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Description of Risk and Resilience Factors among Military Medical Personnel before Deployment to Iraq

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ABSTRACT Military medical personnel preparing for deployment to Iraq ($N = 328$) participated in a survey concerning predeployment risk and resilience factors. Participants reported exposure to an average of 2.5 potentially traumatic events before deployment and 76% ($n = 229$) reported at least two current concerns about predeployment stressors. Military personnel also endorsed a series of positive appraisals of the military, the mission, and their unit. Fairly low levels of post-traumatic stress disorder symptoms before deployment were reported and positive affect was significantly higher than reported negative affect. Post-traumatic stress disorder symptoms that were present before deployment were most strongly associated with risk factors, whereas positive affect was most strongly associated with resilience factors. Predeployment negative affect was associated with a combination of risk and resilience factors. These findings have implications for possible interventions and preparation of medical personnel before military deployment. A better understanding of the factors related to risk and resilience in military medical personnel will allow for improved screening, educational, training, and clinical programs aimed at increasing resilience before military deployments.

INTRODUCTION

Military medical personnel are at risk for developing psychological morbidity.¹ Among their stressful duties are providing direct, sometimes intensive, medical care to combat casualties in a hostile area (e.g., intervening simultaneously with multiple dying and disfigured individuals while experiencing personal life threat), clearing human remains from combat

zones under life-threatening conditions, being assigned to graves registration, and assisting with body handling and identification.²⁻⁴ Without an established front line, military medical personnel in Iraq are at risk of injury from mortar and rocket attacks, similar to other military personnel. Military medical personnel may arguably face additional risks, above and beyond those experienced by other military personnel, because of their dual and complex roles of healer and warrior. Traditionally military medical personnel focused on the former role but, because of the war zone conditions in Iraq and the proximity of the enemy, many must defend themselves while they heal others, thereby assuming the role of combatant as they work under life-threatening conditions.

Although the specific mental health risks of military medical personnel serving in Iraq are unknown, overall soldiers and Marines serving in Iraq are at a high risk of developing symptoms of depression, post-traumatic stress disorder (PTSD), and generalized anxiety disorders. An initial report by Hoge et al.⁵ indicated that 15.6% to 17.1% of returning Iraq combat veterans surveyed in 2003 met screening criteria for at least one of these disorders. However, these diagnoses are provisional and based on self-report questionnaires, rather than clinical interviews, and these estimates come from elite units engaged in extensive, direct, combat operations. Other

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studies conducted with U.K. military personnel found lower rates of mental health problems. Hotopf et al.⁶ found that 4% of soldiers returning from a 2003 deployment to Iraq met criteria for PTSD. However, it is likely that more U.S. than British troops were exposed to potentially traumatic events.⁷ In a more recent study, Hoge et al.⁸ found that the prevalence of screening positive for a mental health problem between 2003 and 2004 was 19.1% among service members returning from Iraq, compared with 11.3% among those returning from Afghanistan. Mental health problems reported on the postdeployment assessment were significantly associated with combat experiences.

Hoge et al.⁵ also found that 9.3% of soldiers and Marines deployed to Iraq met probable criteria for one of these mental health disorders before deployment to the Middle East, which is slightly higher than the 7.8% prevalence rates of PTSD found among the general population.⁹ Furthermore, other research found evidence that predeployment mental health symptoms predicted health-related quality of life among Persian Gulf War veterans¹⁰ and later mental health problems.¹¹

Although the mental health focus has been on symptoms and quality of life following exposure to potentially traumatic events in the war zone, there is also ample evidence that troops poised for deployment may experience considerable anticipatory anxiety and distress,¹²⁻¹⁴ which may place them at higher risk for mental health difficulties after deployment. Among 2,947 military personnel poised for peacekeeping deployment to Somalia in 1995, 6% exceeded screening criteria for PTSD and 43% endorsed elevated levels of psychological distress.¹² In a sample of peacekeepers poised for deployment to Kosovo in 2000, 13% of soldiers met probable criteria for PTSD.¹⁴ Furthermore, rates of previous exposure to potentially traumatic events (PTE) were high among soldiers poised for deployment; 74% reported exposure to at least one PTE with exposure to a mean of 2.38 PTEs before deployment.¹²

