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Assessment of Posttraumatic Stress Disorder in World War II Veterans

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Four posttraumatic stress disorder (PTSD) scales were compared in a community sample of 330 American former prisoners of war and combat veterans of World War II. The Mississippi Scale for Combat-Related PTSD (M-PTSD), the Minnesota Multiphasic Personality Inventory-2 *Pk* PTSD scale, and the Impact of Event Scale (IES) all demonstrated moderate relationships with PTSD as defined by the Structured Clinical Interview for *DSM-III-R*. Comparative validities were similar to those observed in Vietnam veteran samples. Confirmatory factor analysis indicated that the 3 scales loaded significantly on 1 factor. The impact of *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.) PTSD criteria changes was examined and found to be minimal. Implications for the use of the M-PTSD, *Pk*, and IES in combat-related PTSD assessment are discussed.

Various approaches to the psychological assessment of posttraumatic stress disorder (PTSD) have arisen since its appearance in the diagnostic manuals. These approaches include (a) highly structured interviews such as the Diagnostic Interview Schedule (Robins & Helzer, 1985) and the Structured Clinical Interview for *DSM-III-R* PTSD module (SCID PTSD; Spitzer & Williams, 1986), and (b) self-report scales such as the Mississippi Scale for Combat-Related PTSD (M-PTSD; Keane, Caddell, & Taylor, 1988).

Several studies have compared the agreement among PTSD criteria in the revised third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-III-R*; American Psychiatric Association, 1987) and PTSD self-report measures such as the M-PTSD scale, the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979), and the Minnesota Multiphasic Personality Inventory (MMPI) *Pk* PTSD scale (Keane, Malloy, & Fairbank, 1984). In two samples of treatment-seeking Vietnam veterans, M-PTSD scores, IES scores, and *Pk* scores were strongly correlated with each other and with SCID-based PTSD symptoms (McFall, Smith, Mackay, & Tarver, 1990; McFall, Smith, Roszell, Tarver, & Malas, 1990; Watson et al., 1994).

There are few validity studies of PTSD measures among veterans of wars prior to the Vietnam war. In a sample of pre-Vietnam War veteran patients, the M-PTSD and *Pk* scale were predictive of PTSD diagnosed through clinical interview (Hyer et al., 1992). In a community study of 1,210 veterans, the M-PTSD and *Pk* scores correlated .52 for the World War II (WWII) participants and .62 for the Korean War participants, suggesting modest convergence between these measures (Spiro, Schnurr, & Aldwin, 1994). The M-PTSD was predictive of PTSD in a community-based national sample of WWII and Korean War former prisoners of war (POWs) and combat veterans who completed the SCID (Page, 1992). PTSD defined through clinical interviews and a PTSD symptom checklist was predicted by the *Pk* scale in a community sample of WWII POWs (Query, Megran, & McDonald, 1986).

This study examined the predictive power of the M-PTSD, IES, and *Pk* scales to a SCID-based PTSD diagnosis in a community sample of WWII veterans. The comparative performance and interrelationships of these three PTSD self-report measures also were examined.

Method

Participants

The participants were part of a study of WWII and Korean War POWs and combat veterans at the Veterans Affairs Medical Center at Minneapolis. To avoid potential confounding due to age and cohort differences, results from the younger and smaller Korean War sample were excluded from this report. Study participants were sought using Department of Veterans Affairs (VA) rosters of all known POWs in the catchment area to guide direct mailings. Follow-up telephone contacts with 338 potential POW participants resulted in 247 (73%) completed assessments between August 1991 and August 1994. An additional 44 (13%) POWs were willing to participate but could not be scheduled because of ill health or distance from the medical center, and 47 (14%) refused to participate. The 83 combat veterans were recruited through community announcements. Participants in the present report included POWs held by Japan (n = 56) and by Germany (n = 191) and those who were not captured but fought against Japan (n = 43) and Germany (n = 40). Their median age was 71 years and their median education was 12 years. Two were Native American, 1 was Hispanic, and the rest were White. All resided in Minnesota, western Wisconsin, or North Dakota. Most participants completed the study interviews in the course of two visits to the medical center; some interviews were completed in a single visit, and 11 were completed at the POW's home

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in one or two visits. In addition to the M–PTSD, MMPI-2, and IES, four other questionnaires were completed at home by the participant soon after the initial meeting with the evaluator.

Table 1 provides information on war trauma exposure for the POWs and the combat veterans. Combat exposure was assessed using Keane et al.'s (1989) Combat Exposure Scale (CES), which consists of seven items rated on a 5-point Likert scale, with items weighted according to severity. CES means fell in the moderate range of exposure (Spiro et al., 1994). Weight loss while a POW has been found to be an indicator of captivity harshness predictive of later psychiatric morbidity (Eberly & Engdahl, 1991). Our sample's average weight loss is comparable to a 1967 national survey's findings of 34% and 18.4% among POWs of Japan and Germany, respectively (Beebe, 1975).

