

Organizational Psychosocial Factors and Deployment-Related Exposure Concerns in Afghanistan/Iraq War Veterans

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Objective: Environmental exposure concerns are associated with adverse health outcomes in soldiers deployed to South West Asia. There is little data on factors associated with the reporting of exposure concerns. We explored the relationship between deployment-related preparedness/support and exposure concerns. **Methods:** Retrospective chart review of 489 Afghanistan/Iraq veterans evaluated at a Veterans Affairs tertiary center for postdeployment health. **Results:** Virtually all subjects were concerned about environmental exposure(s). There were no significant demographic differences in exposure concerns, preparedness/support variables, or both. Preparedness/support correlated inversely with exposure concerns. Mental health function mediated the relationship between preparedness/support and exposure concerns. **Conclusions:** Deployment-related preparedness/support is associated with exposure concerns and mental health functioning. Definitive studies will provide data and insight on how the military may better prepare/support soldiers to optimize their resilience and reduce deployment-related exposure concerns.

Since the September 11, 2001, World Trade Center attacks, approximately two million members of the US Armed Forces have served in combat or in support of combat operations in Afghanistan and Iraq. From 2002 through the third quarter of fiscal year 2011, 1,353,627 soldiers who served in the Afghanistan/Iraq conflicts have become eligible for health care through the Department of Veterans Affairs (VA), of which 711,986 (i.e., ≈53%) have obtained care at the VA. This cohort of soldiers comprises the nation's newest veterans of war. They made up 7% of the VA's health care utilization during the past year.¹

The experience of war is associated with tremendous physical, psychosocial, and environmental stressors. Persons who have served in conflict are likely to return home with physical and/or mental health symptoms related to their deployment. The three most common diagnoses of Afghanistan/Iraq war veterans who have sought VA health care to date are musculoskeletal ailments (primarily joint and back disorders) (55.7%), mental health disorders (51.7%), and "symptoms, signs, and ill-defined conditions" (50.6%).¹

The diagnostic category of "symptoms, signs, and ill-defined conditions" is a diverse, catch-all category commonly used in outpatient populations and consists primarily of common symptoms

that do not have an immediately obvious cause during a clinic visit or of laboratory test abnormalities that do not point to a particular disease process.¹ Medically unexplained symptoms, symptom-based illnesses, or both, which have been frequently reported by veterans deployed to South West Asia, fall into this diagnostic category.^{2,3} Given the high prevalence of symptom-based illnesses in veterans presenting at the VA for health care, understanding factors that contribute to symptom-based illnesses is important in the prevention, treatment, and long-term management of illnesses among veterans deployed to Afghanistan/Iraq.

Research studies have demonstrated that veterans who endorse deployment-related exposures tend to experience more symptom-based illnesses and poorer health relative to their unexposed counterparts.⁴ Perceived threat or fear of bodily harm acts synergistically with perceived exposure hazards to adversely impact physical and mental health functioning.⁵

It is common for individuals to report an exposure and have little or no concern related to such an exposure, especially if it is an exposure with which they are familiar or that was anticipated. On the contrary, many veterans report little or no actual exposure, yet they have a very high level of concern regarding potential exposure. The unfamiliar and involuntary nature of the occupational/environmental exposures in deployed settings increases the perception of risk and potentially heightens the reported level of concerns associated with exposures, particularly for "unknown" exposures and "dread" hazards such as nuclear, biological, or chemical warfare agents (see Santos et al⁶ elsewhere in this issue). Therefore, it is not sufficient to ask about only the presence or absence of exposure(s); rather, it is necessary to further explore the level of veterans' concern about each exposure. Whether that exposure is real or perceived, the concern is real from the perspective of veterans.

As demonstrated in the companion article⁷ published in this Special Issue, environmental exposure concerns are highly prevalent among Operation Enduring Freedom/Operation Iraqi Freedom veterans in this tertiary care study population, and higher levels of exposure concerns positively correlated with greater somatic symptom burden. The authors concluded that unresolved exposure concerns adversely impact physical symptom reporting in these veterans. Understanding and alleviating factors associated with elevated concerns, therefore, may help to reduce symptom reporting in these veterans.