There are several possible reasons for elevated levels of mental health symptoms before deployment. First, before departing on a deployment, military personnel face a number of stressors that may cause nonspecific distress. Saying goodbye to family members and friends, preparing to be away for an indefinite amount of time, making sure that finances are in order, dealing with last minute business, and preparing for an emotionally challenging deployment are among the predeployment stressors that military personnel may face. Second, military personnel who have participated in previous deployments may be reminded of prior traumatic events as they prepare for future deployment. For example, military medical personnel may recall those whom they were unable to save in the past or may have memories of being injured while caring for a comrade. Slusarcick et al.¹⁵ found that, in a military medical personnel sample, occupational experiences with the dying and the dead were significant predictors of adverse mental health responses. A third possibility is that anticipatory stress may cause elevated levels of mental health symp-

toms in military personnel. Finally, predeployment stressors may have residual effects that elevate symptoms. Before Operation Desert Storm, health care personnel reported a mean of 1.44 negative life events in the past year and those stressors were related to anxiety, depression, and PTSD symptoms.¹⁶

Despite the evidence for elevated mental health symptoms before deployment, few studies have examined the predictors of these symptoms before deployment. Most studies focus on postdeployment predictors of mental health sequelae. In this study, we examined risk and resilience factors that may affect mental health and well-being in military medical personnel before deployment, including recent stressors, potentially traumatic events, and positive military experiences. We also examined whether risk factors (predeployment stressors and potentially traumatic events) or resilience factors (positive military experiences and trait resilience) best predicted PTSD symptoms before deployment.

Predictors of negative and positive affectivity before deployment were also examined, given that negative affectivity predicts PTSD¹⁷ and positive affectivity plays a protective role in the context of negative experiences¹⁸ and in the promotion of coping, health, personal resources, and overall well-being.^{19,20} In fact, positive emotions may account for the relationship between pretrauma resilience and later development of mental health symptoms.²⁰

Given the scarcity of research on protective factors before deployment, especially in military medical personnel, we predicted that risk factors would account for a significant proportion of the variance in PTSD symptoms and that resilience factors would account for a small but significant proportion of the variance, above and beyond risk factors. We also predicted that negative affectivity before deployment would be most strongly associated with risk factors, whereas positive affectivity would be most strongly associated with resilience factors.

METHODS

Procedures

U.S. Air Force medical personnel, who were deployed to Iraq to serve as part of the 332nd Expeditionary Medical Group at Balad Air Base in the period between September 2004 and September 2005, were asked to voluntarily complete a survey. A total of 494 U.S. Air Force medical personnel was given a copy of the survey and asked to participate on the day of deployment, a few hours before departure, and 328 (66%) of these individuals agreed to participate. One of the investigators at Wilford Hall Medical Center provided a description and overview of the study. The first page of the survey provided instructions, informed participants that their participation was voluntary, and ensured the confidentiality of their responses. All completed and uncompleted surveys were placed in large envelopes by participants before return so that the investigators were unaware of which participants com-

pleted the surveys. The institutional review boards at Wilford Hall Medical Center and the Boston Department of Veterans Affairs Health Care System approved all procedures and materials.

Military medical personnel completed the survey in an auditorium under standardized conditions, with an investigator present to provide instructions and to answer questions. The questionnaire took ~45 minutes to complete and participants were asked to indicate whether they would be willing to be recontacted to complete mid-deployment and postdeployment surveys.

Participants

Participants were U.S. Air Force medical personnel ($N = 328$) being processed through Lackland Air Force Base (San Antonio, Texas) before their deployment to Iraq. Most were from Wilford Hall Medical Center (Lackland Air Force Base), although other participants were from >20 other military medical treatment facilities around the United States. This cohort was selected because the subjects were all deploying to work at the same hospital setting and because the largest proportion of the 332nd Expeditionary Medical Group staff members were scheduled to deploy from Lackland Air Force Base. In terms of general demographic features, the cohort was representative of the 332nd Expeditionary Medical Group as a whole. Participants were mostly male (58%; $n = 106$), with a sizable female sample (42%; $n = 78$). Participants were 63% ($n = 205$) Caucasian, 12% ($n = 40$) African American, 14% ($n = 45$) Latino, 9% ($n = 28$) Asian American, and 2% ($n = 8$) identified as being of another ethnicity. The majority of participants reported being married (58%; $n = 190$).

