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THE MMPI AS A PREDICTOR OF POST-TRAUMATIC STRESS DISORDER  
AMONG VIETNAM VETERANS

by

Susan Rogers

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF SCIENCE

in

Psychology

Approved:

UTAH STATE UNIVERSITY  
Logan, Utah

1986

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*Susan Rogers*

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## ABSTRACT

The MMPI as a Predictor of Post-Traumatic Stress Disorder  
Among Vietnam Veterans

by

Susan Rogers, Master of Science  
Utah State University, 1986

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Department: Psychology

The purpose of this study was to determine whether the Minnesota Multiphasic Personality Inventory (MMPI) could be used to discriminate between Vietnam veterans with Post-Traumatic Stress Disorder and those with other mental disorders. Scores on the 13 validity and clinical scales of the MMPI were used as predictor variables in two discriminant analyses. The first of these was performed in replication of studies in which cases of substance-abuse disorder were eliminated from the non-PTSD comparison group. Substance- abuse cases were included in the second discrimination. The results indicated that while the MMPI can be used to discriminate PTSD from non-PTSD veterans, this discrimination is weakened by the presence of cases with substance abuse disorders in the non-PTSD comparison group.

(62 pages)

## CHAPTER I

### INTRODUCTION

Research has shown a significant incidence of Post-Traumatic Stress Disorder among veterans of the Vietnam war, particularly among those with high levels of combat exposure (Figley & Southerly, 1980; Frye & Stockton, 1982). This disorder, which follows exposure to severe stress, is characterized by a pattern of recurring memories, numbed emotional response and anxiety. The rising number of PTSD cases encountered by mental health professionals has created an interest in the use of standardized psychological inventories in the diagnosis of this disorder. While there is evidence that the Minnesota Multiphasic Personality Inventory or MMPI (Hathaway & McKinley, 1967) can be an aid in the diagnosis of PTSD, studies using this measure have had conflicting results. Many of the differences in those findings can be related to variations in sampling method and the screening of subjects with certain diagnoses from non-PTSD comparison groups. A study by Foy, Sippelle, Rueger & Carroll (1984) has yielded a discriminant function using MMPI scores as predictors of PTSD status.

#### Statement of the Problem

Two limitations have been identified in the research regarding the use of the MMPI in the diagnosis of PTSD. First, membership in PTSD and non-PTSD comparison groups have been determined by the use of diagnostic scales which have differed from the criteria outlined in the DSM-III. Second,

various diagnostic groups have been eliminated from non-PTSD comparison groups, which reduces the generalizability of the findings to actual clinical situations.

### Purpose of the Study

This study was designed to replicate the discriminant analysis of Foy et al. (1984) on a similarly screened sample dichotomized into PTSD and non-PTSD criterion groups by clinical diagnostic procedures rather than by the use of a PTSD Scale designed for Vietnam veterans. A second objective of the study was to determine whether the power of the MMPI to discriminate PTSD from non-PTSD veterans is changed by the inclusion of screened subjects.

### Hypotheses

To replicate the procedures used by Foy et al. (1984), with the exception of criterion group formation (DSM-III diagnosis as opposed to PTSD Scale), the following null hypothesis was posed:

Hypothesis 1- The 13 clinical and validity scales of the MMPI cannot be used to create a function which successfully discriminates PTSD veterans from non-PTSD veterans when cases of substance abuse diagnosis are eliminated.

To determine the effects of screening, a second null hypothesis was posed:

Hypothesis 2- The power of the MMPI to discriminate PTSD veterans

from non-PTSD veterans will not be changed by the inclusion of veterans with diagnoses of substance use disorders.



## CHAPTER II

### REVIEW OF THE LITERATURE

#### Development of the PTSD Diagnostic Category

Researchers have estimated that as many as one third of the more than three million veterans of the Vietnam war may have symptoms of Post-Traumatic Stress Disorder or PTSD (Horowitz & Solomon, 1975; Frye & Stockton, 1982; Fairbank, Keane & Malloy, 1984). PTSD is a category of the 1980 American Psychiatric Association's Diagnostic and Statistical Manual (DSM-III) with the following criteria:

1. Exposure to a recognizable stressor (combat, natural disasters, internment in concentration or prisoner-of-war camp, rape, automobile accident, etc.).

2. Re-experiencing the trauma through intrusive memories, recurring dreams or 'flashbacks'.

3. Numbing and reduced involvement with significant activities or persons.

4. Two of the following:

- a. hyperalertness or 'startle response'

- b. sleep disturbance

- c. survivor guilt

- d. memory or concentration impairment

- e. avoidance of situations reminiscent of the traumatic event or intensification of symptoms in such situations (APA, 1980).



The diagnostic category for stress reaction is not new. The DSM-I (APA,1952) included a Gross Stress Reaction with many of the same criteria as PTSD. This category was eventually dropped and later reappeared in the DSM-II (APA,1968) under Adjustment Reaction of Adult Life. The present PTSD category appears in the DSM-III as an Anxiety Disorder. The criteria in their present form were not derived from combat veterans specifically but from individuals exposed to a variety of stressors. It is unlikely that this represents the final form of the PTSD category. Factor analysis (Silver & Iacono, 1984), while generally supportive of the present criteria, suggest that depression and anger are a more important part of the symptomatology than the DSM-III indicates. Since this analysis was limited to Vietnam veterans it is unclear whether the category as a whole needs revision or whether combat-related PTSD differs from that caused by others stressors.

The constant revision of the Diagnostic and Statistical Manual reflects changes in models of human behavior and the related terminology. Changes have also taken place in the nature of warfare itself, making comparison of information from one war to another difficult. Still, a review of the relevant literature reveals a cycle. During a war the primary concern is with acute stress reactions and with keeping the combatants functioning. There follows a period of latency in which it is assumed that the soldiers' psychological problems will disappear on return to civilian life. Later, reports begin to surface about the persistence of symptoms and the re-adjustment problems experienced by veterans.

Such a juncture has been reached in the research coming out of the Vietnam war. Most of the current studies can be placed into two schools, the Stress Evaporation Models and the Residual Stress Model (Figley,1978).

## Stress Evaporation Model

Stress Evaporation theory allows that some readjustment problems will occur among veterans but that these will disappear with time and without the need for intervention. Any enduring problems are thus considered the result of predisposition and not to stress exposure *per se*. In relating stress and anomie, Worthington (1973) found a veteran's positive or negative evaluation of his tour of duty to be more predictive of post-service adjustment than whether or not that tour took place in the war zone. Pre-service variables of age, lack of school or legal problems, and having lived away from home prior to entering the service were better predictors of post-service adjustment than was combat exposure.

Further support for the Stress Evaporation model is found in findings of good adjustment among the majority of Vietnam veterans upon their return to civilian life. In comparisons of Vietnam veterans with non-veteran college students, no differences were found in manifest anxiety (Enzie, Sawyer & Montgomery, 1973), legal and emotional problems (Borus, 1973), trust in government and political isolationism or interventionism (Segal & Segal, 1976), or on factor analysis of symptoms (Panzarella, Mantell & Bridenbaugh, 1978). While 25% of Vietnam veterans were found to have legal problems after discharge from the service, this was comparable to rates among civilians of the same age.

## Residual Stress Model

The Residual Stress model holds that lasting problems may be experienced by normal persons after exposure to catastrophic stressors. One of the main criticisms of the research supporting the Evaporation viewpoint is that differing levels of trauma exposure are not accounted for in the designs of these studies (Figley, 1978). Motivational factors are also a concern with sample of veterans whose release from the service may be delayed until pre-release psychological test results are satisfactory.

