CLINICAL OVERLAP BETWEEN POSTTRAUMATIC STRESS DISORDER AND BORDERLINE PERSONALITY DISORDER IN MALE VETERANS

A Dissertation

by

CHRISTINA DANIELLE BOGGS

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2005

Major Subject: Psychology

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ABSTRACT

Clinical Overlap Between Posttraumatic Stress Disorder and

Borderline Personality Disorder in Male Veterans. (August 2005)

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The associated features, high rates of comorbidity and chronicity of Posttraumatic Stress Disorder (PTSD) and Borderline Personality Disorder (BPD) raise questions regarding the distinctiveness of the two disorders. The present study expands upon previous literature by providing an investigation of clinical features across two groups: PTSD only and comorbid PTSD and BPD in a sample of male veterans (n=178). Results suggest that the two groups were distinct, with the comorbid group displaying higher levels of depression, hostility, alcohol use and general psychopathology. Groups did not differ on rates of personal trauma, adult sexual abuse, childhood sexual abuse, attack, accident or disaster. The two groups did differ significantly on rates of childhood violence.

DEDICATION

To Jana Joseph, a beautiful friend, a gifted clinician and researcher

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I would like to extend my appreciation to each of my committee members. This includes the insightful and helpful editing of Dr. Amanda Jensen-Doss, the feedback of Dr. David Gleaves, and the guidance and support of Dr. Robert Heffer and Dr. Douglas K. Snyder. In particular, I would like to acknowledge my committee chair, Dr. Leslie C. Morey, for his mentorship throughout my graduate training at Texas A&M University. I would also like to extend my thanks to Dr. Patrick Calhoun, staff psychologist at the Durham Veterans Affairs Medical Center, who made this project possible.

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INTRODUCTION

A scholarly debate has ensued regarding the distinctiveness of the diagnoses of Posttraumatic Stress Disorder (PTSD) and Borderline Personality Disorder (BPD) (Herman, 1992a). Currently within the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV; APA, 2000), these two disorders are considered to be clinically and conceptually distinct with differing implications for both diagnostic assessment and clinical intervention. However, there is some speculation within the theoretical and empirical literature that perhaps PTSD and BPD are varying manifestations of the same clinical entity or that they each represent points on a spectrum of disorders (Lonie, 1993).

These questions have led some to call for various solutions, including an additional diagnosis incorporating features of both disorders to address a particularly complex clinical presentation often found in childhood trauma victims. This diagnosis, discussed by the DSM-IV workgroup, was referred to as Disorder of Extreme Stress and characterized clinically by personality changes as a result of exposure to extremely stressful situations (Pelcovitz, van der Kolk, Roth, Mandel, Kaplan & Resick, 1997; van der Kolk, Roth, Pelcovitz, & Mandel, 1993). Such an addition would have given credence to the current debate regarding the distinctiveness of PTSD and BPD by creating an entity which, in effect, would have encompassed the overlapping features.

This dissertation follows the style of *Journal of Consulting and Clinical Psychology*.

The aim of the present study is to examine the similarities and differences between these two disorders. The following sections provide a brief overview of the theoretical and empirical overlap of these disorders, describe some models that have been suggested to account for relations between the two disorders, and outline the aims and hypotheses that underlie the study.

Description of PTSD

PTSD is defined as a stress reaction characterized by re-experiencing the trauma, avoidance and increased physiological arousal. By definition, PTSD tends to be somewhat chronic in nature, lasting at least one month, with symptoms waxing and waning throughout the course of the disorder. Approximately one third of people with a lifetime history of PTSD fail to recover leading to chronic changes in affect, cognition, and interpersonal functioning (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

The DSM-IV (APA, 2000) diagnostic criteria for PTSD state that an individual must undergo a traumatic experience leaving them feeling helpless and in significant fear of imminent death or injury (Criterion A). Such traumatic experiences associated with the future development of PTSD often include motor vehicle accidents (MVA), natural disasters, sexual or physical assault, or combat exposure. Variables surrounding the trauma such as the intensity, extent to which the victim's life was threatened, and loss of life can influence the likelihood of developing PTSD. Victim characteristics including exposure to previous trauma, gender, age, socioeconomic status, and social support networks are also related to the onset of PTSD (Briere, 1992).

For a diagnosis to be made according to the established criteria, an individual must display at least one re-experiencing symptom (Criterion B). This may include flashbacks, nightmares, and intrusive and distressing memories of the traumatic event. Acute psychological distress and physiological reactivity (e.g., sweating, increased heart rate, increased respiration rate) in the face of reminders of the event may also constitute a re-experiencing symptom.

A diagnosis of PTSD also requires three or more symptoms of avoidance (Criterion C). This may involve effortful attempts to avoid thoughts, feelings, conversations, people, activities or places which remind an individual of a previous trauma. For example, many veterans avoid watching movies or television shows with war-related content. Additional symptoms in this category may include an inability to remember specific aspects of the traumatic event, despite great efforts to recall the details, feelings of detachment or estrangement from others, restricted range of affect, and a sense of foreshortened future. Finally, individuals must also have two or more symptoms of increased physiological arousal (Criterion D) to meet criteria for PTSD. This may be characterized by an increased startle response, insomnia, difficulty concentrating, irritability or angry outbursts, or hypervigilance for signs of danger.

Prevalence of PTSD. Although a substantial number of individuals endure a traumatic experience during their lifetime, only a select proportion develop PTSD. However, this group may be larger than originally thought given the frequently changing definition of trauma. As the commonly accepted definition of trauma shifts, prevalence

rates of PTSD also change due to PTSD Criterion A. In perhaps the most comprehensive study of its kind, the National Comorbidity Study interviewed 5877 individuals from around the U.S. and determined an overall PTSD prevalence of 7.8% (Kessler et al., 1995).

Description of BPD

The diagnosis of borderline personality disorder, according to the *Diagnostic and Statistical Manual of Mental Disorders 4th ed.* (APA, 2000), is characterized primarily by instability of relationships, emotions, and identity, as well as significant impulsive behavior. Examples of impulsive behavior may include reckless driving, excessive spending, high risk sexual behavior, drug use, gambling, and binge eating. Additional characteristics include parasuicidal behavior such as cutting, burning oneself, or direct suicide attempts. Paranoid ideation, dissociative phenomena, and intense anger have also been associated with diagnoses of BPD. Personality disorders, like personality, are generally believed to be relatively stable, but do fluctuate in severity and symptomatology (Livesley, 2001). Borderline personality disorder (BPD) is one of the most frequently studied personality disorders and is associated with high treatment utilization and extensive Axis I and Axis II comorbidity (Swartz, Blazer, George, & Winfield, 1990).

Although the etiology of BPD is unknown, many theories abound (Linehan, 1993; Jang &Vernon, 2001; Coccaro, 2001). The most commonly accepted explanation includes a combination of biological, psychological and social influences, including a

history of abuse or neglect. Some evidence for genetic transmission of the disorder has been established with the study of underlying traits associated with BPD such as affective lability and insecure attachment. However, a myriad of factors, such as: childhood sexual abuse, chronic nature of symptoms and age of symptom presentation (Skodol, Gunderson, Pfohl, Widiger, Livesley, & Siever, 2002; Sabo, 1997) may influence the prognosis of the disorder.

Prevalence of BPD. BPD is estimated to have community prevalence rates between 1.1% and 1.8% (Maier, Lichtermann, Klingler, Heun & Jallmayer., 1992; Samuels, Eaton, Bienvenu, Brown, Costa, & Nedstat, 2002; Swartz et al., 1990). Prevalence rates of BPD in psychiatric samples are much higher, ranging from 43% to 60% among psychiatric inpatients (Grilo, McGlashan, Quinlan, Walker, Greenfield & Edell, 1998; Zanarini, Gunderson & Frankenburg, 1989) and from 15% to 30% in outpatients (Loranger, Susman, Oldham, & Russakoff, 1987).

BPD/PTSD Relationship

Comorbidity Rates. It is well established that individuals often simultaneously present with both Axis I (clinical syndrome) and Axis II (personality disorder) diagnoses (Zanarini, Gunderson & Frankenburg, 1989). Dolan-Sewell, Krueger, and Shea (2001) report the percentage of individuals with an Axis II diagnosis who also meet criteria for an Axis I disorder ranges from 67% to 97%. They also note that the percentage of persons with an Axis I diagnosis that are comorbid for an Axis II diagnosis ranges from 13% to 81%. Thus, it is apparent that rates of Axis II diagnoses with a comorbid Axis I

diagnoses are high; however, reported rates of co-occurrence, in general, appear variable and somewhat unreliable. These wide ranges of co-occurrence are influenced by sample selection (e.g., inpatient, outpatient, or both) and type of assessment instruments (e.g., structured diagnostic interview, self-report, chart review). With respect to sample selection, higher rates of comorbidity are associated with greater levels of impairment and distress. Being under more distress may lead individuals to inpatient treatment settings where they are more closely monitored and have more frequent contact with health care professionals than in an outpatient treatment setting. Prevalence studies which sample from inpatients may find higher rates of comorbidity as a function of their chosen sample and are difficult to compare to studies that use an outpatient clinical population. Additionally, Zanarini et al. (1998) points out that another major flaw of many comorbidity studies is the failure to use interviewers who are blind to the condition of the participants. Interviewers who have previously read a patient chart, which includes a current diagnosis, may unintentionally be biased towards giving the patient the same diagnosis.

With regard to specific relationship of PTSD (an Axis I disorder) and BPD (an Axis II disorder), estimates are similarly variable. These comorbidity investigations can be separated into two groups, those that sample BPD patients and investigate Axis I diagnostic overlap and those that sample PTSD patients and investigate Axis II diagnostic overlap. Separation of these studies is important since varying rates may have implications regarding the relationship between the two disorders. Some disorders

may appear to be highly related when a specific patient population is studied, but may not appear to be as highly related when investigating a different patient population. An example might be anorexia nervosa (AN) and depression, studying comorbidity in a group of AN patients may yield a high rate of depression, whereas studying comorbidity in a group of depressed patients may yield a rather low rate of AN. Consequently, it is meaningful to separate comorbidity investigations into two groups: BPD patients with comorbid PTSD and PTSD patients with comorbid BPD.

