

Mental and Physical Health Status and Alcohol and Drug Use Following Return From Deployment to Iraq or Afghanistan

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The mental and physical health of veterans returning from war zone deployment is of substantial concern to the public as well as military leaders and civilian policymakers.¹ Although most veterans return from deployment without suffering long-term consequences, a significant number experience serious psychological harm. Recent research on the Gulf War and Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) veterans confirmed increased risk for mental health problems, including posttraumatic stress disorder (PTSD), depression, suicidality, neuropsychological deficits, and alcohol and drug use.²⁻⁷ These disorders have implications for individual and unit readiness; physical, social, and emotional health of veterans and their families; and the Veterans Health Administration and other health care systems in which veterans obtain services.^{4,7,8} Mental health problems are also often compounded by problems with physical health.⁹ Recent conflicts resulted in over 46 000 soldiers wounded in action, some with serious and debilitating conditions, such as chronic pain, traumatic brain injury, and high risk for cardiovascular disease.¹⁰⁻¹³

The objectives of our study were to examine (1) mental and physical health symptoms and functioning, including posttraumatic stress symptoms (PTSS), and alcohol and drug use in a national sample of veterans within 1 year of returning from deployment in Afghanistan or Iraq; and (2) differences in mental and physical health and alcohol and drug use by gender, service component (Active, National Guard, other Reserve), service branch (Army, Navy, Air Force, Marines), and deployment operation (OIF or OEF). Examination of differences in mental health, alcohol use, and drug use is important for identifying those at high risk so that evidence-based interventions to prevent and treat serious disorders can be implemented

Objectives. We examined (1) mental and physical health symptoms and functioning in US veterans within 1 year of returning from deployment, and (2) differences by gender, service component (Active, National Guard, other Reserve), service branch (Army, Navy, Air Force, Marines), and deployment operation (Operation Enduring Freedom/Operation Iraqi Freedom [OEF/OIF]).

Methods. We surveyed a national sample of 596 OEF/OIF veterans, oversampling women to make up 50% of the total, and National Guard and Reserve components to each make up 25%. Weights were applied to account for stratification and nonresponse bias.

Results. Mental health functioning was significantly worse compared with the general population; 13.9% screened positive for probable posttraumatic stress disorder, 39% for probable alcohol abuse, and 3% for probable drug abuse. Men reported more alcohol and drug use than did women, but there were no gender differences in posttraumatic stress disorder or other mental health domains. OIF veterans reported more depression or functioning problems and alcohol and drug use than did OEF veterans. Army and Marine veterans reported worse mental and physical health than did Air Force or Navy veterans.

Conclusions. Continuing identification of veterans at risk for mental health and substance use problems is important for evidence-based interventions intended to increase resilience and enhance treatment. (*Am J Public Health.* 2012;102:S66-S73. doi:10.2105/AJPH.2011.300609)

when indicated. Gender, service component, branch, and deployment operation are of interest because previous research identified differences in mental health, alcohol use, and drug use as a function of these factors. Continued assessment of these issues is valuable, because as the focus and scope of military engagement changes over time, the sequelae of deployment may also change, resulting in different subgroups emerging as high risk.

Previous research suggested that women were at higher risk for mental health conditions including depression, anxiety, and PTSD after traumatic exposure, whereas men were at higher risk for substance use disorders.¹⁴⁻¹⁹ Based on these findings, we hypothesized that women would report more symptoms of depression and PTSD but less alcohol and drug use than men. Previous research found National

Guard and Reservists to be at higher risk for mental health, alcohol use, and drug use disorders than Active component personnel.²⁰⁻²³ Consequently, we hypothesized more mental health, alcohol use, and drug use problems among National Guard and Reservists than among Active component members. Several studies identified Army or Marine veterans as at higher risk for PTSD, depression, or alcohol misuse compared with Navy or Air Force veterans.^{16,22,24-27} Based on these findings, we hypothesized higher levels of PTSD, other mental health symptoms, alcohol use, and drug use among Army and Marines compared with Navy and Air Force veterans. Significantly more mental health symptoms were reported among OIF (Iraq) veterans compared with OEF (Afghanistan) veterans,^{2,4,11,28} leading us to hypothesize more mental health symptoms and

greater substance use among OIF than OEF veterans.