Barrett-Rueger & Lammers (1981) attempted to resolve the Evaporation-Residual conflict by differentiating help-seeking veterans with high, low and no combat exposure. Differences in post-military adjustment were related to combat exposure and such military factors as disciplinary actions, substance abuse and psychiatric contacts but not to pre-military factors. Combat veterans varied from non-combat veterans in the retrospective perception of their adjustment most at time of discharge and not at the pre-military stage. Though a decrease in stress symptoms was reported during the post-military stage, combat veterans showed persistent problems with sleep disturbance and nightmares, interpersonal relations, tension and anger. Hostility, guilt and depression have all been associated with perceived intensity of combat exposure (Strayer & Ellenhorn, 1975). Persistence of stress symptoms was also noted among veterans of Israel's Yom Kippur War (Merbaum, 1977). In fact, an increase in symptom severity was evident one year after hospital discharge. While combat exposure is useful in differentiating Vietnam veterans who have developed PTSD from those who have not, the veteran's perception of his family's helpfulness after his return is even more important. Even among a sample of former officers

who are functioning well in the educational, professional and financial spheres, 43% have reported moderate to severe symptoms of PTSD (Frye & Stockton, 1982). Figley & Southerly (1980), while citing the good adjustment made by the majority, found as many as 65% of a group of combat veterans experiencing recurring dreams and nightmares and some proportion of these individuals found professional help for their symptoms necessary.

### Comparison of Vietnam Veterans and Other Veterans

In the early part of the war in Vietnam psychiatric casualty rates were surprisingly low (12/1000/year compared to 37/1000/year in Korea). At the time this was assumed to be the result of successful treatment strategies developed during previous wars (Bourne, 1970; Jones & Johnson, 1975). The increasing incidence of post-war adjustment problems left theorists searching for factors unique to the experience of servicemen in Vietnam which would explain these findings. Widespread substance abuse, erosion of military discipline and unit cohesiveness, speed of transition from combat to civilian life (often taking as little as 36 hours), inadequacy of veterans benefits, worries about hidden medical problems (such as long-term effects of agent orange), a depressed economy and subsequent unemployment have all been identified as contributing to the greater number of post-war rather than wartime psychological problems (Lifton, 1973; Stanton, 1980; Figley & Levantman, 1980; Keller & Foy, 1981).

On the other hand, there are indications of significant substance abuse among many Vietnam veterans prior to military service (Penk et al. , 1981) and social alienation of veterans during and after military service was reported after World War I (Leed, 1980).

The average age of the servicemen in Vietnam was 20, younger than in previous wars (Wilson, 1980). Sixty percent were draftees (Figley & Levantman, 1980) and most of those drafted were from lower income brackets. There is also some evidence that a disproportionate number of those serving in positions of highest risk were from the lower classes and minorities (Van Putten & Yager, 1984). Twelve to thirteen month tours of duty, while controlling the length of combat exposure, also reduced unit cohesion, a factor believed to be an important buffer against combat stress (Grinker & Spiegel, 1944; Bourne, 1970; Weinstein, 1974).

In a comparison of interpersonal styles, Vietnam veterans were found to be more rebellious, mistrustful, adventure-seeking and expedient than World-War II veterans (Lorr, Penk & Stenger, 1975). These findings could easily reflect differences in the attitudes of two different age groups, differences in social environment or willingness to discuss problems openly, as well as a difference in combat experience.

Delay in the manifestation of stress symptoms may not be unique to Vietnam. An increase in 'reactivated' stress symptoms reported among World War II veterans has been linked to current life stresses of aging (Christenson, 1981).

In a comparison of hospital documentation on Vietnam and Korea veterans, no differences were found in the percentage of veterans with stress symptoms or the percentage meeting the criteria for PTSD. Acknowledging the changes in documentation and the tendency for Vietnam veterans to seek outpatient treatment rather than admission to hospitals, the authors concluded that PTSD is common to veterans of all wars (Thienes-Hontos, Watson & Kucala, 1982).



## Comparison of Vietnam Veterans and Other PTSD Groups

Though PTSD veterans have not yet been compared directly with persons exposed to other stressors, the results of studies with those groups show a consistent pattern of symptoms.

The following symptoms have been found among victims of rape: depression, loss of involvement in activities, interpersonal and employment problems, guilt, sleep disturbance and nightmares (Ellis, Atkeson & Calhoun, 1982); a denial or 'pseudo-adjustment' phase followed by obsessive memories of the rape (Sutherland & Scherl, 1970); startle reaction and avoidance of stimuli associated with the rape, substance abuse and acting-out (Burgess & Holmstrom, 1974); hostility and decreased ability to concentrate (Nadelson, Notman, Zackson & Gornick, 1982).

Long-term effects of naval disasters have included restlessness, depression, phobias, social isolation, hostility and mistrust of others, sleep disturbance and employment problems (Leopold & Dillon, 1963) as well as a rise in hospitalization and psychiatric separations from military service (Hoiberg & McCaughey, 1984).

Civilian disasters, including floods and fires, also result in increased rates of psychopathology including PTSD, major depression, and adjustment reactions (Lumry, Cedarleaf, Wright & Braatz, 1983). Hostility towards those not involved in the traumatic situation is also frequently reported (Lifton & Olsen, 1976; Green, 1983).

Thus it seems that many of the personality traits thought unique to Vietnam veterans are found among other PTSD groups. Survivor guilt, hostility and acting out are found among civilians as well as military veterans.

## The Diagnosis of PTSD

In 1980, the Veterans Administration made PTSD a compensable condition, even in cases where the first onset of symptoms occurs years after the claimant's military service has ended. This has resulted in a rising number of claims (Atkinson, Henderson, Sparr & Deale, 1982) and has put a strain on the evaluative services of the VA. Besides a lack of sufficient time for review of each case, other problems in diagnosing PTSD include:

1. reservations about the validity of the PTSD criteria in DSM-III
  2. resistance to strict adherence to the DSM-III criteria
  3. negative interactional styles of claimants with PTSD
  4. fictitious PTSD claims
  5. 'partial' PTSD-cases meeting only some of the criteria
  6. 'idiosyncratic' PTSD- definition of stressors too subjective
  7. difficulty in obtaining 3rd party verification of data presented by claimants
  8. reluctance of claimants to discuss painful memories which may be relevant to the diagnosis in a brief interview
  9. possibility of life stressors unrelated to military service
  10. deviant social behavior incorrectly associated with PTSD
  11. possibility of multiple disorders in the same case
  12. 'hardening' of examiners to repeated accounts of traumatic events
- (Atkinson et al., 1982).

The tendency to over- or under-diagnose PTSD has been observed by others. Goodwin (1980) finds that the evaluator's own attitude toward the

Vietnam war and it's veterans may influence a clinician's judgement. Another important diagnostic factor is the recency of the formulation of PTSD criteria and the earlier placement of PTSD veterans into other categories- the most common being personality disorders such as schizoid, anti-social or paranoid (Goodwin, 1980). The need for diagnostic guidelines has pointed to the investigation of standardized personality inventories in the diagnosis of PTSD.

### Depression Inventories

Depression, as measured by the Beck Depression Inventory (Beck et al., 1961) was within the clinical range for one third of a group of veterans an average of 28 months after their return from Vietnam (Nace, Meyers, O'Brien, Ream & Mintz, 1977). Vietnam combat veterans with PTSD appeared significantly more depressed on the same measure than did matched groups of combat veterans without PTSD and those with other disorders. Using the Zung Depression Scale (Zung, 1965), PTSD veterans can be distinguished from combat normals but not from veterans with other psychological disorders (Fairbank et al, 1984).

### Anxiety Inventories

PTSD veterans reported more state and trait anxiety than normals on the State-Trait Anxiety Inventory (Spielberger et al., 1970) but no such differences were observed on Geer's (1965) Fear Survey Schedule (Fairbank,



et al., 1984).

The Manifest Anxiety Scale (Taylor, 1953) did not distinguish Vietnam veterans from non-veteran undergraduates (Enzie et al., 1973). However, a multimodal approach to assessment using behavioral, physiological and self-report indices of anxiety has been successful in discriminating PTSD veterans from non-combat and non-PTSD veterans (Malloy, Fairbank & Keane, 1983).

