Burden of Medical Illness in Women With Depression and Posttraumatic Stress Disorder

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**Background:** Depression and posttraumatic stress disorder (PTSD) are important women's health issues. Depression is known to be associated with poor physical health; however, associations between physical health and PTSD, a common comorbidity of depression, have received less attention.

**Objectives:** To examine number of medical symptoms and physical health status in women with PTSD across age strata and benchmark them against those of women with depression alone or with neither depression nor PTSD.

**Methods:** A random sample of Veterans Health Administration enrollees received a mailed survey in 1999-2000 (response rate, 63%). The 30,865 women respondents were categorized according to whether a health care provider had ever told them that they had PTSD, depression (without PTSD), or neither. Outcomes were self-reported medical conditions and physical health status measured with the Veterans SF-36 instrument, a version of the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) modified for use in veteran populations.

**Results:** Across age strata, women with PTSD (n=4348) had more medical conditions and worse physical health status (physical functioning, role limitations due to physical problems, bodily pain, and energy/vitality scales from the Veterans SF-36) than women with depression alone (n=7580) or neither (n=18,937). In age-adjusted analyses, the Physical Component Summary score was on average 3.4 points lower in women with depression alone and 6.3 points lower in women with PTSD than in women with neither (P<.001).

**Conclusions:** Posttraumatic stress disorder is associated with a greater burden of medical illness than is seen with depression alone. The presence of PTSD may account for an important component of the excess medical morbidity and functional status limitations seen in women with depression.

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Like depression,19 PTSD is particularly salient to the field of women's health. Women are more likely than men to develop severe and persistent PTSD symptoms following trauma exposure.19,20 However, the association between PTSD and physical illness in women is poorly understood.21

We used data from a large, nationally representative survey of women veterans receiving Veterans Health Administration (VHA) care to examine how the presence of diagnosed depression or PTSD relate to physical health and functional status. We hypothesized that patients with PTSD (most of whom also have depression) would have an added physical health burden, over and above that seen in patients with depression alone. Posttraumatic stress disorder is a high-frequency event in this population for whom common exposures include combat-related trauma, military sexual trauma, domestic violence, and childhood abuse.25-30

RECENT RESEARCH DOCUMENTS THAT DEPRESSION ADVERSELY IMPACTS PHYSICAL HEALTH AND FUNCTIONAL STATUS.1,2 An important subgroup of patients with depression are those with comorbid posttraumatic stress disorder (PTSD), a clinically distinct entity affecting about 12% of primary care patients.7 In the primary care arena, there has been less scrutiny of the health implications of PTSD than of depression, although the terrorism events of September 11, 2001, and recent media accounts about domestic violence, military sexual trauma, and childhood sexual abuse have brought trauma into sharper focus. Avoidance behavior and interpersonal difficulties are hallmarks of PTSD, characteristics that potentially challenge patients as they attempt to navigate the health care system. This poses a problem if they also have comorbid medical conditions, as prior studies suggest they often do.7,10,17

DECEASED.
Smaller-scale studies have pointed to associations between PTSD and health.\textsuperscript{7,10-17} However, the few studies that focus on women\textsuperscript{14,31,32} or that include national samples\textsuperscript{10,11,31} have been limited to samples of veterans of specific war eras, and none has simultaneously examined medical conditions and physical health status in patients with both depression and PTSD.

Therefore, we sought to answer the following 2 questions: (1) How common are serious, nonpsychiatric medical conditions among women with a reported history of diagnosed depression alone or with PTSD? (2) Do women with a reported history of diagnosed PTSD in various age strata have more medical conditions and worse physical health status when benchmarked against those with diagnosed depression alone and those with no diagnosis or PTSD?

**METHODS**

The 1999 Health Survey of Veterans\textsuperscript{33} was designed to assess the functional status of a nationally representative sample of veterans enrolled in VHA care. From responders to this cross-sectional survey, we identified women with a self-reported lifetime history of being diagnosed with PTSD, depression, or neither. In age-stratified analyses, we examined self-reported medical conditions and physical health status (measured using the Veterans SF-36 instrument, a version of the Medical Outcomes Study 36-Item Short-Form Health Survey [SF-36] modified for use in veteran populations) in these 3 groups. (SF-36 is a registered trademark of the Medical Outcomes Trust, Boston, Mass.) This secondary data analysis was approved by the human studies committee at the Edith Nourse Rogers Memorial Veterans Hospital, Bedford, Mass.

