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(802) 296-5132
FAX (802) 296-5135
Email: ncptsd@va.gov

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PTSD in Service Members and New Veterans of the Iraq and Afghanistan Wars:
A Bibliography and Critique

Brett T. Litz
National Center for PTSD - VA Boston Healthcare System, Massachusetts Veterans Epidemiological Research and Information Center, and Boston University School of Medicine
and
William E. Schlenger
Abt Associates, Inc., and Mental Illness Research, Education, and Clinical Center, Durham VA Medical Center

Since the beginning of hostilities in Afghanistan in October 2001, more than 1.8 million US troops have served in Operation Enduring Freedom (Afghanistan; OEF) or Operation Iraqi Freedom (Iraq; OIF), with 37% having deployed at least twice. What is the mental health impact of these extensive and ongoing wars, and which Veterans are most at risk for chronic PTSD? These epidemiologic questions take time and resources to answer, and because the character of war changes over time, continued vigilance and assessment are also required.

Historically, epidemiologic studies of wars have been conducted after the end of hostilities. To an impressive degree, however, this is not the case with OEF/OIF. We provide a bibliography of studies on PTSD among OEF/OIF Veterans and observations and recommendations for future research. Because of the importance of specific study design characteristics to inferential power, we have grouped the studies by design type, and due to space limitations, do not cover other important health and mental health outcomes (for an excellent review, see Tanielian & Jaycox, 2008).

Keystone Studies

The earliest OEF/OIF studies were cross-sectional in design. Hoge et al. (2004) conducted anonymous assessments of multiple convenience samples of Army and Marine Corps combat troops one week prior to deployment and approximately four months postdeployment. Using the PTSD Checklist (PCL), Hoge et al. (2004) estimated the prevalence of probable PTSD to be 9% at predeployment, with postdeployment rates of 12% and 18% for OEF and OIF troops respectively. These investigators were the first to document the range of OEF/OIF war-zone exposures, which were higher in OIF, as well as extensive personal and structural barriers to care. Vasterling et al. (2006), also using the PCL, evaluated a smaller convenience cohort of recently redeployed soldiers and found a probable PTSD prevalence rate of 11.6%. Building on their group's earlier work, Hoge et al. (2006) analyzed US military surveillance screening data completed by a convenience sample of Army and Marine Corps troops within 30 days of redeployment and confirmed reports of higher exposure and mental health concerns in OIF troops, as well as higher probable PTSD rates (9.8% vs. 4.7% for OEF).

Subsequent studies documented probable PTSD at time points more distal to the participants' war-zone stress exposure. For example, using methods similar to their 2004 study, Hoge et al. (2007) found a probable PTSD rate of 16.6% in a convenience sample of soldiers one year postdeployment to OIF. Based on VA medical record data, Seal et al. (2007) found that 13% of separated service members who sought VA healthcare between 2001 and 2005 had chart diagnoses of PTSD. This finding is consistent with findings from a small study of a convenience sample of more recent Veterans (Erbes et al., 2007).

Schell and Marshall (2008) conducted a random-digit telephone survey of formerly deployed OEF/OIF active-duty and reserve/guard personnel from all service branches (>60% had deployed 18-36 months prior) at a convenience sample of sites across the country. Using the PCL, the probable PTSD prevalence was 14%. Deployment length and degree of combat exposure were associated

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Author's Addresses: Brett T. Litz**z** is affiliated with the National Center for PTSD - VA Boston Healthcare System and Massachusetts Veterans Epidemiological Research and Information Center, VA Boston Healthcare System (116B-4),150 South Huntington Avenue, Boston, MA 02130 and with the Boston University School of Medicine. Email Address: brett.litz@va.gov.
William E. Schlengerr is affiliated with Abt Associates, Inc., and Mental Illness Research, Education, and Clinical Center, Durham VA Medical Center, 508 Fulton Street Durham, NC 27705. Email Address: Bill_Schlenger@abtassoc.com

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with probable PTSD risk (the rate for participants with no exposure was 1.5%), but time since last deployment was not.

Longitudinal studies began appearing later than cross-sectional studies. Milliken et al. (2007) compared Army screening surveillance data for a large convenience sample collected in the month before redeployment with screening data collected 4-10 months postdeployment. Probable PTSD prevalence for active-duty soldiers increased from 11.8% to 16.7%, and for Reservists and National Guard members from 12.7% to 24.5%. Higher probable PTSD prevalence among Reserve/Guard members has been found in other US service branches (Schell & Marshall, 2008; Smith, Ryan, et al., 2008), and among United Kingdom (UK) troops (Browne et al., 2007; Hotopf et al., 2006), and is particularly noteworthy because approximately 40% of US OEF/OIF troops are Guard or Reserve.

Bliese et al. (2007) screened a smaller convenience cohort of redeployed soldiers within 7 days of redeployment and again 120 days later, using the PCL. The rates of probable PTSD climbed from 3% to 8% between the two assessments. Smith, Ryan, et al. (2008) reported findings for more than 50,000 service members from all branches in the *Millennium Cohort Study* who were assessed at enrollment and 3 years later, nearly 12,000 of whom were deployed to OIF/OEF for the first time after the baseline assessment. They found probable PTSD incidence (new onset) rates of 8.7% among deployed service members who reported combat exposure.

