ABSTRACT

Assessment of Personal Predictive Variables and Symptom Expression in
Posttraumatic Stress Disorder

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Scales assessing personal predictive variables and symptom expression in

posttraumatic stress disorder (PTSD) are numerous and varied. No consensus has been

reached on an exclusive set of personal variables associated with PTSD development,

more than one scale may be available to assess a particular variable and twenty to thirty

scales are in common use for assessing PTSD symptoms. While many studies have

identified one or two predictive factors and used a single scale for assessing each factor,

no study has looked at all of the various factors and compared multiple scales used to

assess them in a single population. A beginning researcher or clinician would have

difficulty knowing where to start with scale selection and experienced investigators may

select tests based only on word of mouth referrals or ease of accessibility. In this study

multiple scales for assessment of the various personal predictive variables and several

instruments for the assessment of PTSD symptoms were administered to a predominately

college student population. This allowed comparison of the relative performance of the

scales, validity, ease of administration, and scoring, as well as an analysis of risk factors

which were most predictive for PTSD. This study showed that the numbers, percentage, and identification of individuals showing significant PTSD symptoms in a population varied with the scales used. Based on the results of this study, if using more than one instrument to assess PTSD symptoms, the Penn Inventory and the Impact of Event Scales-Revised are recommended. Concurrent psychopathology was found to be the largest contributor to PTSD symptom development. Findings here confirm Eysenck's hypothesis that neuroticism and introversion are correlated and related through anxiety in a small portion of the population. Additionally both anxiety and dissociation are supported as factors in PTSD symptom development. Lastly, nontraditional scoring can yield additional valuable information on some scales and should be considered.

Assessment of Personal Predictive Variables and Symptom Expression
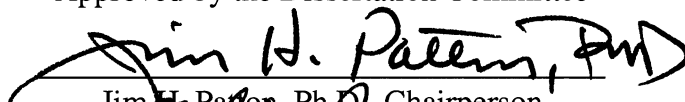in Posttraumatic Stress Disorder

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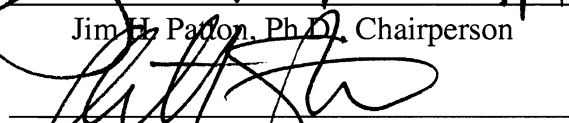Renee Michalski, M.S.

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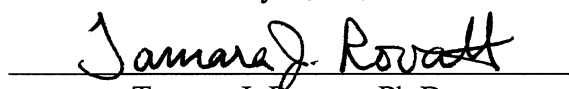
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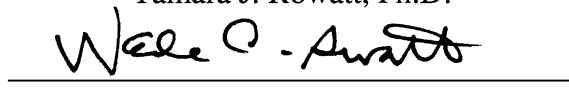
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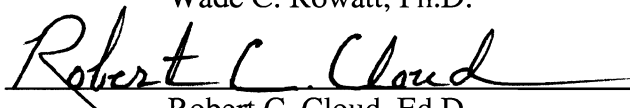
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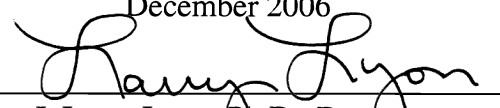Matthew S. Stanford, Ph.D.

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CHAPTER ONE

Introduction

Overview

The purpose of this research effort was to validate personal variables predictive of

Posttraumatic Stress Disorder (PTSD) symptoms and to assess self-report scales used in

identifying these personal risk factors and symptoms. While many studies have

identified one or two predictive factors and used a single scale for assessing each factor,

no one study has looked at all of these various factors and compared multiple scales used

to assess them in a single population. This study considered a broad range of personal

variables as well as evaluated several assessment instruments for those variables and for

PTSD.

PTSD occurs 30 days or more after direct personal experience of an *extreme*

traumatic stressor (American Psychiatric Association, Diagnostic and statistical manual

of mental disorders (4th) Text revision, 2000). Not everyone exposed to the same

traumatic event will develop PTSD, suggesting not only the event but personal variables

determine occurrence. In fact, individual characteristics such as introversion (Carlier,

Lamberts, & Gersons, 1997), neuroticism (Cox, MacPherson, Enns, & McWilliams,

2004), external locus of control (Z. Solomon & Mikulincer, 1990) family history of

psychiatric disorder (Foy, Resnick, Sipprelle, & Carroll, 1987), and dissociation (Carlier,

Lamberts, Fouwels, & Gersons, 1996; Loewenstein & Putnam, 1988; Tichenor, Marmar,

Weiss, Metzler, & Ronfeldt, 1996; Weiss, Marmar, Metzler, & Ronfeldt, 1995) have

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been shown to be salient factors in symptom development (McFarlane, 1988). Foy, Resnick, Sipprelle, and Carroll (1987) proposed a theoretical division of etiological factors into pre-event (pre-military), event (military) and post-event (post-military) categories. Pre-trauma factors include personal attributes of the individual such as personality characteristics, pre-existing mental pathology and the tendency to dissociate. Peritraumatic factors include feelings and experiences during the event such as reacting with fear helplessness and horror, dissociation at the time of the event, and the nature and severity of the event itself. Posttraumatic factors might include social support, availability and type of debriefings, as well as other factors. Since few studies are done prospectively and individuals are almost always studied after the fact; it is difficult to assign findings to these categories (i.e., was the individual neurotic before the event or did neuroticism develop as a result of the event).

Commonly, identification of a traumatic event prompts measures to help exposed individuals better cope with the event. However, recent studies challenge the notion that interventions such as Critical Incident Stress Debriefing or counseling reduce the risk of developing the disorder (McNally, Bryant, & Ehlers, 2003). To allow for the development of proactive plans, it would seem prudent to identify persons at risk for development of PTSD as well as events classifiable as traumatic.

This study investigated the possibility of identifying a PTSD diathesis by using a person's score on assessment scales of personality variables and other personal characteristics to predict their scores on PTSD questionnaires. It also attempted to provide an empirical basis for selecting one assessment scale over another.

Post-Traumatic Stress Disorder

Symptoms/Criteria

Four different criteria must be met to achieve a diagnosis of PTSD (DSM-IV-TR, 2000). Criterion A involves personal exposure to the traumatic event and feelings of fear, helplessness or horror as a reaction to that event. The remaining three criteria require variable endorsements for diagnosis: one symptom from the Criterion B list of re-experiencing the trauma, three symptoms from the Criterion C list of avoidance and numbing, and two symptoms from the Criterion D list of increased arousal symptoms. These criteria are considered in detail in the following sections. Since not all items listed in each criterion are required, the individual picture of PTSD can vary from person to person. To be classified as a person with PTSD, the duration of symptoms has to be longer than one month and, as is frequently the case for DSM diagnosis, the collection of symptoms must cause the person distress or impairment in functioning (DSM-IV, TR, 2000). Many people exposed to traumatic events experience PTSD symptoms in the days immediately following the event. However, during the first 30 days post-event, the diagnosis of Acute Stress Disorder is given. If the symptoms persist past 30 days or develop later, the diagnosis then becomes PTSD.

Event exposure/criteria A1. The description of Posttraumatic Stress Disorder in the APA Diagnostic and Statistical Manual of Mental Disorders 4th ed., Text Revision (2000), begins with the requirement that development of characteristic symptoms follows direct personal experience of an *extreme traumatic stressor*. This stressor is defined as being part of, or witness to, an incident which involves actual death or severe injury or a

violent threat to someone's life or personal integrity; an event so severe that the majority

of people would readily agree upon its noxious nature. Criteria also include learning

about one of these events happening to a family member or close associate. Events can

include military combat, sexual assault, physical attack, being kidnapped or taken

hostage, torture, natural or manmade disasters such as earthquakes, hurricanes, tornados,

tsunamis, mine cave-ins or bombings, and being diagnosed with a life-threatening illness.

Witnessed events that can result in PTSD may include observing serious injury or

unnatural death of another or learning of the death of a family member.

Response to event/criteria A2. During the event, an individual experiences

feelings of fear, helplessness or horror. Communicating by email to those trapped above

the burning floors in the World Trade Center towers on 9/11 or seeing an unreachable

neighbor lady begging you to come get the child she is holding, while watching your

house and hers wash away in a fifteen foot wall of water are events that could easily

induce such feelings (Rosenhan & Seligman, 1984).

Re-experiencing the event/criteria B. Re-experiencing can occur through

intrusive thoughts and memories of the event that come unbidden and may be in response

to stimuli that resemble or symbolize the event. For survivors of the Nazi concentration

camps, this might be a person in uniform; for an ex-soldier, the sound of a car back-firing

or firecrackers on the Fourth of July; for a flood victim, the sound of thunder during a

storm or even the prediction of heavy rains. Caught in the Buffalo Creek flood of 1972

that washed away almost an entire community, Wilbur relates:

> I listen to the news, and if there is a storm warning out, why I don't go to bed that
> night. . . . My nerves is a problem. Every time it rains, every time it storms, I just

can't take it. I walk the floor. I get so nervous I break out in a rash (Rosenhan & Seligman, 1984, p. 222).

In rare cases the person may experience "flashbacks," a dissociative state where they relive the event as though it was happening now (DSM-IV, TR, 2000). Often, the person has distressing dreams where the event is re-lived. Again Wilbur states:

> The whole thing happens over to me even in my dreams, when I retire for the night. In my dreams, I run from the water all the time, all the time. The whole thing just happens over and over in my dreams . . . (Rosenhan & Seligman, 1984, p. 222).

Twenty years after the experience, seventy-one percent of Nazi concentration camp survivors still had dreams and nightmares (Rosenhan & Seligman, 1984). Titchnener and Kapp view these dreams as attempts by the individual to "undo the disaster experience . . . by reliving the disaster in dreams . . . but with a less painful outcome" (Titchener & Kapp, 1976, p. 298).

Avoidance and numbing/criteria C. Effort is made to avoid thoughts, feelings or conversations associated with the trauma as well as activities, people or events that are reminders of the trauma (DSM-IV, TR, 2000). National Guard reservists who served in Operation Desert Storm reported 'avoiding thinking about the war' or 'avoiding war reminders' as moderate or severe symptoms at 1 month (22%) and/or 6 months (19%) after their return home (Southwick et al., 1993). Avoidance may also take the form of a specific amnesia for part(s) of the traumatic event.

Victims will exhibit a numbing of emotional responsiveness, feeling neither as happy nor as sad as usual. They may feel detached from events and people around them and "have a sense of a foreshortened future (e.g., not expecting to have a career, marriage, children, or a normal lifespan)" (DSM-IV, TR, 2000, p. 464). This numbing

may include not feeling sadness or grief for the loss of someone close to them as well as not enjoying activities they used to enjoy (e.g., cooking, hobbies, sports, etc.).

Increased arousal/criteria D. Despite this general emotional numbing, Criterion D points to an over-active sympathetic nervous system as evidenced by hypervigilance, an exaggerated startle response and difficulty falling asleep. Bromberg views hypervigilance as "protection against the repetition of early trauma" (2003, p. 560). He states that the individual attaches "central importance to flawlessly reading the signs [that something bad is going to happen and] . . .has devoted a lifetime to vigilantly waiting for the proverbial other shoe to drop" (Bromberg, 2003, p. 560). Worrying, defined as the underlying cognitive process of *anxious apprehension*, has been associated with low cardiac vagal tone (and therefore increased heart rate) and can be seen as "an attempt to prevent or minimize future problems" (Hofman et al., 2005, p. 465). In a study by Southwick, et al. (1993), the four most frequently endorsed PTSD symptoms at 1 month in a group of reservists who had just returned from Desert Storm were increased startle response (31%), being watchful or on guard (20%), sleep disturbances (19%) and irritability (19%). Also included in this increased arousal category are irritability, outbursts of anger and difficulty concentrating.

Cost to Society

PTSD is by definition a chronic disorder. Long term issues and negative life events facing those with PTSD include poor social functioning (evidenced by fights with friends, breaking up with a girlfriend or divorce), problems at work (ranging from temporary leave to taking early retirement or losing their job) and failing college courses. For some, it causes a total reorganization of their life. Individuals with PTSD have a higher incidence of accidental injuries (Mann & Neece, 1990; Z. Solomon & Mikulincer, 1990; Tarnopolsky & Shammi, 1995). Decreased immune function has been found in victims of hurricanes, earthquakes and other natural disasters (Ironson et al., 1997; G. F. Solomon, Segerstrom, Grohr, Kemeny, & Fahey, 1997) and in prisoners of war (Dekaris et al., 1993) with PTSD. A decrease in the activity of natural killer cell lymphocytes was found in those victims of an earthquake who had PTSD symptoms 16 months after the event compared to those victims who did not have PTSD symptoms (Inoue-Sakourai, Maruyama, & Morimoto, 2000). These special white blood cells (also called cytotoxic T-cells) fight cancer and viral infections (Guyton & Hall, 1996). Both their cytotoxic activity and phagocytic functions were significantly depressed in prisoners of war (Dekaris et al., 1993).

From an employment perspective the loss of man-hours, disability payments and cost of psychiatric and medical care increase the burden this disorder places on society as well as on the individual. This is a major issue in helping professions such as law enforcement. Workman's Compensation laws do not always cover mental illness and even when they do, PTSD litigation is not always successful (Mann & Neece, 1990). These authors estimate 12-35% of police officers have various levels of PTSD

symptomology with PTSD being the fifth most common problem referred to police psychologists.

Incidence of PTSD

Lifetime prevalence of PTSD in adults in the United States is 8% (DSM-IV, TR; APA, 2000) and affects 3.5 % of adult Americans or 7.7 million individuals in a given year (National Institute of Mental Health, 2006). Women (10.4%) are twice as likely as men (5.0%) to have PTSD at some point in their lives while 60.7% of men and 51.2% of women reported experiencing at least one traumatic event (National Center for Posttraumatic Stress Disorder, 2006c). However, numbers in the literature can vary widely depending on the operational definition used. Studies reporting higher percentages usually count any negative symptom as a reaction to the trauma whereas those reporting lower numbers adhere to a strict diagnostic definition of PTSD as outlined in the DSM.

One-third of college student victims of acquaintance assault exceeded criteria for 'clinical levels of distress' (Arata & Burkhart, 1996). Studies reviewed in Weiss (Weiss et al., 1995) and Wagner (Wagner, Heinrichs, & Ehlert, 1998) found anywhere from 3% to 32% of those exposed to a traumatic event had PTSD or 'significant symptoms'. Of nurses who work in the emergency department, one study reported 12% of their sample met full criteria for PTSD (Laposa, Alden, & Fullerton, 2003) while another found high levels of anxiety but no clinically significant PTSD (Kerasiotis & Motta, 2004). Interestingly, male and female Israeli university students who are both subject to obligatory military service and typically see combat exposure during that service, were found to have a PTSD diagnosis in a mere 6% of those exposed (Amir & Sol, 1999). A

study at a northeastern college in the United States replicated the 6% finding in their population of students exposed to such stressors as automobile accidents, deaths and harassment (Oswalt & Silberg, 1995).

In response to the World Trade Center disaster, 11% of adults who live in New York City were reported to have PTSD one month post-event (Schlenger et al., 2002). One year later, 11% of New York school children had PTSD (Connely & Dutton, 2002; Lord, 2002). Early reports concerning the population along the southern coast of the United States who experienced hurricanes Katrina and Rita in early fall of 2005 give numbers that appear inflated, partly because they do not adhere to a strict definition of PTSD. At seven weeks post-event, 45.0 to 49.5 percent of adults in the Orleans and Jefferson parishes of New Orleans, Louisiana exhibited levels of 'emotional distress' that indicated a 'potential need for mental health services'. However, a major difference between this event and the New York World Trade Center attack is that the flooding that followed the hurricane contributed to a loss of infrastructure in that city. Most residential areas at seven weeks had no electricity, gas, water, or garbage removal. This was compared to disruption seen in other disasters immediately post-event or only one to two weeks later. In the aftermath of Katrina and Rita, the structural damage, flooding and inhabitability of most of the city, shut it down for many weeks and caused an extended, in some cases permanent, displacement of residents (Norris, Speier, Henderson, Davis, & Purcell, 2006; Voelker, 2006). Additionally, those who stayed in New Orleans may have been some of the emotionally most vulnerable.

Personal Characteristics

If not everyone exposed to a qualifying event develops PTSD, then the question becomes what is distinct or different about the group that does develop the disorder? The initial investigations of PTSD found the logical dose-response relationship between the severity of the event, personal threat to the individual, amount of exposure to the event and the development of PTSD (Carlier et al., 1997; Speed, Engdahl, Schwartz, & Eberly, 1989; Weiss et al., 1995). However, in a study of firefighters, McFarlane found that intensity of exposure; perceived threat and personal losses sustained in the disaster were not predictors of PTSD. Rather, such personal characteristics as introversion, neuroticism and a past history of psychiatric disorder were predictive (McFarlane, 1988). For college victims of acquaintance assault, cognitive appraisals and self-blame were found to be associated with PTSD whereas situational variables including type of assault were not (Arata & Burkhart, 1996). Weiss, Marmar, Metzler, & Ronfeldt (1995) also found perceived control issues to be correlated to the development of symptoms. In fact, in a review by March (as cited in Maercker, Beauducel, & Schutzwohl, 2000) intensity and duration type variables accounted for only 10% of the variance in the development of PTSD.

Introversion. As a personality variable, introversion describes those who prefer solitary activities and do not express warmth and affection easily. Police officers who have trouble expressing their emotions were found to be 2.17 times more vulnerable than others to developing PTSD, and simply scoring high on a scale of introversion increased their risk by 1.5 times (Carlier et al., 1997). Eysenck, a major theorist in the area of introversion, postulated that introverts experience higher levels of cortical arousal (Hans

Jurgen Eysenck, 1967; S. B. G. Eysenck & Eysenck, 1967). Additionally, according to

Eysenck, under conditions of equal stimulation, introverts would be expected to have a

greater physiological response than extroverts to a simple physical stimulus. Supporting

this position, introverts, as determined by the Eysenck Personality Inventory, produced

more saliva in response to lemon juice on the tongue than those who were not introverted

(S. B. G. Eysenck & Eysenck, 1967). Increased physiological responsiveness, as

evidenced by elevated heart rate, has been correlated with PTSD development in patients

with minor injuries who presented to the emergency department after an event that could

be classified as a traumatic (Shalev et al., 1998).

Eysenck's introversion seems very similar to Jerome Kagan's *behavioral

inhibition*. Kagan (Kagan & Moss, 1962; Kagan, Reznick, & Snidman, 1987; Reznick et

al., 1986) identified children who, by the age of two, were both shy to unfamiliar events

(unfamiliar people or toys, separation from their mother, a person acting out complex

behaviors or a talking robot) and who showed high activation of the reticular activating

system, the hypothalamic-pituatary-adrenal (HPA) axis (cortisol) and the autonomic

nervous system (increased heart rate, pupilary dilation, muscle tension, and levels of

norepinephrine) and a decrease in phonemic variation. Kagan characterized the signs of

behavioral inhibition as having "long latencies to interact with, or immediate retreat from,

the unfamiliar people or objects, proximity to mother, and cessation of play or

vocalization" (Kagan et al., 1987, p. 1460). He found this characteristic in 15% of his

sample, the same proportion found in a study of German kindergarten children. As a

personality trait, behavioral inhibition appears to have some continuity, as children

identified at two years of age also exhibited the same behaviors at 5 ½ years of age

(Reznick et al., 1986). It is not completely clear whether Kagan is describing Eysenck's introversion personality type or the 'anxious' personality type, as defined in the combined Introversion/Neuroticism section.

Eysenck theorized that the degree of introversion/extroversion was related to differing thresholds in the reticular activating system (RAS) leading to different levels of cortical activation (Hans Jurgen Eysenck, 1967; S. B. G. Eysenck & Eysenck, 1967). This could account for why the same event or stimulus might be more upsetting to one person than another. As an introvert, a person will experience greater psychological arousal or distress in response to any given event.

Neuroticism. Neuroticism can be defined as the tendency to be fearful and anxious, to worry and to experience negative/anxious emotions, to be less than satisfied with oneself. Eysenck describes the person who scores high on neuroticism as someone who is very emotional and therefore would have high arousal (Hans Jurgen Eysenck, 1967). About 50% of the variance in neuroticism is attributable to genetic variance (Eley & Plomin, 1997). In a group of Australian volunteer firefighters, those who developed PTSD scored significantly higher on neuroticism than those who did not develop PTSD (McFarlane, 1988). Neuroticism in both men and women was also positively correlated with PTSD symptoms in a national study of individuals who experienced one or more traumatic events such as combat, life-threatening accidents or rape (Cox et al., 2004). In individuals scoring high in neuroticism, McCleery & Goodwin (2001) found lowered cortisol secretion, a robust finding in both blood and urine in individuals with PTSD (Boscarino, 1996; McFarlane, Atchison, & Yehuda, 1997; Yehuda, 1997; Yehuda et al., 2005).

