

# Depression in Veterans of the First Gulf War and Comparable Military Controls

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*Depression is a common mental disorder associated with poor health outcomes. The purpose of this study is to examine the prevalence of depression, mental health comorbidity, illness variables, and quality of life in a sample of military veterans serving during the first Gulf War. The Iowa Gulf War Case Validation Study involved face-to-face evaluations in 1999–2002 of 602 military personnel—either deployed (“deployed veterans”) or eligible but not deployed (“non-deployed veterans”) to the Gulf. Subjects were sampled by conducting a series of case-control studies nested within a population-based survey of 4,886 military personnel. All subjects were interviewed using the Structured Clinical Interview for DSM-IV (SCID-IV), and a series of semi-structured interviews and validated questionnaires. Best estimate psychiatric diagnoses were assigned based on all available data. One-hundred-ninety-two (32%) of the 602 surveyed veterans met criteria for a current or lifetime depressive disorder (major depression, dysthymia, depressive disorder—not otherwise specified). Depressed non-deployed veterans were more likely to be female and to have served in the Air Force than depressed deployed veterans. There were few significant differences between the depressed deployed veterans and the depressed non-deployed veterans. Depressed deployed veterans had significantly higher lifetime rates of comorbid cognitive dysfunction (55% vs. 35%), and anxiety disorders (59% vs. 33%)—mainly accounted for by specific phobias (12% vs. 2%) and posttraumatic stress disorder (33% vs. 10%)—than did depressed non-deployed veterans. Lifetime substance use disorders were significantly more frequent in deployed veterans than non-deployed veterans (70% vs. 52%), particularly alcohol disorders (68% vs. 52%). There were no differences in rates of personality characteristics, family psychiatric history, stressors, hypochondriasis, and level of functioning between the two study groups showed no significant differences. Depressive illness is frequent in military samples, as it is in the general population. The prevalence, pattern of comorbidity, and*

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*illness features were similar in deployed veterans and non-deployed veterans, suggesting that the depression suffered by both groups of veterans is qualitatively comparable. The main difference between study groups was that depressed deployed veterans had higher rates than depressed non-deployed veterans of comorbid anxiety disorders, hypothesized to be part of the stress-related syndromes seen in those who experience combat.*

**Keywords** Gulf War; depression; Veterans; Comorbidity.

In the aftermath of Operation Desert Storm, it became clear that many veterans began reporting multi-system complaints (1). Research has confirmed that the Gulf War (GW) veterans report significantly more symptoms and physical and emotional problems than do comparable controls (2,3). Some investigators have proposed the existence of a GW syndrome, although the existence of such a syndrome or unique GW illness remains controversial given the results of four large population-based studies with appropriate controls (4–7). Nonetheless, research has demonstrated that GW veterans frequently report multi-symptom illness, often overlapping with well-known medical and psychiatric disorders including depressive and anxiety disorders, posttraumatic stress disorder (PTSD), fibromyalgia, and chronic fatigue syndrome (5–10). These multisymptom illnesses (MSI), and other conditions, contribute to increased utilization of health care services, and poorer quality of life found in GW veterans (11,12,13).

In a structured telephone survey of 3,695 Iowa veterans conducted five years post-conflict, our group showed that those deployed to the Gulf experienced significantly more complaints than non-deployed veterans consistent with depression, PTSD, chronic fatigue, cognitive dysfunction, bronchitis, asthma, fibromyalgia, alcohol abuse, anxiety, and sexual discomfort (8). The results of this survey (Wave 1) and the high prevalence of these *a priori* outcomes, particularly depression, led us to conduct a second wave of data collection (Wave 2), a project to validate the presence of several important syndromes in veterans through in-person structured interviews and examinations. The purpose of these nested case-control studies was to further investigate their prevalence and severity, and to determine whether the symptoms of depression assessed during the original telephone survey met standard operationalized criteria for depression, whether depression in deployed veterans had unique features or was similar to the depression seen in non-deployed veterans, and to identify putative risk factors of depression in these subjects.

