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Reassessing War Stress: Exposure and the Persian Gulf War

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Research has shown a clear association between war-zone exposure and psychological readjustment in soldiers. Newer findings suggest that certain event and person characteristics are especially influential in this process. The present article has the following goals: (a) to review existing parameters in the traditional measurement of war-zone exposure, (b) to consider conceptual and methodological limitations in these approaches, (c) to present empirical data from a cohort of Persian Gulf War veterans that support the utility of a broader conceptualization of war trauma, and (d) to examine how gender may be differentially associated with some dimensions of war-zone stress and psychological outcome following deployment. Data suggest that identifying diverse dimensions of war-zone stress may enhance efforts to understand veterans' initial and long-range wartime recovery.

Considerable research to date has confirmed that exposure to combat and associated life threat are clear predictors of both acute and chronic stress reactions and disorders in veterans (Archibald & Tuddenham, 1965; Card, 1983; Fontana & Rosenheck, 1991; Green, Lindy, Grace, & Gleser, 1989; Kulka et al.,

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1988, 1990). This research has shown the importance of measuring combat exposure as a means of understanding the precipitants of these problems (Foy, Resnick, Sipprelle, & Carroll, 1987). Typically, the assessment of wartime exposure has focused on the identification of frequent or commonly occurring combat events, for example, direct threat to life during enemy attack, exposure to artillery, or participation in dangerous patrols (see Wolfe & Keane, 1993, for a review). Based on this emphasis, numerous combat exposure scales have been developed over the past decade in an effort to quantify these dangers (e.g., Figley, 1978, 1985; Friedman, Schneiderman, West, & Corson, 1986; Keane et al., 1989; Laufer, Yager, Frey-Wouters, & Donnellan, 1981; Watson, Juba, & Anderson, 1989; Wilson & Krauss, 1981).

Recently, research and clinical work with posttraumatic stress disorder (PTSD) patients has suggested that combat exposure as a single dimension is insufficient for calculating traumatic exposure (Fontana, Rosenheck, & Brett, 1992; Yehuda, Southwick, & Giller, 1992). Consequently, more diverse dimensions and qualitative features need to be highlighted for evaluating the interaction between wartime exposure and outcome. Wilson and Krauss (1985) described the utility of evaluating the intensity and duration of exposure to certain dangerous combat activities, specifically events involving clear-cut life threat, serious injury, or death. Laufer (1985) and others (Figley, 1985; Fontana et al., 1992; Watson, Kucala, Manifold, Vassar, & Juba, 1988; Yehuda et al., 1992) emphasized the deleterious impact of witnessing or participating in abusive wartime violence in addition to direct combat participation with respect to PTSD. Other researchers (Wilson, Smith, & Johnson, 1985) incorporated qualitative dimensions from work in civilian disasters (e.g., degree of bereavement; speed of stressor onset, duration, or recurrence; extent of displacement from one's home; Gleser, Green, & Winget, 1978) to develop more comprehensive outcome models following war trauma. Finally, Solomon, Mikulincer, and Hobfoll (1987) combined measurement of both subjective and objective parameters of Israeli wartime experiences to delineate elements of perceived military preparedness and degree of exposure to dead bodies. Their findings led them to concur with Ursano and McCarroll (1990) and Green et al. (1989) that exposure to the grotesque as well as extensive contact with the dead and dying were highly predictive of poor outcome in both rescue workers and male combatants.

Methodological Issues of Combat Exposure Measurement

Although empirical work has demonstrated adequate psychometric properties for a number of combat exposure scales (e.g., Gallops, Laufer, & Yager, 1981; Keane et al., 1989; Lund, Foy, Sipprelle, & Strachan, 1984; see Watson et al., 1989, for a review), some important methodological issues still exist. As studies of PTSD evolve, more questions have arisen about the need for specific-

ity of stressor characteristics to assess their interaction with subject-level characteristics. Newer studies of both wartime and civilian trauma specifically indicate that the stress response may be highly complex, with persistent exposure unnecessary for the development of PTSD in some individuals (Baum, 1990), a factor not addressed in existing scales that emphasize event frequency.