According to Eysneck, neurotics have a low threshold and increased excitability in the visceral (limbic or emotional) brain which produces both cortical and autonomic arousal (Hans Jurgen Eysenck, 1967, p. 230-32). In women who experienced a pregnancy loss, neuroticism was correlated with pre-trauma arousal (as determined by questions on sleep habits, etc) and PTSD. However, if this arousal was controlled for, the relationship of neuroticism and PTSD disappeared (Engelhard, van den Hout, & Kindt, 2003).

Introversion and neuroticism/anxiety. Eysenck (1967) believed that in the general population, neuroticism and extroversion are orthogonal dimensions of personality. But for a subpopulation of individuals, those with 'anxiety' (as defined later in this section), he asserts there is a negative correlation between the dimensions; that is those high in neuroticism will also be low in extroversion (i.e., they will be highly introverted) (Hans Jurgen Eysenck, 1967, p. 230 & 233).

Eysenck (Hans Jurgen Eysenck, 1967, pp. 226-252) proposed that *cortical* arousal can be produced in three ways: (1) by incoming sensory stimulation through the Reticular Activating System (RAS), (2) by emotion via activation of the 'visceral brain' and (3) by internal problem-solving behavior of the brain itself. Cortical arousal is sometimes, but not always, accompanied by autonomic arousal. Further, heightened autonomic arousal is certain only in the case of emotion (because autonomic arousal is produced and controlled by parts of the visceral brain inherent in emotion, including the amygdala, hypothalamus, hippocampus and the cingulum). In the case of problem-solving behavior, the person is usually oriented to the task but not emotional (therefore no autonomic arousal). And, in everyday life, 90 to 99 percent of cortical arousal caused via the RAS is

by mild sensory input, with no accompanying emotion, therefore there would be no autonomic arousal (Hans Jurgen Eysenck, 1967, pp. 230-35).

Eysenck (1967) believed that individuals who are introverted have a problem in the 'cortico-reticular loop' involving the RAS. Incoming sensory information heading for cortical processing areas first activates the RAS. The RAS then causes cortical arousal. The cortex can also send stimulatory or inhibitory feedback to the RAS. Introverts seem to react more strongly to a given incoming stimulus due to a decreased threshold and increased excitability in the RAS. Because there are also reciprocal connections between the cortex and the hypothalamus as well as the RAS and the hypothalamus, heightened RAS reaction to stimuli can produce both high cortical arousal and autonomic arousal via excitatory signals sent to the hypothalamus.

For individuals with neuroticism, Eysenck said the problem is in the visceral-RAS loop. He states the visceral brain "interprets experience in terms of *feeling*, rather than in terms of intellectual, symbolized constructs" (Hans Jurgen Eysenck, 1967, pp. 234-235) and that it "speaks in 'organ language' instead of words" (Gellhorn and Loofbourrow as cited in Hans Jurgen Eysenck, 1967). However, we could also think of the visceral brain interpreting experience in terms of behavior (freezing, retreating, attacking). Neurotics have a low threshold and increased excitability in the visceral brain involving limbic structures and producing autonomic arousal. Through connections between the hypothalamus (a visceral brain structure) and the RAS, emotion produces a positive feedback loop of cortical arousal as well as autonomic arousal (Hans Jurgen Eysenck, 1967). In this case, a person may stay in an internal state of cortical and autonomic arousal which could be likened to worry or .anxiety.

Introversion and neuroticism are related through anxiety in the following way. In our society, individuals are not usually exposed to extremely threatening stimuli, nor do they have reason to experience extremely high levels of emotion such as fear for their lives or deep despair. Therefore, high cortical arousal and high emotional (autonomic) arousal are not repeatedly paired for most people. But, for a very small subset of people, *activation and arousal become synonymous* when cortical activation is almost always accompanied by high levels of RAS activation and high levels of autonomic activation (Hans Jurgen Eysenck, 1967). This occurs by one of the two following mechanisms. Either mild stimuli are highly activating (a definition of introversion) or stimuli are extreme (and therefore *traumatic*, like war), thereby producing high RAS, cortical and autonomic arousal. (Recall that for most individuals, low levels of RAS and cortical arousal do not produce emotional arousal). Alternately, the person experiences strong emotion easily (a definition of neuroticism) or over a long period of time (as in continued abuse), thereby living with a state of high autonomic, RAS and cortical arousal. Eysenck (1967) labeled these people highly emotional and anxious, and called the condition anxiety. This state of global high arousal is seen in individuals who are very introverted, very neurotic or who have been exposed to extreme and/or extended stressors (PTSD).

By themselves, neuroticism and extroversion have been shown to be risk factors for PTSD. If PTSD is viewed as an anxiety disorder (which is the classification made in the DSM-IV), we would expect to see the relationship predicted by Eysenck, (i.e., a negative correlation between the two variables) in a higher percentage in the PTSD group.

Locus of control. Whether a person attributes control over life events to himself (internal) or to forces beyond his control (external) defines the concept of locus of control. This construct was part of Rotter's social learning theory (Lefcourt, 1991; Rotter, 1966). One of the variables in this theory is the person's expectancy that their behavior will lead to a particular reinforcement in a specific situation. The degree to which individuals in particular situations held the belief that reinforcement was contingent on their actions varied across individuals. Those with a high expectancy have an internal locus of control while those with a low expectancy have an external locus of control (Rotter, 1966, 1967, 1975). The belief that one has control over the outcome seems to make a person act to be in control. People with an internal locus of control are more likely to use safety belts, have regular dental exams and more often obey doctors orders and persist in required medical treatment (Z. Solomon, Mikulincer, & Avitzur, 1988).

A relationship between an external locus of control and PTSD has been found in several studies. For soldiers with a low level of combat exposure, an external locus of control was related to the development of PTSD (Z. Solomon et al., 1988; Z. Solomon, Mikulincer, & Benbenishty, 1989). For respondents to an urban earthquake freeway collapse, having an external locus of control was associated with higher peritraumatic dissociation scores, a risk factor for PTSD that is discussed in the next section (Marmar, Weiss, Metzler, & Delucchi, 1996). In a study of military personnel, things that truly limit individual's control, like being in lower military ranks (i.e., enlisted service), and factors that could be easily perceived that way, such as lack of promotion and

disciplinary actions, were associated with poor post-war adjustment (Worthington as cited in Foy et al., 1987).

Hanna Levenson split Rotter's *external* category into two categories, *chance* and *powerful others*, adding those to the *internality* variable to create a locus of control measure with three scales (Levenson, 1975; Logsdon, Bourgeois, & Levenson, 1978). Seeking support for division of the external category, she investigated differences in the ability to control heart rate in two different conditions as a function of locus of control. A *learned helplessness* (or failure) condition was created by giving participants false/incorrect feedback about their heart rate. In the success condition, the subject received true/accurate heart rate feedback. Using each individual scale (Internal, Powerful Others and Chance) as a variable, she found that scores on the Chance scale alone predicted controllability of heart rate. In the learned helplessness condition, individuals with a high Chance score did significantly better. In the success condition, those with a low Chance score did better. She states that this difference would have gone undetected with a measure containing only the 'traditional' Internal and External scales. (Logsdon et al., 1978).

Dissociation. Dissociation, disruption in the usually integrated functions of consciousness, memory, and identity or perception, has been linked with not only PTSD but also Acute Stress Disorder, Dissociative Fugue, Dissociative Amnesia and Dissociative Identity Disorder (DID) or *multiple personality*, as well as somatatization and depersonalization disorders (DSM-IV,TR, 2000). Dissociation can include feelings of derealization (feelings that this cannot be real, it must be a fantasy or dream) and depersonalization (it is happening but not to me, a feeling of floating outside of or

hovering above one's body). Some sources include 'stupor' or a state of shock where thoughts are disorganized and sluggish, behavioral responses are slow and the person feels dazed. Numbing may be psychological (knowing your house just burned but not being emotional) or physical (knowing your body was being kicked because it was moving, but not feeling any pain) (Spiegel, 1997). Numbing as a dissociative symptom at the time of the event "suppresses the victim's emotional response to the traumatic event and promotes a feeling of detachment from others" (Classen & Koopman, 1993, p. 3). As a DSM-IV criteria for PTSD, numbing is broadened to include blunted emotional reactions to any and all of life's positive and negative events and continues as a chronic condition. Dissociative amnesia leaves an invisible residue of the event, areas where the slate has been wiped clean. There may be memory gaps where a person does not remember an event or a period of time, and even conflicting behaviors that include not only actions and emotions (such as seductive or aggressive versus shy and retiring) but also opposing clothing choices, food preferences and handedness.

Dissociative states at the time of the event, termed peritraumatic dissociation, have been found to be predictive of later PTSD (Fullerton et al., 2001; Marmar et al., 1994; Tichenor et al., 1996; Weiss et al., 1995). In a study of female military nurses in Vietnam, a strong correlation was found between dissociation at the time of an event and later PTSD. This peritraumatic dissociation was also positively associated with the level of war-zone stress exposure and the tendency to dissociate in general (Tichenor et al., 1996). In emergency workers including police, firefighters, paramedics, emergency medical technicians and highway department personnel responding to a 1989 California freeway collapse during a San Francisco area earthquake, dissociation strongly predicted

PTSD. In this group, peritraumatic dissociation made a unique contribution beyond that

accounted for by scores on a general dissociation scale (Weiss et al., 1995). This unique

contribution of peritraumatic dissociation was also found in male Vietnam veterans

(Marmar et al., 1994). Gender differences were seen in peritraumatic dissociation and

PTSD for persons involved in motor vehicle accidents. Either as driver or passenger,

dissociative symptoms at the time of the accident were of similar frequencies for men and

women. But women who experienced peritraumatic dissociation were at significantly

higher risk for developing PTSD symptoms at one month post accident. Of those with

peritraumatic dissociation, 59.6% of women but only 16.3% of men developed PTSD

(Fullerton et al., 2001). The Peritraumatic Dissociative Experiences Questionnaire

(PDEQ) is frequently used to assess dissociation at the time of the event (Marmar, Weiss,

& Metzler, 1997).

General (or chronic) tendency to dissociate can be measured separately from

peritraumatic dissociation. As a trait, dissociation would be seen as something that

happens in everyday life, not as a response to trauma. These experiences may occur in

the context of a psychiatric disorder or in the general population and may include

amnesia, depersonalization, derealization, absorption and imaginative involvement

(Carlson & Putnam, 1993). Police officers with clinical and subclinical PTSD showed

significantly more chronic dissociative symptoms at 3 months and 12 months post trauma

than police officers without PTSD symptoms (Carlier et al., 1996). Male combat

veterans meeting the criteria for PTSD were found to score much higher than controls

(but not as high as individuals with multiple personality disorder) on the Dissociative

Experiences Scale (Loewenstein & Putnam, 1988), a frequently used scale to measure the general tendency to dissociate (Bernstein & Putnam, 1986).

Dissociation is an interesting phenomenon and one might ask if the trauma causes the tendency to dissociate or is the tendency already there? Two studies support the hypothesis of trauma causing the dissociation. Grabe, Spitzer and Freyberger (1999) examined personality traits divided by Cloninger into "inherited temperament dimensions" such as novelty-seeking or reward dependence and "environmentally determined character dimensions" such as self-directedness and self transcendence. The character dimensions of high self-transcendence and low self-directedness were significant predictors of dissociation. Cloninger's self transcendence has been characterized as spirituality or faith and, according to Kluger, is composed of "the ability to get entirely lost in an experience, . . . a feeling of connectedness to a larger universe and . . . an openness to things not literally provable" (Kluger, 2004, para 4). The authors felt that experience was paramount while genetic factors played a minor roll based on Cloninger's view that these character dimensions were thought to develop during childhood and adolescence in response to experience (Grabe, Spitzer, & Freyberger, 1999). A weakness of this study was the failure to test dissociation in relation to factors other than trauma such as hypnosis or religious experience. In addition, it is necessary to accept Cloninger's division of personality into temperament and character definitions to draw the same conclusions as the authors. However, Carlier, Lamberts, Fouwels and Gersons (1996), also proposed that "PTSD and partial PTSD predict dissociation and not the other way around" (p. 1325). They found that PTSD at 3 months was significantly related to dissociation at 12 months, but the opposite was not true. That is, dissociation at

3 months was not significantly related to PTSD at 12 months. Since PTSD by definition involves experiencing a traumatic event, this could be equated to Cloninger's experience that produces the character dimensions. A major weakness of the Carlier study is that dissociation was examined after, but not during, the event.

Trauma appears to be a strong trigger for the appearance of dissociative symptoms. But other situations can bring forth a dissociative state such as meditation, religious experience, relaxation, sensory deprivation, lack of sleep, hypnosis and something as simple as driving a car (Faith & Ray, 1994). Cholecystokinin tetrapeptide (CCK-4) induces panic attacks with dissociative symptoms in 'average' individuals (Kellner et al., 2002). Having an fMRI scan provoked spontaneous dissociation in at least a third of healthy participants (Michal, Roder, Mayer, Lengler, & Krakow, 2005). These authors list several components of the experience of lying in an MR scanner they believe conducive to producing a dissociative state: the narrow tube of the scanner is like a sensory deprivation tank; subjects are asked to be very still, thereby reducing proprioceptive feedback; ear plugs and monotone acoustic signals contribute to sensory deprivation; subjects are asked to fixate on a crosshair pattern; and overall monotony. In this particular study, dissociation during an fMRI scan was not correlated with a measure of trait dissociation but rather to the attentional effort required on the mental task performed while in the scanner.

High hypnotizability has been cited as a trait of those who frequently dissociate. In one study of college undergraduates, scores on a scale of hypnotic susceptibility were significantly correlated to scores on the Dissociative Experiences Scale (Butler & Bryant, 1997). In another study by Faith and Ray (1994) there was no relationship found

between the two and these authors suggest the distinction between voluntary (willed or permitted, hypnotic) and involuntary pathways to dissociation is important. According to Evans (1991), entering hypnotic states involves four separate factors: passive suggestions; challenge suggestions; imagery; and a fourth factor he labeled 'dissociation' which encompassed amnesia, age regression and post-hypnotic suggestion. Using this multidimensional view, dissociation is seen to be part of but not equal to hypnotizability. Individuals also vary in their ability and degree to which they enter this state of dissociation (Evans, 1991). In a series of studies, he found that hypnotizability, specifically the dissociation dimension, was correlated with a number of variables including the ability to process cognitive information during REM sleep and the physiological ease of falling asleep. He stated this "control of sleep" dimension involved the "ability to fall asleep easily and readily at will, and the tendency to take naps" (Evans, 1991, p. 164). People varied along this dimension, with those high in control of sleep also high in hypnotizability. He also found that these factors were correlated with hospital discharge treatment outcomes in psychiatric patients. In Vietnam veterans, those with high PTSD scores had high hypnotizability whereas those with low PTSD scores did not (Stutman & Bliss, 1985).

Twin and adoption studies can provide strong support for dissociation as an inborn trait. Using teacher and parent ratings, dissociation was compared across age, adopted and biological siblings, identical and same-sex fraternal twins. There were no differences across age (child vs. adolescence), boys were rated higher than girls and adopted children were rated higher than non-adopted children. Importantly, when "sibling class" was compared (adopted vs. non-adopted, identical vs. fraternal),

correlations for teacher reports and parent reports were found in the genetically related groups. That is, correlations were present or higher for biological siblings than for adopted sibling and for identical twins but not fraternal twins. For parents' ratings in twins, the difference was striking: similarity was moderate for fraternal twins at $r = .21$, but substantial for identical twins at $r = .60$ (Becker-Blease et al., 2004).

Dissociation has also been categorized as *pathological* and n*onpathological* (Waller, Putnam, & Carlson, 1996). Although dissociation is frequently treated as a dimension, with some people having a greater ability or tendency to dissociate than others, these authors revisit Janet's view that clinical dissociation is a "discontinuity in awareness that is rarely experienced by healthy individuals" (Janet, 1889, as cited in Waller et al., 1996, p. 300). Nonpathological dissociation involves hypnotizability and intense absorption (e.g., while watching a movie becoming so absorbed that you are unaware of events happening you). Pathological dissociation involves amnesia about dissociative states (having the experience of finding yourself in a place and having no idea how you got there) and derealization/depersonalization (feeling as though you are standing next to yourself, watching yourself do something). Using advanced procedures for identifying taxons (types or natural categories), Waller, Putnam, & Carlson (1996) present support for two different proposals. First, nonpathological dissociation (absorption and imaginative involvement) is a dimensional construct. Second, amnesia for dissociative states and/or depersonalization and derealization are characteristics of a separate type or category of individual. Speculation as to how a pathological dissociator comes to be includes a genetic diathesis and/or an environmental impact of sufficient intensity and particular timing. This study is of particular interest because it presents the

possibility of dissecting out a subcategory of dissociation that may prove to be more predictive of PTSD than general (or 'multifaceted') dissociation. Further, it presents a method for parsing out this group using specific items on the Dissociative Experiences Scale (DES), an assessment instrument already in wide use. The new scale, made up of a subset of questions from the DES, is called the DES-T. Pathological dissociation was expected to correlate with PTSD, with a positive history of psychiatric disorders and with three scales on the SCL-90: GSI (somatization, anxiety on psychoticism). It seems possible that trait and state dissociation could be related to both personal and situational variables and studies that examine dissociation should have a method for teasing apart these two factors.

Dissociation can be seen as a way to cope with overwhelming events that allow no escape. Certainly many events listed as traumatic meet this criterion: being in combat, being held hostage, rape, long term sexual abuse as a child and others. Spiegel (1997) describes a patient who would mentally go to a meadow full of wild flowers whenever being sexually abused by her intoxicated father, concentrating on the beauty of that scene rather than the terror, pain and helplessness of her immediate experience. If dissociation is viewed as an escape mechanism, a way of mentally taking oneself out of a terrible situation, then those who dissociate may show *less* evidence of mental processing at the time of the traumatic event. One physiological marker of the reaction to stress is elevated cortisol, a corticosteroid whose production by the adrenal gland is increased dramatically in response to stress (Guyton & Hall, 1996). Boscarino (1996) reported lower plasma cortisol levels in Vietnam veterans with PTSD than in veterans without PTSD. McFarlane, Atchison, & Yehuda (1997) found that blood cortisol levels two hours after a

traumatic event (hospitalization following an automobile accident) were lowest in those who developed PTSD and highest in those who developed a major depressive disorder. It would seem that those who develop PTSD may not experience the full 'stress physiology' reaction (at least as evidenced by lower cortisol levels) at the time of the event (Yehuda et al., 1998). Through dissociative uncoupling they may be somehow distancing themselves from the event by not fully or consciously processing the event. Spiegel (1997) views this as a positive coping mechanism, "an attempt to maintain mental control just as physical control is lost," a way of "detaching . . . from the immediate experience of terror . . ." (p. 227). Interestingly, women who were pregnant at the time of the World Trade Center disaster and who later developed PTSD from watching the attacks had lower cortisol levels one year after the attacks than those who were present but did not develop PTSD. Lower cortisol levels were found not only in the women, but in their offspring as well. Theories about this correlation include variables of very early parent child attachment, cortisol programming in the womb and shared genetic susceptibility (Yehuda et al., 2005).

Because dissociation is so strongly associated with trauma and with many mental disorders, dissociation can be seen alternately as pathological. The failure to process at the time of the event (a result of dissociation) may cause that event to be brought up again later (perhaps as flashbacks or over-reaction to similar stimuli) in a demand for attention and processing. In other words, if you do not deal with it at the time, you will have to deal with it later. It may be more likely that the brain mechanisms that allow for dissociation also are related to producing flashbacks.

History of psychiatric disorder. Evidence of a concurrent or pre-existing psychiatric condition in those with PTSD has been a robust finding in many studies (Amir & Sol, 1999; Arata & Burkhart, 1996; Grabe et al., 1999; Neal et al., 1994). Axis II personality disorders including Avoidant, Paranoid, Obsessive-Compulsive and Antisocial were found in 79% of combat veterans with PTSD (Bollinger, Riggs, Blake, & Ruzek, 2000). Studies on Vietnam veterans reviewed in Foy, Resnick, Sippprelle & Carroll (1987) found 'pre-exposure/pre-military' variables associated with poor post-war adjustment/PTSD that could be indicative of, or associated with, psychiatric problems. These included poor family stability, drug use, criminal behavior, problematic work history and lower education level. For a group of firefighters responding to bushfires, a personal and/or familial history of psychiatric disorder (as ascertained in an interview) was predictive of PTSD (McFarlane, 1988).

