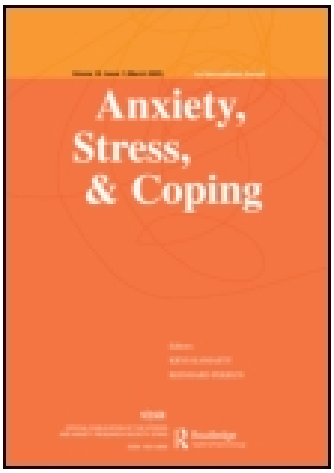

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Do combat stress reaction and posttraumatic stress disorder relate to physical health and adverse health practices? An 18-year follow-up of Israeli war veterans

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DO COMBAT STRESS REACTION AND POSTTRAUMATIC STRESS DISORDER RELATE TO PHYSICAL HEALTH AND ADVERSE HEALTH PRACTICES? AN 18-YEAR FOLLOW-UP OF ISRAELI WAR VETERANS

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This study investigated the long-term health effects of combat stress reaction (CSR) among Israeli CSR casualties (112) and control veterans (184) of the 1973 Yom Kippur war. Posttraumatic stress disorder (PTSD), physical symptoms, and adverse health practices were examined 18 years after the war. The relationship between CSR, PTSD, physical symptoms and adverse health practices was examined via hierarchical linear regression. Findings indicate that although CSR was positively associated with more current physical symptoms and adverse health practices in univariate analyses, these associations were not significant once demographic differences between the groups were controlled. In contrast, current PTSD symptoms were positively associated with current physical symptoms ($p < 0.001$) and showed a trend association with adverse health practices ($p = 0.06$). PTSD was the most powerful predictor of current physical symptoms and appears to mediate the association between CSR and physical symptoms almost two decades after the war. Both combat stress reaction and the results of the study were discussed in the light of the theory of Conservation of Resources (COR).

Keywords: Combat stress reaction; Posttraumatic stress disorder; Physical health; COR theory

The stress of combat is notoriously traumatic. Individuals who are exposed to the imminent threat of death and injury, witness the harm to friends and enemy soldiers and participate in killing, frequently fall prey to immediate and/or long-term psychological disorders. The immediate injury is an acute stress disorder (ASD; APA, 1994), previously labeled as battle shock, battle fatigue or war neurosis, and referred to more recently as combat stress reaction (CSR) (Grinker, 1945; Bartemier, 1946; Kormos, 1978; Solomon *et al.*, 1993). Posttraumatic stress disorder (PTSD) is commonly occurs as the long-term consequence (Kulka *et al.*, 1990; Neria *et al.*, 1998; Schlenger *et al.*, 1999).

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CSR takes place on or near the battlefield and occurs when a soldier is unable to marshal effective coping to deal with combat stimuli (Solomon, 1989). It consists of a wide range of symptoms including restlessness, psychomotor deficiencies, withdrawal, increased sympathetic activity, stuttering, confusion, nausea, vomiting and paranoid responses (Grinker, 1945; Solomon, 1993). This reaction could be a transient crisis with spontaneous remission or in some cases, can persist longer and develop into profound and prolonged PTSD (e.g. Solomon, 1989; Solomon and Kleinhauz, 1996).

Former studies found PTSD to be highly prevalent in CSR casualties. For example, PTSD was identified in 43% of CSR Israeli veterans 3 years after the Lebanon War (Solomon, 1989). In addition, 13% of CSR cases manifested PTSD 18 years after the Yom Kippur war (Solomon and Kleinhauz, 1996). However, no study to date has examined a large-scale array of physical symptoms in CSR casualties. The goal of the current study is aimed at addressing the gap that exists in understanding the association between the initial responses to traumatic stress, such as CSR, and physical health.