Some studies have included groups of troops not deployed to OEF/OIF for comparison purposes. Hotopf et al. (2006) assessed a large probability sample of initial invasion troops from the UK with diverse roles in OIF 1-2 years postdeployment and compared their PTSD rates with non-deployed troops. Using the PCL, they found relatively low and comparable rates of probable PTSD (4%). Subsets that subsequently deployed during the OIF insurgency war did not have higher rates. By contrast, PCL-based probable PTSD rates were appreciably lower among the non-deployed service members in the Smith, Ryan, et al. (2008) study (3%, vs. 8.7% for deployed personnel).

Identifying risk factors for specific outcomes is an important component of descriptive epidemiology. Rona et al. (2007) determined that UK armed forces were 1.5 times more likely to have probable PTSD if they were deployed 13 or more months in the past three years. Browne et al. (2007) found the higher rate of probable PTSD in UK reservists to be due to family problems. Smith, Wingard, et al. (2008) found that prior assault experiences substantially increased risk for PTSD in both men and women deployed to OEF/OIF. Iversen et al. (2008) estimated multivariate predictors of probable PTSD using Hotopf et al.'s (2006) data and found that childhood adversity, time in forward areas, witnessing others wounded or killed, perceived risk, role strain, and lower morale independently increased risk of probable PTSD.

Observations and Recommendations

The relatively rapid (compared to historical standards) accumulation of empirical information about PTSD and related outcomes has had tremendous value in alerting military commanders, service providers, policy makers, and the public to these outcomes. One of the important internal validity issues in evaluating the evidence, however, is the extent to which the assessment methods warrant definitive judgments about clinical state and service needs. Researchers should be circumspect about results based solely on brief screening assessments, particularly if participants suspect that their responses may not be confidential or that their responses may influence the speed of their out-processing. Additionally, much of the validation of combat-related PTSD screeners was conducted with Vietnam Veterans, and may not generalize to current warfighters. Similarly, because many PTSD symptoms are non-specific and overlap with other psychological problems, non-exposure-related adversity and stress may affect the severity and types of symptoms endorsed on surveys that fail to establish an index event that would contextualize and constrain symptom reporting.

Epidemiologic studies also raise questions of external validity (generalizability). The foundation of generalizability is probability sampling, but most OEF/OIF studies have used convenience samples of troops who served in specific time periods and geographic areas. As a result, the generalizability of the findings is limited.

It is also important to acknowledge that PTSD caseness information, though useful, does not index individual burden and also fails to capture patterns of deployment-related psychological problems. Different symptom clusters may have different trajectories, revealing clues about secondary prevention needs, which suggests the need also to look more closely at the symptoms in disaggregated ways. Another benefit of reporting disaggregated PTSD data is that researchers can report the prevalence of symptoms putatively linked to deployment experiences (reexperiencing and avoidance). By contrast, the emotional numbing and hyperarousal symptoms are not time- or event-linked and are likely influenced by pre-existing or comorbid problems. For example, the relatively high predeployment probable PTSD rate found in Hoge et al. (2004) might be inflated by anticipatory anxiety (hyperarousal) and conservation of emotional and relational resources (numbing) in preparation for deployment.

Similarly, it may be useful to disaggregate combat and operational experiences (i.e., war-zone exposures) into thematic categories. Candidates include: life-threat, loss, observing carnage and loss of life, morally challenging acts of omission or commission, betrayal of service and role expectations, and fatigue/exposure to the elements. These war-zone experiences are likely to lead to varying phenomenology and trajectories, requiring different approaches to care. Although several OEF/OIF studies have shown an association between combat exposure and PTSD, a more revealing analysis would be the relationship between different types of exposures and patterns of outcomes.

Readers of OEF/OIF epidemiologic studies should also be mindful that in clinical contexts, it is often safe to assume that symptom burden is evidence of clinical significance, although routine assessment of functional impairment is important in treatment planning. In the epidemiologic context, however, evaluation of functional impact is particularly important. Arguably, while deployed and in garrison, a relatively high percentage of service personnel will endorse significant PTSD symptoms even though they are *functionally resilient*—that is, they are fit for duty and

effective in other roles and with other responsibilities. Some may want care because they are suffering, while others may see their experience as an occupational hazard and may expect a diminution over time, especially if they get sustained respite. The tacit assumption of epidemiologic studies appears to be that all cases need care. If cases were defined as having significant PTSD symptoms and functional impairment, the validity of this assumption would be enhanced.

