Risk Factors for the Development of Posttraumatic Stress Disorder Following Combat Trauma: A Semiprospective Study

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Objective: When positioned in a combat situation, soldiers may be subjected to extreme stress. However, only a few combat-exposed soldiers develop long-term disturbance, namely, posttraumatic stress disorder (PTSD). This study aimed to explore risk factors for developing PTSD in order to improve the psychiatric screening process of new recruits.

Method: In a semiprospective design, we compared 2,362 war veterans who developed PTSD (according to *DSM-IV* criteria) with an equal number of war veterans who did not develop PTSD. Controls were matched on the basis of sequential army identification numbers, that is, the soldier drafted immediately after the index PTSD veteran (usually on the same day). This method ensured similar demographic variables such as socioeconomic level and education. Data were collected from the Israeli Defense Force database and used in a comprehensive survey conducted between January 2000 and March 2001. Comparisons were made on predrafting personal factors (behavioral assessment, cognitive assessment, linguistic ability, and education) and pretrauma army characteristics (ie, rank and training).

Results: Neither behavioral assessment nor training were found to predict PTSD. The predictive factors that were found were essentially nonspecific, such as cognitive functioning, education, rank, and position during the trauma, with little effect from training.

Conclusions: In an armed force that uses universal recruitment, carefully structured predrafting psychological assessment of social and individual qualifications (including motivation) failed to identify increased risk factors for PTSD. However, nonspecific factors were found to be associated with an increased risk for PTSD. This study suggests that the focus of future research on risk factors for PTSD should incorporate other domains rather than behavioral assessment alone.

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Posttraumatic stress disorder (PTSD) is defined by the concurrent presence of re-experiencing, avoidance, and hyperarousal symptoms for at least 1 month, along with clinically significant distress and impairment in social, occupational, or other important areas of functioning, all following a traumatic event. Traumas that can trigger the disorder are extreme situations that involve actual or threatened injury or death, fear, helplessness, or horror. Chronic PTSD is a prolonged and tenacious form of the disorder. In the general US population, chronic PTSD occurs in 29%–39% of those expressing the acute disorder.[1]

Combat exposure is a typical traumatic stressor and can sometimes be followed by acute stress reaction (better known as combat stress reaction [CSR]).[1,2] Fifty-six percent of Israeli soldiers who had CSR during the 1982 Lebanon War developed chronic PTSD.[3] In that same war, CSR accounted for more than 20% of the total number of casualties.[4] The prevalence of chronic PTSD has been reported to be 15.2% among male American veterans who served in the Vietnam War,[5] about 12%–13% in a sample of male American veterans who served in the Iraq and Afghanistan Wars,[6] and 3%–6% among UK military personnel who deployed to the 2003 Iraq War.[2] Although combat stress may also develop into other Axis I and Axis II disorders, PTSD is far more prevalent in this population[5] and the triggering effect of the traumatic event is better documented.

Modern life exposes both combat-trained and combat-support soldiers to war stressors. The high prevalence of PTSD among exposed soldiers, fire fighters, medical teams, and police officers highlights the importance of screening recruits for the risk of developing PTSD in order to reduce this casualty rate. In the era of World Wars I and II, screening for PTSD (or shell shock) was based mainly on intelligence testing.[7] More recently, the reported risk factors for developing PTSD upon exposure to war stressors include premilitary, military, and postmilitary factors.[5,8,9]

Premilitary stressors include family history of psychiatric disorders[5,10]; childhood adversity[11]; emotional or psychiatric disorders prior to the trauma,[12] including PTSD[13]; conduct disorder[5]; previous exposure to traumatic events[14]; gender; lower IQ; and neurodevelopmental problems.[15] Military factors include the magnitude of the stressor, suitability of training for the event, and immediate reactions to the trauma.[16] Postmilitary predictors of chronic PTSD include emerging symptoms of PTSD and depression, social support, and traumatic events in the aftermath of military service.[9]