In this analysis, we focus on developing a better understanding of depression in this cohort of deployed veterans and appropriate military controls (non-deployed), who were eligible, but not deployed, to the GW. Assessing the mental health status of veterans may help to explain why deployed veterans report more symptoms (both physical and psychological) than non-deployed veterans. Furthermore, if depression is confirmed using standard criteria, is it unique? For example, do deployed GW veterans suffer more comorbid disorders than non-deployed veterans? Do depressed GW veterans have less social support than non-deployed veterans? Can any

differences in the patterns of depression in this sample be explained by the presence of posttraumatic stress disorder (PTSD), which has a higher prevalence among the deployed?

We hypothesized that 1) depression would be more frequent among deployed veterans than non-deployed veterans, and 2) there would be few fundamental social, demographic, and military differences in the individuals experiencing depression on the basis of GW deployment. Thus, we focused on examining the clinical features and correlates of the depression in the sample. We hypothesized that the GW deployment experience had not caused a specific type of depression, though deployment may have contributed to a non-specific, generalized response in some individuals. These issues are explored herein.

## METHODS

### Study Sample

The Wave 1 study sample was selected from among the cohort of military personnel who had participated in our earlier structured telephone survey. That survey included military personnel who had listed Iowa as their home of record at the time of enlistment, and had served in the regular military or activated National Guard or the U.S. Reserve between August 2, 1990 and July 31, 1991, the GW period. The individuals were selected from one of four study domains: GW regular military, GW National Guard/U.S. Reserve, non-GW regular military and non-GW National Guard/U.S. Reserve. The sample was further stratified by age, gender, race, branch of military, and military status (enlisted/officer). The sample was designed as a stratified random sample with proportional allocation. We eventually interviewed 3,695 subjects (76% participation) employing a structured, computer-assisted telephone interview, which consisted of validated questionnaires, and investigator-derived questions designed to assess relevant medical and psychiatric conditions. The results of that survey have been reported elsewhere.

In the current Wave 2 study, “cases” were veterans who reported one or more of the following three *a priori* symptom-based conditions during Wave I of the study: depression, cognitive dysfunction, or chronic widespread pain; “controls” were defined as veterans without any of these conditions. These eight strata (one strata for all three conditions, three strata for each combination of two conditions, three strata of only one condition, and one strata of controls)

were further stratified by whether the veteran was deployed to the Gulf or not. This approach resulted in 16 potential strata. Subjects in each strata were selected at random, using an adaptive randomization approach in the control group, which yields a higher probability of inclusion of individuals who are similar to symptomatic individuals on the characteristics likely to be associated with illness. This procedure allows for adjustment of allocation probabilities as the study progresses, so that the characteristics of the case and control samples would be as similar as possible. Thus, controls did not have one of the three specified conditions, and may or may not have been deployed.

The study was approved by the University of Iowa Institutional Review Board, and written informed consent was obtained from all subjects, who volunteered to participate.

### **Assessments**

Demographic data including age, sex, race, education, income and marital status were obtained along with military variables of interest such as military status (active duty), branch of service, rank, deployment to the Gulf, and combat during Operation Desert Storm.

Subjects included in the depression strata were those who, during the Wave 1 telephone survey, had satisfied defined criteria for major depression or minor depression on the basis of responses to the PRIME-MD (14). Major depression and minor depression both required reporting feeling depressed or hopeless, or experiencing little interest or pleasure in life. A designation of major depression required reporting an additional five or more depressive symptoms, while a designation of minor depression required reporting two to four additional depressive symptoms (from a list of nine additional depressive symptoms). Both outcomes were assessed on the basis of symptoms reported at the time of interview or during the previous month.

