Psychiatric diagnoses, comorbidity, and functioning in National Guard troops deployed to Iraq

Shannon M. Kehle, Madhavi K. Reddy, Amanda G. Ferrier-Auerbach, Christopher R. Erbes, Paul A. Arbis, Melissa A. Polusny

*Center for Chronic Disease Outcomes Research, Minneapolis, MN, USA
'Minneapolis VA Medical Center, Minneapolis, MN, USA
"University of Minnesota Medical School, Minneapolis, MN, USA
Alpert Medical School of Brown University, Providence, RI, USA

Abstract

Objective: Over 1.8 million troops have been deployed to Iraq (OIF) and Afghanistan. Estimates of mental health problems postdeployment have been based on screening instruments; no studies have examined the postdeployment mental health of troops returning from OIF using structured diagnostic interviews. The goal of the current study is to (a) report on rates of mental health diagnoses and comorbidity in soldiers after deployment to OIF using clinical interviews, and (b) examine the relationship between mental health diagnoses and overall functioning and quality of life.

Method: Participants were 348 National Guard soldiers drawn from the Readiness and Resilience in National Guard Soldiers (RINGS) study, a longitudinal study of mental health after deployment to OIF from March 2006 to July 2007. Participants completed clinical interviews, including the Clinician Administered PTSD Scale and the Structured Clinical Interview for the DSM-IV, and self-report measures of social adjustment and quality of life 6–12 months following deployment.

Results: Most participants did not meet criteria for a mental health diagnosis. Non-PTSD anxiety disorders and depressive disorders were the most common. Mental health diagnoses were associated with poorer functioning and quality of life. PTSD had the strongest relationship with social functioning and quality of life. For those with PTSD, comorbid diagnoses were not associated with an incremental decrease in functioning or quality of life.

Conclusions: The findings highlight the significant rate and burden of mental health disorders among this population and suggest that while PTSD is relatively uncommon, it is a particularly deleterious disorder.
mental health disorders and comorbidities, as diagnosed by structured clinical interviews, in a sample of U.S. National Guard troops who have recently returned from OIF.

Additionally, this paper will report on how mental health diagnoses impact the social functioning of these troops. Research conducted with veterans of previous wars has shown that post-deployment mental health disorders are associated with impairments in functioning, decreased quality of life, increased health care costs, and significant financial burdens (The Iowa Persian Gulf Study Group, 1997; Jordan et al., 1991; Kang et al., 2003; Priegerson et al., 2002). PTSD alone is associated with an estimated $3 billion dollars of lost productivity per year, an average 3.6 days of work lost per month, a lowered likelihood of veterans working for pay, and a negative impact on veterans’ wages (Kessler, 2000; Savoca and Rosenheck, 2000). In regards to OEF/OIF, the two-year cost of postdeployment PTSD and major depression is estimated to be between $4.0 and $6.2 billion dollars (Tanielian and Jaycox, 2008). Further, rates of comorbidity among individuals with PTSD have been estimated to be as high as 99% (Kulka et al., 1990) and previous studies have shown the negative impact of PTSD is even greater when another mental health diagnosis is present (Kessler and Rosenheck, 1997). In line with previous research, we expected that soldiers who report a mental health diagnosis will report greater negative impact on their functioning, and that comorbid mental health diagnoses will have a cumulative negative impact on the soldiers’ functioning.

1. Materials and methods

The National Guard command and the institutional review boards of the University of Minnesota Medical School, Minneapolis Veteran’s Affairs Medical Center, and Department of Defense approved the study protocol. The investigation was conducted in accordance with the latest version of the Declaration of Helsinki and written informed consent was obtained from participants prior to study enrollment and interview administration.

1.1. Participants and procedures

The study sample was drawn from the Readiness and Resilience in National Guard Soldiers (RINGS) Study, a longitudinal investigation of risk and resilience factors predictive of postdeployment mental health in troops deployed to OIF. Soldiers from a National Guard Brigade Combat Team (BCT) were surveyed one month prior to a 16-month deployment to Iraq and again 3 months following return from deployment. As part of the postdeployment survey, a variety of psychological and deployment-related factors, including quality of life and social adjustment, were assessed using standard mailed survey methodology. All participants were also invited to complete a postdeployment diagnostic interview. Interviews were conducted between 6 and 12 months following troops’ return from Iraq. Participants were compensated $130 for completing the interview.