Brewin and colleagues[17] conducted a meta-analysis of 77 studies of risk factors for PTSD (military and nonmilitary trauma). They also evaluated the consistency of the findings in different populations (military versus nonmilitary) and study designs (prospective and retrospective). A major finding of Brewin and colleagues' meta-analysis[17] is that trauma intensity and posttraumatic variables (social support and life stressors) contribute to the likelihood of developing PTSD more than pretraumatic variables. Brewin and colleagues[17] were concerned, however, that retrospective reporting may intensify the effect of proximal predictors (trauma intensity and postevent occurrences) at the expense of those preceding the traumatic event. They highlighted the importance of large, prospective studies of risk factors for PTSD.[13]

The current study was designed to address the previously mentioned problem of retrospective studies by analyzing prospective data collected before the trauma occurred. This work evaluates the contribution of potential risk factors, recorded prior to combat exposure, to chronic PTSD in a large sample of Israeli combat veterans and matched controls.

METHOD

Data on veterans diagnosed with PTSD were derived from a comprehensive survey of PTSD among military veterans with PTSD-related disability recognized by the Rehabilitation Department of Israel's Ministry of Defense (MOD) and among combat veterans currently receiving treatment in Israel Defense Force's (IDF's) special unit for treatment of combat reaction. The former institution is the equivalent of the Veterans Affairs in the United States in that it manages all veterans' war-related disabilities in the country. The latter is assigned to the same function among active duty and reservists. Thus, the survey comprised all veterans who approached these facilities with either physical or mental disability and were consequently diagnosed with PTSD. Most of the participants (88%) are now off-duty veterans, about 10% of them still serve as reserves, and only a few (2%) remain on active duty.

The survey took place between January 2000 and March 2001, when charts from the 7 regional centers of the MOD rehabilitation department and the 1 IDF center were assessed. The survey evaluated all available records in the centers (n = 5,871), representing 91% of the existing records of the entire population. The subjects' ID numbers were encrypted to provide unique yet unidentifiable subject numbers.

The diagnosis of PTSD had initially been made by a senior psychiatrist, who either evaluated or treated the veteran, and it was reconfirmed by the surveyors on the basis of a chart review via formal *DSM-IV* criteria. The surveyors were 32 psychology students in the last year of their undergraduate studies who were specifically trained to diagnose PTSD. They were overseen by senior, well-informed supervisors. Interrater reliability was found to be within the acceptable range ($\kappa = 0.77$). The data were first coded into data sheets and then into a computerized database. Quality control was done by the supervisors, who randomly reevaluated 50% of the files during each surveyor's first 2 months and 25% at subsequent stages.

All traumatic incidents leading to PTSD occurred during active military service (mandatory service—between ages 18 to 21 years for men and 18 to 20 years for women; and mandatory reserve service—men between ages 21 and 45 years). Traumatic experiences in the PTSD group included combat (81.2%), accidents during routine work or training (5.2%), road traffic accidents (6.6%), terror attacks (4.0%), and other events (3.0%).

Control subjects were matched to the PTSD patients by their draft identification number. A control subject was defined for each PTSD patient as the draftee with a sequential army identification number. This procedure ensured an identical time of drafting and matching of age, sex, and, to some extent, other background variables, such as education and socioeconomic characteristics, since soldiers who were the same sex and age and who lived in the same locale were drafted together. The data of control subjects were collected from the IDF computerized database. Since some of the data were systematically missing for female subjects, we confined the sample to men only. A total of 2,362 PTSD male patients and an equal number of matched controls comprised the study cohort, and, thus, the analysis included 4,724 subjects. The study was approved by the Institutional Ethics Committee of Chaim Sheba Medical Center, Israel. Since this study was based solely on subjects' records, no written consent was required.

Measures Used in the Study

All measures used in the study were collected from the IDF computerized databases.

Education. Data regarding education were categorized into completers of elementary school (the first 8 years of studies), partial completers of high school (more than the first 8 years but less than 12 years of education), completers of high school (12 years of education), and those who had above high school–level education (higher education, including technical training or academic studies).