Subjects included in the chronic widespread pain (CWP) strata were those who 1) reported having fibromyalgia or fibrositis during the past year, or 2) reported having overall body pain, including pain in the arms and legs, back, and both sides of the body, during the past year almost every day for three months or longer, and rating the level of pain during the past 24 hours as at least a "1" on a "0" (no pain) to "10" (worst pain ever) scale. Subjects included in the cognitive dysfunction (CD) strata were those who reported 1) having amnesia or severe memory loss, or 2) reporting at least one symptom of mild cognitive impairment and being "quite a bit" or "extremely" bothered by the symptom, or 3) reporting at least two symptoms of mild cognitive impairment and being at least "moderately" bothered by the symptoms, or 4) reporting problems with feeling confused or disoriented in place or time and was at least "moderately" bothered by the confusion or disorientation.

Information concerning chronic or recurrent physical conditions was obtained as part of the Wave 1 telephone survey conducted in 1995–1996 (8). Medical outcomes determined by symptomatology included depression, alcohol abuse, fibromyalgia, chronic fatigue, cognitive dysfunction, asthma, and bronchitis.

We obtained histories of multiple conditions identified prior to the Gulf War including high blood pressure, seizures or convulsions, asthma, chronic sinusitis, chronic ear infections, peptic ulcer, gastritis, enteric colitis, kidney disease, arthritis, lumbago, migraine, and fibromyalgia. The number of prewar physical conditions was calculated by summing up these conditions. This list was updated at the time of the in-person Wave 2 examination by the physician examiner to obtain the total number of current physical conditions.

We used the 24-item Social Provisions Scale to assess social support (15,16). The scale has been validated in a wide range of settings (16).

Personal medical and psychiatric history items obtained through structured questions including information regarding depression, anxiety disorder, drug abuse, use of psychiatric medication, psychiatric hospitalization, attempted suicide, and incarceration (17). Information regarding the onset of these items prior to the Gulf War was obtained in Wave 1. Family history items assessed included a history of depression, anxiety disorder, alcoholism, drug addiction, psychiatric medications, psychiatric hospitalization, psychotherapy or counseling, suicide attempt, or completed suicide. Information concerning these items was elicited by means of the following question: "Have your parents, brothers, sisters, or children related to you by blood ever had the following?"

The Structured Interview for DSM-IV (SCID) was administered to all study subjects by a trained rater in order to collect psychiatric diagnostic information (18). This widely used instrument has shown reliability comparable to that of other major diagnostic instruments used to assess Axis I disorders (19) following the DSM-IV criteria (20). Interviewers received training in the use and administration of the SCID-IV by one of the investigators (DWB). The training included readings about psychopathology and direct supervision. The inter-rater reliability of SCID-IV results was compared on three separate occasions using audiotapes from randomly selected cases. On these occasions, the Kappa coefficient was consistently in excess of 0.8. Furthermore, assessments based on the trained interviewers use of the SCID and blinded assessments of the psychiatrists based on all available data were nearly always identical.

Assessment of personality (Axis II) was obtained during Wave 2 by using the Schedule for Nonadaptive and Adaptive Personality (SNAP) (21). The SNAP is a factor analytically derived, self-report instrument that assesses traits and dimensions, including negative temperament, positive temperament, and disinhibition. These scales are internally consistent and have acceptable test-retest reliability.

Level of functioning was determined using the Medical Outcome Survey—Short Form 36 (SF-36) Health Survey (22). This is a measure of perceived health status over the past four weeks. It contains 36 items that assess the dimensions of physical and mental health. The instrument is a widely used general health status measure of functional capacity and well being that has excellent reliability and validity.

Hypochondriasis was assessed using the Whiteley Index, which has been shown to discriminate between hypochondriacal and nonhypochondriacal patients (23). A modification of the instrument calls for rating items on five-point scales for the past week. The internal consistency and test–retest reliability are good to excellent. There is also evidence of strong concurrent and convergent validity.

Raw data including self-report questionnaires and the SCID-IV interview were reviewed by one of the psychiatrist investigators (DWB or CPC) who then assigned a “best-estimate diagnosis” (BED) for each subject taking all data into account (24). Identifying data were removed from the materials to ensure that the study psychiatrist was blind to case versus control status.