Fig. 1 details participation rates. Participants were originally contacted approximately one month prior to deployment to OIF while completing a six-month mobilization training. Over the course of approximately 2½ weeks, soldiers were invited through unit announcements and flyers to attend a group briefing session held by investigators. Ultimately, 522 of the approximately 2600 individuals in the total brigade completed the predeployment survey. Those who participated predeployment were demographically similar to the larger brigade (Table 1). Of the 522 soldiers who participated predeployment, 424 participants (81%) completed the follow-up survey. Postdeployment responders and non-responders did not differ on gender, ethnicity, or self-reported predeployment distress. The responders were more likely to be officers (responders = 11%; non-responders = 4%), \( \chi^2(1, N = 522) = 4.43, p < 0.05 \), married (responders = 49%; non-responders = 31%), \( \chi^2(1, N = 522) = 10.65, p < 0.001 \), and older (responder \( M = 29.9 \), SD = 8.8; non-responder \( M = 25.6, SD = 6.9 \), t(520) = -4.46, p < 0.001, than the non-responders.

Eighty-two percent (\( n = 348 \)) of postdeployment survey responders completed a diagnostic interview. Seven participants completed an interview but not a follow-up survey and were excluded from current analyses. There were no differences between soldiers who completed or did not complete the interview on age, ethnicity, marital status, enlisted status, self-reported distress, social adjustment, or quality of life. Soldiers completing interviews were more likely to report some college education (\( \chi^2 = 12.96, p < 0.001 \)). Of those completing interviews, 248 soldiers (71%) were interviewed in-person and 100 soldiers (29%) were interviewed via telephone. There were no differences between those interviewed in-person or by phone on demographics (age, ethnicity, marital status, level of education), postdeployment PTSD or depressive symptomology, number of diagnoses, quality of life, or social adjustment. Female soldiers were more likely to participate in-person than by telephone (\( \chi^2 = 9.49, p = 0.002 \)).

1.2. Measures

The Clinician Administered PTSD Scale (CAPS; Blake et al., 1995), considered to be the “gold standard” of PTSD diagnosis, consists of 30-items, and corresponds to the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-IV-TR; American Psychiatric Association, 2000) criteria for PTSD. Using original CAPS scoring criteria (Blake et al., 1990), PTSD was diagnosed for participants who experienced a traumatic event (criteria A1), reported at least one reexperiencing symptom, three avoidance symptoms, and two hyperarousal symptoms each at a frequency rating of at least 1 and an intensity rating of at least 2, and reported and significant impairment or distress. Subthreshold PTSD was diagnosed for participants who experienced a traumatic event (criteria A1), reported at least one avoidance, one reexperiencing, and one hyperarousal symptoms at a frequency rating of at least 1 and an intensity rating of at least 2, and reported and significant impairment or distress. Subthreshold PTSD was diagnosed for participants who experienced a traumatic event (criteria A1), reported at least one avoidance, one reexperiencing, and one hyperarousal symptoms at a frequency rating of at least 1 and an intensity rating of at least 2, and reported and significant impairment or distress (Stein et al., 1997). Additional Axis I disorders were diagnosed with the SCID-I/NP (Non Patient-Edition) Research Version interview (First et al., 2002). The following modules were administered: Overview, Mood Episodes, Psychotic Disorders, Mood Disorders, Substance Use Disorders, Anxiety Disorders (with exception of PTSD questions), and Somatoform Disorders. Self-report survey data analyzed for the present report were collected by two instruments: the Social Adjustment Scale-Self-Report (SASS-R; Weissman, 1999) and Navy Quality of Life Survey (NQOLS; Wilcove et al., 2003). The SAS-R contains 54-items which assess individual’s functioning in 6 areas: work, social and leisure activities, relationships with extended family, role as a marital partner, parental role, and role within the family unit including economic functioning perceptions. Each item is rated on a five point Likert scale, with higher scores indicating greater impairment. A domain-based approach for assessing soldiers’ quality of life was adapted from the NQOLS. Domains assessed include leisure and recreation, friends and friendship, relationship with relatives, marriage/intimate relationships, relationships with children (if applicable), standard of living, and overall satisfaction with life experiences. Each item is rated on a seven point Likert scale, with higher scores indicating greater satisfaction. We also used the “combat experiences” subscale of the Deployment Risk and Resilience Inventory to assess the presence or absence of a range of combat experiences (King et al., 2006).