Additionally, with the exception of Israeli studies (e.g., Solomon & Mikulincer, 1988), most wartime instruments to date have been developed in the context of the Vietnam War; accordingly, these scales focus primarily on characteristics of that conflict, particularly the protracted combat experiences of male infantry personnel. As military engagements have shifted to briefer, "low-intensity" conflicts involving biochemical weapons and large-scale civilian involvement, scales that were significantly related to psychological outcomes for the Vietnam War may be less applicable for wars such as the Persian Gulf conflict (Buydens-Branchey, Noumair, & Branchey, 1990). Thus, existing scales may have diminished content and construct validity.

A related issue is that these scales may not be descriptive of (or sensitive to) distinctive experiences of female, ethnically diverse, married, and older military personnel who represent rapidly growing segments of the volunteer-based U.S. Armed Forces. To date, most war studies have limited themselves to the reported experiences of male Vietnam combatants (e.g., Fontana et al., 1992), restricting their generalizability, and no prior wartime studies to our knowledge have empirically studied the experiences of men and women deployed within the same units. The present study offers novel, comparative data on the stressor exposure and readjustment of female veterans. Although some civilian trauma studies have included male and female participants, detailed gender comparisons have generally been lacking. Norris (1992) reported on PTSD prevalence rates in a large community sample of men and women following exposure to a host of differing traumatic events, but did not directly examine gender as either a mediator or predictor of psychological outcome nor did she investigate the relationship of gender status to particular event characteristics. Breslau and Davis (1992) found that female gender was a risk factor for PTSD chronicity in a study involving urban young adults, but did not define these findings beyond the identification of subjects' prior (generic) stressor exposure and histories of preexisting psychopathology.

Finally, other issues relate to scale format and administration, specifically the possible confound between self-reported stressor exposure and the time since stressor onset. To date, most studies of PTSD in American combatants have relied on veterans' description of wartime experiences years or decades after actual military service. Some research has suggested that the reporting of stressors is likely to be influenced by subjective appraisal, distress, and subsequent recall bias, leading to a distinct confound between individual perception and more objective event criteria (Sutker, Uddo-Crane, & Allain, 1991). In

addition, recall of exposure may be affected by chronic psychological distress. With the exception of a limited number of surveys and epidemiological studies (e.g., Elder & Clipp, 1988; Kulka et al., 1990), the majority of investigators have relied exclusively on the reports of veterans who are highly symptomatic and typically treatment seeking at the time of evaluation. Thus, estimates of exposure may be constrained by limitations in discriminating objective vs. subjective parameters.

The Ft. Devens ODS Reunion Survey

Despite the fact that the Persian Gulf War was believed to have few adverse consequences for military personnel, anecdotal and clinical reports from soldiers suggest that exposure to a number of traditional (e.g., air and ground attacks) and novel stressors (e.g., fear of biochemical weaponry) occurred. Thus, the Ft. Devens Operation Desert Storm (ODS) Reunion Survey was designed to investigate dimensions of these war stressors and their effects following the conclusion of the Gulf War. We conducted a series of statistical analyses to investigate the potential impact of certain variables on psychological adjustment, focusing particularly on the relationship of traditional exposure measures as compared to the relationship of newer scales developed or modified following the Vietnam War. Because follow-up phases of this longitudinal study are ongoing, we present data from the acute evaluation phase, a period not typically explored in wartime studies. These data depict some critical effects of wartime exposure on very early outcome following military deployment.

Method

Subjects and Procedure

The ODS Reunion Survey, named for its development by a chaplain investigating family reunion factors, consists of a series of standardized and novel measures administered to veterans within five days of their return to this country, before they rejoined their families. Thus, the survey offers some of the earliest systematic data on soldiers' experiences during the conflict. The survey employed a combination of structured and open-ended inquiry formats to investigate the potential range of deployment stressors and their association with very early postwar adjustment. The survey was administered under highly uniform conditions: Units were surveyed immediately upon their return to Ft. Devens, Massachusetts, before any debriefing activities occurred, between April and July 1991. Nearly all units were contacted, and examination of nonparticipants indicated absences primarily for administrative and medical purposes.

