Risk Factors for the Development of Post Traumatic Stress Disorder following Combat Trauma


* The Israel Consortium on PTSD includes:
J. Zohar (chair), A. Bleich, D. Dolfin, N. Laor, M. Mark, Z. Kaplan, E. Klein, M. Kotler, A. Shalev

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Department of Psychiatry
Chaim Sheba Medical Center
Tel Hashomer
Israel
Abstract

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 semi-prospective design, we compared 2,362 war veterans who developed PTSD 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. Comparisons were made on pre-drafting personal factors (behavioral assessment, cognitive assessment, linguistic ability and education), and pre-trauma army characteristics (i.e., rank and training).

Results: Neither behavioral assessment nor training were found to predict PTSD. The predictive factors that were found were essentially non-specific, like cognitive functioning, education, rank and position during the trauma, with little effect of training.

Conclusion: 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, non-specific factors were found to be associated with 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.

Study registered at: [www.clinicaltrials.gov](http://www.clinicaltrials.gov)

Study number: NCT00229359
**Introduction**

Posttraumatic stress disorder (PTSD) is defined by the concurrent presence of re-experiencing, avoidance and hyperarousal symptoms for at least one month, along with clinically significant distress and impairment in social, occupational or other important areas of functioning, all following a traumatic event. Traumata 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 sometimes can be followed by acute stress reaction (better known as combat stress reaction or CSR) (1, Hotopf, M., Hull, L., Fear, N. T., et al, 2006). Fifty six percent of Israeli soldiers who had CSR during the 1982 Lebanon war developed chronic PTSD (2). In that same war, CSR accounted for more than 20% of the total number of casualties (3). The prevalence of chronic PTSD among has been reported to be 15.2% among male American veterans who served in the Vietnam War, (4), about 12 to 13% among male American veterans who served in the Iraq and Afganistan war (5), and 3 to 6% among UK military personnel who deployed to the 2003 Iraq war (Hotopf, M., Hull, L., Fear, N. T., et al (2006) The health of UK military personnel who deployed to the 2003 Iraq war: a cohort study. Lancet, 367,1731-1741). Although combat stress may also develop into other Axis I and Axis II disorders, PTSD is far more prevalent in this population (4) 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 War I and II, screening for PTSD (or shell shock) was based mainly on intelligence testing (Jones, E., K.C. Hyams, and S. Wessely. "Screening for vulnerability to psychological disorders in the military: an historical survey. (Review). " Journal of Medical Screening. 10.1 (Spring 2003): 40(7).) More recently, the reported risk factors for developing PTSD upon exposure to war stressors include pre-military, military and post-military factors (4,6,7). Pre-military stressors include family history of psychiatric disorders (4,8), childhood adversity (Iversen et al Pre enlistment vulnerability factors and their influence on health outcomes in UK Military personnel. Br J Psychiatry 2007: 191: 506-511), emotional or psychiatric disorders prior to the trauma (9), including PTSD (Rona R, Hooper R, Jones M, Hull L, Browne T, Horn O, Murphy D, Hotopf M, Wessely S. Would mental health screening of the UK Armed Forces before the Iraq War have prevented subsequent psychological morbidity? Br Med J 2006: 333: 991-994) conduct disorder (4), previous exposure to traumatic events (10) gender, lower IQ and neurodevelopmental problems (11). Military factors include the magnitude of the stressor, suitability of training for the event and immediate reactions to the trauma (e.g., 12). Postmilitary predictors of chronic PTSD include emerging symptoms of PTSD and depression, social support and traumatic events in the aftermath of military service (e.g., 7).
Brewin and colleagues (13) conducted a meta-analysis of 77 studies of risk factors for PTSD (military and non-military trauma). They also evaluated the consistency of the findings in different populations (military versus non-military) and study designs (prospective and retrospective). A major finding of Brewin et al.’s meta-analysis is that trauma intensity and post-traumatic variables (social support and life stressors) contribute to the likelihood of developing PTSD more than pre-traumatic variables. Brewin and colleagues, however, were concerned that retrospective reporting may intensify the effect of proximal predictors (trauma intensity and post-event occurrences) at the expense of those preceding the traumatic event. They highlighted the importance of large prospective studies of risk factors for PTSD, of which only few have been conducted (e.g., Rona R, Hooper R, Jones M, Hull L, Browne T, Horn O, Murphy D, Hotopf M, Wessely S. Would mental health screening of the UK Armed Forces before the Iraq War have prevented subsequent psychological morbidity? Br Med J 2006: 333: 991-994).

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.

