

# Are Veterans Seeking Veterans Affairs' Primary Care as Healthy as Those Seeking Department of Defense Primary Care? A Look at Gulf War Veterans' Symptoms and Functional Status

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**Objective:** This study compared Gulf War veterans seeking VA primary care with Gulf War veterans seeking treatment from a Department of Defense primary care clinic on measures of physical symptoms, psychiatric complaints, and functional status. Additionally, the association between employment status and health was examined. **Methods:** Analysis was based on the responses of consecutive patients attending the Gulf War Primary Care clinics at either the VA Puget Sound Health Care System in Seattle, WA ( $N = 223$ ), or the Walter Reed Army Medical Center in Washington, DC ( $N = 153$ ), between March 1998 and September 1999. **Results:** After controlling for demographic variables, Gulf War veterans who sought VA care reported significantly more anxiety and PTSD symptoms than active duty military personnel. The groups did not differ on somatic complaints or summary scores from the SF-36. Employment status was significantly, independently, and consistently associated with greater psychiatric symptoms, physical symptoms, and decreased functional status. **Conclusions:** Our findings reveal important differences in health status between veterans seeking primary care at a VA and a Department of Defense facility, differences that are in part related to employment status. Both groups report symptoms of psychiatric distress and decreased functional status, though VA patients are more impaired. Research findings based on clinical samples of veterans at VA sites may not generalize to Gulf War veterans still on active duty (and vice versa). **Key words:** Persian Gulf, healthy worker effect, health, functional status, PTSD, employment.

VA = Veterans Affairs; WR = Walter Reed Army Medical Center; BSI = Brief Symptom Inventory; PHQ = Patient Health Questionnaire; SSC = Somatic Symptom Checklist; PCL-M = Post Traumatic Stress Disorder Checklist, Military version; SF-36 = Medical Outcomes Study Short Form 36; PTSD = posttraumatic stress disorder; GSI = global severity index; DSM-IV = Diagnostic and Statistical Manual for Mental Disorders; MHC = Mental Component Summary; PCS = Physical Component Summary.

## INTRODUCTION

Several studies have found that military personnel deployed to the Gulf War theater of operations report more physical symptoms than veterans from the same era who were not deployed to the Persian Gulf (1–4). It is estimated that 15% to 20% of Gulf War veterans

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seeking care for their war-related health concerns endorse chronic and poorly understood symptoms, including fatigue, joint and muscle pain, headaches, and cognitive problems (5). Many divergent etiologies have been proposed to explain the health care complaints of Gulf War veterans. These include adverse reactions to immunizations (6), allergic reactions (7), infections (8), toxic exposures (9), neurological damage (10), rheumatologic problems (2), somatization (11), and psychological stress responses (12). To date, no unique illnesses, definitive causes, or specific treatments have been empirically established to explain the health problems of Gulf War veterans.

In addition to the studies of physical symptoms, a rapidly expanding research literature has examined the psychiatric status of veterans who served in the Gulf War (13–17). The majority of these studies compared the psychiatric status of veterans deployed to the Gulf with nondeployed Gulf War-era veteran controls. These comparisons consistently found a higher prevalence of emotional distress among Gulf War-deployed veterans compared with nondeployed Gulf War-era veterans (14, 15).

The purpose of this study was to compare Gulf War veterans seen at a VA Medical Center with Gulf War veterans receiving similar clinical services at a Department of Defense Medical Center on measures of physical symptoms, psychiatric distress, and functional status. Both health care systems have well-established Gulf War Clinics that offer primary care and multidisciplinary medical evaluations for Gulf War veterans with health concerns related to deployment to the Persian Gulf. Patients seen at the Department of De-

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fense site were active-duty military or reservist who have been referred for a health evaluation and treatment. Patients presenting at the VA Gulf War clinic comprise veterans who had deployed to the Persian Gulf and have since left the military.