Data presented here are based on 2344 Persian Gulf War veterans (2136

Table 1. Demographic and Military Characteristics of Ft. Devens ODS Reunion Survey Returnees

	Men (n = 2136)		Women (n = 192)		
	%	n	%	n	χ^2
Race					21.55**
White	85.2	1819	74.5	154	
Black	6.9	148	13.9	29	
Hispanic	3.6	78	3.4	7	
Other	4.3	91	8.2	17	
Marital status					50.24**
Married/engaged	56.1	1194	30.8	64	
Single	36.8	783	55.8	115	
Separated/divorced	7.1	148	13.4	28	
Rank					11.46*
Enlisted	41.0	867	51.7	107	
NCO	52.6	1114	40.6	83	
Officer	6.4	136	7.7	16	
Prior war-zone service					11.70**
Yes	12.4	260	4.4	9	
No	87.6	1876	95.6	183	

*$p < .01$.
**$p < .001$.

males and 208 females). The mean age of the sample was 30.2 years (SD = 9.0); subjects had an average education of 13.2 years (SD = 1.8). As shown in Table 1, the majority of veterans were Caucasian, with African Americans represented more in the female sample than in the male sample. A significant greater proportion of male veterans compared to female veterans were married. With respect to military characteristics, more male veterans were noncommissioned officers, whereas more female veterans were enlisted personnel. In addition, male veterans were more likely to have had prior war-zone service than female veterans.

Exposure Measures

Based on findings from existing exposure measures and feedback from veterans, the ODS Reunion Survey chose to investigate three major stressor categories: traditional wartime activities (e.g., troop engagements), nontraditional wartime events (combat war-zone events specific to the Gulf War; significant noncombat war-zone occurrences), and nonwar-zone, deployment-related experiences (domestic, vocational, and psychosocial stressors). All respondents provided information on these stressors in three ways: (a) a fixed format checklist ("traditional Laufer combat") involving minor modifications of previously validated combat exposure questions (Gallops et al., 1981), (b) a fixed format checklist expanded to reflect ODS war-zone experiences ("ODS expanded check-

list"), and (c) an open-ended format where respondents described the single most distressing incident during their deployment period ("self-generated stressor categories"). The expanded checklist was rationally derived from experiences reported during the Gulf War (Rosenheck, 1992).

Laufer combat and ODS exposure scales. Summary scores on these measures were developed as the sum of the number of occurrences of all events. Both checklists focused on more objective (i.e., external) parameters of event exposure (i.e., type, occurrence, and frequency of an event) rather than on an assessment of individuals' feelings about the incident. Despite the latter's importance, more refined appraisals of event characteristics (e.g., ratings of controllability, predictability) were not obtained at this point because of time limitations; correspondingly, the focus was on delineating the spectrum of deployment events. Although this focus represents an improvement over some earlier scales in its breadth, there are limitations in the present approach that we will discuss later in the article.

Self-generated categories. A more qualitative analysis of soldiers' exposure to combat and deployment (including domestic) stressors was conducted using subjects' self-generated descriptions of their single most stressful deployment event. Veterans in this sample generated nearly 300 unique stressor events ranging from traditional combat events (e.g., being under enemy fire) to noncombat war-zone occurrences (e.g., fatal training accidents) to severe domestic stressors (e.g., unexpected death of a loved one at home). An initial classification system for these events was devised with the assistance of military experts and yielded seven supraordinate categories: (a) *combat/mission stressor* (actual threat to life, e.g., by SCUD missile attack or Patriot missile interception; direct exposure to friend/unit member/civilian killed or seriously injured during mission activity); (b) *noncombat, war-zone stressor* (unit member seriously injured or killed in nonmission activity, e.g., accident; self in accident; proximity to or observation of enemy prisoner-of-war riot); (c) *domestic stressor* (prolonged separation from loved ones; family member ill or suffering accident; divorce/legal separation); (d) *anticipation of war/combat activities* (SCUD alert; fear of biological/chemical attack); (e) *physical/situational attributes of war zone* (marked uncertainty of war's status/communication blockade; severe climate/environmental conditions; continual tour of duty); (f) *intraunit "hassles"* (marked personal conflict in unit; harassment; leadership failures); and (g) *absence of specific stressor* (no stressor reported or reported no stress). Classification of individuals' responses into these categories was conducted by three independent civilian raters who had 90% agreement rates; all subsequent classification differences were resolved consensually.

