This study compared MMPI-2 profiles and trauma-specific subscales of the MMPI-2 in groups of combat veterans and sexual assault victims. Analyses indicated a trend toward externalizing symptoms for combat veterans and internalizing symptoms for sexual assault survivors. For diagnostic classification purposes, the PS scale was found to best differentiate post-traumatic stress disorder (PTSD) cases from non-PTSD cases for the combat group, whereas the F-2-8 standard decision rule best differentiated the sexual trauma group from comparisons. These results suggest that type of trauma experienced is a key variable in understanding the patient and dictates the need for different therapeutic focuses. In addition, the results suggest that the MMPI-2 PTSD scales provide a reasonable classification of PTSD status.

MMPI-2 Assessment of Differential Post-Traumatic Stress Disorder Patterns in Combat Veterans and Sexual Assault Victims

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The aim of this study is to examine the clinical utility of the Minnesota Multiphasic Personality Inventory (MMPI-2) as a diagnostic measure of post-traumatic stress disorder (PTSD). As such, the MMPI-2 will be examined for its ability to provide descriptive information about different trauma groups and to classify PTSD-positive patients from PTSD-negative. This study will focus on combat-related and sexual assault-related PTSD. Previous research has documented a common F-2-8 MMPI 3-point code type for combat-related PTSD (Albrecht et al., 1994; Blanchard, Wittrock, Kolb, &

JOURNAL OF INTERPERSONAL VIOLENCE, Vol. 16 No. 7, July 2001 619-639
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Gerardi, 1988; Keane, Malloy, & Fairbank, 1984). That is, scales F (Infrequent Responses), 2 (Depression), and 8 (Schizophrenia) tend to show levels of elevation above the remaining clinical and validity scales. With the exception of a preliminary study reviewing only five MMPI-2 profiles (Wolfe, Mori, & Krygeris, 1994), no studies have been published suggesting a common code type for sexual trauma PTSD.

There is reason to believe, however, that differences may exist between the combat and sexual trauma groups. For one, there are significant gender differences, with males predominant in the combat group and females in the sexual assault group. Second, the etiology of the disorder is vastly different in a combat versus a sexual assault situation. The *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV*) (American Psychiatric Association [APA], 1994) indicates that the original trauma must pose a threat to life or physical integrity to meet criteria for PTSD. Whereas a threat to life appears more consistent with combat trauma, a threat to physical integrity appears more characteristic of sexual trauma. *DSM-IV* adds that the triggering traumatic event(s) may be experienced in groups, as is the norm in combat trauma, or alone, as is typical of sexual trauma. *DSM-IV* also makes a distinction between traditional stressor events (e.g., combat or disaster) and "interpersonal stressors" (APA, 1994, p. 425), such as sexual assault or physical abuse. These differences in etiology may cue different symptoms.

A third difference between the groups is the role of the traumatized individual (Figley, 1985). In combat trauma, the combatants may be agents who inflict trauma as well as victims of trauma; in contrast, sexual trauma victims react to events that are imposed on them (Figley, 1985). Figley and Leventman (1980) hypothesize that the victim/agent role is more likely to be associated with survivor guilt and shame, whereas the pure victim role is more likely to be associated with paranoia and anxiety.

Certainly, all of the above symptoms or associated factors of PTSD may occur in varying degrees in both groups. However, there may be relative differences between the groups that the MMPI-2 will capture. In their review of MMPI PTSD profiles, McCaffrey, Hickling, and Marrazo (1989) conclude, "studies are needed that further delineate the similarities and differences between combat-related and civilian-related forms of PTSD" (p. 75).

In addition to overall profiles, the updated MMPI-2 has two specialized PTSD scales. Keane et al. (1984) devised an empirically based PTSD scale that correctly classified 82% of the combat veterans in their sample. They found a raw score of 30 ($T = 87$) to be optimal as a cutting score in their sample. The validity of this scale, termed the PK scale, has been supported in several studies of combat veterans (Blanchard et al., 1988; Sutker, Bugg, &

Allain, 1991; Watson, Kucala, & Manifold, 1986). The PK scale has rarely been applied to a nonveteran population. Therefore, it is unknown whether the validity of this scale will generalize to the sexual trauma population. Several researchers have suggested study of this issue (Berk et al., 1989; Wilson & Walker, 1990; Wolfe & Keane, 1993).

Schlenger and Kulka (1987) devised a second PTSD measure, the PS scale, which incorporates 26 items of the PK scale plus 34 additional items that were found to differentiate PTSD from non-PTSD veterans in their data set. Schlenger reports in a personal communication (Graham, 1990) that the PS scale correctly classified 81% of the combat veterans in his sample. No specific cutting scores were reported. Only one additional study has examined the value of the PS scale (Sloan, Arsenault, Hilsenroth, & Harvill, 1996), and the results were inconclusive in regard to its utility. Despite this lack of empirical support, the PS scale is included as one of the basic supplementary scales on the MMPI-2 standard interpretive report (Butcher, 1990). There are no studies indicating that PS has been tested within a sexual trauma population, and the present study is clearly one of the initial efforts to determine the utility of the scale.