METHODS

We used an observational research design in which a national random sample of US OEF/OIF veterans was surveyed within 12 months of returning from deployment. Surveys were mailed in November 2008, and data collection, which included repeat mailings and reminder phone calls, was completed by the end of 2009. We allowed up to 1 year for receipt of completed surveys.

Sampling Plan

The sample was stratified by service component (50% Active, 25% National Guard, and 25% other Reserve) and gender, with oversampling of women to make up 50% of the total within each service component. Two thousand OEF/OIF veterans, meeting these stratification specifications and who returned from deployment between 3 and 12 months previously, were obtained from the Defense Manpower Data Center (DMDC). The DMDC is the Department of Defense central repository for personnel data, maintaining 230 secure and protected databases, websites, and programs.²⁹ A total of 167 individuals were determined to be ineligible because they had a military address outside the United States ($n = 102$), were redeployed ($n = 52$), or indicated that they had not been deployed in OEF/OIF ($n = 13$). Of the 1833 eligible individuals, we confirmed that 1043 received the survey materials, and we obtained completed surveys from 598, although 2 surveys were received too late to include in the data analysis. Likely reasons for not receiving the survey included high mobility of the sample, many of whom were still on active duty and might have been deployed elsewhere, moved, or changed telephone numbers. Survey respondents came from every state except Wyoming, as well as the District of Columbia, Puerto Rico, and the US Virgin Islands.

Procedure

Prenotification letters and an “opt-out” postcard were sent to all eligible service members to inform them about the study. Anyone who returned the opt-out postcard within 2

weeks was not recontacted. Two weeks after the prenotification mailing, each eligible veteran was sent a cover letter, an information sheet detailing all elements of informed consent, the survey, and a preaddressed, postage paid return envelope. A modified Dillman method was used to enhance response rates.³⁰ If completed surveys were not returned within 2 weeks, a reminder letter was sent. Up to 6 reminder telephone calls were made, followed by a repeat mailing to remaining nonrespondents. To further maximize response rates, an Internal Revenue Service (IRS) address search, available via a VA Environmental Epidemiology Service interagency agreement with the IRS, was initiated to obtain updated addresses for individuals who could not be reached by mail or phone. This procedure was approved by the institutional review board. Those who returned a completed survey received a \$30 gift card.

Measures

Established, reliable, and valid self-report instruments were used to assess mental and physical health symptoms and functioning, including PTSS, alcohol use, and drug use. Demographic characteristics including race and Hispanic ethnicity, length of deployment, service component, service branch, and deployment operation (OEF/OIF) were obtained from the DMDC. Additional demographic and descriptive information were obtained using self-reported questions used in previous VA research studies.^{31,32} Race/ethnicity was obtained for descriptive purposes and is presented in Table 1 based on self-report.

Mental and physical health, alcohol use, and drug use. Mental and physical health functioning, alcohol use, and drug use were assessed with the Veterans Rand-12 (VR-12),^{33,34} Behavior and Symptom Identification Scale (BASIS-24),³⁵ PTSD Checklist Military Version (PCL-M),³⁶ Alcohol Use Disorders Identification Test (AUDIT-C),³⁷ and Drug Abuse Screening Test (DAST).³⁸

The VR-12 is a brief version of the Veterans RAND-36, assessing 2 broad domains of mental and physical health functioning (Mental Component Score [MCS] and Physical Component Score [PCS]).^{34,39} The VR- and Short Form-12 are among the most widely used functional status measures in the world and have

been shown to be highly reliable and valid. The reliability estimate for the PCS-12 was 0.80, and for the MCS-12 was 0.76.

The PCL-M is a 17-item instrument derived from PTSD diagnostic criteria to assess PTSS severity among veterans. High test–retest and internal consistency reliability and good concurrent validity have been reported.⁴⁰ The BASIS-24 is a multidimensional mental health assessment instrument. We used 5 of the 6 BASIS-24 subscales: depression and functioning, interpersonal relationships, emotional lability, psychotic symptoms, and substance use. A sixth subscale assessing self-harm was excluded because it was deemed inappropriate for use in a mailed survey in which risk of self-harm could not be followed up locally. Reliability of the subscales ranges from 0.77 to 0.91 with good concurrent and discriminant validity.³⁵ BASIS-24 was validated in a national sample of more than 5800 recipients of mental health or substance abuse services, and was also used in other VA mental health studies.^{31,32,35}