### Measures of Family and Interpersonal Functioning

The veteran's perception of his family's helpfulness after his return from combat appears to be a very important factor in post-war adjustment (Frye & Stockton, 1982). Roberts et al., (1982) found no differences between PTSD veterans and non-PTSD veterans in a substance abuse program on the Family Environment Scale (Moos, 1974). Problems of intimacy and sociability as measured by the Horowitz Interpersonal Problem Inventory (Horowitz, 1979) were more severe among PTSD veterans (also substance abusers) than among non-PTSD veterans (Roberts et al., 1982).

### The MMPI and PTSD Diagnosis

There is general agreement among investigators that the original scales of the Minnesota Multiphasic Personality Inventory or MMPI (Hathaway & McKinley, 1967) are of use in the diagnosis of PTSD, but there are differences of opinion about the specific scales involved. The MMPI

scales include four validity scales; ?-Question (this scale consists of items left unanswered and has not been used in the analyses which follow), L-Lie, F-Frequency, K-Test-taking attitude, and ten clinical scales; Hs-Hypochondrisis, D-Depression, Hy-Hysteria, Pd-Psychopathic Deviate, Mf-Masculinity/Femininity, Pa-Paranoia, Pt-Psychasthenia, Sc-Schizophrenia, Ma-Hypomania, and Si-Social Introversion.

One of the earliest applications of the MMPI to the study of combat stress was done prior to the publication of the DSM-III. Merbaum (1977) studied the MMPI profiles of veterans of Israel's Yom Kippur War who had been hospitalized for acute combat reactions. In a comparison of these profiles during hospitalization and one year after discharge, Marbaum found evidence of psychopathology (an average of 7 scales elevated into the clinically significant range). He also found that the group mean profile did not decrease after one year, in fact there was an *increased* T-score on six of the ten clinical scales. The group mean profile changed from an 8-2 configuration to a 2-8 configuration, one often associated with schizophrenic disorders.

While the subjects in this study had a variety of diagnoses (47% neurotic, 47% situational reaction disorders and one case of schizophrenia), interviews of the subjects revealed many familiar PTSD symptoms: anxiety, problems with concentration and memory, sleep disturbance, guilt, interpersonal and employment problems and a variety of physical symptoms. This study does not differentiate subjects on the basis of PTSD status but it does indicate the persistence of combat-related stress symptoms as well as providing some information about the diagnostic categories into which veterans with PTSD may be placed.

In 1981 Penk et al. used the MMPI to investigate the relationship

between combat exposure and PTSD symptoms among Vietnam veterans. Contrary to expectations, univariate and multivariate analysis of the MMPI revealed no significant differences between combat and noncombat groups. However, subjects with heavy combat exposure did differ from subjects with light combat exposure on the Hs scale ( $p < .003$ ). A discriminant function consisting of scales F, Hs, Pd and Ma correctly classified 65.52% of these subjects (60% of the heavy combat and 67.3% of the light combat subjects). The profile for the heavy-exposure group was an 8-4-2 configuration while the light-exposure group had a 4-8-7 configuration with lower overall elevation.

Combat exposure in this study was not measured by length of time spent in combat but by endorsement of items on a Combat Exposure Scale (Figley, 1977) indicating specific combat-related experiences judged to be particularly traumatic.

All of the subjects in this study were patients in a VA substance-abuse treatment program and all reported significant drug use prior to joining the military. Besides limiting the generalizability of the findings of the study, this resulted in a rather homogeneous sample. Neither of the combat subgroups was compared separately with the noncombat group, leaving open the possibility that the light-combat group was as similar to the non-combat group as it was to the heavy-combat group. This kind of middle-group overlap could obscure the differences between combat and non-combat subjects.

Stamper & Sipprelle (1981) dichotomized a sample of Vietnam veterans into PTSD-positive and PTSD-negative groups by means of a PTSD Diagnostic Scale (this scale will be discussed at length later in this review). Multiple  $t$ -tests on the 10 clinical scales of the MMPI showed that the PTSD

group scored significantly higher on scales D ( $p < .017$ ), Pa ( $p < .004$ ), Pt ( $p < .002$ ) and Sc ( $p < .007$ ). The PTSD+ group was characterized by an 8-2-7 profile and the PTSD- group by an 8-4-2 profile. Furthermore, the PTSD+ group had a total of 7 elevated scales while the PTSD- group had only 3.

Visual inspection of the profiles of the two groups reveal parallel configurations with greater elevations for the PTSD+ group.

Subjects for this study were screened and those with diagnoses of primary substance abuse disorder or schizophrenia were eliminated from the analysis, again limiting the generalizeability of the findings.

Interpersonal problems of Vietnam veterans were the focus of a study by Roberts et al. (1982). Once again, a sample made up of veterans seeking treatment for substance abuse disorders was divided into PTSD, non-PTSD and noncombat groups on the basis of six of the 31 items from Figley's (1977) Vietnam-Era Veterans Survey (VVS). These items were chosen for their overlap with the DSM-III criteria for PTSD and included 'bad memories about Vietnam', 'not being able to put Vietnam behind me', 'not being able to sleep', '(difficulty)'controlling my temper sometimes', 'being nervous alot', and 'difficulty in trusting government or institutions'. The PTSD group differed from the non-PTSD group on overall clinical scale elevation ( $p < .008$ ). Univariate analysis of clinical and research scales relating to interpersonal functioning also showed significantly higher scores for the PTSD group on scales Pd, Pa, Si and the research scale SOC (Social Maladjustment). The items making up these scales do indeed relate to interpersonal functioning but they are also positively correlated with each other, especially the Pd and Pa scales. Therefore, an elevation on one would be accompanied by increased elevation on the other.

What is more troubling about this study is the claimed overlap

between the PTSD criteria and the VVS items. The items selected reflect only a few of the PTSD criteria and several of them are specific to Vietnam combat stressor, making this a scale which can only be used for the identification of combat-related PTSD. The item 'difficulty in trusting government or institutions' is totally unrelated to the PTSD criteria yet would correlate highly with items on the Pd scale of the MMPI. The authors assumed that combat exposure itself was the only likely cause of PTSD among their subjects and therefore did not screen their noncombat group for PTSD symptoms. The presence of PTSD subjects in the noncombat group, however unlikely, would reduce the differences between the comparison groups.

Such an assumption was not made in a study by Fairbank, Keane & Malloy (1984). The authors of that study took pains to screen their control groups for PTSD caused by non-military stressors. The three comparison groups for the study consisted of combat veterans with PTSD (PTSD), combat veterans with no psychological disorders (NORMAL) and noncombat veterans with a variety of other psychological disorders (PSYCH). Scores on a variety of standardized psychological inventories were compared, including two depression inventories (BDI and Zung), two anxiety inventories (STAI and Fear Survey Schedule-FSS) and the MMPI. Findings relevant to the MMPI were:

1. The PTSD group had more total elevations than the PSYCH or NORMAL groups (76 for the PTSD, 50 for the PSYCH ,  $p < .001$ ).
2. The PTSD and PSYCH group profiles were similar- the PTSD group with an 8-2 configuration and the PSYCH group with a 2-8. However, the mean scores for the PTSD group were higher.
3. The PTSD group had higher scores on scales Hs ( $p < .01$ ), Hy ( $p < .06$ )



and Pt ( $p < .06$ ) than did the PSYCH group.

4. The PTSD group scored significantly higher than the NORMAL on all but the Mf scale.

5. Overall distress, as shown by the multivariate analysis of all 10 clinical scales, was greater among the PTSD group than the PSYCH group ( $p < .01$ ).

5. The F scale elevations of the PTSD group, while not significantly higher than the PSYCH group's, did fall into the clinically significant range ( $T=75$ ) while the other groups' scores did not ( $T$  PSYCH=69,  $T$  NORMAL=53).