Participant varied in age, with 24% ($n = 78$) reporting ages between 18 and 24 years, 19% ($n = 61$) reporting ages between 25 and 29 years, 17% ($n = 56$) reporting ages between 30 and 34 years, 13% ($n = 41$) reporting ages between 35 and 39 years, 17% ($n = 56$) reporting ages between 40 and 44 years, and 10% ($n = 32$) reporting ages of ≥ 45 years. The majority of participants (59%; $n = 191$) were junior enlisted personnel (E1–E4) or noncommissioned officers (E5–E9), with 41% ($n = 135$) reporting a rank of officer (O1–O6). It is important to note that the percentage of officers in the medical corps is much higher than in the military in general, because of the numbers of physicians, nurses, and allied health workers in these units, most of whom are officers. The highest educational level attained varied, with ~1% ($n = 2$) reporting less than high school completion, 10% ($n = 30$) reporting completion of high school, 41% ($n = 127$) reporting some college or an associate's degree, 24% ($n = 76$) reporting a 4-year college degree, and 24% ($n = 75$) reporting a master's degree or higher.

Measures

Predeployment Stressors

Predeployment stressors are defined as ongoing problems or concerns (e.g., financial problems or health problems of fam-

ily members) endorsed at the predeployment assessment. The 13-item scale lists a number of potential predeployment stressors, with a 5-point response format ranging from "very low" to "very high." This measure was rationally derived and modified from the study of peacekeepers from Somalia (Cronbach's $\alpha = 0.84$) reported by Litz et al.²¹ and the study of peacekeepers from Kosovo (Cronbach's $\alpha = 0.87$) reported by Maguen et al.¹⁴ Cronbach's α for the current sample was 0.76.

Life Events Checklist

The Life Events Checklist (LEC) was developed concurrently with the Clinician-Administered PTSD Scale and was designed to be administered before the Clinician-Administered PTSD Scale to screen for potentially traumatizing events that respondents might have experienced at any time in their lives. The LEC consists of 16 items inquiring about the experience of potentially traumatizing events known to result in PTSD or other post-traumatic symptoms, with a response format ranging from "happened to me" to "does not apply." For each LEC item, a score of 1 was assigned only if the respondent reported directly experiencing an event; a 0 was assigned if any other response option was endorsed. One study found that the LEC exhibits excellent test-retest reliability and good convergence with existing measures of trauma history.²² In a clinical sample of combat veterans, LEC results were significantly correlated with measures of psychological distress and were more strongly predictive of PTSD symptoms than was a measure of combat exposure.²²

Positive Military Experiences

Positive military experiences include thoughts and appraisals of the respondent's current military experience (e.g., respect for officers in the unit, trust for soldiers in the unit, extent to which the unit feels like a family, and feelings of belonging in the unit). This nine-item scale includes a 5-point response format ranging from "not at all" to "extremely." This measure was rationally derived for the current conflict. The internal validity for the current sample was 0.83.

Connor-Davidson Resilience Scale

The Connor-Davidson Resilience Scale is a 25-item questionnaire assessing attitudes about coping with adversity (e.g., "having to cope with stress makes me stronger"). Items require respondents to indicate their degree of endorsement on a 5-point scales ranging from "not true at all" to "true nearly all the time." Connor and Davidson²³ reported Cronbach's α of 0.89 for a validation sample of general-population subjects. Cronbach's α for the current sample was 0.92.