One theory that is helpful for understanding the impact of traumatic stress on physical health is Conservation of Resources (COR) theory (Hobfoll *et al.*, 1995). It suggests that traumatic stress entails dramatic resource depletion that is a motivating factor for intensive attempts at coping in order to limit and to reduce further resource loss. According to COR theory, immediate favorable and unfavorable coping responses will be linked to long terms positive and negative outcome of the traumatic exposure (Hobfoll *et al.*, 1995). Previous research gave partial support to this hypothesis and found that immediate "unfavorable" ways of coping, such as loss of control and emotional breakdown predicted strongly PTSD and general psychiatric symptomatology in Israeli POWs of the 1973 Yom Kippur War (Neria *et al.*, 2000a). The current study took a further step by investigating whether another common set of unfavorable responses, CSR, play a role in the long-term physical health and adverse health practices in veterans from the same war almost two decades after its end.

The link between combat exposure and physical health has been widely documented (for a review see Schnurr and Jankowski, 1999). Considerable research during the last decade in both men and women has indicated that exposure to combat leads to increased vulnerability to a variety of physical problems (Kulka *et al.*, 1990; Falger *et al.*, 1992; Litz *et al.*, 1992; Baker *et al.*, 1997; Elder *et al.*, 1997; Pierce, 1997; Schwartz *et al.*, 1997; Hovens *et al.*, 1998; Wolfe *et al.*, 1998; Wagner *et al.*, 2000), somatic complaints (Solomon *et al.*, 1987a; Shalev *et al.*, 1990; Ohry *et al.*, 1994), adverse health practices (Shalev *et al.*, 1990; Ohry *et al.*, 1994; Beckham *et al.*, 1995; Schwartz *et al.*, 1997), increased medical care utilization (Kulka *et al.*, 1990; McDonald *et al.*, 1995), and high mortality rates (Friedman and Schnurr, 1995; Lee *et al.*, 1995). Several studies that have examined physical health in both war veterans and civilians found PTSD to be a strong predictor of impaired physical health (e.g. Kulka *et al.*, 1990; Breslau and Davis, 1992). Moreover, studies that addressed the relative role of PTSD in comparison to other key variables (Wolfe *et al.*, 1994; Friedman and Schnurr, 1995; Wagner *et al.*, 2000) have found that PTSD is a stronger predictor of physical health problems than other variables, such as war zone exposure, previously believed to be the main predictor of health outcomes.

Two studies conducted among Israeli veterans have found considerable somatic symptomatology (Solomon *et al.*, 1987a), increased biological indices of disease and several risk behaviors, such as smoking (Shalev *et al.*, 1990) in CSR casualties of the

Lebanon war. However, both of the studies assessed outcomes in the short-term and did not examine the relative contributions of CSR and PTSD to the physical health outcomes.

The present study has two aims. First, to examine the long-term physical health residues in veterans who manifested CSR in comparison to non-CSR combat controls. To explore this, a series of measures including physical symptoms, physical disability, post-war hospitalization and adverse health practices were assessed. The second aim was to examine the unique contribution of CSR, demographic variables, level of combat exposure, PTSD, and physical impairment to both physical health and adverse health practices 18 years after the Yom Kippur War. Based on COR theory and studies (Green and Glezer, 1983; Hobfoll and Lerman, 1988; Kaniasty and Norris, 1993; Hobfoll *et al.*, 1995; Neria *et al.*, 2000a) it was hypothesized that; (1) More severe physical health outcomes and adverse health practices would be reported by combat stress casualties than by controls, and (2) PTSD would be strongly predictive of physical health symptomatology and adverse health practices.

METHOD

Participants

The design of the study has been previously described in detail (Solomon and Kleinhauz, 1996). Briefly, the sample ($n = 296$) consisted of two groups of Israeli veterans and included CSR casualties and controls.

CSR group Medical records were obtained from a frontline treatment installation that treated 178 diagnosed CSR casualties during the 1973 Yom Kippur War. Nine (5%) of the casualties were abroad and were not available at the time of the study, and 57 (32%) refused to be interviewed or their whereabouts could not be traced; 112 (63%) were contacted successfully and completed the required questionnaires.

