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War-Related Post-Traumatic Stress Disorder in Black, Hispanic, and Majority White Vietnam Veterans: The Roles of Exposure and Vulnerability

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Abstract

Elevated prevalence rates of chronic PTSD have been reported for Black and Hispanic Vietnam veterans. There has been no comprehensive explanation of these group differences. Moreover, previous research has relied on retrospective reports of war-zone stress and on PTSD assessments that fail to distinguish between prevalence and incidence. These limitations are addressed by use of record-based exposure measures and clinical diagnoses of a sub-sample of veterans from the National Vietnam Veterans Readjustment Study (NVVRS). Compared with majority whites, the Black elevation is explained by Blacks' greater exposure; the Hispanic elevation, by Hispanics' greater exposure, younger age, lesser education, and lower Armed Forces Qualification Test scores. PTSD elevation in Hispanics versus Blacks is accounted for mainly by Hispanics' younger age.

Prevalence rates of PTSD, PTSD-like symptoms, and other psychological problems have been found to be significantly higher in Black than in white majority veterans many years after the Vietnam war (Centers for Disease Control, 1988; Green, Grace, Lindy, & Leonard, 1990; Koenen, Stellman, Stellman, & Sommer, 2003; Kulka et al., 1990; Laufer, Gallops, & Frey-Wouters, 1984; and Penk et al., 1989). There has been less research comparing Hispanic and majority whites, but the nationwide study by Kulka et al. (1990) found even higher rates in Hispanic than in Black Vietnam veterans and, in another context, Galea et al. (2002) have reported elevated rates of PTSD for Hispanics in New York City in response to the 9/11 attacks on the World Trade Center (see also Lewis-Fernandez, Turner, Marshall, Neria, & Dohrenwend, in press.)

A variety of possible explanations have been offered for the elevated prevalence rates of PTSD in Vietnam veterans from Black and Hispanic backgrounds: Greater exposure to war-zone

stressors (e.g., Beals et al., 2002; Green et al., 1990; Kulka et al., 1990; MacDonald et al., 1997); differences in pre-war vulnerability factors (e.g., Kulka et al., 1990); ethno-cultural factors, especially subcultural differences in modes of expressing distress that could lead to the over-diagnosis of PTSD (e.g., Ortega & Rosenheck, 2000); post-war stressful events that could contribute to persistence or recurrence of PTSD (e.g., Schlenger & Fairbank, 1996); and experiences with racial/ethnic prejudice and discrimination (Allen, 1986; Cortright, 1990; Graham, 2003; Parson, 1984; Ruef, Litz, & Schlenger, 2000; Terry, 1984; Van Deburg, 1992). However, no compelling or comprehensive explanation of these group differences (cf. Beals et al., 2002; Green et al., 1990; Koenen et al., 2003; Kulka et al., 1990) has emerged.

For example, while many agree that differential exposure to war-zone stressors plays a major part in the racial/ethnic differences, others question the accuracy of the self-report measures of exposure on which this conclusion is based (e.g., Frueh et al., 2005; McNally, 2003; Wessely & Jones, 2004). Skepticism about these retrospective reports has been stimulated by systematic research on recall bias in reports of such experiences (e.g., Roemer, Litz, Orsillo, Ehlich, & Friedman, 1998; Southwick, Morgan, & Nicolau, 1997). While there is no evidence that such biases are greater in reports from some racial/ethnic groups than others, the above investigations suggest that it would be useful to examine whether measures of exposure that do not rely on veterans' recall would yield the same results.

Another problem is the focus of most previous research on the current prevalence of PTSD; that is, on the presence of the disorder, or symptoms of the disorder, many years after the war when the studies were conducted. Prevalence is a function of initial onset or incidence and subsequent course. Risk factors for one may be quite different from risk factors for the other (e.g., Schnurr, Lunney, & Sengupta, 2004; Susser, Schwartz, Morabia, & Bromet, 2007).