Draft board assessment. All Israeli males between the ages of 16–17 years undergo preinduction screening that

includes physical and psychological assessment of their eligibility to military service. In the current study, we tested the predictive power of the linguistic, cognitive, and behavioral assessment to the development of PTSD.

The cognitive assessment is composed of 4 subtests: (1) arithmetic-revised, a multiple-choice test assessing reasoning and concept manipulation; (2) similarities-revised, which assesses verbal abstraction and categorization; (3) Raven's Progressive Matrices-revised, which measures nonverbal abstract reasoning and visual-spatial problem-solving abilities; and (4) Otis test of mental ability-revised (Otis-R), a verbal intelligence test that measures the ability to understand and carry out verbal instructions. Individual scales are weighted and combined into an overall score ranging from 10 (low) to 90 (high). In the many validation studies conducted by the draft board, the overall score of the cognitive test battery has been found to be a highly valid measure of general intelligence, equivalent to a normally distributed IQ. The correlation of the cognitive test battery summary score and the Wechsler Adult Intelligence Score total IQ was found to be above 0.90.[18]

The behavioral assessment is done by a trained psychometrician who administers a structured interview evaluating (1) social functioning, which assesses social potency and social closeness; (2) individual autonomy, which assesses maturity, self-directed behavior, and personal autonomy; (3) organizational ability, which assesses compliance to timetables, self-mastery, and self-care; (4) physical activity, which assesses involvement in extracurricular physical activities; (5) functioning in structured environments, such as school or at work; and (6) compliance, which assesses willingness to serve according to army needs (motivation). Each behavioral measure is then rated on a scale ranging from 1 (low) to 5 (high). The individual scores are weighted and combined into a total score, ranging from 8 (low) to 40 (high). The test-retest reliability of the behavioral assessment for inductees interviewed after several days by different interviewers is above 0.80.[18]

A combined total score reflects a combination of the cognitive and behavioral scores along with formal education (total number of years of schooling before recruitment) and the linguistic ability. This score ranges between 41 (low) to 56 (high). This total score is a prerecruitment score that assigns a global military quality level to each recruit, which defines the assignment of manpower personnel to military job categories. All the draft board scores used in the study were the original continuous scores on an interval scale.

Service characteristics. The 3-year mandatory service period starts with an intensive training course of army routines. This training is common to all soldiers; however, there are different levels of physical demands as a function of the medical condition of the draftee and the type of unit, combat, or service. This training is followed by a specific training relevant to the soldier's assignment. For combat soldiers, this training period lasts for the first year of the service, while it is much shorter for service soldiers. Details about the service of the subjects were obtained with regard to 2 time points: (1) at the end of the first year of the mandatory service and (2) at the time of the incident. At each time point, the following data were collected: rank (categorized into private, sergeant, staff sergeant, and officer) and army job (categorized into service or combat).

A combination between the job the subjects were assigned to during mandatory training and the jobs they performed at time of trauma was carried out. This combination represents the level of fitness between the training the subjects had and the job they actually performed during the event, thus reflecting the preparation of the subjects for combat conditions. These combinations were restricted to shifts between service and combat units.

Data Analysis

The study was carried out in a matched-pairs design. Therefore, conditional logistic regressions were applied for both the univariate and the multivariate analyses.[19] The main purpose of the analysis was to identify among a large number of potential risk factors those that form the best set of predictors for developing PTSD. Stepwise regression was used to identify this subset among the candidate explanatory variables, some of which were highly correlated. Adjusted odds ratios were calculated in both cases and their 95% confidence intervals are presented. When the explanatory variable was categorical with several categories, the Bonferroni method was applied to identify the significantly different categories. SAS logistic procedure (SAS Institute, Cary, North Carolina) was used for the analysis. Due to missing data, the number of pairs entered into the analysis varied slightly between the variables tested.