PTSD Checklist-Military Version

PTSD symptoms were assessed with a 15-item, modified version of the PTSD Checklist (PCL).²⁴ This questionnaire, the PCL-Military Version (PCL-M), uses a 5-point Likert scale ranging from "not at all" to "extremely" to evaluate the

severity of the PTSD symptoms in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (e.g., repeated, disturbing dreams of the stressful experience). PTSD symptoms include reexperiencing symptoms, avoidance and emotional numbing symptoms, and hyperarousal symptoms. Two items were excluded from the PCL in error (i.e., "your future will be cut short" and irritability symptoms). These items were treated as missing data, and PTSD symptom item means for each individual were substituted for these two items to compute total PCL scores. The PCL-M has excellent internal validity (Cronbach's $\alpha = 0.97$) and reliability ($\kappa = 0.96$) and good sensitivity (0.82) and specificity (0.83).²⁵⁻²⁷ Cronbach's α for the current sample was 0.86.

Positive and Negative Affectivity Schedule

Positive and negative moods were assessed with the 20-item Positive and Negative Affectivity Schedule,²⁸ which contains positive activation (10 items; active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong) and negative activation (10 items; afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared, and upset) subscales. Participants were asked to rate the extent to which they felt each emotion "in the last week" on a 5-point Likert scale ranging from "very slightly or not at all" to "extremely." Watson et al.²⁸ reported Cronbach's α values ranging from 0.86 to 0.90 for positive affect and from 0.84 to 0.87 for negative affect, depending on the time frame assessed. The internal consistency in this study was 0.89 for positive affect and 0.86 for negative affect.

TABLE I. Predeployment Stressors

Item	Proportion (%) Who Endorsed Item as Medium, High, or Very High Concern
Being separated from family members and friends	76 (n = 229)
Completing personal business before I deploy	51 (n = 151)
Family responsibilities	50 (n = 150)
Health problems of family members	34 (n = 102)
Financial problems	34 (n = 103)
Death of close friend or family member	15 (n = 44)
Not having friends to talk to or do things with	10 (n = 29)
Problems with co-workers	10 (n = 29)
Being unfairly treated in my relationship	9 (n = 26)
Personal health problems	8 (n = 24)
Lack of support from my family	5 (n = 16)
Emotional or mental abuse in my relationship	3 (n = 9)
Physical abuse in my relationship	<1 (n = 2)

Percentages reflect endorsements of medium, high, or very high for each item. For each item, the response options were as follows: 1, very low; 2, low; 3, medium; 4, high; 5, very high. The mean score for the full scale was 1.66 (SD, 0.54); N = 328, but values may vary slightly from item to item because of missing data.

TABLE II. Exposure to Potentially Traumatic Events before Deployment

LEC Exposure Item	Proportion (%) Who Endorsed Exposure
Transportation accident (e.g., car accident, boat accident, train wreck, or plane crash)	63 (n = 203)
Natural disaster (e.g., flood, hurricane, tornado, or earthquake)	50 (n = 161)
Physical assault (e.g., attacked, hit, slapped, kicked, or beaten)	37 (n = 119)
Sudden unexpected death of someone close to you	33 (n = 82)
Witnessed sudden violent death (e.g., homicide or suicide)	20 (n = 54)
Unwanted or uncomfortable sexual experience (excluding sexual assault)	17 (n = 52)
Combat or exposure to war zone	17 (n = 52)
Fire or explosion	15 (n = 49)
Serious accident at work, at home, or during recreational activity	14 (n = 44)
Assault with weapon (for example, being shot, stabbed, or threatened with knife, gun, or bomb)	14 (n = 45)
Exposure to toxic substance (e.g., dangerous chemicals or radiation)	11 (n = 34)
Sexual assault (e.g., rape, attempted rape, or made to perform any type of sexual act through force or threat of harm)	10 (n = 31)
Life-threatening illness or injury	8 (n = 26)
Severe human suffering	3 (n = 11)
Serious injury, harm, or death you caused to someone else	<1 (n = 1)
Captivity (for example, being kidnapped, abducted, held hostage, or prisoner of war)	<1 (n = 1)

For each item, the response options were as follows: 0, not applicable; 1, no impact; 2, little negative impact; 3, moderate negative impact; 4, extremely negative impact. The mean score for the full scale was 0.61 (SD, 1.23); N = 328, but values may vary slightly from item to item because of missing data.