Comparison of patients in these two settings will address a sometimes contentiously debated issue in the literature on Gulf War veterans' health—namely, the degree to which studies of active-duty military personnel are representative of Gulf War veterans who are no longer on active duty (18, 19). It is possible, eg, that Gulf War veterans who became symptomatic following overseas duty were more likely to leave the military and enroll in the VA than Gulf War veterans who did not become ill. Such a selection bias may influence the results of studies performed only in a Department of Defense setting by underestimating the severity and magnitude of illness among all veterans. Conversely, studies based on VA enrollees exclusively (Gulf War veterans who have left the military) may overestimate the illness burden if VA enrollees prove to have more impaired health status. Differences between sites would indicate that clinical characteristics may be specific to each study population and may not generalize to the other.

One potentially important differentiating characteristic between Gulf War veterans at VA and Department of Defense sites is the rate of unemployment. Studies in occupational health have suggested that a positive correlation exists between employment status and health. Numerous studies support the hypothesis that employment protects and fosters health (20–22). This association has been linked to a causal beneficial effect of employment on health as well as an effect of social selection where poor health may decrease the chance of getting or keeping a job (23). Therefore, a second aim of this study was to test the hypothesis that employment status would be positively associated with measures of physical symptoms, psychiatric distress, and functional status.

## METHODS

### Subjects

Subjects were 406 consecutive care-seeking patients attending the Gulf War Primary Care clinics at either the VA Puget Sound Health Care System in Seattle, WA ( $N = 253$ ), or the Walter Reed Army Medical Center in Washington, DC ( $N = 153$ ), between March 1998 and September 1999. Sample demographic characteristics are shown in Table 1.

### Instruments

*Somatic Symptoms Checklist.* Twenty physical symptoms were measured by the Somatic Symptoms Checklist (SSC) using a modi-

**TABLE 1. Demographics of Gulf War Veterans Seeking Primary Care at VA Puget Sound Health Care System or Walter Reed Army Medical Center**

	VA ( $N = 253$ ) M (SD)	WR ( $N = 153$ ) M (SD)	<i>p</i> -Value
Age <sup>a</sup>	35.75 (8.2)	38.87 (6.9)	$p < .001$
Education level <sup>a</sup>	13.69 (1.9)	14.16 (2.2)	$p < .01$
Gender <sup>a</sup>			$p < .018$
Female	11.9%	23.5%	
Male	88.1%	76.5%	
Racial/ethnic background <sup>a</sup>			$p < .001$
White	67%	36.4%	
African American	15.4%	55%	
Other	17.6%	8.5%	
Marital status <sup>a</sup>			$p = .997$
Never married	17.4%	17.3%	
Married	66.5%	66.9%	
Divorced	16.1%	15.8%	
Military branch service <sup>a</sup>			$p < .001$
Army	52.2%	77.6%	
Navy	13.1%	6.6%	
Air Force	24.3%	7.9%	
Marines	10.4%	7.9%	
Active duty or reserves <sup>a</sup>			$p < .001$
Active duty	89.2%	58.6%	
Reserves	10.8%	41.4%	
Currently employed <sup>a</sup>			$p < .001$
Yes	71.4%	94.0%	
Combined household income <sup>a</sup>			$p < .001$
Less than \$25,000	49.2%	17.0%	
More than \$25,000	50.8%	83.0%	
Smoking status <sup>a</sup>			$p = .05$
No	66.2%	75.7%	
Combat exposure <sup>a</sup>			$p < .001$
DSTQ score	6.9 (4.6)	4.7 (3.8)	

<sup>a</sup> Values are percentages for all categorical variables; means and standard deviations, in parentheses, are provided for continuous variables.

