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Combat Exposure, Wartime Performance, and Long-Term Adjustment Among Combatants

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This study examined the contribution of exposure to specific battlefield stressors (life-threatening situations, injuries and death, active fighting, and the fallibilities of one's own army) to combatants' battlefield functioning and long-term psychological adjustment. Participants consisted of 399 Israeli veterans of the 1973 Yom Kippur War, categorized by their wartime functioning into 3 groups: combat stress reaction (CSR) casualties, decorated war heroes, and controls (i.e., those who functioned adequately but without special distinction). Findings show that, even though the decorated war heroes reported the highest exposure to battlefield stressors, they functioned better than the other 2 groups during the war. Moreover, some 2 decades later, they showed lower rates of posttraumatic stress disorder and better general psychological health than the CSR casualties. Findings also show that battlefield functioning made a greater contribution to postwar pathology than battle stressors. These

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findings thus raise questions about how decisive the role of battle stress actually is in precipitating war-related pathology.

The human reaction to participation in combat is highly varied. On the front, most combatants cope without obvious pathology. However, an estimated 10% to 30% of combatants sustain a combat stress reaction (CSR; Belenky, Noy, & Solomon, 1987), and an unknown proportion exhibit exceptional bravery.

CSR is a labile, polymorphic disorder characterized by high variability and rapid changes in its manifestations (S. Solomon, 1993). Among its most frequent expressions are restlessness, psychomotor deficiencies, withdrawal, increased sympathetic nervous system activity, stuttering, confusion, nausea, vomiting, and paranoid responses (Bartemeier, 1946; Grinker & Spiegel, 1945; Z. Solomon, 1993). The polymorphic and labile nature of the clinical picture, along with the fact that the diagnostic criteria for acute stress reaction has been established only recently (American Psychiatric Association, 1994), have led most armies to use a functional definition in which the defining feature is that the soldier ceases to function as a combatant and acts in a manner that endangers himself and his fellow combatants (Kormos, 1978).

Decorated war heroes are soldiers whose exceptional self-sacrifice, persistence, and leadership distinguish them from their peers (Blake & Butler, 1976; Gal, 1987). Little is known about them as a group, although some authors suggest that they are not necessarily fearless but act bravely despite their fear (McMillan & Rachman, 1987; Rachman, 1990).

Similar variability has been found in the long-term reactions to combat. After the war is over, most soldiers readjust to their civilian lives without serious pathology. However, between 10% and 20% develop posttraumatic stress disorder (PTSD) marked by a variety of intrusive, avoidance, and hyperarousal symptoms and often accompanied by heightened anxiety, depression, and hostility (e.g., Kulka et al., 1990; Shalev, 2001). Of those who develop PTSD, some recover within a brief period of time, whereas in others the condition becomes chronic (e.g., Rosenheck & Fontana, 1994).

Over the years, considerable effort has been made to account for these differences in responses, both in the short and long term. Research has focused on the contributions of combat conditions and battle stressors (e.g., Green, Grace, Lindy, & Gleser, 1990; King, King, Gudanowski, & Vreven, 1995) and of the soldier's precombat personality (McFarlane, 1990). However, to date, none of the studies has simultaneously examined combatants representing the full range of reactions from CSR through heroism.

In this study, we examined the association between battlefield stressors, wartime functioning, and long-term psychological adjustment in three groups of soldiers: CSR casualties, war heroes decorated for their bravery, and controls who performed adequately but without recognized distinction on the battlefield. In addition, in this study we tried to determine the contribution of battlefield stressors to

battlefield functioning and the contributions of both battlefield stressors and battlefield functioning to the soldiers' long-term psychological adjustment.

BATTLEFIELD STRESS: ASSOCIATIONS WITH WARTIME PERFORMANCE AND LONG-TERM ADJUSTMENT

Battlefield stressors have been consistently associated both with combatants' wartime performance and their long-term adjustment. Most of the research on short-term outcomes has focused on CSR. Findings show that the length (Beebe & Apple, 1951; Swank & Marchand, 1946) and intensity of the combat, as measured by the number of dead and wounded (Beebe & Apple, 1951; Levav, Greenfeld, & Baruch, 1979; Noy, 1987) and exposure to life-threatening situations and to intense feelings of helplessness (Noy, Nardi, & Solomon, 1986; Z. Solomon, Mikulincer, & Hobfoll, 1987; Swank, 1949), are all positively associated with the incidence of CSR.