### Statistical Analysis

Analyses were completed using SAS Version 8 (SAS Institute, Cary, NC) (25). Validation of *a priori* depression outcome was performed by recreating the *a priori* definition of MDD (created for Wave 1 data analysis) at time of Case Validation study assessment (the same group of questions as in the Telephone Survey was included in the Case Validation Study questionnaire of current symptoms) and comparing it with the BED of MDD. Specificity and sensitivity of the *a priori* definition was calculated using best estimated diagnosis as a “gold standard.” Comparisons of false positive and false negative rates of *a priori* (self-report) MDD for GW deployed and non-deployed veterans were performed using SAS CATMOD procedure.

Descriptive statistics, including percents for categorical data and means and standard errors for continuous data, for participants with lifetime validated depression (best estimated diagnosis of MDD, dysthymia or depression NOS) were generated and stratified by deployment status. Demographic and military characteristics, lifetime and current psychiatric disorders, clinical, personal and quality of life measures for GW deployed and era participants were compared to address the question of whether the nature of depression differed among deployed and non-deployed GW era military personnel. Comparisons between GW deployed and GW era participants were made using logistic regression for each categorical variables and t-test for each continuous variable in interest. Odds ratios (ORs) or mean differences were calculated with 95% confidence intervals for categorical and continuous variables, respectively, to reveal the effect of deployment status on each outcome variable of interest.

### RESULTS

A total of 602 veterans were interviewed in Wave 2. The subjects were predominantly male (87.9%) and their mean (SE) age was 39.2 (0.36) years at the time of the interview. Reflecting the Iowa population, they were mostly Caucasian (97%) and the majority had some college education. The majority were Army enlistees belonging to the National Guard or U.S. Reserve. A majority (73%) had been deployed to the Persian Gulf.

Of the 602 subjects interviewed, 192 (32%) met criteria for a lifetime DSM-IV depressive disorder including major depression, dysthymia, depressive disorder not otherwise specified, or bipolar depression. The lifetime prevalence of depressive disorders was greater in non-deployed veterans than deployed veterans (36.6% vs. 30.3%), although this difference is not statistically significant.

Table I compares deployed veterans with depression and era controls with depression. The deployed depressed veterans were more likely to be male, and less likely to be members of the Air Force, but there were no other demographic or

**Table I** Demographic and Military Characteristics Among Depressed Deployed and Non-deployed Veterans ( $n = 192$ )

Variable	Deployed ( $n = 132$ )	Non-deployed ( $n = 60$ )	Deployed vs. non-deployed OR (95% CI)
Age, Mean (SE)	39.3 (0.8)	39.6 (1.1)	-0.3 (-3.1, 2.4) <sup>1</sup>
Gender			
% Men	87.9	73.3	
% Women	12.1	26.7	0.38 (0.17, 0.82)*
Race			
% White	97.0	98.3	
% Black/Other	3.0	1.7	1.84 (0.20, 16.86)
Rank			
% Enlisted	94.7	96.7	
% Officer	5.3	3.3	1.62 (0.33, 8.06)
Military Status			
% Regular	32.6	36.7	
% National Guard/Reserve	67.4	63.3	1.20 (0.63, 2.27)
Branch of Service			
% Army	77.2	63.3	
% Air Force	0.8	18.3	0.03 (0.00, 0.27)*
% Marines	11.4	6.7	1.79 (0.57, 5.66)
% Navy/Coast Guard	10.6	11.8	0.90 (0.34, 2.35)
Medical Conditions (1995–1996)			
% Depression	53.0	51.7	1.06 (0.57, 1.95)
% Alcohol abuse	20.5	18.3	1.15 (0.53, 2.50)
% Fibromyalgia	50.8	38.3	1.66 (0.89, 3.09)
% Chronic fatigue	7.6	1.7	4.79 (0.60, 38.34)
% Cognitive dysfunction	55.3	35.0	2.30 (1.22, 4.32)*
% Asthma	12.1	16.7	0.69 (0.29, 1.62)
% Bronchitis	9.1	8.3	1.10 (0.37, 3.27)

\* $p \leq 0.05$

<sup>1</sup>Means difference (95% CI) is reported.

