothesis 13

There will be a significant inverse correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Comprehension subtest scores.

Hypothesis 14

There will be a significant inverse correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Digit Span subtest scores.

Rationale 4

With regard to another PTSD symptom cluster, Saltzman et al. (2005) indicated that the PTSD avoidance and numbing symptoms were significantly associated with the *WASI* Verbal IQ. Likewise, Kira et al. (2012) reported significant negative correlations between the avoidance and numbing PTSD symptom cluster and the *WISC-IV* Working Memory indices. In view of this, and as PTSD avoidance symptoms involve diminished interest or participation in significant activities such as completing schoolwork, it may be said that reduced involvement in academic tasks are likely to impact performance on verbal tests that correlate with measures of academic achievement and social understanding (Andreou & Karapetsas, 2004; Kamphaus, 2001; Kelly, Madden, Gardner, & Rudman, 2002; Wechsler, 1991). Given this information, it was predicated that avoidance and numbing symptoms would be negatively associated with performance on the *WISC-III* verbal indices.

Hypothesis 15

There will be a significant negative correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Verbal IQ.

Hypothesis 16

There will be a significant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Verbal Comprehension Index.

Hypothesis 17

There will be a significant negative correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Information subtest scores.

Hypothesis 18

There will be a negative significant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Similarities subtest scores.

Hypothesis 19

There will be a significant negative correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Arithmetic subtest scores.

Hypothesis 20

There will be a significant negative correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Vocabulary subtest scores.

Hypothesis 21

There will be a significant negative correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Comprehension subtest scores.

Hypothesis 22

There will be a significant negative correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Digit Span.

Rationale 5

While the Saltzman et al. (2005) study indicated that the PTSD hyperarousal symptoms were not significantly associated with *WASI* Verbal IQ performance, the Kira et al. (2012) investigation reported significant negative correlations between the PTSD hyperarousal symptom cluster and the *WISC-IV* Working Memory Index. Although these outcomes are at variance, PTSD arousal symptoms involve concentration impairment, hypervigilance, and sleep disturbances, each of which has been negatively associated with performance on verbal learning tasks (Curcio, Ferrara, & De Gennaro, 2006; Licht & Dweck, 1984; Scheiner, Keilp, Mindt, Burke, Oquendo, & Mann, 2014). In view of these findings, it was predicated that hyperarousal symptoms would be negatively associated with performance on *WISC-III* verbal indices and subtests scores.

Hypothesis 23

There will be a significant negative correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and *WISC-III* Verbal IQ.

Hypothesis 24

There will be a significant negative correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Verbal Comprehension Index.

Hypothesis 25

There will be a significant negative correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Information subtest scores.

Hypothesis 26

There will be a significant negative correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Similarities subtest scores.

Hypothesis 27

There will be a significant negative correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Arithmetic subtest scores.

Hypothesis 28

There will be a significant negative correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Vocabulary subtest scores.

Hypothesis 29

There will be a significant negative correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Comprehension subtest scores.

Hypothesis 30

There will be a significant negative correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Digit Span scores.

Rationale 6

While the Saltzman et al. (2005) indicated that PTSD functional impairment was significantly associated with *WASI* Verbal IQ performance, the study by Kira et al. (2012) did not report information regarding functional impairment. It should be noted, however, that Saigh, Mroueh, and Bremner (1997) determined that child PTSD was associated with significantly lower performance on measures of school achievement that are associated with verbal intellectual performance (Anderson, 1995; Andreou & Karapetsas, 2004; Kamphaus, 2001). As such, the following hypotheses are predicated.

Hypothesis 31

There will be a significant negative correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Verbal IQ.

Hypothesis 32

There will be a significant negative correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Verbal Comprehension Index.

Hypothesis 33

There will be a significant negative correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Information subtest scores.

Hypothesis 34

There will be a significant negative correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Similarities subtest scores.

Hypothesis 35

There will be a significant negative correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Arithmetic subtest scores.

Hypothesis 36

There will be a significant negative correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Vocabulary subtest scores.

Hypothesis 37

There will be a significant negative correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Comprehension subtest scores.

Hypothesis 38

There will be a significant negative correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Digit Span subtest scores.

Rationale 7

With reference to the studies that reported comparative information regarding performance measures, Saigh et al. (2006) reported that all of the *WISC-III* Performance

indicators of participants with PTSD, traumatized PTSD negatives, and controls did not significantly differ. Likewise, Vasterling and colleagues (1999) reported that the *WAIS-R* Performance IQs of veterans with and without PTSD did not significantly differ. In a similar vein, Zalewski et al. (1994) reported a nonsignificant difference when the *WAIS-R* Block Design subtest was administered to veterans with PTSD, veterans with generalized anxiety disorder, and veterans without psychiatric morbidity. In view of these points, it was expected that the overall number of PTSD symptoms would not be significantly correlated with the *WISC-III* general Performance measure.

Hypothesis 39

There will be a nonsignificant correlation between the total number of PTSD symptoms endorsed on the *CPTSDI* and the *WISC-III* Performance IQ.

Rationale 8

As noted above, three PTSD comparative studies reported nonsignificant difference with reference to performance tests (Saigh et al., 2006, Vasterling, et al., 1999, Zalewski, et al., 1994). Among the studies that looked at associations between PTSD symptom clusters and performance measures, Saltzman et al. (2005) reported nonsignificant correlations between performance measures and re-experiencing symptoms. Similarly, Kira et al. (2012) also found nonsignificant correlations between the *WISC-IV* Processing Speed Index, which includes two Performance subtests, and re-experiencing symptoms. Given this information, the following outcomes are predicated.

Hypothesis 40

There will be a nonsignificant correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Performance IQ.

Hypothesis 41

There will be a nonsignificant correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Perceptual Organization Index.

Hypothesis 42

There will be a nonsignificant correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Picture Completion subtest scores.

Hypothesis 43

There will be a nonsignificant correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Coding subtest scores.

Hypothesis 44

There will be a nonsignificant correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Picture Arrangement subtest scores.

Hypothesis 45

There will be a nonsignificant correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Block Design subtest scores.

Hypothesis 46

There will be a nonsignificant correlation between the total number of re-experiencing symptoms endorsed on the *CPTSDI* and the *WISC-III* Object Assembly subtest scores.

Rationale 9

As described above, Saigh and his colleagues (2006) reported that the *WISC-III* Performance IQ scores of participants with PTSD, traumatized participants without PTSD, and the healthy control group did not significantly differ. Vasterling et al. (1999) also found that the Performance IQ of veterans with PTSD and those without PTSD were not significantly different.

With reference to the studies that looked at associations between PTSD symptom clusters and intellectual functioning, Saltzman et al. (2005) indicated that the PTSD avoidance and numbing symptoms were not significantly associated with the *WASI* Performance Verbal and Full Scale IQs. In contrast, Kira et al. (2012) reported significant negative correlations between the avoidance and numbing PTSD symptom cluster and the *WISC-IV* Perceptual Reasoning and Working Memory indices. Despite this discordance, it is apparent that the majority of reviewed studies did not support the position that performance measures were associated with PTSD or PTSD avoidance and numbing symptoms. As a result, the following hypotheses are indicated.

Hypothesis 47

There will be a nonsignificant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Performance IQ.

Hypothesis 48

There will be a nonsignificant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Perceptual Organization Index.

Hypothesis 49

There will be a nonsignificant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* the *WISC-III* Picture Completion subtest scores.

Hypothesis 50

There will be a nonsignificant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Coding subtest scores.

Hypothesis 51

There will be a nonsignificant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Picture Arrangement subtest scores.

Hypothesis 52

There will be a nonsignificant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Block Design subtest scores.

Hypothesis 53

There will be a nonsignificant correlation between the total number of avoidance and numbing symptoms endorsed on the *CPTSDI* and the *WISC-III* Object Assembly subtest scores.