Our review of the existing OEF/OIF epidemiologic studies reminds us that adaptation to combat and operational experiences is an unfolding dynamic. Little is known about different *trajectories* of response to war stressors. Research has been mostly cross-sectional, which constrains causal inference and fails to provide useful primary and secondary prevention information. The studies that evaluated troops at two postdeployment intervals revealed an overall increase in PTSD symptom burden with the passage of time (Bliese et al., 2007; Miliken et al., 2007; see also Grieger et al., 2006). In Miliken et al., 59% of the active-duty troops who scored at least a 3 on the PTSD screener (noteworthy PTSD) were on a *recovery trajectory* at the six-month mark, and 41% had a pattern of endorsement that suggested a *chronic trajectory.* Conversely, 7% of the active-duty soldiers and Marines who did not have significant PTSD early on had probable *delayed* PTSD at the six-month point (and 93% had a probable enduringly *resilient course* – no PTSD at both time points). Because of selection, training, leadership, cohesion, and pride (etc.), the high rate of enduring resilience is not surprising. A *recovery trajectory* is consistent with prior research – most distressed service members recover because of natural resources and resourcefulness. A *delayed trajectory,* which was prominent in Grieger et al.'s (2006) longitudinal study of physically wounded soldiers, is also consistent with prior research. Documenting these trajectories and the exposure and other factors related to them should be a high priority.

Our review also suggests to us that the research to date has examined a narrow band of the potential risk and resilience predictors of the onset or course of probable PTSD. Descriptive epidemiology fails to identify the service members most in need of preventive care or the mechanisms of risk and resilience that, if known, would be targets for intervention. Cross-sectional research focused on chronic PTSD has revealed risk indicators associated with posttraumatic pathology, which provide a good starting place for OEF/OIF research (see Iversen et al., 2008).

Finally, future research should expand upon self-report surveys and evaluate behavioral, genetic, and other biological variables, as well as family experiences. Multi-systemic evaluations of the risk and resilience predictors of trajectory are enormously expensive and are especially difficult among active-duty personnel, but such studies will advance the field and expand knowledge tremendously.

Summary

Studies to date suggest that 10-18% of combat troops serving in OEF/OIF have probable PTSD following deployment, and the prevalence does not diminish over time. Consistent with a wealth of prior research, there is a robust association between the cumulative burdens of combat and operational stressors and probable PTSD. Of note, National Guard and Reservists may be especially at risk over time.

More broadly, however, although the studies to date have made valuable contributions, all are hampered by one or more common limitations described above. All of these limitations are understandable, given the uncertain and ongoing nature of OEF/OIF, limited research funding, and urgent need for empirical information about deployment-related outcomes that can inform operational decisions. The net result of the limitations, however, is that although the findings have had pragmatic value in alerting government officials and the nation to an important problem, their contribution to our understanding of combat-related PTSD and their ability to inform policy is marginal. Moving the field forward, so that more comprehensive operational, scientific, and policy advantages can be realized, will require independent studies employing longitudinal designs, probability sampling, appropriate quasi-experimental comparison groups, comprehensive clinical assessment of key outcomes, and more-fully-specified models that include comprehensive assessment of exposure and biological markers hypothesized to moderate or mediate the relationship of exposure with PTSD and related outcomes.

ABSTRACTS

Bliese, P. D., Wright, K. M., Adler, A. B., Thomas, J. L., & Hoge, C. W. (2007). **Timing of postcombat mental health assessments.** *Psychological Services, 4,* 141-148. When soldiers return from combat and peacekeeping operations, the United States and many NATO and Partnership for Peace countries conduct some form of postdeployment mental health assessment. In this study, the authors examined the degree to which timing was related to reported prevalence rates of mental health problems in a matched sample of 509 US Army soldiers returning from combat in Iraq. Results showed significant increases in mental health problems at 120 days postdeployment relative to immediate reintegration. The findings are discussed in terms of providing mental health services to soldiers returning from combat. [abstract adapted]

Browne, T., Hull, L., Horn, O., Jones, M., Murphy, D., Fear. N. T., et al. (2007). **Explanations for the increase in mental health problems in UK reserve forces who have served in Iraq.** *British Journal of Psychiatry, 190,* 484-489. Deployment to the 2003 Iraq War was associated with ill health in reserve armed forces personnel. To investigate reasons for the excess of ill health in reservists, UK personnel who were deployed to the 2003 Iraq War completed a health survey about experiences on deployment to Iraq. Health status was measured using self-report of common mental disorders, PTSD, fatigue, physical symptoms and well-being. Reservists reported higher exposure to traumatic experiences, lower unit cohesion, more problems adjusting to homecoming and lower marital satisfaction. Most health outcomes could be explained by role, experience of traumatic events or unit cohesion in theatre. PTSD symptoms were the one exception and were paradoxically most powerfully affected by differences in problems at home rather than events in Iraq. The increased ill-health of reservists appears to be due to experiences on deployment and difficulties with homecoming. [abstract adapted]

