

---

**Item ID Number** 01747

**Author**

**Corporate Author** Center for Environmental Health and Injury Control, CD

**Report/Article Title** Health Status of Vietnam Veterans, I. Psychological Characteristics, The Center for Disease Control Vietnam Experience Study

**Journal/Book Title** JAMA

**Year** 1988

**Month/Day** May 13

**Color**

**Number of Images** 7

**Description Notes**

## Original Contributions

# Health Status of Vietnam Veterans

## I. Psychosocial Characteristics

The Centers for Disease Control Vietnam Experience Study

The Vietnam Experience Study was a multidimensional assessment of the health of Vietnam veterans. From a random sample of enlisted men who entered the US Army from 1965 to 1971, 7924 Vietnam and 7364 non-Vietnam veterans participated in a telephone interview; a random subsample of 2490 Vietnam and 1972 non-Vietnam veterans also underwent a comprehensive health examination, including a psychological evaluation. At the time of the study, the two groups of veterans were similar in terms of level of education, employment, income, marital status, and satisfaction with personal relationships. Certain psychological problems, however, were significantly more prevalent among Vietnam veterans than among non-Vietnam veterans. These included depression (4.5% of Vietnam veterans vs 2.3% of non-Vietnam veterans), anxiety (4.9% vs 3.2%), and alcohol abuse or dependence (13.7% vs 9.2%). About 15% of Vietnam veterans experienced combat-related posttraumatic stress disorder at some time during or after military service, and 2.2% had the disorder during the month before the examination.

(JAMA 1988;259:2701-2707)

health. Comprehensive accounts of the latter three components can be found in a five-volume monograph.<sup>3-7</sup> Information in these five volumes is summarized in a series of three reports in this issue of THE JOURNAL. In this first report, we focus on current psychosocial characteristics; in the second,<sup>8</sup> on physical health; and in the third,<sup>9</sup> on reproductive outcomes.

### SUBJECTS AND METHODS

#### Participant Selection

Study participants were selected from a random sample of male US Army veterans who served during the Vietnam era (Fig 1). To increase comparability between those who served in Vietnam and those who served elsewhere, we selected only veterans who (1) entered military service for the first time between January 1965 and December 1971, (2) served only one term of enlistment, (3) had at least 16 weeks of active service, (4) earned a military occupational specialty other than "trainee" or "duty soldier," and (5) had a pay grade no higher than E-5 (sergeant) when discharged from active duty.

#### Tracing and Interviewing

All veterans not known to have died were eligible for the telephone interview (Fig 1). With the assistance of a private contractor, all eligible veterans were traced using mailings, telephone directory assistance, credit bureau searches, driver's license and motor vehicle registration records, city directories, local records, and personal field visits. Overall, 87% of Vietnam veterans (7924) and 84% of non-Vietnam veterans (7364) were successfully located

MANY veterans are concerned that military service in Vietnam may have adversely affected their health and, perhaps, that of their children. Little objective evidence has been available,

---

See also pp 2708 and 2715.

---

as yet, regarding Vietnam veterans' health compared with that of other veterans of similar age and background. To address these concerns, Congress directed that appropriate epidemiologic studies be conducted (Veterans Health Programs Extension and Improvement

Act of 1979, Public Law 96-151 [HR 3892], 93 STAT 1092-1098; and Veterans' Health Care, Training, and Small Business Loan Act of 1981, Public Law 97-72 [HR 34997], 95 STAT 1047-1063). One study, conducted by the Centers for Disease Control in response to this congressional mandate, was the Vietnam Experience Study (VES).

The VES assessed health effects related to the general Vietnam military experience; it did not focus on exposure to herbicides such as Agent Orange. The health of a sample of male US Army Vietnam veterans was compared with the health of a similar group of US Army veterans who did not serve in Vietnam. The study included an analysis of post-service mortality, which has been published previously,<sup>1,2</sup> a telephone interview, medical examination and psychological testing, and an evaluation of reproductive outcomes and child

---

From the Center for Environmental Health and Injury Control, Centers for Disease Control, Public Health Service, Department of Health and Human Services, Atlanta.

Reprint requests to Centers for Disease Control, 1600 Clifton Rd (F-16), Atlanta, GA 30333 (Frank DeStefano, MD).