Assessment Instruments and Procedure

Structured Clinical Interview for DSM–III–R. The SCID PTSD module is the structured interview most frequently used to evaluate the presence or absence of PTSD. It provides specific operational criteria for the 17 *DSM–III–R* symptoms of PTSD within the reexperiencing, numbing/avoidance, and increased arousal criterion categories. Kulka et al. (1991) reported a SCID PTSD module kappa of .93, reflecting high interrater agreement.

Participants were administered the SCID PTSD module, the SCID Non-Patient Edition (SCID–NP; Spitzer, Williams, Gibbon, & First, 1990), and the SCID for Personality Disorders (SCID–II; Spitzer et al., 1990). All items on the SCID PTSD module were asked of all participants. All interviewers were experienced in the assessment of combat-related PTSD. We authors and a master's-level psychologist conducted the interviews after viewing videotapes and following a detailed guide (Schlenger & Allison, 1987) used in the VA Cooperative Study of PTSD (Keane, Kolb, & Thomas, 1989). We observed and rated each other's interviews. Eight interviews were directly observed by a second rater and five interviews were taped and independently reviewed by two additional raters, allowing three pairs of observations for these cases. There were no disagreements as to the presence or absence of current PTSD among these 23 possible pairs of ratings. All SCIDs were reviewed for clerical accuracy. A detailed POW medical history form and a previous psychiatric examination were on file for nearly all POWs.

Mississippi Scale for Combat-Related PTSD. The M-PTSD (Keane et al., 1988) is a 35-item Likert-scaled questionnaire originally developed to assess *DSM–III* PTSD symptoms and various associated features. It has performed well in clinical settings in distinguishing PTSD cases from others (e.g., McFall, Smith, Mackay, et al., 1990) and in field or community studies such as the National Vietnam Veterans Readjustment Study (NVVRS; Kulka et al., 1990). It has shown high internal consistency (α = .94), test–retest reliability (.97), sensitivity (.93), and specificity (.89) in clinical samples of Vietnam veterans (Keane et al., 1988). Its measurement qualities were examined in detail using the NVVRS sample (King, King, Fairbank, Schlenger, & Surface, 1993), confirming its unidimensionality and demonstrating a high precision in the upper range of the PTSD dimension.

The Impact of Event Scale (IES). The IES (Horowitz et al., 1979) is a 15-item self-report scale developed to measure two core effects of specific traumatic life events: Intrusion (cognitive and affective reexperiencing of the traumatic event) and Avoidance (defensive denial and avoidance of trauma-related memories and feelings). Separate scores may be calculated for these two scales, and they may be summed for a total score. Horowitz et al. (1979) reported a total score split-half reliability of .86. The IES has identified those with stress reaction symptoms in both military samples (e.g., Schwarzwald, Solomon, Weisenberg, & Mikulincer, 1987) and nonmilitary samples (e.g., Horowitz et al., 1979). Although norms for diagnosis are not established, the IES total score has been used to define three levels of clinical concern: below 9 as low, 9 to 19 as moderate, and over 19 as high (Horowitz, 1982). These levels discriminated distress levels across groups of stress clinic patients, cancer patients, and medical students. Persons who handled human remains in Operation Desert Storm were more likely to be in the high concern group than those who did not (McCarroll, Ursano, & Fullerton, 1993). The NVVRS used an IES total score cutoff of 35 to classify PTSD cases (W. E. Schlenger, personal communication, March 24, 1994).

MMPI-PTSD (Pk) Scale. The MMPI *Pk* scale is frequently used and validated in stress-disorder research (see Watson, 1990). The MMPI-2 *Pk* scale consists of 46 true–false items and has been reported to be essentially equivalent to the 49-item MMPI *Pk* scale (Litz et al., 1991), although the MMPI-2 *Pk* score may be lower among highly symptomatic patients. Because the MMPI-2 *Pk* scale is three items shorter than the MMPI *Pk* scale, a correction factor developed by Lyons and Keane (1992) can be added to MMPI-2 *Pk* scores to allow comparisons with MMPI-based studies.

The 60-item *Ps* PTSD scale (Schlenger & Kulka, 1989) also was scored in the present sample. It correlated highly with the *Pk* scale (r = .95), and its performance was equivalent to that of the *Pk* scale, despite speculation (Litz et al., 1991) that the *Ps* scale may perform better in community samples. Therefore, *Ps* scale results are not reported here.