Hoge, C. W., Auchterlonie, J. L., & Milliken, C. S. (2006). **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, 295,* 1023-1032. The US military has conducted population-level screening for mental health problems among all service members returning from deployment to Afghanistan, Iraq, and other locations. This study aimed to determine the relationship between combat deployment and mental health care use during the first year after return and to assess the lessons learned from the postdeployment mental health screening effort, in a population-based sample of Army soldiers and Marines who completed the routine postdeployment health assessment between May 1, 2003, and April 30, 2004, on return from deployment to Operation Enduring Freedom in Afghanistan (*n* = 16,318), Operation Iraqi Freedom (*n* = 222,620), and other locations (*n* = 64,967). Health care utilization and occupational outcomes were measured for 1 year after deployment or until leaving the service if this occurred sooner. The prevalence of reporting a mental health problem was 19.1% among service members returning from Iraq compared with 11.3% after returning from Afghanistan and 8.5% after returning from other locations (*P*<.001). Mental health problems reported on the postdeployment assessment were significantly associated with combat experiences, mental health care referral and utilization, and attrition from military service. Thirty-five percent of Iraq war veterans accessed mental health services in the year after returning home; 12% per year were diagnosed with a mental health problem. More than 50% of those referred for a mental health reason were documented to receive follow-up care although less than 10% of all service members who received mental health treatment were referred through the screening program. Combat duty in Iraq was associated with high utilization of mental health services and attrition from military service after deployment. The deployment mental health screening program provided another indicator of the mental health impact of deployment on a population level but had limited utility in predicting the level of mental health services that were needed after deployment. [abstract adapted]

Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I., & Koffman, R. L. (2004). **Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care.** *New England Journal of Medicine, 351,* 13-22. Studies are needed to systematically assess the mental health of members of the armed services and to inform policy with regard to the optimal delivery of mental health care to returning veterans. We studied members of four U.S. combat infantry units (three Army units and one Marine Corps unit) using an anonymous survey that was administered to the subjects either before their deployment to Iraq (*n* = 2,530) or 3 to 4 months after their return from combat duty in Iraq or Afghanistan (*n* = 3,671). The outcomes included major depression, generalized anxiety, and PTSD, which were evaluated on the basis of standardized, self-administered screening instruments. Exposure to combat was significantly greater among those who were deployed to Iraq than among those deployed to Afghanistan. The percentage of study subjects whose responses met the screening criteria for major depression, generalized anxiety, or PTSD was significantly higher after duty in Iraq (15.6 to 17.1%) than after duty in Afghanistan (11.2%) or before deployment to Iraq (9.3%); the largest difference was in the rate of PTSD. Of those whose responses were positive for a mental disorder, only 23 to 40% sought mental health care. Those whose responses were positive for a mental disorder were twice as likely as those whose responses were negative to report concern about possible stigmatization and other barriers to seeking mental health care. [abstract adapted]

Hoge, C. W., Terhakopian, A., Castro, C. A., Messer, S. C., & Engel, C. C. (2007). **Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans.** *American Journal of Psychiatry, 164,* 150-153. The current Iraq war has posed a considerable PTSD risk, but the association with physical health has not been well studied. The authors studied 2,863 soldiers using standardized self-administered screening instruments 1 year after their return from combat duty in Iraq. Among all participants, 16.6% met screening criteria for PTSD. PTSD was significantly associated with lower ratings of general health, more sick call visits, more missed workdays, more physical symptoms, and high somatic symptom severity. These results remained significant after control for being wounded or injured. The medical burden of PTSD includes physical health problems; combat veterans with serious somatic concerns should be evaluated for PTSD. [abstract adapted]

Hotopf, M. Hull, L., Fear, N. T., Browne, T., Horn, O., Iversen, A., et al. (2006). **The health of UK military personnel who deployed to the 2003 Iraq War: A cohort study.** *Lancet, 367,* 1731-1741. We compared health outcomes in a random sample of UK armed forces personnel who were deployed to the 2003 Iraq war with those in personnel who were not deployed. Participants completed a questionnaire covering the nature of the deployment and health outcomes, which included symptoms of PTSD, common mental disorders, general wellbeing, alcohol consumption, physical symptoms, and fatigue. Findings: The participation rate was 62.3% (*n* = 4,722) in the deployed sample, and 56.3% (*n* = 5,550) in the non-deployed sample. Differences in health outcomes between groups were slight. There was a modest increase in the number of individuals with multiple physical symptoms. No other differences between groups were noted. The effect of deployment was different for reservists compared with regulars. In regulars, only presence of multiple physical symptoms was weakly associated with deployment, whereas for reservists deployment was associated with common mental disorders and fatigue. There was no evidence that later deployments, which were associated with escalating insurgency and UK casualties, were associated with poorer mental health outcomes. [abstract adapted]