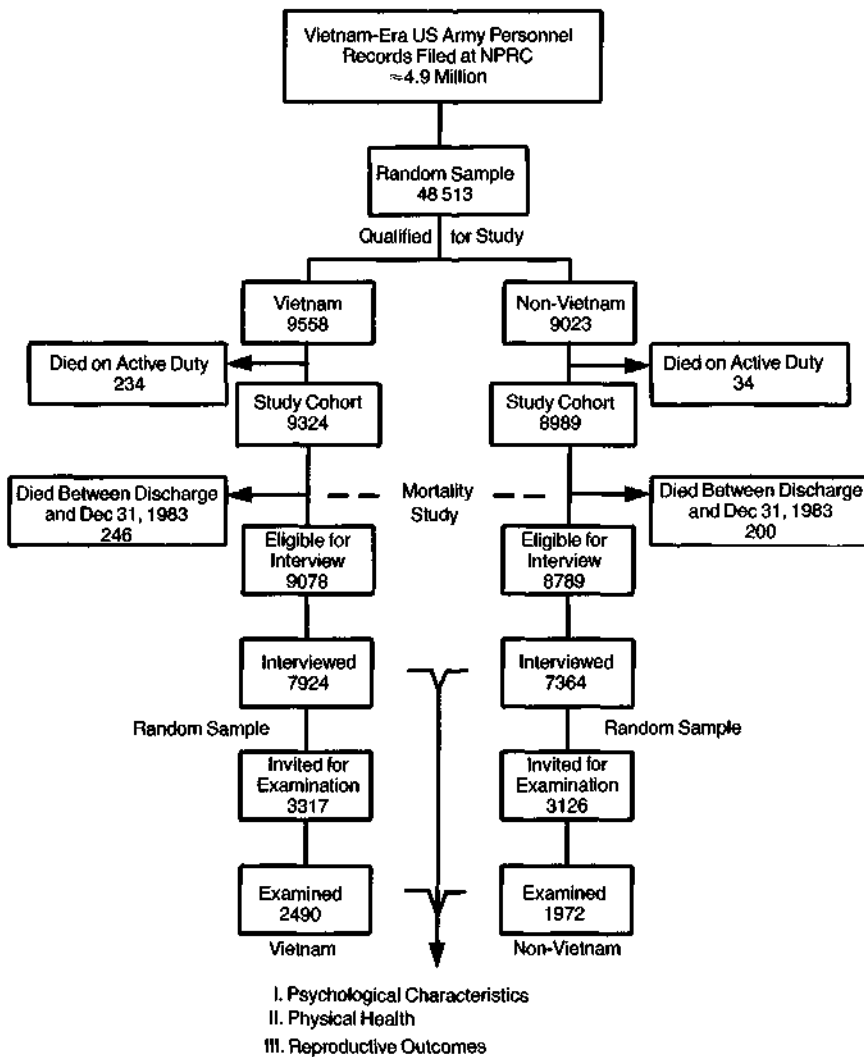


Fig 1.—Number of veterans in each component of Vietnam Experience Study. NPRC indicates National Personnel Records Center.

and interviewed by telephone. Among Vietnam veterans located but not interviewed, 31 were incarcerated and nine were physically or mentally handicapped; the corresponding figures for non-Vietnam veterans were 32 and 11, respectively.

A structured questionnaire was administered by trained interviewers using a computer-assisted telephone interview system. Before the telephone interview and all other components of the VES, participants were given a special assurance of confidentiality. Interviewers could not distinguish Vietnam veterans from other veterans until late in the interview when Vietnam veterans were asked about various experiences unique to Vietnam.

### Examination and Testing

A random subsample of veterans was selected to participate in a comprehensive medical and psychological examination in addition to the telephone interview (Fig 1). Of those invited, 75% of the Vietnam veterans (2490) and 63% of the non-Vietnam veterans (1972) participated. All examinations and tests were performed at one medical facility. Participants' expenses—including travel, meals, lodging, and a nominal stipend—were paid from study funds.

Psychological health was assessed by using the Diagnostic Interview Schedule (DIS) and the Minnesota Multiphasic Personality Inventory (MMPI). The DIS<sup>10</sup> is a standardized questionnaire

that is designed to assess the prevalence of certain psychiatric conditions according to the *DSM-III*<sup>11</sup> criteria of the American Psychiatric Association. The DIS was administered by specially trained psychology technicians under the supervision of licensed clinical psychologists. Technicians generally did not know whether a veteran had served in Vietnam until the end of the interview, when questions about posttraumatic stress disorder (PTSD) were asked.

Since we focused on current status, veterans were considered to have a condition of interest (generalized anxiety, depression, alcohol abuse or dependence, drug abuse or dependence, and PTSD) if they reported a pattern of symptoms in the past month that met the full *DSM-III* criteria for that condition. When we analyzed the occurrence of conditions over a veteran's lifetime, the prevalences of all conditions increased but the relative differences between Vietnam and non-Vietnam veterans generally remained the same.<sup>6</sup>

The MMPI is a self-administered questionnaire that provides a quantitative evaluation of personality, emotional status, and level of psychopathology.<sup>12</sup> Elevations on the standard MMPI clinical scales were defined as *T* scores of 70 or higher, which represents 2 SDs above the mean for the population on which the scales were developed.