In perhaps the most comprehensive study of Axis I comorbidity with BPD, Zanarini, Frankenburg, Dubo, Sickel, Trikha, Levin and Reynolds (1998) examined Axis I comorbidity with BPD by administering the SCID-IV, Revised Diagnostic Interview for Borderlines (DIB-R) and DIPD-III to an inpatient sample. Of note is the finding that 55% of the patients with BPD were also diagnosed with Posttraumatic stress disorder (PTSD), while only 21.6% of the non-BPD group had an additional PTSD diagnosis, a statistically significant difference. The only Axis I diagnosis found at higher rates than PTSD in the BPD group was major depressive disorder, which was present in 82.8% of the sample.

As part of the Collaborative Longitudinal Study for Personality Disorders (CLPS), a multi-site study, Yen et al. (2002) investigated rates of trauma and PTSD in four personality disorders. Axis II diagnoses were made using the Structured Clinical Interview for DSM-IV Axis I Disorders/ Patient Version (SCID), while Axis II diagnoses were based on the Diagnostic Interview for DSM-IV Personality Disorders

(DIPD-IV). The SCID Trauma Addendum was also used to gather information about patients' traumatic experiences. With regard to individuals who reported experiencing trauma, 51% of BPD patients had an additional PTSD diagnosis. This was significantly higher than the other personality disorders evaluated (schizotypal, avoidant, obsessive-compulsive PD's). Consistent with other findings that BPD patients report high rates of traumatic experiences (Herman & van der Kolk, 1987), 91.6% of individuals with BPD reported having a history of trauma.

Using both the SCID and the BPD section of the Structured Interview for DSM-IV Personality Disorders in a large study of outpatients, Zimmerman and Mattia (1999) investigated rates of overlap between BPD and Axis I pathology. Interviewers diagnosed PTSD in 35.6% of the patients with BPD; however, PTSD was diagnosed in only 11.1% of patients without BPD. Although they found a smaller percentage of overlap in their outpatient sample than Zanarini, Frankenburg, Dubo, et al. (1998), the rates of PTSD were still significantly different between patients with BPD and patients without BPD. Evaluating an outpatient sample substantially reduces the comorbidity rates, as they are likely to present with less severe psychopathology and subsequently less disorders than inpatients.

PTSD has been noted to be highly comorbid with dysthymic disorder, substance abuse, and major depression (Keane & Wolfe, 1990). A limited number of studies have specifically looked at the prevalence of personality disorders in patients diagnosed with PTSD. Southwick, Yehuda, & Giller (1993) evaluated a sample of male combat

veterans with a primary diagnosis of PTSD, which consisted of both inpatients and outpatients. BPD was diagnosed more often in the sample than each of the other personality disorder diagnoses. The authors also performed statistical analyses examining inpatients and outpatients separately but identified no group differences, contrary to the notion that inpatients are likely to exhibit greater comorbidity. In the sample as a whole, 76% had a diagnosis of BPD based on results from the Personality Disorder Examination.

In a study of Axis II comorbidity in combat veterans with PTSD, Bollinger, Riggs, Blake & Ruzek (2000) found substantially lower rates of BPD than Southwick and colleagues (1993). This study examined a significantly larger sample comprised solely of male inpatient combat veterans. PTSD was diagnosed using the Clinician Administered PTSD Scale (CAPS) and Axis II disorders were diagnosed with the SCID-II. Results indicate that although 79.4% of patients were diagnosed with at least one personality disorder, BPD was found in only 5.7% of the sample. Unfortunately, Southwick et al. (1993) did not report demographic information for their sample, nor do they provide mean years in combat, making it difficult to interpret these discrepant results. Another study examining rates of BPD comorbidity in outpatient combat veterans with PTSD, using the same measures, found comorbid BPD in 8.7% of the sample, with 45.2% meeting criteria for one or more personality disorders (Dunn, Yanasak, Schillaci, Simotas, Rehm, Soucheck, Menke, Ashton, & Hamilton, 2004). Orsillo, Weathers, Litz, Steinberg, Huska & Keane (1996) found more comorbid

diagnoses of BPD in an outpatient PTSD sample when compared to a non-PTSD sample, however, the differences did not reach statistical significance. In a sample of inpatient combat veterans, mixed PD (with BPD as primary features) was noted in 11.8% and BPD was noted in 5.8% of the sample (Faustman & White, 1989).

To further understand Axis II comorbidity with PTSD, Shea, Zlotnick and Weisberg (1999) used the Personality Diagnostic Questionnaire (PDQ) to evaluate PD diagnoses in three distinct trauma groups: combat veterans, inpatient females with history of childhood sexual abuse, and outpatient females with history of childhood sexual abuse. They found all three groups to be highly correlated with high rates of paranoid PD, schizotypal PD, borderline PD and self-defeating PD. In a follow-up study, Shea and colleagues (2000) compared personality disorder symptoms in individuals with PTSD, those with no trauma, and those with trauma but no PTSD. They found higher rates of BPD and self-defeating PD in the PTSD group than the other two groups, indicating that the development of BPD may be associated with the diagnosis of PTSD rather than a history of trauma. Type of trauma reported by the sample was quite varied with distribution as follows: 25% childhood sexual abuse, 16% childhood physical abuse, 15% witnessing a traumatic event as a child, 14% witnessing a traumatic event as an adult, 11% rape, 11% assault, 10% combat history, and 11% accidents. The study found the highest rates of PTSD in individuals reporting rape at 56%, closely followed by combat history at 48%, childhood sexual abuse at 49% and childhood physical abuse at 50%.

In comparing comorbidity rates in the two domains of studies, BPD with comorbid PTSD and PTSD with comorbid BPD, it is apparent that the rates differ. BPD patients more consistently show moderate to high rates of PTSD whereas the information concerning rates of comorbid BPD in PTSD patients is more variable. It is possible that the research involving Axis II comorbidity in PTSD patients is difficult to compare due to variability in methodology for assessing Axis II disorders and subsequently may not reflect accurate rates of BPD.

Associated Clinical Features. Research has illustrated that characteristics of BPD have also been linked to PTSD. Symptoms of BPD resemble the personality change that sometimes occurs in cases of enduring PTSD, including poor affect regulation, unstable interpersonal relationships, identity disturbance and impulse control (Herman & van der Kolk, 1987). Gunderson and Sabo (1993) point out that if several symptoms of PTSD endure over a long period of time, they may be seen as characteristics of BPD such as irritability, hypervigilance and feelings of detachment. It is not surprising that these two disorders have a high rate of co-occurrence within clinical samples.

Both disorders have also been linked to higher rates of treatment utilization. One study found that individuals with PTSD symptoms tend to seek help from medical or mental health professionals more frequently than non-PTSD controls (Amaya-Jackson, Davidson, Hughes, Swartz, Reynolds, George & Blazer, 1999). Calhoun et al. (2002) reported that veterans with PTSD under age 52 used more medical and mental health resources over a one-year period than veterans without PTSD in the same age group,

group differences were less robust for older veterans. Similar health care utilization data has been gathered for BPD. Several studies have demonstrated that BPD patients are likely to have significantly more psychiatric hospitalizations and outpatient visits for mental health treatment than psychiatric controls (Swartz et al, 1990; Zanarini, Frankenburg, Khera, & Bleichmar, 2001). Conner, Davidson, Hughes, Swartz, Blazer, & George (2002) investigated treatment utilization of individuals with symptoms of PTSD and BPD and found that compared to individuals without BPD, individuals with both PTSD symptoms and BPD exhibited greater functional impairment and had more outpatient mental health visits in the previous 6 months.

Self-injurious behaviors and suicidal gestures are frequently associated with the diagnosis of BPD and are, in fact, one of the defining criteria (APA, 2000). Self-mutilation by BPD patients is thought to be a response to dissociative experiences, regardless of history of childhood abuse (Brodsky, Cloitre, & Dulit, 1995). Studies indicate that suicide risk is also elevated in veterans with PTSD when compared to a non-PTSD psychiatric group and non-psychiatric controls (Hendin & Haas, 1991; Fontana & Rosenheck, 1995; Farberow, Kang, & Bullman, 1990). These risks are elevated in civilians with PTSD; Tarrier & Gregg (2004) found that 56% of a sample of PTSD patients endorsed suicidal ideation, 8.5% reported having made suicide plans, and 9.5% reported making a suicide attempt since the traumatic event.

Possible Models for Understanding Comorbidity

In an effort to further understand how these two disorders may relate to one another, it is useful to consider alternative models of the nature of such relationships. For example, Dolan-Sewell et al. (2001) describes several ways of conceptualizing this kind of Axis I and Axis II comorbidity that could be applied to the high rates of comorbidity found with BPD and PTSD. Three of these models are described below and discussed with respect to the two disorders in question. First, the common risk factor model postulates a shared underlying factor. This model does not presume the two diagnoses to have similar presentations, simply that some component of the underlying cause-genetic, biological, environmental, etc.-is shared. If the etiology of BPD is based on previous traumatic experiences, as has been theorized, then this model could viably explain the overlap in BPD and PTSD. Second, the spectrum/subclinical model indicates that the disorders have some relationship in terms of both etiology and "mechanisms of action." Thus, the two are not seen as qualitatively distinct entities and are conceptualized as occurring along a continuum of mild to severe pathology. Again, the presentation may not necessarily be identical. Within this model, PTSD may be a less severe variant of BPD. The spectrum model is consistent with the development of "complex PTSD" after chronic exposure to trauma, a condition hypothesized to have symptoms which are similar to those found in BPD (Herman & van der Kolk, 1987). Finally, third predisposition/vulnerability model hypothesizes that the development of one disorder both temporally precedes and increases the risk of developing the other

disorder. The first disorder is not a necessary condition for development of the second disorder, but may serve as a contributing factor.

Common Risk Factors Model. One possible reason for high rates of comorbidity between PTSD and BPD may be common risk factors. Chronic trauma has been both theorized and empirically demonstrated to lead to increased risk for the development of pathological personality characteristics (Herman, 1992a; Johnson, Cohen, Brown, Smailes, & Bernstein, 1999). Traumatized children tend to have very visual and repetitious memories, exhibit repetitive behaviors, have trauma-specific fears, and changed attitudes about others, life and the future. These changed attitudes may color future behavior patterns, resulting in a personality disorder diagnosis. Herman (1992a) discusses how individuals abused as children discover ways to adapt including the development of dissociative defenses, development of fragmented identity, and the pathological regulation of emotional states. Such changes in cognition, affect and behavior are very characteristic of BPD.

