Although combat-related posttraumatic stress disorder (PTSD) has been documented for military combatants, little is known about PTSD in noncombatants. Active-duty U.S. Air Force noncombatants ($N = 5,367$) completed a Post-Deployment Health Assessment upon return from combat zones in Iraq ($n = 4,408$) or a noncombat zone in Qatar ($n = 959$). Those deployed to Iraq were significantly more likely to report exposure to someone who was wounded or killed (20.8% vs. 6.3%), feeling in great danger of being killed at some point during deployment (18.9% vs. 3.5%), symptoms of PTSD (4.1% vs. 0.7%), and symptoms of major depression (9.9% vs. 5.4%). These findings suggest that deployment to a war zone is associated with increased mental health problems, even for noncombatants.

The wars in Iraq and Afghanistan are the largest U.S. military conflicts since Vietnam and have included the deployment of almost 2 million military personnel (Tanielian & Jaycox, 2008), many of whom have been exposed to potentially traumatic combat-related events. Posttraumatic stress disorder (PTSD) is one of the risks of this exposure. Reported rates of PTSD and PTSD symptoms in this population vary considerably from a low of 5% (Hoge, Auchterlonie, & Milliken, 2006; Smith et al., 2008) to highs of 30–45% (Helmer et al., 2007; Lapierre, Schweger, & LaBauve, 2007) depending on the assessment approach used, the population evaluated, and the time frame of the evaluation.

Anonymity is one factor believed to influence how service members report PTSD symptoms. It is thought that active-duty military might underreport symptoms on nonanonymous assessments, which have been used for the majority of published studies (Hoge et al., 2006; Hotopf et al. 2006; Lapierre et al., 2007; Martin, 2007; Milliken, Auchterlonie, & Hoge, 2007; Smith et al., 2008; Vasterling et al., 2006), out of concern that a positive endorsement of mental health symptoms might negatively impact their military career. Service members taking anonymous surveys (Hoge et al., 2004; Schneiderman, Braver, & Kang, 2008; Tanielian & Jaycox, 2008) may be more likely to report their symptoms honestly, producing more accurate estimates of PTSD prevalence. This was one conclusion in a letter-to-the-editor report that evaluated the rate of PTSD symptoms in a sample of military personnel who completed anonymous and nonanonymous measures (McLay et al., 2008). The anonymous assessments showed higher rates of PTSD symptoms, both in terms of broad criteria (7.8% vs.

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**Documented Combat-Related Mental Health Problems in Military Noncombatants**

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The wars in Iraq and Afghanistan are the largest U.S. military conflicts since Vietnam and have included the deployment of almost 2 million military personnel (Tanielian & Jaycox, 2008), many of whom have been exposed to potentially traumatic combat-related events. Posttraumatic stress disorder (PTSD) is one of the risks of this exposure. Reported rates of PTSD and PTSD symptoms in this population vary considerably from a low of 5% (Hoge, Auchterlonie, & Milliken, 2006; Smith et al., 2008) to highs of 30–45% (Helmer et al., 2007; Lapierre, Schweger, & LaBauve, 2007) depending on the assessment approach used, the population evaluated, and the time frame of the evaluation.

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Upon return from deployment, and the Post-Deployment Health Assessment, completed 3 to 6 months later (Martin, 2007; Milliken et al., 2007).

One of the most important factors related to PTSD is exposure to combat-related traumatic events during a military deployment. Dohrenwend et al. (2006) studied a population of Vietnam veterans and found that 28.1% with very high combat exposure had current PTSD as compared to 27.0% with high exposure, 14.4% with moderate exposure, and 0.1% for low exposure. Smith et al. (2008) studied a sample of U.S. military personnel and separated them into groups with and without PTSD symptoms before deployment to Iraq, Afghanistan, or neighboring countries. For the group with no prior PTSD symptoms, 7.6% of those who reported combat exposures during deployment screened positive for PTSD on the PCL-M as compared to 1.4% who did not see combat during deployment. For those with PTSD symptoms before deployment, 43.5% of those who reported combat exposure during their deployment screened positive for PTSD as compared to 26.2% without combat exposures.

Most studies have included combatants or a combination of combatants and noncombatants within the same sample. Three studies directly compared the rate of PTSD symptoms in combatants versus noncombatants. Hotopf et al. (2006) studied a sample of military personnel from the United Kingdom and found that those who had served in combat roles were twice as likely (6% vs. 3%) to endorse symptoms of PTSD. In contrast, Smith et al. (2008) studied a sample of U.S. military personnel with no PTSD symptoms before deployment. After deployment, combat specialists actually reported fewer PTSD symptoms (2.4%) than healthcare specialists (2.9%), service supply and functional specialists (3.1%), and other occupations (2.7%). Martin (2007) found that 10.5% of U.S. military combatants reported PTSD symptoms as compared to 13.9% of healthcare specialists and 9.9% of other noncombatant occupations.