In addition to these scales, Keane et al. (1984) have combined two clinical scales and one validity scale into a unitary measure of PTSD referred to as the "standard decision rule." The scales included in the index were F (Infrequent Responses), 2 (Depression), and 8 (Schizophrenia). In the original validation and cross-validation, the standard decision rule correctly classified 74% of the veteran sample (Keane et al., 1984). Keane and his colleagues obtained cutoff *T* scores of F = 66, 2 = 78, and 8 = 79. Subsequent studies have found similar rates with combat veterans (Cannon, Bell, Andrews, & Finkelstein, 1987; Vanderploeg, Sison, & Hickling, 1987), but few studies have applied the F-2-8 index to sexual assault survivors.

Two major questions arise from this discussion of the MMPI-2 and its associated PTSD scales: (a) Do systematic differences exist among trauma groups? and (b) What is the utility of the PTSD scales (F-2-8, PK, and PS) for noncombat-related trauma? The first question is mainly exploratory. Are combat and sexual trauma groups different as measured by the MMPI-2, and, if so, how? Wolfe and Keane (1993) encourage exploration of this issue, stating that MMPI-2 scales "should provide important diagnostic information as well as a comparative basis for the psychological functioning of trauma victims in veteran and nonveteran populations" (p. 170). The second question concerns the generalizability of scales that were constructed to assess combat-related PTSD. Do these scales discriminate the sexual trauma group from a comparison group of non-PTSD patients?

Problems With Previous Research

There are a number of problems with the existing research base examining MMPI assessment of PTSD. First, almost all previous research has used samples of combat veterans. Consequently, we know a great deal about the utility of the MMPI for combat trauma but very little about use of the MMPI with other trauma groups. Second, many of the extant studies have used small sample sizes with limited generalizability. Third, many studies have relied on inadequate procedures for establishing the diagnosis of PTSD. Validity and reliability are weakened when researchers depend on hospital chart diagnosis or a single clinician rater.

Given these limitations, it is not surprising that several authors have made recommendations for further research. For example, Wilson and Walker (1990) state, "future studies should include larger samples and compare profile configuration for different groups of traumatized individuals" (p. 153). Similar comments and suggestions for future research in this area are noted in McCaffrey et al. (1989) and Wilson, Smith, and Johnson (1985). The present study incorporates these suggestions and offers the first comparative analysis of PTSD trauma groups using the MMPI-2.

METHOD

Participants

The PTSD data were collected at two sites. The combat trauma data were collected from a PTSD inpatient unit at a large Veterans Administration Medical Center in California. The sexual trauma data were collected at an inpatient psychiatric unit in Louisiana specializing in the treatment of PTSD and sexual assault. Data collection sites were considered fairly equivalent, given that both were acute inpatient facilities that provide specialized treatment for PTSD.

All PTSD participants were adults who had experienced trauma in adulthood. Childhood trauma was excluded, and data on chronicity of traumatic events were not available. A hospital chart diagnosis of PTSD was required for inclusion in the participant pool. As an additional check, the Los Angeles Symptom Checklist (LASC; Foy, Sipprelle, Rueger, & Carroll, 1984) was used to corroborate a PTSD diagnosis. The LASC, a symptom inventory designed to assess PTSD by *DSM-III-R* criteria, was administered routinely as part of the assessment process at the two PTSD data collection sites. Patient records were selected from an inpatient population currently receiv-

ing treatment or having received treatment in the previous 2 years (given this time frame, sample sizes were uneven).

The combat trauma group was composed of males; the sexual trauma group was composed of females. Gender represents a natural confound in these two populations that cannot be entirely controlled. Insufficient samples were available to obtain counterbalancing groups of female combat trauma patients and male sexual trauma patients. However, separate male and female norms are provided on the MMPI-2 in the uniform *T*-score transformations. These separate norms partially controlled for gender effects.

The combat trauma group comprised 118 patients, the sexual trauma group, 59 patients, and a comparison group of 73 patients was included. The comparison group was a sample of outpatient psychotherapy patients who were administered the MMPI-2 as part of their treatment. This sample was obtained from an MMPI-2 computer-scoring corporation that receives data from multiple sites across the United States. These sites were screened to include adult outpatient psychotherapy settings and to exclude trauma-specific treatment centers. This group did not receive the LASC, but members were screened by chart diagnoses to rule out PTSD. This method cannot entirely screen out PTSD but should minimize the prevalence of this disorder within the comparison group. Outpatients rather than inpatients were considered acceptable for this sample as (a) their MMPI-2 profiles were not directly compared with the PTSD groups and (b) their sole purpose was to provide an accuracy comparison for the PTSD scales.

Exclusion Criteria

Only patients psychiatrically diagnosed with PTSD were screened. Because of the high comorbidity rate in traumatized individuals, patients with additional diagnoses were retained in the sample. As a critical check on the validity of chart diagnoses, patients were excluded if their LASC score fell below the PTSD threshold. Only one participant (from the combat trauma group) with a diagnosis of PTSD failed to meet criteria on this measure and was subsequently omitted. The specific LASC criteria are discussed below.