Experiencing a traumatic event is clearly a key component of PTSD and the symptoms are thought to be a response to that experience. Based on the information presented above it appears as though experiencing trauma, especially in the important developmental phases of childhood, is an important etiological factor in the development of BPD, as well. The mechanism by which the traumatic experience causes the eventual development of a unique symptom cluster is not clear; however, within this common cause model, the mechanism is thought to be similar for each disorder.

Recent epidemiological estimates of trauma indicate that the majority of Americans have endured a traumatic experience qualifying as an extreme stressor (e.g., severe MVA, natural disaster, child abuse, domestic violence) in which a person felt terrified and feared for his or her life. Current estimations of lifetime exposure to traumatic events range from 40-90% (Breslau, 2002; Kessler, Sonnega, Bromet, Hughes & Nelson, 1995). Norris (1992) reported that 69% of a sample reported trauma history. This finding is consistent with results reported by Kessler et al. (1995) in a comprehensive study of 2800 men and 3000 women, which found that 61% in men and 51% of women reported at least one traumatic event in their life. The highest rate of trauma reported in the literature was by Breslau (2002), who reported that these high rates of trauma are not limited to adults; a study of children and adolescents found that 25% (n=1,420) had experienced an extreme stressor or a high magnitude event (Costello, Erkanli, Fairbank, & Angold, 2002).

Prevalence rates of trauma have varied due to differing definitions of abuse, survey methods, and sample selection. Breslau (2002) offers a possible suggestion that the increasing rate of trauma exposure in America is due to changes in the DSM-IV definitions of what constitutes an "extreme stressor". The current definition of an "extreme stressor" has been broadened to include vicarious traumatization and any event which evokes feelings of helplessness and horror (APA, 2000). McNally (2003) acknowledges the breadth of this criterion and suggests that within the broad array of traumatic experiences, many diagnostically significant distinctions can be made. In

particular, he criticizes survey methodology used in post-9/11 research for pathologizing normal reactions to terrorism.

Multiple investigations of lifetime traumatic experiences in veterans with combat-related PTSD suggest that previous experiences of trauma increase one's statistical risk for future traumatic experiences (Davidson, Hughes, Blazer & George, 1991; Kulka, Schlenger, Fairbank, Hough, Jordan, Marmar, & Weiss, 1990; Zaidi & Foy, 1994; Bremner, Southwick, Johnson, Yehuda, & Charney, 1993). This trend may be important in understanding comorbidity rates of PTSD and BPD if indeed a relationship exists between the type of traumatic experience one endures and their subsequent symptom presentation. One study found that the majority of veteran respondents, 96%, endorsed a previous traumatic experience at some point during their lifetime. Specifically, that study found that 69% of participants endorsed some type of childhood victimization, 41% was in the form of sexual assault and 60% in the form of physical assault. Investigating a non-veteran sample, Breslau, Chilcoat, Kessler, and Davis (1999) used a telephone survey approach to evaluate history of trauma and PTSD symptoms in the general population. Their findings suggest that individuals with 2 or more previous traumatic experiences have approximately 5 times greater risk of being exposed to a traumatic event that will lead to the development of PTSD. The mechanism by which previous trauma increases one's risk for experiencing further traumatic events remains unclear.

The finding that individuals exposed to trauma are likely to have experienced multiple traumas poses a methodological obstacle related to how the diagnosis of PTSD is determined. Many clinicians and researchers make the criterion A diagnosis based upon the "worst trauma" considering that individuals may have been exposed to multiple traumas. This contaminates research that seeks to parse out differences between groups that have experienced different types of traumatic experiences. One study examined a causal model of PTSD in female combat veterans by determining the contribution of combat trauma and military sexual abuse to the diagnosis. Using a path analysis, Fontana, Schwartz, and Rosenheck (1997) determined that sexual abuse while in the military and combat trauma in female veterans were equally important in the eventual development of PTSD and the effect was mediated by homecoming reception and social support. Research of this kind offers an opportunity to examine the similarities and differences in clinical outcomes of adult sexual assault and combat-related trauma, which are commonly noted as precipitants of a posttraumatic stress reaction.

However, there are limitations to this conceptualization of shared traumatic etiology. It is possible that the type of experience necessary to produce personality change associated with BPD may be more inclusive than the physical abuse, sexual abuse and physical neglect that are typically assessed. Rates of child abuse trauma in BPD samples ranges from 49-71% (Gunderson & Sabo, 1993, Herman & van der Kolk, 1987, Laporte & Guttman, 1996, Ogata, Silk, Goodrich, Lohr, Westen & Hill, 1990, Zanarini et al., 1998), meaning that a substantial number of individuals diagnosed with

BPD were not victimized as children. In a meta-analysis of studies examining the interface between childhood sexual abuse and BPD, a pooled r of .279 was found for the association between childhood sexual abuse and BPD. According to Cohen (1992), this effect size is small-medium. Based on this moderate effect, the authors postulate that childhood sexual abuse is not a major causal antecedent of BPD, but rather may be related to specific BPD features such as stress-related dissociation. Furthermore, given that this meta-analysis only included published studies, this effect size may be an overestimate of the true relationship between childhood sexual abuse and BPD.

Paris (2001) points out problems with the logic that childhood sexual abuse is the primary cause of BPD, stating that the etiology of BPD must be more complex than simply the presence of childhood sexual abuse as there is a subsection of patients with BPD who were not abused as children. He suggests that methodological problems are pervasive in the literature linking BPD and trauma, such as lack of attention to type, frequency, or severity of trauma. In addition, he indicates that this body of literature fails to address third variables such as parental pathology and parenting practices. Although he admits that it is possible that childhood sexual abuse may play a role in the development of BPD, Paris asserts that there are probably other etiological factors at work.

Spectrum Model. According to Dolan-Sewell et al.'s (2001) models for comorbidity, the spectrum model has been heavily emphasized in literature reviews. For example, Gunderson and Sabo (1993) explored conceptual links between the two

disorders, proposing that the relationship between the two disorders is the vulnerability associated with chronic trauma. Repeated and early trauma destabilizes an individual's ability to develop an identity since their interactions with the outside world are dangerous and threatening. In other words, from this perspective the core symptoms of the two disorders, involving the understanding and conceptualization of others and the world, are the same.

Researchers have explored the notion that some comorbid presentations of these two disorders can be subsumed by one diagnosis, complex PTSD. The construct of complex PTSD is embodied by chronic trauma resulting in personality change which is characterized by traits similar to those found in patients with BPD (Herman & van der Kolk, 1987; Roth, Newman, Pelcovitz, van der Kolk, & Mandel, 1997; Zlotnick, Zakriski, Shea, & Costello, 1996). Both complex PTSD and BPD are suggested to be characterized by disruptions in affect regulation, relationships, and identity. The risk taking behaviors in these two groups are conceptualized as either reenactment of the traumatic experience or a maladaptive attempt to distract oneself from the recurring intrusive memories of the trauma.

Herman (1992a, 1992b) discusses the symptoms of complex PTSD. First, the individual is required to have suffered history of "totalitarian control" for months or even years. She cites examples of this type of victimization, such as concentration camp survivors, domestic abuse victims, and victims of childhood physical or sexual abuse. Second, she describes alterations in affect regulation, which may include self-injurious

behaviors, suicidal ideation, and explosive anger. The third symptom includes alterations in consciousness which may be characterized by the reliving of traumatic experiences, dissociation, depersonalization, and amnesia. Fourth, Herman discusses the presence of alterations in self-perception such as shame, sense of helplessness and stigma. A fifth symptom is adjustments in perception of the perpetrator such as becoming preoccupied with the perpetrator, attributing an unrealistic amount of power to the perpetrator, feeling a special bond with the perpetrator or having gratitude towards the perpetrator. Sixth, Herman notes relationship difficulties characterized by withdrawal, distrust, search for rescuer and failure to protect themselves within relationships. A seventh and final symptom of complex PTSD is alterations in belief systems, such as sense of hopelessness or loss of faith.

Cloitre, Koenen, Gratz, and Jakupacak (2002) echo the sentiment that complex PTSD is, in fact, somewhat distinct from PTSD and more comparable to BPD. However, Cloitre et al. point out that evidence appears to be variable regarding the distinctiveness of this diagnosis from simple PTSD, as simple PTSD does occur without complex PTSD, yet, complex PTSD does not tend to occur without the presence of simple PTSD. This may not be inconsistent with the spectrum model as it may be possible to exhibit features of simple PTSD without complex PTSD at the milder end of the spectrum and to exhibit features of both simple and complex PTSD at the severe end of the spectrum.

Although there is no recognition of "complex PTSD" in the DSM, Herman (1992a) indicates that the relevant DSM-IV work-group suggested the designation of "disorder of extreme stress not otherwise specified" (DESNOS). Thus, the least extreme stress reaction would be adjustment disorder whereas the most extreme reaction would be this new, complex form of PTSD. Herman also stated that the ICD was considering a similar condition called "personality change from catastrophic experience." Zlotnick et al. (1996) found that DESNOS was statistically significantly related to having a history of sexual abuse during childhood, a trend also noted in BPD as discussed previously (Herman, Perry, & van der Kolk, 1989; Landecker, 1992). Roth et al. (1997) reports that the decision not to include complex PTSD in the DSM-IV was based on lack of information regarding whether complex PTSD is a distinct subtype of PTSD or whether it is a marker of more severe PTSD symptoms. Although the final DSM-IV did not include DESNOS nor Complex PTSD, it does qualify the PTSD diagnosis by adding that many associated features may be present, especially when the stressor is of an interpersonal nature (APA, 2000).

"The following associated constellation of symptoms may occur and are more frequently associated with an interpersonal stressor (e.g., childhood sexual or physical abuse, domestic battering): impaired affect modulation, self-destructive and impulsive behavior; dissociative symptoms; somatic complaints; feelings of ineffectiveness, shame, despair or hopelessness; feeling permanently damaged; a loss of previously sustained beliefs; hostility; social withdrawal; feeling constantly threatened; impaired

relationships with others; or a change from the individual's previous personality characteristics (APA, 2000, p.465)."