The AUDIT-C is a brief version of the 10-item AUDIT, a self-report measure designed to identify individuals experiencing problems with alcohol. AUDIT-C identified 90% of patients with alcohol abuse or dependence and 98% of patients with heavy drinking.³⁷ The DAST-10 is a 10-item instrument designed to identify illegal drug use problems. It has high internal consistency reliability ($\alpha = 0.94$), test–retest reliability (intraclass correlation coefficient = 0.71), and has been found to discriminate between outpatients with and without drug use disorders.³⁸

Data Analysis

Sample weights. Two survey respondent weightings were applied to enhance the representativeness of the sample to the larger OEF/OIF cohort. First, we computed sampling weights for the original sample of 2000 across each of the 6 strata from which service members were sampled (all combinations of men and women with Active Component, National Guard, and other Reserve). Second, we computed weights to account for survey nonresponse. This was done by performing a logistic regression on the initial sample of 2000 with “returned survey” (0/1) as the dependent variable, and age, gender, race, and service component as independent variables to estimate a probability of returning the survey for

TABLE 1—Sample Characteristics for Health Status, Alcohol and Drug Use Following Return from Deployment to Iraq or Afghanistan: United States, 2008–2009

Variables ^a	No. (%) or Mean ± SD
Gender	
Male	253 (42.4)
Female	343 (57.6)
Age, y	
18–24	117 (19.6)
25–29	127 (21.3)
30–39	180 (30.2)
≥40	172 (28.9)
Race ^b	
White	448 (75.2)
African-American	107 (18.0)
Asian	20 (3.4)
American Indian/Alaskan native	20 (3.4)
Native Hawaiian/Pacific Islander	10 (1.7)
Hispanic	70 (11.8)
Education	
High school grad/GED/vocational school	94 (15.8)
Some college/associates degree	287 (48.2)
Bachelors degree	137 (23.0)
Post-bachelors degree	74 (12.4)
Marital status	
Single (never married)	174 (29.2)
Married/with partner	326 (54.7)
Separated	16 (2.7)
Divorced	79 (13.3)
Widowed	1 (<1)
Employment status ^b	
Working for pay	495 (83.1)
Working as volunteer	31 (5.2)
Student	84 (14.1)
Homemaker	24 (4.0)
Not working but actively looking for work	66 (11.1)
Not working and not looking	8 (1.3)
Retired	6 (1.0)
Unable to work	10 (1.7)
Time in military, y	
<1	0 (0)
1–2	32 (5.4)
3–4	91 (15.3)
5–10	187 (31.4)
>10 y	285 (47.8)
Most recent deployment operation	
OIF (Iraq)	401 (67.3)
OEF (Afghanistan)	181 (30.4)
Other	11 (1.8)

Continued

each person in the sample. The reciprocal of these probabilities were the values of the second set of weights. The final set of weights was the product of an individual's sampling weight and the nonresponse weight. These weights were used in the calculation of mental health and substance use scores.

Data analysis. We used the t test to assess differences in mental health and substance use by gender, and by deployment operation (OEF/OIF). Analysis of variance was used to assess differences by component and branch of service. All analyses incorporated sampling and nonresponse weights as previously described. In addition, for the PCL-M, AUDIT-C, and DAST-10, we used previously established cut scores to compare probable PTSD, alcohol, and drug use between gender, component, service, and deployment operation. Results based on cut scores are reported in the text but not in tables. Significance level adjustments for multiple testing were not performed, as these adjustments are not recommended for studies in which multiple hypotheses are tested.^{41–43}

RESULTS

To identify differences between survey respondents and nonrespondents, we used descriptive data obtained from the DMDC to compare demographic and deployment characteristics of the 596 survey respondents with those of the 1237 nonrespondents. Survey respondents were more likely than were nonrespondents to be women ($\chi^2 = 15.8; P < .001$), older ($t = -8.48; P < .001$), National Guard or Other Reserve ($\chi^2 = 10.7; P = .005$), and from the Air Force or Navy ($\chi^2 = 16.9; P = .001$) than from the Army or Marine Corps. There were no differences in response rate as a function of race, Hispanic ethnicity, or length of previous deployment.