**PATIENTS AND MEASURES**

From a sampling frame of over 3.4 million veterans enrolled in the VHA system in March 1999, 1.3 million were randomly selected to receive the 1999 Health Survey of Veterans questionnaire. Among those living and with valid addresses, 887,775 (63\%) responded.\textsuperscript{33}

Women made up 4% of the sample (n = 34,737). In the present study, women were excluded if data were missing for mental illness history (n = 27,974) or age (n = 16). Those with a self-reported history of schizophrenia (n = 1062) were also excluded because the effect of schizophrenia was expected to dominate the effect of other mental health conditions. A total of 30,865 women remained; they compose the analytic sample for this investigation.

Data collection took place between July 1999 and January 2000 using a modified Dillman approach.\textsuperscript{34} This included 4 carefully spaced mailings over a 12-week period: (1) a pre-notification letter; (2) a cover letter and self-administered questionnaire; (3) a reminder postcard; and (4) a second questionnaire to nonrespondents.

For these analyses, demographic characteristics included age, race (black, white, other), education (highest grade completed), marital status (married, divorced, separated, widowed, never married), living arrangement (alone or with others), and employment status (employed for wages, self-employed, unemployed, homemaker, student, retired).

Health status was determined using the Veterans SF-36 instrument. The SF-36, which is the basis for the Veterans SF-36 and has been used in diverse patient populations, has well-established validity and reliability.\textsuperscript{15,40} Among the 8 domains of health that the SF-36 examines, 4 relate specifically to physical health: physical functioning, role limitations due to physical problems, bodily pain, and energy/vitality. Each scale is scored from 0 to 100, where 100 denotes the best health. The Physical Component Summary (PCS) is a weighted summary of physical health status that uses weights derived from a national probability sample of the US population (weighted to a US population mean of 50 and standard deviation of 10).\textsuperscript{41}

Mental health conditions and medical conditions were assessed by asking each subject.

Has a doctor ever told you that you have any of the following: depression? post-traumatic stress disorder? arthritis? chronic low back pain? hypertension or high blood pressure? chronic lung disease (emphysema, asthma, chronic bronchitis or chronic obstructive lung disease)? diabetes or high blood sugar? anemia or coronary heart disease? heart attack or myocardial infarction? cancer (not including skin cancer unless it was melanoma)? congestive heart failure, also called weak heart or fluid on the lungs? stroke? and spinal cord injury with quadriplegia or paraplegia?

A positive response to any condition on this checklist indicated the presence of the condition. Women with obesity were identified based on a body mass index of 30 or higher from self-reported height and weight (body mass index is calculated as weight in kilograms divided by the square of height in meters). No diagnostic measures were used to verify patients’ self-report of depression or PTSD history.

**ANALYSES**

Among eligible women who responded to the 1999 Health Survey of Veterans,\textsuperscript{33} we identified 3 mutually exclusive analytic groups: PTSD (if the respondents reported that a “doctor ever told [them] that [they] had PTSD”), depression (if they reported that a “doctor ever told [them] that [they] had depression” but not PTSD), or neither. Note that the PTSD group includes women with comorbid depression because PTSD in this population is typically associated with depression. In contrast, we excluded cases of self-reported PTSD from the depression group in an effort to elucidate the effect of PTSD over and above that of depression.

We first compared the demographic characteristics of women with PTSD with those with depression and those with neither. In descriptive analyses, we identified the frequency of each specific medical condition among women with PTSD, depression or neither.

Since medical illness tends to increase with age, subsequent analyses examined specific age strata (<45, 45-64, ≥65 years). These strata were chosen to reflect war eras (ie, post-Vietnam era, Vietnam era, and pre-Vietnam era, respectively). In all analyses, we benchmarked findings for women with PTSD against those of women with depression (who in prior research have been documented to have increased rates of medical illness) because we wanted to determine whether patients with PTSD (typically comorbid with depression) had even more medical conditions and poorer functional status than those with depression alone. We also benchmarked the findings against those for women with neither depression nor PTSD. Therefore, within each age stratum, we compared mean number of medical conditions and mean Veterans SF-36 physical health component scores (physical functioning, role limitations due to physical problems, bodily pain, and energy/vitality) among women with PTSD, with depression, or with neither. We also performed a multivariable regression on PCS score as a function of age stratum, presence of depression, and presence of PTSD.