This paragraph explicitly mentions 5 of 9 BPD symptoms, the same number of symptoms required for a BPD diagnosis. It is of note that although a number of the symptoms may be present, the DSM does not include BPD in the Differential Diagnosis considerations for PTSD. In addition, the distinction between stressors of an interpersonal nature (i.e., domestic violence, childhood sexual or physical abuse or assault) and those of a non-interpersonal nature (i.e., witnessing an act of violence or act of terror) may embody the distinction between BPD and PTSD. However, it is unclear what constitutes an interpersonal stressor. For example, there are arguments for categorizing trauma associated with combat experience as interpersonal as well as non-interpersonal. The demarcation between what is interpersonal and what is not has not been determined nor well-defined. Perhaps this distinction of interpersonal and non-interpersonal trauma is more useful than the distinction between prolonged and acute trauma in understanding what type of traumatic events lead to the development of complex PTSD rather than simple PTSD.

Moreau and Zisook (2002) provide a model for understanding PTSD as a spectrum disorder. They indicate that patients with PTSD vary along three continua: 1) symptom severity 2) nature of stressor and 3) potential responses to trauma. Their model includes BPD as an additional or different response to trauma along the spectrum of potential responses. In fact, these authors propose that many diagnosticians

misdiagnose patients, giving them the label of BPD when they should be diagnosed with chronic PTSD. This chronic PTSD can result in personality change that should not be mistaken for BPD. However, from this model, it is not clear whether a person develops BPD rather than PTSD is related to the symptom severity or nature of the trauma, as has been discussed previously (i.e., prolonged versus acute), or the nature of the stressor. Furthermore, the authors do not clarify how to distinguish between the two disorders.

Arguments have also been presented against a spectrum conceptualization, typically in favor of considering the disorders as distinct entities. Cloitre, Koenen, Gratz, and Jakupacak (2002) present an argument, in their chapter on differential diagnosis of PTSD, that there are clear distinctions between PTSD and personality disorders. First, the nature of the trauma may have influenced rates of comorbidity between PTSD and Axis II personality disorders. As mentioned previously, Axis II pathology may be more frequently associated with chronic trauma, whereas such high rates of comorbid Axis II conditions are not found in individuals with acute or distinct traumatic experiences. Second, the authors point out that PTSD and PD's do not always overlap, indicating that they are two separate conditions. Third, the presence of PTSD with an additional PD diagnosis appears to influence the clinical features in such a way that they are distinct from individuals without an additional PD diagnosis. More specifically, Cloitre et al. assert that one way PTSD differs from BPD is treatment effectiveness. They review studies looking at the presence of an additional BPD diagnosis on treatment outcome and findings consistently show that individuals with

only PTSD have better treatment outcome than individuals with an additional BPD diagnosis. This finding was replicated across group and individual psychotherapy.

However, these arguments are not necessarily inconsistent with the idea of a spectrum disorder which includes features of PTSD and BPD. It makes sense according to the spectrum model, that having additional BPD features, or being farther along the spectrum, is related to worse treatment outcome. Additional arguments for the distinctiveness of the two disorders include the fact that a significant portion of individuals with BPD (approximately 20%) do not have a history of CSA and that there are symptoms consistently associated with a diagnosis of PTSD which have not been empirically linked to BPD (e.g., insomnia, nightmares, flashbacks).

Predisposition/Vulnerability Model. This model purports that some aspect of having one disorder increases the likelihood of developing the other. The vulnerability model does not require that the etiologies or symptoms of the disorders are related or similar at all. Dolan-Sewell et al. (2001) postulates that perhaps personality features, such as those associated with BPD, may represent risk factors for future trauma exposure and PTSD. However, it also seems an equally viable possibility that previous trauma rather than features of BPD itself may represent a risk factor for future trauma, given that BPD is often associated with a history of childhood trauma (Herman and van der Kolk, 1987).

Given the preponderance of findings indicating that BPD seems to be associated with high rates of self-reported childhood abuse, major theorists have altered their

understanding of the disorder to include the experience of childhood abuse. For example, Gunderson and Chu (1993) call for a revision in the conceptualization of BPD that integrates the experience of traumatic events as a significant factor in the development of this disorder. The conceptualization provided suggests that rather than childhood abuse directly causing BPD, the traumatic experience serves as a manifestation of disruptions in normal parental attachment and nurturance which subsequently result in distorted character development. Similarly, Briere (1992) hypothesizes that the series of events most likely to result in future BPD include problems with attachment figures early in development followed by severe and chronic maltreatment during childhood. He does admit that it is possible that any type of childhood maltreatment could result in a diagnosis of BPD; however, childhood sexual abuse appears to be most likely to lead to this pattern of symptoms.

Chronic trauma has been both theorized and empirically demonstrated to lead to increased risk for the development of pathological personality characteristics (Herman, 1992b; Johnson, Cohen, Brown, Smailes, & Bernstein, 1999; van der Kolk, Hostetler, Herron, & Fisler, 1994). Traumatized children tend to have very visual and repetitious memories, exhibit repetitive behaviors, have trauma-specific fears, and changed attitudes about others, life and the future. These changed attitudes may color future behavior patterns, resulting in a personality disorder diagnosis. Herman (1992a) discusses how individuals abused as children discover ways to adapt including the development of dissociative defenses, development of fragmented identity, and the pathological

regulation of emotional states. Such changes in cognition, affect and behavior are very characteristic of BPD.

Specific Aims and Hypotheses

The current study elaborates upon previous research by examining the similarities and differences between PTSD patients who manifest features of BPD and PTSD patients who do not. Specific aims include 1) to determine whether these groups differ significantly on measures of PTSD symptom frequency and severity, 2) whether these two diagnostic groups differ on associated clinical features such as aggression, hostility, depression, self-injurious behavior, alcohol use, and finally 3) to further clarify whether BPD/PTSD and PTSD only patients differ with respect to the nature of previous trauma. The present study also expands upon the existing literature by focusing on males, whereas previous clinical research has largely reflected these diagnoses in women. Additionally, the inclusion of analyses of previous traumatic experiences will provide information about psychological correlates of early developmental trauma.

If noteworthy qualitative differences are found between groups, this will suggest that the two disorders may represent somewhat distinct entities as the comorbid diagnosis of BPD yields additional information to the clinical picture. Should PTSD symptom severity differ between groups, such findings may offer evidence of BPD as perhaps representing a more severe variant of PTSD. Based upon previous literature, it is hypothesized that the comorbid group will display more severe clinical features associated with both diagnoses. With respect to previous trauma, it is believed that the

comorbid group will display higher rates of childhood sexual abuse and childhood violence compared to the PTSD only group.

METHOD

Participants

Archival data were analyzed from male veterans seeking evaluation and treatment for PTSD between 1997 and 2002 at a specialty outpatient PTSD clinic at a VA hospital in the southeastern United States. Patients presenting to this clinic complete a diagnostic evaluation for the presence and severity of PTSD diagnosis. Interviews were conducted by a licensed clinical social worker, a master's level psychologist, and two licensed clinical psychologists. A clinical psychologist supervised all evaluations.

Individuals were excluded from the study if their PAI profile was determined to be invalid based upon the Roger's Discriminant Function (RDF; Rogers, Sewell, Morey, & Ustad, 1996) over 0.12368 (the cutoff recommended by Rogers et al.) and Inconsistency scale (ICN) t-score above 70t. Two-hundred and seventy participants were excluded based upon validity indicators. This finding is not surprising because, due to the secondary gain involved in the diagnostic process, veterans often apply for service connection for PTSD based upon these evaluations which may result in being awarded monetary compensation for their disability. A total of 178 participants were included in the present study.

Sociodemographic Characteristics. The marital status at the time of the evaluation is as follows: 38.2% married, 27.52% were divorced, 11.79% were remarried, 10.67% were separated, 2.24% were widowed, and 9.55% were never married. Within the current sample, 46.32% were Caucasian, 49.71% were African-American, 1.12%

were Hispanic-White, 0.56% were Hispanic-Black, 0.56% were American-Indian, and 1.69% identified themselves as other. The large majority of the sample is comprised of Vietnam War veterans (77%), with the remainder made up of 2.8% WWII veterans, 0.6% Korean War veterans, 1.7% Between Korean and Vietnam War, 5.6% Post-Vietnam war veterans, and 12.4% Persian Gulf War veterans. The average age of the sample was 53.33 (SD=8.91) and ranged from 27-87.

Measures

The *Personality Assessment Inventory* (PAI, Morey, 1991) is a 344 item measure of psychopathology which consists of 4 validity scales, 11 clinical scales, 5 treatment scales, and 2 interpersonal scales. Most of the clinical scales are broken into 3-4 subscales that offer further clarification of the client's symptom presentation. These non-overlapping scales were created using content-driven scale development. Items responses reflect four possible variations of endorsement (i.e., false, slightly true, mainly true, and very true). This instrument was written at a 4th grade reading level.

The *Clinician Administered PTSD Scale* (CAPS-1; Blake, Weathers, Nagy, Kaloupek, Klauminzer, Charney, & Keane, 1990) is a semi-structured clinical interview commonly used to evaluate symptoms of PTSD over the past month and determines frequency and intensity of each symptom. Since the CAPS covers all DSM-IV criteria for PTSD, it is one of the most common tools for diagnosing PTSD and has been used in a multitude of research studies. The CAPS has been determined to have excellent inter-rater reliability (.92-.99) and internal consistency (alpha=.90), as well as, convergent and

discriminant validity (see Weathers, Keane, & Davidson, 2001, for review). Within the present sample, interrater agreement among clinicians was excellent (kappa=.92), based upon the convergence of ratings of 5 taped CAPS interviews conducted by different clinicians.

The *Minnesota Multiphasic Personality Inventory-2* (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen & Kaemmer, 1989) consists of 567 items designed to assess for numerous clinical syndromes with 10 overlapping clinical scales. This instrument forces individuals to respond with either true or false. This instrument was used to evaluate group differences in overall MMPI-2 profiles, PTSD symptoms and other personality disorder symptoms.

Self-injurious behaviors were assessed using the *Habit Questionnaire* (Resnick & Weaver, 1994), which includes items such as nail biting, chewing on lips, cheek biting, grinding or clenching teeth, picking or scratching at skin, hair pulling, cutting, punching inanimate objects, hitting one's self, and burning one's self. Patients are asked to indicate if these behaviors have occurred over a 2-week period and if so, how many times. A recent investigation of self-injurious behavior, health and PTSD symptoms reported an internal consistency for this measure of 0.67 after removing burning and cutting from the analyses due to their low base rate (Weaver, Chard, Mechanic, & Etzel, 2004). In this study, groups were evaluated for differences on presence and frequency of self-injurious behaviors.