Sample Characteristics

Table 1 presents demographic and deployment characteristics of the 596 survey respondents. Fifty-eight percent were female; average age was 33.9 years; and 75% were White, 18% were African American, and 12% were Latino. Reflecting the oversampling of National Guard and other Reserve personnel, 58% were from these groups. Two thirds of the

sample were deployed most recently to Iraq. The majority (87.5%) were still in the military.

Mental and Physical Health, Alcohol Use, and Drug Use

Addressing our first study objective, mean mental and physical health, alcohol use, and drug use scores are presented for the full sample in Table 1. The mean (SD) MCS score on the VR-12 was 40.56 (7.91), more than 1 SD below the general population mean of 50, whereas the mean (SD) PCS score was 49.51 (9.63), which was close to the general population mean.⁴⁴ The mean (SD) PCL-M score was 31.06 (14.00); 13.9% of the sample met the established threshold score of 50, indicating a likely diagnosis of PTSD.⁴⁵ Mean BASIS-24 subscale and overall scores ranged from 0.56 to 1.52 and were consistently worse than BASIS-24 scores obtained from a national, nonclinical community sample, but better than scores reported for both veteran and nonveteran samples receiving outpatient mental health treatment (T. Idiculla, PhD, unpublished data, 2011).^{31,32,46} Using the VA-established AUDIT-C threshold for probable alcohol use disorder (≥ 5 for both genders),¹⁹ 39.2% of the total sample screened positive for probable alcohol use disorder. Regarding drug abuse, 2.9% screened positive for drug abuse on the DAST-10.

Gender differences. Contrary to our hypothesis that women would report higher levels of depression and PTSS, there were no statistically significant gender differences on any of the mental health or PTSS measures (Table 2). However, our hypothesis regarding substance use was largely supported in that men reported higher mean AUDIT-C, DAST, and BASIS-24 substance use scores than women. Using the AUDIT-C cut score (≥ 5) indicating probable alcohol abuse, significantly more men (41.4%) than women (17.0%) screened positive ($\chi^2 = 12.3; P < .001$), although there was no significant gender difference in the proportion of respondents who screened positive for drug abuse (3% of men and 2% of women).

Deployment operation (OEF/OIF) differences. In partial support of our hypothesis, OIF veterans reported significantly more difficulty in the areas of depression or functioning, overall mental health, and alcohol or drug use than did OEF veterans, as reflected in higher mean BASIS-24 scores in these areas, as well as

TABLE 1—Continued

Service component	
Active	249 (41.8)
National Guard	170 (28.5)
Other Reserve	177 (29.7)
Branch of service	
Army	344 (57.7)
Navy	101 (16.9)
Air Force	125 (21.0)
Marines	25 (4.2)
Total no. of deployments at time of survey	
1	333 (55.7)
2	165 (27.7)
3	57 (9.6)
≥4	40 (6.7)
Length of most recent deployment, d	
≤90	110 (18.5)
91–180	82 (13.8)
181–365	274 (46.0)
>365	123 (20.6)
Current military status	
Enrolled	511 (85.7)
Discharged	73 (12.2)
Mental/physical health	
PTSS (PCL-M) ^c	31.06 ± 14.00
MCS (VR-12 mental health) ^d	40.56 ± 7.91
PCS (VR-12 physical health) ^d	49.51 ± 9.63
Depression/functioning (BASIS-24) ^e	0.95 ± 0.80
Interpersonal relations (BASIS-24) ^e	1.17 ± 0.78
Emotional lability (BASIS-24) ^e	1.52 ± 0.97
Psychotic symptoms (BASIS-24) ^e	0.56 ± 9.81
Overall score (BASIS-24) ^e	1.03 ± 0.68
Alcohol/drug use	
Substance abuse (BASIS-24) ^e	0.45 ± 0.69
Alcohol Use (AUDIT-C) ^f	3.92 ± 2.84
Drug Use (DAST) ^g	0.41 ± 0.81

Note. AUDIT-C = Alcohol Use Disorders Identification Test; BASIS-24 = Behavior and Symptom Identification Scale; DAST = Drug Abuse Screening Test; GED = General Equivalency Diploma; MCS = Mental Component Score; OEF/OIF = Operation Enduring Freedom/Operation Iraqi Freedom; PCL-M = PTSD Checklist Military Version; PCS = Physical Component Score; PTSD = posttraumatic stress disorder; PTSS = posttraumatic stress symptoms; VR-12 = Veterans Rand-12. The sample size was n = 596.