Only one study, Gal's (1987) qualitative analysis of 77 acts of heroism in the 1973 Yom Kippur War, was conducted on the conditions that precede heroism. The study also implicates battlefield stress in the behavior of war heroes. Gal's analysis reveals four patterns of heroic behavior. As he told it, a soldier behaved heroically when (a) his unit was surrounded; (b) only a few fighters were left in the unit, and the commander was wounded; (c) only a few soldiers were fighting against many; or (d) he was the only or one of the only soldiers left, and he fought until the mission was attained. These patterns clearly involve large numbers of casualties, high risk of death or injury, and conditions that might well make less dauntless soldiers feel helpless.

Findings over the long term show a similar association between battle stress and psychological problems. Studies following World War II (WWII; Beebe & Apple, 1951; Swank & Marchand, 1946), the Korean War (Fontana & Rosenheck, 1993), the Vietnam War (Breslau & Davis, 1987; Card, 1987; Egendorf, Kadushin, Laufer, Rothbart, & Sloan, 1981), and the Gulf War (Southwick et al., 1993) all have shown that soldiers exposed to more difficult combat had higher rates of PTSD. Similarly, findings show that PTSD rates are higher among soldiers who observed or commited atrocities or the torture of POWs (Breslau & Davis, 1987; Fontana & Rosenheck, 1993; Green et al., 1990; Kulka et al., 1990). In addition, perceptions of life-threatening situations made a unique contribution to the prediction of posttraumatic symptoms beyond the contribution of active participation in combat (Z. Solomon et al., 1987) or exposure to extreme situations such as atrocities and torture (Green et al., 1990).

However, both the short- and long-term findings leave important issues unattended. The most obvious gap is in the study of heroes. Gal (1987) is the only systematic analysis to date of heroism on the battlefield; to our knowledge, the postwar psy-

chological adjustment of heroes has not been studied at all, nor has any study compared the battlefield stressors to which CSR casualties and heroes were exposed. These deficiencies limit one's understanding not only of heroism but also of CSR. The findings on heroism, few as they are, raise the question of whether—and if so, how—the same battlefield stressors that lead some soldiers to break down contribute to others taking the initiative and risking their lives against all odds.

Another open question is whether the battlefield stressors that are implicated in CSR are the same as those that are implicated in combat veterans' long-term psychological distress. Green et al. (1990) found that the experience of physical injury, loss, and life threat, as well as the acts of injuring and killing enemy soldiers, predicted the development of transient PTSD symptoms, whereas special assignments and exposure to grotesque death were more predictive of persistent symptoms.

BATTLEFIELD FUNCTIONING AND LONG-TERM PSYCHOLOGICAL ADJUSTMENT

Various studies have shown that CSR casualties are more prone to develop long-term emotional disorders than other combatants. Accumulated evidence indicates that years after their breakdown, CSR casualties suffer from higher rates of PTSD, greater anxiety and depression, and more impairment in marital, parental, occupational, and social functioning than combat veterans who had not broken down in the field (e.g., Archibald, Long, & Miller, 1962; Jordan et al., 1992; S. Solomon, 1993). Virtually nothing is known, however, about the long-term emotional adjustment of decorated war heroes. A computerized search yielded no studies on this subject.

Grounds can be adduced for hypothesizing that heroes will either be more or less vulnerable than others to the long-term pathological effects of war. Expectations of greater vulnerability can be based on conversations with decorated war heroes in Israel who stated their bravery was not thought out but stemmed from hopelessness and despair. In addition, findings on Dutch resistance fighters in WWII showed that they suffered from depression and anxiety in the aftermath of their valorous conduct (Velde, Frey-Wouters, & Pelser, 1994). Expectations of decreased vulnerability can be based on the ample empirical evidence (Z. Solomon & Mikulincer, 1992) supporting Bandura's (1977) theory of self-efficacy, which maintains that the way in which a person functions in a situation will influence his or her perceived self-efficacy in similar situations in the future.

METHOD

Participants

The participants were 399 Israeli veterans of the 1973 Yom Kippur War who were classified into three groups:

- *Decorated heroes:* One hundred fifty soldiers received medals for bravery in the 1973 Yom Kippur War. Of these, 16 were abroad at the time of the study. Of the remaining 134, 98 participated in the study, constituting a 73% response rate.
- *CSR casualties:* The research team obtained the medical records of a treatment facility for CSR casualties during the Yom Kippur War. Of the 178 men who were diagnosed and treated in this facility, 9 were abroad at the time of the study. Of the remaining 169, 112 participated in the study, constituting a 66% response rate.
- *Controls:* Two hundred eighty combat veterans of the Yom Kippur War were sampled from Israel Defense Forces (IDF) computerized databanks. Twenty were abroad and 5 were deceased at the time of the study. Of the remaining 255 veterans, 189 participated in the study, constituting a 74% response rate.