The *Beck Depression Inventory-II* (BDI-II; Beck, Steer & Brown, 1996) is a widely used measure of depression (e.g., crying, anhedonia, memory changes, etc.). The measure instructs examinees to choose the sentence that best describes the way they have been feeling over the course of the past two weeks and offers them 4 statements from which to choose. The BDI-II was found to demonstrate adequate internal consistency in the present sample, α=.77 (Osman et al, 1997).

The *Traumatic Life Events Questionnaire-Veteran Version* (TLEQ-Veteran; Kubany, 1995) includes 24 questions regarding a wide variety of traumatic life experiences and evaluates the frequency, subjective rating of fear, serious bodily injury, occurrence relative to military experience and age of occurrence. The questionnaire includes information about natural disasters, motor vehicle accidents, other accidents, combat trauma, unexpected death of friend or family member, life threatening event of a loved one, life threatening illness, robbery with weapon, physical assault by stranger, witness to physical assault by a stranger, threats of bodily harm, childhood physical abuse, witness domestic violence, domestic abuse, childhood sexual abuse by elder, childhood sexual abuse by peer, teenage sexual assault, adult sexual assault, stalking, miscarriages, and abortions. Additionally, this measure allows for the reporting of events not included in the scale and asks examinees to identify the one event that caused the most distress.

The *Combat Exposure Scale* (CES; Keane, Fairbank, Caddell, Zimering, Taylor, & Mora, 1989) is a 7- item questionnaire evaluates the extent to which an individual was

involved in combat. This measure was created with a sample of Vietnam-era veterans to assess subjective report of wartime exposure for utilization in clinical research. The authors report that test-retest reliability was found to be 0.97, while internal consistency was 0.85.

Hostility and aggression were measured with the *Cook-Medley Hostility Scale* (Cook & Medley, 1954). This form of the original scale is comprised of 27 MMPI items selected based upon empirical analyses and has demonstrated good reliability and validity (Smith & Frohm, 1985). Factor analytic studies found two primary factors, identified as Cynicism and Paranoid Alienation (Costa, Zonderman, McCrae & Williams, 1986).

*The Alcohol Use Disorders Screening Test (*AUDIT*;* Babor, T. F., de la Fuente, J. R., Saunders, J., & Grant, M.,1989) is a short face-valid measure of alcohol use. The AUDIT has been found to have good test-re-test reliability at a 6 week interval (r=.88) and internal consistency coefficients ranging from 0.38-0.69 for all items (Daeppen, Yersin, Landry, Pecoud, & Decrey, 2000)

Procedures

Data were collected from initial evaluations of PTSD in male treatment-seeking veterans evaluated in a PTSD specialty clinic. Veterans were either self-referred or referred by another treatment provider within the hospital who felt the patient may be likely to meet criteria for PTSD. All veterans included within the sample had been exposed to an experience that was subjectively rated as traumatic.

Cell Assignments. Two groups of interest are defined in the present study: PTSD diagnosis only and both PTSD and BPD diagnoses. Patients were diagnosed with PTSD if they received a positive diagnosis of PTSD based upon the CAPS interview. The CAPS corresponds with the DSM-IV criteria for PTSD and symptoms were considered present based upon the Frequency ≥ 1/Intensity ≥2 rule which has been shown to provide good diagnostic utility; see Weathers, Keane, & Davidson (2001) for a thorough review of the use of the CAPS as a diagnostic tool for PTSD. The PAI-BOR subscales were used collectively as a diagnostic indicator of BPD; the PAI-BOR scale has been demonstrated to provide efficacious diagnostic information about BPD. Trull (2001) found zero-order correlations between the PAI-BOR scale and the Structured Interview for DSM-IV Personality (SIDP) to be $r=.69$ ($p<.001$) and $r=.77$ ($p<.001$) for the Revised Diagnostic Interview for Borderlines (DIB-R).

Veterans were assigned to the PTSD-only group if they did meet criteria for PTSD based upon the CAPS interview and had no PAI-BOR subscales above 70T. Individuals with PTSD who had three of four BOR subscale above 70t were considered to have an additional diagnosis of BPD. Given that Trull (2001) identified the BOR scale along as an adequate tool for diagnosing borderline personality disorder, we chose to require three subscale elevations as a more stringent indicator of BPD. Similarly, to ensure that the two groups are diagnostically distinct, the PTSD only group was restricted to only those without any BOR subscales above 70t. Because few veterans failed to meet criteria for PTSD, given the nature of the clinical setting, it was not

feasible to create a non-PTSD control group. Ultimately, the PTSD-only group was comprised of 101 veterans, while the PTSD+BPD group was made up of 77 veterans.

Overview of Analyses

The primary analyses involve comparisons between PTSD only and PTSD+BPD groups on a variety of continuous as well as dichotomous variables. For continuous variables, estimated power to detect at least moderate group effect size exceeds .80, while the power to detect a difference in proportions in childhood abuse, based upon published rates for PTSD and BPD, equals .80 at an alpha of .05 (Fleiss, 1981). The primarily analytic strategy involved t-tests for group differences on the CAPS and DTS severity ratings, with the DTS subsequently used as a covariate for further analyses aimed at detecting group differences on a variety of clinical measures, including the Habit Questionnaire (self-injurious behavior), AUDIT (alcohol use), BDI-II (depression), Cook-Medley Scale (hostility/aggression), PAI, and MMPI-2.

In order to detect differences on types of previous traumatic experiences, chi-square analyses were conducted on the dichotomous variables created on the TLEQ. To identify whether these findings remained significant while controlling for PTSD severity, logistic regressions were used to allow for the use of a covariate and the analysis of categorical variables. Further, a principal components analysis was conducted to detect underlying themes within the trauma types on the TLEQ. Group differences were determined using an ANCOVA on the primary factors identified in the PCA.

Due to the extensive number of analyses included within this study, Bonferroni corrections were applied to findings based upon a "family" approach which groups together families of variables. For example, the Bonferroni was calculated separately for variables on the MMPI-2, the PAI, and the TLEQ. Analyses were conducted on all of the MMPI-2 and PAI scales in order to offer more clinical data, particularly as the clinical and validity scales of these personality measures are rarely used alone in clinical settings.

RESULTS

Groups did not differ significantly by age, SES based upon the Hollingshead Index of Social Position, or work status. A correlation matrix, presented in Table 1, presents the intercorrelations between variables included within the study, including those used for diagnostic purposes. As expected, the PAI BOR subscales were highly correlated with the total BOR scale though not as highly correlated with one another. The total CAPS score was correlated 0.53 with the total score on the Davidson Trauma Scale and 0.53 on the Mississippi Scale for Combat-Related PTSD. Total combat exposure was not highly correlated with any other measure.

PTSD Symptom Frequency and Severity

Results of ANOVAS comparing groups on frequency and severity of PTSD symptoms on the Davidson Trauma Scale revealed significant differences in both severity and frequency. On the DTS, the PTSD-only group was found to display lower severity ($F(1, 172) = 66.78$, $p<0.001$) and frequency ($F(1, 172) = 43.26$, $p<0.000$) of PTSD symptomatology than the PTSD+BPD group. Further analyses of the CAPS symptom cluster intensity and frequency scores identified statistically significant differences on criterion B, C, D, and overall ratings. These results are presented in Table 2. In order to determine whether group differences may be attributed to the additional diagnosis of BPD rather than PTSD severity, the DTS severity score was used as a covariate for the remainder of the analyses.

Combat Exposure

Using an ANCOVA, groups were evaluated for differences in exposure to war zone violence on the Combat Exposure Scale. No statistically significant differences were found, suggesting relatively equivalent exposure to combat during their military service, ($F(1, 173) = 0.195$, $p < 0.823$). Mean combat exposure score in the PTSD only group was 20.22 (SD=11.23) while the mean for the comorbid group was 20.12 (SD=12.77), both falling within the moderate range of combat exposure.

Associated Features and Clinical Characteristics

Common clinical characteristics associated with each disorder were evaluated for group differences using an ANCOVA, covarying for PTSD severity using the DTS. Results are presented in Table 3. An ANCOVA was conducted to evaluate differences between diagnostic group and scores on the BDI-II. Results suggest significantly greater levels of depression in individuals with both PTSD and BPD than in those only meeting criteria for PTSD ($F(1, 173) = 37.587$, $p < 0.001$).

Analyses of hostility, cynicism and aggression using the Cook-Medley Hostility Scale were significant, with the PTSD only group (mean=14.90) displaying less hostility and aggression than the PTSD+BPD group (mean=19.44), $F(1, 172) = 20.17$, $p < 0.001$. Similar tests on the aggressive-responding, hostility and cynicism subscales of the Cook-Medley also revealed significant differences between diagnostic groups.

Results from analyses of group differences on the AUDIT indicate that individuals in the PTSD+BPD group earned higher scores on the AUDIT than

individuals in the PTSD only group, F(1, 159) = 4.915, p < 0.009. This finding is indicative of an increased likelihood for alcohol use disorders in the comorbid group.

The Habit Questionnaire was totaled to create a total score indicating the presence of self-harming behaviors. Results of the ANCOVA reflected greater frequency of such behaviors by the PTSD+BPD group, F(1, 157) = 8.626, p <0.000. Regarding each dichotomized item, chi square analyses revealed that the comorbid group endorsed more frequent cutting (X^2=6.054, p<0.014), punching a wall or object (X^2=13.913, p<0.000), hitting oneself (X^2=5.339, p<0.021), pulling hair from head (X^2=4.003, p<0.045), chewing lips (X^2=6.853, p<0.009), and nail biting (X^2=3.929, p<0.047).

Validity and Clinical Profiles on the MMPI-II and PAI

Analyses of covariance were also conducted to determine group differences across clinical scales of the MMPI-2. Means are presented in Table 4 and mean group profiles represented graphically in Figure 1. Notably, each of the validity and clinical scales were found to be significantly different across groups such that the comorbid group scored higher than the PTSD only group. After a Bonferroni correction was conducted (p<0.003), the L-scale was no longer significant; however, all other scales continued to reflect statistically significant differences.

For more information, ANCOVAS were also conducted for each of the validity and clinical scales of the PAI. Means and results are presented in Table 5 and represented graphically in Figure 2. On the PAI, the only scales that were not

statistically significant in the analyses were Infrequency (INF) and Dominance (DOM). Statistically significant group differences consistently represented higher scores on each scale for the comorbid group. After a Bonferroni correction of $p<0.002$ was applied, all scales remained significant except DRG.