One factor that may lead to greater concern about environmental exposures is deployment-related psychosocial factors such as preparedness/social support. In one study that examined organizational psychosocial factors on workers' health after the World Trade Center terrorist attacks, the results showed that after controlling for the level of traumatic experience, workers who felt unsupported as a result of a defensive organizational culture were more likely to report physical symptoms (cough) and job stress, and job stress was an independent predictor of productivity losses.⁸

In this study, we examined whether deployment-related preparedness, support, or both, controlling for level of combat exposure, are associated with the level of concern about environmental hazards. We examined whether resilience, defined as better mental

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Conflicts of Interest and Source of Funding: None declared.

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DOI: 10.1097/JOM.0b013e318255ba57

health function, could explain the relationship between preparedness/support and concern about exposure.

METHODS

The New Jersey War Related Illness and Injury Study Center (WRIISC) is a Department of Veterans Affairs tertiary referral clinical program that specializes in addressing postdeployment health concerns of veterans. Evaluation of veterans at the WRIISC generally includes an assessment of military exposures by an occupational and environmental medicine physician and evaluations by a neuropsychologist/psychologist, social worker, education specialist, as well as a complete history and physical examination by a specially trained nurse practitioner or primary care physician.

As part of their evaluation at the WRIISC, veterans complete a comprehensive intake questionnaire packet, which obtains information about deployment-related environmental and occupational exposures; level of concern about the exposures; preparedness/support before, during, or after deployment; combat-related exposures; mental health functioning; physical symptoms; and demographic information.

The study population comprised 489 Afghanistan/Iraq war veterans who sought clinical evaluation at the WRIISC from March 2006 to June 2010 because of deployment-related health problems, exposure concerns, or both. We conducted a retrospective chart review of the intake questionnaires completed by the participants and explored the relationship between preparedness/support and the reporting of deployment-related exposure concerns in the study population.

MEASURES

Exposure Concerns

Objective assessment of deployment-related occupational and environmental exposures (eg, air sampling) is fraught with logistical challenges because such exposures are highly variable and largely unpredictable. Furthermore, consistent industrial hygiene measurements in combat theater are not always feasible, biomonitoring is often not practicable, and, in the instances when exposure modeling is performed, such data, for the most part, are not readily accessible to public health researchers or clinicians outside the Department of Defense. As such, self-report is frequently used as a surrogate for deployment-related exposures in the vast majority of research studies and clinical encounters.⁹

There is no standardized validated questionnaire used to assess veterans' occupational and environmental exposures in theater. In line with occupational health studies and most Gulf War studies, exposures in this study were assessed using checklist questionnaires because studies demonstrate that qualitative rating of perceived exposures tends to correlate reasonably well with an external standard.^{9,10}

For the purposes of the WRIISC clinical evaluation, an exposure assessment questionnaire measure was created by one of the authors (R.T.), an occupational and environmental medicine physician who specializes in postdeployment environmental exposure concerns. Development of this questionnaire was based on clinical experience and questionnaires used in previous studies,^{4,9,11-14} and the questions were adapted to address specific exposures pertinent to deployment to Iraq/Afghanistan as well as the level of concern associated with each reported exposure.

This questionnaire asked veterans to report (yes, no, or don't know) whether they had been exposed to 16 specific environmental/occupational hazards during their deployment and/or military service. These exposures included air pollution in general; smoke, soot, and air pollution from a specific source; contaminated food/water; petrochemicals; chemicals that they worked with; depleted uranium; chemical alarms/gear/antidotes tablets; chemical weapons; biological or radiological warfare agents; military vaccines; anthrax vac-

cine; prophylactic/preventative medicines; insect bites; insect repellent/insecticide/pesticide/flea collars; defoliants or other herbicides; and witnessed death/human remains and/or sustained serious combat injuries. These are the most common deployment-related exposures of interest that have been evaluated in studies of Gulf War veterans by other researchers.^{4,9,11-14}

In addition to listing potential exposures, the WRIISC intake exposure questionnaire asked the veterans to indicate the level of concern they had regarding each of the exposures they reported. Veterans were asked to rate their level of concern on a five-point Likert scale (0 = not at all concerned, 1 = somewhat, 2 = moderately, 3 = very, 4 = extremely concerned). We computed a summary score for exposure concerns on the basis of the level of concern endorsed by the respondents. If a veteran reported that he or she was not exposed, this was coded as not concerned, or "0."