Examination of sociodemographic variables revealed that the groups differed in age, ethnic background, educational background, and military rank during the war (see Table 1). CSR casualties and decorated veterans were older during the war (M = 25.27, SD = 3.85, and M = 26.79, SD = 6.96, respectively) than the controls (M = 22.30, SD = 3.60), $F(2, 370) = 30.71$, $p < .001$. There were more CSR casualties among those whose father's place of birth was outside Israel, those who had fewer years of education, and those who were of lower military ranks than the controls and decorated veterans. Israel was the father's place of birth for 75% of the decorated veterans. Most of the decorated heroes had a high school education and more than half were officers during the war. These background differences are considered in analyzing the results.

TABLE 1
Distribution of Sociodemographic Variables by Group

	CSR Casualties		*Controls*		*Decorated Veterans*		
Variable	*n*	%	*n*	%	*n*	%	χ^2
Father's place of birth							(4, N = 389) = 22.11***
Israel	58	52	108	59	75	81	
Asia/Africa	47	42	63	34	12	13	
USA/Europe	7	6	13	7	6	6	
Education							(2, N = 394) = 19.70***
Less than 12 years	46	41	47	25	13	14	
12 years and more	65	59	136	75	87	86	
Military rank							(8, N = 380) = 83.39***
Private	88	81	116	65	31	34	
Corporal/sergeant	9	8	18	10	4	3	
1st/2nd lieutenant	10	9	41	23	36	39	
Lieutenant colonel/major	2	2	4	2	21	22	

Note. CSR = combat stress reaction.
***$p < .001$.

Measures

Battlefield stressors. These were assessed using a specially designed self-report questionnaire of 15 items tapping the experience of the fighting. A factor analysis with varimax rotation revealed four factors that explained 64.7% of the variance. Factor 1 consisted of seven items relating to encounters with injuries and death (e.g., "I saw a lot of dead soldiers"). Factor 2 consisted of two items describing active fighting (e.g., "I killed enemy soldiers"). Factor 3 consisted of six items describing own army fallibilities (e.g., "We were shot at by friendly fire"; "I found myself in a situation where support did not arrive"). Factor 4 consisted of three items describing life-threatening situations (e.g., "I found myself in a situation where I was not sure I would come out alive"). Internal consistency alphas ranged from .76 to .91 for the four factors.

PTSD Inventory. The PTSD Inventory used in this study is a self-report scale based on *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev. [*DSM–III–R*]; American Psychiatric Association, 1987) criteria. The questionnaire consists of 17 statements corresponding to the 17 PTSD symptoms listed in the *DSM–III–R* (American Psychiatric Association, 1987). For each statement, participants are asked to indicate ("yes" or "no") both whether they experienced the symptom "sometimes since the war" and whether they experienced it "during the last month." Based on the number of PTSD symptoms reported, two scores were computed reflecting the intensity of the syndrome in both the past and the present.

Internal consistency among the 17 items was high ($\alpha = .89$ for the past and $\alpha = .86$ for the present). The scale was also found to have high convergent validity when compared with diagnoses based on structured clinical interviews (Z. Solomon et al., 1993).

Symptom Checklist–90 (SCL–90). This questionnaire is a self-report measure that inquires about 90 psychiatric symptoms during the 2 weeks preceding the assessment (Derogatis, 1977). Participants were asked to indicate the degree to which they suffered from each of the symptoms in the previous 2 weeks on a scale ranging from 0 (*not at all*) to 4 (*very much*). For analysis we used the Global Severity Index (GSI; Derogatis, 1977), which reflects the clinical severity of all symptoms and is computed by averaging participants' answers on the 90 symptoms.

The SCL–90 is widely used to assess the general mental health of survivors of traumatic events (e.g., Kamphuis & Emmelkamp, 1998). Its proven psychometric properties have been widely published (e.g., Derogatis & Clearly, 1977; Derogatis, Rickles, & Roch, 1976).

RESULTS

Battlefield Stressors and Wartime Functioning

To assess the association between the battlefield stressors and the soldiers' functioning on the battlefield, we carried out a multiple analysis of variance (MANOVA) with the four battlefield stressors as the dependent variables and the research groups as the independent variables. Table 2 presents means, standard deviations, and the results of the univariate tests for the four battlefield stressors.

