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## Gender Differences in Mental Health Diagnoses Among Iraq and Afghanistan Veterans Enrolled in Veterans Affairs Health Care

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**Abstract:** We examined gender differences in sociodemographic, military service, and mental health characteristics among Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans. We evaluated associations between these sociodemographic and service characteristics and depression and posttraumatic stress disorder (PTSD) diagnoses. In a retrospective, cross-sectional study, we used univariate descriptive statistics and log binominal regression analyses of Department of Veterans Affairs (VA) administrative data on 329049 OEF and OIF veterans seeking VA health care from April 1, 2002, through March 31, 2008. Female veterans were younger and more likely to be Black and to receive depression diagnoses than were male veterans, who were more frequently diagnosed with PTSD and alcohol use disorders. Older age was associated with a higher prevalence of PTSD and depression diagnoses among women but not among men. Consideration of gender differences among OEF and OIF veterans seeking health care at the VA will facilitate more targeted prevention and treatment services for these newly returning veterans.

### Full text: Headnote

**Objectives.** We examined gender differences in sociodemographic, military service, and mental health characteristics among Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans. We evaluated associations between these sociodemographic and service characteristics and depression and posttraumatic stress disorder (PTSD) diagnoses.

**Methods.** In a retrospective, cross-sectional study, we used univariate descriptive statistics and log binominal regression analyses of Department of Veterans Affairs (VA) administrative data on 329049 OEF and OIF veterans seeking VA health care from April 1, 2002, through March 31, 2008.

**Results.** Female veterans were younger and more likely to be Black and to receive depression diagnoses than were male veterans, who were more frequently diagnosed with PTSD and alcohol use disorders. Older age was associated with a higher prevalence of PTSD and depression diagnoses among women but not among men.

**Conclusions.** Consideration of gender differences among OEF and OIF veterans seeking health care at the VA will facilitate more targeted prevention and treatment services for these newly returning veterans. (Am J Public Health. 2010;100:2450-2456. doi:10.2105/AJPH.2009.166165)

The number of women in the US military has significantly increased in the past decade, 15% of active duty and 17% of National Guard and Reserve personnel are women.<sup>1</sup> Women also compose 12.65% of the total number of US military personnel who have served in Operation Enduring Freedom (OEF; principally in Afghanistan) and Operation Iraqi Freedom (OIF; principally in Iraq; Melnyk L, Defense Press Officer, Office of the Assistant Secretary of Defense for Public Affairs, The Pentagon, written communication, February 3, 2009). The number of female US veterans has doubled over the past 20 years.<sup>1</sup>

Although ample research has examined female veterans who served in Vietnam, the first Gulf War, and female veterans of multiple eras seeking Department of Veterans Affairs (VA) health care,<sup>2-8</sup> relatively little has been published on female OEF and OIF veterans. Although a growing literature focuses on the rapidly increasing prevalence and incidence of mental health disorders among OEF and OIF veterans,<sup>9,10</sup> we know relatively little about gender differences among this new generation of veterans, especially among veterans seeking VA health care.

One organizing theory that can help frame gender differences postulates that women and men vary in their expression of mental health symptoms, with women more often receiving internalizing diagnoses, such as depression, and men receiving more externalizing diagnoses, such as alcohol and substance use disorders.<sup>11,12</sup> However, many of the studies on which these theories are based use population prevalence rates; consequently, the types of stressors to which individuals are exposed are not held constant. The current conflicts offer a unique opportunity to examine diagnostic differences among women and men exposed to war. Although the particular types of stressors to which individuals were exposed during their deployments may vary, the wars in Afghanistan and Iraq provide an opportunity to examine whether gender differences exist in how men and women respond to potentially traumatic stressors.

The few OEF and OIF studies that have examined gender differences in mental health outcomes have produced mixed results.<sup>13-18</sup> A longitudinal study of OEF and OIF service members found that in the postdeployment period, new-onset posttraumatic stress disorder (PTSD) symptoms were proportionately higher among women.<sup>14</sup> Similarly, another large study of OEF and OIF veterans found that women were more likely than were men to screen positive for PTSD and depression.<sup>15</sup> A third study of OEF and OIF veterans found that female OIF personnel were more likely than were their male counterparts to report depression; however, no gender difference was observed in the prevalence of PTSD.<sup>16</sup> Two additional studies found no difference in PTSD symptoms between female and male personnel deployed to Iraq.<sup>17,18</sup> One notable gap in the literature concerns rates of mental health disorders among OEF and OIF female veterans who seek VA health care after deployment.