Preparedness/Support

For the Veteran's most recent deployment, we obtained information about the perceived level of preparedness/support and enquired to what extent the veteran felt that he or she received adequate training and information and felt supported during and after deployment (see Table 1). These organizational psychosocial questions and response options were derived/utilized in a clinical context. The questions used were thematically similar to some of the component questions in the deployment risk and resilience inventory by King et al,¹⁵ a validated questionnaire that assesses deployment/war zone factors of preparedness and social support that has been used by Afghanistan/Iraq war veterans.¹⁶

Combat Exposure

Combat exposure for the veteran's most recent deployment was assessed with four questions that addressed to what extent the veteran participated in or was exposed to combat/dangerous duties, was in imminent danger of being injured or killed, and experienced injuries to or losses of unit members (see Table 2). The abbreviated questionnaire used for our study was obtained from the Combat Exposure Scale, a validated questionnaire that is widely used to assess exposures to combat-related stressors.¹⁷

TABLE 1. Organizational Psychosocial Variables—Perceived Preparedness/Support in the WRIISC Study Population

	No, Not at All, %	Yes, a Little, %	Yes, a Lot, %
Received appropriate information/training prior to deployment	16.5	37	46.5
Received appropriate information/training while deployed	12.7	37.2	50.1
Received support needed to do job in regard to physical support and materials	19.4	38.2	42.4
Received support needed to do job in regard to emotional and psychological support	34.9	36.6	28.6
Received support needed to adjust to civilian life	43.5	34.5	22.0

WRIISC, War Related Illness and Injury Study Center.

TABLE 2. Reported Level of Combat Exposure and Perceived Threat in WRIISC Study Population

Combat patrols or other dangerous duties?	No	1–3 times	4–12 times	13–50 times	≥51
	22.1%	11.3%	10.9%	13.5%	42.2%
Under enemy fire?	Never	1 day	<1 wk	1–4 wk	4 wk
	27.5%	9.5%	12.1%	11.1%	39.7%
% Unit killed, wounded, or missing in action?	None	1–25%	26–50%	51–75%	≥76%
	45.4%	49.5%	4.0%	0.8%	0.2%
Danger of injury/death?	Never	1–2 times	3–12 times	13–50 times	≥51
	16.9%	13.3%	16.7%	12.4%	40.7%

WRIISC, War Related Illness and Injury Study Center.

Mental Health Functioning

Mental health functioning was assessed with the Veterans Medical Outcomes Study 36-item Short Form Health Survey (SF-36). This instrument is widely used to assess physical and mental health functioning in veteran populations.^{18,19} An algorithm is used to derive a mental health composite scale and a physical health composite scale. Validity of the SF-36 has been confirmed through comparisons with similar measures.^{20,21}

STATISTICAL ANALYSES

Descriptive analyses were conducted to examine the demographic variables and the prevalence of each of the organizational psychosocial variables of interest (preparedness/support) and combat exposure variables. To determine whether the items that queried about perceived preparedness/support should be part of the same scale, we first examined the relationship of each of these items to the dependent variable (exposure concern), using Pearson's coefficient. The correlation of each item to the dependent variable was similar. We next examined the internal consistency of the items through computing the Cronbach α , a reliability coefficient. We repeated this analysis for the combat variables of interest.