<sup>b</sup> Values represent some unemployment in Reservist seeking care at Walter Reed.

fied version of the somatoform assessment module of the PHQ (24). Seven additional items were added to the 13 original PHQ somatoform items. These additional items asked about physical symptoms of specific concern to Gulf War veterans. The modifications involved 1) separating the joint or muscle pain item into one joint pain item and one muscle pain item; 2) separating the stomach gas or indigestion item into one stomach gas item and one indigestion item; and 3) the addition of separate items addressing cognitive, sleep, sinus, and fatigue problems. As in the unmodified PHQ, respondents rated each physical symptom that occurred during the past 30 days on a three-point intensity scale (not bothered at all, bothered a little, bothered a lot). A physical symptom severity score was calculated using a summary score of the 13 items from the PHQ somatoform scale plus the fatigue and sleep problem items from the anxiety subscale of the PHQ (PHQ-15). Total severity score on the PHQ-15 ranges from 0 (none of the 15 symptoms endorsed) to 30 (all symptoms described as bothered a lot). This symptom scale correlates highly with impaired functional status, psychiatric comorbidity, and increased health care utilization (25).

*Brief Symptom Inventory.* The BSI is a 53-item self-report scale comprised of selected items from the Hopkins Symptom Checklist-90-Revised (26). The BSI subscales include somatization, obsessive-compulsive behaviors, anxiety, hostility, interpersonal sensitivity, depression, psychoticism, phobic anxiety, paranoia, and a general distress index called the GSI. Respondents rate their level of distress (five ordinal categories ranging from none to extreme) using the past 7 days as a reference period. Scale scores are expressed as simple means (0 = none, 4 = extreme) of the component items. The BSI has been extensively used in medical and psychological research. Internal consistency (.71–.85), test–retest reliability (.68–.91), and construct, convergent, discriminant, and predictive validity have been demonstrated (26, 27).

*PTSD Checklist-Military (42).* The PTSD Checklist-Military (PCL-M) is a 17-item self-report measure of PTSD symptoms that requires respondents to rate the severity of each symptom during the past 30 days on a five-point ordinal scale. A total PCL-M score was created by summing the item ratings. Convergent validity has been demonstrated by .85 correlation with the Mississippi Scale on a sample of Vietnam veterans (28). The PCL-M has good sensitivity (.82) and specificity (.83) in correctly identifying subjects' PTSD diagnostic status when a score of 50 or more is used as a cut-point (29).

*Desert Storm Trauma Questionnaire.* The Desert Storm Trauma Questionnaire (DSTQ) is a 19-item self-report questionnaire comprised of items dealing with potential traumatic stressors experienced by Gulf War personnel (30). The total score was composed of the sum of all positively endorsed items, with a possible range of 0 to 19. Many items overlap with the well-validated combat exposure scale (31), with the addition of specific items experienced by Gulf War veterans. The additional items include extreme threat to personal safety, seeing others killed or wounded, death of a close friend, sitting with the dying, being stationed close to enemy lines, and witnessing grotesque disfigurement of bodies as a result of wounds.

*Medical Outcomes Study Short Form 36.* The SF-36 is a 36-item questionnaire that assesses functional status (or health-related quality of life) (32, 33). The SF-36 measures functional status in eight dimensions: physical functioning, social functioning, role functioning—physical, role functioning—emotional, vitality, mental health, bodily pain, and general health perception. Subscale scores vary from 0 to 100 (100 = best functioning). The MCS and PCS have been derived using factor-analytic techniques and provide 90% of the reliable variance in the eight SF-36 concepts (34). The test–retest reliability for PCS is high ( $r = .89$ ); internal consistency reliability is high ( $\alpha = .90$ ) in VA ambulatory populations (35) and ranges from .92 to .94 in other general populations (34). Construct validity has been demonstrated by factor analysis with two-dimensional factor structures, the first being a physical factor and the second a mental health factor.

## Procedure

Patients completed psychometric measures as part of the standard clinic admission procedure at each site. Patients were included in the sample only if they reported that they had served in the Persian Gulf theater of operations.

The Walter Reed Army Medical Center site is a military academic medical center and tertiary referral center providing inpatient and ambulatory care to active and retired military personnel and their immediate family members. The Gulf War Health Center at Walter Reed offers primary care and multidisciplinary medical evaluations for Gulf War veterans with related health concerns. Gulf War veterans are either active or reserve personnel who are self- or provider-referred from around the national capitol area and the greater north-

east region of the United States. The Gulf War Health Center also runs an intensive behaviorally based tertiary care treatment program for persistent unexplained physical symptoms after Gulf War service (36, 37). Data for the study were collected in the Gulf War Health Center's primary care setting.