Iversen, A. C., Fear, N. T., Ehlers, A., Hacker Hughes, J., Hull, L., Earnshaw, M., et al. (2008). **Risk factors for post-traumatic stress disorder among UK armed forces personnel.** *Psychological Medicine, 38,* 511-522. This study aimed to investigate the relative contribution of demographic variables; childhood adversity; the nature of exposure to traumatic events during deployment; appraisal of these experiences; and home-coming experiences in relation to the prevalence of PTSD 'caseness' as measured by a score of 50 on the PTSD Checklist (PCL) in UK Armed Forces personnel who have been deployed in Iraq since 2003. Data were drawn from the first stage of a retrospective cohort study comparing UK military

personnel who were deployed to the 2003 Iraq War with personnel serving in the UK Armed Forces on 31 March 2003 but who were not deployed to the initial phase of war fighting. Participants were randomly selected and invited to participate. The response rate was 61%. We have limited these analyses to 4,762 regular service individuals who responded to the survey and who have been deployed in Iraq since 2003. PTSD symptoms were associated with lower rank, being unmarried, having low educational attainment, a history of childhood adversity, and exposure to potentially traumatizing events, in particular being deployed to a 'forward' area in close contact with the enemy. Appraisals of the experience as involving threat to one's own life and a perception that work in theatre was above an individual's trade and experience were strongly associated with PTSD symptoms, as were low morale and poor social support within the unit and non-receipt of a homecoming brief. These results raise the possibility that there are important modifiable occupational factors such as unit morale, leadership, and preparing combatants for their role in theatre which may influence an individual's risk of PTSD. [abstract adapted]

Milliken, C. S., Auchterlonie, J. L., & Hoge, C. W. (2007). **Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq War.** *Journal of the American Medical Association, 298,* 2141-2148. The Department of Defense initiated population-wide screening at 2 time points immediately on return from deployment and 3 to 6 months later to measure the mental health needs among soldiers returning from Iraq. A population-based cohort of 88,235 US soldiers returning from Iraq completed both a Post-Deployment Health Assessment (PDHA) and a Post-Deployment Health Re-Assessment (PDHRA) with a median of 6 months between the 2 assessments. Soldiers reported more mental health concerns and were referred at significantly higher rates from the PDHRA than from the PDHA. Based on the combined screening, clinicians identified 20.3% of active and 42.4% of reserve component soldiers as requiring mental health treatment. Concerns about interpersonal conflict increased 4-fold. Soldiers frequently reported alcohol concerns, yet very few were referred to alcohol treatment. Most soldiers who used mental health services had not been referred, even though the majority accessed care within 30 days following the screening. Although soldiers were much more likely to report PTSD symptoms on the PDHRA than on the PDHA, 49% to 59% of those who had PTSD symptoms identified on the PDHA improved by the time they took the PDHRA. There was no direct relationship of referral or treatment with symptom improvement. The large clinical burden recently reported among veterans presenting to Veterans Affairs facilities seems to exist within months of returning home, highlighting the need to enhance military mental health care during this period. [abstract adapted]

Rona, R. J., Fear, N. T., Hull, L., Greenberg, N., Earnshaw, M., Hotopf, M., et al. (2007). **Mental health consequences of overstretch in the UK armed forces: First phase of a cohort study.** *British Medical Journal, 335,* 603-610. A randomly chosen stratified sample of 5,547 regulars with experience of deployment was assessed. Personnel who were deployed for 13 months or more in the past three years were more likely to fulfill the criteria for PTSD, show caseness on the General Health Questionnaire, and have multiple physical symptoms. A significant association was found between duration of deployment and severe alcohol problems. Exposure to combat partly accounted for these associations. The associations between number of deployments in the past three years and mental disorders were less consistent than those related to duration of deployment. PTSD was also associated with a mismatch between expectations about the duration of deployment and the reality. [abstract adapted]

Schell, T. L., & Marshall, G. N. (2008). **Survey of individuals previously deployed for OEF/OIF.** In T. Tanielian and L. H. Jaycox (Eds.), *Invisible wounds of war: Psychological and cognitive injuries, their consequences, and services to assist recovery,* (pp 87-115) Santa Monica, CA: RAND Center for Military Health Policy Research. The investigators conducted a large population-based survey of personnel previously deployed for OEF/OIF, who were presently reachable by random digit dialing at a landline phone number within the US. The sampling strategy targeted 24 geographic areas that included domestic military bases. A total of 1,965 respondents were screened for combat exposure, military-related PTSD (past 30 days), depression (past 2 weeks), traumatic brain injury (TBI), and service use. Prevalences were 14% for probable PTSD, 14% for depression, and 19% for TBI. Nineteen percent had either PTSD or depression. The three conditions tended to co-occur. Risk factors for PTSD included status as a member of the National Guard or Reserves, female gender, Hispanic ethnicity, more lengthy deployment, and more extensive exposure to combat. Of those with probable PTSD or depression, 30% received minimally adequate care. Barriers to care included, in rough order, concerns about confidentiality and discrimination, preferences for relying on family and friends, concerns about the effectiveness or side effects of treatments, and logistics (e.g., cost). [Abstracted by Editor]