**Methods**

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 combat veterans currently receiving treatment in Israel Defense Force’s (IDF) special unit for treatment of combat reaction. The former institution would be the equivalent of the VA in the US, 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, either for physical or for mental disability, and were consequently diagnosed as having PTSD. Most of the participants are now off-duty veterans and some of them still serve as reserves or in active duty.

The survey took place between January 2000 and March 2001 when charts from the seven regional centers of the MOD rehabilitation department and the one 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 re-confirmed 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 the first 2 months of each surveyor, and 25% at subsequent stages.
All traumatic incidents leading to PTSD occurred during active military service (mandatory service – between the ages 18 to 21 for men, and 18 to 20 for women; and reserve service - males between ages 21 and 45). Traumatic experiences 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, as soldiers from same sex, age and place were drafted together. The data of control subjects were collected from the IDF computerized database. As some of the data were systematically missing for female subjects we confined the sample to males 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. As 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 eight years of studies), partial high school (more than the first eight
years, but less than 12 years of education), full high school (12 years of education), and above high school education (higher education, including technical training or academic studies).

Draft board assessment. All Israeli males between the ages of 16-17 undergo pre-induction screening which 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 four subtests: 1. Arithmetic-R, a multiple-choice test assessing reasoning and concept manipulation; 2. Similarities-R, which assesses verbal abstraction and categorization; 3. Raven's Progressive Matrices-R (RPM-R), which measures non-verbal abstract reasoning and visual-spatial problem-solving abilities; and 4. Otis test of mental ability (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 Adults Intelligence Score (WAIS) total IQ was found to be above 0.90 (14).

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 (14).

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 pre-recruitment 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 three 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 two time points: 1. at the end of the first year of the mandatory service; 2. at the time of the incident. At each time point the following data was collected:

*Rank* - categorized into private, sergeant, staff sergeant, and officer.

*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 both for the univariate and the multivariate analyses (15). The main purpose of the analysis was to identify among a large number of potential risk factors, those which 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. For the univariate analysis, with a polychotomous explanatory variable, the Bonferroni method was applied to identify the significant effects. SAS logistic procedure 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. The most common combination (29.9%) was of pairs where both the PTSD and non-PTSD subjects were full high-school graduates. Education was found to be significantly related to the odds for PTSD (p<.001). The significant and lowest odds ratio were observed for those who had full high school education, as compared to those who had partial high school education OR=0.665 [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 of a subject being one SD above the mean of that variable as compared to a subject being one SD below the mean, namely a difference of 2SD's. As can be seen from table 2, significant differences in odd ratios for PTSD were found for cognitive assessment 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 where both PTSD and non-PTSD subjects were privates (p=0.0002). The rank at the time of the traumatic incident was found to be significantly related to the odds for PTSD (p<.001). The odds for PTSD were lower for both staff sergeants and officers, compared with
privates, (OR=0.317 [0.162, 0.621], OR=0.486 [0.310, 0.760], respectively). The odds for PTSD were also significantly lower for staff sergeants and officers compared to sergeants, (OR=0.342 [0.176, 0.665], OR=0.524 [0.334, 0.823], respectively). There were no significant differences between sergeants and privates, nor 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 time of trauma. The most common combination (28.9%) was of pairs where 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 odds for PTSD (p<.0001).

As can be expected, the lowest odds ratios for PTSD were observed for those 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 (for combat-service vs. service-combat OR=0.494 [0.312, 0.781]; for service-service vs. service-combat OR=0.494 [0.362, 0.675]; for combat-service vs. combat-combat OR=0.654 [0.446 0.959]; for service-service vs. combat-combat OR=0.655 [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 are 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 semi-prospective study, the psychological screening performed at age 17 (about two years prior to mandatory drafting), along with factors related to service (age 18 to 21, and later on, as reserve soldiers, at age 21 to 45), 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), and a relatively unskewed sample, as the draft in Israel is mandatory and include draftees from all walks of life (not including sub-populations such as Ultra-orthodox and Arabs, and draftees who were screened out, such as due to severe physical and mental problems), as compared to other countries.