In a small study of women who served in Vietnam, 23% reported subsequent PTSD symptoms and alcohol abuse while 25% reported PTSD symptoms only. The group with both PTSD and alcohol had more severe PTSD symptoms, dissociated more and had a history of more severe and more frequent childhood sexual abuse (Ouimette, Wolfe, & Chrestman, 1996). Davidson, Smith & Kudler (1989) found that 66% of their sample with PTSD had a familial history of pathology, especially alcoholism and drug abuse. The results of a study of male monozygotic and dizygotic twins where both twins in each pair served on active duty in Vietnam found that PTSD, alcohol dependence and drug dependence have both distinct and additive genetic influences. The risk for PTSD was partially due to a 15% genetic contribution common to alcohol dependence and drug dependence and a 20% genetic contribution specific to PTSD (Xian et al., 2000).

Differences in Psychophysiology

A study investigating the heritability of PTSD symptoms in 4042 male twin pairs (55% monozygotic and 45% dizygotic) who had served in Vietnam found that genetic factors accounted for a "substantial" portion of the variance in the expression of these symptoms. In addition to explaining 13% to 30% of variability in re-experiencing symptoms, 30% to 34% of variability in avoidance symptoms and 28% to 32% of the variability in arousal symptoms, genetic similarity also accounted for differences in combat exposure itself (True et al., 1993). Genetic differences point to the possibility of biological differences in structure and functioning of the nervous system. Areas of functioning that have been investigated in relation to anxiety, arousal and PTSD are startle responses, heart rate, skin conductivity and brain wave evoked potentials.

Psychophysiology is the study of changes in bodily functions as a result of cognitive or emotional states. Differences in physiological responsiveness of combat veterans with and without combat-caused PTSD have been found in startle responses, in autonomic responses such as heart rate and galvanic skin response, and in brain evoked potentials or event related potentials. Davis (1997) summarizes a number of body function changes that accompany the emotional state of fear (see Table 1). Theoretically, differences in responsiveness could represent an effect of exposure, an inborn diathesis or some interaction between the two. Several physiological responses will be addressed here. Evoked potentials will be considered in a separate section.

Startle Reflex

The audiogenic startle reflex can be divided into three components: the initial patterned motor response, a secondary more complex automatic behavior and a slowly

evolving autonomic response. The initial simple motor response is stereotyped, consistent, and proceeds in a cephalocaudal direction. The eyeblink component of this response is invariable and not voluntarily inhibitable. The degree of reflexive contraction (usually flexor, but occasionally extensor) varies in amplitude with stimulus intensity, subject excitability and expectedness of the stimulus (Wilkins, Hallett, & Wess, 1986). EEG and sterotaxic work revealed pontogeniculooccipital spikes, usually produced in an awake animal when involved in behaviors important for survival, as a slightly delayed response, and demonstrated the nucleus reticularis pontic caudalis as the site of the reflex. Stimulation of this nucleus sensitized the reflex, while stimulation of the ventral cochlear nucleus produced habituation (Davis, 1997; Wilkins et al., 1986). Abnormal (exaggerated) startle reflexes have been investigated since at least 1929 and in general are found normal in pattern but enhanced by a lower threshold and reduced habituation (Wilkins et al., 1986).

Exaggerated startle is one indicator of hyperarousal, a symptom of PTSD (Guthrie & Bryant, 2005). Compared to veterans without PTSD and to controls, veterans with PTSD had significantly larger magnitude audiogenic startle eyeblink responses as measured by muscle tension below the left eye in the orbicularis oculi. Veterans both with and without PTSD showed a greater response increase in a dark versus lighted condition (Grillon, Morgan III, Davis, & Southwick, 1998).

Electrodermal Activity – EDA

Visible sweating can be an overt response to an anxiety state. However, much more subtle changes can be measured by examining the conductance or resistance of the skin to an electric current. Small, insensible increases in skin moisture or sweat gland

activity will result in an increased flow of current or conductability. This change in conductivity of the skin is alternately called skin conductance (SCR), galvanic skin response (GSR), skin potential response (SPR) when no actual current is used, or electrodermal activity (EDA) as an umbrella term. Presentation of any external stimuli will produce a change in skin conductance, leading to the conclusion that this signals activation in general. Brain areas associated with an increase in EDA include the reticular activating system, the hypothalamus, the amygdala, the premotor cortex and the prefrontal cortex in general. Some of these areas are associated with orienting responses, motor responses and thermoregulation, as well as emotion, affective states and anxiety or fear. Sweat gland activity is under sympathetic nervous system control, the *fight or flight* system that mobilizes the body in response to a threat or an emergency. This lends further support to the affective, anxiety interpretation. The skin response is considered to be only part of an autonomic nervous system response that includes changes in heart rate, blood pressure, and pupil size. SCR has been shown to change with stimulus novelty, surprisingness, intensity, emotional content and significance (Dawson, Schell, & Filion, 2000).

Changes in SCR to fear-relevant stimuli exhibit resistance to extinction; perhaps making this a more sensitive measure of a person's residual responsiveness to threatening stimuli (Hugdahl, 1978; Hugdahl & Ohman, 1977). Further, differences in electrodermal reactivity have a strong genetic component. In a sample of twenty-something year old twins, about 40% of the total variance in SCR amplitude and number of trials to habituation could be attributed to genetics (Lykken, Iacono, Haroian, McGue, & Bouchard, 1988).

Table 1

Autonomic Responses by Brain Stem Area

Brain Structure	Fear Signs & Behaviors
Lateral hypothalamus	Tachycardia, galvanic skin response, paleness, pupil dilation, blood pressure elevation
Dorsal motor nucleus of vagus Nucleus ambiguus	Ulcers, urination, defecation, bradycardia
Ventral tegmental area Locus coeruleus Lateral dorsal tegmental N. Basal forebrain	Behavioral & EEG arousal, increased vigilance, increased attention
N. reticularis pontis caudalis	Increased startle
Central gray	Freezing, conflict test, CER, social interaction, hypoalgesia
Trigeminal, facial motor N.	Facial expressions of fear
Paraventricular N. (Hypothal.)	Corticosteriod release ('stress response')

Note. From Neurobiology of Fear Responses: The Role of the Amygdala, by M. Davis, 1997, *Journal of Neuropsychiatry and Clinical Neuroscience, 9*, p. 385. Copyright 1997 by American Psychiatric Press. Adapted with permission.

A landmark prospective study evaluated fire fighter recruits still in training on measures of startle including eyeblink and skin conductance. After one year of active service, recruits were again tested on several measures, including eye blink and skin conductance. In the group exposed to trauma during this service time (responding to fires, motor vehicle accidents and suicide), pre-trauma skin conductance was a strong predictor of PTSD symptoms on the Impact of Event scale and accounted for 18% of the variance. Interestingly, another 23% of variance in this study was accounted for by higher scores on the Alcohol Use Disorders Identification Test(Guthrie & Bryant, 2005). In two separate studies, Vietnam veterans with PTSD showed lower amplitude

eletrodermal response to neutral stimuli and greater amplitude electrodermal response to target combat stress stimuli (DeRicco, 1995; McNally et al., 1987).

Event-related Potentials/P300

Personal variables linked to the development of PTSD could result from or be associated with alternate brain organization, anatomy or physiology. One central (brain) psychophysiological measure is the event-related potential (ERP). ERPs are that portion of the elecotroencephalogram (EEG) time locked to and resulting from a specific environmental stimulus (Fabiani, Graton, & Coles, 2000). Differences in ERPs have been found between normal controls and individuals with PTSD in numerous studies (Attias, Bleich, Furman, & Zinger, 1996a; Attias, Bleich, & Gilat, 1996; Charles et al., 1995; Lewine et al., 1997; McFarlane, Weber, & Clark, 1993; Metzger et al., 2002; Metzger, Orr, Lasko, Berry, & Pitman, 1997; Metzger, Orr, Lasko, McNally, & Pitman, 1997; Metzger, Orr, Lasko, & Pitman, 1997; Stanford, Vasterling, Mathias, Constans, & Houston, 2001). The origin of the P300 waveform is multifocal but changes in the P300 are associated with conditions like ADHD and impulsivity that theoretically involve decreases in prefrontal cortex (PFC) functioning. This lends support to the relevance of the P300 ERP waveform in the assessment of PFC function. Decreases in the amplitude of this P300 wave form have been found in persons exhibiting impulsivity with an increase in waveform towards *normal* when these individuals were given phenytoin drug treatment (Barratt, Stanford, Felthouse, & Kent, 1997). Several researchers have implicated a decrease in PFC function in PTSD using the following theoretical model. Both Kolb (as cited in McFarlane et al., 1993) and LeDoux (1994, as cited in Armory & Ledoux, 1997) propose that the amygdala may some how become disregulated (perhaps

involving a loss of prefrontal control) in PTSD type disorders. Support for this notion

comes from the attenuated P300 waveform found in individuals with PTSD who seem

not to be able to control intrusive thoughts as well as emotional or physiological

responses to stimuli. This is similar to impulsive individuals who are not able to control

their behavior and who are thought to have a deficit in prefrontal function. Results from

a number of studies have shown a reliable difference in responding between groups with

PTSD and those without PTSD using a simple auditory discrimination task in an odd-ball

paradigm. In the auditory odd-ball task, low probability target tones (high pitched tones)

are interspersed among more frequent non-target (lower pitched) tones and the subject is

required to count or make a response to the infrequent target tones. Participants with

PTSD had a reliably smaller P3 amplitude to target tones in various populations including

victims of a hold-up with no physical consequences (Charles et al., 1995), combat

veterans and a group composed of females who were sexually abused in childhood

(Metzger, Orr, Lasko, Berry et al., 1997), *civilians* with PTSD secondary to automobile

accidents, fire and criminal violence (Galletly, Clark, McFarlane, & Weber, 2001), and a

mixed male & female inpatient group with PTSD of unspecified etiology (Boudarene &

Timsit-Berthier, 1997; McFarlane et al., 1993) .

Diathesis Stress Model

The diathesis/stress model has been applied to many other areas of biology and

psychopathology. A diathesis is a genetic or inborn factor, a trait, structure or physiology

that puts a person at risk for developing a certain disorder. When exposed to certain

specific stressors, this person has a high probability for developing the disorder, higher

than individuals who do not display the risk factors. At present, it may be difficult to

determine whether many of the factors discussed thus far are predisposing agents or results of trauma exposure. However, a strong association between these factors and PTSD has been demonstrated.

Assessment Scales

The following section describes a number of instruments used in the assessment of triggering events, personal risk factors and symptom expression in PTSD. A wide variety of scales are documented in the literature. No consensus has been reached on an exclusive set of factors associated with PTSD. Further, for each factor, multiple scales are available.

Exposure to Traumatic Life Events

Life Stressor Checklist (LSC). The Life-Stressor Checklist (Wolfe, J., Kimerling, R., Brown, P., Chrestman, K., & Levin, K. (1993c) as cited in Wilson & Keane, 1997, p. 200-228) contains 120 questions that assess exposure and reaction to thirty different events from natural disasters to rape and sexual abuse. For ease of scoring in this study, the scale is divided into two parts: a manual section that requires the participants to give their age at the time of the event, and a portion answered on scantron that inquires about current and past feelings through four standard questions repeated for each event. Several classification variables giving different types of information can be obtained from this scale. Standard scoring options (R. Kimerling, personal communication, May 2001) for the LSC include calculating an overall life stressor score *events* and a weighted score for how these events bothered them in the past year *chronic*. A high magnitude stressor score (HMS) is calculated for numbers 1, 2, 3, 8, 10, 11, 12, 13, 17, 18, 19, and

20 through 30. High magnitude stressors meet the following three criteria: the event would generally be considered traumatic per DSM-V standards, the person thought someone could be harmed or killed, and the person experienced fear, helplessness and horror. A low magnitude stressor score (LMS) is calculated for numbers 4, 5, 6, 7, 9, 14, 15 and 16. Low magnitude stressors are not considered traumatic per DSM-V standards (for example being in jail, parents being divorced, being in foster care, being adopted, or being the caregiver of someone with a severe handicap). In addition, adding the high magnitude stress score and the low magnitude stress score can be combined for a total stress score (HRS). An additional *non-standard* variable *horror* is calculated by adding the scores on the question that reflected DSM-IV criteria IB, experiencing fear, helplessness and horror to the event.

PTSD Symptom Scales

Three scales were used to assess PTSD symptomology: the Impact of Event Scale-Revised (IES-R), the Penn Inventory (PI) and the Civilian Mississippi Scale (CMS). These scales have correlated well with PTSD diagnosis obtained by clinician conducted interviews, but have been reported to over-diagnose, resulting in false positives (Creamer & Chaffer, 1995; Engdahl, Eberly, & Blake, 1996).

Impact of Event Scale-Revised (IES-R). The Impact of Event Scale-Revised, published in Chapter 13 of Assessing Psychological Trauma and PTSD (Wilson & Keane, 1997), is a twenty-two item survey with three subscales that give scores for avoidance (2, 3, 7, 8, 9, 12, 13 and 15), intrusion (1, 4, 5, 6, 10, 11, 14) and hyperarousal (16, 17, 18, 19, 20,21,22), plus a total score. The mean of each subscale is obtained. The

original instrument had only two subscales (avoidance and intrusion) when it was

introduced by Horowitz, Wilner and Alvarez (1979) as a measure of "subjective stress."

The instrument was shown to discriminate between patients and non-patients and to

detect change in clinical status over time. Horowitz's original theory proposed that an

individual would cycle through states of thinking about and processing the event

alternating with states of avoidance, thereby dealing with the experience a little at a time.

In a pathological reaction to an event, the responses are not different, they are just of a

greater magnitude (high scores) or prolonged (persisting) or blocked (processing of the

event does not occur) (Zilberg, Weiss, & Horowitz, 1982). The IES-R could be

considered a measure of current intensity of PTSD as it asks how much the person has

been bothered by symptoms in the past seven days.

A third subscale with seven items assessing hyperarousal symptoms was created

and used by Weiss and Marmar for a study of the reaction of emergency personnel

responding to a 1989 urban earthquake in California (Marmar, Weiss, Metzler, Ronfeldt,

& Foreman, 1996; Weiss & Marmar, 1997; Weiss et al., 1995). The addition of this

subscale brought the instrument in line with DSM-III and DSM-IV criteria which

includes all three areas of intrusion, avoidance and hyperarousal. Psychometric

evaluation of this revised scale was done in 1997 (Weiss & Marmar, 1997). Internal

consistency of the subscales was evaluated using Cronbach's alpha on two different

samples at two different times. The range over those four samples was an Intrusion alpha

of .92-.87, an Avoidance alpha of .86-.84, and a Hyperarousal alpha of .90-.79.

Reliability was assessed used test-retest data with correlation coefficients of Intrusion

.57, Avoidance .51 and Hyperarousal .59. The item, *I have trouble falling asleep*, proved

problematic on both the original and revised versions.

    Penn Inventory (PI). The Penn Inventory, created by Melvin Hammarberg,

measures the strength or intensity of PTSD. It has twenty-six items that can be scored 0-

3, with a range from 0-78 for a total score (Hammarberg, 1992; Meichenbaum, 1994).

Hammarberg (1992) found that 90% of patients diagnosed with PTSD were correctly

identified by a Penn score of 35 or greater. Meichenbaum (1994) reported 95% accuracy

for this cut-off score. A score less than 35 correctly identified 89% of those who had not

been diagnosed with a disorder or who had a disorder other than PTSD with a *predictive*

power of 90%, while the *predictive power* of a score greater than 35 was 95% (M.

Hammarberg, in personal communication, March 9, 2006). Because the predictive power

for those without PTSD is slightly less at a cut score of 35, it may be lowered when

attempting to identify the non-PTSD group. The Penn was developed as a self-report

measure from an original pool of 80 items, based on DSM-III criteria for PTSD. It was

normed using four groups: In-patient and 6 months post-treatment Vietnam veteran

groups with PTSD, a Vietnam veteran group without PTSD and a *non-veteran*, non-

PTSD community *control* group. Cronbach's alphas across those groups ranged from .94

to .86 for veteran groups, with .78 for non-veterans. Test-retest reliability ranged from

.90 to .96. There was no significant difference in mean scores between the in-treatment

and post-treatment groups or between the veterans and non-veterans; but the means for

those groups with PTSD were significantly different from the means of those groups

without PTSD (Hammarberg, 1992). Although the National Center for PTSD states on

their web site that the Penn Inventory is available in its entirety in the 1992 article on

psychometric properties, there are no appendices within the delimited pages (National Center for Posttraumatic Stress Disorder, 2006d). Rather the scale must be obtained by contacting the author at the address given both in the article and on the website. It is used here by permission of the author (Hammarberg, personal communication, 2006). Although clinical interviews, performed by trained clinicians, are desirable and relatively accurate, they are time consuming and expensive. Structured interviews designed to be administered by lay persons or even via computer have attempted to overcome part of this difficulty. The Penn Inventory performed better than a version of a lay interview (CIDI), took less time to complete and was equal in diagnostic accuracy to the Mississippi Scale (Creamer & Chaffer, 1995).

Civilian Mississippi Scale (CMS). The Civilian Mississippi Scale used in this study was a 39 item scale that is a second generation adaptation of the 35 item Combat-related Mississippi Scale used to assess PTSD in military personnel (Keane, Caddell, & Taylor, 1988; National Center for Posttraumatic Stress Disorder, 2000, 2006b; Vreven, Gudanowski, King, & King, 1995). Items for the Combat-related Mississippi were developed in accordance with the DSM-III criteria for PTSD by five clinical psychologists experienced with PTSD patients and included frequently observed clinical features seen in these patients. The original 35 item civilian Mississippi scale can be classified into to the following categories: eleven items on reexperiencing and situational avoidance, eleven items on withdrawal and numbing, eight items on arousal and lack of control, and five items on self-persecution (guilt and suicidality) (Norris & Riad, 1997; Vreven et al., 1995). Differences were found between the military and civilian Mississippi using factor analysis. The military scale demonstrated a *higher order* single

PTSD factor that *subsumed* the four individual factors, where the civilian version did not, presenting a more multidimensional profile (Vreven et al., 1995). The 39 item, *revised* version from the NCPTSD contained wording changes for items 2, 3, & 11 by F. Weathers and A. Meron, as well as four new items added to the original 35 (National Center for Posttraumatic Stress Disorder, 2000). Item 2 had the word 'not' removed (however, accompanying directions still listed item #2 in the reverse scored group). Item three had the word 'violent' changed to 'verbally or physically aggressive'. Number 11 changed 'I fall asleep, stay asleep and awaken only when the alarm goes off,' to 'I fall asleep, stay asleep and feel rested when I awaken.' Four additional questions were added to the survey concerning reexperiencing, memory difficulties, hypervigilance and panic attack symptoms. The scale and scoring can be obtained by contacting T. M. Keane at the Boston VA Medical Center / The National Center for PTSD (Keane et al., 1988; National Center for Posttraumatic Stress Disorder, 2000, 2006b; Norris & Riad, 1997) or Fran Norris at Dartmouth (Norris & Perilla, 1996). An item receives a score of 1-5 for a-d answers with the following items scored in reverse order: 2, 6, 11, 17, 19, 22, 24, 27, 30, and 35 and then all items scores are summed. Combat means were: PTSD = 130 (SD = 18), PSYCH = 86 (SD = 26) and Well-adjusted = 76 (SD = 18). A later study reported the mean on the civilian scale as 63 (SD = 13.20) and combat mean was 69.53 (SD = 20.95). However, this veteran sample was a composite that included those with little or no combat exposure.

In a population of combat veterans, the Mississippi Scale for Combat-related PTSD and a fully structured diagnostic interview were the best predictors of clinical diagnosis, doing better than the Impact of Event Scale (Hammarberg, 1992). In the

NVVRS study, the civilian Mississippi had an internal consistency of p = .86 compared to that for the Mississippi Scale for Combat-related PTSD of p = .94 (Norris & Riad, 1997). However, according to Lauterback, the relationship of the civilian Mississippi with measures of PTSD (IES-R, PPTSD-R) was weaker than it's relationship with measures of depression (BDI) and anxiety (STAI-T), suggesting that it may be more of a "general measure of distress" (Lauterbach, Vrana, King, & King, 1997, p. 499). Corrected item-total correlations for the civilian ranged from .10 to .53 with a mean of .39. Items 2 and 11 had particularly low scores in both the civilian and combat versions. The civilian version was found to be most accurate when assessing persons whose PTSD standing was between 1 and 3 standard deviations above the mean (Vreven et al., 1995).