These problems have been present in previous results from the NVVRS, the study with the largest samples of Black and Hispanic Vietnam veterans (Kulka et al., 1990). Fortunately, the data exist with which to address these limitations. The problem with the assessment of PTSD can be resolved by using detailed diagnostic histories of PTSD obtained for a subsample of NVVRS veterans (Kulka et al., 1990). The problem of measuring exposure can be addressed by using data obtained from the individual veterans' military records and data from record-based historical accounts (Dohrenwend et al., 2004; Dohrenwend et al., 2006).

We previously used these measures to address the hypothesis advanced by Ortega and Rosenheck (2000) that the elevation in Hispanic rates of PTSD reported in the NVVRS by Kulka et al. (1990) is an artifact of a subcultural expressive style that led to over-reporting of symptomatology. We found that although self-report symptom scales seem affected by a pattern of Hispanic expressiveness, the clinical diagnoses in the subsample, which also showed an Hispanic elevation, seemed generally free of such problems (Lewis-Fernandez, Turner, Marshall, Neria, & Dohrenwend, in press). Our purpose here is to use these diagnoses, the record-based measures of exposure, and other measures developed with data from the NVVRS to investigate the relevance of the remaining substantive hypotheses, summarized above, about why the prevalence rates of PTSD, present many year after the end of the Vietnam war, are elevated in Black and Hispanic veterans.

Method

Data Sources and Participants

The NVVRS subsample of male Theater veterans consists of 260 respondents in 28 Standard Metropolitan Regions (SMRs) (including the 15 largest). Completion rates for Theater males targeted for the subsample were 80% or more for each of the three main racial/ethnic groups (Kulka et al., 1990, p. 13). Suitably weighted (see Statistical Analysis subsection below), the

demographic distribution of subsample veterans, including the percents in the racial/ ethnic groups, is very similar to that in the full 1,200 member sample of NVVRS Theater veterans (Dohrenwend et al., 2007).

Five veterans from minority backgrounds other than Black and Hispanic are removed as too few to analyze. Relevant data on PTSD status or information about sampling weights was missing for three more, also omitted. Only four subsample veterans in the three racial/ethnic groups had first onsets of PTSD that were prior to their service in Vietnam. These rates are too low and the n's on which they are based are too small to provide a basis for evaluating whether pre-war PTSD increased vulnerability to war-related PTSD; these four veterans are, therefore, also omitted from the analyses. The sample for the analyses now consists of 248 male veterans of the Vietnam War: 94 majority white, 70 Black, and 84 Hispanic.

Measures

Racial/ethnic background—All respondents in the NVVRS identified their racial background as American Indian, Alaskan Native, Asian, Pacific Islander, Black, White, Other (specify). They were then asked if they were of Hispanic (Spanish) origin and, if so, which of several groupings (e.g., Puerto Rican, Mexican) described their origin or ancestry. This information was used to cross-check the information in the military records on which the racial/ethnic stratification for sampling purposes was based. (Hunt et al., 1994, pp. 21-23). The large majority of the 84 Hispanic respondents, 63, are Mexican American; 15 are Puerto Rican; and the remaining 6 are from various other Latin American countries. Because PTSD rates are elevated in all but the last (and smallest) of these three Hispanic subgroups, and because the sample sizes of all but the Mexican-American subgroup are very small, all Hispanics are combined in the present analyses.

PTSD and other psychiatric disorders—Diagnoses according to then current DSM-III-R criteria were made by 28 doctoral level clinicians using the Structured Clinical Interview for DSM-III-R Diagnoses (SCID) (Spitzer, Williams, & Gibbon, 1987). The interviews were tape-recorded, and NVVRS clinicians conducted an independent reliability check on a subsample of 30 interviews. This check found the inter-rater reliability for the diagnoses of current and lifetime prevalence of PTSD as measured by kappa to be .87 and .94, respectively (Weiss et al., 1992, p. 371).