RESULTS

Education

Table 1 displays the distribution of the matched pairs according to education level. The most common combination (29.9%) was of pairs in which both the PTSD and non-PTSD subjects were high school graduates. Education level was found to be significantly related to the probability of PTSD ($P < .001$). The significant and lowest odds ratio was observed in those who had completed high school education as compared to those who had partially completed high school education (OR = 0.665; [95% CL, 0.547, 0.807].

Draft-Board Assessments

Table 2 displays the descriptive statistics of each draft-board assessment score and the results of the univariate logistic regressions. Due to range differences between the draft-board assessment variables, we calculated for each variable the odds ratio for PTSD in subjects who were 1 SD above the mean of that variable compared to subjects who were 1 SD below the mean, ie, a difference of 2 SDs.

Table 1. Distribution of Education Level of Veterans Diagnosed With Posttraumatic Stress Disorder (PTSD)

	PTSD, n (%)				
Non-PTSD, n (%)	Elementary[a]	High School[b]	Partial High School[c]	Above High School[d]	Total
Elementary	294 (14.75)	56 (2.81)	200 (10.04)	3 (0.15)	553 (27.75)
High school	90 (4.52)	596 (29.9)	181 (9.08)	5 (0.25)	872 (43.75)
Partial high school	154 (7.73)	131 (6.57)	259 (13.0)	7 (0.35)	551 (27.65)
Above high school	3 (0.15)	7 (0.35)	4 (0.20)	3 (0.15)	17 (0.85)
Total	541 (27.15)	790 (39.64)	644 (32.31)	18 (0.9)	1,993 (100.0)

[a]Less than or equal to 8 years of education.
[b]Twelve years of education.
[c]More than 8 years of education but less than 12 years.
[d]More than 12 years of education, including technical training or academic studies.

Table 2. Means, SDs, Estimated Odds Ratios, and 95% CLs for the Draft Board Scores

		PTSD		Non-PTSD		Difference			95% CL of	
Measure	Pairs, n	Mean	SD	Mean	SD	Mean	SE	Odds Ratio[a]	Odds Ratio	*P* Value
Behavioral	1,766	23.07	5.03	22.93	5.15	−0.14	0.13	1.094	0.923, 1.305	.29
Cognitive	2,134	52.51	17.89	55.24	18.49	2.73	0.44	0.624	0.539, 0.722	< .0001
Linguistic	2,224	7.87	1.16	7.91	1.19	0.04	0.028	0.875	0.745, 1.028	.10
Total score	1,992	49.99	3.44	50.37	3.67	0.38	0.080	0.658	0.554, 0.785	< .0001

[a]The odds ratios relate to soldiers who differ by 2 SDs in the respective scale.
Abbreviations: CL = confidence limit, PTSD = posttraumatic stress disorder, SE = standard error.

Table 3. Distribution of Participants' Army Rank Upon Traumatic Incident

	PTSD, n (%)				
Non-PTSD, n (%)	Private	Sergeant	Staff Sergeant	Officer	Total
Private	801 (58.85)	137 (10.07)	4 (0.29)	14 (1.03)	956 (70.24)
Sergeant	143 (10.51)	131 (9.63)	8 (0.59)	15 (1.10)	297 (21.82)
Staff sergeant	15 (1.10)	18 (1.32)	4 (0.29)	2 (0.15)	39 (2.87)
Officer	34 (2.50)	26 (1.91)	0 (0.00)	9 (0.66)	69 (5.07)
Total	993 (72.96)	312 (22.92)	16 (1.18)	40 (2.94)	1,361 (100.00)

Abbreviation: PTSD = posttraumatic stress disorder.