Approximately 37% of U.S. military personnel who have deployed to Iraq and Afghanistan have served in noncombat occupations (Martin, 2007). The primary difference in the roles of combatants and noncombatants during these deployments is that combatants are tasked, if necessary, to engage in direct combat with the enemy, and they are more likely to serve outside the perimeter of a protected forward operating base. Nevertheless, noncombatant military support personnel are often exposed to potentially traumatic combat-related events, including mortar and rocket attacks, improvised explosive-device explosions, transporting and treating severely wounded personnel, and processing human remains. Several studies have documented PTSD risk in civilian or noncombatant military personnel involved with the handling of human remains or mortuary duty (e.g., Peterson, Nicolas, McGraw, Englert, & Blackman, 2002; Sutker, Uddo, Brailey, Allain, & Errera, 1994; Taylor & Frazer, 1982).

The defined distinction between combatants and noncombatants is important because historically, many diagnostic, compensation, and disability guidelines have been based largely on this...
definition. For many decades, the U.S. Veterans Benefits Administration disability system made it significantly more difficult for noncombatants to qualify for service-connected PTSD disability. The system required documentation that an individual engaged in combat with the enemy or received a combat award (e.g., combat infantry badge) to qualify for combat-related PTSD disability. For combatants who met the diagnostic criteria for PTSD, the veteran’s lay statement alone was sufficient to establish the occurrence of the stressor; no additional corroboration was required. In contrast, for those who had served as noncombatants, the disability claims process required additional credible supporting evidence that the claimed in-service stressor occurred, or a service connection would not be granted. Demonstration of service in a general “combat area” or “combat zone” was considered insufficient documentation of combat exposure.

Similar criteria for proof of combat exposure were used in a study by Frueh et al. (2005) of Vietnam veterans. Archival records were reviewed for 100 Vietnam veterans seen consecutively in a Veterans Affairs PTSD clinic. Combat exposure was documented by obtaining objective historical data that included verification of Vietnam war-zone service, combat medals, combat badges, and a combat military occupational specialty in the personnel record. Results indicated that, although 93% had documentation of service in the Vietnam war-zone, only 41% had objective evidence of actual combat exposure (i.e., objective historical data) in their military record. These results led the authors to question the validity of the diagnosis of PTSD in some treatment-seeking veterans. A primary limitation of this study is that not all potentially traumatic events that occur in a war zone are captured in military personnel records or after-action reports.

Dohrenwend et al. (2006, 2007) used a different approach to crosscheck combat exposure reports in the records of 260 Vietnam veterans diagnosed with PTSD. These studies used data from military personnel files extracted by the National Vietnam Veterans Readjustment Study combined with data obtained from military archival sources and historical accounts. Investigators developed a record-based military historical measure that included the military occupational specialty, the monthly killed-in-action rate during their Vietnam service, and the killed-in-action rate for the unit. Results revealed a strong dose-response relationship between level of combat exposure and PTSD symptoms. Less than 1% of the low war-zone exposure group had PTSD compared to 28% of the veterans in the very high exposure category. However, these studies did not differentiate military service members with combatant versus noncombatant military occupational specialties.

The purpose of the present study was to test whether deployment location was associated with reports of combat trauma exposure, depression, PTSD, and other mental health outcomes in a population comprised entirely of noncombatants. One group of noncombatants was deployed to a combat-zone location in Iraq, the other to a relatively safe noncombat location in Qatar. Deployment to most locations in Iraq at that time involved some risk of combat trauma exposure—even for noncombatants. In contrast, Qatar was considered relatively safe, and many deployed service members went there for middeployment rest and recuperation. It was hypothesized that a higher proportion of military noncombatants deployed to Iraq would report exposure to potentially traumatic events and mental health symptoms as compared to noncombatants deployed to Qatar.

METHOD

Participants

Participants were active-duty U.S. Air Force members who had deployed to Iraq or Qatar and completed a Post-Deployment Health Assessment (DoD, 2006) between June 1, 2005, and December 31, 2007. No Air National Guard or Air Force Reserve personnel were included. Participants who had previously deployed to either location were excluded. The average deployment length for participants in both groups was 4 months.