Controls A control group of combatants was recruited from the IDF computerized data files. In order to ensure that the two groups were similar, the participants of the control group were selected from the same combat units who had fought on the same fronts as the CSR casualties. The target population was comprised of 280 individuals, 20 (7%) of whom were abroad at the time of the study, 5 (2%) were deceased and 66 (23%) could not be traced or refused to participate in the study. The study questionnaires were completed by 184 (65.7%) individuals.

Measures

Sociodemographic and military background For the assessment of sociodemographic and military variables, the participants filled out a questionnaire (Neria *et al.*, 1998) asking about their military and civilian background, including father's country of origin, family status, education and military rank.

Combat exposure Combat exposure was assessed using a self-report scale (Neria *et al.*, 2000c) consisting of 23 items based on their war experience. Respondents were

asked to indicate on a 4-point scale (ranging from "not at all" to "a great deal"), the extent to which they had experienced stressful events (e.g. I was exposed to sights or smells of dead people; I found myself in situation where it was not clear who was the commander) during the war. Each subject received a total combat exposure score which was the mean of the 23 items.

Physical health checklist (Ohry et al., 1994) This checklist consists of 27 physical symptoms and three adverse health practices. Respondents were asked to indicate whether they were currently suffering from any of the problems or illnesses and which behaviors (smoking, alcohol usage and self-medication) they were currently engaged in. The number of physical symptoms equals the number of physical symptoms endorsed on the checklist (range 0–27). The number of adverse health practices equals the number of adverse health practices (0–3) endorsed on the checklist.

Physical disability This index was determined by the Israeli Ministry of Defense and characterizes individual physical status after being wounded or physically disabled during military service. This measure ranges from minor disability (1%) to total disability (100%). Individuals with a score of 1% and above were classified as having a physical disability.

Hospitalization Respondents were asked whether they were hospitalized since the war.

Posttraumatic Stress Disorder The disorder assessed via the PTSD inventory (Solomon *et al.*, 1993), and based on DSM-III-R criteria (APA, 1987), assessed both the intensity (number of symptoms) and diagnosis of PTSD (participants are diagnosed as having PTSD if they experienced a traumatic event, endorse one or more intrusive symptoms, three or more avoidance symptoms, and two or more arousal symptoms). The questionnaire consisted of 17 statements corresponding to the 17 PTSD symptoms listed in the DSM-III-R. Internal consistency among the 17 items was high (Cronbach alpha 0.89 for past and 0.86 for present) and the scale was found to have high convergent validity when compared with diagnoses based on structural clinical interview (Solomon *et al.*, 1993). The level of PTSD symptoms for an individual is calculated averaging the intensity across the 17 symptoms.

Procedure

Participants were invited to the rehabilitation center of a centralized hospital in Israel (Sheba Medical Center of Tel Hashomer) where they were seated in small groups and asked to fill out a battery of questionnaires. Before doing so, they were assured about their voluntary participation and that the data would remain confidential and would not in any way affect their status in military or civilian life.

Data analysis The differences between CSR participants and controls on demographic characteristics, level of combat exposure, level of PTSD symptoms, physical disability classification, ever hospitalized, individual physical symptoms, total physical symptoms, and adverse health practices were examined via *t*-tests for continuous variables and chi-square tests for categorical variables. Pearson or biserial correlations were conducted for the association between independent and dependent variables. Two

hierarchical linear regressions were conducted, one for each outcome: physical symptoms and adverse health practices. Independent variables were entered in five steps: (1) CSR versus Controls was entered as a dummy variable (CSR = 1, Controls = 0); (2) demographic characteristics (age, ethnic origin, education, military rank, marital status); (4) level of PTSD symptoms; and (5) physical impairment (physical disability, ever hospitalized). The overall significance of the model was evaluated by the F statistic and the contribution of each step by the F change statistic and the change in R^2. The contribution of an individual predictor to the model after controlling for all others was assessed by comparing the standardized beta weights. Statistical significance was determined by the t-test.