Rationale 10

As noted above, three PTSD comparative studies reported nonsignificant difference with reference to performance tests (Saigh et al., 2006, Vasterling, et al., 1999, Zalewski, et al., 1994). Moreover, Saltzman et al. (2005) reported that symptoms of hyperarousal were not significantly associated with the *WASI* Performance, Verbal and Full Scale IQ. On the other hand, Kira et al. (2012) reported that the hyperarousal PTSD symptom cluster was negatively correlated with the WISC-IV Perceptual Reasoning Index. While the Saltzman et al. (2005) and Kira et al. (2012) outcomes are discordant, it may be said that the majority of the studies that were reviewed reported nonsignificant difference with reference to the achievement of traumatized participants with or without PTSD on performance measures of intelligence. As such, the following hypotheses are warranted.

Hypothesis 54

There will be a nonsignificant correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Performance IQ.

Hypothesis 55

There will be a nonsignificant correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Perceptual Organization Index.

Hypothesis 56

There will be a nonsignificant correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Picture Completion subtest scores.

Hypothesis 57

There will be a nonsignificant correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Coding subtest scores.

Hypothesis 58

There will be a nonsignificant correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Picture Arrangement subtest scores.

Hypothesis 59

There will be a nonsignificant correlation between the total number of hyperarousal symptoms endorsed on the *CPTSDI* and the *WISC-III* Block Design subtest scores.

Hypothesis 60

There will be a nonsignificant correlation between the total number of hyperarousal symptoms that on the *CPTSDI* and the *WISC-III* Object Assembly subtest scores.

Rationale 11

As described previously, Saigh and his colleagues (2006) reported that participants with PTSD did not significantly differ from traumatized youth without PTSD and controls on the *WISC-III* Performance IQ measures. Similar conclusions were indicated by Vasterling et al. (1999) when comparing veterans with PTSD to those without PTSD on *WAIS-R* performance

measures. Saltzman et al. (2005) reported that functional impairment symptoms were significantly negatively correlated with *WASI* Performance and Full Scale IQ scores (Saltzman et al., 2005) and, as mentioned above, the Kira et al. (2012) investigation used the *CAPS-CA* as a diagnostic index, which does not yield a measure of the functional impairment. As the majority of studies that were reviewed do not suggest that performance measures were associated with PTSD or PTSD functional impairment symptoms, the following hypotheses are indicated.

Hypothesis 61

There will be a nonsignificant correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Performance IQ.

Hypothesis 62

There will be a nonsignificant correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Perceptual Organization Index.

Hypothesis 63

There will be a nonsignificant correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Picture Completion subtest scores.

Hypothesis 64

There will be a nonsignificant correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Coding subtest scores.

Hypothesis 65

There will be a nonsignificant correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Picture Arrangement subtest scores.

Hypothesis 66

There will be a nonsignificant correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Block Design subtest scores.

Hypothesis 67

There will be a nonsignificant correlation between the total number of functional impairment symptoms endorsed on the *CPTSDI* and the *WISC-III* Object Assembly subtest scores.

Table 3.1.

Hypothesized Correlations between WISC-III *and* CPTSDI

	Scores of *DSM-IV* PTSD Symptom Clusters via *CPTSDI* (Saigh, 2003b)				
WISC-III Scores (Wechsler, 1991)	Re-experiencing	Avoidance and Numbing	Hyperarousal	Functional Impairment	Total *CPTSDI* Score
Full Scale IQ	Inverse (H_0 2)	Inverse (H_0 3)	Inverse (H_0 4)	Inverse (H_0 5)	Inverse (H_0 1)
Verbal IQ	Inverse (H_0 7 - 14)	Inverse (H_0 15 - 22)	Inverse (H_0 23 - 30)	Inverse (H_0 31 - 38)	Inverse (H_0 6)
Performance IQ	Non-significant (H_0 40 - 46)	Non-significant (H_0 47 - 53)	Non-significant (H_0 54 - 60)	Non-significant (H_0 61 - 67)	Non-significant (H_0 39)

Method

Diagnostic Measures

***DSM-IV* Unstructured Clinical Interviews.** Unstructured clinical interviews based on the *DSM-IV* (APA, 1994) PTSD criteria were independently conducted by New York State licensed psychologists and by one of two board-certified child psychiatrists. For the cases

wherein diagnostic disagreement occurred, case conferences were conducted to discuss the diagnostic symptoms of the cases and final diagnostic decisions were reached through a consensual process.

Children's PTSD Inventory. The guiding aim relative to the development of the *Children's PTSD Inventory* (*CPTSDI*; Saigh, 2003a) involved the preparation of test items that were congruent with the *DSM-IV* (APA, 1994) PTSD diagnostic criteria (Saigh et al., 2000). As indicated in the child-adolescent test development literature (Kamphaus & Frick, 1996; Payne, 1974; Saigh, 1992), attention was directed toward writing items that were brief, easily understood by children, and devoid of technical jargon (Saigh, 2003a). Attention was also directed to preparing clear, simple, and standardized directions for test administration and scoring. The instrument was designed for use with youth aged 7 to 18 years (Saigh, 2003a).

The *CPTSDI* (Saigh, 2003a) consists of five subtests, accompanied by instructions regarding test administration and scoring that are provided within the protocol and manual. The manual also offers additional information about the instrument's scoring and administration (Saigh, 2003b). All items are scored on a dichotomous basis (i.e., 1 for presence of a symptom and 0 for absence of a symptom). Similarly, each subtest is scored dichotomously, as a function of meeting or not meeting *DSM-IV* PTSD (APA, 1994) criteria for the respective symptom cluster. Following a short preface that presents examples of traumatic incidents (e.g., being "badly beaten or taken away from their parents," etc., Saigh, 2003a, p.1), the first subtest consists of four questions regarding potential exposure to traumatic incidents and four questions describing reactivity during the trauma (e.g., "Were you very scared when this happened?" Saigh, 2003a, p. 4). If an examinee fails to meet criteria for significant trauma-exposure and/or reactivity, the directions call for discontinuation of the interview (Saigh, 2003a). Appendix A

presents the actual trauma-exposure preface and the first of a series of questions that assess psychological reactivity during stress-exposure.

The second subtest is made up of 11 questions that reflect the presence or absence of re-experiencing symptoms (e.g., "Are you having a lot of upsetting thoughts about what happened?" "Do pictures about what happened keep popping into your head?" "Are you having a lot of bad dreams about what happened?" Saigh, 2003, p. 4-5). The third subtest includes 16 questions regarding avoidance and numbing symptoms (e.g., "Are you trying not to think about what happened?" "Have you been trying not to have feelings about what happened?" "Have you been trying to stay away from places that remind you about what happened?" Saigh, 2003a, p.6). The fourth subtest has seven questions regarding increased arousal (e.g., "Since this happened, has it been difficult to go to sleep or stay asleep at night?" "Since this happened have you been getting very angry?" "Since this happened, have you become very careful or watchful?" Saigh, 2003a, p. 8), and the fifth subtest has five questions involving different aspects of significant distress (e.g., "Have you been having more problems with your classmates or other children since this happened?" "Have your grades in school gotten worse since this happened?").

As the *DSM-IV* (APA, 1994) PTSD criteria indicate that the symptoms for Criteria B, C, and D must be apparent for at least one month, the *CPTSDI* (Saigh, 2003a) includes a series of items to determine the duration of distress for any endorsed symptoms. The instrument offers the following diagnoses: PTSD Negative, Acute PTSD, Chronic PTSD, Delayed Onset PTSD, and No Diagnosis (Saigh, 2003a).

In order to establish the content validity of the test, a co-chair and two members of the *DSM-IV* PTSD Work Group rated the degree of correspondence between the *CPTSDI* (Saigh, 2003a) test items and the *DSM-IV* (APA, 1994) PTSD diagnostic criteria (Saigh et al., 2000).

The raters utilized a 0–100-point Likert-type scale (e.g., 0 = lowest correspondence, 50 = average correspondence, and 100 = highest correspondence; Saigh et al., 2000). The independent reviewers had not seen or been consulted about the instrument before rating the measure (Saigh et al., 2000). As reported by Saigh et al. (2000), an average rating of 86.67 (SD = 5.77) was observed for the Situational Reactivity subtest. Furthermore, an average of 90 (SD = 10) was observed for the Re-experiencing subtest (Saigh et al., 2000). The Avoidance and Numbing, Increased Arousal, and Significant Impairment subtests each received a mean rating of 90.00 (SD = 0.00) as reported by the authors (Saigh et al., 2000). These reflect high levels of perceived correspondence between the *CPTSDI* (Saigh, 2003a) and the *DSM-IV* (APA, 1994) PTSD diagnostic criteria (Saigh et al., 2000).