RESULTS

Predeployment Stressors

Military medical personnel reported a host of predeployment stressors (Table I). The majority of participants reported significant concern over being separated from family members and friends (76%; n = 229), completing personal business before deploying (51%; n = 151), and family responsibilities (50%; n = 150). Additionally, 90% (n = 275) of participants reported at least one concerning predeployment stressor, 76% (n = 229) reported at least two concerning stressors, and 57% (n = 174) reported three or more concerning stressors before deployment.

Predeployment Trauma

Military personnel reported that a number of potentially traumatic events had occurred in their lifetime, before their deployment (Table II). The majority of military personnel reported experiencing a serious transportation accident (63%;

TABLE III. Positive Military Experiences

Item	Proportion (%) Who Endorsed Item as Quite a Bit or Extremely
How proud do you feel your family members and friends are of your military service?	93 (n = 285)
Do you respect the officers in your unit?	81 (n = 254)
Do you trust the other airmen in your unit?	68 (n = 210)
How good are the available role models and leaders in your unit?	66 (n = 205)
To what extent do you feel you "belong" in your present unit?	64 (n = 200)
How much do you feel the nation supports the military these days?	62 (n = 193)
Do you believe Americans appreciate the importance of military duty in the post-9/11 world?	59 (n = 185)
To what extent is your unit like a family to you?	39 (n = 123)
How isolated do you feel within your unit?	22 (n = 70)

For each item, the response options were as follows: 0, not at all; 1, a little bit; 2, moderately; 3, quite a bit; 4, extremely. The mean score for the full scale was 2.87 (SD, 0.61); N = 328, but values may vary slightly from item to item because of missing data.

n = 203) or a natural disaster (50%; n = 161), with more than one-third experiencing a physical assault (37%; n = 119) or the sudden death of someone close (33%; n = 82). Participants reported an average of 2.5 potentially traumatic events (SD, 1.91 events), with 87% (n = 284) of participants reporting at least one event, 67% (n = 219) reporting at least two events, and 42% (n = 136) reporting three or more events. These rates are slightly higher than those based on population studies. Breslau and Kessler²⁹ found that ~74% of individuals reported direct exposure to potentially traumatic events or witnessing of events. Although the population study indicated lower rates of exposure to traumatic events, compared with our military personnel, individuals experienced ~2.7 events, which is comparable to the findings for the military personnel in our study. However, it is important to note that individuals in our study were younger than the

population in general, which means that a greater proportion of individuals experienced potentially traumatic events at a younger age.

Positive Military Experiences

Military personnel reported a variety of positive appraisals of the military, the mission, their unit, and overall mission support (Table III). More specifically, the vast majority of personnel (93%; n = 285) reported that their friends and family members were proud of their military service, with the majority reporting respect for the officers in their unit (81%; n = 254) and trust for their fellow military medical personnel (68%; n = 210).

Predeployment PTSD and Emotionality

Predeployment PTSD was examined as a continuous severity score, indexed by the PCL-M. The mean predeployment PTSD score was 22.97 (SD, 7.24). This PCL-M mean is comparable to the PCL-M mean reported by peacekeepers in Kosovo before deployment (mean, 25.76; SD, 13.46).¹⁴ Furthermore, as indexed by the Positive and Negative Affectivity Schedule in this sample, reports of positive emotionality (mean, 36.29; SD, 6.98) were significantly higher than reports of negative emotionality (mean, 17.06; SD, 5.75; t = 34.18; p < 0.01).

Predictors of PTSD Symptoms and Affect

In the next set of analyses, we examined predictors of predeployment PTSD symptoms, positive affect, and negative affect. We conducted three hierarchical regression analyses, entering risk variables (stressors and previous traumatic events) in the first block. Resilience variables (positive military experiences and trait resilience) were entered in the second block, to determine whether they accounted for an additional percentage of the variance in each outcome variable. Correlations among variables in the regression models are shown in Table IV.