RESULTS

CSR Casualties versus Controls on Study Variables

Table I presents the descriptive and test statistics for the CSR versus Control groups on study variables. The CSR group was significantly older, was less likely to have graduated from high school, had a higher percentage of officers, and was more likely to be married than the control group. The CRS group also reported a significantly greater number of current PTSD symptoms, physical symptoms, and adverse health practices. The two groups were comparable on ethnic composition, level of combat exposure, proportion classified as having a physical disability, and on the proportion ever hospitalized.

CSR versus Controls on Physical Symptoms and Adverse Health Practices

Table II presents the frequency and chi-square statistics for individual physical symptoms and adverse health practices in the CSR versus Control groups. The CSR

TABLE I Descriptive statistics for CSR vs. controls

Variable	*CSR* $n = 112$	*Controls* $n = 184$	*Test statistic*
Age (years)			
M (SD)	25.27 (3.85)	22.30 (3.60)	$t(295) = 43.08, p < 0.001$
% Non-European	58.0	65.8	$X^2(1) = 1.78, p = 0.18$
% With less than high school education	41.4	25.7	$X^2(1) = 7.93, p = 0.005$
% Officers	11.0	25.1	$X^2(1) = 8.52, p = 0.004$
% Single	39.3	73.6	$X^2(1) = 34.23, p < 0.001$
Level of combat exposure			
M (SD)	1.37 (0.53)	1.34 (0.64)	$t(261.26) = -0.38, p = 0.70$
Level of PTSD symptoms			
M (SD)	3.41 (4.13)	1.83 (2.83)	$t(175.02) = -3.58, p < 0.001$
% Physical disability	12.5	18.1	$X^2(1) = 1.52, p = 0.22$
% Ever hospitalized	51.4	59.1	$X^2(1) = 1.63, p < 0.20$
Physical symptoms			
M (SD)	5.02 (4.13)	4.14 (3.42)	$t(294) = -1.98, p = 0.05$
Adverse health practices			
M (SD)	0.65 (0.74)	0.43 (0.59)	$t(187.51) = -2.63, p = 0.009$

TABLE II Prevalence of physical health symptoms and adverse health practices for CSR casualties and controls

Physical health symptoms by type	*CSR*		*Controls*		
	n	%	*n*	%	X^2 *df* = *1*
High blood pressure	16	14.7	22	12.1	0.40
Rapid pulse	17	15.6	11	6.00	7.24**
Cardiac rhythm irregularity	3	2.8	11	6.00	1.57
Chest pain	15	13.9	22	12.1	0.20
Difficulty in breathing	17	15.7	20	10.9	1.42
Excess perspiration	26	23.6	26	14.3	4.10*
Weakness of limbs	19	17.4	28	15.3	1.95
Numbness in extremities	13	12.3	17	9.4	0.59
Heartburn	29	27.4	37	20.4	2.33
Dizziness	21	19.3	30	16.4	0.39
Skin problems, eczema	20	18.3	24	13.3	1.32
Weakness, fatigue	22	20.4	21	11.5	4.19*
Occasional fever	5	4.5	3	1.7	2.06
Low back pain	49	44.5	78	43.8	0.02
Neck pains	25	22.7	33	18.8	0.54
Headaches	40	37.0	45	24.7	4.96*
Kidney stones	5	4.6	6	3.3	0.31
Hearing loss	36	33.3	84	46.2	4.59*
Vision loss	47	43.5	59	32.3	3.73*
Poor appetite	15	13.9	7	3.9	9.57**
Problems with teeth or gums	49	44.5	78	42.9	0.08
Digestive problems	14	13.0	17	9.3	0.93
Allergies	12	11.0	14	7.9	0.78
Proneness to infection	12	11.0	13	7.1	1.33
Tendency to faint	1	0.9	1	0.5	0.14
Overweight	33	30.3	54	29.7	1.70
Adverse health practices by type					
Smoking	43	39.4	48	26.4	5.42*
Alcohol	4	3.7	6	3.3	0.03
Medication	23	21.3	23	12.8	3.65*

*$p < 0.05$; **$p < 0.01$.

casualties designated six (22%) of the physical symptoms more frequently than the controls. Specifically, they reported higher rates of rapid pulse, excess perspiration, weakness and fatigue, headaches, vision loss and poor appetite than did the controls. The control group reported a higher rate of hearing loss. In addition, the CSR casualties were also reported more smoking and self-medication, two of the adverse health practices.