^aMissing values for each variable ranges between 0 and 12.

^bPercentage exceeds 100% because multiple categories may be endorsed.

^cPCL-M scores range from 1 to 68; higher scores indicate greater symptom severity.

^dMCS and PCS mean (SD) = 50 (10). Their ranges are unbounded. Higher scores indicate better mental health.

^eBASIS-24 scores range from 0 to 4; higher scores indicate greater symptom or problem severity or frequency.

^fAUDIT-C scores range from 0 to 12; higher scores indicate greater risk of alcohol abuse.

^gDAST-10 scores range from 0 to 10; higher scores indicate greater risk of drug abuse.

higher mean levels of alcohol use on the AUDIT-C and more positive screens for drug use (4% OIF vs < 1% OEF; $\chi^2_1 = 5.29$; $P = .02$; Table 3).

Component differences. The hypothesis regarding poorer mental health and increased substance use among National Guard/Reservists versus Active Component was not supported. There were no significant differences among the components on any of the measures using mean scores or cut points for PTSD, alcohol use, or drug use (data not shown).

Service branch differences. Supporting hypotheses regarding service branch differences, results indicated statistically significant differences on all of the measures (Table 4). Post hoc t tests indicated that Army and Marine veterans differed most from Air Force veterans, with statistically significant differences on 8 of the 11 measures. Army and Marine veterans indicated significantly poorer mental health functioning, including more PTSS, depression, and anxiety symptoms, higher alcohol and drug use, and more problematic relationships than did Air Force veterans. Army veterans indicated significantly higher emotional lability and psychotic symptoms than did Air Force veterans. Twenty-five percent of Marines and 15% of Army respondents screened positive for probable PTSD compared with 9.5% of Air Force and 5.9% of Navy veterans. Forty-seven percent of Army respondents and 45% of Marines screened positive for alcohol use compared with 26% of both Air Force and Navy respondents ($\chi^2_3 = 24.91$; $P < .001$); 7.4% of Marines and 3.4% of Army respondents screened positive for drug use compared with < 1% of Air Force or Navy respondents ($\chi^2_3 = 10.99$; $P < .001$).

DISCUSSION

This article extended previously published work in a number of ways. First, we obtained a broader sample than many previous studies, reporting results on a national stratified, random sample of Active and National Guard/Reserve military personnel from all branches of service who were not necessarily enrolled in Department of Veterans Affairs (VA) health care. Second, to allow for comparisons by gender we oversampled women to make up 50% of the sample. Third, rather than using

brief screening tools, we included detailed, well-researched measures reflecting a wide range of mental health symptom and functioning domains, including PTSS, alcohol and drug use, and physical health functioning. Fourth, we applied 2 sets of weights to the data analysis, one to reflect the actual composition of the OEF/OIF force during the sampling interval, and another to account for nonresponse bias. Application of these weights provided more accurate estimates of mental health functioning and substance use problems, thus increasing generalizability of results.

We found that OEF/OIF veterans indicated significantly worse mental health functioning than did the general population based on multiple measures. Alcohol use was also potentially problematic, with 39% screening positive for “probable alcohol abuse,” considerably higher than that reported by Hawkins et al.,¹⁹ based on mandated screening of VA outpatients. This discrepancy might suggest that the context of the VA clinical setting could lead veterans to underreport their drinking in routine screening, resulting in underestimates of the severity of the problem. By contrast, physical health functioning assessed by the VR-12 was comparable to the US general population mean.⁴⁴ The relatively good physical health of our sample might be partly attributed to their youth and fitness compared with the general population.