Patients were also excluded if their MMPI-2 profiles were deemed invalid. The standard rule-out criteria (Butcher, 1990; Graham, 1990) were employed to screen out invalid profiles with more than 15 omitted items or *T* scores above 90 on scales L, K, VRIN, or TRIN. Two patients (both from the combat trauma group) were omitted due to elevated scores on TRIN and VRIN, respectively. No specific cut-off was employed for Scales F and Fb. The rationale for this decision was based on the empirical research with combat-related PTSD. Individuals with this syndrome tend to have elevated F scores

(frequently above 90) as part of the natural presentation of their disorder. Wilson and Walker (1990) suggest that high F scores in this population reflect "genuine distress rather than symptom exaggeration" (p. 153). This position is supported in numerous studies (Albrecht et al., 1994; Burke & Mayor, 1985; Hyer et al., 1986; Hyer, Woods, Harrison, Boudewyns, & O'Leary, 1989), a number of which reported mean *T* scores above 100 on the F scale.

Instrumentation

The Los Angeles Symptom Checklist. The LASC (Foy et al., 1984; King, King, Leskin, & Foy, 1995) was used to check and cross-validate the diagnosis of PTSD. The LASC is a 43-item self-report measure that is scored on a 5-point Likert scale. It was designed originally by Foy et al. (1984) to measure *DSM-III* criteria for PTSD and associated problems. Subsequent revisions of the scale (King et al., 1995) were constructed to mirror *DSM-IV* criteria. Items assess all 17 core symptoms of PTSD and correspond to the *DSM-IV* categories of (a) reexperiencing, (b) numbing and avoidance, and (c) hyperarousal. To determine a categorical diagnosis of PTSD, respondents must endorse (with a rating of 2 or higher) a minimum of one item assessing reexperiencing, three items assessing avoidance and numbing, and two items assessing hyperarousal (King et al., 1995). As noted, only one participant failed to meet these criteria and was excluded from the study.

The LASC has adequate psychometric support. King and her associates (1995) pooled data from prior studies to provide a multisample data set ($N = 874$), with subgroups of combat veterans, battered women, adult survivors of child sexual abuse, maritally distressed women, psychiatric outpatients, and high-risk adolescents. They reported internal consistency alpha coefficients of .94 for the 17 items specifically addressing PTSD and .95 for the full 43-item scale. Alpha levels remained high in King et al.'s sample across subgroups. Combat veterans, for example, obtained alphas of .91 for the 17-item scale and .94 for the 43-item scale, whereas an all-woman group yielded alphas of .89 and .94, respectively, on the two scales. Thus, the LASC appears to represent a homogenous group of items, and this finding holds across age, gender, and military versus civilian status (King et al., 1995). King et al. (1995) also reported test-retest reliability of .94 for the 17-item scale and .90 for the 43-item scale, indicating strong temporal stability.

The accuracy of the LASC was tested against SCID-R diagnoses. After computing a cutting score of 25.26, King et al. (1995) dichotomized cases as PTSD-positive versus PTSD-negative. They obtained a sensitivity rate of 78%, specificity of 82%, and an overall hit rate of 80%. These results were

corroborated by Houskamp and Foy (1991), who reported sensitivity of 70% and specificity of 80% (with SCID-R diagnoses) in their sample of battered women. Similarly, Gallers, Foy, Donahoe, and Goldfarb (1988) obtained an 84% overall hit rate comparing combat veterans' LASC scores to chart diagnoses. Substantial evidence therefore supports the convergent validity of the LASC.

The MMPI-2. The MMPI-2 is a 567-item self-report measure intended for the assessment of psychopathology and personality characteristics. Older versions of the MMPI (Form R, Group Form) were not included in the data set, as these versions were normed on a smaller, less representative sample and did not include several questions from the PS scale. Thorough descriptions of the MMPI-2 are provided in Butcher (1990) and Graham (1990).

RESULTS

Descriptive analyses. Descriptive data for the combat trauma, sexual trauma, and comparison groups are presented in Table 1. Descriptive analyses focused on differences between the combat and sexual trauma groups, as these variables were a major concern of this study. Of the demographic information, categorical variables were tested using chi-square analyses, and continuous variables were analyzed using t tests for equality of group means.

Significant differences were found between the combat and sexual trauma groups for age, $t(173) = 13.26, p < .001$; education, $t(168) = -5.75, p < .001$; and LASC Total Score, $t(176) = 12.33, p < .001$. Chi-square analyses revealed significant differences on ethnicity, $\chi^2(5, n = 175) = 21.37, p < .001$, and marital status, χ^2 $(5, n = 174) = 31.78, p < .001$. Gender was not tested because the samples consisted of homogenous groups of males for combat trauma and females for sexual trauma. These results indicate that the combat group was significantly older and more ethnically diverse than the sexual trauma group. The sexual trauma group was more educated than the combat trauma group and more likely to be married or living with a partner rather than separated or divorced in comparison to the combat trauma group. Finally, the combat trauma group had a significantly higher LASC total score compared to the sexual trauma group.