Compared to the Army and Marines, very few Air Force members are officially designated as combatants. In general, most Air Force combatants are pilots and weapons systems officers (fighter navigators) who deliver military ordinances (bombs, missiles, rockets, etc.) to military targets in combat zones. Because this study targeted PTSD in noncombatants, anyone with a combat-related Air Force Specialty Code was excluded from the analyses. Air Force Specialty Codes are alphanumeric codes used to identify Air Force occupational specialties. It is similar to the Military Occupational Specialty used by the Army and Marines. The following enlisted Air Force Specialty Codes were excluded: Aerial Gunner (1A7X1); Combat Control (1C2X1); Survival, Evasion, Resistance, and Escape (SERO) Operations (1T0X1); Pararescue (1T2X1); Special Investigations (7S0X1); Security Forces (3P0X1); and Explosive Ordnance Disposal (3E6X1). The following Officer Air Force Specialty Codes were excluded: Pilot (11XX), Fighter Navigator (12FX0), Security Forces (12FX), and Special Investigations (71SX). The remaining sample constituted a census of all Air Force deployed during the specified period. The general occupational roles performed by the participants were similar at each location and included the four largest Air Force occupations: Maintenance & Logistics, Support, Operations, and Medical (see Table 1).

Participants deployed to Iraq were stationed at 1 of more than 20 different locations. Specific data on the number of participants deployed to each location in Iraq and the number of combat events that occurred (e.g., mortar attacks at a specific location) were not available for security reasons. However, noncombatant service members deployed to Iraq were at risk for exposure to a variety of potentially traumatic events, such as exposure to severely wounded patients, small-arms fire, and explosions. A proxy measure of potentially traumatic events is the number of combat deaths and wounded-in-action that were reported to occur at the study locations. During the time of the assessment, there were 1,837 combat deaths.
Table 1. Characteristics of Noncombatants by Deployment Location

<table>
<thead>
<tr>
<th>Variable</th>
<th>Iraq (n = 4,408)</th>
<th>Qatar (n = 959)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3,766 (85.4)</td>
<td>805 (83.9)</td>
</tr>
<tr>
<td>Female</td>
<td>642 (14.6)</td>
<td>154 (16.1)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>2,732 (62.0)</td>
<td>585 (61.0)</td>
</tr>
<tr>
<td>Divorced</td>
<td>400 (9.1)</td>
<td>83 (8.7)</td>
</tr>
<tr>
<td>Single, never married</td>
<td>1,243 (28.2)</td>
<td>285 (29.7)</td>
</tr>
<tr>
<td>Separated</td>
<td>30 (0.7)</td>
<td>5 (0.5)</td>
</tr>
<tr>
<td>Military grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-1 to E-3</td>
<td>490 (11.1)</td>
<td>114 (11.9)</td>
</tr>
<tr>
<td>E-4 to E-6</td>
<td>2,713 (61.5)</td>
<td>592 (61.7)</td>
</tr>
<tr>
<td>E-7 to E-9</td>
<td>441 (10.0)</td>
<td>102 (10.6)</td>
</tr>
<tr>
<td>O-1 to O-3</td>
<td>450 (10.2)</td>
<td>92 (9.6)</td>
</tr>
<tr>
<td>O-4 to O-7</td>
<td>311 (7.1)</td>
<td>58 (6.0)</td>
</tr>
<tr>
<td>Air Force specialty code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>767 (17.4)</td>
<td>175 (18.2)</td>
</tr>
<tr>
<td>Maintenance &amp; logistics</td>
<td>1,693 (38.4)</td>
<td>311 (32.4)</td>
</tr>
<tr>
<td>Support</td>
<td>1,225 (27.8)</td>
<td>331 (34.5)</td>
</tr>
<tr>
<td>Medical</td>
<td>163 (3.7)</td>
<td>47 (4.9)</td>
</tr>
</tbody>
</table>

Note. Enlisted military grades range from E-1 (lowest) to E-9 (highest). Officer grades range from O-1 (lowest) to O-7 (highest).

Endorsement of either question is considered a screen positive for depression. Other mental health problems were measured by four items related to suicidal thoughts, interpersonal conflict, interpersonal aggressive ideations, and interest in receiving help for any mental health concern. Trauma exposure was assessed by three items measuring exposure to wounded, killed, or dead; direct combat including discharge of their weapon; and belief that they had been in great danger of being killed at some point during the deployment.