Next, Pearson's coefficient of correlation analyses were conducted to determine the correlation of the three independent and mediation variables, preparedness/support, combat exposure, and mental health function with the dependent variable, which is the level of concern about environmental exposures. We then regressed these variables on the dependent variable, concern about environmental exposure. We assessed whether mental health function mediated, or accounted for, the association between preparedness/support and concern about environmental exposure.

Using the method described by Baron and Kenny,²² first the independent variable was regressed on the dependent variable. Second, the independent variable was regressed on the mediator variable. Then, the independent and mediator variable was regressed on the dependent variable. Finally, we assessed whether the relationship between preparedness and level of concern about environmental exposure changed with the mediator variable in the model. A bootstrapping technique based on 5000 bootstraps and a 95% confidence interval (CI) was also used to determine whether there was mediation. Bootstrapping techniques are commonly used to determine mediation and indirect effects.^{23,24}

RESULTS

Demographics

The average age of the Afghanistan/Iraq war veterans in the WRIISC study population was 32.4 (± 9.7) years and the vast majority (88%) were men. Our sample was ethnically and racially diverse and comprised mainly married/living as married (42.2%) or

single persons (41.5%). Persons who were divorced/separated from their spouses comprised 15.9%, and 0.4% of our study population was widowed. On average, years of education completed was 13.6 (± 1.7).

We compared the demographic characteristics of our study population with those of all separated military personnel who served in support of the Afghanistan/Iraq conflicts and are eligible for VA health care services nationwide, as well as those who utilized VA health care services nationwide from 2002 through May/June 2011, which was the most current data available from the Office of Public Health, Veterans Health Administration.¹

As shown in Table 3, the gender distribution in this study sample mirrored that of Afghanistan/Iraq war veterans who are eligible for and those who utilized VA services nationwide. Younger veterans seemed to be slightly overrepresented in this study sample relative to the two national reference populations.¹ Although the distribution of race/ethnic categories was similar in persons eligible for VA services, versus those who actually utilized VA services, ethnic minorities were overrepresented in the WRIISC study sample. Soldiers who were in the Army or Marine Corps composed the vast majority (87.1%) of the WRIISC study sample compared with those eligible for VA services nationwide where those in the Army or Marine Corps comprised 65.9% versus 74.5% of those who utilized VA services nationwide. Reserve/National Guard soldiers composed approximately 60% of the WRIISC sample versus approximately 45% of the national reference populations of Afghanistan/Iraq veterans (Table 3).¹

We explored the relationship between demographic characteristics of the WRIISC study population and the study variables of interest. As shown in Table 4, relative to ethnic minorities, non-Hispanic whites were significantly more likely to report higher levels of combat exposures and higher average numbers of occupational/environmental exposures, although the level of concern about these exposures was similar between the two groups. There were no differences in reported level of preparedness/support based on race. Reserve and National Guard veterans tended to report higher levels of exposure concern relative to active duty veterans although the difference did not achieve statistical significance. The two groups did not differ in their reporting of preparedness/support or combat exposure. Men were significantly more likely to report higher levels of combat exposures relative to women. There were no gender differences in the level of preparedness/support or related to exposure concerns (Table 4).

Exposure Concerns

Of the 489 subjects in this study, 98.9% reported having at least one exposure to a hazard. On average, veterans in this study endorsed exposure(s) to at least 8 of the possible 16 hazards on the exposure questionnaire. As detailed in the companion article (see

TABLE 3. Demographic Information

	Afghanistan/Iraq Veterans Who Used VA Health Care in FY 2002–2011 (as of June 2011)*	Afghanistan/Iraq Veterans Separated From Active Duty Who Are Eligible for VA Health Care as of May 2011*
Afghanistan/Iraq Veterans in WRIISC Study Sample (N = 489), %	(N = 711,986), %	(N = 1,353,627), %
Sex		
Male	88.1	88.4
Female	11.9	11.5
Birth year cohort		
1980–1995	53.2	46.9
1970–1979	20.9	26.7
1960–1969	17.8	19.9
1950–1959	6.0	5.6
1926–1949	2.1	0.9
Race/ethnicity		
White	36.4	50.3
Black	16.8	9.6
Latino	30.9	9.5
Other	8.0	6.2
Military branch		
Army	66.4	52.9
Marine	20.7	13.0
Navy	8.4	16.4
Air Force	4.4	17.6
Coast Guard	0.2	0.2
Unit type		
Active duty	40.5	54.3
Reserve/guard	59.5	45.7