Predictors of Predeployment PTSD Symptoms

In the hierarchical regression predicting PTSD symptoms before deployment (Table V), the specified risk factors ac-

TABLE IV. Correlations among Variables in Regression Models

Variable	Correlation						
	1	2	3	4	5	6	7
1. LEC	—						
2. Predeployment stressors	0.23 ^a	—					
3. Positive military experiences	-0.02	-0.18 ^a	—				
4. Resilience	0.08	-0.24 ^a	0.34 ^a	—			
5. PTSD	0.34 ^a	0.34 ^a	-0.25 ^a	-0.22 ^a	—		
6. Negative affect	0.15 ^b	0.39 ^a	-0.13 ^b	-0.32 ^a	0.43 ^a	—	
7. Positive affect	0.04	-0.13 ^b	0.46 ^a	0.62 ^a	-0.13 ^b	-0.17 ^a	—

^ap < 0.01, two-tailed test.

^bp < 0.05, two-tailed test.

TABLE V. Hierarchical Regression of Predeployment Factors Predicting PTSD Symptoms

Variable	β	<i>t</i>	<i>R</i> ²
Step 1			0.17 ^a
LEC	0.28 ^a	4.05	
Predeployment stressors	0.24 ^a	3.47	
Step 2			0.20 ^a
LEC	0.30 ^a	4.05	
Predeployment stressors	0.20 ^a	2.75	
Positive military experiences	-0.15 ^b	-2.05	
Resilience	-0.06	-0.83	

Model statistics for the stress symptoms index equation were as follows: $F_{(4,178)} = 11.14, p < 0.01$.

^a $p < 0.01$.

^b $p < 0.05$.

counted for the most variance in PTSD symptoms. The final model accounted for 20% of the variance, with potentially traumatic events ($\beta = 0.30; p < 0.01$), predeployment stressors ($\beta = 0.20; p < 0.01$), and positive military experiences ($\beta = -0.15; p < 0.05$) each predicting a significant proportion of the variance.

Predictors of Predeployment Positive Affect

In the hierarchical regression predicting positive emotionality before deployment (Table VI), the specified resilience factors accounted for the most variance in positive affect. The final model accounted for 44% of the variance, with positive military experiences ($\beta = 0.26; p < 0.01$) and trait resilience ($\beta = 0.53; p < 0.01$) each predicting a significant proportion of the variance. Neither of the risk factors was significantly associated with positive affect.

Predictors of Predeployment Negative Affect

In the hierarchical regression predicting negative affect before deployment (Table VII), the specified risk and resilience factors were each significant contributors to the overall regression equation. The final model accounted for 16% of the variance, with potentially traumatic events ($\beta = 0.14; p <$

TABLE VI. Hierarchical Regression of Predeployment Factors Predicting Positive Affect

Variable	β	<i>t</i>	<i>R</i> ²
Step 1			0.04 ^a
LEC	0.11	1.46	
Predeployment stressors	-0.20 ^b	-2.68	
Step 2			0.44 ^b
LEC	0.01	0.18	
Predeployment stressors	0.01	0.22	
Positive military experiences	0.26 ^b	4.34	
Resilience	0.53 ^b	8.52	

Model statistics for the positive affect index equation were as follows: $F_{(4,177)} = 34.36, p < 0.01$.

^a $p < 0.05$.

^b $p < 0.01$.

TABLE VII. Hierarchical Regression of Predeployment Factors Predicting Negative Affect

Variable	β	<i>t</i>	<i>R</i> ²
Step 1			0.12 ^a
LEC	0.11	1.46	
Predeployment stressors	0.30 ^a	4.18	
Step 2			0.16 ^a
LEC	0.14 ^b	1.99	
Predeployment stressors	0.24 ^a	3.21	
Positive military experiences	-0.01	-0.18	
Resilience	-0.21 ^a	-2.83	

Model statistics for the negative affect index equation were as follows: $F_{(4,176)} = 8.55, p < 0.01$.

^a $p < 0.01$.

^b $p < 0.05$.

0.05), predeployment stressors ($\beta = 0.24; p < 0.01$), and trait resilience ($\beta = -0.21; p < 0.01$) each predicting a significant proportion of the variance.

DISCUSSION

We examined risk and resilience variables among military medical personnel preparing for deployment to Iraq. Although rates of predeployment PTSD symptoms were relatively low and positive affect was greater than negative affect, military medical personnel reported a host of predeployment stressors, which might place them at risk for mental health complications. If military medical personnel are worried about a variety of stressors at home, then it becomes increasingly more complicated for them to remain focused on their military duties during their deployment. Predeployment stressors may create a high baseline of tension, resulting in a ripple effect of stress for military personnel serving in deployed locations.