military differences between the groups. In comparing past medical conditions reported during Wave 1, the deployed depressed veterans were more likely to have reported cognitive dysfunction (55% vs. 35%, OR = 2.3) than non-deployed depressed veterans. Table II shows lifetime psychiatric disorders diagnosed in depressed deployed and depressed non-deployed veterans using the BED process. There were few differences between the groups, particularly for type of mood disorder suffered. The deployed GW veterans were more likely to suffer a specific phobia, posttraumatic stress disorder, or "any anxiety disorder." They were also more likely to suffer from an alcohol abuse/dependence, drug abuse/dependence, or "any substance use disorder."

**Table II** Lifetime Psychiatric Disorders in Depressed Deployed and Non-deployed Veterans ( $n = 192$ )

Disorder	Deployed ( $n = 132$ )	Non-deployed ( $n = 60$ )	Deployed vs. Non-deployed OR (95% CI)
<b>Mood disorders</b>			
% Major depression	75.8	80.0	0.78 (0.37, 1.65)
% Dysthymia	15.9	8.3	2.08 (0.74, 5.81)
% Depressive disorder NOS	12.1	13.3	0.90 (0.36, 2.23)
% Mania	4.5	1.7	2.81 (0.33, 23.87)
% Any mood disorder	100.0	100.0	—
<b>Anxiety disorders</b>			
% Panic disorder	9.8	6.7	1.53 (0.48, 4.90)
% Agoraphobia	9.8	1.7	6.45 (0.82, 50.46)
% Social phobia	14.4	5.0	3.19 (0.91, 11.25)
% Specific phobia	12.1	1.7	8.14 (1.05, 62.86)*
% Obsessive-compulsive disorder	3.0	1.7	1.84 (0.20, 16.86)
% Posttraumatic stress disorder	33.3	10.0	4.50 (1.80, 11.27)*
% Generalized anxiety disorder	19.7	10.0	2.21 (0.86, 5.69)
% Anxiety disorder NOS	2.3	2.3	0.67 (0.11, 4.15)
% Any anxiety disorder	59.1	33.3	2.89 (1.52, 5.47)*
% Psychotic disorders	0	1.7	—
% Somatoform disorders	5.3	5.0	1.06 (0.27, 4.26)
% Eating disorders	3.8	5.0	0.75 (0.17, 3.24)
<b>Substance use disorders</b>			
% Alcohol abuse/dependence	68.2	51.7	2.00 (1.07, 3.74)*
% Drug abuse/dependence	21.2	20.0	1.08 (0.50, 2.30)
% Any substance use disorder	69.7	51.7	2.15 (1.15, 4.03)*
% Other	1.5	0.0	—
% Any disorder	100.0	100.0	—

\* $p \leq 0.05$ ; NOS = not otherwise specified.

Table III compares current psychiatric disorders in the two groups, as assessed by the best estimate process. Again, few differences emerged. The deployed Gulf War veterans were more likely to suffer from "any mood disorder," posttraumatic stress disorder, "any anxiety disorder," or any DSM-IV disorder overall than non-deployed veterans. The prevalence of current substance use disorders did not significantly differ among the groups.

Tables IV and V compare clinical, family history, personality and quality of life variables in deployed and non-deployed depressed veterans. There was little significance between the groups. The deployed group showed evidence of greater distress, lower ratings of positive temperament, and a higher PTSD symptom severity score.