Psychopathology Measures

To assess initial psychological outcome, measures of both PTSD and general psychological distress were included because of the likelihood that returnees would manifest a range of emotional and behavioral phenomena rather than classically defined symptoms of PTSD that frequently evolve later in the course of readjustment (Baum, 1990; Green, Grace, et al., 1990). Symptomatology was assessed using three instruments: two empirically validated scales—the Mississippi Scale for Combat-related PTSD (Keane, Caddell, & Taylor, 1988) and the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983)—and a PTSD checklist derived from the existing cardinal *Diagnostic and Statistical Manual of Mental Disorders* (3rd edition, revised) symptoms of the disorder. Responses to a broad series of background and demographic items (e.g., age, race, marital status, education, occupation) as well as attitudes about the deployment experience (e.g., individual and unit preparedness, family support) were also obtained.

Results

Exposure Data

Using the traditional (Laufer) combat scale and a five-level combat exposure classification scheme (scored 0–4, with higher scores denoting more exposure) based on the Vietnam experience (Gallops et al., 1981), 56% of men and 58% of women in this sample scored in the lower ranges for traditional combat activities (i.e., categories 0–1). Only 3% of male and 3% of female returnees would be classified as having high levels of traditional combat exposure according to this scale. As shown in Table 2, no significant differences were found between male and female veterans on mean Laufer combat scores, $t(2281) = 0.68$, ns. The more comprehensive ODS expanded checklist yielded higher mean

Table 2. Combat Exposure in Ft. Devens ODS Reunion Survey Returnees

	Men (n = 2136)		Women (n = 208)		
	$M/\%$	SD/n	$M/\%$	SD/n	t/χ^2
Laufer Combat Exposure	2.84	2.11	2.73	2.28	0.68
ODS Expanded Exposure	7.14	4.85	6.80	4.50	0.73
Self-generated stressors (percent)					9.19*
Combat	37.6	804	48.3	100	
Warzone noncombat	28.0	599	24.2	50	
Personal/domestic	25.0	533	20.3	42	
None reported	9.4	200	7.2	15	

*$p < .05$.

scores (see Table 2) and showed that the three most commonly endorsed war-zone experiences for both genders were similar: formal alert for chemical or biological attack (74% of men; 78% of women), receiving incoming fire from large arms (74% of men; 70% of women), and witnessing death and/or disfigurement of enemy troops (50% of men; 45% of women).

A Pearson product-moment correlation coefficient was computed to examine the association of the Laufer combat scale with the ODS expanded checklist. The correlation between the two exposure scores was highly significant, $r(2283) = .53$, $p < .001$.

The distribution of self-generated stressor categories was significantly different for males and females, $\chi^2(3, N = 2343) = 9.19$, $p < .05$. Combat stressors were the most widely selected, endorsed by nearly 48% of the women compared to 38% of the men. Noncombat, war-zone stressors were second in prevalence (28% of men; 24% of women); 25% of male and 20% of female returnees reported primacy of domestic stressors. Only 9% of men and 7% of women reported no critical stressor (see Table 2).

A series of analyses were carried out to examine the structural content of the survey's two scaled exposure measures in this sample. Specifically, a factor analysis of the modified Laufer combat scale produced one factor that accounted for 23% of the variance, a finding consistent with prior research on that scale and other similar early combat measures (e.g., Keane et al., 1989). A principal axis factor analysis with an oblimin rotation was performed on items in the ODS expanded war-zone checklist. Six factors accounted for 48% of the variance. Correlations between factors were positive and moderate, ranging from .06 to .35. Factor labels, based on items loading at the .3 level or higher, were assigned as follows: (1) witnessing enemy/civilian death and dying, (2) severe unit threat or catastrophe, (3) traditional engagement in combat, (4) biochemical alert, (5) care of dead and dying, and (6) serious "snafus" (e.g., equipment failure, leadership errors). Factor scores were generated for each of the six factors; these factor scores then served as independent variables in subsequent analyses.