The Seattle Division of the VA Puget Sound Health Care System has provided medical and mental health care to Gulf War veterans since 1993. With the creation of a designated outpatient clinic for Gulf War veterans, integrated and comprehensive medical and psychiatric treatment is provided for veterans who are experiencing negative health consequences as a result of deployment to the Persian Gulf. Gulf War veterans are either self-referred or referred from other primary care clinics and/or ancillary clinics.

## Statistical Analysis

Bivariate relationships were tested for statistical significance using two-tailed independent samples *t* tests for comparisons of continuous variables and chi-square tests for categorical or ordinal variables. The purpose of these analyses was to determine if there were differences between sites without adjusting for demographic variables and combat exposure. Analysis of covariance (ANCOVA) was then performed to determine whether site differences existed after controlling for the effects of demographic variables and combat exposure.

As expected, there were differences across the two sites concerning employment status: 94% of the Walter Reed sample reported being employed vs. 70% of the VA sample. To tease apart the effects of site and employment status on the dependent variables of interest (ie, physical symptoms, psychiatric symptoms, and functional status), three different series of ANCOVA models were tested.

The first series of models specified site and employment status as main effects along with the interaction term involving the two variables. These analyses addressed the question of whether the relationship between employment and dependent variables of interest differed across the two sites. This series of models is referred to as model 1 in the Results section. Analyses involving model 1 included the entire sample of veterans.

The purpose of the second series of models (model 2) was to test whether dependent variables differed across sites when the sample was restricted to employed veterans. In the model 2 series, only site was specified as a main effect and models were tested only among the employed sample ( $N = 234$ ; 117 persons at each site), thus controlling for employment status.

The purpose of the third series of ANCOVA models (model 3) was to assess associations between employment and dependent variables of interest within the VA sample only. This was necessary because of the small number of unemployed individuals at the Walter Reed site. In the third series of ANCOVA models, only employment status was specified as a main effect, and the sample was restricted to the VA site. That sample consisted of 48 unemployed and 117 employed individuals. In all three series of models, age, education level, race/ethnicity (white, black, and other), branch of military service (army vs. other), gender, smoking status (smoker vs. nonsmoker), the number of combat traumas to which the veteran was exposed, and duty status before the Gulf War (reserves vs. active duty) were all specified as covariates for each of the dependent variables of interest. These covariates were selected from demographic variables that were statistically significant between sites. An alpha of .05 was used as the criterion for statistical significance in all analyses.

Of the original 406 participants, 62 (or approximately 15%) were missing data on the MCS and the PCS. Of those 62 subjects, 39 (63%) received a version of the survey with incorrect wording on several of

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the SF-36 items; therefore, data from those 39 individuals were deleted only for analyses involving the SF-36 items. The 62 participants missing data on the MCS and PCS were compared with those who were not missing data on the following variables: age, depression scores on the BSI, number of combat trauma exposures, PCL-M scores, number and severity of somatic symptoms reported, perceived social support, and education level. Results from *t* tests indicated that there were no significant differences between the two groups. Finally, approximately 1% of the participants were missing data for the combat trauma and nonwar-zone trauma indices. Listwise deletion (inclusion of only those with complete data for each analysis) was used for all analyses because either no differences were observed between those with and those without missing data or because the amount of missing data was small (ie, approximately 1%).

### RESULTS

#### Univariate Comparisons Between Sites

Patients enrolled at the VA and Department of Defense sites differed with respect to age, gender, race, branch of the military service, duty status before the Gulf War (reserves vs. active duty), current employment status, household income, and tobacco usage. Statistical comparisons between groups on demographic variables can be found in Table 1.