**Table III** Current Psychiatric Disorders in Depressed Deployed and Non-deployed Veterans ( $n = 192$ )

Disorder	Deployed ( $n = 132$ )	Non-deployed ( $n = 60$ )	Deployed vs. Non-deployed OR (95% CI)
<b>Mood disorders</b>			
% Major depression	30.3	23.2	1.43 (0.71, 2.89)
% Dysthymia	14.4	6.7	2.35 (0.76, 7.25)
% Depressive disorder NOS	6.1	6.7	0.90 (0.26, 3.12)
% Mania	0.8	0	—
% Any mood disorder	50.8	36.7	1.78 (0.95, 3.33)
<b>Anxiety disorders</b>			
% Panic disorder	5.3	1.7	3.30 (0.40, 27.47)
% Agoraphobia	9.1	1.7	5.90 (0.75, 46.46)
% Social phobia	13.6	5.0	3.00 (0.85, 10.61)
% Specific phobia	11.4	0	—
% Obsessive-compulsive disorder	3.0	1.7	1.84 (0.20, 16.86)
% Posttraumatic stress disorder	27.3	5.0	7.13 (2.10, 24.20)*
% Generalized anxiety disorder	19.7	10.0	2.21 (0.86, 5.69)
% Anxiety disorder NOS	2.3	3.3	0.67 (0.11, 4.15)
% Any anxiety disorder	51.5	25.0	3.19 (1.62, 6.27)*
% Psychotic disorders	0	0	—
% Somatoform disorders	5.3	5.0	1.06 (0.27, 4.26)
% Eating disorders	3.0	0.0	—
<b>Substance use disorders</b>			
% Alcohol abuse/dependence	10.6	5.0	2.25 (0.62, 8.11)
% Drug abuse/dependence	3.0	1.7	1.84 (0.20, 16.86)
% Any substance use disorder	13.6	6.7	2.21 (0.71, 6.84)
% Other disorder	1.5	0	—
% Any disorder	68.2	51.7	2.00 (1.0, 3.74)*

\* $p \leq 0.05$ ; NOS = not otherwise specified.

**Table IV** Clinical, Personal, and Quality of Life Measures in Depressed Veterans

Scale	Deployed ( <i>n</i> = 132)	Non-deployed ( <i>n</i> = 60)	Deployed vs. Non-deployed OR (95% CI)
Life Stress, Moderate to Extreme			
During 5 year period prior to GW, %	39	49	0.65 (0.35, 1.22)
Military experience at time of GW, %	83	64	2.72 (1.31, 5.64)*
Disability (reported to physician)			
No disability (reference), %	35	43	
Slight disability, %	31	33	1.17 (0.57, 2.43)
Severe disability, %	34	24	1.71 (0.79, 3.70)
Distress: pain/mental suffering			
None (reference), %	25	40	
Mild, %	47	43	1.73 (0.85, 3.50)
Moderate/severe, %	28	17	2.51 (1.04, 6.05)*
Family History			
Functional syndrome, %	13	14	0.92 (0.37, 2.31)
Depression, %	40	44	0.84 (0.44, 1.58)
Alcohol/drug use disorder, %	38	35	1.13 (0.59, 2.17)
Anxiety disorder, %	14	9	1.67 (0.58, 4.78)
Suicide/attempted suicide, %	17	16	1.10 (0.47, 2.58)
Personal psychiatric history			
Suicide attempt (ever), %	10	8	1.20 (0.41, 3.54)
Psychiatric medication, %	27	28	0.95 (0.48, 1.87)
Psychiatric hospitalization, %	13	10	1.33 (0.50, 3.56)

\**p* ≤ 0.05.

To examine the validity of the syndromal depression reported from Wave 1 using the BED diagnosis obtained from the case validation (Wave 2) study, as the “gold standard,” we recreated our Wave 1 survey definition of current symptomatic depression with self-reported depression items asked during the case validation study. We found that the syndromal depression criteria were both sensitive (70.4%) and specific (86.2%) as compared to the SCID diagnosis of current MDD during the case validation study. Furthermore, we did not find a significant difference in false positive rates when comparing deployed to non-deployed veterans; although we did find that deployed veterans had lower false negative rates than non-deployed veterans (rates difference = -32.8, 95% CI = (-61.1, -4.57), Chi-square test statistic = 5.19, *p* = 0.02).