Despite widespread publicity and concern about increasing rates of PTSD among OEF/OIF veterans, probable PTSD for this sample (13.9%) was within the range reported by other researchers and lower than rates reported in some studies.^{2,4,28} A number of factors were identified as influencing reported rates of PTSD, including methodological factors (strictness of the definition, amount of time since return from deployment, sampling strategy, and response rates), as well as substantive factors (combat and other traumatic exposure).^{21,47,48} Differences in PTSS or PTSD and other mental health problems as a function of postdeployment assessment time interval might be especially important to monitor as there was conflicting evidence regarding the impact of time on these conditions.²¹ Kulka et al.⁴⁹ reported that depression, anxiety, and other mental health concerns subsided over time, whereas other researchers reported that PTSD sometimes had

TABLE 2—Gender Differences in Mental and Physical Health Status, Alcohol and Drug Use: United States, 2008–2009

Variables	Men (n=253), Mean (SD)	Women (n=343), Mean (SD)	t	P
Mental/physical health				
PTSS (PCL-M) ^a	31.17 (14.04)	29.97 (13.54)	1.04	≤.297
Depression/functioning (BASIS-24) ^b	0.95 (0.80)	0.95 (0.85)	0.01	≤.989
Interpersonal relations (BASIS-24) ^b	1.18 (0.78)	1.11 (0.79)	1.08	≤.282
Emotional lability (BASIS-24) ^b	1.51 (0.97)	1.60 (1.00)	-1.09	≤.275
Psychotic symptoms (BASIS-24) ^b	0.57 (0.82)	0.45 (0.69)	1.89	≤.06
BASIS-24 overall score ^b	1.03 (0.68)	1.00 (0.69)	0.55	≤.582
MCS (VR-12 mental health) ^c	40.55 (7.78)	40.67 (9.11)	-0.16	≤.87
PCS (VR-12 physical health) ^c	49.50 (9.64)	49.57 (9.55)	-0.08	≤.937
Alcohol/drug use				
Alcohol Use (AUDIT-C) ^d	4.06 (2.86)	2.54 (2.27)	6.99	≤.001
Substance abuse (BASIS-24) ^b	0.47 (0.70)	0.24 (0.42)	4.74	≤.001
Drug Use (DAST) ^e	0.42 (0.82)	0.30 (0.63)	2.01	≤.045

Note. AUDIT-C = Alcohol Use Disorders Identification Test; BASIS-24 = Behavior and Symptom Identification Scale; DAST = Drug Abuse Screening Test; MCS = Mental Component Score; PCL-M = PTSD Checklist Military Version; PCS = Physical Component Score; PTSD = posttraumatic stress disorder; PTSS = posttraumatic stress symptoms; VR-12 = Veterans Rand-12.

^aPCL-M scores range from 1 to 68; higher scores indicate greater symptom severity.

^bBASIS-24 Scores range from 0–4; higher scores indicate greater symptom or problem severity or frequency.

^cMCS and PCS mean (SD) = 50 (10). Their ranges are unbounded. Higher scores indicate better mental health.

^dAUDIT-C scores range from 0–12; higher scores indicate greater risk of alcohol abuse.

^eDAST-10 scores range from 0–10; higher scores indicate greater risk of drug abuse.

TABLE 3—Differences in Mental and Physical Health Status, Alcohol and Drug Use by Deployment Operation: United States, 2008–2009

	Iraq (OIF; n=401), Mean (SD)	Afghanistan (OEF; n=181), Mean (SD)	t	P
Mental/physical health				
PTSS (PTSD checklist)	31.69 (14.28)	30.54 (13.70)	0.89	≤.371
Depression/functioning (BASIS-24) ^a	1.01 (0.84)	0.82 (0.74)	2.72	≤.007
Interpersonal relations (BASIS-24) ^a	1.21 (0.80)	1.07 (0.74)	1.93	≤.054
Emotional lability (BASIS-24) ^a	1.57 (1.00)	1.42 (0.96)	1.68	≤.093
Psychotic symptoms (BASIS-24) ^a	0.54 (0.76)	0.60 (0.93)	-0.70	≤.484
BASIS-24 overall score ^a	1.07 (0.69)	0.93 (0.67)	2.37	≤.018
MCS (VR-12 mental health) ^b	40.69 (8.05)	40.24 (7.82)	0.63	≤.529
PCS (VR-12 physical health) ^b	49.40 (9.74)	49.76 (9.63)	-0.41	≤.683
Alcohol/drug use				
Alcohol use (AUDIT-C) ^c	4.17 (3.07)	3.51 (2.21)	2.97	≤.003
Substance abuse (BASIS-24) ^a	0.53 (0.74)	0.30 (0.53)	4.25	≤.001
Drug Use (DAST) ^d	0.42 (0.88)	0.35 (0.63)	1.07	≤.286

Note. AUDIT-C = Alcohol Use Disorders Identification Test; BASIS-24 = Behavior and Symptom Identification Scale; DAST = Drug Abuse Screening Test; MCS = Mental Component Score; OEF/OIF = Operation Enduring Freedom/Operation Iraqi Freedom; PCS = Physical Component Score; PTSD = posttraumatic stress disorder; PTSS = posttraumatic stress symptoms; VR-12 = Veterans Rand-12.