A significant overall effect was found, $F(8, 748) = 10.06$, $p < .001$. The four univariate analyses with the Scheffé post hoc contrasts revealed the following patterns:

1. Active combat participation was highest among the decorated heroes, next among the controls, and lowest among the CSR casualties.
2. Exposure to injury and death of others was higher among the decorated heroes than the CSR casualties and controls.
3. Exposure to own army fallibilities was also higher among the decorated heroes than the CSR casualties and controls.
4. Exposure to life-threatening situations was similar among CSR casualties and decorated veterans, and their level of exposure was higher than that of the controls.

In short, the decorated heroes reported higher levels of all four battlefield stressors than the controls and higher levels of three of the stressors than the CSR casualties. The only stressor to which the heroes and CSR casualties reported a similar level of exposure was life-threatening situations.

TABLE 2
Means and Standard Deviations of War Stressors Dimensions According to Research Group

	CSR		*Controls*		*Decorated*		
Stressors	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F(2, 377)*
Exposure to injuries and death of combatants	1.92	0.83	1.78	0.91	2.40	0.76	16.86***
Active participation in combat	1.09	1.14	1.46	1.24	2.20	1.15	22.54***
Own army fallibilities	1.18	0.68	1.21	0.79	1.61	0.84	10.05***
Life-threatening situation	2.14	0.73	2.11	0.94	2.66	0.52	15.49***

Note. CSR = combat stress reaction.
***$p < .001$.

Because of the significant sociodemographic differences among the groups, another four MANOVAs were carried out, each with a sociodemographic feature (age, ethnic background, educational background, and military rank) as the independent variable. These analyses yielded no significant association between any of the sociodemographic variables and the battlefield stressors or any significant interaction between the sociodemographic variables and the research groups. In other words, the differences in the research groups' exposure to battlefield stressors were unrelated to their demographic variables.

Battlefield Functioning, Battlefield Stressors, and Long-Term Psychological Adjustment

Figure 1 shows the percentages of past and current PTSD in the three groups of soldiers. As is seen, the CSR casualties had the highest rate of PTSD both past (37%) and current (13%). At both times their rates were significantly higher than those of the other two groups. No significant difference was found in the PTSD rates of heroes and controls at either time.

To ascertain the unique and relative contribution of the sociodemographic variables, wartime performance, and battlefield stressors to long-term adjustment, three hierarchical regressions were carried out using each of the adjustment measures as the dependent variables. In the first step, two demivariables representing the soldier's wartime performance were entered. The first demivariable represented the

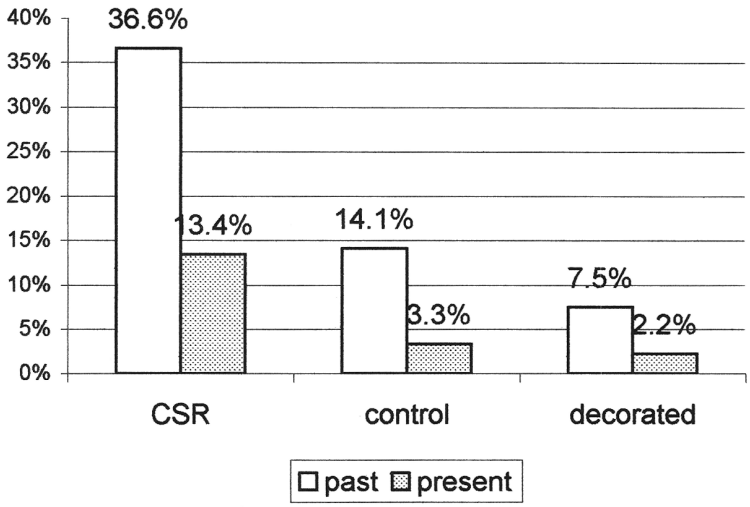

FIGURE 1 Rates of posttraumatic stress disorder by research group. CSR = combat stress reaction.