## DISCUSSION

Depressive illness is frequent in the general population and several large studies have suggested that it is more

**Table V** Personality and Quality of Life Measures in Depressed Veterans

Scale	Deployed ( <i>n</i> = 132) Mean (SE)	Non- deployed ( <i>n</i> = 60) Mean (SE)	Deployed vs. Non-deployed Mean Difference (95% CI)
Trait/temperament scales			
Negative	14.7 (0.7)	13.3 (1.0)	1.4 (-1.1, 3.9)
Positive	14.7 (0.6)	17.0 (0.7)	-2.3 (-4.3, -0.4)*
Disinhibition	9.6 (0.5)	8.4 (0.6)	1.2 (-0.5, 2.9)
Hypochondriasis, Whiteley Index	27.1 (0.9)	26.0 (1.4)	1.1 (-2.1, 4.3)
PTSD symptom severity	29.8 (0.6)	25.8 (0.7)	4.0 (2.0, 6.0)*
Social provisions scale	74.8 (1.1)	75.0 (1.7)	-0.2 (-4.1, 3.7)
SF-36, Health status			
Physical functioning	71.6 (2.3)	73.6 (3.0)	-2.0 (-9.8, 5.9)
Physical role	55.2 (3.4)	58.9 (5.4)	-3.7 (-15.9, 8.6)
Bodily pain	54.6 (1.8)	55.9 (3.1)	-1.2 (-7.8, 5.4)
General health	52.9 (2.0)	57.5 (3.6)	-4.6 (-12.3, 3.0)
Vitality	40.1 (2.1)	47.2 (3.1)	-7.1 (-14.4, 0.3)
Social functioning	64.8 (2.1)	67.0 (3.1)	-2.1 (-9.6, 5.3)
Emotional role	60.3 (3.6)	70.6 (5.4)	-10.4 (-23.0, 2.3)
Mental health	59.9 (1.8)	62.5 (2.6)	-2.6 (-9.0, 3.8)
Physical component	42.5 (0.9)	43.2 (1.5)	-0.6 (-4.0, 2.7)
Mental component	40.9 (1.1)	44.6 (1.5)	-2.7 (-6.4, 1.0)

\**p* ≤ 0.05.

common among military personnel who participated in the first Gulf War than among comparable controls not deployed to the Gulf (4–7). However, it is unclear whether the depression experienced by deployed veterans differs in any fundamental way from those who did not experience the unique psychological and environmental stressors associated with Gulf deployment. If the depression experienced by deployed military personnel was unique, perhaps a different pattern of social, demographic, or military factors should emerge in terms of risk factors, comorbid mental health disorders, effect on quality of life, personality features, and family psychiatric history.

Most experts view depression as a collection of disorders, which share a similar syndromal pattern (26,27). The best way to classify these depressive subtypes is still evolving, but many researchers employ such factors as history of comorbid mental health conditions (e.g. anxiety disorders, substance use disorders), lifetime course, family history of psychiatric disorder, associated risk factors (e.g., age, gender, stressful life events), symptom pattern (e.g., melancholia, psychotic depression), and response to treatment. Thus, subtypes of depression will differ based on patterns of psychiatric comorbidity, symptom pattern, family history, and treatment response.

Considering these factors, there were remarkably few differences separating the deployed and non-deployed depressed veteran groups, and there appeared to be no special pattern to it in terms of risk factors, psychiatric comorbidity, family psychiatric history, or other variables that were examined. In fact, there was no evidence in the current analysis that prevalence of depression was higher in the deployed, as might have been expected from results of earlier studies. Not surprising, the frequency of lifetime PTSD was significantly higher among the deployed than non-deployed, as was the category of specific phobia and "any anxiety disorder. Alcohol disorders were also more frequent as was "any substance use disorder." None of the "current" psychiatric diagnoses differed with respect to deployment as shown in Table III, except for PTSD, both in terms of diagnosis and as measured in terms of dimensionally with the Mississippi scale. As one might expect, more deployed veterans identified their military experience at the time of the first Gulf War as "moderately to extremely stressful," than non-deployed personnel who were active in the military at the same time (83% vs. 64%), and perhaps the perception of stress is reflected by the higher prevalence of anxiety disorders.