^aBASIS-24 scores range from 0–4; higher scores indicate greater symptom or problem severity or frequency.

^bMCS and PCS mean (SD) = 50 (10). Their ranges are unbounded. Higher scores indicate better mental health.

^cAUDIT-C scores range from 0–12; higher scores indicate greater risk of alcohol abuse.

^dDAST-10 scores range from 0–10; higher scores indicate greater risk of drug abuse.

a delayed onset, resulting in higher rates over time.^{21,50,51}

Tests of our hypotheses regarding subgroup differences on mental health, PTSS, alcohol, and drug use yielded mixed results. Higher rates of alcohol use in men, and worse mental health, PTSS, alcohol, and drug use among Army and Marine Corps veterans were observed, suggesting that these veteran subgroups were at higher risk for mental health problems. Although we were not aware of any significant differences in eligibility criteria for enlistment or commissioning in the different service branches that would lead to systematic predeployment differences among service personnel, demographic and cultural differences among the service branches as well as different stressors might contribute to their increased risk.

Contrary to our hypothesis, we found no gender differences in mental or physical health symptoms or functioning. It was important to note, however, that women experienced less intense combat than men.⁵² Consequently, this finding did not preclude the possibility that women would be more vulnerable to combat stress when exposed at the same levels as men. To address this possibility more directly, another study based on this dataset examined whether associations between combat-related stressors and postdeployment mental health differed for women and men, and found no clinically significant differences.⁵² The lack of significant gender differences might reflect improved training of female service members and the increased numbers of women currently in the military—15% now compared with less than 3% during World War II—as well as the fact that women’s occupational roles in the military might be more similar to men’s roles than in the past. The higher proportion of women in today’s military might also provide social and emotional support that might increase their resilience.

Also contrary to our hypotheses, National Guard/Reserve Component veterans did not differ from Active component veterans with respect to mental or physical health functioning or substance use. The lack of differences between components might be because of changing expectations regarding deployment. As these wars continue, National Guard and other Reserve personnel are more likely to expect to be deployed. Consequently, they might be more psychologically and

TABLE 4—Service Branch Differences in Mental and Physical Health Status, Alcohol and Drug Use: United States, 2008–2009

	Army (n = 343), Mean (SD)	Air Force (n = 125), Mean (SD)	Marines (n = 27), Mean (SD)	Navy (n = 101), Mean (SD)	F	P
Mental/physical health						
PTSS (PTSD checklist) ^a	33.79 (14.76)	26.53 (12.67)	32.62 (14.48)	27.31 (10.01)	11.14	≤.001
Depression/functioning (BASIS-24) ^{a,b}	0.99 (0.80)	0.71 (0.63)	1.18 (0.97)	0.93 (0.78)	6.26	≤.001
Interpersonal relations (BASIS-24) ^{a,b}	1.22 (0.77)	0.90 (0.69)	1.41 (0.85)	1.16 (0.72)	8.47	≤.001
Emotional lability (BASIS-24) ^{b,c}	1.71 (1.05)	1.31 (0.91)	1.32 (0.67)	1.40 (0.95)	7.65	≤.001
Psychotic symptoms (BASIS-24) ^{b,c}	0.66 (0.87)	0.37 (0.67)	0.48 (0.62)	0.57 (0.86)	3.86	≤.009
BASIS-24 overall score ^{a,b}	1.10 (0.68)	0.80 (0.59)	1.16 (0.71)	0.98 (0.65)	7.45	≤.001
MCS (VR-12 mental health) ^{a,d}	40.44 (8.04)	42.60 (7.83)	39.53 (6.99)	39.35 (7.92)	4.03	≤.007
PCS (VR-12 physical health) ^{d,e}	48.31 (9.89)	49.78 (10.07)	51.36 (9.33)	51.02 (7.98)	3.46	≤.016
Alcohol/drug use						
Alcohol use (AUDIT-C) ^{a,f}	4.48 (3.13)	2.96 (2.02)	3.93 (2.63)	3.44 (2.59)	9.76	≤.001
Substance abuse (BASIS-24) ^{a,b}	0.59 (0.79)	0.21 (0.35)	0.54 (0.74)	0.27 (0.44)	12.50	≤.001
Drug use (DAST) ^{a,g}	0.44 (0.83)	0.18 (0.45)	0.78 (1.18)	0.28 (0.47)	10.80	≤.001