Even more interesting were the results of a discriminant analysis of the PTSD and non-PTSD subjects using the 4 predictor variables of: Mean Score for the Depression Inventories, Mean Score for the Anxiety Inventories, Summed Score for the FSS, and the Average T Score for the 10 Clinical Scales of the MMPI. Results of this analysis correctly classified 83% of the subjects with only 3 false negatives (PTSD subjects misclassified as non-PTSD). The MMPI variable contributed the most to this discrimination, followed by the depression, anxiety and FSS, in that order. The results of this study suggest that the multidimensional MMPI may be of greater use in identifying PTSD than scales which measure a single dimension of personality.

However, these results must be considered in light of the sampling procedures used in the study. The sample was small but had been carefully equated for age, race, branch of service and educational level. Placement of subjects into PTSD or non-PTSD groups were agreed upon by two separate raters on the basis of interviews and histories. The PTSD subjects were drawn from a Vietnam stress management program. If they had been in the program for any amount of time and had profited from it, their MMPI

profiles may have been somewhat normalized. The combat normals were drawn from the VA Medical Center staff and though none of these subjects had a history of previous psychiatric treatment, a desire to appear normal may have introduced a bias into their responses to the MMPI. Five of the twelve PSYCH subjects were receiving psychoactive medications at the time of the study, which again may have biased their responses towards the normal range. Finally, all of the potential subjects with psychosis, seizure disorder and organicity were eliminated from the sample, leaving a PSYCH comparison group consisting of nonpsychotic depression, dysthymic disorders, adjustment disorders and alcohol abuse. The results then may be more applicable to differentiating PTSD from 'neurotic' disorders but not from character or thought disorders. The authors concluded that:

...there is an apparently significant segment of the Vietnam veteran population that reports symptoms that warrant psychotic diagnoses (i.e. schizophrenia, affective disorders) or personality disorder in conjunction with the PTSD diagnosis (Axis I and Axis II; DSM-III). More research needs to be conducted on the ability of the various assessment procedures to classify these groups of Vietnam veterans. Identification of these individuals is difficult because psychotic symptoms may be the most obvious to the clinician, and the presence of PTSD may be overlooked. (p. 918)

Keane, Malloy & Fairbank (1984) compared a much larger sample (100 PTSD, 100 non-PTSD) of inpatient and outpatient veterans. Results of that study again revealed that both groups had similar MMPI profiles with peaks on the 8 (Sc) and 2 (D) scales, but the PTSD group had significantly greater elevations on the F scales and on all the clinical scales except *Mf*. In a discrimination using a decision rule with cutoffs at one standard deviation

below the PTSD mean on scales F (T=66), D (T=78), and Sc (T=79), a 74% correct classification rate was achieved. An MMPI subscale consisting of 49 differentially endorsed items (chi-squares with  $p < .001$ ) an 82% correct classification of subjects was achieved.

When the sample for this study is examined it is noted that the non-PTSD group contained subjects with affective, anxiety, personality and psychotic disorders. No subjects with primary substance abuse disorder were present in this comparison group.

Foy et al.(1984) compared the MMPI scores of veterans designated as PTSD-positive and PTSD-negative by means of the PTSD Diagnostic Scale. This scale was designed to operationally define the DSM-III criteria for PTSD and was constructed from military history,interview and checklist items. The items, as reported by the authors of the scale (Stampler & Sippelle, 1981) include; witnessing the death of a U.S. serviceman in Vietnam, vivid memories of unpleasant experiences, nightmares, panic attacks, lack of leisure activities, lack of same or opposite sex friends, inability to express feelings, survivor guilt (as indicated by increasing distress over the death of a comrade), and several descriptors of excessive autonomic arousal. According to this scale the only significant stressor in Vietnam was the witnessing of a death of a comrade.

Results showed that the PTSD-positive group had significantly higher scores than the PTSD-negative group on MMPI scales Pt and Pa ( $p < .01$ ) and on scales Sc and D ( $p < .05$ ). The positive group was typified by an 8-2-7 configuration while the negative group had an 8-4-2 profile configuration. A discriminant analysis using the 13 scales of the MMPI as predictor variables resulted in a correct classification of 82.43% of the subjects (88.2% PTSD+ and 76.5% of the PTSD-). The scales composing the discriminant function were Pt,



Mf, F, L and Pa. This function explained 46% of the variance.

The subjects for this study were 21 PTSD+ and 22 PTSD- in-patient veterans from the Los Angeles area. Actively psychotic individuals and those with primary diagnosis of substance abuse were eliminated from the sample, leaving a PTSD-negative group composed of subjects with character disorders and adjustment reactions. As with the Fairbank study, this screening limits the ability to generalize these findings to all Vietnam veterans.

### Summary of MMPI Studies

The findings regarding the use of the MMPI to identify veterans with PTSD can be summarized as follows:

1. PTSD groups often have significantly higher scores than non-PTSD groups on individual MMPI scales. These have included the F, Hy, D, Hs, Pa, Pt, Sc and Si scales (Penk et al., 1981; Stampler & Sippelle, 1981; Roberts et al., 1982; Fairbank et al., 1984; Foy et al., 1984 ).

2. PTSD groups consistently have more elevations (7-8 elevations for the PTSD groups, 3-4 for the non-PTSD) than non-PTSD groups (Stampler & Sippelle, 1981; Fairbank et al., 1984; Foy et al., 1984).

3. PTSD groups can be characterized by some variation of 8-2-7 profile (Penk et al., 1981; Stampler & Sippelle, 1981; Fairbank et al., 1984; Foy et al., 1984). While configuration alone may not differentiate PTSD from non-PTSD, configuration *plus* elevation may (PTSD groups tend to have a parallel but higher pattern).

4. These profiles may show no significant decrease over time (Merbaum, 1977).

5. The F scale for the PTSD group is often in the clinical ( $T > 70$ ) range while the F scale for the non-PTSD is usually within normal limits (Fairbank et al., 1984).

6. Discriminant analyses of screened samples using the MMPI yield 82-83% correct classification of PTSD and non-PTSD subjects (Keane, et al., 1984; Foy et al., 1984)

## CHAPTER III

### METHOD

#### Sample

The sample for this study was composed of 94 male Vietnam veterans from the Salt Lake City area. These individuals had been evaluated by psychologists at the VA Medical Center and a VA Outreach program (Vet Center) between 1980 and 1985. The four largest diagnostic groups were PTSD (35%), Substance Use Disorders (33%), Schizophrenia (9%) and Affective Disorders (8%). The remaining 15% of the sample was composed of individuals with Personality Disorders, Somatoform Disorders, Organic Brain Syndromes, Anxiety Disorders (besides PTSD), Adjustment Disorders and Psychosexual Disorders (See Appendix A for a frequency count).

To ensure that these subgroups (VAMC and OUTREACH) were representative of the same veteran population, chi-square analyses of the demographics of age, race, branch of service, marital status, employment status were performed. No significant differences were found in these characteristics (Appendix B), with the exception of race. All of the OUTREACH PTSD subjects were white, compared to only 75% of the VAMC PTSD subjects.

#### Measures

1. Minnesota Multiphasic Personality Inventory (MMPI). The MMPI is the most widely used and researched standardized personality inventory. Originally constructed to differentiate between specific diagnostic groups and

a normal control group, the instrument consists of 550 True-False items. It yields scores on four validity scales designed to measure test-taking attitudes including the number of omitted items, the L scale- which reflects the number of socially desirable items endorsed, the F scale- which measures the number of items endorsed concerning negative or unusual experience, and the K scale- measuring the amount of good feeling reported. The MMPI also yields scores on ten clinical scales including Hs (Hypochondriasis), D (Depression), Hy (Conversion Hysteria), Pd (Psychopathic Deviate), Mf (Masculinity-Femininity), Pa (Paranoia), Sc (Schizophrenia), Ma (Hypomania) and Si (Social Introversion). While the clinical scales were originally designed to place persons into these diagnostic categories, they are now more often used to indicate the presence and strength of certain personality/ behavioral characteristics. Over 450 research scales have been introduced since the MMPI's publication in 1943. The MMPI was originally normed on a rather narrow sample in Minnesota, however, a great deal of normative data have been collected since the test was designed. As of 1978, some 6,000 references can be found citing this inventory. Reported scale reliabilities range from the .50s to the .90s. Lower reliabilities may reflect the fact that some of the behaviors the MMPI is designed to measure are themselves subject to fluctuation. The VAMC currently scores the 13 basic scales as well as 80 of the research scales.