Seal, K. H., Bertenthal, D., Miner, C. R., Sen, S., & Marmar, C. (2007). **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, 167,* 476-482. US veterans separated from OEF/OIF military service and first seen at VA health care facilities between September 30, 2001 (US invasion of Afghanistan) and September 30, 2005, were studied. The prevalence and clinical circumstances of subgroups at greatest risk for mental health disorders are described. Of 103,788 OEF/OIF veterans seen at VA health care facilities, 25,658 (25%) received mental health diagnosis(es), 56% of whom had 2 or more distinct mental health diagnoses. Overall, 32,010 (31%) received mental health and/or psychosocial diagnoses. Mental health diagnoses were detected soon after the first VA clinic visit (median of 13 days), and most initial mental health diagnoses (60%) were made in nonmental health clinics, mostly primary care settings. The youngest group of OEF/OIF veterans (age, 18-24 years) were at greatest risk for receiving mental health or PTSD diagnoses compared with veterans 40 years or older. Co-occurring mental health diagnoses and psychosocial problems were detected early and in primary care medical settings in a substantial proportion of OEF/OIF veterans seen at VA facilities. [abstract adapted]

Smith, T. C., Ryan, M. A. K., Wingard, D. L., Slymen, D. J., Sallis,

J. F., Kritz-Silverstein, D., et al. (2008). **New onset and persistent symptoms of post-traumatic stress disorder self reported after deployment and combat exposures: Prospective population based US military cohort study.** *British Medical Journal, 336,* 366-371. To describe new onset and persistence of self reported PTSD symptoms in a large population based military cohort [Millennium Cohort Study], many of whom were deployed in support of the wars in Iraq and Afghanistan, data were collected from 50,184 service members. More than 40% of the cohort were deployed between 2001 and 2006; between baseline and follow-up, 24% deployed for the first time in support of the wars in Iraq and Afghanistan. New incidence rates of 10-13 cases of PTSD per 1,000 person-years occurred in the millennium cohort. New onset self-reported PTSD symptoms or diagnosis were identified in 7.6-8.7% of deployers who reported combat exposures, 1.4-2.1% of deployers who did not report combat exposures, and 2.3-3.0% of non-deployers. Among those with self reported symptoms of PTSD at baseline, deployment did not affect persistence of symptoms. Conclusions: After adjustment for baseline characteristics, these prospective data indicate a threefold increase in new onset self-
reported PTSD symptoms or diagnosis among deployed military personnel who reported combat exposures. The findings define the importance of PTSD in this population and emphasize that specific combat exposures, rather than deployment itself, significantly affect the onset of symptoms of PTSD after deployment. [abstract adapted]

Smith, T. C., Wingard, D. L., Ryan, M. A. K., Kritz-Silverstein, D., Slymen, D. J., Sallis, J. F., et al. (2008). **Prior assault and post-traumatic stress disorder after combat deployment.** *Epidemiology, 19,* 505-512. The objective of this study was to prospectively examine the relation between prior assault and new-onset PTSD symptoms in a large US military cohort deployed in the wars in Iraq and Afghanistan. Data on exposures and health outcomes were collected in the Millennium Cohort study at enrollment (July 2001 to June 2003) and follow-up (June 2004 to February 2006) from over 55,000 participants. Of these, 5,324 were deployed in Iraq and Afghanistan, reported combat exposures, and were free of PTSD at baseline (881 women and 4,443 men). New-onset PTSD symptoms or diagnosis among deployers reporting combat exposures occurred in 22% of women who reported prior assault and 10% not reporting prior assault. Among men reporting prior assault, rates were 12% and 6%, respectively. Adjusting for baseline factors, the odds of new-onset PTSD symptoms was more than 2-fold higher in both women and men who reported assault prior to deployment. [abstract adapted]

Vasterling, J. J., Proctor, S. P., Amoroso, P., Kane, R., Heeren, T., & White, R. F. (2006). **Neuropsychological outcomes of Army personnel following deployment to the Iraq War.** *Journal of the American Medical Association, 296,* 519-529. Neuropsychological performance deficits serve as sensitive measures of neural dysfunction and are often associated with psychosocial and occupational problems. Previous studies have not conducted objective neuropsychological assessments both before and after a major war-zone deployment. To examine objective neuropsychological outcomes of Iraq War deployment in a large military cohort, the Neurocognition Deployment Health Study, a prospective, cohort-controlled study conducted at military installations, was initiated. This report centers on 961 male and female active-duty Army soldiers drawn from the larger cohort. Deploying Army soldiers (n = 654) were examined prior to deployment to Iraq (April-December 2003) and shortly after return (January-May 2005) from Iraq deployment. A comparison group of soldiers (n = 307) similar in military characteristics but not deploying overseas during the study was assessed in sessions timed to be as close as possible to the assessment of deployers. Multiple linear regression analyses adjusted for battalion membership revealed that Iraq deployment, compared with nondeployment, was associated with neuropsychological compromise on tasks of sustained attention, verbal learning, and visual-spatial memory. Iraq deployment was also associated with increased negative state affect on measures of confusion and tension. In contrast, deployment was associated with improved simple reaction time. Deployment effects remained statistically significant after taking into account deployment-related head injury and stress and depression symptoms. Deployment to Iraq is associated with increased risk of neuropsychological compromise. Findings point to the need to investigate further the impact of deployment on neural functioning. Public health implications include consideration of neuropsychological compromise in health prevention and postdeployment clinical and occupational management. [abstract adapted]

CITATIONS

Bliese, P. D., Wright, K. M., Adler, A. B., Cabrera, O., Castro, C. A., & Hoge, C. W. (2008). **Validating the Primary Care Posttraumatic Stress Disorder Screen and the Posttraumatic Stress Disorder Checklist with soldiers returning from combat.** *Journal of Consulting and Clinical Psychology, 76,* 272-281. In a sample of 532 service members, the Primary Care PTSD Screen and the PTSD Checklist had good and comparable diagnostic efficiency. Implications and limitations were discussed.