Procedure

Study methods were modeled after three previous studies (Hoge et al., 2006; Martin, 2007; Milliken et al., 2007) and involved the retrospective review of archived data collected from Air Force personnel who had been deployed to Iraq and Qatar in 2005 through 2007. All Air Force personnel deployed to these locations were required to complete a Post-Deployment Health Assessment during the 2-week period preceding their return from deployment. This study was approved by the Wilford Hall Medical Center Institutional Review Board as an exempt protocol, because the data were archival and had been previously collected for screening purposes. The investigators received deidentified data and did not have access to any individual identifying information or personal health information of the participants. The Statistical Package for the Social Sciences (SPSS; Version 15.01 for Windows) was used for all statistical analyses. Odds ratios with 95% confidence intervals and chi-squared analyses with p-values less than .05 were used to indicate statistically significant differences between the Iraq and Qatar groups. It should be noted that the upper limit of the odds ratios for some of the items in Table 2 is not accurate by the Cornfield method (Schlesselman, 1982). This is a method of determining asymptotic confidence limits that does not use a continuity correction.

RESULTS

Participants included 4,408 active-duty Air Force members who were deployed to Iraq and 959 who were deployed to Qatar. The mean age was similar in each group (Iraq = 30.1, SD = 6.6; range = 17–55; Afghanistan = 30.3, SD = 7.1; range = 19–58). There were no significant differences between groups in terms of gender, marital status, or military grade (see Table 1). Approximately 90% of each group was from the four primary Air Force Specialty Code occupational areas (Operations, Maintenance, & Logistics, Support, and Medical). There were differences between Iraq and Qatar in the percentages of deployed service members with Maintenance & Logistics and Support Air Force specialty codes. There were significantly more Air Force personnel deployed to Iraq who had a Maintenance & Logistics Air Force specialty code (43.3% vs. 37.5%), χ²(1, N = 2004) = 10.42, p < .001. In contrast, there

The prevalence of combat experiences and mental-health-related outcomes reported on the Post-Deployment Health Assessment are included in Table 2. Noncombatants deployed to Iraq were about three times as likely to report having been exposed to someone who had been wounded or killed, four times as likely to have discharged their weapon, and six times as likely to report that they felt they were in great danger of being killed at some point during deployment.

Noncombatants who were deployed to Iraq were also about six times more likely to report symptoms of PTSD according to the PC-PTSD criteria of \( \geq 2 \) positively endorsed questions. Using the more stringent criteria of \( \geq 3 \) questions, the Iraq group was more than five times as likely to screen positive for PTSD. In terms of PTSD symptom clusters, noncombatants deployed to Iraq were more than three times as likely to report the PTSD symptoms of reexperiencing, avoidance, hypervigilance, and numbness/detachment.

Noncombatants who were deployed to Iraq were also about twice as likely to screen positive for depression on the Patient Health Questionnaire-2. The endorsement of suicidal ideation, interpersonal aggressive ideation, and mental health concerns was very low for both groups, and there were no significant differences between groups.

**DISCUSSION**

This study found that approximately 20% of noncombatant Air Force personnel deployed to Iraq reported that they had been exposed to potentially traumatic combat experiences, and they were almost six times as likely to screen positive for PTSD compared to a similar group of noncombatants deployed to Qatar. This finding is important because it documents that individuals serving in...
noncombatant support roles are not insulated from exposure to combat-related trauma. Throughout history, noncombatants serving on or near the military battlefield have been exposed to the horrors of war. However, to the best of our knowledge, this is the first study to specifically examine the impact of deployment location on reports of exposure to combat-related events and combat-stress symptoms in a sample comprised exclusively of noncombatants.

There are a number of limitations with the study. The demographic variables of the participants in each group were similar in terms of gender, age, marital status, and military grade. However, information on the average amount of time in service was not available, and if differences existed between groups, they could have accounted for some of the differences in results. In addition, there were differences in the percentages of service members working in maintenance and support occupations in Iraq and Qatar. However, there is no compelling reason to expect significant differences in combat-stress symptoms based on these noncombat occupational differences.

The population included only active-duty Air Force personnel, so the results may not generalize to Guard or Reserve personnel or other branches of the military. In addition, the average length of deployment was 4 months, which is shorter than with other military branches (Hoge et al., 2006; Mental Health Advisory Team, 2009). Therefore, differences observed in the study could be more pronounced for the other service branches.

Another study limitation is that the measure of combat events was based on self-report. Specific data on the number of potentially traumatic events that occurred at each location (e.g., attacks by mortars, rockets, missiles, rocket-propelled grenades, small arms fire, etc.) was not available because that information is classified. However, publically available information indicated that there were over 17,000 combat deaths and wounded-in-action in Iraq during the time of the study, with no reports of combat deaths or wounded in Qatar (DoD, 2010; Iraq Coalition Casualty Count, 2009).