Results from the somatic symptom checklist (SSC) revealed that veterans at both sites reported that, in the past 30 days, they were "bothered a lot" by feeling tired and having joint pain, problems with sleep, and concentration difficulties. The mean number of physical symptoms was significantly higher ( $t = 2.24$ ,  $df = 404$ ;  $p = .025$ ) for VA patients (6.1 symptoms,  $SD = 3.9$ ) compared with Walter Reed patients (5.2 symptoms,  $SD = 3.7$ ). Mean symptom severity score ratings derived from the PHQ-15 did not significantly differ.

Comparisons of BSI psychiatric subscales are shown in Table 2. VA care-seeking Gulf War veterans scored significantly higher on each of the subscales compared with WR patients ( $p < .005$  for all comparisons). Similarly, the GSI, a global measure of psychiatric distress, was also significantly higher ( $p < .001$ ) for VA patients compared with WR patients.

The results of SF-36 subscale site comparisons are presented in Table 3. Statistical comparisons revealed that sites differed on all subscales ( $p < .05$ ) with the exception of the social functioning scale. The MCS score, a composite measure of mental health functioning, was significantly lower at the VA site ( $p < .01$ ), suggesting poorer functioning among VA patients compared with WR patients. The PCS, a composite measure of physical functioning, was not significantly different between sites.

**TABLE 2. Prevalence of Psychiatric Complaints Among Gulf War Veterans Seeking Primary Care**

	VA	Walter Reed	<i>p</i> -Value
BSI <sup>a</sup>			
Somatization	1.23 (0.90)	1.00 (0.74)	.004
Obsessive-compulsive	1.81 (1.17)	1.28 (0.97)	.000
Interpersonal sensitivity	1.03 (1.11)	0.57 (0.83)	.000
Depression	1.29 (1.12)	0.79 (0.90)	.000
Anxiety	1.23 (1.00)	0.67 (0.76)	.000
Hostility	1.48 (1.13)	0.85 (0.90)	.000
Phobic anxiety	0.88 (1.05)	0.29 (0.52)	.000
Paranoid ideation	1.06 (1.03)	0.75 (0.97)	.003
Psychoticism	0.91 (0.94)	0.54 (0.71)	.000
GSI	1.23 (0.89)	0.78 (0.67)	.000
PCL-M score <sup>a</sup>	33.7 (16.1)	26.1 (13.0)	.000

<sup>a</sup> Values are means with standard deviations in parentheses.

**TABLE 3. SF-36 Scales<sup>a</sup> for Gulf War Veterans Seeking Primary Care**

	VA ( <i>N</i> = 211)	Walter Reed ( <i>N</i> = 153)	<i>p</i> -Value
Physical functioning	62.5 (26.7)	69.7 (25.4)	.01
Role physical	35.0 (37.9)	45.5 (41.9)	.01
Bodily pain	39.3 (22.2)	45.6 (23.7)	.01
General health	38.1 (20.4)	44.3 (21.2)	.005
Vitality	31.6 (20.3)	37.3 (22.8)	.01
Social functioning	54.3 (30.6)	52.0 (26.3)	.44
Role emotional	46.4 (44.2)	62.0 (43.2)	.001
Mental health	52.9 (22.0)	65.4 (23.1)	.000
PCS	36.7 (10.2)	38.2 (11.3)	.19
MCS	38.2 (12.7)	42.5 (11.8)	.001

<sup>a</sup> Values are mean scales scores and standard deviations are in parentheses.

#### ANCOVA: Effects for Site and Employment Status

*Physical symptoms.* As noted previously, physical symptom severity was measured using the PHQ-15. For model 1 (the interaction model), results indicated that neither the main effects for site or employment status nor the interaction term was statistically significant ( $p > .05$ ). For model 2 (the employed sample only), results indicated that, after controlling for covariates, site effects were not statistically significant. After controlling for site effects and the same covariates in model 3 (tested only with the VA sample), results indicated that employed status was significantly associated with lower PHQ-15 scores, indicating less severe symptoms ( $p = .02$ ). PHQ-15 scores were significantly higher (greater physical symptoms

severity) for the unemployed vs. the employed VA veterans (adjusted mean PHQ-15 scores were 16.28 and 13.86, respectively).