For the present research, three psychiatrists (including RLF) and two post-doctoral clinical psychologists reviewed a random selection of 52 tapes of the SCID interviews, confirming similar reliability for PTSD, whether calculated on results unweighted (kappa = .84 current and .95 lifetime) or weighted back to the population (kappa = .75 current and .96 lifetime). For other disorders, all but two of the kappas based on the weighted results for major depression, panic disorder, generalized anxiety disorder (current only), alcohol abuse or dependence, polysubstance abuse or dependence, and antisocial personality (lifetime only) were over .80. The exceptions were .68 for current panic disorder and .56 for lifetime polysubstance abuse or dependence.

War-related PTSD—The basic distinction called for in the SCID module for each PTSD symptom was between “lifetime prevalence” (i.e., whether or not the symptom occurred for a month or more during the veteran's lifetime) and, if lifetime, whether the symptom was “current” (i.e., had a period prevalence of presence for a month or more during the six months prior to the examination). The clinician then ascertained whether the symptoms recorded as present occurred together for at least a month in sufficient numbers and types to meet criteria for current prevalence, or lifetime but not current prevalence of PTSD (Schlenger, 1987). We

used additional information to establish whether a PTSD diagnosis was war-related (Dohrenwend et al., 2006; Lewis-Fernandez et al., in press; Marshall et al., 2006).

We will use the term “incident PTSD” (e.g., Susser, Schwartz, Morabia, & Bromet, 2006) to refer to first onsets of PTSD that were war-related. Incident PTSD is the sum of two subtypes: “current PTSD,” consisting of first onsets of war-related PTSD that met full diagnostic criteria within the 6 months prior to SCID examination; and “past PTSD,” consisting of such first onsets that did not meet full diagnostic criteria within 6 months prior to the SCID diagnostic interview.

Probable severity of exposure to war zone stressors—Data extracted by the NVVRS from personnel files (“201 files”) for purposes of designing and drawing the NVVRS sample (Kulka et al., 1988; 1990) facilitated construction of new measures of exposure for the present research from recently available records and historical accounts (e.g., Coffelt, Arnold, & Argabright, 2002). These new measures have been described in detail elsewhere (Dohrenwend et al., 2004; Dohrenwend et al., 2006; Dohrenwend et al., 2007). In brief summary, the composite military historical measure (MHM) consists of four categories ranging from probable very high to low severity of exposure. Veterans in the high and very high categories (11.7%) typically had high exposure military occupational specialties (MOSs), were in large military units with high casualty rates measured by killed in action (KIA), and served at times of high U.S. KIA rates; men in the very high category (3.2%) were further distinguished by having been in small units (e.g., companies) that suffered 10 or more KIAs during the veteran's tour in Vietnam. By contrast, veterans in the low exposure category (19.8%) typically had low exposure MOSs, served in large units with low KIA rates, served at times of low KIA rates, and were in small units with no KIAs during the veteran's Vietnam service. The remaining veterans in the moderate exposure category (68.4%) differed from those in the low mainly in that most served in Vietnam when KIA rates were moderate or high rather than low.

This MHM is based largely on casualty rates. Several additional indicators of exposure to war-zone stress are used: 201 file evidence of having received a Purple Heart, receiving a combat infantryman badge (CIB), and self-reports in answers to NSVG or SCID questions about personal involvement in harming prisoners or civilians.

Vulnerability and exacerbating factors—Most of the possible vulnerability and exacerbating factors identified in relevant reviews (Brewin, Andrews, & Valentine, 2000; Dalgleish, 2004; Fontana, & Rosenheck, 1994; Halligan & Yehuda, 2000; King, King, Foy, & Gudanowske, 1996; Macklin et al., 1998; Ozer, Best Lipsy, & Weiss, 2003; Schnurr, P.P., Lunney, & Sengupta, 2004) were measured in the NVVRS (Kulka et al., 1990, p. 80; Hunt et al., 1994). Some measures are based on data from the 201 files. These include younger age at entry into Vietnam, derived from date of birth, and lower Armed Forces Qualification Test (AFQT) scores. The AFQT scores are classified into the following Department of Defense aptitude groupings: Categories I (percentiles 93-100) and II (percentiles 65-92) standing for above average; Category III (percentiles 31-64) further subdivided into IIIA higher and IIIB lower standing for average; and Categories IV (percentiles 10-30) and V (percentiles 1-9) standing for below average, with Category V scorers routinely rejected for service (e.g., Sellman, 1990). Also included in the 201 files are disciplinary actions and pre-Vietnam educational level, cross-checked with the veterans' self reports. The SCID diagnostic interviews provide the measures of pre-war psychiatric disorders.