Locus of Control

Two scales were used to assess locus of control, one of the personal variables that has been associated with PTSD. These are Rotter's Internal-External Locus of Control Scale (RIEC) and Levenson's Internality, Powerful Others and Chance Scale (IPC).

Rotter Internal-External Locus of Control (RIEC). The Rotter Internal-External Locus of Control Scale (Rotter, 1966, 1967, 1975) uses a forced choice methodology in 23 question pairs that group an internal statement with an external statement, plus 6 filler questions. The scale has been used extensively in college students(Lefcourt, 1991, p. 420). One point is given for each external statement selected. Scores range from 0 (most internal) to 23 (most external). The one factor reported that accounts for most of the variance is the belief in one's own control (for items worded in the first person) combined with a belief that people have control in general (when items are worded in the

third person). A weakness of this scale is that the internal and external items are not highly correlated with one another. This can be interpreted to mean that it is possible to endorse both alternatives, even though they were supposed to be opposites. The scale is published in Rotter (1966) and in chapter 9 of Measures of Personality and Social Psychological Attitudes (Lefcourt, 1991, pp. 422-425).

Internality, Powerful Others and Chance (IPC). The IPC scale is used to assess locus of control. Hanna Levenson split Rotter's *external* category into two variables; *chance* and *powerful others* and created the IPC scale with sub scales for internal (i), chance (c) and powerful others (p). The scale can be scored as a whole or each subscale can be scored separately (Lefcourt, 1991). Norms for this scale with a student sample include Kuder-Richardson reliabilities of .64 for I, .77 for P and .78 for C; test-retest reliability after one week of .60-.79 and after seven weeks from .66-.73; convergence between P and C scales from .41-.60 and P and C correlations with I between -.23 and .19 (Lefcourt, 1991, p. 426). The scale is published in chapter 9 of Measures of Personality and Social Psychological Attitudes (Lefcourt, 1991, pp. 427-428).

Dissociation

A second personal risk factor linked to the development of PTSD is dissociation. Three different measures were used to measure dissociation. The Peritraumatic Dissociative Experiences Questionnaire (Wilson & Keane, 1997, p. 423-425) assesses dissociation at the time of the event. The Dissociative Experiences Scale (Carlson & Putnam, 1993, pp. 26-27) assesses the general tendency to dissociate. A subset of

specific items on the Dissociative Experiences Scale, which constitute the DES-Taxon, are used to assess pathological dissociation (Waller et al., 1996).

Peritraumatic Dissociative. Experiences Scale (PDEQ). The PDEQ, developed by Marmar, Weiss and Metzler, is a short 10 question self-response questionnaire designed to measure dissociation at the time of the event. Items are assessed as *not true at all* (0) to *extremely true* (4). It is published as Appendix A to chapter 14: The Peritraumatic Dissociative Experiences Questionnaire (Marmar et al., 1997). Responses are summed and divided by the number of items (ten). A suggested cut off score for this average across items is 1.5 with values above that representing clinically meaningful levels of peritraumatic dissociation (Marmar, Weiss, Metzler, & Delucchi, 1996). The first scale, a *rater version* where an interviewer assigns value to each item, performed well in a group of male Vietnam veterans, a group of female Vietnam veterans and a group of emergency personnel responding to a California earthquake. In those groups, high scores were strongly predictive of symptomatic distress and PTSD. This 'rater' version is found in Appendix B of chapter 14 (Marmar et al., 1997). The self-report scale is used here with permission of the author (Marmar, C., personal communication, April 3, 2001).

Dissociative Experiences Scale (DES). The DES was developed from interviews with persons diagnosed as having dissociative disorders by DSM-III criteria, from scales assessing memory loss, and was also reviewed by clinicians and experts in the field of dissociation (Bernstein & Putnam, 1986). The scale was meant to be used on an adult clinical population (18 years or older) and the authors caution that scores from a non-

clinical group will probably cluster in the low range, making it difficult to draw meaningful conclusions from small differences (Carlson & Putnam, 1993). It is currently a twenty-eight item scale where the respondents mark the percentage of time they have experienced a certain type of dissociative episode by circling a percent from 0% to 100%, listed in ten percent increments. This scale is published in its entirety as an Appendix A in Carlson and Putman (1993). The original version required the respondent to make a hash mark along a 100mm line connecting 0% and 100% found below each question. This version is published as an appendix in Bernstein & Putnam (1986) although item #25 is missing and the response lines in the journal copy are not 100mm (Carlson & Putnam, 1993). A total score is obtained by adding the percentage points for all items and dividing by 28 (the number of items). The scale was tested on several different populations including college students, adults, individuals with schizophrenia, PTSD, dissociative identity disorder (DID), anxiety disorder and alcoholics (Bernstein & Putnam, 1986). In a review of several studies (Carlson & Putnam, 1993), test-retest reliability ranged from .79 to .96, internal split-half reliability ranged from .83-.93. One study reported a Cronbach's alpha of 0.95. Higher scores for groups with DSM-III dissociative disorders were taken as evidence of criterion validity. A cut off score of 30 or above to identify PTSD was suggested.

Dissociative Experiences Scale-Taxon (DES-T). Waller, Putnam & Carlson (1996) proposed that 'pathological' dissociation is a qualitatively different subtype that can be identified by an eight question subset of the standard DES to include questions 3, 5, 7, 8, 12, 13, 22 and 27. These eight items were identified using advanced taxometric procedures that included MAMBAC, MAXSLOPE and MAXCOV-HITMX. In their

sample they found that individuals with PTSD scored significantly higher on the DES-T

than normals, but only half as high as individuals with multiple personality disorder (DID

in the DSM-IV). In fact, the typical average individual item score for eight diagnostic

control groups including anxiety, eating disorders, late adolescents and schizophrenia was

zero. The PTSD group scored the highest on items 12 (derealization) and 22 (act

different in different situations) and the lowest on items that reflect amnesia including

item 5 (finding new things among belongings) and item 13 (feeling like their body does

not belong to them). The eight questions included in the taxon scale are published as an

appendix to their article (1996).

Introversion and Neuroticism

Two personality characteristics frequently associated with the development of

PTSD are neuroticism and introversion. One instrument used to assess both factors is the

Eysenck Personality Inventory.

Eysneck Personality Inventory (EPI). Low scores on the extroversion scale of the

Eysneck Personality Inventory (Hans Jurgen Eysenck & Eysenck, 1964) are used to

identify introverts. The Eysneck Personality Inventory is an early version of the Eysneck

Personality Questionnaire (Educational and Industrial Testing Service, 1994). It has 57

items with a choice of a Yes/No answer. There are three scales of *impulsivity*, *sociality*

and *extroversion*. Scores on these scales are combined in such a way as to give an

assessment of Extroversion/Introversion and Neuroticism (emotionality or

stability/instability). The EPI also contains a *lie* scale. The dimensions of extroversion

and neuroticism are said to be independent in this inventory, an improvement from its

precursor, the Maudsley Personality Inventory. The main addition to the EPQ inventory

(not used here) was a new psychoticism variable. The EPI and the EPQ are published by

and can be purchased from EdITS (Educational and Industrial Testing Service, 1994).

Previous Pathology

Previous mental pathology is also a personal risk factor associated with PTSD.

One instrument used to assess for mental pathology is the Symptom Checklist-90R.

Symptom Checklist-90R (SCL-90R). The Symptom Checklist -90R by Leonard R.

Derogatis has nine individual subscales or symptom dimensions that assess the various

mental pathologies of somatization, obsessive-compulsive, interpersonal sensitivity,

depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism

(Derogatis, 1977, 1994). The scoring scheme also produces three global indices that

reflect the level of overall distress: the Global Severity Index (GSI), the Positive

symptom Distress Index (PSDI) and the Positive Symptom Total (PST). One of these,

the GSI, is frequently reported in the literature.

A measure of severity, the Global Severity Index or GSI, is obtained by getting a

grand total for the summed distress scores and the 'additional items' divided by 90.

According to Derogatis (1994) and Degrogatis and Savitz (1999) the GSI represents the

most sensitive single indicator for current level or depth of the disorder. The GSI

combines the number of symptoms reported with the intensity of perceived distress. The

number of symptoms endorsed is given by the PST. The PSDI is obtained by dividing

the grand total by the PST (number of symptoms endorsed). The PSDI reflects the

average level of distress reported for the symptoms that were endorsed. Each item is

assessed on a 5 point scale of distress from 'not at all' (0) to 'extremely' (4). Derogatis (1977) gives a detailed factor analysis of the dimensional scales in which all performed well or fairly well with the exception of the Psychoticism scale (Derogatis & Cleary, 1977). Separate norms exist for males and females and four different groups (psychiatric outpatients, community nonpatients, psychiatric inpatients and community adolescents).

Derogatis (1994) reports Cronbach alphas for the SCL-90R ranging from a low of .77 for psychoticism to a high of .90 for depression. Test-retest coefficients for a one-week time interval on a psychiatric outpatient population ranged from a low of .78 on hostility to a high of .90 on phobic anxiety. The SCL-90R shows good convergent validity with the MMPI (Minnesota Multiphasic Personality Inventory) and the GHQ (General Health Questionnaire) as well as good criterion validity when compared to a structured interview, the PSE (Present State Examination). The global indices on the SCL-90R compared favorably to the global indices on the PSE. On the diagnostic dimension scales, "caseness" represents a cut-off point where scores above it would indicate the respondent was positive for that dimension. The scale is published by Leonard Derogatis and National Computer Systems (Derogatis, 1994) and is printed as Appendix V in the second edition of the scoring manual (Derogatis, 1977) .

Summary

The purpose of this research effort was to develop a line of inquiry into proposed PTSD diathesis. Historically, several different self-report measures of both PTSD and the various risk factors have been used. In this study, multiple scales for the various factors and for PTSD symptoms were administered to the participants. This allowed assessment of the relative performance of the PTSD scales in our population and

convergent validity of the three PTSD scales. Scores on scales measuring personality and other personal variables were evaluated for the ability to explain variance in PTSD scale scores. This will potentially allow future researchers and clinicians to eliminate some scales and to utilize risk factor assessment scales that are highly correlated with a particular PTSD symptom scale; thus decreasing the amount of time necessary for the assessment procedure.

Research Hypotheses

1.   A relatively low percentage of individuals will be found to have significant PTSD symptoms, confirming estimates in the research literature.

2.   Reacting to traumatic events with fear, helplessness, and horror will be more predictive of PTSD than simply exposure to those events.

3.   The personal characteristics of introversion, neuroticism, external locus of control, a general tendency to dissociate, dissociation at the time of the traumatic event, and history of a psychiatric disorder will be predictive of PTSD symptoms.

4.   Levenson's chance external locus of control will make a unique contribution to the variance in PTSD scores.

5.   Neuroticism and extroversion will be negatively correlated.

6.   Pathological dissociators will be distinguished by high DES-T scores. High DES-T scores will show a higher correlation to PTSD, SCL-90R scores and history of psychiatric illness than general or total DES scores.

7.   There will be a high degree of convergent validity among the three PTSD scales.

CHAPTER TWO

Methods and Materials

Participants and Recruitment

College students represent an easily accessible participant pool from a population whose daily environment does not frequently include traumatic events (if we exclude finals and dissertations). However, rates of PTSD in this population reported in the literature suggest that traumatic exposure does occur and that the diathesis/stress model may apply universally (Amir & Sol, 1999; Oswalt & Silberg, 1995). Undergraduate students at a large private university were recruited for participation in this study. Data for a total of 424 participants were collected. Students received extra credit or satisfied research participation requirements for an introductory psychology class by filling out the packet of questionnaires. Information regarding this study was made available to undergraduates taking psychology courses in two ways. Initially, the method for registration was by means of a sign-up sheet with a very brief study description posted on an experiment bulletin board in the hallway near the stairs and elevator on the floor which houses the Psychology and Neuroscience Department. Later, a website facilitated registration and, in some cases, on-line surveys. During collection of the first set of data (2000-2001) the student population had recently been exposed to several traumatic events including a student auto-pedestrian death that elevated campus-wide awareness of risk. The students signed up for a specific date and time and then reported to the assigned classroom in groups to complete the packet of questionnaires. A card documenting

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participation was given to the student and their name was entered on a log sheet turned in at the end of the semester. In general one percentage point of course extra credit was given for each hour of participation. It was anticipated that approximately two hours would be needed to complete the packet. Because this study used human participants, the study went through an internal review and approval process by the institutional IRB.

Research Packet Contents

The research packet consisted of questionnaire/scales to identify the presence of PTSD symptoms and risk factors, to ascertain exposure to traumatic events and to assess reaction to those events. Consent forms and a resource list were also included. Research materials were in the same order in every packet. The scales were selected on dual criteria: first, appropriateness to the assessment of stressful events and risk factors in the population(s), and second, ease of administration and scoring. All of the measures were self-administered scales used to identify the presence of personality variables and PTSD symptoms in participants for research purposes only; there were no diagnoses made and the participants were not informed of their scores. Self-administered questionnaires were critical to the research design because they enabled collection of the large sample necessary for comparison over various groups. They also had the potential to increase disclosure because the subjects were not facing an interviewer while giving their answers. Further, McCaffrey (1989) urged "restraint in applying the assessment strategies and diagnostic decision rules developed on Vietnam veterans with *combat related* PTSD (who typically went through an interview/diagnostic process) to others with *civilian related* PTSD" (p. 74). Therefore self-administered questionnaires were selected over a structured interview and, where available, civilian versions instead of combat versions

were utilized, even though they did not all have the normative data that their combat-related counterparts possessed. All scales were retyped using a single format and the name of the scale was replaced by the term "Trauma survey" and a letter abbreviation particular to that scale (i.e., Trauma survey–IES-R). More detailed information about each scale is located in Chapter 1. The following is a complete list of the research packet contents.

Event(s)

-Life-Stressor Checklist R to assess event exposure

Wolfe, 2001; (Wolfe, J., Kimerling, R., Brown, P., Chrestman, K., &

Levin, K. (1993c) as cited in Wilson & Keane, 1997, p. 200-228)

PTSD Scales

-Civilian Mississippi Scale (CMS) to assess PTSD symptoms

National Center for Posttraumatic Stress Disorder, 2000, 2006a

-Penn Inventory (PI) to assess PTSD symptoms

Published in Chapter 13 of Assessing Psychological Trauma and PTSD

(Wilson & Keane, 1997, p. 339-411), used with permission of author

(Hammarberg, personal communication)

-Impact of Event Scale-Revised (IES-R) to assess PTSD symptoms

Published in Chapter 13 of Assessing Psychological Trauma and PTSD

(Wilson & Keane, 1997, p. 339-411)

Psychiatric Symptoms

-Symptom Checklist-90R (SCL-90R) to assess concurrent or past psychiatric

symptoms

Published by Leonard Derogatis and National Computer Systems

(Derogatis, 1994) and as Appendix V in the second edition of the scoring

manual (Derogatis, 1977)

Personality

-Esyneck Personality Inventory (EPI) to assess introversion and neuroticism

Published by and can be purchased from EdITS (Educational and

Industrial Testing Service, 1994), originally published in 1964 (Hans

Jurgen Eysenck & Eysenck)

-Rotter's RIEC to assess locus of control

Published in Rotter (1966) and in Measures of Personality and Social

Psychological Attitudes (Lefcourt, 1991, pp. 422-425)

-Levenson's IPC to assess locus of control

Published in Measures of Personality and Social Psychological Attitudes

(Lefcourt, 1991, pp. 427-428)

Dissociation

-Dissociative Experiences Scale (DES) to assess the tendency to dissociate

Published in its entirety as Appendix A in Carlson and Putman (1993)

-Peritraumatic Dissociative Experiences Questionnaire (PDEQ) for dissociation at

the time of the event

Found in Appendix B of Chapter 14 (Marmar et al., 1997), used here with

permission of the author (Marmar, C., personal communication)

Others

List of on-site and community resources

Consent form

Debriefing

Students were informed at the beginning of the session that answering some of the

questions in the packet might bring up uncomfortable thoughts and feelings and if they

desired help with those thoughts or feelings, they should contact the university

counseling center. A small piece of paper in the packet with the phone number of the

counseling center was pointed out to each participant with the instructions to put the

paper in a safe place (purse, wallet, notebook) for later use. Attention was also directed

to another sheet in the packet listing off campus community resources known to treat

PTSD.

Scoring the Scales

Scales were scored according to each scale's individual directions, with any

deviations noted under the description of each scale or in the results section. Some

subscales and scoring schemes used for the Life Stressor Checklist (LSC) deviate from

the suggested scoring method, several cut-scores for the CMS were considered, and both

adolescent and non-patient adult norms for the GSI score on the SCL-90R were assessed.

Some scales were answered on Scantron® forms and were scanned and loaded into an

Excel® spreadsheet. Other questionnaire answers were entered into spreadsheets by

hand. A strict conservative definition of PTSD was used to classify only those who

scored above the established cut-offs for inclusion in the PTSD positive group.

Data Analysis

Data were loaded into SPSS for Windows, version 13.0 (SPSS, 2004) for scoring,

analysis, and to obtain correlations and regressions to elucidate the relationships among

the PSTD scales and the predictive variables. Correlations were run on the three PTSD

scales and all of the risk factor variables. A special set of correlations were done using

the two Eysenck variables of neuroticism and extraversion and a new variable called

NEeysenck. A linear regression analysis for each PTSD scale assessed the unique

predictive ability of the personal variables for each scale: Life Stressor Checklist, the GSI

of the SCL-90R, the extroversion and neuroticism scores on the Eysneck, the PDEQ,

DES, the Rotter Locus of Control and Levenson's IPC. Additional linear regressions

were done on the PDEQ to assess the factors that contributed to dissociation at the time

of the event.

CHAPTER THREE

Results

Participant Demographics

Data were collected at different time points from groups of undergraduates in an

introductory psychology class at a large private university: 2000-2001, $N = 149$ (35%);

2002, $N = 12$ (3%); 2006, $N = 241$ (57%) and from one group of practicing nurses at a

local hospital (2004-2005, $N = 22$, 5%) for a total of 424 participants. In the 2006 group,

69.5% (166) were female and 30.5% (73) were male. Gender was not asked in the early

packets but assigned where possible based on names on the consent form. Combined, the

known and estimated groups had 76.1% (305) females and 23.9% (96) males. For 23

participants, gender was unassigned. The age range was truncated in the largest

undergraduate group (2006, $N = 241$) where age was asked in the packet. The mode and

the mean were 19 years of age (44.1%) with 99.6% of subjects falling between 18 and 24

years of age, one subject was 49 years of age.

PTSD Scales

In this study, three scales were used to measure PTSD symptoms. They included

the Penn Inventory (PI), the Impact of Event Scale-Revised (IES-R) and the Civilian

Mississippi Scale (CMS). In addition, a combination variable was created that included

anyone identified as having a high level of PTSD symptoms by any of the three scales.

This variable was called PTSDANY. The scale selected for measurement impacted the

results.

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Frequency of PTSD

The number of persons identified as having a high level of PTSD symptoms was different for each of the three scales and for the PTSDANY combination variable. The Civilian Mississippi Scale (CMS) was the most conservative. Using the cut-off of 107 as suggested by Keane, Caddell and Taylor (1988), Meichenbaum (1994) and the National Center for PTSD (National Center for Posttraumatic Stress Disorder, 2006a), 4.4% (18 of 410) of the sample was identified as having high PTSD symptomology. The combination variable PTSDANY (being classified as having high symptoms by any of the 3 PTSD scales) was the most inclusive at 16.3% (64 of 393 participants). The Impact of Event Scale-Revised (IES-R) was the highest of the three individual scales at 10.8% (44 of 409) using a cut-off of 5, followed by the PENN Inventory (PI) at 8.3% using a cut-off of 35 (Hammarberg, 1992; Meichenbaum, 1994; Norris & Riad, 1997).

Using various cut-offs identified in the literature for the different versions of the Mississippi Scale, the frequency of those with high PTSD symptom levels ranged from 4.4% (18) to 17.7% (73) as shown in Table 2.