TABLE 3
Regression Beta Coefficients and Amount of Variance Explained Between Predictors and Outcome Variables

	Posttraumatic Symptoms in the Past		*Posttraumatic Symptoms in the Present*		*GSI*	
Variable	β	$\Delta R^2(\%)$	β	$\Delta R^2(\%)$	β	$\Delta R^2(\%)$
Step 1: Immediate coping						
Demivariable 2	.07		.08		.13*	
Demivariable 1	–.30***	10.7	–.20***	5.6	–.12*	4.3
Step 2: Sociodemographic variables						
Demivariable 2	.01		.00		.05	
Demivariable 1	–.26***		–.16**		–.08	
Father's country of origin			.12*		.17**	
Rank	.20***	3.5	.17**	4.7	.16**	6.3
Step 3: War stressors						
Demivariable 2	.10		.05		.10	
Demivariable 1	–.26***		–.17**		–.07	
Father's country of origin			.12*		.17**	
Rank	.19***		.16**		.19**	
Own army fallibilities	.23***		.17**			
Life-threatening situations	.14*	10.3		2.6		0.0
Total amount of variance explained		24.5		12.9		10.6

Note. GSI = Global Severity Index.
*$p < .05$. **$p < .01$. ***$p < .001$.

CSR casualties versus the two other groups; the second demivariable represented the decorated heroes versus the two other groups. In the second step, four variables representing the combatants' background variables—namely their age, rank, country of origin, and education—were entered. In the third step, the four battlefield stressors and their interactions with the research groups were entered. The three dependent variables were PTSD in the past, PTSD in the present, and current GSI. Table 3 presents the significant beta coefficients and the percentage of variance explained by each of the independent variables.

Posttraumatic symptoms in the past. Twenty-five percent of the variance in PTSD symptoms in the past was explained by the independent variables. The study groups contributed 11% to the explained variance and demonstrated mainly the effect of CSR (as reflected in the first demivariable). CSR casualties suffered from higher levels of posttraumatic symptoms in the past than the two other groups. Background variables contributed 3.5% to the explained variance. Officers

suffered from fewer symptoms than other combatants. Battlefield stressors contributed 10.3% to the explained variance. Only life-threatening situations and those involving own army fallibilities made a significant contribution. Combatants who reported greater exposure to life threat and own army fallibilities suffered from more posttraumatic symptoms.

Current posttraumatic symptoms. Thirteen percent of the variance of current posttraumatic symptoms was explained by the independent variables. Wartime performance contributed 5.6% to the explained variance and again demonstrated the effect of CSR. CSR casualties suffered from more current PTSD symptoms. Background variables contributed 4.7% to the explained variance. Officers and combatants whose parents originated from Europe or the United States suffered from less posttraumatic symptomatology. Of all the battlefield stressors, only own army fallibilities made a significant contribution (2.6%), although a smaller one than it made to PTSD in the past (10.3%).

GSI. Eleven percent of the variance in the GSI was explained by the independent variables. Wartime performance contributed 4.2% to the explained variance. Again, the significant contribution was made only by the CSR. CSR casualties suffered from higher levels of psychiatric symptoms than both the decorated heroes and the controls. Background variables contributed 6.3% to the explained variance. Combatants whose parents originated from Europe or the United States and officers suffered from fewer symptoms. The contribution of these two background variables changed the effect of the research groups to be insignificant. In other words, it might be that some of the differences in the three groups' psychiatric symptoms stemmed from differences in their background variables. Battlefield stressors did not make any significant contribution.

DISCUSSION

This study is the first to compare CSR casualties and decorated war heroes. Although the greatest reported exposure to battlefield stressors was sustained not by the CSR casualties but by the decorated war heroes, the heroes adjusted substantially better after the war. The decorated war heroes reported greater participation in active combat, greater exposure to the injury and death of others, greater exposure to extreme situations than both the CSR casualties and controls, and the same level of reported exposure to life-threatening situations as the CSR casualties. They not only functioned exceptionally well in battle, but they also had lower rates of PTSD and better general psychological health than the CSR casualties.

These findings raise questions about the conclusions of previous studies (e.g., Levav et al., 1979; Noy, 1987), which compared CSR casualties to non-CSR com-

bat controls. Those studies generally found that CSR casualties had higher exposure to battlefield stressors than the controls and concluded from this that battlefield stress was a major contributor to war-related psychopathology. Our findings do not rule out the role of battle stress in CSR and subsequent psychopathology. Indeed, they also show that CSR casualties reported greater exposure to life-threatening situations than controls, which lends support to previous claims that CSR is a response to the threat to the integrity of the body and the fear of death (Glass, 1973; Swank, 1949). However, our finding that war heroes reported a level of exposure to life threat similar to that of the CSR casualties and greater exposure to the other stressors strongly suggests that whatever contribution battle stress may make to CSR, it is not a decisive factor in and of itself. Our conclusion is consistent with findings in the literature (Lazarus & Folkman, 1984) on stress that the mental health impact of stressors depends less on their objective severity than on the individual's assessment of the severity of the threat posed by the stressor and of the resources at his or her disposal to cope with the stressor .