We also constructed new measures from items in the main survey instrument developed by Kulka et al. (1990) called the National Survey of the Vietnam Generation (NSVG). Minority veterans answered five questions about their perceptions of whether they were discriminated against because of their ethnic or racial background with reference to being (1) sent to Vietnam,

(2) demoted or denied a promotion, (3) given an unpleasant duty assignment, (4) given a dangerous duty assignment, or (5) in some other way treated unfairly or badly. These items formed additive scales with internal consistency reliabilities of .80 for Black veterans and .79 for Hispanic veterans in the subsample. In addition, we used items from the NSVG indicating post-Vietnam treatment by members of the mental health professions, unemployment, and marital separation or divorce.

All veterans were asked in the NSVG whether they experienced any “negative or hostile” events after returning from Vietnam. Examples provided to the respondents include being spit at, being called “baby-killer,” and being challenged to fights in bars.

Data Analyses

Initial analyses consist of a series of bivariate associations. The first analysis compares the rates of war-related incident PTSD, current PTSD, and past PTSD in majority White, Black, and Hispanic veterans. The second two analyses assess the plausibility of greater severity of war-zone stress exposure as an explanation for elevated rates in Blacks and Hispanics by examining the bivariate associations of race/ethnicity to exposure severity and of exposure severity to likelihood of PTSD. For each analysis, Wald chi-squared statistics serve as omnibus tests for statistically significant differences across the groups. Significant omnibus tests are followed by post-hoc pairwise t-tests of differences in proportions.

Subsequent logistic regression analyses examine the extent to which race/ethnic differences in PTSD are reduced by controlling for levels of exposure. In these analyses, any reduction of 10% or more in the logistic regression coefficient is considered substantial (Rothman, 2002, p. 194).

Racial/ethnic differences in war-related PTSD that remain after controlling for exposure are then subjected to further analyses. We attempt to explain remaining differences in terms of additional risk factors for PTSD identified in the trauma literature. Because of the large number of candidate risk factors, we screened them and retained only those variables showing a bivariate association to both PTSD and racial/ethnic group. The criteria for association are statistical significance at $p < .10$ and/or odds ratios (ORs) of 2.0 or more. Variables that meet these criteria are added as needed to the logistic regression models that already include race/ethnicity and exposure level.

Because of the complex sampling designs in which the probability of selection into the full NVVRS sample and into the subsample varied substantially across groups of veterans (for example, across race and ethnic groups), the data were weighted back to the population of Vietnam Theater veterans in the areas from which they were sampled (Kulka et al., 1988, Appendix B and Appendix D). Further, to account for this complex design, we use the software package SUDAAN (Shah, Barnwell, & Bieler, 1997) to obtain Taylor-series estimates of the standard errors.

Focus on the 260 veterans in the diagnosed subsample is necessary because clinical diagnoses are available only for subsample members. This means, however, that there is much less statistical power than has been available for analyses of group differences based on the full 1,200 member sample. When differences are as large as the statistically significant ($p \leq .05$, two-tailed) differences found by Kulka et al. (1990) between Hispanics and a group composed mainly of non-Hispanic whites (27.9% versus 13.7%) or between Blacks and this group of mainly non-Hispanic whites (20.6% versus 13.7%), power to detect comparable significant differences in the diagnosed subsample is .73 for the first comparison and .69 for the second. However, power to detect the statistically significant difference found by Kulka et al. (1990) in current PTSD between Hispanics (27.9%) and Blacks (20.6%) with a two-tailed test and α

= .05 is only .19 when using the diagnosed subsample. To deal with problems of Type II errors that may accompany this loss of statistical power, group differences that fall short of statistical significance at the .05 level but are similar in direction and magnitude to differences that are statistically significant at this level or better in the full NVVRS sample are taken as matters to be explained.