Table 4. Distribution of Shifts of Army Job From Training to the Time of Trauma

	PTSD, n (%)				
Non-PTSD, n (%)	Combat-Combat[a]	Combat-Service[b]	Service-Combat[c]	Service-Service[d]	Total
Combat-combat	241 (18.52)	25 (1.92)	48 (3.69)	137 (10.53)	451 (34.67)
Combat-service	32 (2.46)	4 (0.31)	9 (0.69)	25 (1.92)	70 (5.38)
Service-combat	24 (1.84)	3 (0.23)	19 (1.46)	42 (3.23)	88 (6.76)
Service-service	233 (17.91)	22 (1.69)	61 (4.69)	376 (28.90)	692 (53.19)
Total	530 (40.74)	54 (4.15)	137 (10.53)	580 (44.58)	1,301 (100.00)

[a]A soldier who was trained to perform combat jobs and was on combat duty at time of trauma.
[b]A soldier who was trained to perform combat jobs and was on service duty at time of trauma.
[c]A soldier who was trained to perform service jobs and was on combat duty at time of trauma.
[d]A soldier who was trained to perform service jobs and was on service duty at time of trauma.
Abbreviation: PTSD = posttraumatic stress disorder.

As can be seen in Table 2, significant differences in odd ratios for PTSD were found for cognitive assessment score and for draft-board assessment total score. Lower odds ratios for PTSD were found for those with higher cognitive score and for those with higher total score.

Rank. Table 3 displays the distribution of the matched pairs according to rank upon the traumatic incident. The majority (58.8%) were pairs in which both PTSD and non-PTSD subjects were privates ($P = .0002$). The rank at the time of the traumatic incident was found to be significantly related to the probability of PTSD ($P < .001$). The probability of PTSD were lower for both staff sergeants and officers compared with privates (OR = 0.317 [95% CL, 0.162, 0.621] vs OR = 0.486 [95% CL, 0.310, 0.760], respectively). The probability of PTSD were also significantly lower for staff sergeants and officers compared to sergeants (OR = 0.342 [95% CL, 0.176, 0.665] vs OR = 0.524 [95% CL, 0.334, 0.823], respectively). There were no statistically significant differences between sergeants and privates or between officers and staff sergeants.

Training. Table 4 displays the distribution of the matched pairs according to shifts of army job from training to the

Table 5. Adjusted Odds Ratios for PTSD: Multivariate Analysis (n = 1,098)

Effect	Odds Ratio[a]	95% CL
Education		
High school vs partial high school	0.658	0.550, 0.867
Cognitive assessment	0.483	0.287, 0.777
Rank		
Officer vs private	0.512	0.274, 0.956
Officer vs sergeant	0.490	0.264, 0.909
Training		
Service-service vs combat-combat	0.556	0.446, 0.691
Combat-service vs service-combat	0.594	0.357, 0.990
Service-service vs service-combat	0.491	0.347, 0.692

[a]For the cognitive assessment, adjusted odds ratios for PTSD are of a subject being 1 SD above the mean of that variable as compared to a subject being 1 SD below the mean.
Abbreviations: CL = confidence limit, PTSD = posttraumatic stress disorder.

time of trauma. The most common combination (28.9%) was of pairs in which both PTSD and non-PTSD subjects were trained to perform service jobs and were in this position at war time. Having a combat job at the time of trauma was found to be significantly related to the probability of PTSD ($P < .0001$).

As can be expected, the lowest odds ratios for PTSD were observed in those subjects who were in service positions in war time, whether they were trained to perform combat jobs or were trained to perform service jobs, as compared with those who were in combat positions in war time, whether they were trained to perform service jobs or combat jobs (combat-service vs service-combat, OR = 0.494 [95% CL, 0.312, 0.781]; service-service vs service-combat, OR = 0.494 [95% CL, 0.362, 0.675]; combat-service vs combat-combat, OR = 0.654 [95% CL, 0.446 0.959]; service-service vs combat-combat, OR = 0.655 [95% CL, 0.541, 0.793]).