Because most women with PTSD also had depression, we defined PTSD as a reported history of PTSD with or without a
A research has been seen to have a mean (SD) PCS score than the general population of women, which in prior of women veterans had a heavier burden of physical illness. The relationship between PTSD and PCS score was thus more pronounced than the effect of advancing age (women aged 45-64 years had only a 3.4-point drop in PCS scores, whereas women with a reported history of PTSD was as much as 38 points lower (in the case of role limitations due to physical problems) than for patients with neither depression nor PTSD.

Using the PCS scores of the Veterans SF-36 as a summary measure of physical health status, we again found a reported history of PTSD to be associated with poor scores. The average PCS score of a woman younger than 45 years in our sample who had neither depression nor PTSD was 43.5. With this as the reference group in a multivariable regression, Table 3 shows the effect of various states on PCS scores. For example, compared with this reference group, women with a reported history of depression had, on average, a 3.4-point lower PCS score, whereas women with a reported history of PTSD (with or without depression) had a 6.3-point lower PCS score. The relationship between PTSD and PCS score was thus more pronounced than the effect of advancing age (women aged 45-64 years had only a 3.4-point drop in PCS scores compared with women aged <45 years). The combined effect of being 65 years or older and having a reported

**Table 1. Demographic Characteristics of Women With Diagnosed Posttraumatic Stress Disorder (PTSD), Depression, or Neither**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PTSD (n = 4348)</th>
<th>Depression (n = 7580)</th>
<th>Neither (n = 18,937)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD) age, y</td>
<td>45.7 (12.1)†</td>
<td>50.2 (15.3)†</td>
<td>53.2 (17.8)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>75.6</td>
<td>78.8†</td>
<td>75.3</td>
</tr>
<tr>
<td>Black</td>
<td>18.1‡</td>
<td>16.7†</td>
<td>19.8</td>
</tr>
<tr>
<td>High school graduate</td>
<td>98.8‡</td>
<td>97.7†</td>
<td>97.0</td>
</tr>
<tr>
<td>Married</td>
<td>32.8‡</td>
<td>36.6†</td>
<td>40.1</td>
</tr>
<tr>
<td>Live alone</td>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>Currently employed</td>
<td>37.2†</td>
<td>42.2†</td>
<td>47.9</td>
</tr>
</tbody>
</table>

*Unless otherwise indicated, data are percentage of patients. For all P value calculations, the Neither group serves as the comparison.
†P<.001.
‡P<.05.

Table 2. Percentage of Women With Posttraumatic Stress Disorder (PTSD), Depression, or Neither Who Report Having Been Told by a Physician That They Had Various Medical Conditions*

<table>
<thead>
<tr>
<th>Medical Condition</th>
<th>PTSD (n = 4348)</th>
<th>Depression (n = 7580)</th>
<th>Neither (n = 18,937)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis</td>
<td>60.6</td>
<td>57.8</td>
<td>47.9</td>
</tr>
<tr>
<td>Chronic low back pain</td>
<td>59.0</td>
<td>49.5</td>
<td>33.4</td>
</tr>
<tr>
<td>Obesity</td>
<td>34.5</td>
<td>34.2</td>
<td>26.4</td>
</tr>
<tr>
<td>Hypertension</td>
<td>33.9</td>
<td>38.2</td>
<td>36.1</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>32.0</td>
<td>26.4</td>
<td>17.5</td>
</tr>
<tr>
<td>Diabetes</td>
<td>12.4</td>
<td>13.6</td>
<td>10.7</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>11.9</td>
<td>13.3</td>
<td>10.7</td>
</tr>
<tr>
<td>Cancer</td>
<td>10.2</td>
<td>10.6</td>
<td>10.1</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>6.9</td>
<td>7.9</td>
<td>6.1</td>
</tr>
<tr>
<td>Stroke</td>
<td>6.3</td>
<td>6.8</td>
<td>4.6</td>
</tr>
<tr>
<td>Spinal cord injury</td>
<td>2.2</td>
<td>1.4</td>
<td>0.9</td>
</tr>
</tbody>
</table>

*Statistical significance is not tested in this descriptive table; percentages are raw frequencies not adjusted for age.