Correlations between Independent and Dependent Study Variables

Table III presents the correlational analysis for the independent and dependent variables included in the hierarchical regression analyses described below. CSR casualties, having less than a high school education, being single at the time of the war, and level of PTSD symptoms showed significant positive correlations with the number of physical symptoms. Being an officer had a significant negative correlation with the number of physical symptoms. Non-European ethnicity, CSR, level of PTSD symptoms and having a physical disability classification showed significant positive correlations with adverse health practices. Being an officer had a significant negative

TABLE III Correlations between independent and dependent variables

Variable	*Physical symptoms*	*Adverse health practices*
CSR	0.11*	0.16**
Age (years)	0.09	0.03
Ethnic origin (Non-European)	0.05	0.24***
Education (less than high school)	0.17**	0.10
Military rank (Officer)	−0.16*	−0.16**
Marital status (Single)	0.09*	0.06
Level of combat exposure	0.11	0.02
Level of PTSD symptoms	0.47***	0.21***
Physical disability	0.01	0.13*
Ever hospitalized	−0.04	−0.07

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

correlation with adverse health practices. Age, level of combat exposure, and ever being hospitalized were unrelated to either the number of physical symptoms or the number of adverse health practices.

Hierarchical Regression Analyses

Table IV presents the hierarchical regression analyses for variables predicting number of physical symptoms. The final overall model was highly significant ($p < 0.001$) with $R = 0.48$. Variables were entered in five steps. Only the first step (CSR) and the fourth step (level of PTSD symptoms) added significantly ($p < 0.05$) to the model over and above the previously entered steps. PTSD symptoms was the only individual item that had a significant positive association with physical symptoms in the final model, which explained about 20% of the variance in the number of physical symptoms.

Table V presents the hierarchical regression analyses for variables predicting number of adverse health practices. The final overall model was highly significant ($p < 0.001$) with $R = 0.37$. Variables were entered in five steps. The first step (CSR), the second step (demographic variables) and the fourth step (level of PTSD symptoms) added significantly ($p < 0.05$) to the model over and above the previously entered steps. Ethnicity (being non-European) and marital status (being single) were the only individual items that had a significant (negative) association with adverse health practices in the final model, which explained about 10% of the variance in these practices. There was a trend towards significance ($p = 0.06$) for the association of a age (younger) and a greater number of PTSD symptoms with more adverse health practices in the final model.

DISCUSSION

The results of the current study point to several key findings that shed light on the long-term physical consequences of combat stress reaction and their predictors. As expected, the results show that 18 years after the war, CSR was positively related to physical symptoms and adverse health practices. However, when demographic differences were controlled these associations were not significant, and current PTSD symptoms were associated with both physical symptoms and adverse health practices. These findings

TABLE IV Hierarchical regression analyses for variables predicting number of physical symptoms

Predictors	*Step 1*			*Step 2*			*Step 3*			*Step 4*			*Step 5*		
Adjusted R^2	*0.01 1*			*0.02 5*			*0.03 5*			*0.199*			*0.192*		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
CSR vs. controls	0.96**	0.51	0.12	0.50	0.55	0.06	0.51	0.55	0.07	−0.08	0.51	−0.01	−0.09	0.51	−0.01
Demographic															
Age (years)				0.03	0.10	0.03	0.03	0.10	0.04	0.02	0.09	0.03	0.02	0.09	0.03
Non-European				0.08	0.57	0.01	0.008	0.57	0.001	0.38	0.52	0.05	0.38	0.53	0.05
Less than high school education				1.24**	0.60	0.15	1.27**	0.60	0.15	0.57	0.56	0.07	0.57	0.56	0.07
Officers				−0.62	0.68	−0.06	−0.60	0.67	−0.06	−0.01	0.62	−0.001	−0.01	0.62	−0.001
Single				−0.36	0.79	−0.05	−0.32	0.78	−0.04	−0.50	0.71	−0.06	−0.50	0.72	−0.06
Level of combat exposure							0.76*	0.43	0.12	0.16	0.40	0.02	0.16	0.40	0.024
Level of PTSD symptoms										0.47***	0.07	0.45	0.47**	0.07	0.45
Physical impairment															
Physical disability													−0.06	0.62	−0.006
Ever hospitalized													−0.05	0.46	−0.007