Engelhard, I. M., Van den Hout, M. A., Weerts, J., Arntz, A., Hox, J. J. C. M., & McNally, R. J. (2007). **Deployment-related stress and trauma in Dutch soldiers returning from Iraq.** *British Journal of Psychiatry, 191,* 140-145. Dutch infantry troops from three cohorts completed questionnaires before deployment to Iraq (n = 479), and about 5 months (n = 382, 80%) and 15 months (n = 331, 69%) after. There were no group changes for general distress. Rates of deployment-related PTSD based on questionnaires substantially overestimated rates of PTSD based on clinical interviews.

Erbes, C., Westermeyer, J., Engdahl, B., & Johnsen, E. (2007). **Post-traumatic stress disorder and service utilization in a sample of service members from Iraq and Afghanistan.** *Military Medicine, 172,* 359-363. PTSD, depression, alcohol abuse, quality of life, and mental health service utilization were studied in 120 returnees from the wars. Prevalences were 12% for PTSD and 33%

for problematic drinking. Mental health services were used by 56% of PTSD cases and 18% of alcohol abuse cases.

Grieger, T. A., Cozza, S. J., Ursano, R. J., Hoge, C., Martinez, P. E., Engel, C. C., et al. (2006). **Posttraumatic stress disorder and depression in battle-injured soldiers.** *American Journal of Psychiatry, 163,* 1777-1783. Rates, predictors, and course of probable PTSD and depression were examined three times (1, 4, and 7 months post-injury) in 243 hospitalized soldiers. Early severity of physical problems was strongly associated with later PTSD or depression. The majority of soldiers with PTSD or depression at 7 months did not meet criteria for either condition at 1 month.

Hoge, C. W., McGurk, D., Thomas, J. L., Cox, A. L., Engel, C. C., & Castro, C. A. (2008). **Mild traumatic brain injury in U.S. soldiers returning from Iraq.** *New England Journal of Medicine, 358,* 453-463. In a survey of 2,525 soldiers, mild traumatic brain injury (i.e., concussion) was strongly associated with PTSD and physical health problems 3 to 4 months after the soldiers returned home. PTSD and depression were important mediators of the relationship between mild traumatic brain injury and physical health problems.

Lapierre, C. B., Schwegler, A. F., & LaBauve, B. J. (2007). **Post-traumatic stress and depression symptoms in soldiers returning from combat operations in Iraq and Afghanistan.** *Journal of Traumatic Stress, 20,* 933-943. Following deployment to either Iraq (n = 2,275) or Afghanistan (n = 1,814), 44% of survey participants self-reported clinically significant levels of depressive symptoms, posttraumatic stress symptoms, or both. These results suggest a potentially high rate of mental health concerns in soldiers immediately after returning from a combat zone.

Larson, G. E., Highfill-McRoy, R. M., & Booth-Kewley, S. (2008). **Psychiatric diagnoses in historic and contemporary military cohorts: Combat deployment and the healthy warrior effect.** *American Journal of Epidemiology, 167,* 1269-1276. The authors compared incidence of diagnosed mental disorders in a cohort of Marines deployed to combat (OIF or OEF) to the rates in two historical and two contemporary military control groups. Psychiatric disorders were diagnosed most frequently during the initial months of recruit training. The disproportionate loss of psychologically unfit personnel early in training creates a "healthy warrior effect," because only those persons who have proven their resilience during training remain eligible for combat.

Tanielian, T., & Jaycox, L. H. (Eds.). (2008). *Invisible wounds of war: Psychological and cognitive injuries, their consequences, and services to assist recovery.* Santa Monica, CA: RAND Center for Military Health Policy Research. In the face of mounting public concern over post-deployment health care issues for OEF/OIF veterans, several task forces, independent review groups, and a Presidential Commission have been convened to examine the care of the war wounded and make recommendations. Concerns have been most recently centered on two combat-related injuries in particular: PTSD and traumatic brain injury. With the increasing incidence of suicide and suicide attempts among returning veterans, concern about depression is also on the rise.

Wright, K. M., Bliese, P. D., Thomas, J. L., Adler, A. B., Eckford, R. D., & Hoge, C. W. (2007). **Contrasting approaches to psychological screening with U.S. combat soldiers.** *Journal of Traumatic Stress, 20,* 965-975. Four different approaches to psychological screening were evaluated against structured clinical interviews in studies with U.S. soldiers preparing to deploy and returning from combat operations in Iraq. A composite screen with measures of posttraumatic stress, depression, and alcohol problems, along with a single self-referral item, performed most effectively.