Despite their relatively young mean age, nearly 90% of women with a reported history of PTSD indicated that they had at least 1 serious medical condition. Arthritis, chronic low back pain, obesity, hypertension, and chronic lung disease were the most common conditions in the PTSD group (Table 2).

Among women younger than 45 years, 17% had a reported history of PTSD, and 25% had a reported history of depression; among women aged 45 to 64 years, 17% had PTSD, and 28% had depression; among women 65 years or older, 4% had PTSD, and 20% had depression. Across age strata, women with a reported history of PTSD had more medical conditions than did women with a reported history of depression, who in turn had more than those with neither (Figure 1). Consistent with this finding, physical function was worst in women with a reported history of PTSD (vs those with depression or neither) in every age stratum, and across every physical subscale of the Veterans SF-36 (physical functioning, role limitations due to physical problems, bodily pain, and energy/vitality) (Figure 2). The subscale score for patients with a reported history of PTSD was as much as 38 points lower (in the case of role limitations due to physical problems) than for patients with neither depression nor PTSD.

The 30,865 women in our analytic sample were divided into 3 groups based on whether they reported that a health care provider had ever told them that they had depression or PTSD: 4348 (14%) had PTSD (of whom 89% had depression); 7580 (25%) had depression (without PTSD); and 18,937 (61%) had neither. Compared with women with neither, women with a reported history of PTSD were younger and more likely to be unmarried and unemplyed (Table 1). For our full sample, the mean (SD) PCS score was 38.6 (12.9). Thus, on average, our sample of women veterans had a heavier burden of physical illness than the general population of women, which in prior research has been seen to have a mean (SD) PCS score of 49.1 (19.4).
In subsidiary analyses, we repeated the PCS regression analysis separating isolated PTSD from PTSD with comorbid depression. We found that a reported history of depression alone was associated with a 3.4-point decrease in PCS score (P < .001); PTSD alone was associated with a 4.0-point decrease in PCS score (P = .01); and PTSD with comorbid depression was associated with a 6.6-point decrease in PCS score (P < .001).

**COMMENT**

In the large national sample of women veterans in the present study who used VHA care, the presence of a self-reported lifetime history of having been diagnosed with PTSD (typically comorbid with depression) was associated with an excess burden of medical illness even more pronounced than that seen with diagnosed depression alone. Medical conditions were more prevalent in women with a reported history of PTSD than in women who reported depression or neither depression nor PTSD, and physical health status was lower in women with a reported history of PTSD, across every age group.

Nearly all women in the PTSD group reported having at least 1 of the serious chronic medical conditions examined. Arthritis, chronic low back pain, obesity, hypertension, and chronic lung disease were particularly prevalent. Prior studies have consistently found an association between PTSD and increased numbers of self-reported medical conditions.10-14,31 Chronic pain (back pain, arthritis) was particularly common in a series of 185 women and men with PTSD in private sector New England primary care practices.12 Among a national study of male Vietnam veterans, the 322 subjects who had a lifetime history of PTSD were more likely than those without PTSD to have nervous system disease, infectious diseases, musculoskeletal disease, circulatory disorders, endocrine-nutritional-metabolic disease, respiratory disease, and digestive disease.10 In the present study, the leading 2 causes of mortality in women, coronary artery disease and cancer,42 each affected more than 10% of women with a reported history of PTSD, despite the women’s relatively young average age. Since we found that women with a reported history of PTSD were more likely to be younger, unmarried, and unemployed than other groups, their limited social support and economic

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**Table 3. Regression Analysis: Estimated Physical Component Score (PCS) Adjusted for the Effect of Age, Depression, and Posttraumatic Stress Disorder (PTSD)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Estimated Coefficient (SE) for PCS Score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept†</td>
<td>43.5 (0.13)</td>
</tr>
<tr>
<td>Age 45-64 y</td>
<td>−3.4 (0.17)</td>
</tr>
<tr>
<td>Age ≥65 y</td>
<td>−8.2 (0.18)</td>
</tr>
<tr>
<td>Depression‡</td>
<td>−3.4 (0.17)</td>
</tr>
<tr>
<td>PTSD§</td>
<td>−6.3 (0.21)</td>
</tr>
</tbody>
</table>

*P < .001 for each coefficient.
†The intercept represents the estimated mean PCS score for a woman younger than 45 years with neither depression nor PTSD.
‡Patients with diagnosed depression (and not PTSD).
§Patients with diagnosed PTSD (with or without depression).
resources could compromise their ability to address these health needs.