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

TABLE V Hierarchical regression analyses for variables predicting number of adverse health practices

Predictors	*Step 1*			*Step 2*			*Step 3*			*Step 4*			*Step 5*		
Adjusted R^2	*0.013*			*0.088*			*0.084*			*0.096*			*0.100*		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
CSR vs. controls	0.18**	0.09	0.13	0.12	0.09	0.09	0.12	0.09	0.09	0.08	0.10	0.06	0.07	0.10	0.05
Demographic															
Age (years)				−0.03*	0.02	−0.17	−0.03*	0.02	−0.17	−0.03*	0.02	−0.17	−0.03*	0.02	−0.16
Non-European				−0.35***	0.10	−0.25	−0.35***	0.10	−0.25	−0.33***	0.10	−0.23	−0.32***	0.10	−0.23
Less than high school education				0.07	0.10	0.05	0.07	0.10	0.05	0.03	0.10	0.02	0.03	0.10	0.02
Officers				−0.08	0.11	−0.05	−0.08	0.11	−0.05	−0.05	0.12	−0.03	−0.06	0.11	−0.04
Married				−0.26**	0.13	−0.19	−0.26**	0.13	−0.19	−0.27**	0.13	−0.20	−0.26**	0.13	−0.19
Level of combat exposure							0.01	0.07	0.01	−0.02	0.07	−0.02	−0.02	0.07	−0.02
Level of PTSD symptoms										0.02**	0.01	0.14	0.02*	0.01	0.13
Physical impairment															
Physical disability													−0.14	0.12	−0.08
Ever hospitalized													−0.12	0.09	−0.09

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

give further support to the view that the emotional responses to war-zone exposure, both in the short- and long-term (CSR and PTSD respectively), contribute to physical health problems even two decades after the exposure.

The associations found between CSR and physical symptoms suggest that psychological distress following a traumatic exposure increases vulnerability to physical problems. These findings are in line with previous reports of Israeli CSR casualties (Solomon *et al.*, 1987b; Solomon and Kleinhauz, 1996) that found such casualties to be more vulnerable for long-term psychological sequelae than combat veterans that did not show signs of CSR during the war. For many individuals, war experience is highly pathogenic with severe and long-term residues (Kulka *et al.*, 1990). The detrimental effects of war are especially salient among persons who have experienced a psychiatric breakdown on the battlefield. The differences observed in the CSR and control group were both quantitative and qualitative. The groups differed in the number of reported problems. This suggested that the physical problems in the CSR group were more intense than those in the control group.

There are several possible explanations for the more prevalent and intense physical symptoms among the CSR casualties. First, the intensity may stem from the nature of the breakdown itself. For example, CSR is a culmination of processes through which a person is stripped of a sense of safety and mastery and experiences an overwhelming vulnerability and helplessness (Solomon, 1993). The intense physical problems may also represent a failure to rebuild shattered assumptions (Janoff-Bulman, 1992) and to regain a sense of security, safety and mastery (Herman, 1992). Secondly, CSR identification entails labeling and stigma that may undermine self-worth and self-esteem of the afflicted individuals (Noy, 1991; Solomon, 1993). In Israel, at the time of the study, male identity has been highly associated with efficient combat activities and valor (Neria *et al.*, 2000b). Experiencing a psychiatric breakdown, receiving professional recognition and aid in combat, and above all, the incapacity to carry on fighting may carry a significant toll both to the self and to the network of social relations. In addition, combatants with a history of CSR perceive themselves as more vulnerable, manifest many psychophysiological symptoms as acute reactions and may expect to be distressed and sick. Thus, they may be both more attentive to physical symptoms and more willing to report on this when asked.