### Data Analysis

Multivariate analyses were performed by using logistic regression<sup>13</sup> to compute odds ratios and 95% confidence intervals. As a general approximation, if a 95% confidence interval excludes 1.0, the odds ratio estimate can be considered to be statistically significant (ie,  $P < .05$ ). In the results presented herein, all odds ratios have been adjusted for six characteristics that were considered a priori to be potential confounders or modifiers of associations between place of service and current health. These "entry characteristics" were age at entry into the army, race, score on the enlistment general technical test (a measure of mental aptitude), enlistment status (drafted or volunteered), year of entry into the army, and primary military occupational specialty (tactical or nontactical). For nearly all conditions, unadjusted estimates were similar to estimates that were adjusted for the six entry characteristics as well as to estimates that were adjusted for additional characteristics, such as education and marital status.<sup>6</sup> We also evaluated interactions between entry characteristics and place of service. When final models included significant inter-

action terms, odds ratios were standardized to the distribution of the interaction variable in both cohorts combined.<sup>14,15</sup>

In the VES we had no objective measure of the amount of combat experienced by individual veterans. We did, however, use tactical military occupational specialty as an indirect indicator of which men were likely to have participated in direct combat. We realize, however, that some men with nontactical military occupational specialties would have experienced heavy combat and vice versa. As part of the psychological testing, we administered a combat exposure questionnaire<sup>16</sup> that relied on men's recollections of events that occurred 15 to 20 years earlier. Both of these indicators of combat exposure are thus imperfect, although they probably are related to some extent to actual combat experienced. Vietnam veterans with tactical military occupational specialties did have higher self-reported combat exposure scores (mean, 34 [of a possible 72]) than those with nontactical military occupational specialties (mean, 18). Since we tried to use objective information as much as possible, we relied on military occupational specialty category as the indicator of level of combat for the present analysis.

A summary analysis was performed to determine which of the entry characteristics, including place of service, were associated with current "poor psychological status." A veteran was considered to have a poor psychological status if he met full DIS criteria for generalized anxiety, depression, or substance abuse in the past month and if he had elevations on at least two of eight clinical scales (scales 1 through 4 and 6 through 9) from the MMPI. In a clinical setting, such findings would typically lead to further psychological or psychiatric evaluation and, perhaps, treatment.

## RESULTS

### Participant Characteristics

Among those who were interviewed, the age and racial distributions of the Vietnam and non-Vietnam groups were similar (Table 1). The two groups also were similar with respect to age at entry into the army, enlistment status, and having had any absent without leave or confinement time while in the army. Non-Vietnam veterans tended to have higher entry general technical test scores while more Vietnam veterans entered the army before 1969, were assigned tactical military occupational specialties, and served in units associated with direct combat activity. Smaller proportions of Vietnam than

Table 1.—Comparison of Selected Demographic and Military Characteristics Among Vietnam and Non-Vietnam Veterans

Characteristic*	Veterans			
	Interviewed		Examined	
	Vietnam (N = 7924)	Non-Vietnam (N = 7364)	Vietnam (N = 2490)	Non-Vietnam (N = 1972)
Mean age at interview, y	37.5	37.4	37.4	37.4
Race, % white (not Hispanic)	83.2	82.0	82.5	81.1
Mean age at enlistment, y	19.8	20.1	19.8	20.1
Year of enlistment, % before 1969	72.0	60.6	70.5	60.5
Enlistment status, % volunteers	35.6	32.8	38.3	35.1
Mean score on enlistment GT test	103.9	106.6	104.6	107.6
Primary MOS, † % tactical operations	34.2	26.9	34.0	25.3
Type of unit, ‡ % combat unit	57.0	44.8	55.9	45.0
AWOL or confinement time, % with some	10.0	10.5	9.4	10.8
Type of discharge, § % nonhonorable	1.8	6.2	1.9	6.5
Pay grade at discharge, ¶ % E1-E3	9.3	15.9	9.4	16.4

\*Unknown values are excluded from the results shown here. GT indicates general technical; and AWOL, absent without leave.

†MOS indicates primary military occupational specialty—the job for which the man was trained in the army. Tactical operations includes jobs such as infantryman, armored vehicle crewman, artillery crewman, and combat engineer.

‡Refers to the principal unit recorded in the military record for the man's foreign assignment (or US assignment if no foreign service was performed). Combat units include infantry, artillery, armor, cavalry, and engineer.

§Also called *character of service*. Nonhonorable includes underhonorably, other than honorable, undesirable, general-underhonorably, bad conduct, and dishonorable.

||Grades E1 through E3 correspond to the various ranks of private.

non-Vietnam veterans were discharged nonhonorably or at lower pay grades.

The characteristics of the subsample of veterans examined were similar to those of the telephone interview participants (Table 1). Additional information that was available only for the examination participants indicated that childhood (younger than age 15 years) behavioral problems, as reported by the veterans, were not different in the two groups. In each group, about 12% had been expelled or suspended from school, 3% had run away from home, and 6% had been arrested.

At the time of the study, the socioeconomic characteristics of Vietnam and non-Vietnam veterans were generally similar among the telephone interview participants and those examined (Table 2). Marital status was similar in the two cohorts: about 60% of ever-married veterans were currently married to their first wives. Non-Vietnam veterans tended to have more education and higher household incomes, but these differences almost disappeared after adjusting for differences in the six entry characteristics. More than 90% of the veterans in both groups were currently

employed. The types of jobs the veterans held also were similar, although more non-Vietnam veterans were in executive, managerial, and professional specialty occupations. Information from those examined indicated that more than 90% of Vietnam and non-Vietnam veterans felt satisfied with their current personal relationships.