Power is further compromised when level of war-zone stress exposure and other potential mediators of the race/ethnic differences are added to the model. We do not attempt to apply inferential statistics to the mediation pathways; we seek only to describe the proportion of the race/ethnic difference attributable to these risk factors.

Results

Bivariate Associations between Race/ethnicity, the MHM of War-zone Stress Exposure, and SCID Diagnoses of War-related PTSD

The three panels in Table 1 display, respectively, racial/ethnic differences in rates of war-related PTSD, the relationship of PTSD probability to our composite MHM of probable war-zone stress exposure, and the distribution of exposure across the three race/ethnic groups. The first panel shows that Blacks and Hispanics are more likely than majority whites to develop incident PTSD.

The two minorities also have elevated rates of current PTSD. However, unlike Blacks, the elevated rate of incident PTSD among Hispanics compared to majority whites consists mainly of current PTSD. Finally, although the elevation in current PTSD among Hispanics relative to Blacks is not statistically significant, it is similar in magnitude to the statistically significant difference reported by Kulka et al. (1990) using the NVVRS algorithm for current PTSD in the full NVVRS sample.

The second panel of Table 1 shows that current PTSD is directly related to severity of exposure. By contrast, past PTSD, consisting of incident PTSD that has remitted, appears to be unrelated to severity of exposure.

The bottom panel shows that both minorities were more exposed to war-zone stressors than majority whites. There also seems to be a tendency for Blacks to have had more severe exposure than Hispanics. Although the difference is not statistically-significant, Blacks have nearly twice the odds of Hispanics of being in the two highest exposure categories (OR = 1.91, $p = .16$).

To further investigate the possibility that Blacks experienced more severe war-zone stressors than Hispanics, we compared these minorities on indicators of exposure that were not included in the MHM. While Blacks did not differ from Hispanics in proportions with Purple Hearts (10.9% for both groups) based on their military records, nor in self-reports of personal involvement in harm to prisoners and civilians (22.3% for Blacks versus 26.4% for Hispanics), Blacks had a significantly higher proportion with records showing receipt of Combat Infantryman Badges (20.3% versus 5.3%, $p < .05$).

The Role of Exposure

The next set of analyses examines the extent to which race/ethnic differences in war-zone exposure account for minority elevations in war-related PTSD. Because past war-related PTSD, unlike current, is not associated with exposure level and racial/ethnic background, these regression analyses focus on veterans with current war-related PTSD by contrast with veterans with no incident PTSD.

Table 2 compares unadjusted odds ratios for the racial/ethnic differences in current PTSD with odds ratios adjusted for controls on MHM severity of exposure. Consistent with previous NVVRS research with a measure of exposure based on self report and the NVVRS algorithmic approximation of current PTSD (Kulka et al., 1988;1990), the Table 2 results show that controlling MHM exposure comes close to accounting for the difference between Blacks and majority whites, but not for the difference between Hispanics and majority whites. The logistic regression coefficient for Blacks is reduced by 73.5% for Blacks when exposure is added to the model. This compares with a reduction of 25.9% for Hispanics.

The Addition of Other Risk Factors

We screened seven pre-Vietnam variables that (1) differentiate Hispanics from majority whites and (2) show a positive association with current PTSD that might, together with exposure, help explain elevated rates of current PTSD in Hispanics compared with majority whites. These are: Having one or more family members who were arrested and charged with more than a traffic violation; lower educational level prior to Vietnam; lower scores on the AFQT; being younger, and, related to age, going to Vietnam as an enlisted man in rank below sergeant, having no prior military tours, and reporting no prior exposure to enemy fire.

Of the seven, the three that are least susceptible to recall bias and most strongly related to current PTSD are educational level, AFQT score, and pre-Vietnam age (especially the difference between those under 25 and those 25 and over). Moreover, pre-Vietnam educational level and AFQT scores are lower in both Blacks and Hispanics than in majority whites, and Hispanics younger age as well as lower educational level and lower AFQT differentiate them from Blacks as well as majority whites. The associations of these three variables with current PTSD are shown in Table 3.