Individuals Identified by Scale

Persons scoring high (above cut-off) on one scale may not have scored above cut-off on the other two scales. There was some overlap, but there was also a subset of identified individuals, unique to each scale. Only two people were identified by the CMS who were not identified on either the IES-R or the PI. The PI found 11 people who were not identified by the IES-R or the CMS and the IES-R found 21 people not identified by the PI or CMS. All three scales agreed on a PTSD designation for only nine subjects, 14% of the 64 who scored positive on any one scale. The percentage found here for those

identified by one scale only was very similar to those shown in the original frequency

calculation (see Table 3).

Table 2

Civilian Mississippi Scale
Cut-score Influence on Identification of PTSD Symptoms At or Above Cut-off

Cut-off	*N*	Frequency	Percentage
107	412	18	4.4
100	412	33	8.0
91	412	64	15.5
89	412	73	17.7

Table 3

Cross-Tabs of Scales and PTSD Symptoms At or Above Cut-off

Scales	*N*	Frequency	Percentage
IES or PI or CMS	393	64	16.3
IES + PI + CMS	384	9	2.3
PTSDAll/PTSDANY	64	9	14.0
CMS only	384	17	4.4
CMS / not IES or PI	384	2	0.5
PI only	384	29	7.6
PI / not IES or CMS	384	11	2.8
IES only	384	39	10.2
IES / not PI or CMS	384	21	5.5

Interscale Correlations

Pearson r correlations between the scales are moderate to high and are all statistically reliable at $p = .000$. The correlation between the PI and the CMS is $r = .768$, between the IES-R and CMS is $r = .674$, and between the IES-R and PI is $r = .604$.

Reliability

Good internal consistency (all items on the scales contributing to the measurement of a single construct) was evidenced by high Cronbach's alpha scores, ranging from .886 for the CMS, .868 for the PI and .937 for the IES-R. Lauterbach, Vrana, King and King (1997) found a coefficient alpha for the total CMS questionnaire of .89 (using college students), which is essentially identical to the alpha in the present study. Question #2 on the CMS was the only question in all of the scales that showed a negative item-total correlation (see Table 4).

Eysenck's Neuroticism and Extraversion

For all three PTSD scale scores, neuroticism explains from 23% (IES-R) to 42.4% (CMS) of the variance (variance $= r^2$), while extraversion accounts for approximately 3% of variance in PI and CMS scores and the correlation with the IES-R is practically nonexistent and not statistically reliable. The lowest correlation of the three on either variable is with the IES-R as shown in Table 5. For the dissociative scales neuroticism explains, from 12% (PDEQ) to 15% (DES). However, extroversion does not have a meaningful relationship with either scale.

Differences in NE Correlations

Eysenck proposed that for a subpopulation of individuals he labeled *anxious*, there would be a negative correlation between neuroticism and extraversion (NE). Those high in neuroticism would also be low in extroversion (i.e., they would be highly introverted). The results of the present study showed a small but statistically reliable negative correlation between neuroticism and extraversion ($r = -.243$, $p = .000$, $N = 388$) across all subjects.

Table 4

Internal Reliability of PTSD Scales Assessed Using Cronbach's Alpha

Scale	N	Cronbach's Alpha	Number of Items
IES-intrusion subscale	267	.834	7
IES-avoidance subscale	270	.832	8
IES-hyperarousal subscale	271	.819	7
IES-all items	262*	.937	22
IES-subscale total to total	409	.992	3
PI	408	.868	26
CMS	410	.886	39
CMS Question #2	410	-.416**	1

Note. *N for IES scale is smaller than the IES subscale and total scores because, for the first data set, the scale was scored in a separate Excel spread sheet and only subscale and total values are in the SPSS spreadsheet.
Note. **Corrected item total correlation

Table 5

Correlation of Neuroticism and Extraversion with the PTSD Scales

Trait	r	p	t
		IES-R	
Neuroticism	.487	.000	10.775
Extraversion	.080	.118	-1.569
		PI	
Neuroticism	.607	.000	14.741
Extraversion	.189	.000	-3.744
		CMS	
Neuroticism	.652	.000	16.739
Extraversion	.191	.000	-3.807

NE and PTSD. The NE correlation increased slightly in the subpopulation of those above cut off on the PTSD scales. On two of the four measures, PTSDANY ($r = -.267$, $N = 56$) and the PI ($r = -.386$, $N = 31$), the increases reached an acceptable level of statistical reliability ($p \leq .05$).

The NE correlations for individuals below cut off on the PTSD measures were statistically reliable and in the expected negative direction, but they were considerably smaller than those in the PTSD groups and smaller than the total sample correlation (see Table 6).

To confirm this trend for a higher neuroticism/extraversion correlation in the group with PTSD, NE correlation comparisons were made for each scale and for the IES-R subscales by creating a new variable called NEeysenck. A subject received a 1 (or was positive) for this trait if they were in the upper left quadrant of the distribution of the NE

correlation, i.e., they were both high in neuroticism and low in extraversion. The cut-off

for this variable was the upper third or 33%. The three scales retained their original

rankings obtained with the initial method of analysis (CMS, PI, IES-R). Of the three

IES-R subscales, hyperarousal is the one with the highest correlation to NEeysenck as

shown in Table 7.

Table 6

Correlation Between Neuroticism and Extroversion for Those Below Cut-off

Scale	r	p	N
PTSDANY	-.189	.001	303
PI	-.211	.000	344
IES	-.220	.000	335
CMS	-.204	.000	306

Table 7

Correlation Between NEeysenck and PTSD Scales and IES Subscales

Scale	r	p	N
IES total score	.204	.000	378
IES avoid	.201	.000	388
IES intrusion	.148	.004	383
IES hyperarousal	.244	.000	389
PI	.352	.000	377
CMS	.366	.000	383

NE and dissociation. Dissociation at the time of the event is measured by the Peritramatic Dissociative Event Questionnaire (PDEQ), while the Dissociative Events Scale (DES) measures the general tendency to dissociate. Those individuals who score above cut off on the PDEQ show a negative NE correlation ($r = -.349$, $p = .009$, $N = 55$).whereas there is no meaningful relationship for those above cut off on the DES. Those who do not score high in the tendency to dissociate, as measured by the DES, have a statistically reliable NE correlation ($N = 313$, $r = -.279$, $p = .000$).

NE and Symptom Checklist-90R. The global severity index (GSI), the average response per item across the entire scale, is the commonly used score from the Symptom Checklist-90R. The NE correlation for those above cut-off criteria on the GSI (using the adult norm group) was small but statistically reliable ($r = -.352$, $p = .000$, $N = 104$). For the group below cut-off on this scale the correlation dropped to -.119 and did not reach an acceptable level of statistical reliability ($p = .058$, $N = 255$). The positive symptom total (PST) is the number of symptoms endorsed. Difference in NE correlation between high and low groups here was not remarkable ($r = -.299$, $p = .002$, $N = 101$, and $r = -.203$, $p = .001$, $N = 266$ respectably). The positive symptom distress index (PSDI) is the sum of scores on all responses divided by the number of items endorsed. The NE correlation for the group above cut-off on the PSDI ($r = -.388$, $p = .003$, $N = 55$) was considerably higher than the NE correlation in the group below cut-off ($r = -.174$, $p = .002$, $N = 306$).

Traumatic Events: Life Stressor Checklist, Revised

The Life Stressor Checklist-Revised (LSC-R) has questions about 28 separate events and two open ended questions for events not included in the list. Both a

traditional and a non-traditional method of analysis were used to evaluate scores on this instrument.

Non-Traditional Scoring

The researcher was curious to know which events were experienced the most and which events were most stressful for this group. Therefore an alternate scoring method was devised. For each of the 28 individual events listed in the scale, frequencies were run and the following scores were calculated: event horror score, event acute score, and an event chronic score

Frequency of events. The two most commonly endorsed events were expected (62%) and unexpected (45%) death of someone close to you, followed by seeing a serious accident (36%). Approximately 25% of the sample had been sexually harassed at school or work, seen family violence before age 16, been in a serious accident, or had parents who divorced while they were living with them. Some of the least common events centered around marriage and children including separation from their child (0.5%), having a child with a severe handicap (0.7%), being divorced or separated (3.1%) and having an abortion or miscarriage (4.4%). Twenty-two percent reported having parents who separated or divorced while they were living with them. Events endorsed rarely included being physically neglected (1.2%), being in foster care or put up for adoption (1.4%) and having spent time in jail (2.2%), although 20.8% reported having a close family member in jail.

Only 4.6% of the total sample (19 of 414) reported having none of the experiences in the list, while 3.9% (16 of 414) reported no traumatic events at all (even in

the open-ended questions), which means 96% of the sample had been exposed to at least one event that could be considered traumatic. On average, each participant reported experiencing 4 or 5 traumatic events.

Event horror score. Endorsement of the item that asked 'did you experience intense helplessness, fear, or horror' was summed across subjects for each event. The event that caused horror the most frequently when it occurred was having a baby or child with a severe mental or physical handicap. While this item was endorsed by only three people in the study, it was horrifying for those individuals. One of these subjects was in the college group; the other two were in the nurses group. The event ranked second by the event horror score was forced sexual touching after age 16 with a threat of harm if noncompliant. This was the number one event ranked by the *event acute score* detailed in the following section. This consistently ranked higher than unwanted sexual touching before age 16. Likewise, unwanted sex after age 16 ranked higher on all three measures than unwanted sex before age 16 (see Table 8 for complete list of scores on all questions).

Event acute score. The event acute score summed the responses for the following three items: 'believing that you or someone else could be killed or seriously harmed,' 'feelings of intense helplessness, fear, or horror,' and a rating of 'how upsetting' the event was at the time. The number one event identified by the event acute score**,** as stated above, was forced sexual touching after age 16. The next seven events that caused high acute stress were physical abuse or attack by someone you knew after age 16, divorce or separation, having a serious mental or physical illness, the sudden unexpected

death of someone close to you, having a serious accident, having an abortion or miscarriage and seeing family violence before age 16 (see Table 8).

Event chronic score. The event chronic score summed the responses for the item 'how much has it affected your life in the past year' across subjects for each event. The fact that it still bothers you now meets the criteria for PTSD (e.g., it is chronic). Forced sexual touching after the age of 16 was ranked third on the list, with being placed in foster care or up for adoption and having an abortion or miscarriage ranked first and second. Being emotionally abused or neglected was fourth (see Table 8).

Response type. A response type score was calculated for each participant by dividing their chronic score by the number of events they experienced (chronic/events). This response type was then correlated with the three PTSD scales. The IES-R was the most sensitive to response type ($r = .400$), followed by the CMS ($r = .270$), and PI ($r = .265$). All were statistically reliable at $p = .000$.

While the non-traditional analysis method is not standard scoring for this scale, it yielded additional valuable information as to the prevalence of specific events among this population and the extent to which each event impacted the individuals. Questions #29 and #30 were not included in this ranking as many different events were represented by positive endorsements on those items.

Table 8

LSC Event Endorsement Frequencies and Event Horror Scores.

Q.#	Event	freq.	%	Horror score	Acute score	Chronic score
1	Been in disaster (hurricane, tornado, fire)	78	18.8	0.62	3.04	0.26
2	Seen serious accident (mva, etc.)	149	36.0	0.72	4.03	0.76
3	Had serious accident (mva, job-related)	98	23.7	0.78	4.28	1.15
4	Jail - close family member	86	20.8	0.42	2.88	1.05
5	You in jail	9	2.2	0.44	3.00	1.22
6	You in foster care /up for adoption	6	1.4	0.33	2.00	2.50
7	Parental divorce	91	22.0	0.45	2.79	1.68
8	You divorced or separated	13	3.1	0.85	4.46	1.31
9	Serious money problem for you	34	8.2	0.65	3.26	1.65
10	You have had serious illness (physical or mental)	71	17.1	0.75	4.38	1.75
11	You were emotionally abused or neglected	71	17.1	0.82	4.18	1.77
12	You were physically neglected	5	1.2	0.40	2.60	1.40
13	You had abortion or miscarriage	18	4.4	0.72	4.28	2.17
14	Separated from your child against your will	2	0.5	0.50	4.00	1.00
15	Your baby or child has severe handicap (mental or physical)	3	0.7	1.00	4.00	1.67
16	You were caregiver of someone close to you w/severe physical/ mental handicap	57	13.8	0.49	3.16	1.65
17	Sudden or unexpected death of someone close to you	189	45.8	0.73	4.36	1.67
18	Expected death of someone close to you	257	62.2	0.45	3.54	1.23
19	See family violence before age 16	102	24.8	0.76	4.24	1.01
20	View robbery, mugging or attack	50	12.1	0.60	3.62	0.52
21	You were robbed, mugged or physically attacked	31	7.5	0.65	3.94	0.84
22	Physically abused/attacked by someone you knew before age 16 (hit/slapped/beat)	49	11.9	0.73	3.98	0.94
23	Physically abused/attacked by someone you knew after age 16	28	6.8	0.75	4.57	1.29
24	Sexual harassment - jokes, demands for sexual favors -at work or school	115	27.8	0.17	2.07	0.78
25	Forced sexual touching before age 16, threat of harm if noncompliant	44	10.7	0.68	3.80	1.61
26	Forced sexual touching after age 16, threat of harm if noncompliant	28	6.8	0.89	4.57	2.04
27	Unwanted sex before age 16 (oral, anal, genital), threat of harm if noncompliant	18	4.4	0.67	4.00	1.72
28	Unwanted sex after age 16, threat of harm if noncompliant	30	7.3	0.70	4.10	1.97
29	Any other events happened to you, not mentioned above	40	9.7	0.85	4.85	2.28
30	Events mentioned above, happened to person close to you, upset you	125	30.3	0.66	3.77	1.28

Traditional Scoring

Standard scoring for the LSC included calculating an overall life stressor score *events*, a weighted score for how the event(s) bothered them in the past year *chronic*, a high magnitude stressor score (HMS) and a low magnitude stressor score (LMS). In addition, adding the high magnitude stress score and the low magnitude stress score were combined for a total stress score (HRS). An additional *non-standard* variable *horror* reflected DSM-IV criteria IB, experiencing fear, helplessness and horror to the event.

The chronic score has the highest correlation for all three scales. The low magnitude stressors had the lowest correlation with the PTSD scales. The horror variable showed a slightly stronger correlation than HMS or LMS, or the combination variable HRS. LSC score correlation coefficients were the highest for the IES-R indicating it is the most sensitive of the three to constructs measured by this instrument as shown in Table 9.

Table 9

Correlation of LSC Subscale Score to PTSD Scale Scores

LSC Scores	IES-R	PI	CMS	PTSDANY
Events	.328	.290	.296	.248
Horror	.375	.359	.357	.297
Chronic	.496	.362	.422	.394
HMS	.329	.322	.313	.328
LMS	.196	.171	.173	.161
HRS	.338	.315	.316	.327

Note. All correlations *p* = .000.

Psychiatric Symptoms: Symptom Checklist-90R

The Symptom Checklist-90R (SCL-90R) is sensitive to the presence of mental disorders. It yields nine subscales and three global indices.

Global Indices

All indices of the SCL-90R correlate with the three PTSD scales and have Pearson correlation coefficients ranging between .496 and .699. The Global Severity Index (GSI) has the highest correlation of the three. All three indices correlate most highly with the CMS, so it would seem the CMS is most sensitive to psychiatric disorders as illustrated in Table 10.

Table 10

Correlation Between SCL-90R Global Indices Scores and PTSD Scales

	IES-R		PI		CMS	
Global Index	*r*	*N*	*r*	*N*	*r*	*N*
GSI	.599	396	.659	395	.699	396
PST	.552	403	.584	402	.640	403
PSDI	.496	396	.544	395	.546	396

Note. All correlations *p* = .000.

The IES-R has three subscales: avoidance, intrusion and hyperarousal. Across these three subscales, every dimension scale score in the SCL-90R (somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, etc.) has its highest correlation with the hyperarousal subscale (see Table 11).

Table 11

IES-R Subscales and SCL-90R Symptom Dimensions

IES-R Subscales	r	N	r	N	r	N
	Somatization		Obsessive Compulsive		Interpersonal Sensitivity	
Avoidance	.348	405	.397	408	.477	408
Intrusion	.330	401	.440	404	.482	404
Hyper-arousal	.414	406	.451	409	.499	409
	Depression		Anxiety		Hostility	
Avoidance	.479	408	.472	408	.405	408
Intrusion	.505	404	.467	404	.409	404
Hyper-arousal	.534	409	.511	409	.436	409
	Phobic Anxiety		Paranoid Ideation		Psychoticism	
Avoidance	.291	408	.440	408	.455	412
Intrusion	.296	404	.453	404	.457	408
Hyper-arousal	.327	409	.487	409	.502	413

Note. All correlations *p* = .000.

Norm Groups for Scoring

The number and frequency of individuals identified with PTSD symptoms are very different depending upon the norm group selected. For example using the GSI, the adult norm group identified 29% as reaching cut-off for significant psychopathology, a much higher number than when using the adolescent norm group where only 2.7%

reached cut-off. Differences in norm groups for the PST and PSDI showed similar

results (see Table 12).

Table 12

Individuals Above Cut off by Norm Group

	Adolescent Norm Group		Adult Norm Group	
Global Index	Frequency	Percentage	Frequency	Percentage
GSI	10	2.7	114	29.2
PST	8	2.1	112	28.1
PSDI	19	5.1	59	15.1

For the people who are above cut-off on the GSI as determined by adult norms,

the correlation between introversion (low extraversion) and neuroticism was statistically

reliable ($r = -.352$, $p = .000$, $N = 104$). However, when using the adolescent norm group

the correlation between introversion (low extraversion) and neuroticism was not

statistically reliable ($r = -.464$, $p = .117$, $N = 10$).

Dissociation: DES, PDEQ and DES-Taxon

Frequency of High Dissociators

In this study 14.5% (58 out of 400) of the subjects scored above cut-off on the

PDEQ, the scale for peritraumatic dissociation. Only 6.2% (26 out of 420) scored above

cut-off on the DES, the scale for general tendency to dissociate.

Interscale Comparisons

Only 11 individuals were identified as high dissociators by both dissociation

scales. This was 15.5% of those 71 identified as high dissociators by either scale. This

analysis, with an *N* of 396, found 58 (or 14.6%) over cut-off score on the PDEQ and 24

(or 6%) over cut-off score on the PDEQ. Correlation between the PDEQ and the DES was fairly low but statistically reliable ($r = .368$, $p = .000$, $N = 396$).

The DES-Taxon is comprised of a subset of 8 questions from the DES. The correlation between the DES-Taxon and the PDEQ was almost identical to that of the PDEQ and the DES ($r = .367$, $p = .000$, $N= 396$). However, DES-Taxon had poorer internal reliability than the other two dissociation scales and explained less variance on the PTSD scales.

Reliabilities of the DES-Taxon, DES and PDEQ

The DES-Taxon performed the poorest with a Cronbach's alpha of .712 ($N = 417$, # of items = 8). The PDEQ was a respectable .883 ($N = 400$, # of items = 10). The DES had excellent internal reliability with a Cronbach's alpha of .907 ($N = 415$, # items = 28).

Dissociation and the PTSD Scales

The PDEQ had higher correlations than the DES and the DES-Taxon for all three PTSD scales. The CMS was the most sensitive to the DES (i.e., tendency to dissociate) as shown in Table 13.

Peritraumatic Dissociation and the Other Risk Factors

The highest correlations with the other PTSD risk factors are between the PDEQ and current psychiatric symptoms (GSI, $r = .411$, $p = 000$, $N = 386$), the tendency to dissociate (DES, $r = .368$, $p = 000$, $N = 396$), the personality characteristic of neuroticism (neuroticism, $r = .348$, $p = 000$, $N = 370$) and the experience of fear, helplessness and horror during the event (horror, $r = .341$, $p = 000$, $N = 390$).

Table 13

Dissociation and PTSD Scale Correlations

Dissociation Scale	*r*	*F*	*p*	*t*
		IES-R		
DES	.348	55.417	.000	7.444
PDEQ	.498	126.779	.000	11.260
DES-T	.287	33.680	.000	5.803
		PI		
DES	.393	73.449	.000	8.570
PDEQ	.479	114.170	.000	10.685
DES-T	.330	49.010	.000	7.001
		CMS		
DES	.463	110.416	.000	10.508
PDEQ	.491	122.942	.000	11.088
DES-T	.396	75.131	.000	8.668

Note. *df* = 1 for entire table

Horror accounted for the most unique variance in peritraumatic dissociation (β = .257, *t* = 5.131, *p* = 000), followed by the tendency to dissociate (DES, β = .166, *t* = 3.053, *p* = 002) and the presence of symptoms of a psychiatric disorder (GSI, β = .187, *t* = 2.915, *p* = 004) as determined using a regression analysis of six factors that together gave an *R* = .523 (adjusted R^2 = .260), an *F* of 20.666, *df* = 6, *p* = .000. The other three factors were all lower and did not reach an acceptable level of statistical significance: neuroticism, extraversion and locus of control. Using only the top four factors from the previous model, the results were essentially identical as shown in Table 14.