All of these differences are noteworthy and bear consideration in the interpretation of the results. However, none are consistently related to differences in MMPI-2 profiles (Graham, 1990; Greene, 1987), with the exception of the LASC. The LASC is a measure of PTSD symptom severity and thus can be expected to affect the dependent measures of this study (i.e., MMPI-2 scales

TABLE 1: Demographic Information on Post-Traumatic Stress Disorder (PTSD) and Comparison Groups

	Group		
Variable	*Combat Trauma*	*Sexual Trauma*	*Comparisons*
Age			
M	48.4	35.9	38
SD	4.9	7.5	13.7
Gender, Percentage male	100	0	45.4
Ethnicity (%)			
Caucasian	63.9	87.5	—
African American	12.6	1.8	—
Hispanic	18.5	0	—
Native American	1.7	5.4	—
Other	3.4	5.4	—
Marital Status (%)			
Married	26.3	55.4	42.5
Living with partner	1.7	5.4	0
Separated	21.2	7.1	0
Divorced	43.2	12.5	15.1
Widowed	0	1.8	0
Never married	16.1	17.9	42.5
Educational level[a]			
M	3.32	4.67	3.33
SD	1.41	1.48	1.69
Los Angeles Symptom Checklist (LASC)			
Mean total score	118.0	69.6	—
SD	22.5	28.6	—

NOTE: Ethnicity and LASC data were not available for the comparison group.
a. Educational level: 3 = advanced training beyond high school, 4 = some college, 5 = graduated from college.

measuring various symptoms of psychological distress). To control for this confound, the LASC was included as a covariate in the analyses.

Analysis 1. The multivariate analyses of the combat and sexual trauma samples were performed as an omnibus test of significant overall group differences. Twenty-eight MMPI-2 scales (validity, clinical, and content scales) served as dependent variables, whereas group status (combat versus sexual trauma) served as the independent variable. According to Wilks's criterion, the two groups differed significantly on the combined set of dependent variables, Wilks's lambda = .41, $F(28, 145) = 3.82$, $p < .001$.

TABLE 2: Mean *T* Scores and Standard Deviations on the MMPI-2 Scales for Combat and Sexual Trauma Groups

	Combat Trauma (n = *118*)		*Sexual Trauma* (n = *59*)		
MMPI-2 Scale	M	SD	M	SD	F *Ratio*
Lie (L)	48.61	9.5	50.45	10.49	.74
Infrequency (F)	84.97	21.4	95.27	22.0	5.58*
Defensiveness (K)	38.87	7.3	42.73	8.7	5.80*
Hypochondriasis (Hs)	72.82	13.0	78.08	11.0	4.74*
Depression (D)	80.31	11.2	85.16	12.6	4.04*
Hysteria (Hy)	69.78	13.2	79.15	13.0	12.51**
Psychopathic deviate (Pd)	74.66	10.9	79.86	11.4	4.95*
Masculinity—femininity (Mf)	52.68	7.9	53.39	11.4	.13
Paranoia (Pa)	78.76	18.4	81.48	15.7	.57
Psychasthenia (Pt)	83.42	12.3	80.03	11.0	2.05
Schizophrenia (Sc)	87.29	17.6	87.23	13.7	.00
Mania (Ma)	58.45	12.2	61.67	11.8	1.60
Social introversion (Si)	71.29	10.4	66.12	11.8	4.93*
Health concerns (HEA)	75.51	13.5	77.33	13.2	.53
Depression (DEP)	80.29	11.0	81.26	11.1	.19
Family problems (FAM)	67.49	13.5	73.03	12.6	4.03*
Antisocial practices (ASP)	61.15	11.8	55.34	12.2	5.13*
Anger (ANG)	71.38	11.5	62.83	11.7	12.27**
Cynicism (CYN)	63.90	11.1	55.56	10.0	13.23**
Anxiety (ANX)	77.36	10.1	79.01	9.3	.74
Obsessiveness (OBS)	68.29	12.3	67.75	11.7	.05
Fears (FRS)	63.66	13.4	59.32	10.8	2.67
Bizarre mentation (BIZ)	69.75	20.3	72.04	15.0	.36
Low self-esteem (LSE)	70.96	13.0	72.00	12.5	.154
Type A Personality (TPA)	62.59	12.4	57.69	12.1	3.46
Social discomfort (SOD)	73.82	11.0	67.13	13.9	6.70**
Work interference (WRK)	76.55	11.3	74.26	11.9	.95
Negative treatment indicators (TRT)	74.15	14.0	73.43	12.8	.07

NOTE: The degrees of freedom for all ANOVAs were 1/174. Means were adjusted with the Los Angeles Symptom Checklist as a covariate.
*$p < 0.05$. **$p < 0.01$.

After controlling for PTSD severity via the covariate, one-way analyses of variance (ANOVAs) were carried out with the 28 MMPI-2 scales as dependent variables and group status as the independent variable. As indicated in Table 2, there were significant group differences on a number of the scales.