Results for the BSI Somatization subscale were similar. For model 1, the main effects (site and employment status) and their interaction were nonsignificant ( $p > .05$ ). Again, after controlling for the demographic variables and employment status in model 2, the main effect for site was nonsignificant. However, after controlling for the demographic variables in model 3, the main effect for employment status was statistically significant ( $p = .038$ ). Similar to the PHQ-15 results, somatization scores were significantly higher (greater physical symptoms severity) for the unemployed vs. the employed veterans (adjusted means were 1.51 and 1.17, respectively).

*Psychiatric symptoms.* On the BSI depression subscale, results from model 1 indicate that the main effect of site and the interaction between site and employment status were not statistically significant but that the main effect for employment status was significant ( $p < .05$ ). After controlling for covariates in model 2, site showed a trend toward significance among the sample of employed individuals ( $p = .08$ ). Similarly, although it did not meet strict significance testing criteria of  $p < .05$ , results from model 3 indicated that employment status appeared to have a significant effect ( $p = .06$ ) after controlling for site differences and covariates.

With respect to BSI anxiety subscale scores, model 1 indicated a statistically significant main effect for site, while employment status and the interaction term remained nonsignificant. The site effect remained significant when the sample was restricted to employed individuals in model 2 ( $p = .008$ ), while employment status showed a trend toward significance ( $p = .097$ ) within the VA site in model 3. According to model 2, anxiety scores were significantly higher for the VA vs. Department of Defense site (adjusted means were 1.00 and 0.67m respectively).

Model 1 indicated that there were no significant main effects nor was there a significant interaction for the Global Severity Index of the BSI, a measure of global distress. For model 2, results indicated a statistically significant main effect for site among employed individuals, while for model 3, employment status showed a trend toward statistical significance within the VA site ( $p = .08$ ). Planned comparisons for model 2 indicated that GSI scores were significantly higher for the VA vs. Department of Defense site (adjusted means were 0.98 and 0.78m respectively), indicating greater global distress.

Regarding PTSD symptoms, results from model 1 indicated that both site and employment status were

significant main effects while the interaction term was nonsignificant. Results for models 2 and 3 confirmed that site and employment status were significant main effects, respectively, after statistically controlling for covariates. Model 2 indicated that PCL-M scores were significantly higher for the VA vs. the Walter Reed sample of employed individuals (adjusted means were 29.06 and 25.07, respectively) and the unemployed vs. the employed veterans from the VA (adjusted means were 37.59 and 31.97, respectively).

*Functional status.* Concerning the PCS, which is a measure of physical functioning, model 1 results indicated that employment status showed a trend toward significance ( $p = .07$ ), although neither site nor the interaction was statistically significant. Model 2 results indicated a nonsignificant effect for site among employed individuals. Model 3 results indicated a significant effect for employment status with the VA sample. Model 3 comparisons indicated that scores were significantly lower for the unemployed vs. the employed (adjusted means were 32.48 and 38.65, respectively). Lower scores indicate worse physical functioning.

Model 1 results for MCS scores, a general measure of mental health functioning, were similar, indicating that neither main effects nor the interaction was significant. Furthermore, results for models 2 and 3 indicated nonsignificant effects for site among employed individuals and employment status in the VA site, respectively.

## DISCUSSION

This is the first study to demonstrate the presence of significant differences in symptomatology and health status among Gulf War veterans seeking primary care in a VA setting vs. those presenting for primary care in a Department of Defense setting. Gulf War veterans who remain on active duty and seek health care in the military describe themselves as healthier, less emotionally distressed, and more often employed than Gulf War veterans who left military service and are seeking care at the VA Medical Center. These findings indicate that VA and Department of Defense samples are not equivalent on a number of important demographic and clinical characteristics. Research findings based exclusively on one sample or the other may not generalize to the population of Gulf War veterans at large.