Similar to rates reported by Bolton et al.¹² and Slusarcick et al.,¹⁶ potentially traumatic events before deployment were widely reported by military medical personnel, and there is evidence that preexisting trauma may place individuals at greater risk for later mental health complications, such as PTSD.^{30,31} With similar definitions of potentially traumatic events (i.e., excluding learning about the traumatic events of others), nearly 74% of U.S. adults in the general community have been exposed to at least one PTSD-qualifying traumatic event,²⁹ which is lower than the rates reported in our study. It is significant that, before deployment, a greater number of military medical personnel reported potentially traumatic events, compared with the population at large, although they were younger than individuals surveyed in epidemiological studies.

We also found that predeployment PTSD symptoms were most strongly associated with risk factors (i.e., predeployment stressors and lifetime trauma), over and above resilience factors. It is possible that, in the context of preparations for deployment, nagging stressors and a history of trauma simply outweigh the benefits derived from a resilient personality in

predicting PTSD symptoms. Risk factors being the most robust predictors of PTSD symptoms before deployment should also be considered within a dose-response framework, given that cumulative stressors and trauma often have long-lasting effects, sometimes affecting individuals many years later.³² Another possibility is that individuals who experience adversity and high levels of stress before deployment are primed for the development of subsequent mental health symptoms, given past history, predeployment stressors, and immediate PTSD symptoms.

Screening for these stressors before deployment and implementing interventions to help military personnel manage anxieties before deployment may ameliorate the long-term mental health impact. This is especially important for potentially high-risk groups such as military medical personnel, who may be intensely involved with and exposed to traumatic injury, death, and dying, above and beyond exposure to war zone stressors. Screening efforts should be implemented with caution and with awareness of their limitations.³³ There have been several guidelines suggested for screening of military personnel,³⁴ including the assertion that the benefits of screening should outweigh the harms (e.g., the stigma arising from being "unfit" for service and the cost of screening programs), especially given the importance of morale and trust in the war zone. Education should focus on indicating that stress before deployment is the norm rather than a liability and that most individuals manage effectively if proper steps are taken to reduce stressors before departure. Interventions also should focus on teaching stress reduction and coping skills related to the transition to the war zone, including communication skills aimed at closure with respect to stressful situations at home. As always, screening tools and education/intervention programs should be empirically tested and validated before implementation on a larger scale.

We also found that resilience factors (i.e., trait resilience and positive military experiences) were most strongly associated with positive affect before deployment, which is consistent with previous findings concerning positive emotions.³⁵ Resilience can be defined as response flexibility in the face of ever-changing situational demands, including the ability to recover from negative and stressful experiences and find positive meaning in seemingly adverse situations. Individuals exhibiting high trait resilience often experience positive emotions even in the throes of stressful events and compounded adversity.³⁶ More specifically, resilient military personnel may experience positive emotions despite numerous reported predeployment stressors, and this personality trait, in addition to positive military experiences, creates a milieu in which military personnel are able to maintain well-being amid serious stressors. As highlighted by Fredrickson and Losada,³⁶ although positive affect may be temporary, the accumulated resources that amass as a result of positive feelings are robust. Furthermore, these resources function as cumulative assets that can be drawn upon in times of need, to manage future stressors and adverse situations.

Positive military experiences before deployment also played an important role in predicting positive affect, with the establishment of trust, support, pride, and belonging being an important foundation that helps military members thrive and feel part of a larger mission and purpose. These positive military experiences are also likely related to fostering strong cohesion and morale, which are associated with fewer post-deployment PTSD symptoms and overall well-being.^{37,38} Establishing this foundation before deployment is critical, given the multitude of war zone stressors that these military medical personnel may experience. If personnel do not feel support, trust, guidance, and feelings of belonging to a larger team, then thriving in this challenging environment will be difficult. Although it is unclear whether trait resilience can be increased, positive military experiences certainly represent a variable that can fluctuate; fostering this strong foundation before deployment may indirectly attenuate adverse mental health reactions after deployment.