Finally, our findings are in line with previous studies (Green and Glezer, 1983; Hobfoll and Lerman, 1988; Kaniasty and Norris, 1993; Neria *et al.*, 2000a) that suggested that the failure to cope effectively in the short-term may itself produce adverse effects. The initial loss caused both by the combat exposure and by the failure to cope make individuals extremely vulnerable to subsequent losses, a phenomena that has been termed "loss cycle" or "loss spiral" (e.g. Hobfoll *et al.*, 1995).

Results also confirmed the expectation that war-induced physical problems are wide and varied. In fact, the study revealed that elevated symptoms of rapid pulse, excess perspiration, weakness and fatigue, headaches, vision loss and poor appetite were more often observed following CSR. Previous reports highlighted the association between posttraumatic symptoms and symptomatology of panic disorder and attacks (e.g. Shalev *et al.*, 1990). The present findings confirm these findings, thereby suggesting a resemblance between CSR and panic symptomatology. The differences in adverse health practices of smoking and medication are also consist with previous reports of strong associations between traumatic exposure and adverse health practices as

smoking, alcohol usage and use of medication (Helzer *et al.*, 1987; Ohry *et al.*, 1994; Shalev *et al.*, 1990). As previously shown (Schnurr and Spiro, 1999), these practices reflect a struggle of the vulnerable veteran to deal both with his psychological as well as with his physical symptoms. However, cultural differences between the American and the Israeli societies at the time of the study may account for the fact that Israeli veterans were not alcohol consumers.

Interestingly, our findings suggested a higher rate of hearing loss in the controls. This finding might be explained by the fact the controls remained active reserve combatants for the last two decades since the war and this problem might be related to the continuous exposure to the loud noises of combat exposure and military training.

Of the sociodemographic variables that we examined, having less than high school education, having a low military rank and being single at the time of the war were associated with physical symptoms. Non-European ethnic origin and low military rank were associated with adverse health practices. Those findings are in line with former studies that suggested the salutary impact of education (e.g. Antonovsky, 1987; Neria *et al.*, 1998), ethnic origin (Marsella *et al.*, 1996; Manson, 1997), marital relationship (Kulka *et al.*, 1990) and military status (Solomon, 1993).

Consistent with several reports in the last decade, PTSD found to be the main predictor of physical health almost two decades after the war. It was previously suggested that PTSD might cause changes in neurochemical and physiological structures (Friedman and Schnurr, 1995; Boscarino, 1996) leading to various physical symptomatology. Moreover, PTSD is a complicated and demanding disorder, with a heavy toll on the individual that might lead to a decrease in daily function and in his ability to take care of himself (Solomon *et al.*, 1987b). Finally, the strong contribution of current PTSD to the physical symptoms in the current sample gives further support to the COR theory suggesting that not only immediate responses to traumatic exposure, but moreover long-term responses, as this study demonstrates, accelerate "loss spirals" resulting in more severe and wide-ranging negative outcomes.

CONCLUSIONS

The current findings have several limitations that need to be taken into account. The retrospective and self-report design used in this study is vulnerable to recall errors (Dohrenwend, 1998), the influence of current mental health status (Brown and Harris, 1978), and to social desirability (King and King, 1991). With this in mind, the findings in the current study have demonstrated the relationship between responses to war stress and the long-term physical health of individuals who have manifested combat stress reactions and PTSD. This marks a meaningful step towards furthering our understanding of the relationship between the emotional and the physical aspects of health. These results support the "loss spiral" hypotheses of COR theory and contribute to our understanding of the process and the aftermath of initial breakdown in the battlefield. The depletion of resources, inadequacy of coping, and short- and long-term emotional toll of war-zone exposure suggest that sensitive multidisciplinary assistance to war veterans is necessary to aid these individuals in recovery.

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