1.3. Interviewer training and reliability

Interviews were conducted by a team of eight doctoral level graduate students who completed extensive training and ongoing clinical supervision. Training included a day-long didactic lecture, viewing of administration training tapes, and the completion of “check-out” interviews. To ensure quality of the interviews and prevent drift, refresher training was held for all interviews after approximately three months. All interviewers participated in weekly supervision provided by the investigators at which time interviews were reviewed, and consensus diagnoses were established.

All interviews were digitally recorded for reliability purposes. Ten percent of interviews were reviewed and independently rated by a second interviewer. Inter-rater reliabilities for individual diagnoses from the SCID ranged from 0.56 to 1.0. Across all diagnostic categories, inter-rater reliability for the SCID was moderate to good (kappa = 0.67). Reliability for the CAPS was also evaluated across symptom ratings, yielding an interclass correlations coefficient of 0.88.

1.4. Data analysis

Pearson chi-square tests were used to examine differences in diagnosis by gender and age category. Logistic regressions were conducted to examine the relationship between each of the diagnostic groups in Table 2 and associated social functioning and quality of life. The comparison group for each of the regressions was the no diagnosis group. With the exception of the no diagnosis group, diagnostic groups were not mutually exclusive because participants could have had more than one diagnosis. Odds ratios (OR), 95% confidence intervals (CI), and p-values are reported for each of the logistic regression comparisons. All continuously distributed variables were converted to z-scores prior to entry into the regression models. Thus, the OR represents the factor by which the odds of having a specific disorder changes in conjunction with a standard deviation difference in the independent variable (e.g. total social functioning). Cohen’s d effect sizes were also calculated for each comparison. The effect sizes can be interpreted using Cohen’s definition of small (0.2), medium (0.5), and large (0.8) effects (Cohen, 1988).
Table 1
Demographic characteristics of interview participants, overall readiness and Resilience in National Guard Soldiers (RINGS) cohort at baseline, and the Brigade Combat Team population.

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>Overall cohort (n = 522)</th>
<th>Panel participants at follow-up (n = 348)</th>
<th>Brigade Combat Team population (n = 2573)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male, No. (%)</td>
<td>462 (88)</td>
<td>304 (87)</td>
<td>2339 (91)</td>
</tr>
<tr>
<td>Female, No. (%)</td>
<td>60 (12)</td>
<td>44 (13)</td>
<td>234 (9)</td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–29 years, No. (%)</td>
<td>313 (60)</td>
<td>170 (49)</td>
<td>1672 (65)</td>
</tr>
<tr>
<td>30+ years, No. (%)</td>
<td>209 (40)</td>
<td>172 (51)</td>
<td>901 (35)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic, No. (%)</td>
<td>484 (93)</td>
<td>325 (93)</td>
<td>2407 (95)</td>
</tr>
<tr>
<td>Non-white, No. (%)</td>
<td>37 (7)</td>
<td>23 (7)</td>
<td>134 (5)</td>
</tr>
<tr>
<td>Rank</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enlisted, No. (%)</td>
<td>471 (90)</td>
<td>303 (87)</td>
<td>2301 (90)</td>
</tr>
<tr>
<td>Officer, No. (%)</td>
<td>51 (10)</td>
<td>44 (13)</td>
<td>270 (10)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married, No. (%)</td>
<td>237 (45)</td>
<td>173 (48)</td>
<td>1006 (40)</td>
</tr>
<tr>
<td>Not married, No. (%)</td>
<td>285 (55)</td>
<td>163 (52)</td>
<td>1515 (56)</td>
</tr>
</tbody>
</table>

a Percentages reported are the proportion of individuals within each demographic subgroup who reported the outcome.
b Mean age for the brigade was not available.