### Psychological Evaluation

Vietnam veterans were more likely than non-Vietnam veterans to meet DIS criteria for alcohol abuse or dependence, generalized anxiety, and depression (Table 3). Few men in either group met DIS criteria for drug abuse or dependence. Vietnam veterans were significantly more likely to meet criteria for at least one of the conditions or for two or more of the conditions.

Analyses of combat-related PTSD were restricted to Vietnam veterans since non-Vietnam veterans had little opportunity to experience combat. About half of Vietnam veterans reported experiencing one or more symptoms related to a traumatic combat event, and 15% met DIS diagnostic criteria for combat-related PTSD at

Table 2.—Comparison of Selected Socioeconomic Characteristics Among Vietnam and Non-Vietnam Veterans

Characteristic*	Veterans, %			
	Interviewed		Examined	
	Vietnam (N=7924)	Non-Vietnam (N=7364)	Vietnam (N=2490)	Non-Vietnam (N=1972)
<b>Marital status at interview</b>				
Married	74.2	74.5	73.2	73.8
Divorced, separated, or widowed	17.1	16.6	18.1	17.7
Never married	8.7	8.9	8.7	8.5
<b>Education†</b>				
Less than high school	14.1	11.6	13.7	10.1
High school graduate	39.6	37.9	37.2	35.8
Some college	28.5	28.9	30.3	29.1
College graduate	17.8	21.7	18.9	25.0
<b>Usual occupation</b>				
Executive and managerial	18.5	20.5	19.6	21.8
Professional specialties	11.0	14.0	11.3	15.0
Office, clerical, and sales	7.8	7.7	8.0	6.8
Service and transportation	13.5	12.4	15.3	13.7
Precision work, craft, and repair	25.7	24.5	24.0	24.4
Operator and laborer	20.6	18.1	18.9	16.3
Farmer, forester, and fisherman	2.9	2.8	2.8	2.4
Unemployed at interview	9.5	8.5	9.6	9.1
<b>Income, \$‡</b>				
<10 000	9.7	9.4	10.0	10.0
10 000-29 999	46.6	45.0	47.1	45.1
30 000-49 999	33.4	33.3	32.9	32.5
>50 000	10.3	12.4	10.0	12.4

\*Men with unknown values for a particular variable were excluded from the analysis of that variable.

†Highest grade or year of regular schooling attained as of interview.

‡Combined family (gross) income for the calendar year immediately preceding the year of interview.

some time during or after service (Table 4). In the month before examination, 79% of Vietnam veterans had no symptoms and 21% had one or more symptoms, with 2% meeting full diagnostic criteria for combat-related PTSD.

Meeting DIS diagnostic criteria for combat-related PTSD was associated with having a tactical military occupational specialty. The odds ratio for tactical vs nontactical military occupational specialties was 2.0 (95% confidence interval, 1.5 to 2.5) for "ever" meeting DIS diagnostic criteria and 1.7 (95% confidence interval, 1.0 to 3.0) for meeting diagnostic criteria in the month before examination.

Veterans who met criteria for PTSD were also more likely to meet DIS criteria for other psychiatric conditions. Among those who met DIS criteria for combat-related PTSD during the month before examination, 66% also met DIS criteria for anxiety or depression and 39% met criteria for alcohol abuse or dependence.

The MMPI provided further information about the veterans' current psychological status. The reliability of each veteran's responses was evaluated by using the standard MMPI validity scales (L, F, and K) and two additional scales (Carelessness and Test-Retest). The same proportion of veterans in the two cohorts (11%) showed questionable or invalid profiles on the basis of elevations on these scales (*T* scores  $\geq 70$  on the L scale;  $\geq 80$  on the F scale; or  $>70$  on the K, Carelessness, or Test-Retest scales). Analyses conducted with and without exclusions of questionable profiles yielded essentially the same results; questionable profiles have been excluded from the results presented herein.

A larger proportion of Vietnam than non-Vietnam veterans showed MMPI indications of psychological problems (Table 5). Significantly more Vietnam veterans had elevations on scales 1, 2, 3, and 7 (which provide the MMPI's best indication of anxiety, somatization, and

depression) as well as on scale 8 (which indicates unusual thoughts or behaviors, usually related to distress or psychopathology). Other clinical scales, including 4 and 9 (which are commonly associated with characteristics of addictive or antisocial personality) and 5 and 0 (both of which are of little clinical relevance), did not differ between Vietnam and non-Vietnam veterans. Overall, about half the participants in each group showed no elevation on any clinical scales, but elevations on two or more clinically relevant scales (scales 1 through 4 and 6 through 9) were significantly more frequent among Vietnam veterans.