Veterans seeking psychiatric services at the VAMC are also interviewed and several other variables are available for analysis.

2. Demographic Variables. Demographic information gathered at the time of evaluation includes age, sex, race, occupation, marital status, and religious affiliation. The lack of data regarding the religious affiliation of the Outreach subjects prevented the use of this variable in analysis.

3. Military Variables. A military history is taken during the evaluation. Data gathered for this study included branch of military service and combat status. However, missing data prevented the use of combat status as a useful variable in the analysis.

4. Diagnosis was determined by VA staff psychologists according to the guidelines of DSM-III (APA,1980).

### Procedures

Data was obtained from existing records at the VAMC and Vet Center. Veterans seeking psychological services at the VAMC have usually been administered the MMPI before being admitted for inpatient treatment but more recently this test has been administered when a veteran is referred for outpatient treatment or for compensation evaluations. In cases where the subject has taken the MMPI several times, the earliest test record was selected for analysis in this study.

All of the subjects were placed into two criterion groups according to diagnosis.

a. PTSD Group This group consisted of all subjects who were diagnosed as PTSD. In cases of multiple diagnosis, any subject with PTSD listed among their diagnoses were placed into this group, regardless of other diagnoses. This group totalled 33 subjects.

b. OTHER Group This group consisted of all subjects who received diagnoses exclusive of PTSD. Rather than breaking this group down by individual diagnoses, groupings consistent with DSM-III headings were used. For example, Anxiety Disorders, Affective Disorders, Personality Disorders, etc. This group consisted of 61 subjects.



The demographic and military characteristics (age, race, branch of service, marital and employment status) of the two criterion (PTSD and OTHER) groups were compared using chi-square analyses and no significant differences were found (Appendix C).

Scores on the 13 MMPI scale were then used as predictor variables in the classification of subjects into the PTSD and OTHER criterion groups and a series of stepwise discriminant analyses were done. The first of these in a replication of the methods of Foy et al., (1984), was run on the sample after the subjects with primary diagnoses of substance use disorders were eliminated . The second was run on an unscreened sample. Results of these two discriminant analyses, including correct classification rate and canonical correlations, were compared with those obtained by Foy et al. Finally, a 3-Way discriminant analysis was done on the PTSD, OTHER and SUBSTANCE groups to further examine the possibility of overlap in these categories. The SPSS-X statistical package was used for all of the discriminant analyses.

## CHAPTER IV

## RESULTS

The subjects' scores on the 13 of the MMPI were used as predictor variables in stepwise discriminant analysis. This procedure results in the construction of a linear combination of predictors (discriminant function) which best differentiates the criterion groups. Three such analyses were done for this study. The first of these was done in replication of the methods used by Foy et al., (1984).

It was hypothesized that the 13 scales of the MMPI cannot be used to create a function which successfully discriminates PTSD veterans from non-PTSD veterans when cases of substance abuse disorder are eliminated. Results of the first discriminant on the screened sample are presented in the next four tables. Mean MMPI scores and standard deviations for the PTSD and OTHER criterion groups are shown in Table 1.

Table 1

Group Means and Standard Deviations- Substance Abuse Cases Removed

	PTSD		Other		Total	
L	47.38	7.72	46.87	10.99	47.13	9.37
F	84.06	19.37	66.57	19.22	75.60	21.07
K	45.06	8.73	47.60	12.22	46.29	10.52
Hs	75.25	15.68	66.37	16.31	70.95	16.47
D	83.41	15.65	76.77	19.78	80.19	17.93
Hy	72.47	9.40	65.90	11.58	69.29	10.94
Pd	84.06	11.26	73.57	12.39	78.98	12.86
Mf	64.53	9.94	67.57	9.95	66.00	9.98
Pa	76.22	12.20	71.57	15.55	73.97	14.00
Pt	84.81	15.51	75.03	13.82	80.08	15.41
Sc	95.75	23.20	78.30	18.24	87.31	22.56
Ma	75.63	13.20	68.43	13.00	72.15	13.53
Si	64.06	11.22	57.13	11.45	60.71	11.77

After stepwise entry into the discriminant function, 7 scales were found to make a significant contribution to the discrimination of the PTSD and (screened) Other groups. These scales and their standardized discriminant function coefficients (which indicate the variable's importance in discriminating, regardless of sign) are presented in Table 2.



Table 2

Scales Contributing to the Discrimination of PTSD and Other Groups  
When Substance Abuse Cases are Removed

Scale	Standardized Discriminant Function Coefficient
Hy	1.025
F	0.902
Hs	-.715
Pa	-.702
K	-.485
Pd	0.447
Mf	-.310

A discriminant score for new cases (veterans whose PTSD status is unknown) can be arrived at using the function composed of the linear combination of these scales.

Table 3

Canonical Discriminant Function When Substance Abuse Cases are Removed

Eigenvalue	Canonical Correlation	Wilks' Lambda	Chi-Square	D.F.	Sig.
0.532	.589	.652	24.10	7	.001

Eigenvalue shows the ratio of between- groups to within- groups sums of squares. In discrimination it is necessary that variability *between* groups be greater than variability *within* groups. Thus, large eigenvalues indicate good discrimination.

The canonical correlation indicates the association between independent variables in the discriminant function and the dependent variables which define membership in the criterion groups. Thus, 35% of the variation in this function is explained by the criterion groups.

Wilks' lambda and the chi-square conversion provide a test of the null hypothesis that the population means are equal. The results of this test indicate that the two groups are different and that the discriminant function is significant. Thus, the first hypothesis was rejected.

Table 4

Classification Results When Substance Abuse Cases are Removed

Actual Group	# of Cases	Predicted Group	
		Other	PTSD
Other	30	27 90.0%	3 10.0%
PTSD	32	8 25.0%	24 75.0%

Percentage of Grouped Cases Correctly Classified 82.26%

82.26% of the total screened sample was correctly classified, indicating that the screening of subjects with substance abuse disorders resulted in a close match to the correct classification rate obtained by Foy et al. (1984). Classification was comparable in either case- when criterion groups were determined by the use of a PTSD Scale or by clinical diagnosis.

However, the two functions differed in their composition and in the number of false negatives (PTSD identified as other). In the present study 75% of the PTSD subjects were correctly classified compared to 76.5% in the previous study. In other words, it was slightly more likely that a PTSD subject would be misclassified using the function obtained in the present study.

The second hypothesis stated that the power of the MMPI to discriminate PTSD veterans from non-PTSD veterans will not be changed by the inclusion of subjects with diagnoses of substance use disorders. Means and standard deviations of the sample *including* substance abuse cases are presented in Table 5.

Table 5

Group Means and Standard Deviations- Substance Abuse Cases Included

	PTSD		Other		Total	
	M	SD	M	SD	M	SD
L	47.38	7.72	47.64	9.28	47.55	8.72
F	84.06	19.37	69.07	17.85	74.34	19.66
K	45.06	8.73	47.66	10.20	46.75	9.74
Hs	75.25	15.68	67.37	18.47	70.14	17.85
D	83.41	15.65	78.02	17.96	79.91	17.29
Hy	72.47	9.40	66.00	13.30	68.27	12.41
Pd	84.06	11.26	74.15	14.64	77.64	14.30
Mf	64.53	9.94	64.71	10.01	64.65	9.93
Pa	76.22	12.20	70.69	14.18	72.64	13.71
Pt	84.81	15.51	75.08	16.33	78.51	16.61
Sc	95.75	23.20	78.74	20.70	84.55	23.03
Ma	75.63	13.20	68.19	11.37	70.80	12.49
Si	64.06	11.22	59.10	12.21	60.85	12.05

After stepwise entry into the discriminant function, six scales were found to make a significant contribution to the discrimination of the PTSD and (unscreened) Other group. These scales and their standardized discriminant function coefficients are presented in Table 6.