Table 14

PDEQ Four Factor Regression

Scale	β	t	p
Horror	.250	5.073	.000
DES	.192	3.640	.000
GSI	.182	2.895	.004
Neuroticism	.092	1.518	.130

Note. $R = .515$, $F = 30.818$

A large percentage of the study sample did not exhibit significant psychopathology, therefore the regression was run again without the GSI. When the model was run with only horror, DES and neuroticism the rank order stayed the same, but neuroticism became a statistically reliable factor as shown in Table 15.

Table 15

PDEQ Three Factor Regression, Without GSI

Scale	β	t	p
Horror	.265	5.440	.000
DES	.243	4.839	.000
Neuroticism	.180	3.452	.001

Note. $R = .496$, $F = 38.311$

To predict peritraumatic dissociation in individuals who have not yet experienced a traumatic event a regression was run without horror, both with and without the GSI. With psychopathology in the model, the tendency to dissociate (DES) was equally as important as the GSI in predicting dissociation at the time of an event, whereas the importance neuroticism played was greatly reduced (see Table 16).

Table 16

PDEQ Three Factor Regression, Without Horror

Scale	β	t	p
GSI	.227	3.509	.001
DES	.214	3.940	.000
Neuroticism	.123	1.989	.001

Note. $R = .462$, $F = 31.784$

Finally, when just the tendency to dissociate and neuroticism were entered into the regression equation, the amount of variance explained dropped by only a slight amount, but neuroticism gained importance as shown in Table 17.

Table 17

PDEQ Two Factor Regression

Scale	β	t	p
DES	.263	5.079	.000
Neuroticism	.242	4.678	.000

Note. $R = .423$, $F = 39.474$

Locus of Control: RIEC and IPC

Having an internal locus of control has a small protective relationship with PTSD as shown by the negative correlations of the PI and CMS PTSD scales with Levenson's 'i' (internal) and the fact that Rotter's RIEC score (high is external) is positively correlated with PTSD (see Table 18, 19, and 20). The chance score of Levenson's scale has a reliable positive correlation with the PTSD scales and a robust positive correlation with the Rotter score as shown in Table 21.

Table 18

Correlations of the Locus of Control Scales and IES-R

Scale	r	p	N
RIEC (Rotter)	.201	.000	395
Internal (Levenson)	-.064	.201	398
Powerful others (Levenson)	-.037	.666	399
Chance (Levenson)	.238	.000	399

Table 19

Correlations of the Locus of Control Scales and PI

Scale	r	p	N
RIEC	.388	.000	395
Internal	-.191	.000	397
Powerful others	.012	.818	398
Chance	.336	.000	398

Table 20

Correlations of the Locus of Control Scales and CMS

Scale	r	p	N
RIEC	.398	.000	398
Internal	-.212	.000	399
Powerful others	-.018	.723	400
Chance	.321	.000	400

Table 21

Correlation of Rotter Scores with Levenson Scale Scores

Scale	r	p	N
Internal	-.311	.000	400
Powerful others	-.025	.612	400
Chance	.522	.000	400

Risk Factors for PTSD – Multiple Regressions

Current psychiatric symptoms (GSI) account for most of the variance in all three PTSD scale scores. Peritraumatic dissociation (PDEQ) is next, with neuroticism being about equal to the PDEQ for the PI and CMS. The IES-R is also sensitive to the experience of fear, helplessness and horror. The neuroticism value does not reach an acceptable statistical significance level in the IES-R comparison. The PI and CMS scores are influenced by all factors in the model, with horror being the least and locus-of-control next. Together these account for 47% (IES-R) to 60% (CMS) of the variance in the PTSD scale scores (see Table 22).

Out of 62 individuals who did score above cut-off on at least one PTSD scale, 72% had psychological symptoms that reached cut-off on the GSI (45 of the 62 PTSD symptom positive individuals), while 27% (17 of the 62 of PTSD symptom positive individuals) did not. Only 2 PTSDANY subjects were missing GSI scores. Further regression analysis below with the GSI removed explores the difference in PTSD development factors for individuals who do not have a psychiatric history. In the current study, approximately 70% of the sample was below cut-off on the GSI using adult norms (see Table 23).

Without psychopathology, the highest correlations with the PTSD scales are the

tendency to dissociate at the time of the event (PDEQ), the personality trait of

neuroticism and experiencing horror at the time of the event (horror). Peritraumatic

dissociation has the strongest correlation with the IES-R, where the PI and CMS are more

sensitive to neuroticism. Locus of control (RIEC) did not have a relationship with the

IES-R, but is an important factor on the other two scales (see Table 23 and Table 24).

Table 22

Five Factor Regression with GSI

Risk Factor	IES-R			PI			CMS		
	$R = .687$			$R = .754$			$R = .783$		
Scale	$F = 57.271$			$F = 84.435$			$F = 102.162$		
	β	*t*	*p*	β	*t*	*p*	β	*t*	*p*
GSI	.450	8.284	.000	.384	7.794	.000	.406	8.801	.000
PDEQ	.249	5.318	.000	.173	4.083	.000	.200	5.027	.000
Horror	.121	2.693	.007	.114	2.829	.005	.062	1.633	.104
Neuroticism	.062	1.157	.248	.220	4.476	.000	.246	5.366	.000
RIEC	-.023	-.537	.592	.138	3.470	.001	.134	3.602	.000

Table 23

Five Factor Regression without GSI

Risk Factor	IES-R			PI			CMS		
	$R = .620$			$R = .696$			$R = .736$		
Scale	$F = 40.733$			$F = 61.677$			$F = 78.122$		
	β	*t*	*p*	β	*t*	*p*	β	*t*	*p*
PDEQ	.302	6.042	.000	.220	4.791	.000	.225	5.226	.000
Horror	.184	3.822	.000	.140	3.231	.001	.124	3.047	.002
Neuroticism	.264	5.187	.000	.385	8.210	.000	.397	9.044	.000
RIEC	-.017	-.362	.717	.144	3.356	.001	.119	2.952	.003
DES	.119	2.440	.015	.107	2.367	.018	.189	4.464	.000

Table 24

Four Factor Regression without GSI

Risk Factor Scale	IES-R R = .607 F = 48.495			PI R = .692 F = 76.732			CMS R = .719 F = 89.653		
	β	t	p	β	t	p	β	t	p
PDEQ	.328	6.699	.000	.245	5.503	.000	.267	6.263	.000
Horror	.184	3.814	.000	.140	3.227	.001	.123	2.970	.003
Neuroticism	.291	5.878	.000	.415	9.180	.000	.444	10.311	.000
RIEC	-.005	-.104	.917	.160	3.761	.000	.154	3.790	.000

To determine the probability of PTSD symptom development in individuals who have not yet experienced a traumatic event, scales that indicate responses to an event were eliminated from the regression. Without PDEQ and horror in the equation, the GSI score and neuroticism had the strongest correlations (see Table 25).

Table 25

Four Factor Regression without PDEQ or Horror

Risk Factor Scale	IES-R R = .620 F = 53.830			PI R = .723 F = 94.695			CMS R = .777 F = 133.009		
	β	t	p	β	t	p	β	t	p
GSI	.481	8.216	.000	.426	8.341	.000	.430	9.319	.000
Neuroticism	.142	2.489	.013	.255	5.071	.000	.277	6.080	.000
DES	.059	1.232	.219	.066	1.574	.116	.126	3.294	.001
RIEC	.018	.400	.689	.148	3.660	.000	.144	3.957	.000

For individuals who have not yet experienced a traumatic event and do not evidence current psychopathology the regression was run without the GSI. Neuroticism and the tendency to dissociate (DES) were statistically reliable predictors of PTSD symptom development (see Table 26).

Table 26

Three Factor Regression without PDEQ, Horror, or GSI

	IES-R			PI			CMS		
Risk Factor Scale	*R* = .512 *F* = 42.237			*R* = .647 *F* = 85.351			*R* = .702 *F* = 116.712		
	β	*t*	*p*	β	*t*	*p*	β	*t*	*p*
Neuroticism	.409	7.975	.000	.484	10.598	.000	.514	12.007	.000
DES	.171	3.455	.001	.164	3.738	.000	.215	5.222	.000
RIEC	.035	.706	.481	.164	3.747	.000	.152	3.754	.000

Correlation Matrix for All Variables

Correlations of all variables are shown in Table 27. The Lie Scale of Eysenck's Personality Inventory had a statistically significant negative correlation with the IES-R, IES intrusion and hyperarousal subscales, PI, CMS, GSI, PST, neuroticism, extroversion, Rotter's scale, Levenson's internal scale, tendency to dissociate, and peritraumatic dissociation (see Table 27). The size of these statistically significant negative correlations ranged from *r* = -.116 to *r* = -.255.

Table 27

Correlations Between PTSD Scales, Event Scores, Psychiatric Symptoms, Personality, Locus of Control, and Dissociation

variables	1	2	3	4	5	6	7	8
PTSD Scales								
1 IES	-							
2 IES Avoidance	.925**	-						
3 IES Intrusion	.933**	.787**	-					
4 IES Hyperarousal	.934**	.802**	.817**	-				
5 PI	.604**	.512**	.547**	.602**	-			
6 CMS	.674**	.605**	.597**	.687**	.768**	-		
Event Scores								
7 # of Events	.328**	.277**	.315**	.284**	.290**	.296**	-	
8 Horror	.347**	.304**	.352**	.358**	.359**	.357**	.860**	-
9 Chronic	.496**	.427**	.474**	.471**	.362**	.422**	.738**	.745**
10 HMS	.329**	.264**	.307**	.342**	.322**	.313**	.732**	.815**

(Table Continues)

Table 27

variables	1	2	3	4	5	6	7	8
11 LMS	.196**	.138**	.211**	.172**	.171**	.173**	.615**	.500**
12 HRS	.338**	.275**	.318**	.345**	.315**	.316**	.737**	.820**
Psychiatric Symptoms								
13 GSI	.599**	.535**	.546**	.593**	.659**	.699**	.176**	.250**
14 PSDI	.496**	.453**	.434**	.476**	.544**	.546**	.126*	.195**
15 PST	.552**	.487**	.509**	.541**	.584**	.640**	.160**	.218**
Personality								
16 Neuroticism	.487**	.480**	.418**	.487**	.607**	.652**	.222**	.309**
17 Extraversion	-.080	-.110*	-.050	-.105*	-.189**	-.191**	-.038	-.104*
18 Lie Scale	-.138**	-.094	-.137**	-.130**	-.218**	-.202**	-.071	-.037
Locus of Control								
19 Rotter's (External)	.201**	.202**	.192**	.191**	.388**	.393**	.004	.080

(Table Continues)

Table 27

variables		1	2	3	4	5	6	7	8
20	Levenson's Internal	-.064	-.029	-.079	-.077	-.191**	-.212**	.008	.005
21	Levenson's Powerful others	-.037	-.036	-.038	-.028	.012	-.018	-.042	-.035
22	Levenson's Chance	.238**	.220**	.221**	.223**	.336**	.321**	-.068	-.024
Dissociation									
23	Tendency to Dissociate	.348**	.311**	.319**	.321**	.393**	.463**	.142**	.135**
24	Peritraumatic dissociation	.498**	.435**	.468**	.460**	.479**	.491**	.279**	.341**

Table 27

variables	9	10	11	12	13	14	15	16
PTSD Scales								
1 IES								
2 IES Avoidance								
3 IES Intrusion								
4 IES Hyperarousal								
5 PI								
6 CMS								
Event Scores								
7 # of Events								
8 Horror								
9 Chronic	-							
10 HMS	.657**	-						

(Table Continues)

Table 27

variables	9	10	11	12	13	14	15	16
11 LMS	.433**	.331**	-					
12 HRS	.670**	.988**	.370**	-				
Psychiatric Symptoms								
13 GSI	.330**	.184**	.063	.199**	-			
14 PSDI	.256**	.151**	.086	.167**	.790**	-		
15 PST	.300**	.179**	.015	.191**	.911**	.428**	-	
Personality								
16 Neuroticism	.290**	.254**	.079	.254**	.637**	.437**	.641**	-
17 Extraversion	-.021	-.055	-.022	-.051	-.177**	-.152**	-.121*	-.243**
18 Lie Scale	-.070	-.070	-.026	-.080	-.200**	-.083	-.238**	-.276**
Locus of Control								
19 Rotter's (External)	.077	.042	-.013	.039	.310**	.221**	.301**	.357**

Table 27

variables		9	10	11	12	13	14	15	16
20	Levenson's Internal	-.051	.039	-.067	.032	-.142**	-.095	-.128**	-.116*
21	Levenson's Powerful others	-.046	-.039	-.040	-.040	-.051	.007	-.017	-.052
22	Levenson's Chance	.036	-.007	-.055	-.008	.293**	.223**	.286**	.295**
Dissociation									
23	Tendency to Dissociate	.210**	.127*	.040	.136**	.444**	.336**	.427**	.392**
24	Peritraumatic dissociation	.357**	.338**	.122*	.338**	.411**	.306**	.380**	.348**

(Table Continues)

Table 27

variables	17	18	19	20	21	22	23	24
11 LMS								
12 HRS								
Psychiatric Symptoms								
13 GSI								
14 PSDI								
15 PST								
Personality								
16 Neuroticism								
17 Extraversion	-							
18 Lie Scale	-.167**	-						
Locus of Control								
19 Rotter's (External)	-.012	-.215**	-					

Table 27

variables		17	18	19	20	21	22	23	24
20	Levenson's Internal	.039	.131**	-.311**	-				
21	Levenson's Powerful others	-.042	.001	-.025	.077	-			
22	Levenson's Chance	.026	-.116*	.522**	-.112*	.086	-		
Dissociation									
23	Tendency to Dissociate	.035	-.255	.247**	-.105*	-.045	.239**	-	
24	Peritraumatic dissociation	.025	-.155**	.247**	-.111*	-.043	.193**	.368**	-

*Note. *p < .05; ** p < .01*

CHAPTER FOUR

Discussion

Who Had PTSD Symptoms?

Beyond basic research applications, prevalence has practical significance because

it "identifies the level of burden of disease or health-related events on the population and

health care system" (National Cancer Institute, 2006, para 1). Using more than one self-

administered PTSD scale is recommended (M. Hammarberg, 1990, in personal

communication, March 9, 2006). This study shows that the number, percentage and

identification of individuals showing significant PTSD symptoms in a population vary

with the scale and the analysis used. The number of persons identified as having high

levels of PTSD symptoms differed for each of the three scales used in this study and for

the PTSDANY combination variable. The Civilian Mississippi Scale (CMS) was the

most conservative in identifying individuals showing significantly high PTSD

symptomology at a low of 4.4% using the cut-off suggested in Keane, Caddell and Taylor

(1988). The Penn Inventory (PI) identified PTSD symptoms in 8.3% of participants,

which is in line with the DSM-IV life-time base rate figure (8%) for a community

population (American Psychiatric Association, 2000). The Impact of Event Scale

Revised (IES-R) identified PTSD symptoms in 10.8% of participants, which agrees with

the literature cited in this paper for studies that used strict DSM-IV criteria for PTSD

(Amir & Sol, 1999; Laposa et al., 2003; Oswalt & Silberg, 1995; Schlenger et al., 2002).

The combination variable of PTSDANY was the most liberal, identifying PTSD

symptoms in 16.3% of participants, which was higher than the DSM-IV figure and the literature using strict DSM-IV criteria.

A beginning researcher or clinician would have difficulty knowing where to start with scale selection. Meichenbaum (1994) listed over 30 self-report scales available in for assessing PTSD symptoms in general non-combat populations (pp. 176-180). Norris and Riad (1997) discussed in some detail 20 standardized measures of civilian PTSD and ended with a plea for cross-validation studies of existing instruments rather than the creation of more new scales. Awareness of commonly used scales allows one to know what is usually done, makes comparisons across studies easier and guides the development of new instruments (Elhai, Gray, Kashdan & Franklin, 2005). When surveyed, clinicians and research members of the International Society for Traumatic Stress Studies (ISTSS) listed the following influences that may guide test selection: ease of accessibility, uniqueness of what is assessed by the instrument, word-of-mouth referrals, reputation and prestige of the author or associated institution, familiarity with the instrument, psychometric quality of the test and test administration time (Elhai, Gray, Kashdan, & Franklin, 2005). The IES-R (13%, clinical, 14% research) and the IES (11% clinical, 8% research) were selected by that group more often than the combat Mississippi scale (9% clinical, 2% research) or the Civilian Mississippi Scale (2% clinical, 2% research). In research settings, the IES-R was administered 3928 times in the year preceding the survey while the Mississippi was administered only 707 (civilian version) and 321 (combat version) times. In a clinical setting, there was almost equal use between the IES-R (963) and the combat Mississippi (991), while the civilian version was administered only 14 times (Elhai et al., 2005).

Once a scale is selected, further problems may be encountered in determining

how to evaluate the scores. Difficulties abound in using the Mississippi Scale for PTSD.

First, there are several versions of this scale. The original version was specifically

designed for combat veterans and had 35 items (Engdahl et al., 1996; Keane et al., 1988).

A civilian version with 35 items was created in 1990 by Kulka et al. (as cited in Norris,

Perilla, & Murphy, 2001) changing wording from 'since I was in the military' to 'in the

past' (Norris et al., 2001; Norris & Riad, 1997). This civilian version went through

several subsequent revisions. In one, the wording was changed from 'in the past' to a

form referencing a specific event such as Hurricane Andrew and was translated to

Spanish (Norris & Perilla, 1996). The number of items dropped to 30 in Norris and

Perilla (1996), stayed at 35 (National Center for Posttraumatic Stress Disorder, 2006a) or

increased to 39 in a revised Civilian version (National Center for Posttraumatic Stress

Disorder, 2000). In some studies, only selected items were used for analysis, such as the

15 items used by Norris and Perilla (1996). In others, the combat version was used to

assess civilians (Marmar, Weiss, Metzler, Ronfeldt et al., 1996). Yet results are

compared across studies, whether the researchers used the civilian version or the combat

version and without regard to the number of items on the scale. Cut-offs for significant

PTSD symptom level are reported across studies without necessarily designating the

version or length of the instrument (Engdahl et al., 1996). For any one version, several

different cut-offs may be found across the literature. The CMS cut-off used in this study

was from one of the original studies published by the author of the scale (Keane et al.,

1988). It turns out that study used a clinical outpatient population and the 35 item

combat version of the CMS. Using a cut-off of 91, Engdahl, Eberly and Blake found the

combat version of the CMS gave a similar rate (24.1%) to that obtained by using the

Structured Clinical Interview for DSM III-R (21.2%) in a community based sample of

war veterans(1996). In the present sample, frequency of individuals with a high level of

PTSD symptoms using the various cut-offs reported in the literature ranged from 4.4%

(18/412) using a 107 cut score to 17.7% (73/412) using 89 as the cut score.

The 39 item Civilian Mississippi Scale (CMS) used in this study was obtained

from the National Center for PTSD (NCPTSD) in 2000 by asking for the most current

version and is one of the *revised versions*. Permission for use was granted after signing a

data sharing agreement so that the results could be included in the normative information

still being gathered. However, incomplete normative data would end up presenting a

particularly difficult problem in trying to determine an appropriate cut score. The *current*

(2006), *official* version of the CMS from the NCPTSD has 35 questions but comes

without a recommendation for a cut-off score. The revised version used in this study still

lacks normative information (D. Kaloupek, personal communication, October 3, 2006).

When comparing the internal consistency of the 35 item version of the civilian

Mississippi with the 39 item version, the scales were very similar on scores such as the

average item total, split half reliability and Chronbach's alpha (Lauterbach et al., 1997).

Although several sources endorse scoring the civilian version of the Mississippi the same

as the combat version (National Center for Posttraumatic Stress Disorder, 2000, 2006b),

they do not address the issue of using the combat cut-off in a civilian population. The

variability in the length of the civilian scale revisions further clouds the issue. Although

the 107 cut-off used in the analysis here originated in an out-patient population, the scale

length of the revised version used was 4 questions longer, giving more opportunities to

accrue points. However, using the 107 cut-off still produced a very low percentage of persons identified as having a high level of PTSD symptoms. The Mississippi is reported to be better at discerning those at the top end of the distribution i.e., 1 to 3 standard deviations above the mean (Vreven et al., 1995). The base rate of the combat population in the original validation study was high at 33% (Keane et al., 1988). According to the DSM-IV and the literature reviewed here, the base rate for a non-patient community sample is more likely to be 8% to 11%. Meichenbaum cautions that a scale developed in a high base rate population and used to assess a low base rate population will give an increased number of false positives (1994). Due to the problem with selecting an appropriate cut-off score, it is difficult to assess the impact of this factor in the current study sample. Problems with scoring alone are a reason to eliminate the Mississippi from a battery of tests.