Tables 3.1 and 3.2 provide information about the reliability of the *CPTSDI* (Saigh, 2003a). As is apparent from results of these analyses, the reported evidence supports the conclusion that the *CPTSDI* is a reliable test (Saigh et al., 2000).

Table 3.2.

Internal Consistency Estimates for CPTSDI *(Saigh, 2003a)*

Scale	Number of Items	Cronbach's *alpha*	Item-Total Correlations		*alpha* if Item Deleted	
			M	Range	*M*	Range
Re-experiencing	11	.89	.60	.32-.81	.88	.86-.89
Avoidance and Numbing	16	.89	.54	.37-.72	.88	.87-.89
Increased Arousal	7	.80	.53	.32-.72	.77	.74-.81
Significant Impairment	5	.69	.46	.33-.62	.64	.56-.70
Overall Diagnosis	43	.95	.55	.29-.81	.95	.95-.95

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Table 3.3.

Cohen's kappa *and Intraclass Correlation Coefficients (ICCs) for* CPTSDI *(Saigh, 2003a)*

Scale	Interrater Reliability (n= 104)		Test-Retest Reliability (n = 42)	
	Cohen's *kappa*	ICC	Cohen's *kappa*	ICC
Exposure	1.00	.89*	1.00	.94*
Re-experiencing	.84	.95*	.81	.87*
Avoidance and Numbing	.93	.96*	.86	.93*
Increased Arousal	.98	.96*	.78	.74*
Significant Impairment	.95	.94*	.66	.66*
Overall Diagnosis	.96	.98*	.91	.88*

* $p < .001$

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Sensitivity, specificity, predictive power (positive and negative), and diagnostic efficiency were also examined with using various methods (Yasik et al., 2001). These methods included diagnostic clinical interviews, conducted by a Board-certified psychiatrist or a licensed psychologist, and administrations of the PTSD Modules from both the *DICA-R* (Reich, Leacock, & Shanfield, 1994) and administrations of the PTSD module from the *Structured Clinical*

Interview for the DSM-IV (*SCID*; First et al., 1996). Based on analysis of a sample of 76 trauma-exposed children and adolescents, and 28 youth without a history of exposure, the *CPTSDI* (Saigh, 2003a) demonstrated moderate to high *kappa* coefficients (Yasik et al., 2001), as can be seen in Table 3.4.

Table 3.4.

Prediction Parameters of the CPTSDI *(Saigh, 2003a)*

Criterion measure	*n*	Sensitivity	Specificity	Positive Predictive Power	Negative Predictive Power	Diagnostic Efficiency
Clinician-derived diagnosis	104	.87	.99	.96	.95	.95
DICA-R PTSD Module	86	1.00	.92	.65	1.00	.93
SCID PTSD Module	90	.93	.95	.76	.99	.94

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Convergent validity was addressed by correlating scores based on the *CPTSDI* (Saigh, 2003a) and scores from the *Revised Children's Manifest Anxiety Scale* (*RCMAS*; Reynolds & Richmond, 1978), the *Children's Depression Inventory* (*CDI*; Kovacs, 1992), the *Child Behavior Checklist* (*CBCL*; Achenbach, 1991), and the *Junior Eysenck Personality Inventory* (*JEPI*; Eysenck, 1965). As is evident from Table 3.5 (below), Yasik and colleagues (2001) determined that the *CPTSDI* (Saigh, 2003a) scores were associated with measures that assess psychological constructs that are theoretically related to PTSD (i.e., anxiety via the *RCMAS*; Reynolds & Richmond, 1978; and depression via the *CDI*; Kovacs, 1992). Additionally, related components of the other instruments, specifically, the Neuroticism scale from the *JEPI* (Eysenck, 1965) and the Internalizing scale from the *CBCL* (Achenbach, 1991) demonstrated anticipated associations (Yasik et al., 2001).

Table 3.5.

Convergent and Discriminant Validity of the CPTSDI *(Saigh, 2003a)*

Comparison Measure	*n*	*r*
Revised Children's Manifest Anxiety Scale		
Total Score	75	.70**
Worry/Oversensitivity	75	.65**
Social Concern/Concentration	75	.60**
Physiological Anxiety	75	.64**
Lie	75	-.08
Children's Depression Inventory		
Total Score	74	.59**
Anhedonia	74	.54**
Ineffectiveness	74	.50**
Interpersonal Problems	74	.32*
Negative Self-Esteem	74	.44**
Negative Mood	74	.47**
Junior Eysenck Personality Inventory		
Extraversion	70	-.07
Neuroticism	70	.58**
Lie	70	.02
Child Behavior Checklist		
Total Score	64	.51**
Externalizing	64	.21
Internalizing	64	.55**

* $p < .01$ ** $p < .001$

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Diagnostic Interview for Children and Adolescents, Revised (DICA–R). The *DICA-R* (Reich et al., 1995) is a structured diagnostic interview that is congruent with the *DSM-IV* diagnostic criteria for multiple psychiatric disorders. Participants received administrations of the

psychotic symptoms, substance dependence, major depressive disorder, attention-deficit/hyperactivity disorder, and conduct disorder modules. Reich (2000) reported test-retest *kappa* coefficients ranging from .32 to .59 for the attention-deficit/hyperactivity disorder module and .55 to .80 for the major depressive disorder module. Coefficients of .76 and .92 were observed for the psychotic symptoms and conduct disorder modules (Reich, 2000; Reich, personal communication, April 6, 2000).

Demographic Measure

***Hollingshead Four-Factor Index of Social Status* (Hollingshead, 1975)**. This test includes a series of questions regarding parent education, parent occupation, and marital status. Participants are assigned to social class designations with the lowest scores assigned to Class V and the highest scores assigned to Class I. Cirino et al. (2002) reported high (.95) to moderate (.73) inter-rater reliability coefficients for the instrument. The authors observed convergent validity correlation coefficients that ranged from .42 to .92 when Hollingshead scores were correlated with scores on the *Socioeconomic Index of Occupations* (Nakao & Treas, 1992).

Dependent Measure

Wechsler Intelligence Scale for Children–Third Edition (WISC–III). The *WISC–III* (Wechsler, 1991) is a standardized measure of intellectual functioning appropriate for individual administration to children ages six to 16 years. Following administration, the test yields information pertaining to an individual's overall intellectual functioning, as well as specific information regarding his or her verbal and non-verbal cognitive abilities. The *WISC–III* was standardized on a nationally representative sample of 2,200 children without learning or cognitive disabilities. The *WISC–III* consists of ten standard subtests that are used in the calculation of Verbal, Performance, and Full Scale IQs as well as Index scores for Verbal

Comprehension and Perceptual Organization. With regard to internal consistency, the Full Scale, Verbal, and Performance IQ scales all demonstrated high test-retest reliability coefficients of .89, at minimum (Wechsler, 1991). Among the individual subtests, described below, internal consistency correlation coefficients ranged between .61 to .92, with the exception of Symbol Search and Coding.

With regard to validity, Slate (1995) examined the associations between the *WISC-III* (Wechsler, 1991) and its predecessor, the *WISC-R* (Wechsler, 1974), using a sample of intellectually disabled children. Three years after evaluation with the *WISC-R*, the students were administered the *WISC-III.* Results revealed generally high positive correlations between the measures on their Full Scale IQs (.84), Verbal IQs (.87), and Performance IQs (.80), after he adjusted for restricted range of intellectual performance due to the nature of his sample. Taken together with the findings of initial investigations by Wechsler (1991), these correlations suggest generalizability of the *WISC-III* IQ measures to populations that differ in cognitive abilities relative to the initial normative sample. Similarly, studies have demonstrated adequate concurrent, construct, discriminant, and predictive validity (Woolger, 2001, p. 221).