Table 6

Scales Contributing to the Discrimination of PTSD and Other Groups  
When Substance Abuse Cases are Included

Scale	Standardized Discriminant Function Coefficient
Hy	1.079
Hs	-.774
F	.623
Si	.538
Ma	.530
Pa	-.444

Table 7

Canonical Discriminant Function When Substance Abuse Cases are Included

Eigenvalue	Canonical Correlation	Wilks' Lambda	Chi-Square	D.F.	Sig.
0.287	.472	.776	24.71	6	.001

From Table 7 it can be seen that 22% of the variance (the square of the canonical correlation) was accounted for by the groups on the function. The function is still significant, but the eigenvalue is lower and lambda is higher, indicating less discrimination between the groups when the substance abuse cases are included. The decrease in discrimination is borne out by the classification results presented in Table 8.

Table 8

Classification Results When Substance Abuse Cases are Included

Actual Group	# of Cases	Predicted Group	
		Other	PTSD
Other	59*	43 72.9%	16 27.1%
PTSD	32†	10 31.3%	22 68.8%

Percentage of Grouped Cases Correctly Classified 71.43%

\*Two of the Other cases with diagnoses of psychosexual disorder were inadvertently removed from the discriminant analysis

† One of the PTSD cases was removed from the discriminant analysis because of missing data.



Table 8 presents the classification results on the unscreened sample. The correct classification rate provides a measure of the agreement between the two methods used to classify the sample, in this case clinical diagnosis and prediction with the MMPI. This rate can also be used to estimate the power of the function to accurately predict the group membership (or PTSD status) of individuals in a new sample. 71.43% of the total sample was correctly classified. 68.8% of the PTSD subjects were correctly identified as such, leaving 31.3% incorrectly identified as belonging to the Other group. 72.9% of the Other group was correctly identified, leaving 27.1% misclassified into the PTSD group. Thus it was slightly more likely that this function would misclassify a PTSD subject as having another diagnosis than vice versa. The 71.43% correct classification rate for the total sample is a significant improvement over the 50% rate achieved by chance. However, it does not approach the 82% discrimination achieved when substance abuse cases are removed from the comparison group. Therefore, the second hypothesis was also rejected.

Table 9

Summary of Findings- 2 Way Discriminations

	Unscreened	Screened	Foy et al.
Scales	Hy Hs F Si Ma Pa	Hy F Hs Pa K Pd Mf	Pt Mf F L Pa
Canonical Correlation	.47	.59	.68
Wilks' Lambda	.776	.653	.536
Chi-Square	21.71	24.11	18.38
Significance	.001	.001	.003
Correct Classification	71.43%	82.26%	82.35%

Finally, an additional 3-Way discrimination of PTSD, Other and Substance subjects was done. Results of this analysis are presented in Tables 10 and 11 (note that two functions were produced in this analysis).

Table 10

Group Means and Standard Deviations- 3-Way Discrimination

	PTSD		Other		Substance	
	M	SD	M	SD	M	SD
L	47.38	7.72	47.11	11.31	48.13	7.13
F	84.06	19.37	67.29	19.69	70.68	16.18
K	45.06	8.73	47.54	12.54	47.77	7.70
Hs	75.25	15.68	66.86	16.78	67.84	20.14
D	83.41	15.65	77.43	20.23	78.55	15.96
Hy	72.47	9.40	65.71	11.85	66.26	14.67
Pd	84.06	11.26	72.96	12.61	75.23	16.39
Mf	64.53	9.94	64.29	10.18	62.39	9.42
Pa	76.22	12.20	72.29	15.55	69.26	12.91
Pt	84.81	15.51	75.04	14.28	75.13	18.23
Sc	95.75	23.20	78.50	18.88	78.45	22.53
Ma	75.63	13.20	67.50	12.91	68.81	9.96
Si	64.06	11.22	57.57	11.69	60.48	12.69

Table 11

Classification Results- 3 Way

Actual Group	# of Cases	Predicted Group		
		Other	PTSD	Substance
Other	28	18 64.3%	2 7.1%	8 28.6%
PTSD	32	5 15.6%	20 62.5%	7 21.9%
Substance	31	8 25.8%	6 19.4%	17 54.8%

Percentage of Grouped Cases Correctly Classified 60.44%  
(Prior probability .333)

## CHAPTER V

### DISCUSSION

The goal of this study was to investigate the power of the Minnesota Multiphasic Personality Inventory to discriminate Vietnam veterans with Post-Traumatic Stress Disorder from those with other mental disorders. Results indicate that the MMPI has moderate ability to discriminate these two groups. Results also indicate that the discriminative power of the MMPI is improved when subjects with substance abuse disorders are eliminated from the comparison group.

In general, these results are consistent with prior PTSD discrimination studies using the MMPI. However, the finding of improved discrimination with screening has methodological implications for this line of research.

Chi-square analyses were done to assure that the two criterion groups were discriminated according to PTSD status and not another variable. There are some limits to this conclusion. Many of the MMPI scales are negatively correlated with intelligence and no measure of intelligence or educational level was obtained for this study. The possibility therefore exists that an intellectual bias was present in the sample.

Several of the MMPI scales are also sensitive to differences in the socioeconomic status of the respondents. Even though data was collected on the employment status of the subjects at the time of testing, that is a very limited measure of long-term employment status and is by no means an adequate measure of the socioeconomic status of the subjects.

It was first hypothesized that the 13 clinical and validity scales of the MMPI cannot be used to create a function which successfully discriminates PTSD veterans from non-PTSD veterans when substance abuse cases are removed from the non-PTSD comparison group. This hypothesis was rejected. The linear combination of scores on six of the MMPI scales correctly classified 82.26% of the sample before screening and accounted for 34% of the variance.

It should be noted that this is more accurately termed a PTSD vs OTHER discrimination since PTSD veterans are being differentiated from veterans with other disorders and not from normals. Nor is it a discrimination of the presence or absence of individual PTSD symptoms. Anxiety is a symptom of many different disorders and clinicians often diagnose in terms of the prominence of a symptom within a constellation rather than on its total absence or presence.

The scales contributing to this discrimination included the Hy, F, Hs, Pa, K, Pd and Mf scales. The scales contributing the most to the discrimination are composed mainly of items reflecting somatic concerns. The Hy scale consists of 33 items dealing with physical complaints and the use of these complaints in a manipulative or avoidant way. The scale is highly reliable with test-retest scores of .80-.90. The scale is also unidimensional- factor analysis reveals that much of the variability of this scale is accounted for by a single factor (Dahlstrom & Welsh, 1960). Scores on this scale are negatively correlated with intelligence and socioeconomic status (Graham, 1977). The Hs scale, designed to measure psychogenic disorders of physical functioning, is composed of 60 items and seems to have two main content areas- specific physical complaints and denial of



psychological maladjustment. Reliability of this scale is lower than that of the Hy scale and again, the scale is negatively correlated with intelligence (Duckworth, 1979). Elevations on this scale are also associated with acting out without awareness, a finding which is interesting in light of the 'flashbacks' experienced by some PTSD veterans. Several of the items on the PTSD Subscale (Keane et al., 1984) refer to such aggressive behavior, as well as lack of awareness at the time of such action.