VA, Veterans Affairs; WRIISC, War Related Illness and Injury Study Center.
*From Veterans Health Administration.¹

TABLE 4. The Relationship Between Demographics and Study Variables of Interest

Demographic	Composite Score of Preparedness/Support	Composite Score of Combat Exposure	Average Number of Exposures	Composite Score of Level of Exposure Concern
Race/ethnicity				
Non-Hispanic white	5.6	8.3*	9.0*	16.6
Other	5.7	7.0	8.1	16.6
Duty status				
Active	5.4	7.8	8.7	15.4†
Reserve/National Guard	5.7	7.3	8.4	17.7
Gender				
Male	5.6	7.8*	8.5	16.7
Female	5.8	5.4	8.2	16.2

*Statistical significance when compared with counterpart $P < 0.05$.
†Trend toward statistical significance when compared with counterpart $P < 0.10$.

McAndrew et al⁷ in this issue), the most frequently reported exposure(s) by veterans in this study population was to air pollution from sand, dusts, smoke, etc (87% to 94%), vaccines including anthrax (86%), and petrochemical agents (81%).

For veterans who endorsed exposure to a hazard, we evaluated their level of concern for each hazard by examining the prevalence of having “somewhat” or higher level of concern for that hazard. Table 5 demonstrates that although the prevalence of reported exposures to radiological, chemical, and biological warfare hazards was relatively low among the veterans in this study, the prevalence of reporting concern about these exposures was high (see Table 5). In the current analyses, we collapsed the levels of exposure concern items into a summary score. The composite score for exposure concern on average was 16.6 (±12.7) out of a possible 64.

Preparedness/Support

Most of the veterans in this study reported having some level of feeling prepared/supported before, during, and/or after deployment. Many more veterans reported receiving physical support and materials versus the emotional/psychological support needed to perform their jobs (80.6% vs 65.1%). Almost half of the veterans reported that they did not receive any support for readjustment to civilian life (Table 1).

We examined the relationship of the five items of preparedness/support variable (see Table 1) to the sum total concern about environmental exposure(s) and found that each preparedness item was negatively correlated with the sum of concern about environmental exposures. Thus, veterans who felt well prepared/supported reported less concern about environmental exposure(s). Pearson coefficients ranged from $r = -0.14$ to $r = -0.27$. The Cronbach α for the five items was 0.82. Because of the high correlation relationship between the individual items and similar correlation with our

TABLE 5. Prevalence of Self-Reported Exposure(s) to Environmental Hazard(s) and Prevalence of Concern About Reported Exposure(s)*

Exposure	Prevalence of Reported Exposure(s), %	Prevalence of Reported Concern(s), %
Air pollution—general (eg, sand storm)	94	90
Air pollution—specific (eg, burn pit)	87	93
Vaccines	86	78
Anthrax vaccine	86	86
Petrochemicals	81	84
Insect bites	75	74
Bodies/combat injury	69	75
Insect repellent	67	73
Chemicals used on job	62	74
Prophylactic/preventative medicines	55	74
Contaminated food/water	37	93
Chemical gear/prophylactic tablets	26	85
Depleted uranium	21	94
Chemical weapons	7	93
Biological warfare	6	92
Herbicide	2	90

*Adapted from McAndrew et al.⁷

TABLE 6. Correlations Between Variables

	Environmental Exposure Concern	Preparedness/Support	SF-36 MCS	Combat Exposure/Threat
Environmental exposure concern	1.00	−0.26*	−0.45*	0.35*
Preparedness total	−0.26*	1.00	0.42*	−0.32*
SF-36 MCS	−0.45*	0.42*	1.00	−0.29*
Combat exposure	0.35*	−0.32*	−0.29*	1.00

MCS, Mental Composite Score; SF-36, 36-item Short Form Health Survey.
* $P = 0.01$.

dependent variable, we collapsed the items into a composite score for further analyses. The composite score for training, preparedness, and support on average was 5.3 (± 2.9) out of a possible 0 to 10. The negative correlation between the sum of preparedness/support and concern about environmental exposures was moderate ($r = -0.26$; $P = 0.01$) (see Table 6).