Interestingly, a careful pre-drafting 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 fit 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 four unspecific predictors for PTSD: lower education level (partial vs. full 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 also found PTSD subjects to have lower IQ (16-20), education (16, 18-24), and level of preparedness for a combat situation (25, 26), as compared with non-PTSD subjects. Similar findings were also explored by Breslau et al. (2006) who found that children with high IQ (115 and above) had a decreased risk to develop PTSD. Interestingly, Breslau et al. (2006) also found that those with high IQ had a decreased risk for being exposed to traumatic events (27). Iversen et al (2007) found that Exposure to childhood adversity predicted lower education and lower rank (Iversen et al Pre enlistment vulnerability factors and their influence on health outcomes in UK Military personnel. Br J Psychiatry 2007: 191: 506-511). The overall relatively weak predictability of pre-service variables found in the current study shows again what was already found in 1944 by the US army (Jones, E., K.C. Hyams, and S. Wessely. "Screening for vulnerability to psychological disorders in the military: an historical survey. (Review). " Journal of Medical Screening_ 10.1 (Spring 2003): 40(7).)
The lack of differences between PTSD and non-PTSD subjects in relation to the behavioral assessment in the pre-draft screening might be related to the screening itself. Had this pre-draft screening not been found to predict any other later onset psychopathology, it might be interpreted as lack of validity of the process. However, Davidson et al. (28) used the same behavioral assessment variables to predict schizophrenia and found it to be a major predictor. This suggests that the lack of findings in PTSD are not due to the validity power of the assessment, but specifically related to PTSD. These rather surprising results may also have have a legal implication as to whether the soldiers could better screened or trained before facing potentially traumatic events.

The current study focus on variables which comprise the army pre-drafting screening tool, and the results are related to this data. However, when expanding the search for predictive variables for PTSD, other peri-traumatic and post-traumatic variables have been found to predict PTSD, such as family history of psychiatric disorders (4,8), childhood adversity (Iversen et al Pre enlistment vulnerability factors and their influence on health outcomes in UK Military personnel. Br J Psychiatry 2007: 191: 506-511), emotional or psychiatric disorders prior to the trauma (9), previous exposure to traumatic events (10), social support and traumatic events in the aftermath of military service (e.g., 7). This variables may be extremely important in predicting PTSD.

Although this study presents a rather large sample – 4,724 – in a semi-prospective design which is unique among the literature which 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. As 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. As the estimated prevalence of “hidden PTSD” is 16% (16), it 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 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, therefore mainly represent this population.

In conclusion, contrary to our expectations, careful pre-draft psychological screening including factors like motivation, social functioning and individual autonomy, along with preparedness for the job (training), failed to predict who is vulnerable to PTSD. Pre-traumatic predictors for PTSD found in this study included non-specific factors, such as education, cognitive ability, rank and army job, which would assist coping
and better adaptation to any kind of trauma, being physical or psychological, or to avoid encountering it, as was suggested earlier (27).

These findings might suggest that a careful approach should be used with such screening tools that could bring to both false positive and false negative, thus could on one hand send to the frontline inadequate soldiers and on the other hand undraft potentially appropriate personnel which could later suffer from mistaken stigmatization. The findings also suggest that the core pathology of PTSD might not be associated with vulnerability to psychological and behavioral factors, such as those tested in the current study, and therefore other tools for screening those who are at risk for developing PTSD should be explored. Other parameters, including such physiological measures as hormone levels, might be found to have predictive power for developing PTSD following an exposure to traumatic event, and in turn, to point out new directions, not only about treating PTSD, but ultimately to give a hint as to how PTSD could be prevented.
References


28. Breslau N, Lucia VC, Alvarado GF: Intelligence and Other Predisposing Factors in Exposure to Trauma and Posttraumatic Stress Disorder. Arch Gen Psychiatry. 2006; 63:1238-1245

Table 1. Distribution of education level

<table>
<thead>
<tr>
<th>Education Level</th>
<th>PTSD (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>elementary</td>
<td>full-high</td>
</tr>
<tr>
<td>Non-PTSD (%)</td>
<td>294 (14.75)</td>
<td>56 (2.81)</td>
</tr>
<tr>
<td>full-high</td>
<td>90 (4.52)</td>
<td>596 (29.9)</td>
</tr>
<tr>
<td>part-high</td>
<td>154 (7.73)</td>
<td>131 (6.57)</td>
</tr>
<tr>
<td>above high</td>
<td>3 (0.15)</td>
<td>7 (0.35)</td>
</tr>
<tr>
<td>Total</td>
<td>541 (27.15)</td>
<td>790 (39.64)</td>
</tr>
</tbody>
</table>

Table 2. Means, SD's, estimated odds ratios, and 95% confidence intervals for the draft board scores