Among the validity scales, the sexual trauma group scored significantly higher on F (Infrequent Responses) and K (Defensiveness). F indicates highly unusual or pathological responses, whereas K indicates guardedness

and a desire to portray oneself favorably. These results may seem somewhat contradictory in that they indicate patients who are less open about their psychological difficulties, who simultaneously endorse numerous infrequent and pathological responses. However, examination of the group means reveals that the sexual trauma group means are actually elevated on F but fall within the average range on K. The significant difference on K is due to a low mean score on this scale for the combat trauma group. Apparently, the combat veterans are more open about their problems, perhaps even exaggerating them as a plea for help (Graham, 1990). This finding is also consistent with the higher LASC scores obtained by the combat veterans.

Among the clinical scales, the combat trauma group scored significantly higher than the sexual trauma group on Social Introversion (Scale 0). This difference indicates a greater tendency toward shyness, introversion, and social withdrawal. The sexual trauma group scored significantly higher than the combat trauma group on Hypochondriasis (Scale 1), Depression (Scale 2), Hysteria (Scale 3), and Psychopathic Deviate (Scale 4). These findings indicate a variety of primarily neurotic symptoms, including excessive bodily concern, depressed mood, somatization, and rejection of societal values and norms (Graham, 1990). The higher score on Scale 4 for the sexual trauma group was somewhat surprising, as research suggests that many combat veterans engage in antisocial behavior such as drug abuse, physical altercations, and other criminal involvement (Keane & Wolfe, 1990; Sierles, Chen, Messing, Besyner, & Taylor, 1986). However, Scale 4 also encompasses a broader rejection of societal norms and standards, as well as conflictual relationships, sexual acting out, and other impulsive behavior (Graham, 1990). These factors may play a greater role than overt aggression in the lives of sexual trauma survivors.

The content scales were included in the analysis, as prior studies suggest that their test-retest reliability, internal consistency, and validity may actually be superior to the basic clinical scales (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1990). Among the content scales, the sexual trauma group scored significantly higher on Family Problems. This finding is consistent with the elevation on Scale 4, suggesting conflictual family relationships, and it may also account for cases in which a family member is the perpetrator. Among additional content scales, the combat trauma group scored significantly higher on Antisocial Practices, Anger, Cynicism, and Social Discomfort. Antisocial Practices appears to be a more narrowly defined scale than Psychopathic Deviate, which may explain why combat veterans score higher on this measure, whereas sexual assault survivors score higher on Psychopathic Deviate. Specifically, Antisocial Practices addresses a history of getting into trouble at school or with the law and also assesses cynicism and

resentment of authority figures (Graham, 1990). These characteristics are also reflected in the high Cynicism score, which indicates guardedness and distrust of others. Many combat veterans report feeling manipulated or tricked by the government or military (Figley, 1978; Friedman, 1981), factors that may load highly on this scale. Indeed, Lifton (1983) adds that many Vietnam veterans experienced a loss of innocence stemming from their combat experience, resulting in feelings of pervasive distrust and disconnection from others. The history of anger control problems among combat veterans is also well documented (Blank, 1993; Scrignar, 1988; Yager, Laufer, & Gallops, 1984). Yager et al. (1984) found a linear relationship between increasing combat exposure and increasing aggression and antisocial behavior, which supports the present findings. Social Discomfort, the final scale showing higher scores for combat veterans, is generally elevated in people who are shy and introverted and who would rather be alone than with others (Graham, 1990). As suggested, elements of distrust are likely to play a role in the development of this symptom.

The primary similarity between the groups was the overall elevation of the MMPI-2 profiles. Due to their inpatient status, both PTSD groups were expected to have significantly elevated profiles. However, the degree of elevation across scales could not be predicted. Table 2 reveals that, after controlling for PTSD severity, the combat trauma group had mean T scores within the clinically significant range ($T > 65$) on 20 of the 28.combined clinical and content scales. Similarly, the sexual trauma group had mean elevations on 19 of the 28 scales.

Analysis 2. The second analysis sought to test the clinical utility of the three MMPI-2 measures most typically employed to assess PTSD: F-2-8, PK, and PS. Discriminant function analysis (DFA) was the most appropriate test of this question. DFA yields discriminant functions, or linear composites of the predictor variables, that combine to predict group membership. Thus, one can examine whether a combination of predictor variables can separate the PTSD group from the comparison group. F-2-8, PK, and PS served as the predictor variables, and PTSD status served as the criterion variable. Two stepwise discriminant function analyses were performed, one for combat trauma versus comparisons and one for sexual trauma versus comparisons. Variable selection was based on the minimization of Wilks's lambda, with a minimum F-to-enter = 3.84.

DFA is a mathematical maximization technique that risks capitalizing on chance findings. To address this problem, the samples were randomly split and cross-validated as a test of the model. This preliminary technique served as a check on the reliability of the analyses. The resulting classification rates

for each sample indicated minimal shrinkage (0.3 to 4.5% overall) from the classification test, on which the discriminant model was built, to the validation test, on which the model was tested for reliability. Therefore, the overall classification scheme demonstrated a high degree of consistency (Tabachnick & Fidell, 1989). As a result, interpretation of the classification rates was deferred to the combined-sample discriminant function analysis to maximize statistical power.