Rates of psychiatric comorbidity were calculated for the entire panel, for participants with a diagnosis of PTSD, and for participants with a diagnosis of either PTSD or subthreshold PTSD. For the entire panel, we conducted one-way analysis of covariance (ANCOVA) to examine the association between total number of diagnoses and overall social functioning and quality of life. We then conducted a second ANCOVA to examine the relationship between having no diagnosis, one diagnosis, or two or more diagnoses and overall social functioning and quality of life. Next, using only those with either PTSD or subthreshold PTSD, we again conducted an ANCOVA to examine the association between number of diagnoses and overall social functioning and quality of life. Finally, using only those with PTSD or subthreshold PTSD, we conducted an ANCOVA to examine the association between having a comorbidity (yes/no) and total social adjustment and overall quality of life. Due to a response bias within our sample, we controlled for marital status, education level, age, and enlisted status in the regressions and ANCOVAs.

2. Results

2.1. Sample characteristics and deployment experiences

Interview completers were 87% male, 93% Caucasian, 50% married, 87% enlisted rank, with a mean age of 31.30 (SD = 9.5) years (Table 1). Four percent of the sample had a previous deployment to OEF/OIF. Troops reported substantial exposure to combat and other potentially traumatic war-related events. A large majority of soldiers (91%) reported participating in combat missions or patrols, 94% reported that they or a member of their unit received incoming small arms fire, 55% were attacked by terrorists or civilians, and 22% thought they killed someone in combat. Ten percent of the sample reported being wounded or injured during deployment.

2.2. Rates of postdeployment psychiatric diagnoses

Table 2 displays rates of postdeployment psychiatric disorders. A majority (62%) of the sample did not meet criteria for a current psychiatric disorder at the time of assessment. Depressive disorders were the most common diagnoses; major depressive disorder was the most frequent diagnosis in that category (n = 41). Non-PTSD anxiety disorders (other anxiety) and alcohol use disorders were also relatively common. The most frequent disorders in the other anxiety category were anxiety disorder not otherwise specified (NOS; n = 20), social anxiety disorder (n = 11), and generalized anxiety disorder (n = 9). Of those who met criteria for an alcohol use disorder, 73% were diagnosed with dependence. As we have previously reported, 7% of the sample met criteria for PTSD (Erbes et al., under review). When those with subthreshold PTSD were included, the sample prevalence increased to 15%. Pain disorder, somatization disorder NOS, and psychotic disorder NOS were each diagnosed in one participant; these disorders were not included in the analyses due to their low prevalence in the sample.

Women were more likely than men (52% vs 36%) to have a psychiatric diagnosis, \( \chi^2 = 4.40, p = 0.04 \). Specifically, female soldiers were more frequently diagnosed with PTSD (14% vs 6%; \( \chi^2 = 4.03, p = 0.04 \)), depressive disorders (27% vs 13%; \( \chi^2 = 6.41, p = 0.01 \)), and non-PTSD anxiety disorders (25% vs 12%; \( \chi^2 = 6.10, p = 0.01 \)). Age was not significantly associated with the presence of any diagnosis.

2.3. Functioning and quality of life associated with psychiatric diagnoses

Table 3 displays the association between psychiatric diagnoses and overall functioning and quality of life among the panel of OIF deployed troops. Drug use disorder was eliminated from these analyses due the small number of cases. Only participants in an intimate relationship (n = 157) were included in the marriage/intimate relationship analyses, while only those with children (n = 123) were included in the analyses related to parenting. Having a diagnosis of PTSD (M = 2.19, SD = 0.39), subthreshold PTSD (M = 2.17, SD = 0.56), depressive disorder (M = 2.14, SD = 0.48), non-PTSD anxiety disorder (M = 2.00, SD = 0.41), or alcohol use disorder (M = 1.98, SD = 1.20) was associated with lowered social functioning when compared with those without psychiatric diagnoses.
a diagnosis ($M = 1.72$, $SD = 0.35$). In regards to PTSD, after adjusting for age, marital status, enlisted status, and educational level, the odds of having PTSD increased three-fold for each standard deviation increase in impairment on the total social functioning score (Table 3). Impairments in social and leisure activities, extended family relationships, and family role functioning were significantly associated with all diagnostic categories. Impairment in self-reported functioning as a marital/intimate partner was associated with all diagnoses except PTSD and subthreshold PTSD. Parental role functioning was not associated with any diagnoses.