Current poor psychological status was also more prevalent among Vietnam veterans (Table 6). The increased prevalence of current poor psychological status, however, was more prominent among those veterans who entered the army before 1968. Regardless of whether a veteran had served in Vietnam, current poor psychological status was more prevalent in veterans who were not white, who had been young (younger than age 19 years) at enlistment, or who had lower general technical test scores at enlistment. The other entry characteristics, including military occupational specialty category, were not associated with current poor psychological status. The prevalence of current poor psychological status among Vietnam veterans was 13% for those with tactical military occupational specialties and 12% for those with nontactical military occupational specialties.

The same proportional increase in current poor psychological status associated with service in Vietnam was found within different subgroups defined by race, age at enlistment, and enlistment general technical test score (Fig 2). Although proportional differences remained the same, absolute differences in risk of current poor psychological status between Vietnam and non-Vietnam veterans necessarily varied as the underlying risk changed. Thus, the absolute differences in risk between Vietnam and non-Vietnam veterans diminish as the risk moves downward from nonwhite veterans who had been young and had had low general technical test scores at enlistment to white veterans who had been older and had had high general technical test scores at enlistment.

#### COMMENT

Since the time of the conflict to the present, veterans and others have been concerned about the psychological health of American military personnel who served in Vietnam and about their

Table 3.—Vietnam and Non-Vietnam Veterans Who Met DIS Criteria for Selected Psychiatric Conditions\*

Condition	Veterans, %		Odds Ratio†	95% Confidence Interval
	Vietnam (N=2490)	Non-Vietnam (N=1972)		
Alcohol abuse or dependence	13.7	9.2	1.5	1.2-1.8
Drug abuse or dependence	0.4	0.5	0.9‡	0.4-2.0
Generalized anxiety§ (with or without depression)	4.9	3.2	1.5	1.1-2.1
Depression (with or without generalized anxiety)	4.5	2.3	2.0	1.4-2.9
Total No. of above conditions				
≥1	19.2	13.1	1.5	1.3-1.8
≥2	3.5	1.8	1.9	1.2-2.8

\*DIS indicates Diagnostic Interview Schedule. Veterans must have met DIS criteria in the month before examination.

†Adjusted for the six entry characteristics.

‡Crude odds ratio presented because the number of cases is not sufficient for an adjusted estimate.

§For clinical purposes, depression is considered the primary diagnosis for individuals with both depression and anxiety. Of Vietnam veterans, 2.8% had generalized anxiety alone and 2.1% had generalized anxiety and depression; of non-Vietnam veterans, 2.2% had generalized anxiety alone and 1.0% had generalized anxiety and depression.

Table 5.—Vietnam and Non-Vietnam Veterans With Elevated MMPI Clinical Scales (T score ≥70)\*

MMPI Scale	Veterans, %		Odds Ratio‡	95% Confidence Interval
	Vietnam (N=2221)†	Non-Vietnam (N=1754)†		
1	15.6	9.1	1.7	1.4-2.1
2	25.1	17.3	1.6	1.3-1.8
3	8.9	5.9	1.5	1.2-2.0
4	15.7	14.7	1.0	0.9-1.2
5	12.7	12.9	1.1	0.9-1.3
6	9.1	7.2	1.3	1.0-1.7
7	16.5	10.9	1.6	1.3-1.9
8	16.3	9.2	2.0	1.6-2.4
9	13.7	13.5	1.1	0.9-1.3
0	11.0	8.3	1.3	1.0-1.6
No scales elevated§	51.5	59.6	0.7	0.7-0.8
≥1 scales elevated§	48.5	40.4	1.3	1.2-1.5
≥2 scales elevated§	28.2	20.8	1.5	1.2-1.7

\*MMPI indicates Minnesota Multiphasic Personality Inventory; a T score of 70 or higher represents 2 SDs above the standardization sample mean.

†Veterans with questionable profiles are not included in this analysis.

‡Adjusted for the six entry characteristics.

§Excluding scales 5 and 0.

adaptation to civilian life after their return home.<sup>17-20</sup> In this study, 15 to 20 years after army service, Vietnam veterans seem to be functioning socially and economically in a manner similar to army veterans who did not serve in Vietnam. At the time of the study, few men in either group of veterans were in jail, institutionalized, or mentally or physically incapacitated. In both groups, three fourths of the men were married at the time of interview, with similar proportions married to their first wives. In addition, more than 90% expressed satisfaction with their family

and other personal relationships. More than 90% were also currently employed. After differences that were present at induction into the army (such as general technical test score) had been accounted for, the educational levels, types of occupations, and household incomes of the two groups were similar.