The present study had the advantage of examining not only medical conditions but also function. Marked decrements in physical health status (measured with the PCS and physical subscales of the Veterans SF-36) were seen among women with a reported history of PTSD when benchmarked against those with isolated depression or with neither mental health condition. Three factors serve to indicate that this is a robust finding: (1) the large magnitude of the effect; (2) the consistency of the gradient from neither mental health condition to isolated depression to PTSD for every domain of physical function and in every age range; and (3) the presence of a parallel gradient by number of medical conditions. The fact that subsidiary analyses demonstrated that the effect of PTSD alone was more pronounced than that of depression alone further reinforces this conclusion.

The association between depression and medical illness has received a great deal of attention in recent years.\(^1\) Our findings suggest that the medical needs of patients with PTSD (who typically, as in our study, present with comorbid depression\(^4\)) may be even more pronounced than those of patients with isolated depression. Indeed, the presence of PTSD may account for an important component of the excess medical morbidity and functional status limitations observed in prior studies of women with depression. While our study was not designed to determine the mechanisms for such an association, direct tissue injury, high-risk behaviors (such as smoking or substance use), and chronic neuroendocrine dysregulation can all be seen following trauma.\(^15\)

In our study, the presence of a reported history of PTSD was associated with, on average, a 6.3-point decrement in PCS score. A decrement of this magnitude is clinically important: for example, in the general veteran population, diabetes has been associated with a 3.1-point decrease in PCS score, angina with a 2.5-point decrease, and osteoarthritis with a 4.8-point decrease.\(^33\) Indeed, poor self-reported health status is an independent risk factor for increased mortality.\(^45,46\) A 10-point decrease in PCS score has been associated with a 1.4-fold increase in odds of death following coronary artery bypass grafting.\(^45\) The 6.3-point decrease in PCS scores for patients with a reported history of PTSD can be compared with a 3.4-point gradient between women younger than 45 years and those aged 45 to 64 years in our study. Thus, with respect to overall physical health functioning, the effect of having a reported history of PTSD is more substantial than the effect of aging by an average of 16 years.

The largest differences between women with a reported history of PTSD and those with no mental health condition were seen for the Role Limitations Physical subscale of the Veterans SF-36, especially for younger women. Specifically, the average woman with a reported history of PTSD who was younger than 65 years had a 38-point decrement in physical role functioning scores compared with those with no mental illness. To put this difference into perspective, the Medical Outcomes Study reported differences in physical role functioning scores in patients with various chronic conditions vs those without: 28 points for congestive heart failure, 13 points for chronic lung disea,
is unknown. However, PTSD affects over 10% of US women; as in our population, interpersonal violence is a common precipitant. Given the high rates of domestic violence and sexual assault in the United States, and the continued threats of war and terrorism, this problem is unlikely to abate in the near future.

In conclusion, our findings have 4 major implications. First, we have identified strong associations between physical and mental illness. To fully address such interactions, integrative systems of care designed to coordinate medical and mental health services may prove to be particularly applicable for women with depression and comorbid PTSD.

Second, our findings serve to facilitate needs assessment: systems of care designed for women with depression and comorbid PTSD should emphasize services for prevalent conditions like chronic pain syndromes, obesity, hypertension, and chronic lung disease. Even the youngest cohort of women in our study had substantial medical morbidity, which suggests that their health care needs merit special attention. The high prevalence of preventable conditions like obesity, chronic lung disease, and coronary artery disease in women with a reported history of PTSD raises the possibility that lifestyle modifications might reduce risk of excess morbidity and mortality from these causes. However, since the precipitants of adverse health behaviors may be distinct in patients with PTSD (eg, smoking to relieve anxiety), preventive health interventions may need to be tailored accordingly.

Third, the burden of depression with comorbid PTSD on physical health appears to be even more pronounced than that of depression alone. Thus, the recommendation for brief depression screens administered in the primary care setting may apply to PTSD as well, perhaps targeting patients with identified depression.

Finally, when projecting budgets and allocating staff, health care systems and funding agencies should anticipate the potential need to apply more resources to the care of women with depression who have comorbid PTSD, given their increased burden of medical illness.

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The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

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