Overall quality of life was negatively associated with having a diagnosis of PTSD ($M = 4.35$, $SD = 1.04$), subthreshold PTSD ($M = 4.44$, $SD = 1.26$), depressive disorder ($M = 4.63$, $SD = 1.09$), non-PTSD anxiety disorder ($M = 4.81$, $SD = 0.99$), or alcohol use disorder ($M = 4.90$, $SD = 1.20$) when compared with those without a diagnosis ($M = 5.48$, $SD = 0.94$). In regards to PTSD, for each standard deviation change in satisfaction with quality of life (representing increased satisfaction), the odds of having PTSD decreased by a little over one-half (Table 3). Decreased quality of life in leisure and recreational activities, relationships with relatives, and standard of living were significantly related to all diagnostic categories. Decreased quality of life related to friends and friendship was associated with all diagnoses except alcohol use disorder. The subdomain of marriage/intimate relationships was significantly, negatively related to all diagnostic categories but PTSD and non-PTSD anxiety disorders. Finally, decreased satisfaction with relationships with children was only associated with PTSD and the depressive disorders.

An examination of effect sizes revealed that PTSD had the largest association with disruptions in social functioning and quality of life. PTSD ($d = 1.27$ and $d = 1.14$ respectively), subthreshold PTSD ($d = 0.96$ and $d = 0.94$), and depressive disorders ($d = 0.99$ and $d = 0.84$) all had large associations with overall social functioning and quality of life. The effect sizes for non-PTSD anxiety disorder ($d = 0.73$ and $d = 0.69$) and alcohol use disorders ($d = 0.29$ and $d = 0.54$) were in the small to medium range.

### 2.4. Rates of psychiatric comorbidity

Twenty-three percent of the sample had only one diagnosis, 10% had two diagnoses, 3% had three diagnoses, and 2% had four or more diagnoses. Among participants with PTSD, the average number of diagnoses was 1.74 ($SD = 1.36$) with a range of zero to five. Eighty-seven percent of those with PTSD had at least one additional diagnosis; 44% had one, 17% had two, 13% had three, and 13% had four or more comorbid diagnoses. Table 4 shows rates of specific comorbid diagnoses among participants with a diagnosis of PTSD and a diagnosis of either PTSD or subthreshold PTSD.

### 2.5. Impact of psychiatric comorbidity on functioning and quality of life

For the entire panel, a one-way ANCOVA showed that number of diagnoses was associated with impairments in overall social functioning, $F(6, 337) = 9.97$, $p < 0.001$, and quality of life, $F(6, 337) = 8.79$, $p < 0.001$. When we categorized participants into three groups (no diagnosis, one diagnosis, two or more diagnoses), we again found that number of diagnoses was associated with impairments in both overall social functioning, $F(2, 341) = 28.95$, $p < 0.001$ and quality of life, $F(2, 341) = 25.49$, $p < 0.001$. Posthoc tests (Least Significant Difference) showed that each group differed significantly from each other ($p < 0.002$). For those with a diagnosis of PTSD or subthreshold PTSD, a one-way ANCOVA showed that additional diagnoses were not related to further impairments in total functioning, $F(5, 37) = 1.66$, $p = 0.22$, or overall quality of life, $F(5, 37) = 0.24$, $p = 0.64$. Similarly, among individuals with PTSD or subthreshold PTSD, there were no significant differences in social functioning, $F(1, 41) = 0.002$, $p = 0.96$, or quality of life, $F(1, 41) = 0.44$, $p = 0.44$, between those with and without comorbid disorders.