Table 1
Trauma Exposure Among the Sample's Prisoners of War (POWs) and Combat Veterans

Group	*n*	Age at exam	CES	Injured/ wounded	Weight loss
POW	247	73.2	20.5	62.9%	28.6%
Combat	83	72.5	22.9	57.8%	
Total	330	73.0	21.2	61.6%	

Note. CES = Combat Exposure Scale. Weight loss = percentage of body weight lost while imprisoned.

Results

To estimate the relative validity of the three PTSD self-report measures, confirmatory factor analyses were conducted using EQS (Bentler, 1992). The factor solutions were developed simultaneously on randomly divided halves of the total group. Only a one-factor model produced an acceptable fit of the model to the data, $\chi^2(3, N = 165) = 2.36$, $p = .43$, and a normed fit index (Bentler & Bonett, 1980) was .994, suggesting convergence among the three measures on a single underlying factor. The regression coefficients for the measures were M-PTSD = .998, IES = .739, and *Pk* = .729.

Using one third of the total sample as a development group, cutoffs for the three self-report instruments were determined empirically to maximize the kappa statistic against a SCID-defined PTSD criterion. Optimal cutoffs were 91 for the M-PTSD, 38 for the IES, and 14 for the *Pk*. The remaining two thirds of the sample constituted the validation group to which the obtained cutoffs were then applied.

Compared with the SCID PTSD prevalence rate of 21.2%, the three questionnaires somewhat overestimate PTSD prevalence: M-PTSD = 24.1%, IES = 33.6%, and *Pk* = 24.1%. The M-PTSD exhibited a SCID-defined 6% false positive rate and a 9% false negative rate. The IES scale had false positive and false negative rates of 24% and 3%, respectively; corresponding rates

for the *Pk* scale were 11% and 7%. Over half of the false positives on each of the scales had past PTSD. For each scale, comparisons of false positives to false negatives did not reveal distinct differences in scores on their remaining measures or in their demographics. Overall, the M-PTSD was a slightly better indicator of PTSD than the other measures, exhibiting agreement with the SCID in 85% of the cases, versus 80% for the IES and 82% for the *Pk* scale. When applied to subgroups (not shown), all three measures slightly underestimated the SCID-based PTSD rate in the subgroup with the highest base rate, the POWs of Japan, and tended to overestimate PTSD in the other groups. Age did not significantly correlate with any of the PTSD measures.

Our cutoff for the M-PTSD was slightly higher than that used in other community veteran samples (Kulka et al., 1991; Page, 1992). When adjusted for the shorter length of the MMPI-2 scale, our *Pk* cutoff of 14 is close to the MMPI *Pk* cutoff of 15/16 noted by Watson (1990) as discriminating PTSD cases from non-PTSD individuals. The IES typically has not been given a single cutoff score, but our cutoff of 38 is near 35, which is the cutoff used by the NVVRS, noted earlier.

Using SCID-defined PTSD as the criterion, Table 2 summarizes the cross-validated (and development group) discriminative validity statistics for the three self-report measures in this study. For comparison, non-cross-validated statistics from other samples of older veterans are presented. Statistics drawn from the NVVRS cross-validational Clinical Examination Component (Kulka et al., 1991) also are included. Alphas, sensitivities, and specificities from the present sample were comparable to others in Table 2. The present sample's kappa statistics were modest (.47–.50) and lower than others in the table, although comparable to those found in the NVVRS. The internal consistency (alpha) for the SCID PTSD module in the present sample was .86.

Logistic regression analysis using the M-PTSD scale alone to predict PTSD diagnosis yielded a hit rate of 87%. The IES total score and *Pk* score used individually yielded hit rates of 83% and 84%, respectively; combining either or both with the M-PTSD scale increased the hit rate by less than 1 percentage point. We also attempted to improve diagnostic accuracy by applying cutoffs from all possible pairs of measures to predict SCID PTSD status. Selecting cases using the IES cutoff of 38 and a more sensitive cutoff (80) for the M-PTSD increased the hit rate to 87% ($\kappa = .60$).

DSM-IV (American Psychiatric Association, 1994) redefined PTSD Criterion A (the stressor criterion) to require that intense fear, helplessness, or horror be experienced during trauma exposure. In addition, it adds a Criterion F, requiring that the PTSD symptoms cause clinically significant distress or impairment. Reexamination of the *DSM-III-R* PTSD-positive cases indicated that all of them would meet the new Criterion A and that only one of the *DSM-III-R* positive cases did not seem