Some of the remaining possible risk factors that we do not include in the models are related to the probability of current PTSD, but unrelated to race/ethnicity; for example, pre-war psychiatric disorders. Other omitted factors are elevated among the minorities but the elevations in Blacks are at least equal to, and often greater than, the elevations in Hispanics and thus are not consistent with the exposure-adjusted patterns displayed previously in Table 2. These other factors include disciplinary actions during the war, post-war adversities like marital separation/divorce and unemployment, and lack of treatment by members of the mental health professions. Blacks also report experiencing more prejudice and racial discrimination during Vietnam and more adverse reactions from others upon homecoming than do Hispanics. We focus, therefore, on the role of pre-Vietnam education, AFQT and age.

Table 4 contrasts the results of logistic regression predicting current PTSD in which these three pre-war factors are added to exposure. Their addition reduces the exposure-adjusted odds ratio of 2.23 to 0.80 in the comparison of Hispanics with majority white veterans. The bottom panel of Table 4 shows that the addition of these three vulnerability factors to the model reduces the odds ratio to 0.82, completely accounting for the Hispanic elevation in exposure-adjusted probability of current PTSD compared with Blacks.

Discussion

Consistent with the results of previous research that found higher rates of PTSD-like symptoms and other psychological problems in Black Vietnam veterans than in majority white veterans, Kulka et al. (1990) reported higher prevalence rates of current PTSD in Blacks in the NVVRS. These investigators also found Hispanic rates of current PTSD that were even higher than Black rates. However, unlike the elevated rate in Blacks, the elevated rate in Hispanics could not be accounted for by the greater severity of exposure to war-zone stressors reported by the two minorities compared with majority whites. And the finding of a higher rate of current PTSD

in Hispanics than in Blacks posed an additional puzzle because the Hispanics reported less severe exposure to war-zone stressors than did the Blacks in the NVVRS.

Apart from these unsolved substantive questions, there were methodological problems with these previous results. The exposure measure was based on retrospective reports by veterans that were open to recall biases, and a measure of current PTSD which left unclear whether the racial/ethnic differences were due to risk factors for the onset of PTSD, for adverse course, or both.

We attempted to resolve these methodological and substantive problems by using record-based measures of exposure to war-zone stressors and diagnostic histories in a sub-sample of NVVRS veterans. We also investigated in detail a set of potential risk and exacerbating factors. We found that both Blacks and Hispanics had higher rates of both war-related first onsets of PTSD (incident PTSD) and first onsets that were current 10-11 years after the war (current PTSD). However, while Blacks and Hispanics had similar rates of incident PTSD to each other, PTSD course was more chronic for Hispanics, resulting in higher rates of current PTSD in Hispanics than in Blacks.

Unlike current PTSD, past PTSD showed no association with racial/ethnic background and exposure. For this reason, we focused on current PTSD in our investigation of why previous research had found that exposure accounted for most of the elevation in Black but not for the even greater elevation in Hispanic rates of current PTSD. We replicated with our new record-based measure of exposure the finding with self-reported exposure by Kulka et al. (1990) that Hispanics, and even more so Blacks, experienced more severe war-zone stressors than majority whites. Also consistent with the previous results of Kulka et al. (1990), we found that, while control of severity of exposure nearly eliminated the difference in rates of current PTSD between Black veterans and majority white veterans, it did not come close to eliminating the difference between Hispanics and majority whites. Nor did control of exposure account for the higher rate of current PTSD in Hispanics than in Blacks.

To address these continuing puzzles, we investigated a variety of other possible explanations. The possibility that an ethnocultural factor of greater expressivity in Hispanics contributed to an over-diagnosis of PTSD was discounted on the basis of findings reported in our previous paper by Lewis-Fernandez et al. (in press). The possibilities that Hispanics experienced more prejudice and discrimination in Vietnam than Blacks, were met with more adverse reactions upon homecoming than Blacks or majority whites, or had more adverse post-war events such as marital separations/divorces and periods of unemployment could also be discounted.