Five subtests are utilized to generate the Verbal IQ score: Information, Similarities, Arithmetic, Vocabulary, and Comprehension. An additional five subtests are administered to derive a Performance IQ score: Picture Completion, Coding, Picture Arrangement, Block Design, and Object Assembly. Altogether, scores on each of these ten subtests yield the Full Scale IQ.

Two additional indices are calculable from administration, the Verbal Comprehension Index and the Perceptual Organization Index. With regard to the first, four verbal subtests (Information, Similarities, Vocabulary, and Comprehension) generated the index score that

describes one's ability to understand verbally presented information. The second, the Perceptual Organization Index, reflects one's ability to integrate and organize information presented visually and is derived from scores on Picture Completion, Picture Arrangement, Block Design, and Object Arrangement subtests.

The first of the aforementioned verbal subtests, Information, requires examinees to answer questions that assess general factual knowledge including that related to object names, historical events or people, and places. During administration of the Similarities subtest, examinees must describe how two objects or concepts are alike one another, which evaluates more abstract verbal reasoning skills. The Arithmetic subtest assesses children's mathematical reasoning skills, along with their ability to process verbally and visually presented information in order to solve problems in mind. Word knowledge is specifically examined through the Vocabulary subtest, which requires examinees to define various words of increasing difficulty. Finally, on the Comprehension subtest, examinees are presented with questions that require social and verbal reasoning to answer correctly. In addition to the five standard subtests, the Digit Span subtest was administered as investigators have reported that it is sensitive to anxiety (Plante, Plante, Rahm, Brentar, & Couchman, 1997) and as PTSD is classified as an anxiety disorder in the *DSM-IV* (APA, 1994).

Of the performance subtests, the first, Picture Completion, asks examinees to identify the missing piece from a picture of a person, animal, or object. This subtest assesses children's ability to meaningfully organize and interpret visually presented information. The second subtest, Coding, is a timed test that measures examinees' ability to complete simple tasks quickly and efficiently by asking them to copy target symbols that match their corresponding symbol or number. Picture Arrangement, the third performance subtest, requires examinees to sort pictures

such that they correctly describe a story in a logical order. Arrangement of the illustrated pictures assesses one's ability to organize and demonstrate planning skills. On the Block Design subtest, examinees must use arrange colored blocks in order to match a target design within a specified time period. This task requires children to utilize spatial reasoning, motor, and visually processing skills in order to correctly reproduce the 2-D images. The fifth and final performance subtest, Object Assembly, provides children with puzzle pieces that they must fit together to form the shape of common objects using visually processing, motor, and visual-motor integration skills.

Table 3.6 presents a table of the subtests that correspond to the different domains of intellectual functioning and indices assessed by the *WISC-III* (Wechsler, 1991).

Table 3.6.

WISC-III *Subtests and Indices (Wechsler, 1991)*

	Subtests
Verbal IQ	• Arithmetic • (Digit Span)
Verbal Comprehension Index	• Information • Similarities • Vocabulary • Comprehension
Performance IQ	• Coding
Perceptual Organization Index	• Picture Completion • Picture Arrangement • Block Design • Object Assembly

For the present investigation, licensed psychologists or doctoral school psychology students who successfully completed courses and practicum involving the intellectual assessment of children and adolescents administered the *WISC–III* to participants.

Procedure

The data for this report was obtained from an investigation that was underway from 1991 to 2016. This study used the same inclusion and exclusion procedures and some of the participants that were included in previous case-control research. These prior studies examined the differential validity of the PTSD classification based upon several norm-referenced tests of intelligence (Saigh et al., 2006), memory (Yasik et al., 2007), anxiety (Yasik et al., 2012), self-concept, anger (Saigh et al., 2008), misconduct (Saigh et al., 2002), and personality (Saigh et al., 2016). After receiving IRB approval from multiple institutions, personnel at Bellevue Hospital in New York City were asked to refer children aged 6 to18 years with a history of trauma exposure to the research team. In order to minimize unsystematic error related to diagnostic evaluations (Nelson & Israel, 2003; Spitzer, Endicott, & Robins, 1978), and decrease the potential for information variance, all of the children and adolescents were given clinical interviews by two independent evaluators.

Inclusionary Criteria. The final sample included traumatized youth between the ages of 6 and 16 years. Within this context, 28 children met criteria for PTSD and 50 children who were exposed to traumatic events did not meet criteria for PTSD.

With reference to cases with PTSD, these children met full diagnostic the criteria for disorder on the basis of two separate clinical interviews that were performed using the *DSM-IV* diagnostic criteria (APA, 1994). Hospital psychiatrists and staff psychologists performed these evaluations. The PTSD group also met full criteria for PTSD as indicated by two separate

administrations of the *CPTSDI* (Saigh, 2003a; 2003b). With reference to traumatized youth without PTSD, these participants were also exposed to traumatic experiences that were consistent with the *DSM-IV* PTSD Criterion A1 definition for trauma exposure (APA, 1994). This definition maintains that trauma involves experiencing, witnessing, or being confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of self or others (APA, 1994). Beyond endorsing a traumatic experience, the PTSD negatives did not endorse sufficient symptoms to warrant a PTSD diagnosis. In making this determination, hospital psychiatrists and staff psychologists performed clinical interviews based and concluded that the participants had been exposed to one or more traumas as indicated by the *DSM-IV* PTSD Criterion A1 definition and did not meet the remaining criteria for a PTSD diagnosis (APA, 1994). All of the traumatized PTSD negatives also represented they were exposed to at least one Criterion A1 event during two administrations of the *CPTSDI* (Saigh, 2003a; 2003b) by different examiners and did not met the minimum criteria for a PTSD diagnosis.

Exclusionary Criteria. Given that abused or neglected children may experience emotional distress due to court proceedings and/or mandated foster care arrangements (Zona & Milan, 2011; Rayburn, McWey, & Cui, 2016), children who were reportedly abused or neglected were not included in the present research sample. The New York State Family Court Act (Article 10, Section 1012, 1970) definition was used to delineate cases of sexual or physical abuse. As such, youth who were abused by a parent or guardian were excluded. Children or adolescents who had been sexually or physically assaulted by someone other than a parent or guardian were included. As previous research concluded that children with IQs in the deficient range provided inconsistent responses and demonstrated difficulty comprehending items on the *CPTSDI* (Saigh,

2003b), participants whose *WISC-III* Full Scale IQ was 70 or less were not included. Participants who were not able to understand or speak English were excluded. Youth with major comorbid disorders, including ADHD, MDD, conduct disorder, substance dependence, and psychotic symptoms, identified through administrations of the *Diagnostic Interview for Children and Adolescents-Revised* (*DICA–R*; Reich, Leacock & Shanfield, 1995) and such cases were excluded. Participants currently receiving a medication that could affect performance on an IQ test and those with positive histories for head trauma were also excluded.

Participant Sample

Hospital staff referred 235 trauma-exposed children. Parent or guardian consent and child assent was secured for 164 (70%) cases. Fifty-two (32%) of these cases had a history of head trauma (n = 24), limited English skills (n = 10), reported child abuse or neglect (n = 2), or *WISC-III* Full Scale IQs in the deficient range (n = 16), and were excluded. With reference to the remaining 112 cases, 46 (41%) were diagnosed with PTSD and 66 (59%) were not. Nine traumatized youths (3 with PTSD and 6 PTSD negatives) were older than the upper age limit of the *WISC–III* (16 years, 11 months, 30 days) and were excluded. Eleven more were excluded because they did not complete the research protocol for the current investigation. Among the sample with PTSD, eight participants were excluded because they also met diagnostic *DSM-IV* criteria for major depressive disorder. An additional case was excluded having met criteria for substance abuse. With reference to the sample of traumatized PTSD negatives, five participants were excluded due to presence of comorbid disorders (one youth met criteria for ADHD, two for MDD, and two for Conduct Disorder).

Using the aforementioned recruitment procedure, the final sample consisted of 28 children with PTSD and 50 trauma-exposed PTSD negatives (n = 78). Figure 3.1 presents a

flowchart that reflects the selection and case identification process and Table 3.7 presents the demographic characteristics of the selected sample.

Figure 3.1.