<table>
<thead>
<tr>
<th>Scale</th>
<th>N (of pairs)</th>
<th>Mean (PTSD)</th>
<th>SD (PTSD)</th>
<th>Mean (Non-PTSD)</th>
<th>SD (Non-PTSD)</th>
<th>Mean difference</th>
<th>SE of differences</th>
<th>Odds Ratio†</th>
<th>95% Confidence Interval of OR</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral</td>
<td>1766</td>
<td>23.07</td>
<td>5.03</td>
<td>22.93</td>
<td>5.15</td>
<td>-0.14</td>
<td>0.13</td>
<td>1.094</td>
<td>[0.923,1.305]</td>
<td>0.29</td>
</tr>
<tr>
<td>Cognitive</td>
<td>2134</td>
<td>52.51</td>
<td>17.89</td>
<td>55.24</td>
<td>18.49</td>
<td>2.73</td>
<td>0.44</td>
<td>0.624</td>
<td>[0.539,0.722]</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Linguistic</td>
<td>2224</td>
<td>7.87</td>
<td>1.16</td>
<td>7.91</td>
<td>1.19</td>
<td>0.04</td>
<td>0.028</td>
<td>0.875</td>
<td>[0.745,1.028]</td>
<td>0.10</td>
</tr>
<tr>
<td>Total score</td>
<td>1992</td>
<td>49.99</td>
<td>3.44</td>
<td>50.37</td>
<td>3.67</td>
<td>0.38</td>
<td>0.080</td>
<td>0.658</td>
<td>[0.554,0.785]</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

† The odds ratios relate to soldiers who differ by 2SD's in the respective scale.

Table 3. Distribution of participants' army rank upon traumatic incident

<table>
<thead>
<tr>
<th>Army Rank</th>
<th>PTSD (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-PTSD (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>private</td>
<td>801 (58.85)</td>
<td>956 (70.24)</td>
</tr>
<tr>
<td>sergeant</td>
<td>137 (10.07)</td>
<td>14 (1.03)</td>
</tr>
<tr>
<td>Staff-sergeant</td>
<td>4 (0.29)</td>
<td>15 (1.10)</td>
</tr>
<tr>
<td>officer</td>
<td>14 (1.03)</td>
<td>297 (21.82)</td>
</tr>
<tr>
<td>Total</td>
<td>993 (72.96)</td>
<td>312 (22.92)</td>
</tr>
<tr>
<td>Private</td>
<td>18 (1.32)</td>
<td>39 (2.87)</td>
</tr>
<tr>
<td>Sergeant</td>
<td>2 (0.15)</td>
<td>69 (5.07)</td>
</tr>
<tr>
<td>Staff-sergeant</td>
<td>0 (0.00)</td>
<td>40 (2.94)</td>
</tr>
<tr>
<td>Total</td>
<td>1361 (100.00)</td>
<td>16 (1.18)</td>
</tr>
</tbody>
</table>
Table 4: Distribution of shifts of army job from training to the time of trauma

<table>
<thead>
<tr>
<th>Non-PTSD (%)</th>
<th>PTSD (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Combat-combat</td>
<td>Combat-service</td>
</tr>
<tr>
<td>Combat-combat¹</td>
<td>241 (18.52)</td>
<td>25 (1.92)</td>
</tr>
<tr>
<td>Combat-service²</td>
<td>32 (2.46)</td>
<td>4 (0.31)</td>
</tr>
<tr>
<td>Service-combat³</td>
<td>24 (1.84)</td>
<td>3 (0.23)</td>
</tr>
<tr>
<td>Service-service⁴</td>
<td>233 (17.91)</td>
<td>22 (1.69)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>530 (40.74)</td>
<td>54 (4.15)</td>
</tr>
</tbody>
</table>

¹Combat-combat – A soldier who was trained as combat and was on combat duty in time of trauma.
²Combat-service – A soldier who was trained as combat and was on service duty in time of trauma.
³Service-combat – A soldier who was trained as service and was on combat duty in time of trauma.
⁴Service-service – A soldier who was trained as service and was on service duty in time of trauma.

Table 5: Adjusted Odds Ratios for PTSD – Multivariate Analysis

<table>
<thead>
<tr>
<th>Effect</th>
<th>OR†</th>
<th>95% Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-high vs. part-high</td>
<td>0.658</td>
<td>[0.550,0.867]</td>
</tr>
<tr>
<td>Cognitive assessment</td>
<td>0.483</td>
<td>[0.287,0.777]</td>
</tr>
<tr>
<td>Rank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Officer vs. private</td>
<td>0.512</td>
<td>[0.274,0.956]</td>
</tr>
<tr>
<td>Officer vs. sergeant</td>
<td>0.490</td>
<td>[0.264, 0.909]</td>
</tr>
<tr>
<td>Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service-service vs. combat-combat</td>
<td>0.556</td>
<td>[0.446,0.691]</td>
</tr>
<tr>
<td>Combat-service vs. service-combat</td>
<td>0.594</td>
<td>[0.357,0.990]</td>
</tr>
<tr>
<td>Service-service vs. service-combat</td>
<td>0.491</td>
<td>[0.347,0.692]</td>
</tr>
</tbody>
</table>

†For the cognitive assessment, adjusted odds ratio for PTSD are of a subject being one SD above the mean of that variable as compared to a subject being one SD below the mean.