Psychological Outcome Data

Mean scores on the Mississippi Scale were generally low in the overall sample ($M = 62.3$, $SD = 13.5$), yet were significantly higher among women, $t(2340) = 5.22$, $p < .001$. Scores of 89 or higher have previously been used to identify wartime PTSD in community-based veterans from the Vietnam era (Kulka et al., 1990). In our sample, 4% of men and 9% of women scored above this cutoff, $\chi^2(1, N = 2342) = 13.03$, $p < .001$ (see Table 3). According to the General Severity Index (GSI) of the BSI, more substantial proportions (28–31%) of the soldiers scored in a clinically significant range. A slightly but not significantly higher percentage of women fell into that clinically significantly range,

Table 3. Symptom Endorsement by Ft. Devens ODS Reunion Survey Returnees

	Men (n = 2136)		Women (n = 208)		
	$M/\%$	SD/n	$M/\%$	SD/n	t/χ^2
Mississippi	61.8	13.1	67.7	15.8	5.22*
BSI/GSI	0.45	0.45	0.66	0.62	4.81*
PTSD Checklist Total	1.31	1.45	1.90	1.65	5.05*
Percent above clinical cutoff					
Mississippi	3.9	82	9.1	19	13.03*
BSI/GSI	28.2	601	31.7	66	1.24
PTSD Checklist	18.3	389	30.8	64	19.47*
PTSD symptom endorsement (percent)					
Nightmares	12.2	259	20.7	43	12.55*
Startle response	32.2	688	51.9	108	33.47*
Avoid thoughts	16.5	351	26.4	55	13.51*
Hyperalert	22.9	487	28.4	59	3.41
Irritability	34.5	736	47.1	98	13.59*
Intrusive thoughts	12.7	271	5.4	32	1.28

*$p < .001$.

$\chi^2(1, N = 2337) = 1.24$, ns. Thus, although the prevalence of presumptive PTSD was relatively low, a substantial number of returnees reported high levels of general psychological distress.

Examination of the behavioral checklist of stress-related symptoms showed that individual PTSD symptoms occurred at considerable rates and were significantly different for males and females (see Table 3). Irritability was commonly reported—by nearly 35% of men and 47% of women, $\chi^2(1, N = 2342) = 12.55$, $p < .001$. An exaggerated startle response was described by nearly one-third of returnees, including 32% of male and 52% of female respondents, $\chi^2(1, N = 2342) = 33.47$, $p < .001$. Thus, individual symptoms potentially associated with PTSD were present in a substantial portion of this sample.

Relationship Between Exposure and Adjustment

Multiple regression analysis was used to investigate the relationship of war-zone exposure to psychological outcomes, adjusted for demographic characteristics. Models were developed for each outcome variable (i.e., Mississippi Scale, BSI GSI, and PTSD checklist), considered separately. The following strategy was employed for each outcome variable, to ensure the development of meaningful, parsimonious models. First, the predictor variables were classified into four distinct categories: demographic characteristics, Laufer exposure scores, ODS factor scores, and critical stressor variables. Exploratory forward-entry stepwise multiple regression models were developed for each outcome variable to assess the independent contribution of individual variables within each of the four cate-

gories of predictor variables. The exploratory analyses indicated that three slightly different sets of predictors were associated with respective outcome variables. The multiple regression models were developed for each outcome variable considering the predictor variables along with two-way interactions between gender and each of the other predictor variables. The predictors and interaction variables were entered into the multiple regression models in a hierarchical fashion, according to the following order: demographic variables, gender by demographic interaction variables, Laufer exposure scores, gender by Laufer exposure score interaction variables, ODS factor scores, gender by ODS factor score interaction variables, critical stressor variables, and gender by critical stressor variables.

All three regression models were highly significant, explaining between 12% and 17% of the variance in outcome measures (see Table 4). Potentially owing to the low rate of formal PTSD in the sample, PTSD checklist scores, which assess a less comprehensive range of symptoms, were the most adequately explained by the predictor variables. In each model, Laufer combat scores and ODS expanded factor scores were significantly related to psychological outcomes after adjusting for background variables. The significance of exposure measures varied somewhat by model. Self-generated stressor categories were not significant predictors in models pertaining to Mississippi scores and BSI/GSIs. There was a moderate but significant relationship between endorsement of the combat category and PTSD checklist totals.