Summary of Predictors

A final predicting model was obtained by applying stepwise conditional logistic regression. The final model included cognitive assessment, education, rank, and level of fitness between training to the job performed at the time of trauma. Due to the large number of missing values, the final model was based on only 1,098 pairs. The conclusions obtained from the univariate and multivariate analyses are very similar. However, since the multivariate model was based on fewer cases, the confidence intervals were usually wider. Table 5 displays the adjusted odds ratios of the fitted model. The effect sizes of all the variables listed in Table 5 are very similar (odds ratio close to 0.5). However, there are large differences in the width of the associated confidence intervals.

DISCUSSION

In this semiprospective study, the psychological screening performed at age 17 years (about 2 years prior to mandatory drafting) along with factors related to service (age 18 to 21 years, and, later on, as reserve soldiers, at age 21 to 45 years) were compared between 2,362 veterans who developed PTSD as a result of their service (either as draftees or reserves) and 2,362 veterans who did not develop PTSD. The study includes a rather large number of veterans (in spite of missing data, the lowest number of pairs to be compared was more than 1,000). The sample is also relatively unskewed as compared to other countries because the draft in Israel is mandatory and includes draftees from all walks of life (with the exception of specific subpopulations, such as Ultraorthodox Jews and Arabs and draftees who were screened out due to severe physical and mental problems).

Interestingly, a careful predrafting behavioral assessment, which can be considered a "psychological fitness" assessment, had limited clinical power in differentiating individuals who are prone to develop PTSD from those who are not. It is also important to note that the position of the soldier during the trauma ruled out the effect of the level of fitness between training to the job performed at the time of trauma, which represents the adequacy of the training the soldiers received for combat or service jobs. The comparison revealed 4 unspecific predictors for PTSD: lower education level (partial high school education vs high school education), lower cognitive ability, lower rank (privates and sergeant vs staff sergeant and officers), and army job during the trauma (combat vs service).

The findings of this study are in line with the existing literature, which has also found that PTSD subjects compared with non-PTSD subjects have lower IQ,[20–24] education,[20,22–28] and level of preparedness for a combat situation.[29–31] Similar findings were also explored by Breslau et al[32] who found that children with high IQ (115 and above) had a decreased risk to develop PTSD. Interestingly, Breslau et al[32] also found that those with high IQ had a decreased risk for being exposed to traumatic events.[32] Iversen et al[11] found that exposure to childhood adversity was associated with lower education and lower rank. The relatively weak overall predictability of preservice variables found in the current study confirms the 1944 US Army vulnerability screening study.[7]

The lack of differences between PTSD and non-PTSD subjects in relation to the behavioral assessment in the predraft screening might be related to the screening itself. Had this predraft screening not been found to predict any other later onset psychopathology, it might be interpreted as having a lack of validity in its process. However, Davidson et al[33] used the same behavioral assessment variables to predict schizophrenia and found them to be a major predictor. This suggests that the lack of findings in PTSD is not due to the validity power of the assessment but specifically related to PTSD. These rather surprising results may also have a legal implication as to whether the soldiers could be better screened or trained before facing potentially traumatic events.

The current study focuses on variables that comprise the army predrafting screening tools, and the results are related to this screening. However, when expanding the search for other predictive variables for PTSD, peritraumatic and posttraumatic variables have been found to predict PTSD. These variables include family history of psychiatric disorders,[5,10] childhood adversity,[11] emotional or psychiatric disorders prior to the trauma,[12] previous exposure to traumatic events,[14] social support,[9] and traumatic events in the aftermath of military service.

Although this study presents a rather large sample—4,724—in a semiprospective design that is unique in the literature that tries to address the question of risk factors for PTSD, the study is not without limitations. One limitation relates to the assumption of non-PTSD among the control group. Since the control subjects were picked based on a lack of complaints, rather than on a direct interview, it is, therefore, conceivable that some of them actually did suffer from PTSD but did not apply to the MOD for treatment. As the estimated prevalence of "hidden PTSD" is 16%,[20] this group might contribute to type I error. However, it can be assumed that this can only reinforce our finding. The findings showed that PTSD patients had lower education, cognitive ability, and rank. It might be safe to assume that if 16% of non-PTSD patients had switched from control to PTSD, the global picture of our findings would have been strengthened. At any rate, our conclusions are limited to the PTSD individuals who actually applied to the MOD or IDF for treatment, as we have no access to those who applied to other facilities, had spontaneous recovery, or did not seek help.