DFA for combat trauma. Results of the combined-sample DFA with the three PTSD scales as predictors and combat-related PTSD as the criterion variable indicate that a single function, the PS scale, emerged as significant, with a Wilks's lambda = .55, $F(1, 189) = 155.57$, $p < .001$. After removal of PS, neither PK nor F-2-8 met minimum F-to-enter tolerance, as the three scales were highly intercorrelated in the combined sample as well. Tolerance refers to the proportion of variance for a new predictor that is not accounted for by predictors already in the equation (Tabachnick & Fidell, 1989). Thus, after inclusion of PS, little unexplained between-groups variance remained (eigenvalue = .82). In the equation, canonical correlation squared indicates the proportion of variance in the discriminant function accounted for by group membership. The canonical correlation of .67 indicates that scores on the PS scale accounted for 45% of the variance in group membership. Thus, although all three PTSD scales appeared to be adequate predictors of combat-related PTSD, PS was the most powerful.

In DFA, classification rates are computed by assigning participants to groups based on the discriminant function. Classification rates for combat trauma versus comparisons using the combined sample are presented in Table 3 for the three predictor scales. Because of unequal group sizes, prior probabilities for placement in each group were not equal. Rather, group prediction by chance was equal to n/N (with n = the number of participants in the largest sample) (Betz, 1987). In this case, combat trauma patients outnumbered comparisons by 118 to 73. Thus, combat trauma patients had a 62% chance of being classified correctly by chance alone. This caveat induces a more modest interpretation of the results.

Overall, PS, PK, and F-2-8 appear to be adequate predictors of combat-related PTSD. The PS scale is clearly the most effective at differentiating combat trauma patients from comparisons. This scale demonstrates sensitivity of 81.4% and specificity of 78.1% and therefore is equally adept at classifying combat-related PTSD-positive patients and ruling out PTSD-negative patients. The overall classification rate is 80.1%, compared to a 62% rate of correct classification by chance. As Table 3 indicates, PK and F-2-8 present similar although somewhat less impressive rates of categorization.

TABLE 3: Discriminant Classification on Three Scales for Combat Trauma Versus Comparison Group

			Predicted Group	
Scale	*Actual Group*	n	*Combat Trauma*	*Comparisons*
F-2-8 Index	Combat Trauma	118	88	30
			74.6%	25.4%
	Comparisons	73	20	53
			27.4%	72.6%
Overall accuracy, 73.8%				
PK Scale	Combat Trauma	118	94	24
			79.7%	20.3%
	Comparisons	73	19	54
			26.0%	74.0%
Overall accuracy, 77.5%				
PS Scale	Combat trauma	118	96	22
			81.4%	18.6%
	Comparisons	73	16	57
			21.9%	78.1%
Overall accuracy, 80.1%				

DFA for sexual trauma. Results of the combined-sample DFA with the three PTSD scales as predictors and sexual assault-related PTSD as the criterion variable indicate that a single function, the F-2-8 index, emerged as significant, with a Wilks's lambda = .80, $F(1, 130) = 31.57$, $p < .001$. After removal of F-2-8, neither PK nor PS met minimum F-to-enter tolerance. The F-2-8 discriminant function maximally separated the sexual trauma sample and the comparison group (eigenvalue for the discriminant function = .24). The canonical correlation of .44 indicates that scores on the F-2-8 index accounted for 20% of the variance in group membership. All three scales were adequate predictors of sexual-assault-related PTSD, but F-2-8 was the most powerful.

Classification rates for sexual trauma versus comparisons using the combined sample are presented in Table 4 for the three predictor scales. Group sizes once again were unequal for sexual trauma ($n = 59$) and comparisons ($n = 73$). The prior probability for sexual assault classification was 45%, which in this case magnifies what might at first appear to be modest results.

Overall, F-2-8, PK, and PS appear to be adequate predictors of sexual assault-related PTSD. The F-2-8 index emerges as the most effective at differentiating sexual trauma patients from comparisons. This scale demonstrates sensitivity of 69.5% and specificity of 68.5%, compared to a 45%

TABLE 4: Discriminant Classification on Three Scales for Sexual Trauma Versus Comparison Group

Scale	*Actual Group*	n	*Predicted Group*	
			Sexual Trauma	*Comparisons*
F-2-8 Scale	Sexual Trauma	59	41	18
			69.5%	30.5%
	Comparisons	73	23	50
			31.5%	68.5%
Overall accuracy, 68.9%				
PK Scale	Sexual Trauma	59	42	17
			71.2%	28.8%
	Comparisons	73	29	44
			39.7%	60.3%
Overall accuracy, 65.2%				
PS Scale	Sexual Trauma	59	42	17
			71.2%	28.8%
	Comparisons	73	33	40
			45.2%	54.8%
Overall accuracy, 62.1%				

rate of chance findings. The overall classification rate is 68.9%. Table 4 indicates that PK and PS perform less accurately, especially in regard to scale specificity.