### 3. Discussion

We found that a majority of National Guard soldiers recently returned from a combat deployment to Iraq did not meet criteria for a mental health disorder. However, overall rates were higher in this panel than in epidemiological studies of community dwelling residents, in which overall past-year prevalence among adults has ranged from 20 to 30% (Kessler et al., 1994; Narrow et al., 2002; Reiger et al., 1984). Rates of disorders were also substantially higher in this postdeployment sample than in an epidemiological study of a general, non-OIF deployed, military cohort (Riddle et al., 2007). The soldiers had slightly higher rates than community and non-deployed military samples across all diagnoses, with the exception of drug use disorders. Not surprisingly, the greatest elevation was in PTSD, which was double the population estimate of 3.6% (Kessler et al., 1994; Narrow et al., 2002). However, the rate of PTSD in our panel was similar to what has been observed in other trauma exposed populations (Breslau et al., 1998), and to recent estimates of PTSD among Vietnam veterans. While the National Vietnam Veterans’ Readjustment Study (NVVRS) originally estimated that 15.2% of Vietnam veterans met criteria for PTSD approximately 10 years after the end of the war (Kulka et al., 1990), reanalyses of those data resulted in an estimated prevalence of 9.7% (Dohrenwend et al., 2006). While rates of PTSD in our sample were lower than in other studies of OIF soldiers that relied on self-report measures, self-report measures of depression and alcohol use disorders yielded rates similar to those in our panel (Hoge et al., 2004; Jacobson et al., 2008; Milliken et al., 2007). Finally, comorbidity was common. More than 85% of soldiers with a diagnosis of PTSD had at least one additional mental health diagnosis, with depressive disorders being the most common. These findings are similar to PTSD comorbidity rates in both the community and among Vietnam veterans, which have estimated lifetime comorbidity between 50 and 99% (Breslau et al., 1991; Davidson et al., 1991; Kessler et al., 1995; Kulka et al., 1990).

Over one-half of female soldiers had a mental health diagnosis and female soldiers were significantly more likely to have a mental health diagnosis than male soldiers. Specifically, in our panel,
Women were diagnosed with PTSD, depressive disorders, and non-PTSD anxiety disorders at twice the rate of men. These discrepancies are in line with epidemiological studies (both general population and military); however, the overall rate of mental health disorders among female soldiers is substantially higher than in females in the general population (Kessler et al., 1994). Further, these data reflect a shift in the roles and outcomes of deployed female soldiers, as data from NVVRS revealed that female Vietnam veterans had PTSD at one-half the rate of their male counterparts (Turner et al., 2007). Given this finding, the impact of combat deployments on female soldiers’ mental health will be an important area of future study.

Soldiers with a mental health diagnosis reported significant impairments in both social functioning and quality of life. All of the diagnostic categories were related to substantial impairments and decreased quality of life. However, PTSD was associated with the greatest impairments. Among Vietnam veterans, PTSD has been associated with impaired social and familial role functioning, poor health status, diminished well-being, and disruptions in work functioning (Carroll et al., 1985; Jordan et al., 1992; Zatzick et al., 1997). Our data suggest that the presence of PTSD is associated with similar problems among OIF soldiers as early as six months postdeployment. Contrary to our hypotheses, psychiatric comorbidity among soldiers with PTSD was not related to further impairments in social functioning or quality of life. However, having more than one diagnosis was related to higher levels of impairment in the full panel. Previous epidemiological and clinic-based studies have found that having more than one psychiatric diagnosis is associated with a greater disturbance in functioning and quality of life (Kessler and Frank, 1997; Olsson et al., 1997; Ormel et al., 1994). While it is important to view the results regarding PTSD as preliminary due to the small number of participants with PTSD, it may be that among this population, PTSD is particularly debilitating and those with PTSD are already experiencing such large disruptions that a “floor effect” may be occurring, in which comorbid diagnoses do not further reduce quality of life and social functioning.

This study has a number of strengths, including the use of gold-standard clinical interviews and a large non-treatment seeking population. However, participants were self-selected. Thus, while the panel demographics are similar to that of the overall brigade, this was not an epidemiological study and results may not generalize either to other National Guard units or the larger military population. Further, although our analyses suggest few differences between responders and non-responders and we attempted to control for response bias in the analyses, the findings may have been influenced by either postdeployment survey or interview response biases. Our panel also had a very small number of soldiers with previous OEF/OIF deployments. The relationship between multiple deployments, psychiatric diagnoses, and functioning is an important area of future study. Also, a number of our diagnostic conditions had few participants, thus, we may have been underpowered to find differences between groups, particularly for analyses examining intimate relationships and parenting. Conclusions regarding functioning and quality of life are based on self-report and must be considered preliminary. It is possible that the self-report items measured a general sense of well-being, rather than specific domains of functioning. As such, the findings require further objective validation (e.g. collateral reports; objective work performance data) in a larger sample. Finally, it is important to note that we do not have predeployment diagnostic data, thus, we cannot conclude that the disorders are the result of deployment to a combat zone. Rather, the study highlights the overall postdeployment mental health burden of soldiers deployed to OIF.