Participant Selection Process

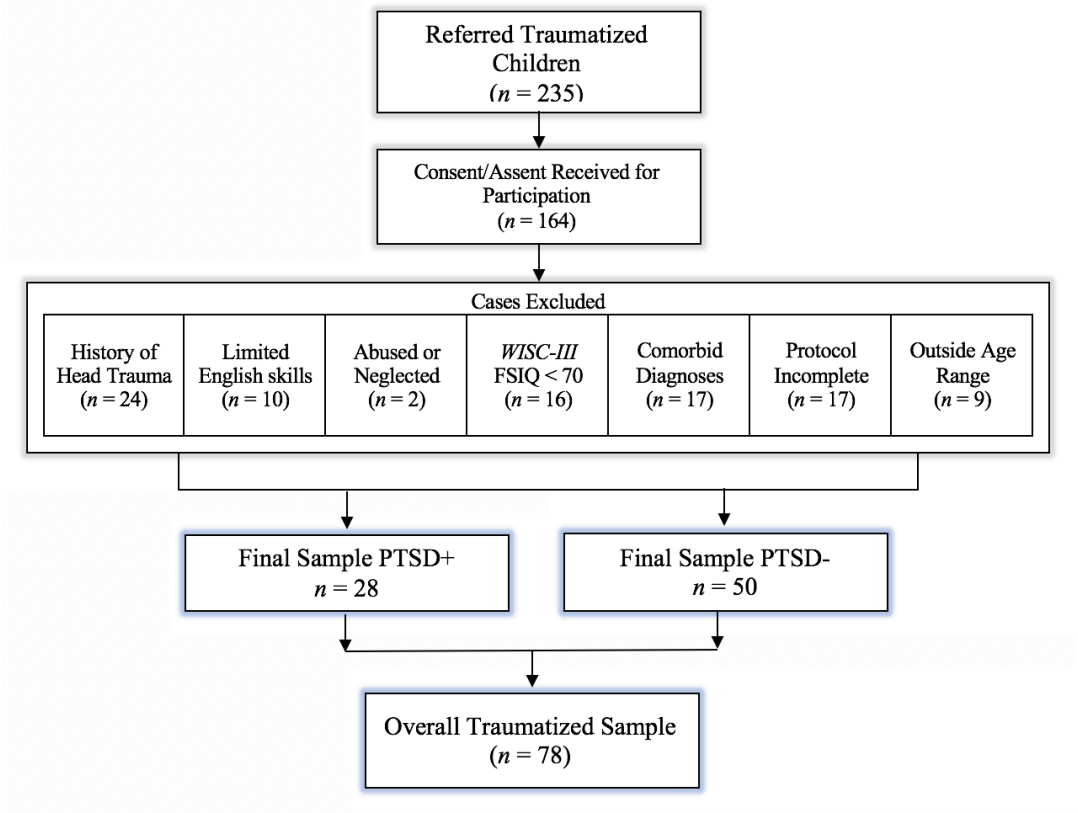


Table 3.7.

Demographic Variables

Variable	
Age (years)	
M	13.42
SD	2.68
Hollingshead Social Class	
M	3.35
SD	1.10
Ethnicity (%)	
Caucasian	11.54
African American	23.08
Hispanic	56.41
Asian	7.70
Other	1.28
Diagnostic Status (%)	
PTSD Positive	35.90
PTSD Negative	64.10
Gender (%)	
Male	66.67
Female	33.33

Chapter IV

Results and Analyses

Analysis Procedures

Table 4.1 presents the *WISC-III* (Wechsler, 1991) means and standard deviations and Table 4.2 presents the *CPTSDI* (Saigh, 2003a) frequency means and standard deviations. To examine the relationship between *DSM-IV* PTSD symptom clusters (APA, 1994), as measured by the *CPTSDI* (Saigh, 2003a; 2003b) and various aspects of intelligence, as measured by the *WISC-III* (Wechsler, 1991), a series of correlational analyses were conducted. Visual and statistical inspection of the data indicated the presence of outliers and significant violations regarding the assumption of normality. Visually, boxplots, histograms, and QQ plots revealed evidence of outliers and non-normal distributions with regard to the *CPTSDI* total score and the *WISC-III* Full Scale IQ scores. Shapiro-Wilks tests of normality yielded concordant results (Full Scale IQ: $W = 0.94$, $p < 001$; Total *CPTSDI*: $W = 0.88$, $p < .001$). Two examples of such histograms depicting the distribution of the Full Scale IQ and Total *CPTSDI* score are presented below (Graphics 4.1. and 4.2., respectively). Comparable violations to the assumption of normality were observed at the subtest level on the *CPTSDI* and within the indices and subtests scaled scores of the *WISC-III*.

To account for these deviations from the requirements associated with parametric statistical analyses, a series of Kendall's rank correlation coefficients (*tau*; Bolboaca & Jantschi, 2006; Kendall, 1938) were performed to assess the relation between the number of *CPTSDI* symptoms at the diagnostic and cluster levels and the *WISC-III* scores. This method of statistical analysis is conducted by creating ranks among variables in a dataset and comparing the number of concordant and discordant pairs of rankings between those variables (Noether, 1981).

Kendall's *tau* analyses are suggested to provide the best population estimate of correlation coefficients for relatively small datasets that contain a large number of tied ranks between the variables examined and include extreme scores or outliers (Field, 2009).

Additionally, to avoid undue increases in the potential for making Type I Errors, an *alpha* level of .025 was utilized. The use this *alpha* level, rather than more stringent methods for multiple comparisons (e.g., Bonferroni, Tukey's, Scheffe, etc.), was made after a thorough review of related literature. Findings indicated that the aforementioned approaches are excessive in their attempts to control error rates and that informed decisions regarding *alpha* adjustments are best determined by the theory motivating comparisons (Bender & Lange, 1999; Perneger, 1998; 1999; Schulz & Grimes, 2005). Specifically, statisticians and other researchers have suggested that adjustments for Type I Errors be based on the number variables of interest in the analysis: in this case, two primary constructs (intelligence and posttraumatic symptoms). This approach is particularly appropriate for those studies such as this, which are exploratory in nature and designed to inform future models of analysis (Feise, 2002; Lakens, 2016).

Table 4.1.

WISC-III *(Wechsler, 1991) Means and Standard Deviations*

Variable	*M*	*SD*
Verbal IQ	95.45	12.43
Performance IQ	93.12	12.15
Full Scale IQ	93.71	11.78
Verbal Comprehension Index	95.36	11.36
Perceptual Organization Index	94.49	12.86
Information	9.32	2.81
Similarities	9.38	2.86
Arithmetic	8.79	2.96
Vocabulary	8.86	2.43
Comprehension	8.73	2.94
Digit Span	9.84	2.95
Picture Completion	9.68	2.46
Coding	8.58	2.86
Picture Arrangement	8.72	3.07
Block Design	8.90	3.17
Object Assembly	8.42	2.88

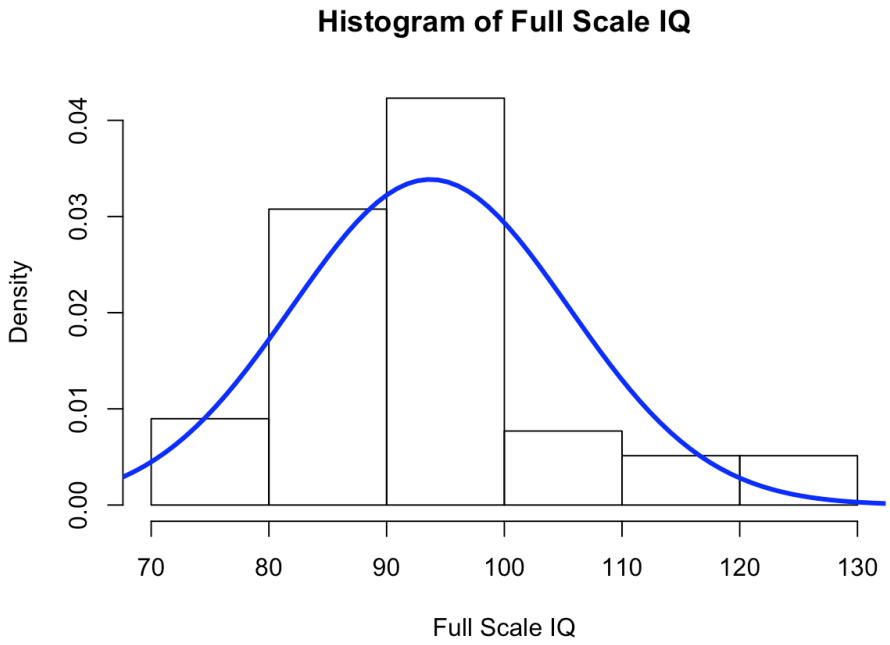
Table 4.2.