DISCUSSION

This exploratory study sought to identify differences among combat trauma and sexual trauma groups. There is a natural confound within these populations that cannot be entirely controlled. The results, however, may still be generalizable given the overwhelming preponderance of males who present for treatment of combat-related PTSD and of females who present for treatment of sexual assault-related PTSD. Caution with regard to the interpretation of these results is also warranted given the lack of data related to chronicity and recency of trauma and the additional limitations cited below. As a second aim, this study examined the utility of the PTSD scales and indexes, particularly focusing on their relevance for noncombat-related trauma. These scales were constructed to assess combat-related PTSD, and thus there was the question of whether they would discriminate a sexual trauma group from comparisons.

In summary, descriptive analyses of the data yielded several important group differences. Compared to the sexual trauma group, the combat trauma group was found to be older, less educated, more ethnically diverse, more likely to be separated or divorced, and more symptomatic on the LASC, a measure of PTSD symptom severity. Of these findings, only the differential score on the LASC was truly surprising. Both the combat and sexual trauma samples were initially selected because each was receiving inpatient services at specialized PTSD treatment facilities. Therefore, it was presumed that their respective levels of PTSD symptom severity would be roughly equivalent. However, LASC scores of combat veterans were 69.5% higher than those of sexual assault survivors. This finding can be interpreted as a true difference in genuine distress or as a difference in the reporting style of combat veterans. Some research suggests a tendency to overreport symptoms stemming from ritualized bonding with other veterans and/or efforts to gain greater Veterans Administration compensation (Hyer, Fallon, Harrison, & Boudewyns, 1987; Perconte & Goreczny, 1990; Perconte & Griger, 1991).

Comparison of the groups revealed several statistically significant differences. For example, the sexual trauma group scored higher on Scales 1, 2, and 3. These scales, often referred to as the "neurotic triad" (Greene, 1991), represent depression and a cluster of somatic and hysterical traits. Greene (1991) states that such patients tend to be easily fatigued, anxious, and dependent. Moreover, he adds that they have often "learned to tolerate great unhappiness and a high level of discomfort; consequently, they may have poor motivation for treatment" (p. 150). The implication of these findings is that sexual assault survivors may be more depressed and more likely to manifest their symptoms physiologically than combat veterans. The higher rates of somatization among the sexual assault survivors is consistent with extant descriptions of this population (See Briere, 1988; Sedney & Brooks, 1984).

Overall, both groups had highly elevated MMPI-2 profiles across clinical and content scales. Before controlling for PTSD symptom severity, the combat trauma group endorsed significantly more symptoms and signs of pathology than did the sexual trauma group. After controlling for PTSD, one basic trend appeared to hold: The combat trauma group appeared more likely to externalize negative affect via anger, cynicism, antisocial acts, and distrust of others. On the other hand, the sexual trauma group appeared more likely to internalize negative affect through depression, somatic complaints, and anxiety. These findings are generally consistent with research indicating higher comorbidity with antisocial personality disorder for combat veterans (Keane & Wolfe, 1990) and with borderline personality disorder for sexual assault survivors (Herman, Perry, & van der Kolk, 1989).

Some of these differences in symptom profiles are associated with gender, which unfortunately could not be controlled in this study. However, whether attributed to gender or type of trauma, the differences between the groups suggest different therapeutic approaches. For example, psychotherapy with the combat veteran might focus on (a) finding systematic strategies for managing anger, (b) developing interpersonal trust, (c) verbalizing rather than acting on feelings, and (d) reframing negative cognitions. Alternately, therapy with the sexual trauma survivor might focus on (a) finding strategies for self-calming, (b) connecting psychological distress to physical symptoms, (c) managing family conflict, and (d) challenging depressive cognitions and low self-esteem. Ultimately, clinicians need to be flexible in adapting their treatment to the individual needs of patients. Still, these exploratory results suggest that type of trauma is a key variable in understanding the patient and may dictate the need for different therapeutic interventions.

The second hypothesis sought to determine whether the F-2-8, PK, and PS scales could correctly classify the two PTSD samples from a non-PTSD comparison group. In effect, the clinical utility of the scales was in question. DFA was performed using the PTSD scales as predictor variables and PTSD status as a dichotomous criterion variable. The results were initially cross-validated, proving the classification schemes to be fairly reliable. Shrinkage from the classification model to the validation test was minimal.

The combined-sample DFA for the combat trauma group resulted in one significant function, the PS scale, which accounted for 45% of the variance differentiating the combat-related PTSD group from comparisons. PK and F-2-8 were only marginally worse predictors, suggesting that all three scales were measuring much the same construct. Although the PS scale was the most accurate, all three scales demonstrated adequate ability to diagnose combat related-PTSD patients (sensitivity) correctly and to rule out PTSD-negative patients (specificity) correctly. These findings support the inclusion of the PTSD scales as part of a multimethod assessment of combat trauma patients.