In a large college sample, the CMS had a higher correlation with a measure of depression (.71 with the BDI) and a measure of anxiety (.70 with the trait version of the State-Trait anxiety Inventory) than with other measures of PTSD (.36 with the IES-R and .52 with the PPTSD-R), prompting the authors to suggest that the CMS assesses general psychopathology rather than PTSD specifically (Lauterbach et al., 1997). Part of the reason for the high correlation with depression can be explained by the fact that items measuring suicidality and depression were added by Keane, Caddell and Taylor to the original combat scale (and retained on the 35 and 39 civilian versions) because in his experience, these were seen frequently in individuals with PTSD (1988). Indeed, all three global indices of the Symptom Checklist-90, scores that summarize overall level of distress on a scale that measures mental pathology, correlated most highly with the CMS

in the present study; making it the most sensitive of the three PTSD scales to psychiatric disorders

As a general rule, for clinical screening purposes, it would be appropriate to use the scale, cut-off, or combination of identifiers that selects appropriately for the larger percentage of individuals with PTSD symptoms. In these circumstances, the goal would be to identify those individuals who may need further help, not overlooking anyone who may indeed have PTSD. The false positives could be eliminated later with further assessment, including a clinical interview. However, in a research context, for the purpose of establishing theoretical relationships or investigating cause and effect relationships, a more conservative approach would be preferable.

The Mississippi is not the only scale that has revision issues. The Life Stressor Check List has two different revised versions, one with more questions per event than the other. In the literature they are both referred to as *revised* making it impossible to tell from the name which scale is actually being used

Individuals Identified by Scales

Of those who scored above cut-off on any one scale, only 9 (14%) received a PTSD designation on all three scales. The specific individuals identified as showing high PTSD symptoms in a population may depend on the scale used to assess PTSD. As is discussed later, one PTSD scale may select for a particular characteristic (such as depression) while another may preferentially identify those individuals with anxiety. Researchers and clinicians need to be aware of these selection biases when using a particular scale.

Interscale Correlations (Convergent Validity)

Correlations between scales are moderate to high and statistically reliable, with the highest correlation between the PI and the CMS. High correlations would be expected because in theory, these scales all measure the same construct, namely PTSD. When seeking to eliminate a scale from the battery, one could select the CMS or the PI based on this high correlation, assuming that either scale would be sensitive to similar variables.

<div align="center">

Cronbach's Alpha for Internal Consistency

</div>

These three scales are well known and have been sufficiently used and evaluated to allow for identification and correction of any internal consistency problems, therefore it is not surprising that good internal consistency was evidenced by high Cronbach's alpha scores. The close similarity between the CMS's alpha in the present study and the coefficient alpha from the Lauterbach, Vrana, King and King (1997) study, also using a college student population, suggests that the instrument performed similarly in both samples, supporting the reliability and validity of the results in this study.

Cronbach's alpha scores for the individual survey items did illuminate one problem within one of the scales. Question #2 on the CMS was the only question in all of the scales that showed a negative item-total correlation. That question reads: "I feel guilt over things I did in the past" and the item is reverse scored per instructions from the NCPTSD (D. Blumberg, personal communication, October 10, 2000). Vreven, Gudanowski, King and King (1995) found self-persecution and guilt to be one of the four content area factors for the CMS. Because it was unclear why feeling guilty over something you did in the past would necessarily be protective against PTSD (which is

what the reverse scoring suggested) an attempt was made to find an explanation for the

negative correlation. If the item was meant to measure survivor guilt, the wording was a

bit awkward, and it should not have been reverse scored. However, it is also likely that

the wording of this question was inadvertently changed. The version of the scale sent in

2000 from the National Center for PTSD Boston contained the notation that wording was

revised on items 2, 3, and 11 by F. Weathers and A. Meron. A search for another source

of the actual items on the scale turned up a list of partial sentences in Vreven,

Gudanowski, King and King (1995). The wording of item #2 in that article was "do not

feel guilt" (p. 99). The NCPTSD was queried for a solution. It turned out that the

directionality of item #2 was changed (by taking out "not") and should not be reverse

scored on this revised version. Rescoring item #2 correctly and rerunning the frequencies

did not alter them with any practical significance. The two highest frequencies changed

by the addition of 1 person each so that the cut-score 91 group went from 15.4% to

15.5% and the cut-score 89 group increased to a frequency of 17.7% from 17.6%. Still,

as sent out this scale included misinformation on scoring.

Neuroticism and Extraversion

Eysenck saw neuroticism and extraversion as usually independent personality

characteristics. Neuroticism is by far the more important factor in PTSD, explaining

from 23% (IES-R), to 36.8% (PI) to 42.4% (CMS) of the variance in PTSD scale scores,

while extraversion accounts for only 3% of the variance in PI and CMS scores and is not

meaningfully related to the IES-R. The lowest correlation with either variable was found

for the IES-R. Included in Eysenck's Personalilty Inventory (EPI) is the Lie Scale, which

"attempts to measure a tendency on the part of some subjects to 'fake good,' this

tendency is particularly marked when the questionnaire is administered under conditions where such a tendency would seem appropriate" (H. J. Eysenck & Eysenck, 1994, p. 9). Participants in this study were not under conditions in which it would have been particularly advantageous to provide false information. According to Eysenck and Eysenck, a high correlation of -.5 or greater between neuroticism and the lie scale would indicate such a condition. In this study, the statistically significant correlation between neuroticism and the lie scale was well below that (r = -.276). They suggest that when this is the case the Lie Scale actually measures social naivety or conformity and should not be used as a correction for lying (H. J. Eysenck & Eysenck, 1994).

Eysenck's NE Correlation

In a subpopulation of individuals, those Eysenck labeled anxious, he asserted there was a negative correlation between neuroticism and extraversion; that is those high in neuroticism will also be low in extroversion (i.e., they will be highly introverted).The IES-R had the lowest correlation of the three PTSD scales with the NEeysenck variable, just as it had with the individual neuroticism and extraversion variables. In fact, the three scales retained their original rankings obtained with the initial method of analysis (filtering the data to get the *above cut-off* group for each scale and then running the NE correlation). However, it is interesting to note that of the three IES-R subscales, hyperarousal is the one with the highest correlation to NEeysenck. This suggests that anxiety plays a bigger role in hyperarousal symptoms (as measured by this subscale), than in symptoms of intrusion or avoidance. These findings confirm Eysenck's hypothesis that in a small portion of the population, neuroticism and introversion are correlated and that they are related through the construct of anxiety.

NE and Dissociation

Is PTSD an anxiety disorder or a dissociative disorder? Many authors have argued that PTSD should be considered a dissociative disorder and although the DSM-IV has PTSD under anxiety disorders, a dissociation component is acknowledged. Dissociation at the time of the event is measured in this study by the Peritramatic Dissociative Event Questionnaire (PDEQ), while the Dissociative Events Scale (DES) measures the general tendency to dissociate. Those individuals who score above cut off on the PDEQ show a negative NE correlation whereas those above cut off on the DES do not. In fact, those who do not score high on the tendency to dissociate have a reliable NE correlation ($r = -.279$, $p = .000$, $N = 313$). Peritraumatic dissociation is related to anxiety. Higher negative NE correlation in those individuals who score high on the PDEQ (but not the DES) suggest that part of what the PDEQ (but not the DES) is measuring is anxiety. The PDEQ accounts for more of the unique variance in PTSD scale scores than the DES (see multiple regression section). Dissociating at the time of the event seems to be more related to anxiety than to a tendency to dissociate in general. This result would support PTSD's inclusion in the anxiety disorders category of the DSM-IV.

Both the PDEQ and the DES are correlated with neuroticism but not with extraversion. But a statistically reliable NE correlation is seen in those who score high on the PDEQ but not on the DES. This NE correlation associated only with the PDEQ suggests that there is a difference between the *tendency to worry* (neuroticism) and *anxiety*, as evidenced by the NE correlation, and it is this anxiety component that influences dissociation at the time of the event. As has been shown elsewhere, a broad spectrum of pathologies (as measured by the SCL-90R subscales) are most highly

correlated with the hyperarousal component of PTSD (as represented by the hyperarousal subscale on the IES-R). Neuroticism was strongly related to pre-trauma arousal and to PTSD in a study of women with a pregnancy loss (Engelhard et al., 2003). These authors suggested that "PTSD arousal symptoms tap a specific aspect of neuroticism" (p. 1). Perhaps this specific aspect is the arousal produced by anxiety.

NE and Symptom Checklist-90R

This questionnaire has 90 items that can be rated from 'not at all' to 'extremely' and gives subscale scores for 9 symptom dimensions and three global indices. It screens for symptoms of psychopathology with subscales for somatization, OCD, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. The Global Severity Index (GSI) of the Symptom Checklist-90R indicates the average response per item across the entire scale and is the commonly used score for this scale. According to Derogatis, it is the "best single indicator of the current level or depth of the disorder" (1994, p. 12). It sums all the responses and divides by 90 (the number of items). The NE correlation for those above cut-off criteria on the GSI (using the adult norm group) was small but reliable, but for the group below cut-off on this scale the correlation dropped and did not reach an acceptable reliability level. This would suggest that anxiety (as defined by Eysneck) is an important part of mental pathology. As will be shown later, the GSI scores account for a large amount of the variance in the scores on the PTSD scales. This supports the notion that anxiety is a significant factor in the development and maintenance of PTSD.

The Positive Symptom Distress Index (PSDI) is reported to be a measure of "response style" (Derogatis, 1994, p. 13) and reflects the average level of distress

reported, for the symptoms that were endorsed. The PSDI is the sum of scores on all responses divided by the number of items endorsed (that is the number of symptoms endorsed or the PST). The NE correlation for the group above cut-off on the PSDI ($r = -.388$, $p = .003$, $N = 55$) was considerably higher than the NE correlation in the group below cut-off ($r = -.174$, $p = .002$, $N = 306$). These higher correlations in the groups above cut off for the GSI score and the PSDI score support the notion that anxiety is a significant component to commonly experienced mental disorders, and that these two indices are sensitive to that component.

Derogatis considers the PSDI score of the SCL-90R a measure of response style, reflecting a person's average level of distress given the presence of psychiatric symptoms. Neuroticism and extraversion correlations were considerably higher for the group above cut-off on the PSDI than in the group below cut-off. These higher correlations in the above cut-off group further support the notion that anxiety is a significant component of commonly experienced mental disorders.

Using nontraditional scoring, a "response type" was calculated for each person from the LSC, indicating an average level of response across events. This response type variable showed modest correlations with the development of PTSD with scale correlations of IES-R $r = .400$, CMS $r = .270$, PI $r = .265$.

NEeysenck and LSC responding type showed a small but highly reliable correlation of $r = .135$, $p = .009$. Clearly this study demonstrates that reaction (fear, helplessness, and horror), event, and anxiety are important factors in PTSD development.

Traumatic Events: LSC – Life Stressor Checklist-Revised

The Life Stressor Checklist-Revised includes questions about 28 separate events and 2 open ended questions for events not included in the list. The *non-traditional* analysis method yielded valuable information such as commonly endorsed events. For college students these included death of someone close to them followed by seeing a serious accident. Being in a serious accident or having parents who divorced while they were living with them were also common. Surprisingly, 25% had been sexually harassed at school or work or seen family violence before age 16. Given the relatively young age of the participants (mode 19) and the fact that most were college students, it was not surprising that some of the least common events centered around marriage and children. The moderate to high socioeconomic status of most students attending the private university may have contributed to the fact that other rarely endorsed events included physical neglect, being in foster care or put up for adoption and having spent time in jail, although 20.8% reported having a close family member in jail. Even in our sample with a relatively low *PTSD* rate and a very young average age, a striking 96% of participants had been exposed to at least one event that could be considered traumatic and, on average they had experienced 4 or 5 traumatic events. This result supports both the notion that traumatic experiences are common and that only a small percentage of those exposed to such events will develop PTSD.

An infrequent event that consistently caused horror when it occurred was #15, having a baby or child with a severe mental or physical handicap. Interestingly, this would not have been scored as a traumatic event by the LSC–R official scoring method

because 'thinking someone could be killed' was not endorsed. However, the average ranking for 'how much did it bother you then' was 3, with 4 being max.

Forced sexual touching after age 16 with a threat of harm if noncompliant was ranked second by the *horror score*, number one by the *acute score* method and consistently ranked higher that unwanted sexual touching before age 16. Likewise, unwanted sex after age 16 ranked higher on all three measures than unwanted sex before age 16. A recent study of the psychological impact of sexual trauma among college sophomore women found persons who experienced adolescent sexual assault were at greatest risk for psychopathology, poor social adjustment and risky sexual behaviors. Also in this high risk group were those who experienced revictimization, sexual assault as an adolescent/adult or someone with a history of childhood sexual assault. These groups ranked higher than childhood sexual assault and childhood sexual abuse (Kaltman, Krupnick, Stockton, Hooper, & Green, 2005). The *unwanted sexual touching* question occurred on the survey before the *unwanted sex* question which may account for its higher rate. Also, it is likely that unwanted touching is a more frequent occurrence than the unwanted sex. Events that still bother the person now included some of those that were most stressful when they occurred: *forced sexual touching after the age of 16* and *having an abortion or miscarriage*. It is interesting that the *non-DSM-IV*, low magnitude, stressors included at least one event that received a high *chronic* score in our sample (foster care or adoption).

The *chronic* score has the highest correlation for all three scales. If PTSD is defined as the long term or chronic reaction to an event, one might ask why the correlation is not larger. Part of the reason may be that the majority of this survey

(questions 1-28) asked about specific events. Only two questions were open-ended. Even given the variability accounted for by all of the factors investigated in this study, what specific event bothers someone and why is a very individual matter. A more open-ended assessment that allowed individuals to create their own personal list of events might yield a higher correlation but be less reliable. Further, the PSTD scales explored each of the criteria for PTSD with multiple questions. One scale even had specific subscales for intrusion, avoidance and hyperarousal. It would follow that a single question (the LSC-R *chronic* question) is neither specific enough nor able to cover a range of different symptoms, a task which was accomplished by the PTSD questionnaires. Because the *chronic* score has such a high correlation with the three scales, it might be possible to assess both history of exposure and current PTSD symptoms using only the LSC instrument.

There seems to be some validity in the distinction between low and high magnitude stressors as the low magnitude stressors had the lowest correlation with the PTSD scales. In this scoring scheme, there appears to be little difference between scoring just the high magnitude stressors (HMS) and adding the low magnitude stressors (LMS) to the high (HRS). Simply tallying the experience of horror over all events (horror) produced a variable with a slightly stronger correlation than HMS or LMS, or the combination variable HRS, and provides an indication of the noxious nature of the event and the person's reactions to the event.

The style or amount of response to a traumatic event varies from person to person. One person may respond excessively and with horror to most any event that happens to them while others may experience many similar events and not be bothered by any of

them. Still others may increase in responsiveness as the number of events they encounter increases. It is well documented that past history of trauma increases the likelihood of PTSD (Weiss et al., 1995; Wolfe & Kimerling, 1997). This research shows that response type (being bothered by the events one experiences) seems to play an important role in whether a person expresses PTSD symptoms as measured by these three scales.

Psychiatric Symptoms: Symptom Checklist 90R

All indices of the SCL-90R correlate with the three PTSD scales. The GSI has the highest correlation of the three, giving credence to the fact it is the most widely used of the three indices and suggesting that it can be used with confidence in PTSD studies. Using a regression analysis, it was determined that the GSI was the factor that explained the largest amount of variance in PTSD scale scores. All three indices correlated most highly with the CMS, so it would seem the CMS was the most sensitive to psychiatric disorders of the three scales used in this study. It is interesting to note that across the three IES-R subscales of avoidance, intrusion and hyperarousal, every dimension scale score in the SCL-90R (somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, etc.) had its highest correlation with the hyperarousal subscale. This is the subscale that was not in the original version by Horowitz, Wilner and Alvarez (1979), but was added and then used by Weiss, Marmar, Metzler and Ronfeldt (1995) for a study of respondents to a California earthquake (Weiss & Marmar, 1997). The addition of this third subscale brought the instrument more in line with the then DSM-III and now DSM-IV criteria. The fact that the IES-R has high correlations with the other two PTSD scales (PI, $r = .604$ and CMS, $r = .674$) also validates this additional subscale. Hyperarousal on the IES-R seems to be the most sensitive of the

three to psychiatric symptoms but all subscales showed a modest correlation so this factor seems to underlie all areas of PTSD.

Norm groups in the SCL-90R manual include an adult non-patient group and an adolescent non-patient group (age 13-19 years). The norms for the adolescent group are considerably more liberal, allowing a higher raw score before reaching cut-off for psychopathology. It is difficult to know which of these norm groups to use for college students because they overlap both groups in age and are functionally in a gray area between high school students and independent adults. The number and frequency of individuals identified are very different depending upon the norm group selected. This could affect correlations with other scales and be especially important when assessing the contribution of several variables (psychopathology, locus of control, extraversion, etc.) to a single construct.

Eysenck postulated that for a small subset of individuals, the normally independent characteristics of introversion (low extraversion) and neuroticism are correlated. This finding was supported in the total sample in this study. Eysenck additionally labeled the individuals in this subset *anxious*. The *PTSD high symptom group* in the present study demonstrated a higher correlation. This may indicate that those with PTSD symptoms are also anxious. For GSI of the SCL-90R, which is a measure of psychopathology including anxiety, the correlation between neuroticism and extraversion (NE correlation) was reliable using the adult norm group, but not the adolescent norm group. This would tend to support using the adult norm group for a college population.

Because values for the adolescent norm group are more liberal (i.e., a higher raw score is necessary to reach cut-off), those individuals above cut-off would have more neurotic or anxious qualities. It would be expected that the NE correlation would be high for those above cut-off using adolescent norms. However, the NE correlation did not reach statistical significance in this group. The lack of statistical reliability in the group identified using adolescent norms could be because the N was so small.

Dissociation: DES and PDEQ

Is PTSD an anxiety or a dissociation disorder? Do these two dissociation scales measure the same or different things? Is there a difference in dissociation scales and their relationship to PTSD scales? Is there a difference between a general tendency to dissociate and *pathological dissociation*. Does the DES-Taxon measure *pathological dissociation*?

Correlation between the PDEQ and the DES was fairly low but statistically reliable ($r = .368$, $p = .000$, $N = 396$), suggesting that although they do measure some of the same things, they also assess things unique to each scale. Given the NE correlation with the high PDEQ group discussed previously, peritraumatic dissociation seems to be associated with high anxiety, where the general tendency to dissociate is not. The PDEQ has good internal reliability (Cronbach's alpha of .883) and the DES had excellent internal reliability at $\alpha = .907$.

Waller, Putnam and Carlson (1996) suggested that pathological dissociation was different than the everyday tendency to dissociate and could be measured by a subset of eight questions on the DES that assessed amnesia and depersonalization/derealization. They called this truncated scale the DES-Taxon and described the dissociative taxon as a

"discrete latent variable," the presence or absence of a trait rather than a dimension. However, in this study the DES-Taxon was neither more or less correlated with the PDEQ than the DES (suggesting it measured nothing different), had poorer internal reliability (Cronbach's alpha of .721) than the other two dissociation scales and explained less variance on the PTSD scales. Given the higher reliability of the DES and the failure of the DES-Taxon score to explain additional unique variance the use of the DES-Taxon score cannot be recommended based on the results from this study.

The PDEQ had higher correlations and regression F ratios than the DES (or the DES-Taxon) for all three PTSD scales revealing that peritraumatic dissociation (dissociation at the time of the event) is more predictive of who develops PTSD (explains more of the variance) than the general tendency to dissociate. In addition, the PDEQ had a respectable Cronbach's alpha of .883. Of the three dissociation scales, it would seem that the PDEQ would be best to include in a prospective study trying to predict who will get PTSD.