Exposure to Traumatic Events

Overall, the number of traumatic events each group endorsed were significantly different based upon responses on the TLEQ when covarying for PTSD severity, $F(1, 122) = 5.153$, $p < 0.007$. The comorbid PTSD and BPD group reported experiencing a mean of 9 traumatic experiences (SD= 3.50) while the PTSD only group reported an average of 7 traumas (SD=3.39). The frequencies of endorsement for each type of trauma are presented in Table 6. Dichotomous variables were derived from items on the TLEQ, representing seven different types of traumatic experiences (Illness, Attack, Child Violence, Childhood sexual abuse, Adult sexual abuse, Accident/disaster, Warzone). Chi square analyses were conducted on each dichotomous variable to determine the presence of group difference on endorsement rates. Findings revealed significant group differences in Attack ($X^2=11.440$, $p<0.001$) and Childhood Violence ($X^2=20.299$, $p<0.000$), with the comorbid group reporting greater rates of both types of traumatic events. Chi square analyses on Adult sexual abuse suggested a trend in the direction of the comorbid group displaying higher endorsement of this type of traumatic event ($X^2=3.253$, $p<0.071$). The two diagnostic groups did not differ significantly on Illness, Childhood sexual abuse, Accident/Disaster, and Warzone trauma.

To determine group differences on types of previous trauma experienced while controlling for PTSD severity, a logistic regression was conducted with simultaneous entry of the dichotomous TLEQ trauma variable and PTSD severity. All chi-square and logistic regression results are reported in Table 7. These results suggest that, once severity of PTSD symptomatology was taken into account, Child Violence and Personal Attack once again were related to predicted group membership at $p<0.05$. Once a Bonferroni correction at $p<0.007$ was applied, these findings were no longer significant. Childhood sexual abuse did not contribute to diagnosis, above and beyond PTSD severity. However, this may be influenced by the limited number of individuals who endorsed CSA on the TLEQ.

To further clarify the nature of these differences on type of traumatic experiences, a principal component analysis using a varimax rotation was conducted on the seven dichotomous trauma types from the TLEQ. Two primary components were identified from a scree plot, accounting for 37.852% of the variance in these variables: 1) Impersonal trauma (made up of illness, attack, warzone) and 2) Childhood trauma (comprised of childhood sexual abuse and childhood violence). Factor loadings from this analysis are presented in Table 8. For Factor1, Impersonal Trauma, the eigenvalue was 1.33, which accounted for 19.04% of the variance. Factor 2 had an eigenvalue of 1.317, explaining 18.80% of the variance. ANCOVAs were used to evaluate the two factor sccores for group differences, covarying for PTSD severity. Factor 1 (Impersonal Trauma) did not reveal group differences ($F(1, 122) = 2.313$, $p <0.103$). The comorbid

group did display higher rates of the type of traumas making up Factor 2 (Childhood Trauma; $F(1, 122) = 9.792$, $p < 0.006$). These findings suggest that the comorbid PTSD and BPD group was more likely to endorse a history of childhood trauma than the PTSD only group.

DISCUSSION

This study sought to clarify the relationship between PTSD and BPD by examining overlap in clinical features and group differences on early traumatic events in a treatment-seeking group of male veterans. The most prominent finding is that male veterans with comorbid diagnoses of PTSD and BPD display greater levels of psychopathology than individuals with PTSD only. Results indicate greater alcohol use, self-harming behaviors, depression, aggression and hostility. Although these features have been linked to both diagnoses, this finding indicates that the additional diagnosis of BPD suggests a considerably more severe clinical picture than PTSD alone. Because having traits of BPD was associated with more severe PTSD based upon the CAPS and Davidson Trauma Scale, analyses were conducted using PTSD severity as a covariate. Significant group differences on hostility, depression, hazardous alcohol use, and self-harming behaviors continued to be present even when analyses were conducted controlling for severity of PTSD. None of the original group differences on these variables were explained by severity of PTSD symptomatology alone, although the groups did differ significantly on severity and frequency of PTSD symptoms. These findings do indicate that individuals with both PTSD and BPD are likely to display significantly greater psychopathology and general distress than PTSD alone. In addition, results suggest that individuals with an additional diagnosis of BPD display all the similar characteristics of individuals with PTSD alone; however, they exhibit more severe psychopathology and may reflect a more severe point on the same spectrum.

Significant group differences were also found across almost all clinical scales of the MMPI-2 and the PAI, suggesting increased global distress. The PAI profile is highlighted by a very high NIM score for the comorbid group, which is known to be highly indicative of subjective distress. It is unlikely that PAI group differences simply reflect greater attempts on the part of the comorbid group to purposefully display themselves as impaired as efforts were taken to remove cases of potential malingerers based upon the Rogers Discriminant Function (Rogers et al., 1996). However, it is possible that in this sample, individuals have increased motive for secondary gain and that this may account for differences between these two diagnostic groups. The F-scale on the MMPI-2 was also significantly elevated. Findings from Orr et al. (1990) suggest that patients with PTSD may score higher on the MMPI-2 F, F-K, and Obvious scales due to the significant correlation of these scales with physiological responsivity. The PAI-NIM scale may also be identifying group differences related to the more severe manifestation of PTSD present in the comorbid group. The PTSD only group was also purposefully designed to have a limited amount of BPD features by ruling out anyone with a PAI-BOR subscale above 70t. The highest clinical elevations for both groups on the PAI included the MAN and SCZ scales. On the MMPI-2, the most significant elevation was apparent on the Mf, Pd, and Hy scales respectively. The MMPI-2 Depression scale failed to identify clinical levels of depression in either sample, a stark contrast with the PAI.

The present study found that the comorbid group exhibited more frequent and severe PTSD symptomatology as compared to the PTSD only group. This is in contrast to findings by Heffernan and Cloitre (2000) that an additional diagnosis of BPD did not influence the overall presentation of PTSD but was associated with higher levels of irritability/anger outbursts. The finding that individuals in the comorbid group scored higher on clinical variables was consistent with findings from Heffernan & Cloitre (2000), who also found that the comorbid group endorsed greater levels of anger, anxiety and interpersonal problems. Zlotnick et al. (2003) also found that a comorbid group (PTSD+BPD) of women exhibited greater risk for suicidal behaviors, impulsivity, and general psychopathology and dysfunction. Neither of these studies accounted for severity of PTSD.

Results from the present study indicated that the comorbid group endorsed higher rates of childhood violence and personal attack, although this difference did not remain significant following a statistical correction for Type I error. Although studies of female samples have linked additional diagnoses of BPD to childhood sexual abuse (Zanarini et al., 1997), this was not confirmed in the present sample of male veterans. Rather, individuals with comorbid PTSD and BPD were no more likely to endorse a history of CSA than individuals with only PTSD. Although one might expect rates of such abuse to be elevated in an all-PTSD sample, thus potentially obscuring between-group differences, it is notable that few individuals in either group reported childhood sexual abuse. This could potentially reflect a hesitation on the part of male veterans to admit to

a history of sexual abuse. Concerns have been expressed within the VA system that military sexual trauma appears to be problematic for men (Cuthbertson, Rosenfeld, Booth-Kewley, & Magnusson, 1992; Cuthbertson, Rosenfeld, & Newell, 1993; Polusny & Murdoch, 2005), however, many may not report acts of sexual harrassment or assault due to shame and embarrassment.

To further investigate study hypotheses surrounding type of trauma and its relationship to diagnosis, the trauma types were factor analysed and two factors were extracted; one related to impersonal forms of trauma while a second related to childhood traumas. Examination of these factor scores revealed that both groups endorsed high rates of impersonal traumatic experiences, such as warzone, accidents or disasters, and illness. It is noteworthy that the comorbid group displayed higher rates of childhood trauma in general, as compared to the PTSD only group. This is consistent with literature suggesting that patients with BPD report higher rates of childhood maltreatment than patients without BPD (Herman et al., 1989; Ogata et al., 1990). These findings are consistent with the theory that perhaps could be linked to trauma that is interpersonal in nature (van der Kolk, 2000). It has also been well established that the earlier the traumatic experience, the greater the dysregulation, hyperarousal and impairment in functioning (Pitman, Orr, & Shalev, 1993; van der Kolk, Roth, Pelcovitz, & Mandel, 1993).

Previous research has found few group differences on CSA in female samples. Heffernan and Cloitre (2000), investigating two groups of women with CSA, found no

difference between a PTSD and PTSD+BPD group on severity, frequency and number of perpetrators of the abuse. They found greater group differences based upon the presence of increased verbal and physical abuse by the mother and speculate that perhaps attachment issues are to blame for the development of character pathology. Zlotnick et al (2003) failed to find significant differences in pathological childhood experiences between the PTSD only and PTSD+BPD group, although both groups displayed significantly more rates of childhood abuse than the BPD only group.

The findings of the current study are not inconsistent with what would be anticipated in the Spectrum Model, given that PTSD severity varied significantly across diagnostic categories and groups differed on type of trauma endorsed. The comorbid group also reported a greater rate of childhood trauma than the PTSD only group. Should the two groups have displayed few or even no differences in their clinical presentation, this would have offered evidence for the hypotheses that PTSD and BPD might represent the same clinical entity. In other words, the additional diagnosis of BPD would have failed to provide additional clinical utility above and beyond the diagnosis of PTSD. In this case, it appears that the BPD does yield information relevant to assessment and treatment in this male veteran sample.

Results from the current study suggest that this comorbid PTSD and BPD group could benefit from a different approach to treatment than is typically offered in PTSD treatment settings. Common treatment approaches for combat-related PTSD include imaginal exposure, cognitive processing therapy, and psychodrama; however, such

interventions may not adequately address the affective dysregulation and behavioral impulsivity found in patients with BPD.

The significant differential sex prevalence rate of BPD (3W:1M) has limited the number of empirical studies of this disorder in male samples or mixed gender samples. Thus, the majority of empirical data examining complex PTSD has been conducted with female samples and these findings may not generalize well to men. Although this study provides important information about these disorders in men, comparisons across genders would offer clarification of possible gender differences in the development of the two disorders. Findings suggest that women are likely to suffer PTSD symptoms for a greater length of time than men (Davis & Breslau, 1998), with the rate of remission in women estimated at four times longer than men (12 months in men versus 48.1 months in women; Breslau et al, 1998). These differences may be a reflection of the fact that women exhibit different symptom clusters of PTSD than men (Brady & Back, 2002) and tend to be exposed to different types of trauma (Kessler et al, 1995).