Although the outward indications are that the two groups of veterans have made similar adaptations to civilian life, the study results also indicate that more Vietnam veterans than non-Vietnam veterans currently are experiencing psychological problems. The current

Table 4.—Vietnam Veterans Who Ever Met DIS Criteria for Combat-Related PTSD and Those Who Met Full Criteria in the Month Before Examination\*

Type of Symptoms	Vietnam Veterans, % (N=2490)	
	Ever	Month Before Examination
Combat-related PTSD†	14.7	2.2
Criterion B		
Recurrent thoughts or dreams	32.4	7.8
Felt as if event recurring	9.4	1.9
Criterion C		
Lost ability to care about others or lost interest in usual activities	17.1	5.1
Criterion D		
Jumpy or easily startled	45.1	10.6
Trouble sleeping	34.6	3.4
Ashamed of being alive	8.1	1.9
Forgetful or trouble concentrating	13.6	0.4
Avoids situations that remind	28.8	7.9
Symptoms get worse in situations that remind	17.3	3.9
No symptoms	49.9	79.2

\*DIS indicates Diagnostic Interview Schedule; and PTSD, posttraumatic stress disorder.

†To meet DIS criteria for combat-related PTSD, a veteran had to report a combat-related traumatic event (criterion A), at least one reexperiencing symptom (criterion B), a numbing symptom (criterion C), and at least two symptoms of autonomic arousal (criterion D). All symptoms were related specifically to the traumatic event.

psychological problems of Vietnam veterans, as determined by the DIS, mainly involve (1) alcohol abuse or dependence, affecting about 14% of Vietnam veterans compared with 9% of non-Vietnam veterans; (2) anxiety, 5% vs 3%; and (3) depression, 5% vs 2%. The MMPI results, although they do not provide information on discrete diagnostic categories, were generally in accord with the DIS results. Also, according to DIS criteria, about 15% of Vietnam veterans have ever experienced combat-related PTSD, and about 2% experienced the disorder during the month before the examination.

Fewer than 1% in either cohort met DIS criteria for current drug abuse or dependence. The mortality analysis of the VES cohorts suggested that drug-related deaths were higher among Vietnam veterans throughout the approximately 13 years of follow-up.<sup>12</sup> The VES telephone interviews and examinations, however, indicate that current regular use of illicit drugs was similar among Vietnam and non-Vietnam veterans. Drug use, typically involving only marijuana, was reported by about 10% of Vietnam and 8% of non-Vietnam veterans.<sup>4</sup> Use of illicit drugs other than marijuana was reported by about 2% to 3% in each group.<sup>4</sup>

To identify the participants who could be considered to have the poorest current psychological status, we combined

Table 6.—Risk Factors Associated With Current Poor Psychological Status

Factor	Prevalence of Poor Psychological Status		Odds Ratio*	95% Confidence Interval
	%	No.		
Year of entry and place of service				
1965-1967				
Non-Vietnam	5.6	51	1.0	Referent
Vietnam	13.0	163	2.3	1.6-3.2
1968-1971				
Non-Vietnam	8.8	93	1.0	Referent
Vietnam	10.9	134	1.3	0.8-2.0
Other risk factors				
Race				
White	8.8	322	1.0	Referent
Nonwhite†	14.7	119	1.4	1.1-1.8
Age at enlistment, y				
<19	16.3	105	1.9	1.5-2.4
19-24	8.7	326	1.0	Referent
>24	12.7	10	1.4	0.7-2.8
Enlistment GT test score‡				
<88	16.0	142	1.9	1.6-2.2
88-101	12.4	110	1.3	1.2-1.4
102-113	9.5	88	1.0	Referent
114-124	8.1	70	0.8	0.7-0.8
>124	3.4	29	0.6	0.5-0.7

\*Adjusted for all other risk factors in table.

†Nonwhite includes blacks, Hispanics, American Indians, Asians, and Pacific Island Americans.

‡GT indicates general technical.

When military occupational specialty category was used as an indicator of the extent of direct combat likely to have been experienced, the only psychological condition that showed a strong association with level of combat was combat-related PTSD. Vietnam veterans with tactical military occupational specialties were nearly twice as likely as those with nontactical military occupational specialties to have ever experienced combat-related PTSD. For all the other psychological conditions, the increased relative risk associated with service in Vietnam was evident in both military occupational specialty categories. This suggests that those Vietnam veterans who had tactical military occupational specialties were not at any greater relative risk of having these subsequent psychological problems than those who had nontactical military occupational specialties.

For most psychological conditions, the relative effect of service in Vietnam was the same regardless of such characteristics as race, age at entry into the army, enlistment status, and induction general technical test score, as well as military occupational specialty category. This suggests that the effect of Vietnam service, at least for those who entered the Army between 1965 and 1967, was a general one for which most veterans who served in Vietnam may have been at risk.

The increased prevalence of current psychological problems among Vietnam veterans does not seem to have been due to the characteristics of the men who were sent to Vietnam. From all available information, the characteristics of the two groups seemed to be similar. In particular, the racial distributions and the prevalences of reported childhood behavioral problems were nearly identical. Also, preservice prevalences of psychiatric symptoms, including anxiety, depression, and substance abuse, were similar in the two groups.<sup>6</sup> The only difference in known entry characteristics was that those with higher entry general technical test scores seemed less likely to serve in Vietnam. This difference, however, was small and did not account for the differences in psychological findings between Vietnam and non-Vietnam veterans.