This study is the first to provide diagnostic data for a community sample of OIF soldiers. The data highlight the significant rate and burden of mental health disorders among this population. Further, while PTSD appears to be particularly deleterious, it is also relatively uncommon. Thus, the findings highlight the importance of successfully identifying and treating a range of mental health problems, not only PTSD, in returning soldiers. If untreated, these disorders may have devastating effects, both for the soldier and for society.

**Contributors**

Shannon Kehle participated in study conceptualization and design, analysis and interpretation of data, drafting and revision of the manuscript, and statistical analysis. Madhavi Reddy participated in acquisition of data, drafting and revision of the manuscript, and administrative support. Amanda Ferrier-Auerbach participated in study conception and design, drafting and revision of the manuscript, and administrative support. Christopher Erbes participated in study conceptualization and design, acquisition of data, supervision, revision of the manuscript, and obtaining funding. Paul Arbisi participated in study conceptualization and design, acquisition of data, supervision, revision of the manuscript, administrative support, and obtaining funding. Melissa Polusny participated in study conceptualization and design, acquisition of data, supervision, analysis and interpretation of data, revision of the manuscript, and obtaining funding.

**Role of funding source**

This research was supported by the Minneapolis VA Medical Center Research Service and grants to Melissa A. Polusny, PhD, from Minnesota Medical Foundation (Grant #3662-9227-06) and Department of Defense Congressionally Directed Medical Research Program (CDMRP) (W81XWH-07-2-003) and a grant to Christoph R. Erbes, PhD, from the Department of Veterans Affairs Health Service Research and Development program (RRP 08–385). None of the sponsors had any role in the following: design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript.

**Conflict of interest**

All authors declare that they have no conflicts of interest.

**Acknowledgements**

The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of Veterans Affairs, Department of the Army, or the Department of Defense. This material is supported in part by the Department of Defense Center for Health Promotion and Preventive Medicine, through the Department of Defense Congressionally Directed Medical Research Program (CDMRP) (W81XWH-07-2-003) and a grant to Christopher R. Erbes, PhD, from the Department of Veterans Affairs Health Service Research and Development Program (RRP 08–385). None of the sponsors had any role in the following: design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript.

**Table 4**

Rates of comorbidity among National Guard soldiers with a diagnosis of PTSD.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Depressive disorders</th>
<th>Other anxiety</th>
<th>Alcohol use disorders</th>
<th>Drug use disorders</th>
<th>No comorbid diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD</td>
<td>16/23 (70)</td>
<td>8/23 (35)</td>
<td>5/23 (22)</td>
<td>0/23 (0)</td>
<td>3/23 (13)</td>
</tr>
<tr>
<td>Threshold</td>
<td>27/53 (51)</td>
<td>15/53 (28)</td>
<td>10/53 (19)</td>
<td>1/53 (2)</td>
<td>10/53 (19)</td>
</tr>
</tbody>
</table>

Abbreviations. PTSD, posttraumatic stress disorder.

* Rows do not sum because participants can have more than one comorbid diagnosis.
Veterans Affairs, Veterans Health Administration, Office of Research
development, Health Services Research & Development.

References


Erbes CR, Polusny MA, Arbisi PA. Post-traumatic stress disorder and symptoms in National Guard soldiers following combat deployment, under review.


Hoge CW, Auchterlonie JL, Milliken CS. Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. Journal of the American Medical Association 2006;295(9):1023—32.


Kessler RC, Frank RG. The impact of psychiatric disorders on work days lost. Psychological Medicine 1997;27:851—73.


Seal KH, Bententhal D, Miner CR, Sen S, Marmar C. Bringing the war back home: mental health disorders among 103,788 US veterans returning from Iraq and Afghanistan seen at Department of Veterans Affairs facilities. Archives of Internal Medicine 2007;167(5):476—82.