Rather, a set of pre-war vulnerability factors turned out to be critically important. Hispanics were younger than both Black and white majority veterans when they went to Vietnam, and they had less pre-war education and lower AFQT scores than majority whites, and, to a lesser degree, Blacks. Focusing on these variables, we found that controlling their younger age, together with their lower education, lower AFQT scores, and greater exposure, accounted for the higher rates of current PTSD in Hispanics compared with majority whites. Moreover, controlling age, education, and AFQT scores accounted for the higher rates of current PTSD in Hispanics than Blacks, despite the greater exposure of Blacks to war-zone stressors. These greater vulnerabilities in Hispanics may override in importance other factors, such as Blacks' more severe exposure to war-zone stress and Blacks' reports of experiencing more prejudice and negative homecoming reactions.

We have attempted to resolve methodological problems in previous research. However, there are several limitations in our approach. Our MHM measure of exposure has the great advantages of clear temporal priority in relation to PTSD and independence from retrospective reports of exposure, but it contains some imprecision. For example, Army medics were

assigned to a battalion's headquarters company, but served with the line platoons of the battalion's other companies. There is no record in their 201 files of which companies medics actually served with, so we were unable to calculate whether they were in high KIA rate companies and belonged, therefore, in the "very high" exposure category. More important, the MHM cannot comprehensively capture veterans' war zone experiences. For example, the MHM does not provide information about the veteran's personal involvement in injuring or killing enemy combatants, or causing harm to prisoners or civilians, any or all of which may have affected whether he developed PTSD (e.g., Grossman, 1995; Laufer, Brett, & Gallops, 1985; McNair, 2002; Yager, Laufer & Gallops, 1984). However, we investigated some of the more important of these factors, including veterans' reports of personal involvement in harm to prisoners and civilians, and they do not account for the elevated rates of current PTSD in Hispanics compared to Blacks.

The exclusive focus on the current prevalence of PTSD in most previous research confounds factors in onset of disorder and factors in adverse course. To surmount this diagnostic problem, we have had to rely on retrospective reports of past disorder for veterans whose PTSD remitted before the follow-up examinations. It is possible that limitations on recall have obscured a relationship between past PTSD and severity of exposure. Our reliance on the SCID diagnoses in the 260-member subsample has also exacted a price in reduced statistical power. We have had, for example, to combine various subgroups of Hispanics that would be valuable to compare and contrast (cf. Lewis-Fernandez et al., in press).

Despite these limitations, our results have important historical and contemporary implications. Vietnam is the first war in which Blacks were fully integrated in U.S. military units. The change resulted, however, in Blacks going from near exclusion from combat roles in World War I and World War II, with only the beginnings of change in the Korean conflict (Bogart, 1969), to being more exposed to war-zone stressors than men from majority white backgrounds in Vietnam. There is need to find out more about the roles of educational level and low AFQT scores in their assignments to combat roles, and the extent to which other factors, personal choice or discrimination, may have been involved as well.

Hispanics were also more exposed to war-zone stressors than majority whites, but they were less exposed than Blacks. The additional factors of younger age, less pre-war education, and lower AFQT scores appear to have put them at greater psychological risk than either Black or white majority veterans. The reason may be that younger age than either Blacks or majority whites was the critical vulnerability factor for Hispanics. How these vulnerability factors -- of lower education, lower AFQT scores, and especially younger age -- are related to each other and to increasing both exposure to war-zone stressors and vulnerability to the adverse psychological consequences of such exposure are major challenges for future research and public policy.