Surprisingly, the F-2-8 standard decision rule was the least effective predictor (73% classification rate) for combat veterans, although it had previously received the most empirical support (Blanchard et al., 1988; Cannon et al., 1987; Keane et al., 1984). Because of unequal sample sizes, F-2-8 had a 62% random chance classification rate. In comparison, Keane et al.'s (1984) original findings for the scale indicate a 74% classification rate, with chance equal to 50% in their sample. Subsequent research (Blanchard et al., 1988; Vanderploeg et al., 1987) generally obtained classification rates similar to Keane et al.'s findings and higher than those obtained in the current study. On the other hand, the PS scale, the newest and least studied measure, performed

comparatively well (80.1% classification rate). The only data with which we can compare this performance is the original validation of the scale by Schlenger and Kulka (1987). They reported an 81% classification rate, which is more accurate than the data obtained here, after controlling for (62%) chance findings. Nonetheless, the PS scale appears quite promising for use with a combat trauma population and is deserving of further study.

For the sexual trauma group, the combined-sample DFA yielded one significant function, the F-2-8 index, which accounted for 20% of the variance differentiating the sexual assault-related PTSD group from comparisons. PK and PS achieved similar, although somewhat lower classification rates, which was expected because all three scales were highly intercorrelated. The F-2-8 index demonstrated adequate sensitivity and specificity, whereas PK and PS were reasonably sensitive but less specific than F-2-8. That is, PK and PS had higher levels of false positives within the non-PTSD sample. Consequently, when working with sexual trauma patients, clinicians should be aware that low scores on PK and PS indicate a low probability of PTSD, but high scores convey less certainty. Additional assessment procedures are needed for corroboration.

Given the smaller sample size of the sexual trauma group, chance classification was equal to 45%. Therefore, the 68.9% classification rate for the F-2-8 standard decision rule was considerably better than chance. These results extend the findings of Koretsky and Peck (1990) and Wolfe et al. (1994), who first suggested that the F-2-8 standard decision rule may have clinical utility for civilian forms of PTSD. Whereas their studies were flawed by small sample sizes and subjective diagnostic techniques, this study had a larger sample and employed objective diagnostic criteria.

Overall, the second hypothesis received moderate support. The PTSD scales are not perfect predictors but are significantly more accurate than chance in differentiating PTSD-positive from PTSD-negative patients. Moreover, the scales appear applicable to a sexual trauma population despite the fact that (a) the scales were developed for diagnosis of combat-related PTSD and (b) this study and others suggest significant differences between combat and sexual trauma groups. Apparently, the trauma groups share enough symptom variance that F-2-8, PK, and PS can classify either group when compared to non-PTSD therapy patients.

Limitations. This study has several limitations. First, PTSD may take many forms, depending on the original trauma. Although combat and sexual trauma have been addressed, these results may not generalize to victims of natural disasters, major automobile accidents, or other types of trauma exposure. A second concern related to generalizability is the manner of sample

selection. The PTSD samples were drawn from consecutive admissions over the previous 2 years rather than a random sampling within participant pools. Third, as noted, gender remains a potential confound to these results. Ideally, samples of female combat veterans and male sexual assault survivors could be incorporated into future research. Fourth, data on chronicity and severity of trauma were not available. Thus, the effects of multiple traumatic events, additional life trauma history, and severity of traumatic experience could not be assessed. Future studies would be strengthened by controlling for these trauma variables.

Further research. These results indicate several directions for future research. The MMPI-2 and LASC suggest key differences between combat and sexual trauma groups, which now need to be subjected to confirmatory analyses. Also, the clear differences on the self-report instruments used in this study need to be evaluated via additional methods. For example, the combat group endorses much higher PTSD symptom severity by self-report. Corroborating evidence from external sources, such as therapist ratings or spouse/partner ratings, is needed. In addition, the high LASC scores and inpatient status of the samples limit the generalizability to less severely affected outpatient samples. Subsequent studies could determine if similar results would obtain with outpatient groups.

Future research should also further examine the psychological mechanism at work in different types of trauma. The results of this study suggest that different trauma etiology can cue different symptom presentations. In addition to chronicity and severity, other trauma variables may affect how people respond psychologically to highly dangerous and traumatic events. Variables such as locus of control, ability to predict the onset of traumatic experience, perceived self-efficacy in the face of trauma, and/or level of arousal/preparedness prior to trauma appear worthy of further study.

Additional research should also focus on the efficacy of the PTSD predictor measures. The PS scale shows considerable promise, particularly in the diagnosis of combat veterans, but it has not received empirical attention to date. The MMPI-2 PTSD scales have been compared with other instruments (e.g., the Mississippi Scale for Combat-Related PTSD, the Impact of Events Scale, etc.) on combat trauma samples. However, the accuracy of different measures has not been studied with a sexual trauma population. In fact, sexual-assault-related PTSD is still a relatively new construct and has received less empirical attention overall. Studies are needed to further define this group. Possibly, in future editions of *DSM*, type of trauma would distinguish one category of PTSD from another. This recommendation has been

proffered elsewhere (Brett, 1993; Herman, 1993), and the present study supports such a classification scheme.

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