Examination of Table II shows very high rates of lifetime psychiatric comorbidity, rates higher than are reported in the general population, yet comparable to what has been reported before in samples of depressed subjects in general and military populations (28,29). These rates may also partly reflect the oversampling of cases of chronic widespread pain and cognitive dysfunction as well, both of which are also associated with psychiatric comorbidity. One-third of the deployed veterans had a lifetime diagnosis of PTSD (27% had current PTSD at the time of the interview), and rates of substance use disorders were very high. The high rate of PTSD most likely reflects the contribution of experiences during the first Gulf War. While lifetime rates of substance use disorder are very high, their use appears to have been in the past for most, as only 11% of the deployed indicated a current alcohol disorder (vs. 5% of the non-deployed) and 3% a drug use disorder (vs. 2% of the non-deployed), rates not much different from that seen in the general population (28). Quality of life variables and ratings of disability were similar in the two groups, again suggesting that the depression suffered in the two groups is similar in how it affects important life domains, and in its severity. Scale scores on the SF-36 did not differ, nor did results on any of the other instruments that were compared.

Interestingly, the current analysis from Wave 2 data was developed to validate through careful evaluation the presence (past or current) of depressive illness in persons who endorsed having had substantial depressive symptoms at the time of our telephone survey (Wave 1) in the mid-1990s. Of the 602 included in Wave 2, only 32% met criteria for

lifetime depression (major depression, dysthymia, or depressive disorder, not otherwise specified), and only 15% were suffering a current depression. Over 31% of the Wave 2 study participants satisfied the criteria of having any current depression during the 1995–1996 assessment period. While this suggests that the initial survey instrument may have led to an over-diagnosis of depression, it could be that subjects who previously reported depressive symptoms either had forgotten past symptoms by the time of the Wave 2 interviews, chose not to report symptoms, believed that their symptoms were unimportant, or that they possibly attributed them to a physical illness. Because depression tends to be a remitting illness for most affected persons, an individual may have experienced an episode and improved or remitted, never to experience another episode. For that reason, it is not surprising that few of the subjects were currently depressed. We expected that most persons depressed in 1995 would have improved, either spontaneously or through treatment, because that is the nature of depressive illness. An alternative reason why rates of depression differed between the time of the telephone interview (Wave 1) and the case validation study interview (Wave 2) is that the definition of depression differed across assessment points.

We are confident of our current findings because of the thoroughness of the subject assessments. Because the study was developed to assess the validity of specified conditions, the results cannot be generalized to all veterans. Although recall bias could have altered reports of symptoms (30,31), the potential for this confound is likely reduced by the use of multiple validated self-report measures, and the use of the SCID-IV, a widely used psychiatric diagnostic instrument that has excellent reliability and validity. Raters were personally trained by one of the investigators and reliability checks during the study showed excellent concordance of the raters with one of the study investigators. Finally, the BED method was used so that all relevant information would be taken into account.

## **CONCLUSION**

The first Gulf War involved nearly 500,000 personnel, many of whom subsequently developed mental, emotional, and physical symptoms in excess of comparable military personnel not deployed to the Gulf. This finding has been replicated and, while no evidence of a specific "Gulf War illness" has emerged, the controversy continues (32). A goal of this study was to carefully examine specific problems and complaints reported by veterans during Wave 1 interviews conducted in 1995 to 1996, through a nested case-control design (Wave 2). In this analysis, we qualitatively examined veterans reporting lifetime depression comparing the deployed and non-deployed. What emerged from the

comparison was that, apart from differences in the prevalence of PTSD, other anxiety disorders, and substance abuse, there were few important differences between the groups. These differences in *lifetime* disorders probably reflect the transient influence of Gulf deployment and its unique stressors. We had earlier documented that all of these conditions were reported in excess during Wave 1 (11,33); by Wave 2, subjects reported similar rates of all current mental health conditions, with the ongoing exception of PTSD, which reflects its persistence, a feature well documented in studies of veteran populations. In summary, the depression in veterans of the first Gulf War shows no unique pattern of demographic, clinical, or military factors that suggest the depression they develop is special or unique.

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