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Table 1
Associations between Race/Ethnicity, Military Historical Measure (MHM) of Severity of War-Zone Stress Exposure, and Rates of War-Related PTSD

PTSD Status	Race/Ethnicity of Veteran			Wald χ^2
	White (n=94) %	Black (n=70) %	Hispanic (n=84) %	
Incident PTSD	18.7	33.0 ^b	32.9 ^d	5.52 [*]
Current PTSD	9.0	16.8	22.0 ^b	6.82 ^{**}
Past PTSD	9.7	16.2	10.9	1.22

PTSD Status	MHM of Exposure				Wald χ^2
	Low (n=38) %	Moderate (n=152) %	High (n=37) %	Very High (n=21) %	
Onset PTSD	10.3	23.3	38.6	38.7	6.78 [*]
Current PTSD	0.3	12.3	27.0	33.5	30.32 ^{****}
Past PTSD	9.9	11.0	11.6	5.2	1.38

MHM of Exposure Severity	Race/Ethnicity of Veteran			Wald χ^2
	White (n=94) %	Black (n=70) %	Hispanic (n=84) %	
Low	29.8	9.7 ^c	15.0 ^b	9.17 ^{**}
Moderate	63.6	59.0	65.6	0.50
High	5.3	20.5 ^b	12.0	6.22 ^{**}
Very High	1.3	10.8 ^c	7.4 ^b	10.61 ^{****}

Note. Percentages are weighted to the population of male theater veterans; sample n's in parentheses.

^a Indicates significant difference from White majority in pair-wise test; $p < .10$.

^b Indicates significant difference from White majority in pair-wise test; $p < .05$.

^c Indicates significant difference from White majority in pair-wise test; $p < .01$.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

**** $p < .001$.

Table 2

Odds Ratios (ORs) and Confidence Intervals (CIs) for Racial/Ethnic Contrasts in War-related PTSD Unadjusted and Adjusted for Military Historical Measure of Probable Severity of Exposure to War-zone Stressors

Ethnic contrasts (n)	Unadjusted OR (95% CI)	OR Adjusted for Exposure (95% CI)
Majority white (94)	Ref	Ref
Black (70)	2.23 (0.95 – 5.23)	1.24 (0.45 – 3.38)
Hispanic (84)	2.95 (1.27 – 6.82)	2.23 (0.90 – 5.52)

Table 3

Rates of Current War-Related PTSD by Pre-War Risk Factors of Armed Forces Qualifications Test (AFQT) Level, Level of Education, and Age at Entry to Vietnam

Characteristic	Subsample n	Weighted % with PTSD	χ^2
AFQT level from high to low			26.52 ****
Category I: Above average	7	0.0	
Category II: Lower but still above average	62	8.2	
Category IIIA: Higher average	30	12.1	
Category IIIB: Lower average	72	14.0	
Category IV: Below average	63	21.0	
Pre-war educational level			28.71 ****
College graduate or more	13	0.0	
Some college	48	6.7	
High school graduate only	122	12.8	
No high school diploma	65	15.9	
Age at entry to Vietnam			9.10 *
19 or younger	73	15.6	
20	56	11.7	
21	33	13.6	
22 – 24	50	10.3	
25 or older	33	2.8	

* p < .10.

** p < .05.

*** p < .01.

**** p < .001.

Table 4

Adjusted and Unadjusted Odds Ratios (ORs) and Confidence Intervals (CIs) for Race/Ethnic Contrasts in Current War-Related PTSD.¹

Contrast	OR	95% CI
Black vs. White		
Unadjusted	2.23	0.95 - 5.23
Adjusted for Exposure	1.24	0.45 - 3.38
Adjusted for Exposure & Pre-War Risk Factors	1.16	0.37 - 3.64
Hispanic vs. White		
Unadjusted	2.95	1.27 - 6.82
Adjusted for Exposure	2.23	0.90 - 5.52
Adjusted for Exposure & Pre-War Risk Factors	0.80	0.25 - 2.59
Hispanic vs. Black		
Unadjusted	1.35	0.57 - 3.20
Adjusted for Exposure	1.72	0.69 - 4.31
Adjusted for Exposure & Pre-War Risk Factors	0.82	0.30 - 2.25

¹ Pre-War Risk Factors for the Black vs. White contrast include Armed Forces Qualification Test categories and pre-war educational attainment levels. Pre-War Risk Factors for the Hispanic vs. White and Hispanic vs. Black contrasts include these same two variables plus age at entry to Vietnam.