Combat Exposures

As summarized in Table 2, the majority (70% to 80%) of the veterans in this study reported that, during their most recent deployment, they participated in combat patrols, dangerous duties, or both; were under enemy fire; and/or were in imminent danger of injury or death. More than half (54.6%) reported that one or more members of their unit were killed, wounded, or missing in action.

We examined the relationship of each combat exposure variable to the sum total concern about environmental exposure(s) and found that each question was positively correlated with concern about environmental exposures. Thus, veterans with higher combat exposures were more likely to report greater concern about environmental exposures. Pearson coefficient ranged from $r = 0.21$ to $r = 0.33$. The Cronbach α for the four items was 0.78. Because of the high correlation relationship between the items and similar correlation of each item with our dependent variable, we collapsed the items into a composite score for further analyses. The composite score for combat exposures on average was 7.4 (± 4.4) out of a possible range of 0 to 16. The positive relationship between the sum of combat exposure and concern about environmental exposure was $r = 0.35$ ($P = 0.01$) (see Table 6).

Mental Health Functioning

Mental health functioning was assessed using the SF-36 mental composite score (MCS), which can range from 0 to 100 with a mean of 50 and a standard deviation of 10. Higher scores denote higher levels of functioning. The average MCS for this study population was very low at 36.6 (± 15.5), and mental health functioning correlated negatively with reported concerns about environmental exposure(s) ($r = -0.45$; $P = 0.01$) (see Table 6).

We conducted regression analyses to evaluate the relationship between deployment-related preparedness and reported concern about environmental exposure(s). We first included all demographic variables. The only variable that contributed to the model was age. Therefore, in the reported model we only controlled for age along with combat exposure and examined whether mental health functioning mediated the relationship between preparedness/support and concern about environmental exposure.

As depicted in Table 6, both preparedness/support and combat exposure correlated significantly to concern about environmental exposure(s). Veterans who reported greater deployment-related preparedness/support were less likely to be concerned about environmental exposures. Veterans who had more difficult deployment ex-

TABLE 7. Regression Analyses Predicting Concern About Environmental Exposure(s)

	Unstandardized Coefficients		Standardized Coefficients		
	<i>B</i>	<i>SE</i>	β	<i>T</i>	<i>P</i>
Age	0.29	0.06	0.22	4.9	<0.01
Preparedness	−0.77	0.21	−0.17	−3.67	<0.01
Combat exposure	0.92	0.14	0.32	6.67	<0.01
Age	0.28	0.06	0.21	5.06	<0.01
Preparedness	−0.23	0.21	−0.05	−1.09	0.28
Combat exposure	0.70	0.13	0.24	5.36	<0.01
SF-36 MCS	−0.29	0.04	−0.36	−7.63	<0.01

MCS, Mental Composite Score; SF-36, 36-item Short Form Health Survey.

periences from the perspective of combat exposures were more likely to report concerns about their environmental exposure(s) (Table 7).

We next entered mental health functioning into the regression model. As depicted in Table 2, The SF-36 MCS was significantly related to concern about environmental exposure(s) and accounted for the relationship between preparedness and concern about environmental exposure(s), as shown in Table 7. Finally, a bootstrapping technique based on 5000 bootstraps and a 95% CI was used to examine our mediation hypotheses. This analysis showed that mental health functioning (95% CI: −0.8689 to −0.3635) mediated the relationship between preparedness and concern about environmental exposure(s).