It is noteworthy that this study involves the use of a retrospective measure of traumatic life events, which may result in an over or under-estimate of childhood trauma. Additionally, no information is available regarding which trauma the individual identified as their primary trauma, leading to the development of PTSD. Such data could shed light on the etiological mechanisms at work within each disorder.

The present study, although it is the first of its kind to explore this diagnostic distinction in a male sample, does not include a control group with neither PTSD nor

BPD. Although previous studies have not always included such a group (Heffernan & Cloitre, 2000), these comparisons may yield further information about the characteristics of someone who experiences a potentially traumatic event yet does not develop problematic levels of stress-related psychopathology. This would be beneficial in efforts to prevent the development of PTSD following exposure to combat or civilian-related trauma, as well as, the presence of characterological changes over time. The nature of the sample, a specialty clinic accepting referrals specifically for the evaluation and treatment of PTSD, precluded a non-PTSD control group of sufficient size to conduct the requisite statistical analyses. The study also does not include a BPD only group, which limits the interpretation of data to some degree. Although we can extrapolate on how an additional diagnosis of BPD influences the clinical presentation of a patient with PTSD, it is not possible to explore how the additional diagnosis of PTSD influences the clinical picture of a patient with BPD. Also, previous studies have found higher rates of CSA in PTSD+BPD patients than BPD only patients and such comparisons cannot be made in the present study. Future studies might include a 2x2 design, investigating the presentation of BPD, PTSD, a comorbid PTSD+BPD group, and a control group with neither diagnosis. The inclusion of both men and women would allow for greater understanding of how the presentation of these disorders differ across sexes. An additional area for future research is treatment outcome, in particular the field may benefit from focus on the influence of comorbid personality pathology on treatment outcome in PTSD patients.

SUMMARY

The present study contributes to the current literature on PTSD and BPD, primarily by offering data regarding the presentation of these disorders in men. Further, veterans, by virtue of their combat exposure, tend to have high rates of PTSD and would benefit from a better understanding of the interplay between PTSD and Axis II pathology. Due to the high rate of BPD in the present sample and the clear increase in psychopathology due to the additional diagnosis, it is recommended that clinicians screen veterans for BPD.

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APPENDIX A

Table 1

Correlation Matrix.

	TOTAL HABITS	DTS	DTS-TOTAL	AUDIT	COOK-MEDLEY	BDI-II	TOTAL COMBAT	CAPS TOT	PAI-BOR	PAI-BORS	PAI-BORN	PAI-BORI	PAI-BORA
Total Habits	1												
DTS-Severity	0.21**	1											
DTS-Total	0.22**	0.96**	1										
AUDIT	0.63	0.16**	0.19**	1									
Cook-Medley	0.20**	0.21**	0.25**	0.21**	1								
BDI-II	0.25**	0.54**	0.58**	0.26**	0.33**	1							
Total Combat	-0.03	0.04	0.04	-0.03	0.14	0	1						
CAPS Total	0.24**	0.49**	0.53**	0.1	0.14*	0.47**	0.12*	1					
PAI-BOR	0.30**	0.51**	0.52**	0.25**	0.42**	0.48**	-0.006	0.39**	1				
PAI-BORS	0.22**	0.24**	0.52**	0.28**	0.29**	0.25**	-0.03	0.13*	0.74**	1			
PAI-BORN	0.26**	0.38**	0.39**	0.18**	0.37**	0.35**	-0.05	0.27**	0.78**	0.45**	1		
PAI-BORI	0.19**	0.50**	0.50**	0.15**	0.27**	0.48**	0.01	0.38**	0.82**	0.45**	0.56**	1	
PAI-BORA	0.28**	0.49**	0.50**	0.20**	0.40**	0.43**	0.05	0.42**	0.82**	0.49**	0.51**	0.58**	1

Table 2

Clinician Administered PTSD Scale Results.

	PTSD ONLY (N=98)		PTSD+BPD (N=70)			
	MEAN	SD	MEAN	SD	F	p value
Frequency Reexperiencing Symptoms	8.06	4.09	10.05	3.99	9.8	0.002**
Frequency Avoidance Symptoms	16.03	5.34	19.98	4.02	27.148	0.000**
Frequency Hyperarousal Symptoms	12.56	3.49	14.55	3.36	13.61	0.000**
Intensity Reexperiencing Symptoms	10.14	4.33	12.15	4.15	9.03	0.003*
Intensity Avoidance Symptoms	13.89	4.81	17.18	4.44	20.31	0.000**
Intensity Hyperarousal Symptoms	11.68	3.4	13.37	3.35	10.17	0.002*
Frequency Total	36.68	10.34	44.6	9.26	25.81	0.000**
Intensity Total	35.74	10.66	42.71	9.94	18.3	0.000**
Total Sum (Intensity+ Freq)	72.43	20.41	87.31	18.64	23.13	0.000**

Note: **p<.001, *p<.01

Table 3

Clinical Characteristics: Adjusted Means and Results.

	PTSD ONLY		BPD+PTSD			
	Mean	SD	Mean	SD	F value	p value
AUDIT	6.78	9.56	11.24	11.53	4.91	0.009**
Cook-Medley	14.9	5.3	19.44	3.64	20.17	0.000**
Aggressive-Responding	4.11	1.98	5.45	1.78	10.59	0.000**
Hostile Affect	2.57	1.41	4.25	0.95	41.06	0.000**
Cynicism	8.22	3.33	9.74	2.29	6.31	0.002*
CES	20.22	11.23	20.12	12.77	0.195	0.823
BDI-II	26.19	9.77	36.32	11.45	37.58	0.000**
HABIT Frequency	3.6	2.38	4.97	1.87	8.62	0.000**

Note: **p<.001, *p<.01

Table 4

MMPI-2: Adjusted Means and Results.

	PTSD ONLY		BPD+PTSD			
	Mean	SD	Mean	SD	F	p value
Lie (L) Scale	51.48	8.07	47.33	7.67	6.87	0.001
Infrequency (F) Scale	74.23	15.58	104.76	15.94	89.14	0.000**
Correction (K) Scale	40.52	7.88	33.68	4.02	25.09	0.000**
Scale 1, Hs	76.54	12.56	85.14	11.49	22.32	0.000**
Scale 2, D	77.96	12.8	88.16	10.32	32.29	0.000**
Scale 3, Hy	74.21	14.56	80	11.42	16.72	0.000**
Scale 4, Pd	66.4	11.73	79.44	10.62	31.99	0.000**
Scale 5, Mf	49.11	8.47	53.92	7.17	11.48	0.000**
Scale 6, Pa	70.77	13.88	91.76	16.96	45.89	0.000**
Scale 7, Pt	75.67	14.33	90.73	12.15	40.65	0.000**
Scale 8, Sc	79.52	14.92	103.25	14.52	65.18	0.000**
Scale 9, Ma	55.26	11.43	65.38	13.26	14.44	0.000**
Scale 10, Si	66.28	10.74	76.96	8.96	35.3	0.000**

Note: *p<.001, **Bonferroni Correction p<.003

Table 5

PAI: Adjusted Means and Results.

	PTSD ONLY		BPD+PTSD			
	Mean	SD	Mean	SD	F	p value
INC	56.42	7.37	53.53	7.03	4.85	0.009*
INF	51.68	8.57	49.27	7.95	1.91	0.15
NIM	60.86	11.13	90.15	18.39	96.97	0.000**
PIM	47.81	8.92	27.92	8.29	114.87	0.000**
SOM	68.87	12.03	84.89	12.09	48.74	0.000**
ANX	63.81	9.68	84.25	10.14	127.6	0.000**
ARD	68.78	9.54	85.92	9.06	112.36	0.000**
DEP	71.5	10.44	91.52	10.26	118.36	0.000**
MAN	50.27	8.92	64.22	10.42	44.76	0.000**
PAR	57.23	8.37	79.07	11.93	101.79	0.000**
SCZ	64	10.59	90.28	11.5	157.129	0.000**
BOR	57.78	6.32	83.51	5.54	419.19	0.000**
ANT	53.13	8.23	68.26	11.06	52.83	0.000**
ALC	57.92	16.2	70.04	19.03	10.14	0.000**
DRG	59.51	12.78	66.07	15.56	4.72	0.01
AGG	55.65	9.82	77.96	11.34	98.22	0.000**
SUI	56.75	14.86	78.89	21.13	38.3	0.000**
STR	58.02	10.47	76.28	10.61	67.77	0.000**
NON	61.49	11.01	77.26	11.34	43.66	0.000**
RXR	43.34	8.53	30.36	5.31	74.02	0.000**
DOM	50.41	9.1	49.71	11.73	0.401	0.67
WRM	39.22	10.51	29.1	10.27	21.75	0.000**

Note: *p<.001, **Bonferroni correction p<.002

Table 6
TLEQ: Response Rates.

Trauma Type	% Endorsement		% Endorsing Criterion A		% Prior to Military	
	PTSD	PTSD+BPD	PTSD	PTSD+BPD	PTSD	PTSD+BPD
Natural Disaster	64/86.5%	44/81.5%	42/68.9%	35/79.5%	22/34.9%	17/38.6%
MV Accident	30/40.5%	35/64.8%	20/71.4%	24/72.7%	6/20.7%	10/28.6%
Other Accident	30/41.1%	24/44.4%	23/79.3%	22/95.7%	9/30%	8/34.8%
War Zone	65/87.8%	42/77.8%	52/88.1%	40/95.2%	1/1.6%	1/2.4%
Death of Loved One	62/86.1%	51/94.4%	44/75.9%	42/87.5%	12/19.7%	20/40.8%
Loved One Suffering	34/45.9%	21/39.6%	24/70.6%	17/85%	3/8.8%	7/35.0%
Personal Illness	27/36.5%	24/44.4%	18/66.7%	24/100%	4/14.8%	2/8.3%
Robbery	14/18.9%	15/27.8%	10/76.9%	12/85.7%	3/23.1%	4/28.6%
Beaten by Stranger	23/31.1%	27/50%	17/73.9%	21/84%	8/34.8%	9/33.3%
Witness Attack	24/32.4%	35/64.8%	15/62.5%	26/81.3%	7/29.2%	13/38.2%
Death Threat	35/47.3%	37/68.5%	20/57.1%	27/77.1%	12/34.3%	6/17.1%
Childhood physical abuse	13/17.6%	14/25.9%	11/84.6%	14/100%	13/100%	13/92.9%
Family Violence	17/23%	34/63%	16/94.1%	31/93.9%	17/100%	31/97%
Spouse Physical Abuse	21/28.4%	18/33%	10/47.6%	10/58.8%	8/40%	2/11%
Childhood Sexual Abuse by Adult	8/10.8%	11/20.4%	9/37.5%	10/90.9%	N/A	N/A
Childhood Sexual Abuse by Peer	3/4.1%	7/13.0%	1/50%	4/80%	N/A	N/A
Teen Sexual Abuse	1/1.4%	5/9.3%	1/100%	3/60%	1/100%	5/100%
Adult Sexual Assault	4/5.4%	8/14.8%	0%	3/50%	2/50%	2/25%
Stalking	8/10.8%	17/31.5%	4/50%	15/88.2%	0%	1/5.9%
Miscarriage	15/20.3%	15/27.8%	10/66.7%	8/57.1%	2/14.3%	0%
Abortion	17/23%	13/24.1%	7/41.2%	6/46.2%	5/29.4%	2/15.4%

Table 7

TLEQ: Chi square and Logistic Regression Results.