Another limitation of this study is that it is based on data derived from charts and a computerized database. Thus, although issues such as unit cohesiveness, quality of leadership, moral of unit, and family history were suggested as important variables, they were not available, and, therefore, were not studied. In addition, although the design employed in the current study is rather large and representative, it is based on treatment-seeking veterans, and, therefore, mainly represents this population. Furthermore, although cognitive testing can be expected to have been uniform, there is no way of guaranteeing the accuracy, reliability, and stability of such behavioral measures as maturity or autonomy, as assessed at the time of predraft screening.

In conclusion, contrary to our expectations, careful predraft psychological screening, including factors such as motivation, social functioning, and individual autonomy, along with preparedness for the job (training), failed to predict who is vulnerable to PTSD. Pretraumatic predictors for PTSD found in this study included nonspecific factors, such as education, cognitive ability, rank, and army job, which would assist in coping with and better adapting to any kind of trauma, physical or psychological, or reduce the likelihood of encountering it.[32]

These findings suggest that predraft screening is not helpful in identifying vulnerability to PTSD and could actually be associated with a myriad of side effects, including changed view of oneself or ruined careers. The findings also suggest that the core pathology of PTSD might not be associated with the psychological and behavioral factors that were studied in the predrafting examination. Hence, other parameters, including physiologic (as well as psychological) measures, need to be developed in order to find a valid screening tool for vulnerability to PTSD following an exposure to a traumatic event.

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REFERENCES

1. Kessler RC, Sonnega A, Bromet E, et al. Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry.* 1995;52(12):1048–1060.
2. Hotopf M, Hull L, Fear NT, et al. The health of UK military personnel who deployed to the 2003 Iraq war: a cohort study. *Lancet.* 2006;367(9524):1731–1741.
3. Solomon Z. Combat-related PTSD among Israeli soldiers. *Bull Menninger Clin.* 1987;51(1):80–95.
4. Noy S, Levy R, Solomon Z. Mental health care in the Lebanon War, 1982. *Isr J Med Sci.* 1984;20(4):360–363.
5. Kulka RA, Fairbank JA, Jordan BK, et al. *Trauma and the Vietnam War Generation: Report of Findings from the National Vietnam Veterans Readjustment Study*. New York, NY: Brunner Mazel; 1990.
6. Hoge CW, Castro CA, Messer SC, et al. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med.* 2004;351(1):13–22.
7. Jones E, Hyams KC, Wessely S. Screening for vulnerability to psychological disorders in the military: an historical survey. *J Med Screen.* 2003;10(1):40–46.
8. King DW, King LA, Foy DW, et al. Post traumatic stress disorder in a national sample of female and male Vietnam veterans: risk factors, war zone stressors and resilience recovery variables. *J Abnorm Psychol.* 1999;108(1):164–170.
9. King LA, King DW, Fairbank JA. Resilience recovery factors in post traumatic stress disorder among female and male Vietnam veterans: hardiness, post war social support, and additional stressful life events. *J Pers Soc Psychol.* 1998;74(2):420–434.
10. Fontana A, Schwartz LS, Rosenheck R. Post traumatic stress disorder Among female Vietnam veterans: a causal model of etiology. *Am J Public Health.* 1997;87(2):169–175.
11. Iversen AC, Fear NT, Simonoff E, et al. Influence of childhood adversity on health among male UK military personnel.