A potential concern with the study is the possibility of participation bias. Examination participation rates for Vietnam veterans were higher than those for non-Vietnam veterans. Detailed analyses of the factors that influenced participation showed that those examined were similar to those interviewed by telephone.<sup>6</sup> Thus, participa-

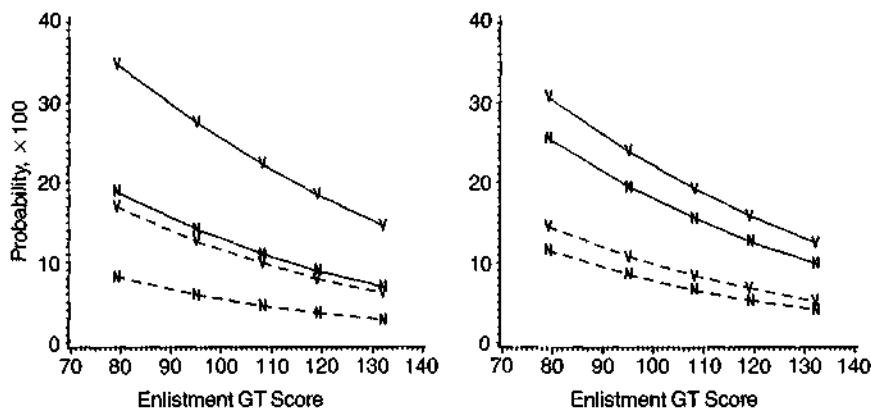


Fig 2.—Predicted probability of poor psychological status by place of service, age at enlistment, race, general technical (GT) test score, and year of entry into military service. Left, Veterans who entered service between 1965 and 1967. Right, Veterans who entered service between 1968 and 1971. V indicates Vietnam; N, non-Vietnam; solid lines, nonwhite and younger than 19 years old; and dotted lines, white and between 19 and 24 years old.

findings from the DIS and the MMPI. Among veterans who entered the army from 1965 to 1967, the prevalence of current poor psychological status for Vietnam veterans was about double the prevalence for veterans who did not serve in Vietnam; among those who entered later, the prevalences were similar. This suggests that some change occurred around 1968, but we cannot specify what the change may have been. The range of possibilities includes not

only changes in the nature of the Vietnam conflict, but also changes in American societal attitudes and perceptions about the conflict and changes in the attitudes or expectations of men entering the army. Compared with veterans who entered the army before 1968, the prevalence of current poor psychological status decreased among Vietnam veterans but increased among non-Vietnam veterans who entered in 1968 or later.

tion bias is not likely to have had a large influence on the study results.

The higher prevalence of psychological problems among Vietnam veterans does not seem to be related to their being in worse current physical health. In the medical examination component of the VES, few differences were found between Vietnam and non-Vietnam veterans in terms of neuropsychological performance, neurological findings, or other objective measures of current physical health.<sup>5,8</sup>

Military service in Vietnam was, undoubtedly, an emotionally and psychologically difficult experience for many US servicemen. Fifteen to 20 years afterward, more Vietnam veterans have psychological and emotional problems compared with veterans who did not serve in Vietnam. These psychological problems, however, are not of a magnitude that has resulted in Vietnam veterans' having, as a group, lower social and economic attainment.

This report was prepared by the following: Drue H. Barrett, MA; Coleen A. Boyle, PhD; Pierre Decoufle, ScD; Frank DeStefano, MD, MPH; Owen J. Devine, MS; Robin D. Morris, PhD (Centers for Disease Control and Georgia State University, Atlanta); Mark J. Scally, MPA; Nancy E. Stroup, PhD; Scott F. Wetterhall, MD; and Robert M. Worth, MD, PhD.

Other VES staff members include the following: Charles L. Adams, MPH; Joseph L. Anest, PhD; Andrew L. Baughman, MPH; Edward A. Brann, MD, MPH; Eugenia E. Calle, PhD; Elizabeth A. Cochran; Karen S. Colberg; Robert C. Diefenbach; Barbara Dougherty; Sandra S. Emrich; W. Dana Flanders, MD, DSc; Anthony S. Fowler; Robert R. German; Patricia Holmgren, MS; Martha I. Hunter; M. Riduan Joesoef, MD, PhD; John M. Karon, PhD; Muin J. Khoury, MD, PhD; Marcie-jo Kresnow, MS; Heather D. McAdoo; Brenda R. Mitchell; Linda A. Meyer; Thomas R. O'Brien, MD, MPH; and Joseph B. Smith.