Several demographic variables and interaction variables were significantly associated with the outcome measures. Female gender, lack of college education, lower (nonofficer) rank, and marital separation or dissolution, for example, were generally associated with poorer psychological outcome. Self-perceptions of combat preparedness also predicted a substantial percentage of variance in the Mississippi Scale, BSI GSI, and PTSD checklist scores. For women, prior warzone service predicted significantly greater increments in all three outcome variables. Higher Laufer scores were associated with significant increases in women's BSI/GSIs relative to those of men. Increments in Factor 1 (witnessing deaths) predicted differentially greater Mississippi and PTSD checklist scores in women, and increases in Factor 6 (major "snafus") were similarly related to higher Mississippi scores and BSI/GSIs. For men, marital dissolution predicted larger increments in Mississippi scores and BSI GSIs, and higher Factor 4 (anticipatory alert) scores were associated with differentially higher PTSD checklist totals.

Discussion

Results showed that Laufer combat and ODS expanded exposure scores did not differ significantly between men and women. Both scores were associated with psychological and PTSD outcome measures, a finding consistent with prior

Table 4. Beta Coefficients from Final Multiple Regression Equations

	Outcome variable		
Predictor	Mississippi	BSI/GSI	PTSD Checklist
Gender	.134***	.153***	.100***
College education	−.096***	−.057**	−.091***
Marital status			
Single	—	—	−.077***
Separated/divorced	.060**	.058**	—
Rank			
Enlisted	—	—	—
Officer	−.089***	−.087***	−.077***
Race			
White	—	—	—
Black	.035	—	—
Hispanic	—	—	—
Prior service	—	—	—
Preparedness score	−.070***	−.074***	.064**
Gender × single	—	—	—
Gender × separated/divorced	−.053*	−.045	—
Gender × prior service	.077***	.103***	.068***
Laufer	.085**	.055*	.111***
Gender × Laufer	—	.052*	—
Expanded Combat Exposure Scores (CES)			
CES Factor 1	.112***	.114***	.115***
CES Factor 2	−.124***	−.147***	−.185***
CES Factor 3	.088***	.066**	.067**
CES Factor 4	.077***	.107***	.132***
CES Factor 5	.109***&	.093***	.172***
CES Factor 6	.152***	.185***	.180***
Gender × CES Factor 1	.062**	—	.052*
Gender × CES Factor 2	—	—	—
Gender × CES Factor 3	—	—	—
Gender × CES Factor 4	—	—	−.048*
Gender × CES Factor 5	—	—	—
Gender × CES Factor 6	.046*	.055*	—
Self-generated stressors			
Combat	—	—	.048*
War zone	—	—	—
Domestic	—	—	—
Gender × Combat	—	—	—
Gender × War zone	—	−.057*	—
Gender × Domestic	—	—	—
R^2	.122	.125	.170
Adjusted R^2	.115	.118	.164
F	17.50***	17.91***	27.48***
df	17, 2139	17, 2136	16, 2140

Note. Gender coded as 0 = male, 1 = female.
*$p < .05$.
**$p < .01$.
***$p < .001$.

research employing traditional combat scales (e.g., Keane et al., 1988). Although rates of presumptive PTSD were low compared to levels obtained for Vietnam veterans (Kulka et al., 1988, 1990), symptom rates were consistent with this sample's relatively limited combat exposure (see, for example, Brill & Beebe, 1955; Weinberg, 1946) and are comparable to the amount of generalized distress found in civilian samples after a variety of catastrophic life events (Baum, 1990; Green, Lindy, et al., 1990). Still, several studies have suggested that acute stress levels can increase over time (Baum, 1990; Prince-Embury & Rooney, 1988; see Sutker, Uddo, Brailey, & Allain, this issue), manifesting as delayed symptom onset in some individuals (Dew et al., 1987; Green, Lindy, et al., 1990). Consequently, longer term follow-up is required to determine the full trajectory of this disorder and its associated features.

Both the Laufer combat and ODS expanded total scores predicted postwar psychological adjustment. Although the Laufer scale was a significant predictor of outcome measures, components of the expanded wartime measure were as significant and all ODS checklist factors were significantly related to outcome. Findings from these factor dimensions (e.g., witnessing death, anticipatory alert) are consistent with previous military and civilian research showing that certain stressor components, particularly exposure to the grotesque (Yehuda et al., 1992), extensive contact with the dead and dying (Green et al., 1989; Ursano & McCarroll, 1990), and sustained anticipatory alert (Bleich et al., 1991), negatively impact outcome above and beyond the seeming contribution of generic trauma.