CPTSDI *(Saigh, 2003a) Symptom Means and Standard Deviations*

Variable	*M*	*SD*
Re-experiencing Symptoms	2.29	2.86
Avoidance/Numbing Symptoms	4.33	3.68
Hyperarousal Symptoms	1.69	1.86
Impairment Symptoms	1.17	1.41
Total Symptoms	2.27	1.34

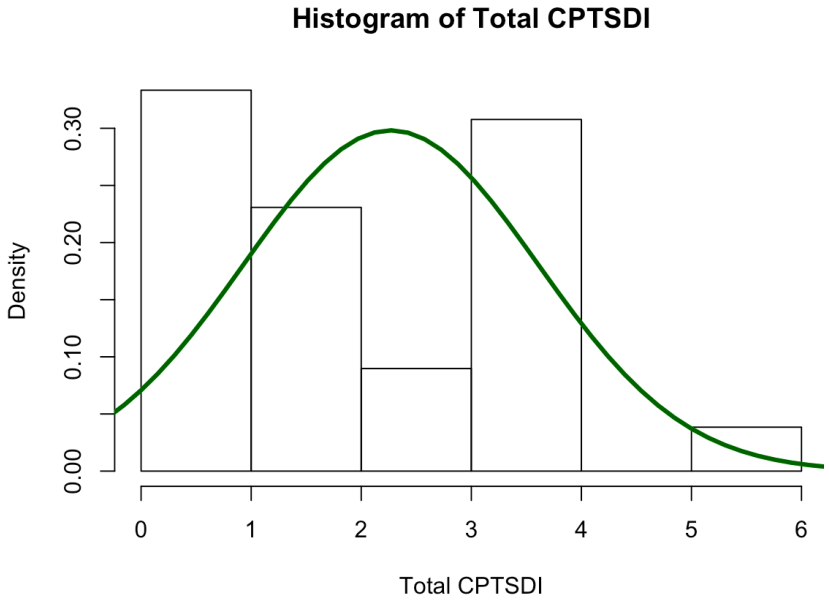
Graphic 4.1.

Distribution of Full Scale IQs



Graphic 4.2.

Distribution of Total CPTSDI *Scores (Saigh, 2003a)*



Results

As described above, a series of Kendall's rank correlations were conducted using SPSS Version 24 (IBM, 2016). Table 4.3 presents Kendall's rank correlation coefficients and Figure 4.1 presents a visual matrix of the observed correlations and corresponding *p*-values, created using RStudio software (RStudio Team, 2016). In Figure 4.1, the strength of correlation coefficients is depicted by color gradient, with stronger correlations appearing in the matrix as more solid relative to those with weaker correlation coefficients; positive correlations appear in blue tones while negative correlations appear in red. Overall, results support the hypotheses indicated in the previous chapter, particularly with regard to the directional relationships described, although a number of the correlations did not reach the level of significance.

As may be seen, significant inverse correlations were identified between the *WISC-III* Full Scale IQ and the Avoidance and Numbing (τ = -.210, n = 78, p < .01), Hyperarousal (τ = -.244, n = 78, p < .01), and Functional Impairment (τ = -.217, n = 78, p < .025). These findings indicate that three of the *DSM-IV* PTSD symptom clusters were significantly associated with poorer performance on the *WISC-III*. Of note, Re-experiencing symptoms and the Full Scale IQ scores were not significantly associated (τ = -.148, n = 78, p = .074).

With regard to the relationship between the Verbal IQ scores and PTSD symptom clusters, each correlation conducted revealed significant inverse correlations. As anticipated, lower Verbal IQ scores were significantly related to Re-experiencing (τ = -.209, n = 78, p < .025), Avoidance and Numbing (τ = -.272, n = 78, p < .01), Hyperarousal (τ = -.345, n = 78, p < .001), and Functional Impairment symptoms (τ = -.288, n = 78, p < .01). Relatedly, lower scores on the Verbal Comprehension Index (VCI) were associated with all PTSD symptom clusters, with the exception of the Re-experiencing symptoms, at a statistically significant level. The

Avoidance and Numbing (τ = -.249, n = 77, p < .01), Hyperarousal (τ = -.305, n = 77, p < .001), and Functional Impairment (τ = -.226, n = 77, p < .01) symptom clusters were inversely correlated with VCI scores. Analogous to the findings regarding the Full Scale IQ and re-experiencing symptoms, VCI scores were not significantly related to that symptom cluster (τ = -.157, n = 77, p = .060).

At the subtest level, five of the six verbal tests were identified as significantly and inversely related to cluster scores. In particular, lower scores on the Vocabulary subtests were significantly correlated with all clusters: Re-experiencing (τ = -.259, n = 78, p < .01), Avoidance and Numbing (τ = -.307, n = 78, p < .01), Hyperarousal (τ = -.313, n = 78, p < .01), and Functional Impairment symptom clusters (τ = -.197, n = 78, p < .025). Lower Arithmetic subtest scores were significantly correlated with three symptom clusters: avoidance and numbing (τ = -.207, n = 78, p < .025), Hyperarousal (τ = -.230, n = 78, p < .01), and Functional Impairment (τ = -.197, n = 78, p < .025) symptoms. Similarly, lower scores on the Comprehension subtest were associated with higher scores on the Avoidance and Numbing (τ = -.210, n = 78, p < .025), hyperarousal (τ = -.313, n = 78, p < .01), and Functional Impairment (τ = -.295, n = 78, p = .001) *CPTSDI* subtests (Saigh, 2003a). Lower scores on the Similarities subtest were related to both Avoidance and Numbing (τ = -.214, n = 78, p = .01) and Hyperarousal (τ = -.245, n = 78, p < .01) symptoms. Finally, scores on the Information subtest were inversely correlated with the Hyperarousal symptom cluster (τ = -.202, n = 78, p < .025). The remaining correlations between Verbal subtests and PTSD symptom clusters were non-significant.

With reference to the Performance IQ scores, the correlations failed to reach the level of significance with one exception. This exception involved the Block Design subtest as a

significant relationship was observed between the Block Design scaled scores and the PTSD Functional Impairment symptom cluster (τ = -.223, n = 78, p < .01).

Table 4.3.