In addition to the finding on site differences, employment status among Gulf War veterans was consistently and independently predictive of health functioning. In an effort to assess employment status as a predictor of physical and mental health outcomes in

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this sample of Gulf War veterans, it was necessary to test several ANCOVA models to try to disentangle general effects associated with the two different sites and those associated specifically with employment status. As employment status and site were confounded, several tests were needed in order to support conclusions about employment status as a predictor of physical and mental health outcomes. A model (model 1) including both site and employment status as main effects and the interaction between the two was specified along with the aforementioned covariates to assess whether effects occurred differentially across the two different sites for employed vs. unemployed veterans. For all of the dependent variables of interest, none of the models supported a significant interaction between site and employment status. This finding suggests that the effects of employment are independent of site.

The next step was to compare the two sites after restricting the sample with employed veterans only (a second way of comparing sites while controlling for employment status) and controlling for covariates. Significant site differences emerged for anxiety and PTSD symptoms and global distress, where scores for the VA veterans indicated greater distress than those for the Walter Reed sample. Additionally, site effects showed a trend toward significance ( $p = .08$ ) for depression scores.

The third step was to examine the effect of employment on dependent variables in analyses restricted to the VA site, a step made necessary by the small numbers of unemployed individuals seeking care at the WR site. Results from these models indicated significant effects or a trend toward significance for employment status with respect to measures of physical symptom severity, physical functioning, global distress, and psychiatric symptoms including depression and PTSD. Employed Gulf War veterans reported less severe symptoms, less distress, and better functioning than unemployed Gulf War veterans. This finding suggests that factors related to health and employment may play a role in the health care utilization of Gulf War veterans.

Several explanations may account for the findings on site differences and the contributions of being employed, explanations that are not mutually exclusive. One explanation may be that veterans who have left the military have done so in part because poorer health has reduced their ability to function on the job. This explanation is consistent with a social selection theory in which a person's health status or other personal characteristics simultaneously place them at higher risk for both unemployment and poor health (22, 38).

A second potential explanation is that employment,

either in the military or civilian sector, helps protect against distress and enhances health-related functioning. This explanation is consistent with studies that have suggested a causal relationship where unemployment precipitates a decline in health as a result of a combination of loss of income (39), loss of self-esteem (40), and increased stress (41). In fact, in a recent study of Gulf War veterans, Ismail and colleagues found that Gulf war veterans from the United Kingdom who had left military service reported a two to three times increase in reporting ill health symptoms than veterans who remained on active duty (42).

A third explanation may be that site differences are the result of different selection factors related to patient referral criteria or referral patterns. It must be recognized that issues such as disability rating and related benefits may be an implicit or explicit aspect of every health care encounter in the VA and Department of Defense health care systems. In the VA setting, demonstrating a connection between one's health status and military service may be integral to determining eligibility for disability and benefits. In Department of Defense settings, the care of injuries incurred while on military service is unrelated to specific cause and effect determinations between service-related exposures and injury.

Some limitations of our study should be considered when interpreting these findings. Patients were drawn from a single VA site and a single Department of Defense site in two different geographical locations. Therefore, we are unable to assess whether the findings in these sites are characteristic of other VA or Department of Defense medical settings. Data were collected over a period of approximately 1 year, and therefore we are unable to assess whether confounding temporal trends may exist in the health status of veterans seeking Department of Defense vs. VA care. Although statistically significant effects were found, adjusted mean differences between groups on some of the variables were not large and were likely influenced by other factors in addition to employment. Additionally, only a small proportion of the Department of Defense patients were unemployed, nearly all of them reservists, and there were insufficient numbers of female veterans at both sites to justify strong conclusions regarding the relationship of these veteran characteristics to health status. Last, this study uses only self-report measures of physical health. Findings may differ if more objective indices of health status are used.

Despite these limitations, these results suggest important differences in the health status between Gulf War veterans seeking Department of Defense care vs. those seeking VA care and for those employed vs. unemployed. Future research should assess Depart-

ment of Defense and VA cohorts longitudinally and should specifically compare the health characteristics of women seeking care across the two health care systems.

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