Negative affect was associated with a combination of risk and resilience factors, with trait resilience being inversely related to negative affect. The mechanism through which individuals experienced negative affect seems to share a common pathway with PTSD symptoms and positive affect. Although PTSD symptoms and negative affect before deployment might be synonymous, we found that this was not the case, theoretical overlap notwithstanding. We conceptualize the relationship between PTSD symptoms and negative affect as concentric circles, each with its own independent predictors. Another important point to highlight with respect to negative affect is that the existence of negative affect before deployment should not be viewed as maladaptive. In fact, a small dose of negative affect in the midst of preparations for deployment is a healthy response. Some have highlighted that it is important to pay attention to positive:negative affect ratios in trying to understand overall well-being.³⁹ Indeed, we found that, overall, positive affect was significantly greater than negative affect among military medical personnel.

There are several limitations in this study that should be noted. First, given that this was a convenience sample, Air Force medical personnel who were surveyed might not be representative of all military personnel deployed to Iraq or even specifically of military medical personnel. Military personnel deployed to Iraq represent a diverse group, in terms of their branch of service, rank, duties, and demographic characteristics, which is important to consider when interpreting these results. Our sample contained a large proportion of officers (41%; $n = 135$), which is fairly typical of medical military personnel, because of the large number of doctors, nurses, and allied health professionals in these units, but is not typical of the military in general. Our sample also included a large proportion of women (42%; $n = 78$), approximately twice that of women in the Air Force (20%).⁴⁰ Second, there are a number of variables that may be important to capture in the future. For example, a direct measure of cohesion and morale would help depict some of the underlying

sentiments of connectedness that may explain additional variance in a complicated picture. Other personality measures would also likely help to make these results more complete.

There are several important implications of the current study. A better understanding of the factors related to resilience in military medical personnel should allow for improved educational, training, and clinical programs to increase resilience or hardiness before military deployments. Certain resilience variables, such as temperament and cognitive ability, are influenced by genetic factors and thus may be difficult to alter via intervention. Even here, however, we may be able to glean important clues that can assist with programs designed to foster resilience. For example, research that elucidates the coping styles of especially resilient individuals may suggest ways of teaching these styles to others, thereby bolstering their resilience. Moreover, a focus on the individual as the locus of resilience must not lead us to overlook interventions performed at the group level that can positively affect the resilience of group members.⁴¹ Interventions that heighten group cohesion, boost morale, and increase the quality of leadership should buffer personnel against deployment stress. Trusted leadership and strong unit cohesion can be systemic protective factors that lead to increased group resilience in deployed military medical personnel. This highlights the importance of teaching the concepts of leadership and unit cohesion, which are included in most senior military officer professional education courses.

The identification of individual and environmental risk factors among military medical personnel also may help improve programs to decrease the potential negative impact of deployment. Because of the high costs of education and training for many military medical personnel, the discharge of one military medic for a deployment-related mental health disorder could easily cost >\$250,000, in terms of medical disability, medical care, and costs to train a replacement.

Although multiple deployments may heighten the risk for psychological problems, they may also improve resilience, based on increased knowledge and experience of deployed personnel. For example, one prospective study of British troops deployed to Iraq revealed that mental health significantly improved after the troops returned from their successful mission.⁴² These data suggest that well-trained soldiers with high morale who successfully master a stressful deployment may experience improved mental health and possibly increased resilience and self-efficacy. Additional prospective longitudinal research is needed to evaluate the factors of risk and resilience as they relate to military medical deployments.

Overall, military medical personnel deployed to Iraq exhibited low levels of PTSD symptoms and high levels of positive affect before deployment. Premilitary exposure to trauma and current stressors should be included as part of any comprehensive model considering factors that impinge on military personnel before deployment. Trait resilience seemed to protect against overwhelming negative affect and also predicted reports of positive affect among these individ-

uals. Future studies should aim to understand the important role predeployment factors play as military members prepare to deploy, as well as their impact on postdeployment mental health. Although the emphasis has understandably been on mental health responses following deployment, by failing to consider predeployment factors we are at risk of missing critical factors that could help explain the overall well-being of military personnel.

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