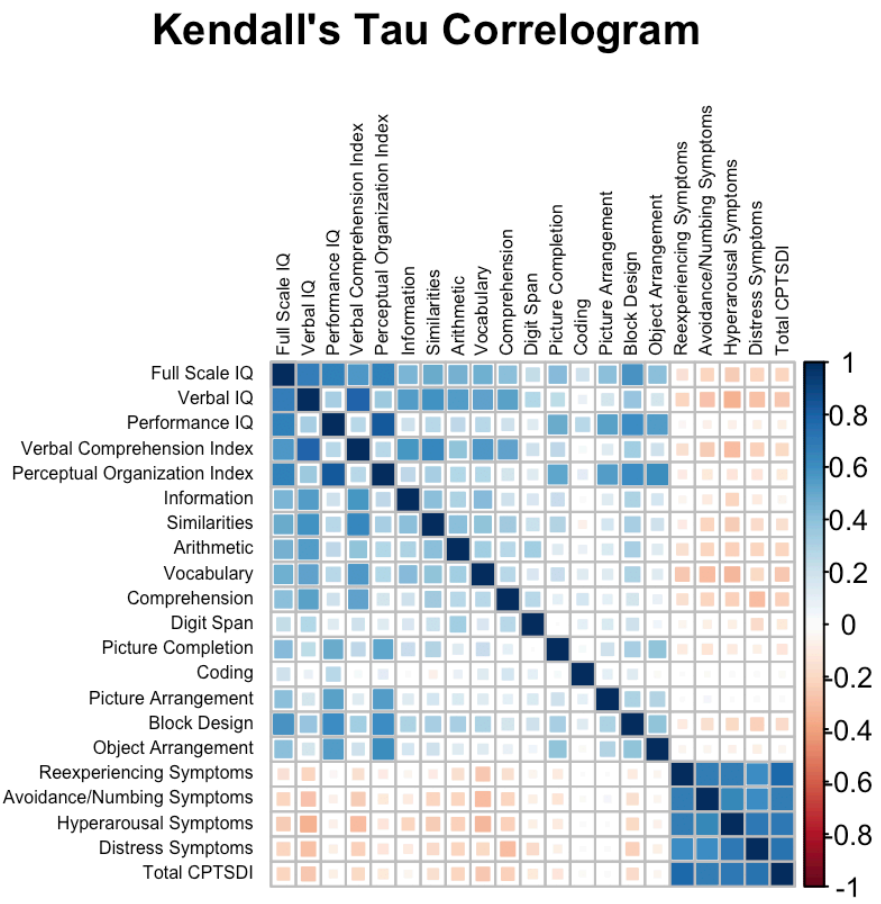
Kendall's Rank Correlation Coefficients

Total Number of Symptoms Endorsed by *CPTSDI* Cluster (Saigh, 2003a)					
WISC-III Scores (Wechsler, 1991)	Re-experiencing	Avoidance & Numbing	Hyper-arousal	Functional Impairment	Total Score
Full Scale IQ	-.148	-.210**	-.244**	-.217*	-.205*
Verbal IQ	-.209*	-.272**	-.345**	-.288**	-.264**
Performance IQ	-.040	-.066	-.068	-.071	-.070
Verbal Comprehension Index	-.157	-.249**	-.305**	-.226**	-.196*
Information	-.049	-.099	-.202*	-.096	-.056
Similarities	-.082	-.214**	-.245**	-.174	-.155
Arithmetic	-.169	-.207*	-.230**	-.205*	-.208*
Vocabulary	-.259**	-.307**	-.313**	-.197*	-.252**
Comprehension	-.156	-.210*	-.225**	-.295**	-.221*
Digit Span (n = 75)	-.055	-.075	-.073	-.178	-.110
Perceptual Organization Index	-.087	-.113	-.120	-.124	-.116
Picture Completion	-.103	-.131	-.104	-.070	-.122
Coding	-.005	-.023	.014	-.014	-.030
Picture Arrangement	-.004	.042	-.006	.015	.016
Block Design	-.093	-.169	-.186	-.223**	-.178
Object Assembly	-.045	-.045	-.060	-.077	-.046

* $p < .025$, ** $p < .01$

Note: n = 78 unless otherwise indicated.

Figure 4.1.



Summary of Results

The results of the present examination involving the associations between the *CPTSDI* subtests and the *WISC-III* IQ, index, and subtest scores reveal support for the majority of the hypotheses described in Chapter III. Table 4.4 provides a summary of conclusions regarding the hypotheses proposed. Specifically, significant inverse relationships between the Avoidance and Numbing, Hyperarousal, Impairment, and Total *CPTSDI* scores with the Full Scale, Verbal IQ, and Verbal Comprehension Index scores were consistent with the current investigation's hypotheses. Additionally, non-significant associations between each *CPTSDI* subtest and the *WISC-III* Performance IQ scores as was also anticipated.

Four notable discrepancies between the hypotheses and observed correlations were revealed. First, a non-significant correlation emerged between the *CPTSDI* Re-experiencing subtest scores and the *WISC-III* Full Scale IQ scores (Hypothesis 2). A second noteworthy discrepancy between the hypotheses and extant results involved the nonsignificant correlation between the Re-experiencing *CPTSDI* subtest and the *WISC-III* Verbal Comprehension Index (Hypothesis 8). The third and fourth most surprising conclusions regarding the hypotheses that were not supported occurred at the subtest level. In particular, the Digit Span subtest scores on the *WISC-III* were not significantly correlated with the *CPTSDI* subtests (Hypotheses 14, 22, 30, and 38). In contrast, the *WISC-III* Block Design subtest scores were significantly and negatively associated with the Impairment subtest on the *CPTSDI* (Hypothesis 66). Chapter V considers these outcomes from a theoretical and clinical perspective.

Table 4.4.

Summary of Support for Primary Hypotheses

Total Number of Symptoms Endorsed by *CPTSDI* Cluster (Saigh, 2003a)					
WISC-III Scores (Wechsler, 1991)	Re-experiencing	Avoidance & Numbing	Hyper-arousal	Functional Impairment	Total Score
Full Scale IQ	Inverse (H_0 2) NOT SUPPORTED	Inverse (H_0 3) SUPPORTED	Inverse (H_0 4) SUPPORTED	Non-significant (H_0 5) SUPPORTED	Inverse (H_0 1) SUPPORTED
Verbal IQ	Inverse (H_0 7; 8-14) SUPPORTED*	Inverse (H_0 15; 16-22) SUPPORTED*	Inverse (H_0 23; 24-30) SUPPORTED*	Inverse (H_0 31; 32-38) SUPPORTED*	Inverse (H_0 6) SUPPORTED*
Performance IQ	Non-significant (H_0 40; 41-46) SUPPORTED	Non-significant (H_0 47; 48-53) SUPPORTED	Non-significant (H_0 54; 55-60) SUPPORTED	Non-significant (H_0 61; 62-67) SUPPORTED*	Non-significant (H_0 39) SUPPORTED

* Exceptions described above

Chapter V

Discussion

This chapter presents an interpretation of the results obtained from this study. First, the purpose of the study will be reviewed. Next, a discussion of the theoretical and clinical implications of the results will be provided. Lastly, the implications and recommendations for future research will be presented along with limitations of the present study.

Purpose of the Study

In a departure from most of the research that has explored the cognitive functioning of traumatized children, this study examined the relationship between PTSD symptom clusters and domains of measured intelligence after controlling for a variety of possible confounding factors. Specifically, the present investigation controlled for variables that could influence cognitive performance, such as major comorbid disorders and the effects of psychotropic medications, by eliminating participants who met these exclusionary criteria from the study in order to examine the relationship between measures of intelligence and PTSD symptoms.

Summary of Sample Demographics

Among the selected sample of 78 traumatized youth, twenty-eight were diagnosed with PTSD (36%) and 50 did not meet criteria for the disorder (64%). The average age of the sample was approximately 13 years (*SD* = 2.68), with the majority of participants self-identifying as Hispanic (56%), followed by African American (23%), Caucasian (12%), Asian (8%), and a final 1% indicated "Other" with regard to their ethnicity. Two thirds of the sample were males (66.67%).

With regard to sample characteristics, the sample's mean scores on the *WISC-III* Full Scale, Verbal, and Performance IQs (Wechsler, 1991) fell in the Average range, as did their

Verbal Comprehension and Perceptual Organization index scores. In terms of PTSD symptoms identified using the *CPTSDI* (Saigh, 2003a), Avoidance and Numbing symptoms were endorsed at the greatest percentage among participants (27.06%), followed by symptoms of Hyperarousal (24.12%), Impairment (23.4%), and Re-experiencing (20.82%).

Statement of Hypotheses and Summary of Results

Consistent with the primary hypotheses of the current study, significant inverse correlations were observed between each of the *CPTSDI* symptom clusters and the *WISC-III* Verbal indices. Moreover, with the exception of the *WISC-III* Block Design subtest, nonsignificant correlations were observed between all *WISC-III* Performance measures and the *CPTSDI* symptom clusters.

Among the *CPTSDI* subtests, symptoms of Hyperarousal were significantly inversely correlated with the greatest number of *WISC-III* measures. Specifically, the Hyperarousal subtest was significantly negatively correlated with the Full Scale and Verbal IQ scores, along with the Verbal Comprehension Index and all but one of the Verbal subtests (i.e., Digit Span). This outcome may be best understood given that the Hyperarousal subtest measures concentration impairment, hypervigilance, and sleep disturbance and that these variables have also been negatively associated with performance on verbal measures and other learning tasks (Curcio et al., 2006; Licht & Dweck, 1984; Scheiner et al., 2014).