NEW OEF/OIF PUBLICATIONS From The National Center for PTSD

The National Center for PTSD has several new publications available online that could be of interest to OEF/OIF Veterans and clinicians who work with them:

Returning from the War Zone: A Guide for Military Personnel contains information to help military personnel understand what to expect when returning from a war zone, and to help them adapt to home life.
http://www.mentalhealth.va.gov/MENTALHEALTH/ptsd/files/SMGuide.pdf

Returning from the War Zone: A Guide for Families of Military Members helps military family members understand what to expect during the reintegration period following their loved one's time in a war zone, and helps them adapt to home life together.
http://www.mentalhealth.va.gov/MENTALHEALTH/ptsd/files/FamilyGuide.pdf

These new guides now include full color photos, narratives and live links. They have also been formatted for easy printing to use as handouts. An interactive version of *Returning from the War Zone: A Guide for Families of Military Members* with video clips is also now available.
http://dev.mindandmedia.com/va/narration4/player.html

Please see as well the VA's OEF/OIF Mental Health Care Resources pages, providing a wealth of information about VA mental health services as well as other links that should be quite helpful to returning OEF/OIF Veterans.
http://www.mentalhealth.va.gov/MENTALHEALTH/OEFOIF/index.asp

The focus of this issue brings to mind the breadth of research on OEF/OIF Veterans currently being conducted by researchers at the various divisions of NCPTSD. This research spans from basic science to intervention development, with levels of analysis ranging from neuroscience to families and communities. Although we cannot provide details about all of the dozens of studies currently listed in the Center's database, we will highlight a few projects that seem to provide a flavor for the whole.

One aim of PTSD research is to increase understanding of risk and resilience among persons exposed to combat. The Behavioral Science Division is examining psychological, social, and biological markers of risk and resilience prospectively in a cohort of Marines (Dewleen Baker, Bill Nash, and Brett Litz); the consequences of head injuries on emotional functioning and neurocognitive performance among Army soldiers (Kevin Brailey and Jennifer Vasterling); and the effects of PTSD on anger and partner violence among OEF/OIF Veterans (Casey Taft). The Neurocognition Deployment Health Study (NDHS) is a major longitudinal study of OIF Veterans that since 2003 has been building a unique dataset encompassing pre- and post-deployment measures of mental health and performance (e.g., Vasterling and Sue Proctor). A particularly exciting development at the Behavioral Science Division has been the development of a PTSD population registry (Terry Keane); this national registry will gather data from Veterans with PTSD to allow study of the natural history of PTSD, including progression and remission, risk factors, and comorbidities. The Clinical Neurosciences Division is collaborating with the Connecticut Department of Mental Health to study risk for adjustment problems among returnees from Iraq and their families (Steve Southwick); and the Women's Division is conducting research to validate the Deployment Risk and Resilience Inventory (Dawne Vogt).

Much of the Center's OEF/OIF research is focused on developing and disseminating treatments for combat-related mental health problems. The Behavioral Science Division is examining the efficacy of combining D-cycloserine (a medication to enhance extinction) and exposure therapy to treat PTSD (Litz); the Clinical Neurosciences Division is examining the use of propranolol to block reconsolidation of combat memories (Deane Aikins); and the Women's Division is testing relationship enhancement therapy (Taft and Candice Monson). Several researchers across divisions are participating in the "STRONG STAR" multidisciplinary PTSD research consortium, which includes projects on assessment (Litz and Alan Peterson, Behavioral Science Division); cognitive behavioral conjoint therapy for PTSD (Monson, Women's Division); and individual versus group cognitive processing therapy (Patty Resick, Women's Division). The Dissemination Division has launched a longitudinal survey predicting treatment utilization and clinical outcomes over 2 to 3 years among VA patients with PTSD (Craig Rosen).

NCPTSD is also actively engaged in developing novel modes of screening or treatment delivery. The Behavioral Science Division is developing procedures for automated telephone screening of alcohol problems and other conditions (Lisa Najavits); the Pacific Islands Division is examining whether cognitive processing therapy can be delivered effectively to Veterans in rural and remote areas via video-teleconferencing (Leslie Morland); and the Dissemination Division is comparing clinical outcomes of PTSD patients randomized either to usual aftercare or to usual care plus biweekly telephone monitoring (Rosen). The Behavioral Science Division is evaluating the use of web-based (online) interventions to enhance coping and resilience among military families (Dan King and Lynda King); to treat PTSD in primary care settings (Litz); and to treat prolonged grief (Litz). Litz's DE-STRESS model is based on cognitive behavioral principles and makes use of "coaches" to whom participants have routine access via e-mail and phone.

Finally, the Executive Division is examining the use of community networks to help with service members' reintegration (Laurie Slone). Building on their prior work in Vermont, these researchers aim to create a community network (in another state) that will assist military members and their families, educate the community about PTSD, decrease barriers to care, and bring together community stakeholders to address service gaps.

National Center for PTSD
VA Medical Center (116D)
215 North Main Street
White River Junction, VT 05009-0001