	Chi-Square Results		Logistic Regression Results					
	Chi-Square	p value	Chi-Square	p value	Beta	SE	Exp (B)	p-value
Personal Trauma or Illness	1.61	0.204	1.7999	0.407	-0.51	0.97	0.599	0.601
Attack	11.44	0.001**	13.25	0.001*	-1.49	0.64	0.22	0.019
Child Violence	20.299	0.000**	19.49	0.000**	-1.53	0.46	0.21	0.00 1**
Childhood sexual Abuse	1.663	0.197	1.7	0.42	-0.73	0.58	0.48	0.212
Adult Sexual Abuse	3.253	0.071	3.34	0.18	-0.84	0.76	0.42	0.266
Accident or Disaster	0.098	0.775	1.07	0.585	-0.56	0.68	0.56	0.41
Warzone	2.304	0.129	3.9	0.142	0.27	0.56	1.31	0.631

Note: **p<.001, *p<.01

Table 8
Factor Analysis of TLEQ Trauma Types.

	Components	
	1	2
Illness	0.639	0.120
Attack	0.719	0.148
Childhood Violence	0.332	0.709
Childhood Sexual Abuse	- 0.001	0.812
Adult Sexual Abuse	0.095	-0.019
Accident/Disaster	0.215	-0.054
Warzone	0.419	-0.339

APPENDIX B

Figure 1

MMPI-2 Mean Profiles: PTSD and PTSD+BPD.

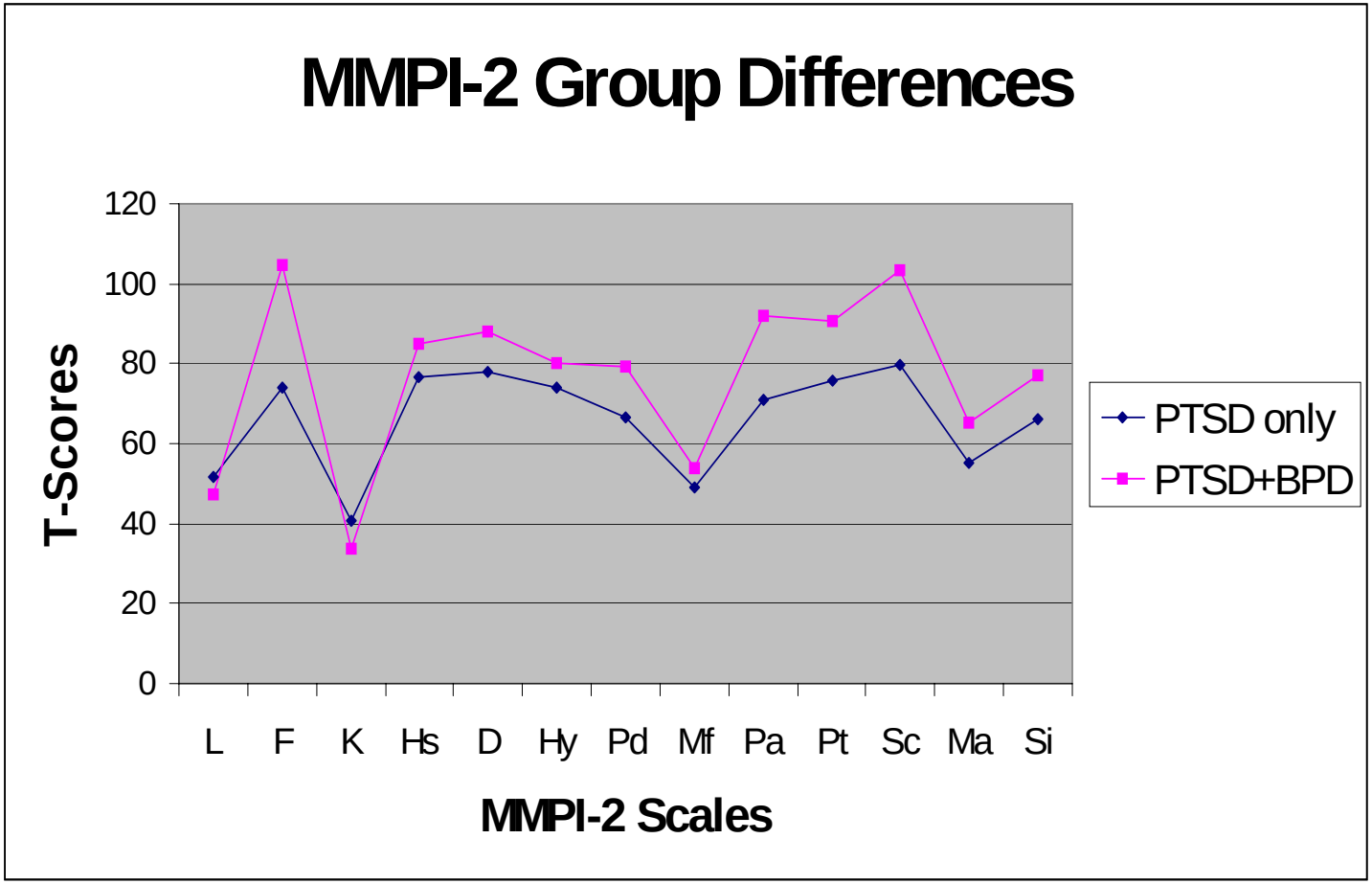
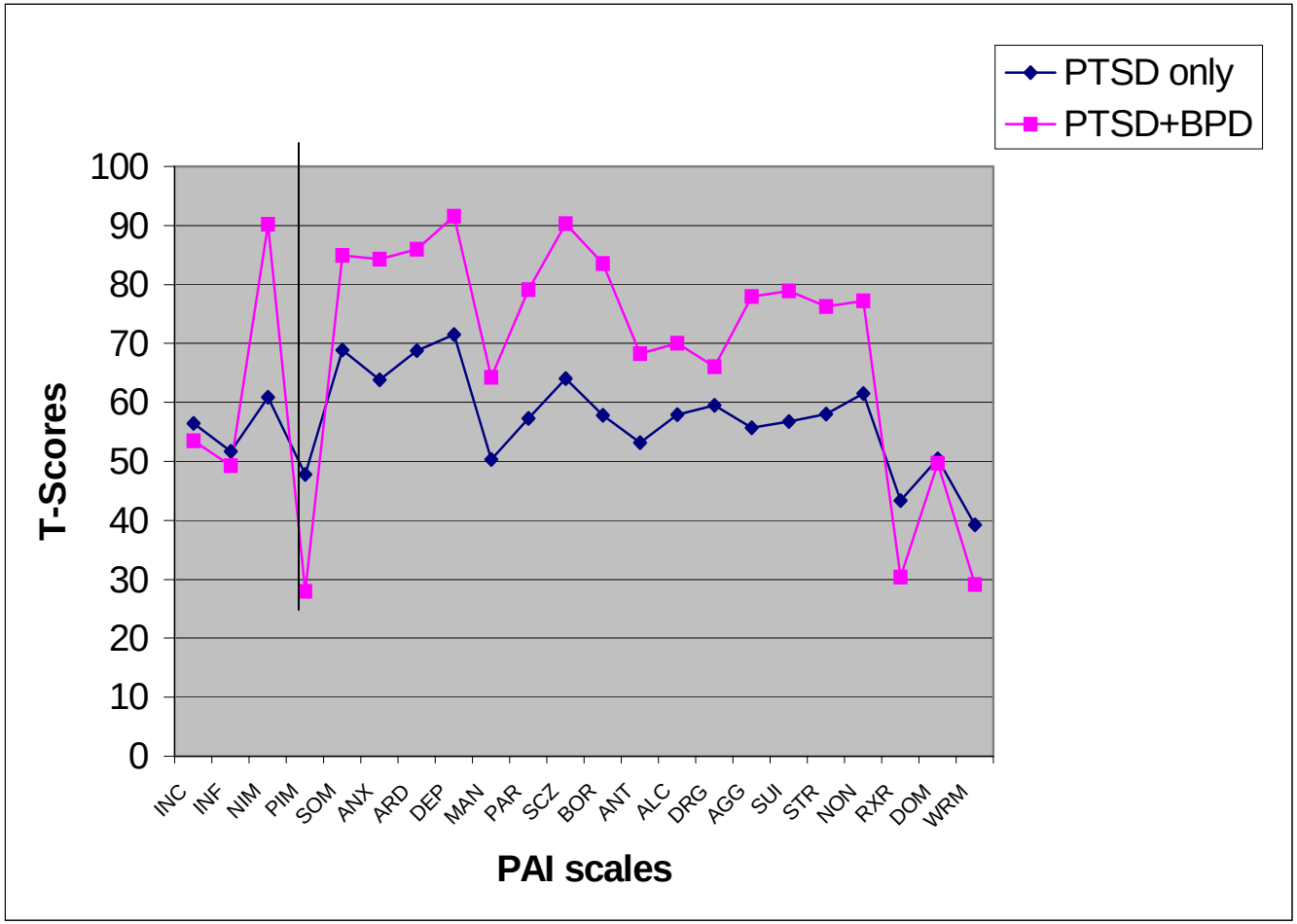


Figure 2
PAI Mean Profiles: PTSD and PTSD+BPD.



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