Few studies have examined associations between demographic and military service characteristics and adverse mental health outcomes among newly returning veterans. In a longitudinal study of OEF and OIF service members, new-onset PTSD was higher among those who were younger, never married or divorced, Black (non-Hispanic), enlisted, Reserve or National Guard members, or Army personnel.<sup>14</sup> In another study of OEF and OIF military personnel, being separated or divorced (vs married) and being junior enlisted (vs officer status) were significantly associated with PTSD and depressive symptoms.<sup>16</sup> A study of veterans seeking VA health care found that being younger was associated with mental health and PTSD diagnoses; young men were at greater risk than were younger women.<sup>10</sup>

The rapid growth of the female military and veteran populations has led to interest at the Department of Defense and VA in identifying prevalent mental health diagnoses among female veterans, as well as associated demographic and military service characteristics, to appropriately evaluate, triage, and care for this new generation of returning female veterans. Among OEF and OIF veterans seeking VA health care nationwide, we identified (1) gender-specific demographic and military service characteristics, (2) gender-specific mental health diagnoses, and (3) independent correlates of PTSD and depression among female and male OEF and OIF veterans. Previous research findings led us to hypothesize that depression would be more prevalent among women, that alcohol and substance use disorders would be more prevalent among men, and that there would be little to no difference by gender in rates of PTSD. We also hypothesized that being younger, separated or divorced, and junior enlisted would be significantly associated with PTSD and depressive symptoms because of greater vulnerability and increased combat exposure.

## METHODS

We conducted a retrospective, cross-sectional analysis of information from existing VA databases. We identified our study sample from the VA OEF/OIF Roster, a database of veterans who have separated from OEF/OIF military service, which was originally created from the Defense Manpower Data Center contingency tracking system deployment file. The roster contains records for OEF and OIF veterans (beginning October 1, 2001) who served within the OEF and OIF combat zones or areas of operation or were identified as directly supporting the OEF and OIF mission outside the defined combat zone and who subsequently enrolled in VA health care. We linked the OEF and OIF Roster database, which contains OEF and OIF veterans' demographic and military

service information, to the VA National Patient Care Database, which provides information about the dates of VA visits and associated diagnostic codes from the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9- CM).<sup>19</sup> These data are derived from electronic medical records generated during VA clinical visits.

#### Study Population

To qualify for study participation, OEF and OIF veterans must have visited a VA facility at least once between April 1, 2002, and March 31, 2008. Because we focused on mental health diagnoses specifically associated with OEF and OIF military service, we included only OEF and OIF veterans who were first-time users of VA services after the start of OEF or OIF. We also excluded veterans who had enrolled in VA health care but were subsequently killed in action. Our final study population comprised 329049 OEF and OIF veterans.

Women made up 12.4% (n=40701) of the sample. Veterans' average age was 31.2 years (SD=9.01). The majority of veterans were White (67.3%); 16.2% were Black, and 10.8% were Hispanic. Just over half were veterans of active duty (52.9%; others served in the National Guard or Reserve) and were veterans of Army service (56.2%) who had been enlisted personnel (92.8%) rather than officers. The majority of veterans (67.9%) had completed 1 OEF or OIF deployment rather than multiple deployments.

#### Variables

Demographic and military service characteristics. We extracted demographic information (age, gender, race/ethnicity, and marital status) and military service information, such as component type (active duty vs National Guard or Reserve), branch of service, rank (officer vs enlisted), and number of deployments (1vs >1) from veterans' records. We collected demographic information from administrative databases rather than verifying the data through self-reports.

Mental health diagnoses. We extracted mental health diagnoses from medical health records. The diagnoses were given by trained professionals who evaluated patients during VA clinical visits and based their diagnoses on criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.<sup>20</sup> We were not able to verify diagnoses through standard diagnostic instruments.

We defined mental health diagnoses as ICD- 9-CM codes 296.20 to 307.59; the specific diagnoses used were for PTSD (309.81), depression (296.20-296.25, 296.30-296.35, 300.4, and 311), anxiety (300.00-300.09, 300.20-300.29, and 300.3), adjustment disorders (309.0-309.9, excluding 309.81), alcohol use disorders (305.00-305.03 and 303), substance use disorders (305.20- 305.93 and 304), and eating disorders (307.1, 307.50-307.51, and 307.59).