Considering the available background and combat exposure variables, PTSD symptoms (as defined by the PTSD checklist) were best predicted by regression models, although models predicting other outcome measures were significant as well. This finding may reflect the low rates of formal PTSD and other psychiatric disorders in our sample as well as our choice of outcome measures. We did not, for example, examine symptoms of depression, anxiety, or social isolation, all of which may be more pronounced than PTSD following acute war stress (see Sutker et al., this issue). Also, it is possible that certain symptoms (rather than disorders) are linked to particular wartime experiences. Glover (1988), for example, found that psychosocial disturbances and poor affective modulation (e.g., rage) followed leadership failures in wartime and that involvement with atrocities often produced severe guilt in male Vietnam combat veterans. In civilian populations, severe depression has resulted after witnessing death and extensive personal or material loss (Green, Lindy, et al., 1990). Finally, we did not consider other types of behavioral outcomes, e.g., health status, a variable frequently linked to experiences involving moderate life stress (Cohen & Williamson, 1991). These dimensions are likely to be important in further interpreting common sequelae of the wartime experience.

A methodological issue relates to this study's reliance on self-report data. Some research has shown that self-reports of stress are vulnerable to bias from a

host of event-related and personal characteristics (Folkman, 1992; McCrae, 1984), each of which could potentially impact estimates of symptomatology (Strayer & Ellenhorn, 1975; Sutker et al., 1991). Also, we did not objectively verify actual wartime experiences owing to the initial unavailability of unit histories and military records. Refinement of exposure and outcome models will need to examine issues of subjective–objective concordance to address the impact of attributions and perceptions on the readjustment course (Breslau & Davis, 1987).

A major strength of this study is its use of a diverse sample. We found that adjustment of women in our sample was significantly affected by certain background and event-based characteristics, e.g., lower education, serious unit incidents ("snafus"), and extensive exposure to dying. Prior wartime service also was predictive of outcome for women but not for men. In another Persian Gulf War study, Ben-Zur and Zeidner (1991) found that Israeli women reported significantly more symptoms of anxiety and depression than men comparably exposed to the Iraqi missile threat during this conflict. Age was also identified as a risk factor and had an inverse relationship to outcome. Other variables were not described.

Although our findings suggest that female personnel were more symptomatic in response to certain wartime stressors, at least during the initial postdeployment phase, these results should be interpreted cautiously. First, reporting style was not assessed, and social desirability in reporting psychological states may differ considerably between men and women. Some civilian studies have suggested that women report considerably more negative affect and distress than men in response to similar lifetime events (e.g., Conger, Lorenz, Elder, Simons, & Ge, 1993; Fujita, Diener, & Sandvik, 1991). However, the processes underlying these patterns are poorly understood. Second, some potentially critical experiences, such as prior sexual or criminal victimization, that are likely to predispose to substantial subsequent distress (Resnick, Kilpatrick, Best, & Kramer, 1992; Wyatt, 1990), were not evaluated at this time. In addition, one possibly decisive stressor—sexual harassment or assault during the deployment—was not addressed in the initial survey phase. Recent data from a subsequent phase (Wolfe, Young, & Brown, 1992) suggest that sexual harassment and assault occurred during the deployment and that appreciable levels of symptoms stem from these experiences. Thus, stressor assessment as it relates to gender-specific experiences must be pursued in greater detail.

This project offers an unusual opportunity to track the perceptions, experiences, and reactions of a relatively diverse group of deployed individuals after war. The data confirm that a host of event, social environment, and personal characteristics should all be considered in the development of more valid models of posttrauma outcome. The current findings do not suggest that new exposure scales are needed for all subsequent military conflicts or catastrophic occur-

rences. Rather, the results point to the conceptual and clinical utility of evaluating stressors more precisely, in this case in light of the changing composition of wartime forces and military experiences. Overall, these data serve two purposes: to alert clinicians and researchers alike to the importance of obtaining early baseline data and of the importance of broadening identification and measurement of components of exposure as population demographics and types of trauma evolve over time.

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