Similarly, the symptom measures were based on the self-report on the Post-Deployment Health Assessment. This measure was designed as an epidemiological screening tool, not a measure that would result in actual diagnoses. From this perspective, the Post-Deployment Health Assessment may actually be of limited usefulness for the purposes of science, and there is the potential for both false-positive and false-negative rates. However, previous reports have found high completion rates on the Post-Deployment Health Assessment (Armed Forces Health Surveillance Center, 2007). Therefore, to the best of our knowledge, there were few nonresponders to the surveys in the study, and differences between the samples are not likely due to differential response rates.

Another limitation of the study is that there is no predeployment baseline measure of PTSD or mental health functioning. A limitation of the DoD’s current deployment screening program is that the Pre-Deployment Health Assessment, which is administered just before deployment, does not include any measures of PTSD or mental health functioning as are included in the Post-Deployment Health Assessment and Post-Deployment Health Reassessment. The U.S. military’s health surveillance capabilities and future research would be significantly enhanced by the addition of these measures before deployment. However, inclusion of such items in a predeployment survey may pose logistical problems for screen-positive individuals and may increase the chances of false-positives in individuals desiring to get out of a deployment. The results are also limited because the data was collected at the time of the initial return from a deployment to Iraq or Qatar. Future studies should also evaluate the potential delayed onset of symptoms on the Post-Deployment Health Reassessment completed 3–6 months later.

The percentage of noncombatants screening positive for PTSD in the study was about 4%, which is similar to previous studies with noncombatants (Hotopf et al., 2006; Martin, 2007; Smith et al., 2008). The rates of PTSD symptoms are considerably lower than the 10–12% found in Army and Marine combatants returning from Iraq (Hoge et al., 2006; Milliken et al., 2007). However, Air Force personnel have not deployed to Iraq and Afghanistan in the same manner as the Army and Marines. As such, comparisons between studies should be undertaken cautiously, and the differences observed could actually be more pronounced for Army and Marine personnel.

The results of the study also help highlight an interesting finding in the literature that, in some cases, noncombatant personnel might actually be at greater risk of developing PTSD (Martin, 2007; Smith et al., 2008). It is logical to presume that combatants should have higher levels of combat exposure and combat-related PTSD. However, it may also be that combatants are more resilient because they are specifically trained for combat situations; they may anticipate that these events will occur; and they have the opportunity to “fight back” in a battlefield situation. In contrast, noncombatants may not receive the same level of training for exposure to combat-related traumatic events, and they may not consider these events likely to occur during deployment. Noncombatants also serve in a passive role and are not usually able to fight back unless they are directly attacked by enemy forces. There may be factors that differentially influence symptoms in combatants and noncombatants that are similar to previous research on controlled versus uncontrolled stress (Baratta et al., 2007; Kant, Bauman, Anderson, & Mougey, 1992). Previous studies suggest that control over stressors attenuates the effects of stress on psychophysiology. Limited ability to fight back and serving in a passive role might increase the risk for combat-related PTSD in noncombatants. These assumptions should be evaluated in future studies.

The results of the study provide important data that engagement in actual combat with the enemy or personally participating in a fight or encounter with a military foe is not required for there to be reports of combat-related PTSD symptoms. Previous research with Vietnam veterans found that events such as personal threat to one’s safety (e.g., witnessing people wounded or killed,
feeling in danger of being killed) are not limited to those serving in combatant roles (King, King, Gudanowski, & Vreven, 1995). These results should be taken into consideration by individuals involved in diagnostic, compensation, and disability evaluations of noncombatants; they provide further evidence supporting the recent decision by the U.S. Congress and the Department of Veterans Affairs (VA) to amend the VA's long-standing requirements for establishing a service connection for PTSD when applying for VA benefits. Under the new rule (VA, 2010), documentation—requirement standards for veterans who served as noncombatants in a war zone or combat area have been eased to more closely resemble those applied to veteran combatants.

In summary, the results of the study highlight the importance of screening all military personnel who have deployed to a war zone, including those who did not serve in combat roles and might otherwise be overlooked. Because a large proportion of the almost 2 million military service members who have deployed to Iraq and Afghanistan are military support personnel, even this relatively low 4% rate of PTSD symptoms represents an estimated 80,000 personnel who may be at risk for PTSD.

REFERENCES