Our findings also suggest that the contribution of battlefield stress to postwar pathology is limited. Battlefield stressors made no contribution to general psychiatric symptomatology. They contributed to PTSD, but they contributed considerably more to PTSD in the past than to current PTSD. Moreover, two of the stressors had no significant impact: Active participation in fighting and exposure to injury and death of others were associated neither with past nor current PTSD. Exposure to life-threatening events and own army fallibilities contributed to past PTSD, but exposure to own army fallibilities contributed to current PTSD. These findings are consistent with other findings indicating differential impacts of different battle stressors (Green et al., 1990; King et al., 1995).

Own army fallibilities is the only one of the four battlefield stressors examined that was associated with chronic PTSD; the impact of exposure to life-threatening events waned with time. The lasting impact of own army fallibilities is of note. The items in this factor are uncertainty as to who is in command, endangerment by the activities or behavior of other soldiers, failure of assistance to arrive in an emergency, emotional breakdown of soldiers nearby, observance of fellow soldiers caught in a trap or ambush, and exposure to an unexpected enemy attack. The common denominator seems to be that all the items point, in one way or another, to defective functioning on the part of other soldiers or the army command. This defective functioning indicates to soldiers that they cannot rely on their buddies or superiors, the people on whom they are most dependent in combat, to guard their safety. The lasting uncertainty and distrust that such a realization evokes may explain the enduring impact. Further study is required to verify this hypothesis.

On the whole, the findings seem to point to the importance of battlefield functioning over that of battlefield stressors. Battlefield functioning made a more salient contribution to the variance in chronic PTSD than battlefield stressors. Moreover, consistent with previous findings (Kulka et al., 1990; Z. Solomon, 1993), the

CSR casualties had a higher percentage of both past and current PTSD than the controls. The heroes, for their part, had statistically similar percentages of PTSD at both points of time as the controls despite their greater exposure to all the battlefield stressors.

The question that arises is why the heroes functioned better than the CSR casualties on the battlefield and suffered considerably less long-term pathology. In this study we did not search for an answer to this question. It might be that the fact of having been decorated had a beneficial effect on the decorated heroes' mental health in later life. In addition, our findings that veterans of low military rank tended to report more PTSD symptoms and more general psychiatric symptomatology than veterans who were officers suggest that precombat factors played a role.

Officers in the IDF represent an elite group of soldiers whose selection criteria include high IQ, high motivation to serve in the army, high self-esteem, and emotional maturity. Rank may be understood as an indication of robustness and personality resources, and officers seem to have an advantage over their lower ranking comrades. This suggestion is consistent with findings indicating that war heroes show higher commitment and motivation than CSR (Dekel, 1998). In addition, it may be that the officers' special training and the responsibility they bore for the men who served under them endowed their combat with greater meaning, helped them to achieve a certain control in face of the threat, and promoted resiliency in both the short and long term (Waysman, Solomon, & Schwarzwald, 1998).

Considerably more research is required before definitive statements can be made about the relative contributions of battle stress and soldiers' precombat resources—whether personal, social, or moral—to their functioning and mental health (King, King, Foy, Keane, & Fairbank, 1999). Moreover, great care must be taken not to cast aspersions on soldiers who sustained acute or long-term pathology as a result of their participation in combat.

The major limitation of this study is that the data about war stressors were gathered through retrospective self-reports, which, as is well known, are subject to the quirks of memory and bias. Some researchers (Roemer, Litz, Orsillo, Ehlich, & Friedman, 1998; Wolfe, Brown, & Kelly, 1993) caution that the report of the stress of past battle is affected by the respondent's current psychological status. It cannot be ruled out that CSR casualties reported high levels of war stress to justify their combat breakdowns and subsequent psychopathology or that war heroes reported high exposure to justify the medals and honors they received. However, in this study we could not address whether these distortions occurred.

This study points to the importance of more careful investigation of the origins of war-induced psychopathology. This effort would entail both examining the possibly differential impacts of different battle stressors and investigating the possible contribution of precombat factors, especially those related to the individual's resources and personality, to soldiers' combat functioning, and to their

subsequent adjustment. It would be useful if armies would gather preenlistment and precombat data on their recruits.

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