DISCUSSION

In this study, deployment-related preparedness/support was related to concern about environmental exposures after controlling for level of combat exposure. Mental health function accounted for (mediated) this relationship.

There are two possible explanations for the findings of this study. First, veterans who felt well prepared/supported were more likely to have higher levels of mental function and as such were able to have a healthier coping response with respect to their deployment-related exposure concerns. Second, veterans who have higher levels of mental function were more likely to feel well prepared/supported and were less likely to be concerned about their deployment-related exposures. The cross-sectional and correlational nature of this analysis precludes us from making an inference about cause and effect of the observed associations in this study.

Nevertheless, on the basis of previous literature,^{25–30} we would expect that organizational preparedness/support enables veterans to be more resilient to the adverse impact of war on mental

health functioning. For example, in a cross-sectional study of Danish soldiers deployed to Iraq, help and support from superiors was associated with decreased psychological distress.³⁰ Higher level of mental health functioning and psychological resilience may, in turn, mediate/buffer concerns about environmental exposures and ultimately improve overall physical functioning, sense of well-being, or both.

There are several limitations to this study. The questions used to assess preparedness/support were derived in the context of clinical evaluations, and though these questions are thematically similar to component questions of validated questionnaires used in other studies,^{15,16} the specific questions/response categories used in this study, as far as we are aware, have not been validated in studies of veterans deployed in support of Afghanistan/Iraq conflicts. It will be appropriate for subsequent studies to utilize questionnaires that have been validated in this cohort of soldiers.

Virtually all (98.9%) of the subjects in this study reported having exposure to at least one environmental hazard in the course of their deployment. This is much higher than the prevalence of reported exposure concerns among all US Armed Forces who have been deployed in support of Afghanistan/Iraq conflicts. In the ongoing surveillance of exposure concerns by the Department of Defense, of the cohort of returning soldiers evaluated between October 2009 and September 2010, approximately one third of the soldiers endorsed exposure concerns on their postdeployment health reassessment performed approximately 6 months after their return from combat, with the Reserve/National Guard components reporting much higher levels of concern than those in active duty.³¹ In keeping with national data, the Reserve/National Guard soldiers in this study tended to report higher levels of exposure concerns relative to their active duty counterparts, although this did not achieve statistical significance.

The much higher prevalence of exposure concern in this study versus the national population is not surprising, given that our subjects were drawn from a tertiary specialty referral facility that addresses deployment-related health and exposure concerns. In addition, the subjects in this study self-selected to attend the clinic and are subject to the self-selection and recall biases associated with conducting studies in this type of population. As such the results of this study cannot be generalized to all Afghanistan/Iraq war veterans, although they do provide valuable information about a treatment-seeking cohort of these veterans.

This study evaluated self-reported exposures and perceived levels of concerns about such exposures. The results of this study cannot be used to represent actual exposures in combat because studies have demonstrated that although self-reports can be a useful component of a broader exposure assessment strategy, they are not sufficiently accurate to warrant their sole use in exposure assessment in population-based studies.³²

This study is further limited in that it did not consider time since deployment and how this may or may not affect reported exposure concerns; there are data to suggest that severity of reported mental health symptoms increases over time since return from combat.^{33,34} Subsequent studies that evaluate deployment-related exposure concerns should examine whether exposure concerns vary on the basis of time interval from return from deployment.

What this study demonstrates, however, is that organizational psychosocial variables of preparedness/support are associated with reported exposure concerns, mental health functioning, or both. Large cohort and case-control studies that examine military organizational psychosocial variables and health outcome indicators such as mental health functioning, exposure concerns, multisymptom illness, or all three are needed to have a better understanding of how these organizational variables may be optimized, to improve soldiers' resilience and their ability to deal with the mental health, exposure-related and physical health stressors associated with combat deployment.

ACKNOWLEDGMENTS

This study is the result of the work supported with resources and the use of facilities at the War Related Illness and Injury Study Center, Department of Veterans Affairs, New Jersey Health Care System. The views expressed are those of the authors and do not reflect the official policy or position of the US government.

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