Aggressiveness, antisocial behavior, hostility, paranoid ideation and again, physical complaint are the content areas covered in the 64-item F scale. This validity scale was designed to measure test-taking attitude and the degree to which the respondent reports unusual thoughts or experiences and is positively correlated with the Pa and Sc scales (Graham, 1977). Blacks and persons with poor reading skills also tend to score higher on the F scale.

The contribution of scales measuring aggression and alienation is not surprising in light of this description of PTSD from the DSM-III (APA, 1980).

Increased irritability may be associated with sporadic and unpredictable explosions of aggressive behavior, upon minimal or no provocation. The latter symptom has been reported to be particularly characteristic of war veterans with the disorder. (p237)

The F and Hs scales also contributed to the discrimination of Heavy vs. Light combat veterans (Penk et al., 1981). Authors of that study noted a similarity between PTSD criteria and behavioral components of the former diagnostic category of Hysteria. Fairbank, Keane & Malloy, (1984) found higher scores on scales Hy and Hs among PTSD subjects compared to

non-PTSD psychiatric subjects.

The overlapping content of the Hy and Hs scales suggest two possible factors- a hostility dimension and a somatic dimension. The possibility also exists that there is an undetected socioeconomic bias in the present sample which would account for these findings.

The most interesting results of this study concern the effects of screening. The second hypothesis stated that the discriminative power of the MMPI would be unchanged by the inclusion of subjects with primary diagnoses of substance abuse, was rejected. When these subjects were included, the correct classification dropped from 82.26%, a rate which compared favorably with the 82.35% obtained by Foy et al., (1984) and with the 83% obtained by Keane, Malloy & Fairbank (1984), to 71.43%. The amount of explained variance also dropped from 34% to 22%.

Most of the previous studies in which the MMPI was used to identify PTSD subjects have used screened samples. Foy et al., (1984) eliminated alcoholics and 'actively psychotic' subjects; Fairbank et al., (1984) screened for psychosis, seizure disorder, organicity and exposure to non-military traumatic events; Keane, Malloy & Fairbank's (1984) sample contained no subjects with primary substance abuse disorders. The results of the current study indicate that the same analysis run on a sample with and without screening yield different classification rates. Screening may introduce some amount of control into a study but it also reduces the generalizeability of the findings to real clinical situations in which all diagnostic groups may be present and differential diagnoses have to be made. Several studies have suggested the possibility that PTSD veterans could be misdiagnosed as

psychotic or personality disordered (Zarcone, Scott & Kauver, 1977) as schizophrenic or affectively disordered (Van Putten & Emory, 1973) or histrionic (Penk et al., 1981). If the subjects so often eliminated from PTSD studies *are* similar to the PTSD subjects, the correct classification rates being reported may be erroneously high.

Such a broad conclusion cannot be drawn from the results of this study. When a certain kind of subject is eliminated from one of the criterion groups, it is also possible that the scores which serve to differentiate the criterion groups are also eliminated. If, for example, subjects with adjustment disorders were eliminated from the OTHER group and their responses to the MMPI were very *dissimilar* to those of the PTSD group, their removal would have decreased some of the differences between the two criterion groups and likewise would decrease the correct classification rate. The results of the present study merely indicate that screening will effect results of discriminant analyses and represents a limitation on the generalization of results of studies in which this was done.

The predictor scales selected by the first (screened) analysis in this study are similar to those selected in the second (unscreened) analysis. In each case the Hy, F and Hs scales contributed the most to the discrimination. However, these scales differ from those in Foy's function, despite the similar classification rates. Only 3 scales- the Mf, F and Pa were common to both functions. The function obtained by Foy did explain more of the variance (46% compared to 34%). This is not a cross-validation of Foy's function as such, but since the analysis selected a different best set of predictors, it stands to reason that Foy's function would be less than 82% successful in identifying the PTSD subjects in the present sample.

It should be noted that the screening procedures used in the present study and the one it is designed to replicate (Foy et al., 1984) were not identical. The design of the original study eliminated 'actively psychotic' subjects as well as substance abusers. Given the archival nature of the current study it was not possible to determine the mental status of the psychotic subjects in the sample, so only subjects with primary diagnoses of substance abuse disorders were screened. That left a comparison group consisting of subjects with diagnoses of schizophrenia, personality disorders, somatoform disorders, affective disorders, organic brain syndromes, anxiety disorders, adjustment disorders and psychosexual disorders. This may represent a very different comparison group than that employed by Foy et al. While it was the conclusion of the authors of the original study that the greatest misclassification of PTSD veterans would be into psychotic categories, the results of a similar study (Keane et al., 1984) showed as good a 'hit rate' between PTSD veterans and a comparison group containing 22% psychotics and *no* substance abusers. Thus, the real difficulty may be in distinguishing PTSD veterans from substance abusers.

The three-way discrimination of the entire sample into PTSD, OTHER and SUBSTANCE groups can further clarify these relationships. This analysis resulted in a 60.44% overall correct classification (62.5% PTSD, 64% OTHER, and 54.8% SUBSTANCE). The substance abuse group was the most difficult to classify with 25.8% of its members placed into the OTHER and 19.4% placed into the PTSD group. Since false PTSDs were less frequent than misclassification of OTHER and SUBSTANCE subjects as each other, it would appear that there is still greater similarity between the OTHER and SUBSTANCE groups than between either of them and the PTSD group.



Screening may also be a factor in the greater success reported in discriminations using checklist items as predictors variables. Frye & Stockton (1982) reported a 90% correct classification of PTSD vs non-PTSD subjects (all had been officers in Vietnam) with 5 items including: negative perception of family's helpfulness on return from the war, high combat exposure, external locus of control, more immediate discharge after the war, and more positive pre-service attitude toward the war. The elimination of 'borderline' PTSD cases (subjects with some but not all of the symptoms) certainly may have enhanced this discrimination. When these borderline subjects were included in the discrimination, correct classification rates dropped to 71.6% (only 58% of the borderline group was correctly classified). Again, the elimination of the borderline cases presents a threat to generalization and such cases have been found in other studies (Atkinson et al., 1982). It is exactly these cases that a clinician would need the assistance of an objective personality inventory in classifying.