#### Statistical Analyses

We used the t test for age and the c2 test for all other variables to compare the demographic and military service characteristics of women and men in the sample. Next, we determined and then compared the cumulative prevalence of specified mental health diagnoses among women and men, again through c2 analyses. We also categorized veterans by whether they had 1, 2, or 3 or more mental health diagnoses and determined whether the number of diagnoses differed by gender. Finally, we examined the independent associations of demographic and military service characteristics with PTSD and depression diagnoses with log binominal regression models that incorporated all interactions between gender and other demographic and military variables. Because we had multiple significant interaction terms, we ran each log binomial regression separately for men and women to better elucidate the magnitude and direction of the gender differences.

We conducted all analyses with SAS version 9.1 (SAS Institute, Cary, NC) and Stata version 11 (StataCorp LP, College Station, TX). Because of our very large sample size, we chose a threshold P value of less than .001 to indicate statistically significant differences between women and men. We also used this threshold P value to indicate significant interaction terms in the log binomial regression models. In addition, we used effect sizes to help determine whether statistically significant differences were also clinically significant when interpreting and discussing our findings. We used the Cohen h when examining effect sizes of proportional data and the Cohen

d for means, reporting small (0.1-0.3), medium (0.4-0.7), or large ([double dagger]0.8) effect sizes.<sup>21</sup> We used a cutoff of 0.1 for clinical significance and did not interpret effect sizes that were less than 0.1 as significant.

## RESULTS

Among OEF and OIF veterans who were new users of VA health care, women were more likely than were men to be young (<30 years; Cohen  $d=0.23$ ), Black (Cohen  $h=0.39$ ), single (not married; Cohen  $h=0.33$ ), and veterans of the Air Force (Cohen  $h=0.17$ ). Women were also more likely than were men to have been deployed to Iraq or Afghanistan only once (Cohen  $h=0.11$ ). Although other variables may have been statistically significant (Table 1), we only note results with effect sizes of at least 0.1.

We found 3 clinically significant diagnostic differences with small effect sizes. Female veterans received depression diagnoses more frequently than did men (Cohen  $h=0.15$ ), and male veterans received diagnoses of PTSD (Cohen  $h=0.13$ ) and alcohol use disorder (Cohen  $h=0.23$ ) more frequently than did women (Table 2). We also observed a statistically but not clinically significant difference in diagnoses of anxiety and eating disorders: female OEF and OIF veterans received both diagnoses more frequently than did their male counterparts.

### Independent Correlates of Posttraumatic Stress Disorder Diagnoses

The log binomial regression for PTSD diagnoses for both men and women revealed significant gender interactions with the following variables: age, marital status, component type, branch, and rank, all at  $P$  values of less than .001. Consequently, we stratified the log binomial regression models for PTSD diagnoses by gender (Table 3).

Significant correlates of receiving PTSD diagnoses among both female and male OEF and OIF veterans were being divorced, separated, or widowed (vs being married); being a veteran of Army service (vs Navy or Air Force service); participating in active-duty service (vs National Guard or Reserve service); having been enlisted (vs an officer); and having served multiple deployments (vs 1 deployment). Among women, PTSD diagnoses were significantly associated with being older than 30 years. Women who were older than 30 years were also at significantly greater risk for PTSD diagnoses than were their male counterparts, for whom older age seemed to be a protective factor.

We observed several other statistically significant gender differences, in magnitude but not direction of effect, for receiving PTSD diagnoses. Women were more likely than were men to receive a PTSD diagnosis if they had never been married (for women, relative risk [RR]=0.97; for men, RR=0.82;  $P<.001$ ), in the Reserve or National Guard (for women, RR=0.90; for men, RR=0.74;  $P<.001$ ), in the Navy (for women, RR=0.45; for men, RR=0.33;  $P<.001$ ) or Air Force (for women, RR=0.45; for men, RR=0.26;  $P<.001$ ), or an officer (for women, RR=0.69; for men, RR=0.51;  $P<.001$ ).