The lack of significant correlations between the *WISC-III* Digit Span subtest and the Hyperarousal subtest from the *CPTSDI*, along with the other non-significant correlations between this *WISC-III* subtest and the *CPTSDI* subtests, may be best explained when one considers that Digit Span scores have been identified as being poor predictors of verbal performance on the *WISC-IV* (Wechsler, 2003). It should be noted that the Digit Span was

utilized to derive a separate Working Memory Index in the *WISC-IV* (Wechsler, 2003). Moreover, factor analyses conducted by the test developers and by independent researchers revealed that Digit Span loads onto a unique factor better than Verbal IQ (Bodin, Pardini, Burns, & Stevens, 2009; Wechsler, 2003). As such, the nonsignificant relationship between *WISC-III* Digit Span scores and *CPTSDI* subtests is not surprising.

In the current study, significant negative correlations were observed were between the Avoidance and Numbing *CPTSDI* subtest and a number of the *WISC-III* verbal indices. Importantly, the *CPTSDI* Avoidance and Numbing symptoms include diminished interest in significant activities, poor preparation for and performance on academic tasks, and decreased social engagement. As these areas of functioning are related to performance on the *WISC-III* verbal indices (Wechsler, 1991; Andreou & Karapetsas, 2004; Kamphaus, 2001; Kelly et al., 2002), and as previous research indicated that youth with PTSD had lower scores on the *WISC-III* verbal parameters (Saigh et al., 2006), the observed negative correlations are not surprising.

In addition, these significant inverse correlations may also be related to biological characteristics (Saigh et al., 2006). Viewed in this context, it should be recognized that the right hippocampus is a brain structure that has been associated with verbal functioning (Sass, Westerveld, & Lencz, 1992; Scoville & Milner, 1957). Further, researchers have linked PTSD to reduced hippocampal volume among children and adults (Bremner et al., 2003; Bremner, Vermetten, Afzal, & Vythilingam, 2004; Gilbertson et al., 2002; Gurvits et al., 1996; Villareale et al., 2002). As youth with PTSD and traumatized youth without PTSD were included in the present sample, it is conceivable that some of the significant inverse correlations were due to the inclusion of PTSD positive youth with possible reductions in hippocampal volume.

Interestingly, the Re-experiencing subtest was relatively less frequently associated with the *WISC-III* Verbal subtests, such that significant inverse correlations were only evident on the Vocabulary subtest. This finding may be better understood when the task demands of the subtests are considered. Specifically, the Vocabulary subtest heavily depends on word retrieval skills relative to other aspects of verbal intelligence, including abstract reasoning ability (Wechsler, 2014). As such, it is possible that greater numbers of Re-experiencing symptoms, including emotional and physiological reactions to internal or external reminders of the traumatic event may have interfered with the ability to learn new words and recall previously learned words.

Examined in this context, it is interesting to note that Amir, Badour, and Freese (2009) and Aupperle, Melrose, Stein, and Paulus (2012) suggested that individuals with PTSD and traumatized individuals without PTSD may derive less benefit from learning strategies that emphasize cognitive rehearsal of information and may display greater inhibitory difficulties relative to non-traumatized controls. It is therefore possible that inhibitory dysfunction as described by Amir et al. (2009) and Aupperle et al. (2012) may be related to the learning of new words and the retrieval of the specific meanings of words from memory. Lending further support for these findings with reference to the Re-experiencing cluster and verbal intelligence, the absence of significant correlations between this *CPTSDI* subtest and the other *WISC-III* Verbal subtests is consistent with results from the study by Kira and colleagues (2012) wherein Re-experiencing symptoms were not significantly correlated with any *WISC-IV* Verbal measures.

With reference to the significant inverse correlations that were noted between the *CPTSDI* Functional Impairment subtest and the *WISC-III* Information, Arithmetic, Vocabulary, and Comprehension subtests and the Verbal Comprehension Index, support for these findings

may be found within the work of Saigh, Mroueh, and Bremner (1997). These authors determined that youth with PTSD evidenced significantly poorer performance on standardized measures of school achievement, an observation which has been subsequently reported in the literature (Anderson, 1995; Andreou & Karapetsas, 2004; Kamphaus, 2001). In view of this, it should be noted that the *WISC-III* indices and subtests in question involve school-related learning skills (Andreou & Karapetsas, 2004; Kamphaus, 2001; Kelly et al., 2002; Wechsler, 1991) and that participants with self-reported functional deficits involving academic achievement were expected to perform less well on the verbal learning tasks that are included on the *WISC-III*.

The nonsignificant differences between *CPTSDI* subtests and the majority of *WISC-III* Performance measures were anticipated based on prior research. In particular, Saigh et al. (2006) reported that all of the *WISC-III* Performance indicators of participants with PTSD, traumatized PTSD negatives, and controls did not significantly differ. On the other hand, the significant inverse relationship between the *CPTSDI* Functional Impairment subtest and the *WISC-III* Block Design subtest was not expected. A possible explanation for this outcome may have to do with the fact that the Block Design subtest differs from other subtests in that it is a timed task requiring participants to arrange three-dimensional colored blocks into abstract configurations that correspond to abstract two-dimensional printed designs (Wechsler, 1991). In view of this, it is possible that the global distress and general dysfunction that are part and parcel of the *CPTSDI* Functional Impairment subtest, and the Functional Impairment cluster, may have made performance on this complex task under timed conditions particularly difficult for the traumatized participants.

Taken together, the clinical implications of these findings are worthy of consideration. Specifically, the observed inverse relationship between children and adolescents' performance

on verbal intelligence measures and their self-rated posttraumatic stress symptoms highlights the importance of clinical flexibility in treatment. This is an important point as the only "well established" psychotherapy treatment for children and adolescents with PTSD is Trauma-Focused Cognitive-Behavioral Treatment (TF-CBT; Silverman et al., 2008), based on the present literature review. As a modality, TF-CBT and related treatments emphasize patients' development of his/her "trauma narrative" as a fundamental aspect of the intervention (Silverman et al., 2008, p. 9). The conclusions from the present investigation suggest that treatment for these youth may benefit from the incorporation activities that allow patients to describe their trauma narratives without heavy reliance on verbal expression (i.e., drawing, using toys, etc.). These types of creative adaptations to evidence-based interventions, which allow a shift away from primarily verbal communication in sessions to alternative means of expression, may be better suited to meet the clinical needs of trauma-exposed youth.

Future Directions

In interpreting these results, it is important to remain cognizant that the present findings are best generalized to populations with characteristics similar to those of the selected sample (e.g., primarily Hispanic and male) . It is likely that this study's sample consisted of more male youth than female as a result of the manner in which most cases were referred: emergency room visits to Bellevue Hospital. The overrepresentation of males in this sample is consistent with the finding that, among those younger than 18 years, males are more likely to visit the emergency room than females (Wier, Yu, Owens, & Washington, 2013), Future research should be performed to clarify the relationship between PTSD symptoms and particular aspects of intellectual functioning with larger and more heterogeneous samples of youth in order to assess the external validity of this work.

Additionally, the generalizability of these results relative to the *DSM-5* PTSD (APA, 2013) classification is uncertain. The new criteria differ in multiple ways from the *DSM-IV* PTSD criteria (APA, 1994). Although Hoge, Riveier, Wilk, and Weathers (2014) reported that most cases exposed to the same trauma met criteria for PTSD according to both the *DSM-IV* (APA, 1994) and the *DSM-5* (APA, 2013) criteria, evidence supporting the differential validity of the *DSM-5* (APA, 2013) classification is very limited. A similar situation emerged following publication of the *DSM-III* (APA, 1980). At that time, Quay and Werry (1986) made a number of theoretical and clinical observations that remain apropos. These authors sagely observed: "A disorder is empirically validated by determining its relationship to other variables… Of particular concern is differential validity; two putatively separate disorders ought not to be related in the same way to the same variable" (p. 35). Their observations are especially significant at this time as the validity of the *DSM-5* (APA, 2013) PTSD criteria have been seriously questioned (Brewin, 2013; Hoge et al., 2016) and as alternative PTSD diagnostic symptoms have been recommended for the upcoming revision of the World Health Organization's (WHO) *International Classification of Diseases* (Maerker et al., 2013).

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