Br J Psychiatry. 2007;191:506–511.
12. Gurvits TV, Lasko NB, Schachter SC, et al. Neurological status of Vietnam veterans with chronic posttraumatic stress disorder. *J Neuropsychiatry Clin Neurosci.* 1993;5(2):183–188.
13. Rona RJ, Hooper R, Jones M, et al. Would mental health screening of the UK armed forces before the Iraq war have prevented subsequent psychological morbidity? *BMJ.* 2006;333(7576):991.
14. Engel CC Jr, Engel AL, Campbell SJ, et al. Posttraumatic stress disorder symptoms and precombat sexual and physical abuse in Desert Storm Veterans. *J Nerv Ment Dis.* 1993;181(11):683–688.
15. Gurvits TV, Gilbertson MW, Lasko NB, et al. Neurological soft signs in chronic post traumatic stress disorder. *Arch Gen Psychiatry.* 2000;57(2):181–186.
16. Shalev AY, Freedman S, Peri T, et al. Predictors of PTSD in trauma survivors: prospective evaluation of self report and clinician administered instruments. *Br J Psychiatry.* 1997;170:558–564.
17. Brewin CR, Andrews B, Valentine JD. Meta analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *J Consult Clin Psychol.* 2000;68(5):748–766.
18. Gal R. The selection, classification and placement process. In: *A Portrait of the Israeli Soldier*. Westport, CT: Greenwood Press; 1986:77–96.
19. Hosmer DW, Lemeshow S. *Applied Logistic Regression*. 2nd ed. New York, NY: Wiley; 2000.
20. Solomon Z. Untreated combat-related PTSD: why some Israeli veterans do not seek help. *Isr J Psychiatry Relat Sci.* 1989;26(3):111–123.
21. McNally RJ, Shin LM. Association of intelligence with severity of posttraumatic stress disorder symptoms in Vietnam combat veterans. *Am J Psychiatry.* 1995;152(6):936–938.
22. Pitman RK, Orr SP, Lowenhagen MJ, et al. Pre-Vietnam contents of posttraumatic stress disorder veterans' service medical and personnel records. *Compr Psychiatry.* 1991;32(5):416–422.
23. Sutker PB, Galina ZH, West JA, et al. Trauma-induced weight loss and cognitive deficits among former prisoners of war. *J Consult Clin Psychol.* 1990;58(3):323–328.
24. Sutker PB, Davis JM, Uddo M, et al. War zone stress, personal resources, and PTSD in Persian Gulf War returnees. *J Abnorm Psychol.* 1995;104(3):444–452.
25. Vasterling JJ, Brailey K, Constans JI, et al. Attention and memory dysfunction in posttraumatic stress disorder. *Neuropsychology.* 1998;12(1):125–133.
26. Green BL, Grace MC, Lindy JD, et al. Risk factors for PTSD and other diagnoses in a general sample of Vietnam veterans. *Am J Psychiatry.* 1990;147(6):729–733.
27. Macklin ML, Metzger LJ, Litz BT, et al. Lower precombat intelligence is a risk factor for posttraumatic stress disorder. *J Consult Clin Psychol.* 1998;66(2):323–326.
28. Neria Y, Solomon Z, Dekel R. An eighteen-year follow-up study of Israeli prisoners of war and combat veterans. *J Nerv Ment Dis.* 1998;186(3):174–182.
29. O'Toole BI, Marshall RP, Schureck RJ, et al. Risk factors for posttraumatic stress disorder in Australian Vietnam veterans. *Aust N Z J Psychiatry.* 1998;32(1):21–31.
30. Hytten K, Hasle A. Fire fighters: a study of stress and coping. *Acta Psychiatr Scand Suppl.* 1989;80(s355):50–55.
31. Chemtob CM, Bauer GB, Neller G, et al. Post-traumatic stress disorder among special forces Vietnam veterans. *Mil Med.* 1990;155(1):16–20.
32. Breslau N, Lucia VC, Alvarado GF. Intelligence and other predisposing factors in exposure to trauma and posttraumatic stress disorder. *Arch Gen Psychiatry.* 2006;63(11):1238–1245.
33. Davidson M, Reichenberg A, Rabinowitz J, et al. Behavioral and intellectual markers for schizophrenia in apparently healthy male adolescents. *Am J Psychiatry.* 1999;156(9):1328–1335.