Note. AUDIT-C = Alcohol Use Disorders Identification Test; BASIS-24 = Behavior and Symptom Identification Scale; DAST = Drug Abuse Screening Test; MCS = Mental Component Score; PTSD = posttraumatic stress disorder; PTSS = posttraumatic stress symptoms; VR-12 = Veterans Rand-12.

^aSignificant difference between Army and Marine and Air Force veterans.

^bBASIS-24 Scores range from 0–4; higher scores indicate greater symptom or problem severity or frequency.

^cSignificant difference between Army and Air Force veterans.

^dMCS and PCS mean (SD) = 50 (10). Their ranges are unbounded. Higher scores indicate better mental health.

^eSignificant difference between Marine and Navy and Army veterans.

^fAUDIT-C scores range from 0–12; higher scores indicate greater risk of alcohol abuse.

^gDAST-10 scores range from 0–10; higher scores indicate greater risk of drug abuse.

emotionally prepared and less vulnerable to deployment-related stresses. Similarly, the shift of combat operations from Iraq to Afghanistan might alter the balance between these 2 operations in terms of associated risks.

This study had a number of limitations. First, because of the retrospective design of the study, we could not infer that the physical and mental health status of respondents reflected the impact of deployment. It was possible that predeployment variations might account for the postdeployment differences. Second, we used only self-reported measures of mental health and substance use, which might be subject to bias. To minimize potential bias, we implemented the survey at least 3 months after participants had returned from deployment, and we conducted the survey independently of the Department of Defense or the participant's military unit. Thus, concerns about stigma regarding reporting mental health problems and potential evaluation regarding fitness for duty were minimized. Third, our response rate of 57% was based on the number of potential participants that we confirmed received the survey, but was 33% of the eligible participants, slightly lower than the 36% participation rate reported for the Millennium Cohort

Study.²⁵ Although we weighted the data to address nonresponse, the weighting procedure assumed that the data were missing at random.⁵³ It was possible that nonresponse might have depended on unobserved information. For example, if military personnel with poor mental health were less likely to return the survey, then our results would only apply to a somewhat healthier segment of the population.

From clinical, public health and policy perspectives, the results of this study suggest a number of implications. First, continued multidimensional assessment of postdeployed veterans is valuable because previously identified findings may change as contextual factors, such as increasing numbers of women and the locus of combat, shift. Second, the context and timing of assessment (e.g., within one's unit, immediately after returning from deployment) have been shown to affect results. Consequently, we should strive to implement assessments in as neutral a context as possible to minimize (1) potential response bias because of concern about discrimination associated with admitting mental health or substance use problems, and (2) failure to report problems to avoid further mental health evaluation that would delay return to home. Third, continuing

identification of those at highest risk for mental health and substance use problems, including examination of individual and deployment characteristics (e.g., race/ethnicity, education, income, combat exposure) is important for development and implementation of evidence-based interventions to increase resilience, as well as to enhance treatment when indicated. ■

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S. V. Eisen had overall responsibility and provided supervision for this study. S. V. Eisen, A. R. Elwy, M-L. Drainoni, J. Martin, and D. Vogt contributed to obtaining funding. S. V. Eisen, A. R. Elwy, D. Vogt, M. E. Glickman, M-L. Drainoni, and J. Martin contributed to the study concept, design, and acquisition of the data. S. V. Eisen, M. E. Glickman, and M. R. Schultz contributed to the statistical analysis. S. V. Eisen, M. R. Schultz, and P. E. Osei-Bonsu contributed to drafting the article. All authors contributed to the interpretation of data and to critical revision of the article for intellectual content.

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Note. The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs or any of the institutional affiliations listed.

Human Participant Protection

This study was approved by the institutional review board of the Edith Nourse Rogers Memorial Veterans Hospital.

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