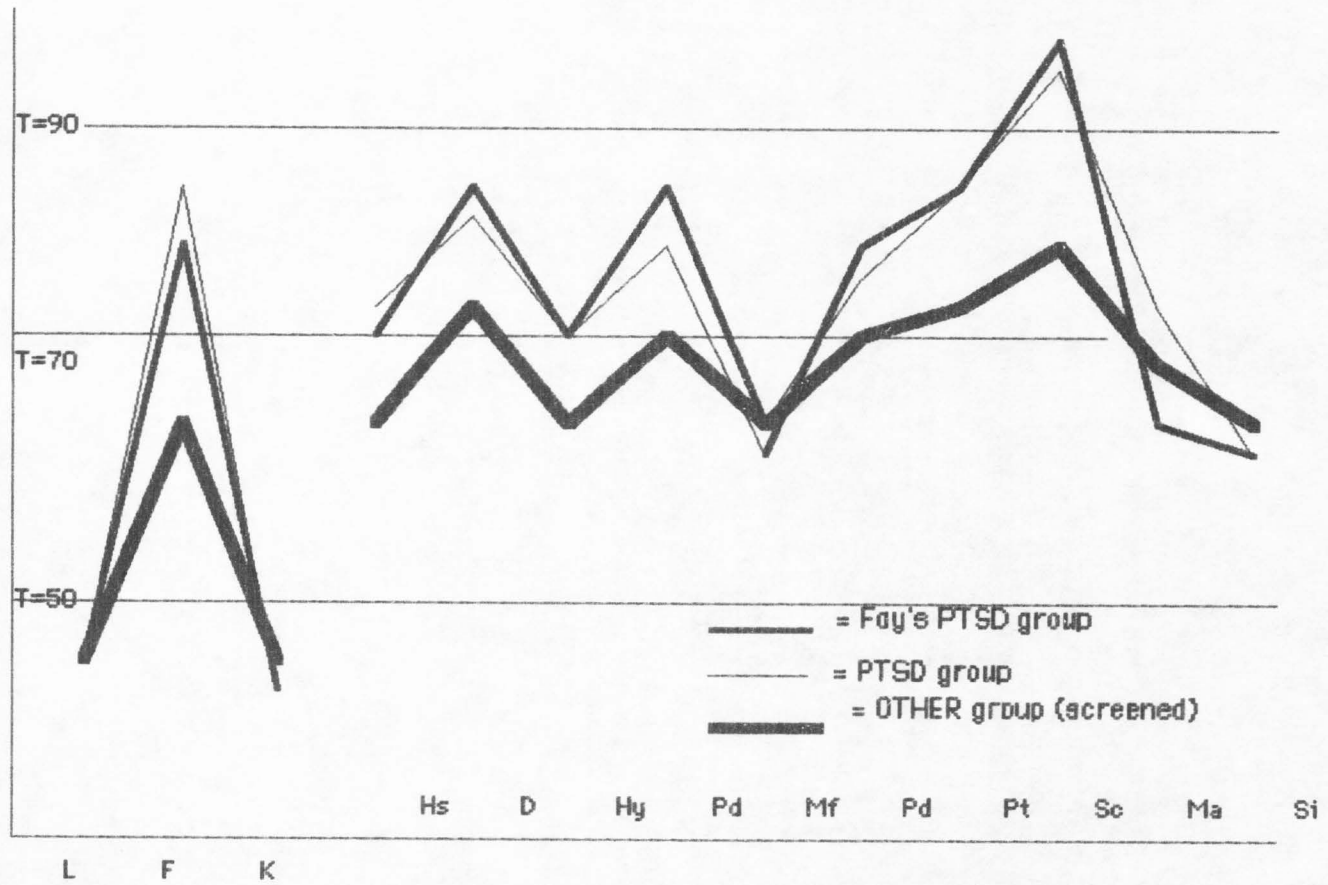
Foy et al., (1984) also reported a 93% correct classification rate using checklist items of: tension/anxiety, disgust, alcohol abuse, suicidal thoughts, hostility, marital problems, depression, irritability and restlessness. The greater face validity of these checklists (many items are synonyms for the PTSD criteria) may account for their greater success in identifying individuals with PTSD when compared with the criterion-keyed and multidimensional MMPI. Such face validity also leaves a PTSD predictive checklist vulnerable to deception and distortion. Since fictitious cases of PTSD are not unheard of (Atkinson et al., 1982) and secondary gain in the form of veterans compensations exist, a less obvious measure of PTSD may be of benefit to the diagnostician. Interestingly, the highest PTSD classification

rates (100%) have been reported in a study using behavioral and physiological measures of anxiety (Malloy et al.,1983). When presented with mild combat stimuli (videotape), PTSD subjects were discriminated from psychiatric and combat-normal non-PTSD controls by the predictor variables of mean Heart Rate, mean Skin Response Level, mean Skin Response Magnitude, mean score on a self-report anxiety measure and mean score on a behavioral measure. It was discovered, however, that the behavioral measure (terminating the videotape by pressing a button), contributed the most to this discrimination and when this variable was removed, correct classification rates fell to 80%.

It is the factorial complexity of the MMPI that has lead to the increasing use of pattern or profile analysis in diagnosis. Results of the present study are consistent with previous profile analyses. The PTSD group, as reported in several other studies, had a parallel (8-2-7) but higher MMPI profile than the OTHER group (screened or unscreened). Results regarding the number of elevations also support previous findings- the PTSD group had an average of 8 elevations while the OTHER group had an average of only 5. The F scale of the PTSD group was elevated into the clinically significant range (T PTSD= 84) while the F scale of the OTHER group was within normal limits- a result also in agreement with previous findings. Such elevations, which would lead a clinician to question the validity of a PTSD profile, may actually indicate a 'fake bad' profile or may indicate a genuine divergence of experience for the PTSD veteran.



Figure 1- MMPI Profile Comparisons



## Limitations

The discrimination and correct classification rates achieved in this study involve a dichotomy based on clinical diagnosis. Clinical diagnosis itself is subject to a certain amount of error and unreliability.

Therefore, misclassifications using the discriminant function may reflect the lack of reliability in the clinical judgement involved in determining the criterion groups as well as a lack of discriminative power of the MMPI.

Results of a study using only Vietnam veterans cannot be applied to all individuals with Post-Traumatic Stress Disorder. The PTSD criteria are still new and were not developed specifically for combat reactions. Caution must also be applied in applying these findings to all Vietnam veterans since no confirmation exists that this sample is representative of that population as a whole. Lack of information on combat exposure, intelligence and socioeconomic status reflect potential biases in the sample used in this study. A further obstacle to discrimination exists in the frequent cases of multiple diagnoses. It is possible for an individual to have primary and secondary diagnoses or a set of secondary traits. This is particularly true of substance use disorders- which may appear as a separate entity or as a response (usually 'self-medicating') to the discomfort of other disorders. It is possible that many of the PTSD veterans in this sample had some history of alcohol or drug use, even if this is not foremost among their diagnoses. Finally, the nature of the MMPI itself- with the low scale reliability and intercorrelations among some of the scales, may place a limitation on the usefulness of the results.

## Recommendations

The direction for further research which was most obvious when this study was proposed has already been taken. A subscale of 49 items from the MMPI has been published while this thesis was in progress (Keane et al. , 1984). This subscale, while not improving the classification rates achieved by discriminant analysis using the MMPI, would be more easily keyed and used by clinicians. The issue of screening has yet to be resolved and a cross-validation of the PTSD subscale on a sample containing substance abusers may approach that resolution. This subscale has yet to be cross-validated on a non-veteran PTSD population. Such a study could further clarify the relation between combat-related PTSD and PTSD caused by exposure to other stressors, as well as resulting in a more universally applicable subscale.

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APPENDICES

Appendix A  
Frequency Count of Diagnoses

CATEGORY	FREQUENCY	PERCENT
Schizophrenic	8	8.5
Personality	1	1.1
PTSD	33	35.1
Substance	31	33.0
Somatofom	4	4.3
Affective	7	7.4
OBS	2	2.1
Anxiety	3	3.2
Adjustment	3	3.2
Psychosexual	2	2.1



Appendix B  
Chi-Square Analyses -Outreach vs. VAMC

	AGE			
	30-34	35-39	40-70	Total
VAMC	6	16	2	24
OUTREACH	2	5	2	9

Chi-Square= 1.19

	BRANCH			
	Army	Marine	Navy/A.F.	Total
VAMC	15	5	4	24
OUTREACH	5	2	2	9

Chi-Square= .17

	MARITAL STATUS			
	Single	Married	Divorced	Total
VAMC	6	9	9	24
OUTREACH	1	6	2	9

Chi-Square=2.29

## EMPLOYMENT STATUS

	Unempl.	Employed	Student	Total
VAMC	12	10	2	24
OUTREACH	4	4	1	9

Chi-Square=.15

## Appendix C

## Chi-Square Analyses-PTSD vs. OTHER

	AGE			
	30-34	35-39	40-70	Total
PTSD	8	21	4	33
OTHER	20	36	5	61

Chi-Square=1.27

	BRANCH			
	Army	Marine	Navy/A.F.	Total
PTSD	20	7	6	33
OTHER	32	15	14	61

Chi-Square=.59

	RACE			
	White	Black	Other	Total
PTSD	25	5	3	33
OTHER	43	14	4	61

Chi-Square=.90

## MARITAL STATUS

	Single	Married	Divorced	Total
PTSD	7	15	11	33
OTHER	9	31	21	61

Chi-Square=.65

## EMPLOYMENT STATUS

	Unempl.	Employed	Student	Total
PTSD	16	14	3	33
OTHER	26	33	2	61

Chi-Square=2.11