Current and former Centers for Disease Control staff members who also made important contributions include the following: Robert J. Delaney; John J. Droscher; J. David Erickson, DDS, PhD; Melin-

da L. Flock, MSPH; John J. Gallagher; Jerry G. Gentry, MSPH; Michael E. Kafrisson, MD, MSPH; Marilyn L. Kirk; Peter M. Layde, MD, MSc; Maurice E. LeVois, PhD; Peter J. McCumiskey; Daniel L. McGee, PhD; Terry J. Meranda, MS; Daniel A. Pollock, MD; Melvin W. Ralston; Philip H. Rhodes, MS; Richard K. Rudy, MD; Paul D. Simpson, MS; and Dennis M. Smith, MD.

Consultants who made important contributions to this study component include the following: Lee N. Robins, PhD (Washington University, St Louis), and Marjorie A. Speers, PhD (Division of Chronic Disease Control, Center for Environmental Health and Injury Control, Centers for Disease Control).

Many other individuals and organizations have provided invaluable support to the study. These include the following: the Agent Orange Working Group and its Science Panel; the Congressional Office of Technology Assessment; the Army Reserve Personnel Center, US Army and Joint Services Environmental Support Group, Department of Defense; Equifax Inc; the General Services Administration; the Internal Revenue Service; Lovelace Medical Foundation; the National Personnel Records Center, National Archives and Records Administration; the National Center for Health Statistics; the Institute of Medicine, National Academy of Sciences; Research Triangle Institute; the Social Security Administration; the Veterans Administration; and other staff members of the Centers for Disease Control and outside consultants.

Leaders of Veterans Service Organizations provided important input and support to the study, and participation by Vietnam-era veterans made the study possible.

#### References

1. Boyle CA, Decoufle P, Dolaney RJ, et al: *Post-service Mortality Among Vietnam Veterans*. Atlanta, Centers for Disease Control, 1987.
2. Centers for Disease Control Vietnam Experience Study: Postservicemortality among Vietnam veterans. *JAMA* 1987;257:790-795.
3. Centers for Disease Control Vietnam Experience Study: *Health Status of Vietnam Veterans: I. Synopsis*. Atlanta, Centers for Disease Control, in press.
4. Centers for Disease Control Vietnam Experience Study: *Health Status of Vietnam Veterans: II. Telephone Interview*. Atlanta, Centers for Disease Control, in press.
5. Centers for Disease Control Vietnam Experience Study: *Health Status of Vietnam Veterans: III. Medical Examination*. Atlanta, Centers for Disease Control, in press.
6. Centers for Disease Control Vietnam Experience Study: *Health Status of Vietnam Veterans: IV. Psychological and Neuropsychological Evaluation*. Atlanta, Centers for Disease Control, in press.
7. Centers for Disease Control Vietnam Experience Study: *Health Status of Vietnam Veterans: V. Reproductive Outcomes and Child Health*. Atlanta, Centers for Disease Control, in press.
8. Centers for Disease Control Vietnam Experience Study: Health status of Vietnam veterans: II. Physical health. *JAMA* 1988;259:2708-2714.
9. Centers for Disease Control Vietnam Experience Study: Health status of Vietnam veterans: III. Reproductive outcomes and child health. *JAMA* 1988;259:2715-2719.
10. Robins LN, Helzer JE, Cottler LB, et al: *The Diagnostic Interview Schedule, Version III-A, Training Manual*. St Louis, Veterans Administration, 1987.
11. *Diagnostic and Statistical Manual*, ed 3. Washington, DC, American Psychiatric Association, 1980.
12. Dahlstrom WG, Welsh GS, Dahlstrom LE: *An MMPI Handbook: Clinical Interpretation*, revised edition. Minneapolis, University of Minnesota Press, 1972, vol 1.
13. Engelman L: Stepwise logistic regression, in Dixon WJ, Brown MB, Engelman L, et al (eds): *BMDP Statistical Software*. Berkeley, University of California Press, 1983, pp 830-844.
14. Wilcosky TC, Chambles LE: A comparison of direct adjustment and regression adjustment of epidemiologic measures. *J Chronic Dis* 1965;38:849-856.
15. Flanders WD, Rhodes PII: Large sample confidence limits for regression standardized risks, risk ratios, and risk differences. *J Chronic Dis* 1987;40:697-704.
16. Egendorf A, Kadushin C, Laufer RS, et al: *Legacies of Vietnam: Comparative Adjustment of Veterans and Their Peers*, publication V101. Washington, DC, Center for Policy Research Inc, 1981, pp 134-630.
17. Helzer JE, Robins LN, Wish E, et al: Depression in Vietnam veterans and civilian controls. *Am J Psychiatry* 1979;136:526-529.
18. Blank AS: Stresses of war: The example of Vietnam, in Goldberg L, Breznitz S (eds): *Handbook of Stress: Theoretical and Clinical Aspects*. New York, Free Press, 1982, pp 631-643.
19. Laufer RS, Gallops MS, Frey-Wouters E: War stress and trauma: The Vietnam veteran experience. *J Health Soc Behav* 1984;25:65-85.
20. Robins LN, Davis DH, Goodwin DW: Drug use by U.S. Army enlisted men in Vietnam: A follow-up on their return home. *Am J Epidemiol* 1974;99:235-249.