### Independent Correlates of Depression Diagnoses

The log binomial regression for depression diagnoses for both men and women revealed significant gender interactions with the following variables: age, marital status, branch, and rank, all at  $P$  values of less than .001. Consequently, we stratified the log binomial regression models for depression diagnoses by gender (Table 4). Female and male veterans who were White; were divorced, separated, or widowed; had served in the Army; had been active-duty personnel; or had been enlisted personnel were significantly more likely to receive depression diagnoses. Among women, being older than 30 years was independently associated with receiving depression diagnoses. Women who were older than 40 years also had significantly greater risk than men for receiving depression diagnoses.

We found several other statistically significant gender differences, in magnitude but not direction of effect. Women were at higher risk than were men of receiving a depression diagnosis if they had never been married (for women, RR=1.02; for men, RR=0.90;  $P<.001$ ), in the Navy (for women, RR=0.79; for men, RR=0.65;  $P<.001$ ) or Air Force (for women, RR=0.75; for men, RR=0.55;  $P<.001$ ), or an officer (for women, RR=0.68; for men, RR=0.53;  $P<.001$ ).

## DISCUSSION

Our findings add to the literature by elucidating characteristics of OEF and OIF veterans seeking VA health care, gender differences in diagnoses, and gender-stratified correlates of PTSD and depression diagnoses. In an era in which a greater proportion of women have served in the US military in a much wider variety of military occupational specialties than ever before, our results contribute to a better understanding of the characteristics of women seeking VA health care as well as how these characteristics may differentially be associated with mental health outcomes.

We found that OEF and OIF female veterans seeking VA health care were more frequently young, Black, and not married than were male veterans seeking VA health care. These findings mirror gender differences in military populations: women in the US military are typically younger, and a disproportionately large number of military women (30%) belong to a racial/ethnic minority group.<sup>1</sup> However, women have been underrepresented in many previous studies. Studies that examined prevalence rates of mental health disorders among OEF and OIF veterans included very small numbers of women or did not examine gender differences.<sup>9,22</sup> For example, an initial report by Hoge et al. indicated that 15.6% to 17.1% of returning OIF combat veterans and 11.2% of returning OEF combat veterans met screening criteria for at least 1 mental health disorder, but this study included very few women (1%-2%), and it is unclear how many of these women were racial/ethnic minorities.<sup>9</sup> Such demographic differences also have significant implications for mental health services because young women may have multiple competing priorities, such as employment, school, and sole responsibility for caring for family members or children, all of which present specific barriers to accessing and engaging in mental health treatment. Studies of barriers to care among OEF and OIF military personnel also have included few women, with low numbers of racial/ethnic minority women.<sup>9</sup> Our findings emphasize the need to include young and racially/ethnically diverse women in all studies of OEF and OIF veterans.

We found that depression diagnoses were more frequent among female OEF and OIF veterans and that PTSD and alcohol use disorder diagnoses were more frequent among male OEF and OIF veterans who sought VA health care. The finding that depression was more frequently diagnosed among women and that alcohol use disorders were more frequently diagnosed among men were consistent with internalizing-externalizing theories of mental health diagnoses and with previous studies of OEF and OIF veterans.<sup>11-13,15,16,23</sup> Although we hypothesized that gender differences would not arise in PTSD, we found slightly higher rates of PTSD diagnoses among men. This finding differs from those of previous studies.<sup>14,15</sup> The higher diagnosis rates may be attributable to level of combat exposure because the men in our study were more likely than were the women to have had multiple deployments. It may be that as women's combat exposure increases, the PTSD gender gap will narrow.

Although anxiety and eating disorder diagnoses were statistically more common among female than they were among male OEF and OIF veterans who sought VA health care, effect sizes were below recommended levels and consequently not deemed clinically significant; however, these differences should continue to be explored. Also, disordered eating, traversing the spectrum from anorexia and bulimia to binge eating, is not routinely assessed in most health care systems, including the VA. Consequently, eating disorders may be underreported and undertreated and may result in serious and sometimes life-threatening complications or in chronic disease, which may differentially affect women. Evaluation of potentially undiagnosed conditions could result in earlier intervention and arguably less impairment over the life course.