The results of the current study strongly suggest that peritraumatic dissociation is a significant factor in the development of PTSD. This leads to the question of what factors seem to influence dissociation at the time of the event. The highest correlations with other factors in this study are between the PDEQ and current psychiatric symptoms (GSI, $r = .411$, $p = .000$, $N = 386$), the tendency to dissociate (DES, $r = .368$, $p = .000$, $N = 396$), the personality characteristic of neuroticism (neuroticism, $r = .348$, $p = .000$, $N = 370$) and the experiencing of fear, helplessness and horror during the event (horror, $r = .341$, $p = .000$, $N = 390$). Regression analysis revealed that the most important factor determining whether someone dissociated at the time of the event (the factor that

accounted for most unique variance) was experiencing horror at the time of the event, followed by the tendency to dissociate and the presence of symptoms of a psychiatric disorder.

To consider those individuals who do not have psychiatric symptoms, the regression was run a second time without the GSI, with the rank order staying the same, but neuroticism becoming a reliable factor. To evaluate the ability of the risk factors to predict dissociation at the time of the event in those individuals who have not yet experienced an event, a regression analysis was performed using GSI, DES and neuroticism. Interestingly, for those with other psychopathology, the tendency to dissociate was equally important in predicting dissociation at the time of an event whereas neuroticism played a much lesser role. Finally, just the tendency to dissociate and neuroticism were run to evaluate the ability to predict peritraumatic dissociation in those individuals who have not yet experienced a traumatic event and do not have other psychopathology. The amount of explained variance dropped by only a slight amount, but neuroticism gained importance. Therefore, for those individuals not yet exposed to a traumatic event, psychopathology (GSI), the tendency to dissociate (DES) and neuroticism (EPI) seem to be the best preexisting predictors of whether or not someone will dissociate at the time of a traumatic event. The other factor, how horrifying the event may be, is partially grounded in the event itself and the meaning of the event to the individual.

Locus of Control: RIEC and IPC

An internal locus of control has a small protective relationship with PTSD as shown by the negative correlations of the PI and CMS PTSD scales with Levenson's

Internal, and the fact that Rotter's score (high is external) is positively correlated with

PTSD. Hanna Levenson's *Chance* scale illuminates the external dimension of Rotter's

locus of control by showing that it is the Chance component that is predictive. That is,

the Chance score of Levenson's scale has a reliable positive correlation with the PTSD

scales and a robust positive correlation with the Rotter score. *Powerful others* is the other

external dimension of the Levenson instrument and indicates a belief that other people in

a position of power control what happens in your life. Powerful others did not reach

statistical significance in any of the correlations in the present study. Neither of these

scales specifically addressed belief in a supreme being and several subjects expressed

concern for the inability to indicate this in some way. However, both Rotter's external

questions and Levenson's Chance questions had some reference to such things as

'fortune' or 'fate' or 'what is going to happen, will happen.' Given the similar

performance of the Rotter score and the chance score, either one could be given equal

confidence.

<div align="center">

Risk Factors for PTSD-Regressions

</div>

Which variables explain the most variance for each scale? Current psychiatric

symptoms (GSI) account for most of the variance in all three PTSD scale scores.

Peritraumatic dissociation (PDEQ) is an important factor in the variance of all three

scales, especially the IES-R, with neuroticism being about equal to the PDEQ for the PI

and CMS. The IES-R was also sensitive to the experience of fear, helplessness and

horror. Because the neuroticism β is not a statistically reliable component of the IES-R

regression model, it would appear that the IES-R measures dissociation at the time of the

event due more to the experience of horror rather than to a trait anxiety as might be

indicated by a high neuroticism score. The PI and CMS scores are influenced by all factors in the model, with GSI, PDEQ, and neuroticism followed by locus of control, with horror accounting for the least amount of variance. Together these account for 47% (IES-R) to 60% (CMS) of the variance in the PTSD scale scores. This supports the importance of these factors in the development of PTSD. The importance of the top three factors in this study (prior history of mental illness, dissociation at the time of the event and feeling fear, helplessness and horror) is confirmed by a study of canine search and rescue handlers who were deployed to 9/11 disaster sites (Alvarez & Hunt, 2005).

Out of 62 individuals who did score above cut-off on at least one PTSD scale, 72% had psychological symptoms that reached cut-off on the GSI (45 of the 62 PTSD symptom positive individuals), while 27% (17 of the 62 of PTSD symptom positive individuals) did not. In this study, approximately 70% of the sample was below cut-off on the GSI using adult norms. Therefore it was necessary to complete further regression analysis with the GSI removed.

Because not everyone who experiences PTSD has other psychopathology, it is prudent to look at a regression analysis that does not include the GSI score. Without psychopathology, the most important factors in high PTSD symptomology expression are the tendency to dissociate at the time of the event (PDEQ), the personality trait of neuroticism and experiencing horror at the time of the event (horror). Peritraumatic dissociation is measured best by the IES-R, where the PI and CMS are more sensitive to neuroticism. As was discussed earlier, the IES-R had the lowest correlation to neuroticism.

Given that current psychiatric symptoms (GSI) account for most of the variance in the PTSD scale scores and that dissociation at the time of the event (PDEQ) is second, one might expect the presence of psychopathology to be the most important factor in whether or not this dissociation occurs. It is interesting that the presence of a psychiatric disorder (GSI score) was not the best predictor of peritraumatic dissociation, as shown above. Instead, the third factor in the regression model, horror at the time of the event, explained most of the variance in PDEQ scores with the tendency to dissociate second.

Based on these results, in a population with probable PTSD or a history of event exposure, prediction of PTSD symptom development is best achieved by administering the GSI to assess current psychopathology, the PDEQ to assess dissociation at the time of the event and then by asking about fear, helplessness and horror at the time of the event. However, for those individuals without psychopathology, the personality trait of neuroticism is also an important factor, justifying the addition of the Eysenck Personality Inventory (EPI) or the Eysenck Personality Questionnaire (EPQ). To predict the probable development of PTSD in a population that has not yet been exposed to traumatic events, the GSI of the SCL-90R (for psychopathology), EPI (for neuroticism) and possibly the DES (tendency to dissociate) can be recommended based on these results. Assessment of that non-exposure population for those individuals without psychopathology revealed that the tendency to dissociate and neuroticism remain as important factors.

Several authorities have advocated use of more than one scale to assess PTSD symptoms, even in a single study (National PTSD web site and M. Hammarberg, personal communication, March 9, 2006). Given the frequencies of those identified as

having high PTSD symptoms reported at the beginning of this analysis (the CMS being the lowest), and given the cut score and scale variability issues with the CMS and that the PI and the CMS seem to be similar in their correlations to many of the individual risk factors, dropping the CMS from the group of PTSD scales seems the wisest choice. Which is to say, if one wished to use more than one instrument to assess PTSD symptoms the PI and the IES-R are recommended.

Future Directions

Discriminant Analysis

As shown in this study, individuals identified with PTSD symptomology may depend on the scale used to assess PTSD. Persons scoring high (above cut-off) on one scale may not score above cut-off on the other two scales. There is some overlap, but there is also a subset of individuals who are uniquely identified by each scale. With a larger N, using discriminant analysis, it may be possible to determine if any one scale selects for particular risk factors. Put another way, one could ask whether individuals uniquely identified by one scale would answer items differently than individuals identified by the other two scales.

Contribution of Work Stressors to PTSD

Most PTSD event scales assess a broad spectrum of *life events* or are specific for combat. There are several occupations that expose workers to events that could be classified as *traumatic* on a fairly regular basis. These occupations include but are not limited to police, fire, EMS and nurses in critical care areas (ED, OR, ICU, CCU, NICU, etc.) of hospitals. Identifying exposure to work events that might be classified as

traumatic and are correlated with the development of PTSD symptoms could alert the

individual and the employer to those at risk. A prototype has been developed based on

the style of the Life Stressor Checklist-R. Events were identified by asking individuals in

selected professions (EMS and in-hospital nurses) to think of a traumatic event or events

that occurred to them at work and write down ten words relating to that event. Because

the current study included only a very small number of subjects (22) from only one of

these areas, it was not meaningful to assess the performance of this prototype. Because

so few participants could be obtained, the intermediate step of ranking the words or

events by another group was not completed. These events need to be standardized in this

manner and the instrument then given to a larger number of subjects and to other groups

within this overall occupational category. Development of stressor checklists particular

to police and fire/rescue occupations may also be productive.

P300 ERPs

An important body of research has shown a correlation between amplitude and

latency of various components of event related potentials and presence or absence of

PTSD symptoms (Attias, Bleich et al., 1996a; Attias, Bleich, Furman, & Zinger, 1996b;

Charles et al., 1995; Lewine et al., 1997; McFarlane et al., 1993; Metzger, Orr, Lasko,

Berry et al., 1997; Metzger, Orr, Lasko, & Pitman, 1997). Results of some studies are

contradictory and use of different waveform components make it difficult to compare

across studies. Boudarene and Timsit-Berthier (1997), Metzger, et al (2002), Metzger,

Orr, Lasko, Berry and Pitman (1997) and McFarlane, Weber and Clark (1993) found

decreased P300 amplitude to target stimuli when compared to controls; while others

found increased P300 amplitude to target stimuli (Attias, Bleich et al., 1996a; Metzger,

Orr, Lasko, McNally et al., 1997). However, all of these studies were in agreement on findings of a prolonged reaction time and increased latency of P300 in PTSD individuals compared to controls.

To investigate Event Related Potential (ERP) P300 relationship with the various risk factors in this study both personal variables and evoked-potential technology could be combined to see if a person's score on a PTSD questionnaire predicts their answers on assessment scales for these variables as well as their brain ERP to an auditory stimulus. This would allow exploration of the relationship between evoked potential waveforms, personal variables and degree of PTSD symptoms. A pilot study could use college student subjects, further investigations could explore the high stress work populations listed above.

Designs, using a general auditory task and others exercising stimulus specificity have been useful in bringing PTSD/non-PTSD differences to light. While a single risk factor may have been included in some studies, no one study has simultaneously addressed all the variables presented in this paper. Relating variation in P300 measurements to these personal risk factors for individuals with PTSD or at risk for developing PTSD (i.e., a high exposure work setting) could add another assessment tool to the area of PTSD research. Psychophysiology might be a particularly important tool because it would not rely on self-report data to screen for PTSD. Members of some professions may be prone to biased self-report assessments of their potential psychopathology.

Dissociation in Fiction Authors

The topic of dissociation as an event and a trait is a complex and interesting one. Writers are capable of extended periods of absorption in their work. Fiction authors in particular represent a group of individuals who seem to have a gift for imagining and placing themselves in other worlds and other situations. Higher trait dissociation and/or peritraumatic dissociation might be found in this population and therefore this might be an interesting research avenue.

Confirmatory Factor Analysis on DES in a College Student Population

Three similar factors have been found in the analysis of items on the Dissociative Experiences Scale but their relative standing and the items that load on each factor varies. In a sample that included clinical and non-clinical participants, 49% of the variance was accounted for by the following factors: amnesic dissociation (items 3, 4, 5, 6, 8, 10, 25, and 26), absorption and imaginative involvement (2, 14, 16, 17, 18, 20, 22, 23) and depersonalization and derealization (7, 11, 12, 13, 27, 28), Carlson, et al., and Schwartz and Frischholz as cited in Carlson and Putnam (1993). Using only the non-clinical participants, Carlson et al. (as cited in Carlson & Putnam, 1993) found that 40% of the variance was accounted for by the following: absorption and changeability 18% (items 12, 14, 15, 16, 17, 18 20, 23, 24), derealization 13% (items 3, 4, 7, 11, 12, 13, 28) and amnesic experiences 9% (items 5, 6, 8). With a larger sample, it would be interesting to see what factors and what item loadings are found in a college student population.

APPENDIX

APPENDIX A

Personal Communications

R. Kimmerling, May 2001

Data Sharing Agreement

M. Hammarberg, March 9, 2006

C. Marmar, April 2, 2001

D. Kaloupek, October 3, 2006

D. Blumberg, October 10, 2000

Scoring Procedures for Mississippi Scale

M. Davis, November 13, 2006

Rachel Kimerling, Ph.D.
San Francisco General Hospital
1001 Potrero Ave, Suite 2100
San Francisco, CA 94110
Phone: (415) 206-6447
Fax: (415) 206-3855
Rachelk@itsa.ucsf.edu

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UCSF

Department of Psychiatry, Langley Porter Psychiatric Hospital & Clinics

May 2001

Dear Colleague,

Thank you for your interest in the LSC-R. Due to an increased interest in the instrument, we have updated the information. Enclosed is an updated version of the Life Stressor Checklist, scoring options, a measure review, and a data sharing agreement for purposes of establishing the most up to date psychometric information. Please do not hesitate to contact me for further information.

Sincerely,

Rachel Kimerling

Rachel Kimerling, Ph.D.

Life Stressor Checklist Data Sharing Agreement

For purposes of maintaining the most up to date psychometric properties of the LSC-R, we are asking for a data sharing agreement from investigators using the instrument. Please fill out the attached questionnaire and return to:

Rachel Kimerling, Ph.D.
Department of Psychiatry
UCSF School of Medicine
San Francisco General Hospital
1001 Potrero Ave., Suite 2100
San Francisco, CA 94110
(415) 206-6447
FAX 206-3855
rachelk@itsa.ucsf.edu

Study Title_____

Institution: _BAYLOR UNIVERSITY - WACO_____

Population Characteristics: (please circle all that apply)

| Male | Veterans | Adult Student *(college)* | Ethnic Minority |
| Female | Civilians | Adolescent | Treatment-Seeking |

Design Characteristics:	YES	NO
Is the study cross-sectional?	☑	☐
Is the study longitudinal?	☐	☑
Will you administer the LSC-R on more than one occasion?	☐	☑
Will you assess PTSD?	☑	☐
Will you assess other psychopathology?	☑	☐
Did you translate the LSC into another language?	☐	☑

Please specify:_____

Please indicate your full contact information: mailing address phone fax and e-mail, even if you think we already have it:

Michalski, Renee

From:	Mel Hammarberg
Sent:	Thursday, March 9, 2006 6:31 PM
To:	Michalski, Renee
Subject:	Re: Penn Inventory

Dear Renee,

I am attaching the Penn Inventory with supporting material including instructions for scoring and initial normative data. Feel free to make as many copies as you need. I would appreciate it if you would not share copies with other professionals without prior consent. There is no charge for the use of the instrument for dissertation research.

I would strongly suggest using at least two or possibly three instruments in research on PTSD so that you can assess the cross-validation of the instruments themselves.

You can find considerable further information using "Google" to access "PTSD," which will take you to the National Center for PTSD. You can then access "Assessment" and "Adult Self-report Instruments" where you will find the Penn Inventory and a battery of other instruments as well. That should get you up and running.

If you have further questions, feel free to send an email. Good wishes.

Dr. Hammarberg
--- "Michalski, Renee" <Renee_Michalski@baylor.edu> wrote:

> Dr. Hammarberg:
> I am conducting research on individuals with PTSD
> for my doctoral dissertation. In reading your 1992
> article on the Penn Inventory, I noticed that it
> suggested contacting you for a copy of the actual
> instrument. Can you please tell me how to obtain a
> copy? I feel certain there must be other published
> sources by now but my search of either the Mental
> Measurements Yearbook or EBSCO host data base did
> not turn it up. I would appreciate your help.
> Thank you for your time in responding to this.
> Renee Michalski

From: Charles Marmar (4/2/01)
To: Renee Michalski

Re: PDEQ
Dear Renee:

The suggested cutoff score is an average score across items of 1.5 or greater.

Reference:

1996*   C.R. Marmar, D.S. Weiss, T.J. Metzler, & K.L. Delucchi. Characteristics of emergency services personnel related to peritraumatic dissociation during critical incident exposure. American Journal of Psychiatry, 153:94-102.

You have my permission to use the measure; good luck with your research

At 02:16 PM 4/1/01 -0600, you wrote:
Dear Dr. Marmar:

I am a doctoral student in the Dept. of Psychology & Neuroscience at Baylor University in Waco, Texas. I want to use the PDEQ (Peritraumatic Dissociative Experiences Questionnaire) as part of my doctoral research on PTSD. I have a copy of the instrument obtained from Ch. 14 in Assessing Psychological Trauma (1997) (Wilson & Keanne, Eds.) and have obtained a total score for my respondents. Do you have (or know where I can get) normative or cutoff score information?

Thanking you in advance for your time and assisstance,

Renee Michalski

Michalski, Renee

From:	Kaloupek, Danny G
Sent:	Tuesday, October 3, 2006 11:52 AM
To:	Michalski, Renee
Cc:	Kaloupek, Danny G
Subject:	Info re: Civilian Mississippi Scale

Mississippi Scale - civilian 35 items.pdf

Renee,

Your letter about the civilian mississippi scale was passed along to me. It appears that the research assistant who sent you material in 2000 sent the wrong version of the scale. It should have been the original version (attached), not the revised version which changed the directionality of item #2. The scoring instructions you describe apply to the original version, so item #2 is NOT reversed scored for the revised version you used.

We don't generally distribute the revised version of the scale because it lacks normative information. That said, it probably is better than the original in terms of clarity.

You might do a search of the PILOTS database (accessible via the National Center for PTSD website) to see if you can locate studies with undergraduates that offer guidance about a suitable cut score. The score of 107 is based on treatment-seeking outpatients and I expect it is too high for your sample. The National Vietnam Veterans Readjustment Study came up with a score based on a community sample (I believe it was around 86) that is probably more appropriate. Still, it would be advisable to find a directly applicable score in the published literature.

I hope this helps.

    -Danny Kaloupek

****
Danny Kaloupek, Ph.D.
Deputy Director
Behavioral Science Division
National Center for PTSD (116B-2)
VA Boston Healthcare System
150 South Huntington Avenue
Boston, MA 02130-4817 USA

Ph: 857-364-4144
Fax: 857-364-4501
eFax: 419-781-6681

Email #1: danny.kaloupek@va.gov
Email #2: kaloupek@bu.edu

BOSTON VA MEDICAL CENTER
VA New England Healthcare System (10N1)
150 South Huntington Avenue
Boston, MA 02130

October 10, 2000

[handwritten: mail ltr here on 9/28/06 asking about question #2 & cutoff]

In Reply Refer To: 116B-2
Behavioral Sciences Division
National Center for PTSD

Dear Ms. Michalski,

Thank you for your interest in the instruments developed at the National Center for PTSD, Boston. Enclosed you will find the Civilian version of the PTSD Checklist (PCL) that you requested from Dr. Keane. In addition, I have included psychometric information, scoring guidelines and related articles for this measure.

I hope this information proves useful to your work. If I can be of any further assistance, please do not hesitate to contact me at (617) 414-4335, or via electronic mail at *debbie.blumberg@bmc.org*.

Sincerely,

Debbie Blumberg
Psychology Technician
National Center for PTSD

Scoring Procedures for the Mississippi Scale
for Combat Related PTSD

Scoring procedures are as follows:

Each item receives a score of 1-5, with the following items scored in reverse order:

2, 6, 11, 17, 19, 22, 24, 27, 30, and 34

Add all items to obtain the total score which correctly classifies 90% of all subjects as PTSD or non-PTSD. Means for the three validation groups are as follows:

PTSD: 130 (sd = 18)
PSYCH: 86 (sd = 26)
Well-adjusted: 76 (sd = 18)

For the Spouse and Civilian Mississippi the scoring is the same.

There are no norms at this point for either the Spouse or the Civilian Mississippi.

Michalski, Renee

From:	Michael Davis
Sent:	Monday, November 13, 2006 10:30 AM
To:	Michalski, Renee
Subject:	Re: 1992 & 1997 article

Of course, I am happy to grant permission.

Michael Davis

Michalski, Renee wrote:

Dear Dr. Davis:

I am writing to ask your permission to use a portion of the schematic diagram
listing output targets of the amygdala in my dissertation entitled Assessment
of Personal Predictive Variable and Symptom Expression in Posttraumatic
Stress Disorder. This diagram is figure 2 in both your 1992 and 1997
articles. I am enclosing as an attachment what I would like to use.

Thank you very much for your consideration of this request.

Renee Michalski

Renee Michalski, M.S.
Dept. of Psychology & Neuroscience
Baylor University
One Bear Place
#97334
Waco, Texas 76798
254/710-2814

Note: Packages must be sent to the physical address:
Baylor Sciences Building
101 Bagby Avenue
Waco, Texas
76706

Michael Davis
Robert W. Woodruff Professor of Psychiatry, Behavioral Sciences and Psychology
Emory University
Department of Psychiatry
                                    Yerkes National Primate Center
                                    954 Gatewood Drive NE
                                    Atlanta, GA 30329
                                    Tel: 404-727-3591
                                    FAX: 404-727-3436
                                    Email: mdavis4@emory.edu

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