Table 2
Comparative Validities of Three Self-Report PTSD Measures

Study	Sample	*N*	α	Cutoff	Sensitivity	Specificity	κ
		Mississippi Scale for Combat-Related PTSD					
Present study							
Validation group	WWII community	214	.93	91	.66	.87	.50
Development group	WWII community	114	.93	91	.84	.92	.73
Hyer et al. (1992)	Pre-VN veteran & POW patients	55	.85	100	1.00	.93	—
Spiro et al. (1994)	WWII & Korean War community	1,104	.71	89	—	—	—
Page (1992)	WWII & Korean War community	252	—	89	.73	.84	.56[b]
Kulka et al. (1991)	VN community	440	.94	89	.77	.83	.53
		MMPI-2 *Pk* scale					
Present study							
Validation group	WWII community	209	.93	14	.60	.84	.47
Development group	WWII community	114	.93	14	.69	.90	.51
Hyer et al. (1992)	Pre-VN veteran & POW patients	55	—	34	.83	.79	—
Spiro et al. (1994)	WWII & Korean War community	977	.87	15	—	—	—
Query et al. (1986)	WWII POWs community	69	—	17	.67	.88	.72[b]
Kulka et al. (1991)	VN community	440	.89[a]	14	.72	.82	.48
		Impact of Event Scale					
Present study							
Validation group	WWII community	210	.94	38	.78	.82	.49
Development group	WWII community	114	.94	38	.84	.83	.55
Schlenger (personal communication, 1994)	VN community	440	—	35	.92	.62	.57

Note. PTSD = posttraumatic stress disorder; MMPI-2 *Pk* = Minnesota Multiphasic Personality Inventory–2 PTSD Scale; WWII = World War II; VN = Vietnam War; POWs = prisoners of war. Dashes = not applicable or data not reported.
[a] split-half reliability, uncorrected. [b] calculated by the present authors.

distressed or impaired by his symptoms. *DSM–IV* also moves one symptom, physiological reactivity on exposure to cues, from Criterion Group D (increased arousal) to Group B (reexperiencing the trauma). Rescoring of the SCID data led to reclassification of three cases from *DSM–III–R*-positive to *DSM–IV*-negative, and two cases from *DSM–III–R*-negative to *DSM–IV*-positive. The three self-report measures were virtually identical in performance under either *DSM* criteria set. These reanalyses suggest that *DSM–III–R*-based PTSD may be comparable to *DSM–IV*-based PTSD.

Discussion

All three self-report measures effectively predicted SCID-diagnosed PTSD in this sample of elderly veterans. At least two factors probably contributed to this. First, although the sample proportion of PTSD cases (21%) is below the 50% base rate required for optimum test performance (Meehl & Rosen, 1955), it is higher than that observed in most community samples of war veterans. Second, all but a few of these men were unfamiliar with the diagnosis of PTSD, making symptom exaggeration or malingering less of a concern than in many clinical samples (see Lyons, Caddell, Pittman, Rawls, & Perrin, 1994).

Statistically determined cutoffs will maximize kappa, but optimal cutoffs will vary with the sample and the user's purpose. Effective screening in groups seeking treatment or compensation may require higher cutoffs than those reported here. Lower cutoffs may be more appropriate if the cost of missing a true case outweighs the cost of identifying a false case. Scores close to but below a selected cutoff may suggest past PTSD and continuing PTSD symptoms, warranting further evaluation. Because these scales were intended as screening devices that could identify quickly those people for whom a more thorough diagnostic assessment is indicated, the use of lower cutoffs may be justified in many applications of these PTSD self-report measures.

The simultaneous use of two or all three self-report instruments does not seem justified by our data. Coupled with the need to establish local norms, the relatively minor increase in diagnostic accuracy gained through the use of two scales suggests that this is not an efficient strategy for identifying cases. The best of the self-report instruments used in this study, the M-PTSD, worked nearly as well used alone as when combined with the other two measures.

Scale characteristics may interact to produce identical scores in individuals with different symptom patterns. Reviewing an individual's item responses may prove helpful. With the M-PTSD, if any of the several items with ambiguous time frames are endorsed, inquiry as to the *current* presence of symptoms may resolve discrepant diagnostic information. Knowledge of item characteristics may prove helpful. King et al. (1993) identified a set of M-PTSD items that have good precision across the full PTSD continuum. These items should be most useful in evaluating persons not seeking treatment for PTSD. Other items are precise in the upper range of the PTSD dimension and are informative when screening for PTSD among treatment-seeking groups. Still other M-PTSD items are most precise at very high PTSD levels and should be useful in case identification among inpatient clinical samples. Similar analyses could be applied to the IES and *Pk* scales to improve understanding of their item-level performance and enhance the interpretability of total scores.

Among older veterans, the M-PTSD, *Pk*, and IES scales appear to converge and should be helpful diagnostic tools for clinical screening purposes when used with appropriate cutoffs. The similarity in cutoff scores demonstrated between our sample and the Vietnam community sample may suggest a continuity of symptoms across time and between cohorts. Further comparisons at the item and symptom level between cohorts are needed to learn more about similarities and possible differences. Comparisons with other trauma survivor groups should enhance the general understanding of PTSD.

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