The most pronounced gender difference we found in correlates of PTSD and depression diagnoses among our sample of OEF and OIF veterans in the VA health care system was related to age. Among all female veterans, older women were at greater risk than were younger women for receiving diagnoses of both PTSD and depression. Although being younger was protective against PTSD diagnosis for women, the reverse was true for men; younger men were at higher risk than older men for PTSD diagnosis. One possibility is that women who are older may have more established family and community lives and may have a more difficult time deploying and then reintegrating after returning from war.

Several gender differences in demographic and military service characteristics reached statistical significance; these differences were in magnitude but not direction of effect. More research is needed to determine whether these findings are clinically significant.

We also observed several similarities between women and men. The finding that veterans who were divorced, separated, or widowed were at greatest risk for receiving PTSD diagnoses is consistent with previous research,<sup>16</sup> and being married may be associated with greater social support. Indeed, the degree of social support upon homecoming has been found to be an important predictor of mental health outcome and may explain these findings.<sup>24</sup> Also, being married may signify an ability to form close relationships and engage in self-disclosure, which may also be protective.

Female and male veterans with proxies of higher combat exposure were more likely to receive PTSD diagnoses. Military variables such as Army service, active duty, lower rank, and multiple deployments may be proxies for greater exposure to potentially traumatic events, all of which place individuals at greater risk for developing PTSD. Lower rank and enlisted status may also be proxies for lower educational attainment, which has been shown to be an independent risk factor for PTSD.

The finding that active-duty veterans were at greater risk than National Guard or Reserve veterans for developing PTSD is noteworthy because previous research had found the opposite to be true.<sup>25</sup> There is also evidence that level of combat is a strong predictor of mental health problems,<sup>17</sup> and it could be that active-duty veterans seeking VA health care have higher levels of combat exposure than do their National Guard and Reserve counterparts.

For depression diagnoses, we also found that being Black served as a protective factor for both women and men. Black women and men were less likely than their White counterparts to receive depression diagnoses. Evidence suggests that ethnic minorities return home to more supportive communities and that their welcome may differ as they reengage in these communities. Previous research suggests that racial/ethnic minorities have stronger social support networks than do Whites and that strong networks may serve as a protective factor against certain mental health diagnosis, such as depression.<sup>26</sup> These findings highlight the importance of determining level of social support in relationships, among families, and in veterans' communities and of focusing on improving community reintegration for recently returned veterans.

#### Limitations

Our sample was taken from a population of veterans who visited a VA health care facility at least once from 2002-2008; therefore, our results should not be generalized to all OEF and OIF military personnel or veterans. We selected a population of veterans who served in support of OEF or OIF or both, and therefore, these results should not be generalized to veterans of other eras. For example, a strength of the current VA system is that all veterans are systematically screened for mental health disorders, yet this screening may also result in detection bias when compared with veterans of other eras who served before the establishment of universal VA mental health screening.

We abstracted ICD-9-CM code diagnoses from administrative health records and did not verify the diagnoses with standardized diagnostic measures. In a previous study, however, we found that the majority of veterans received mental health diagnoses on 2 or more occasions and that among veterans who first received a mental health diagnosis in a non-mental health setting, 92% received the same diagnosis in a follow-up mental health visit.<sup>10</sup> Finally, important unmeasured variables may account for some of the gender differences we observed. For example, we used number of deployments to index exposure, and we did not have detailed information on levels of exposure within deployments.

#### Conclusions

We found several significant gender differences in demographics and military service characteristics, mental health diagnoses, and independent correlates of PTSD and depression diagnoses among veterans who returned from Iraq or Afghanistan and sought care in the VA health care system. Female veterans were likelier



than were male veterans to be young, Black, and diagnosed with depression. Men were more frequently diagnosed with PTSD and alcohol use disorder than were women. Older age was associated with a higher prevalence of PTSD and depression diagnoses among women than it was among men, in whom younger age portended greater risk.

Gender differences are important to consider as the VA and Department of Defense continue to expand and strengthen programs to evaluate and provide health care for a new generation of returning veterans.

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#### **Contributors**

S. Maguen, C.R. Marmar, and K. H. Seal originated and designed the study. S. Maguen obtained funding for the study. L. Ren acquired the data. S. Maguen and L. Ren analyzed the data, and all authors interpreted them. S. Maguen, J. O. Bosch, and K. H. Seal drafted the article, and all authors helped to edit it.

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Human Participant Protection

The study was approved by the committee on human research, University of California, San Francisco, and the San Francisco VA Medical Center.

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