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Psychological Benefits and Liabilities of Traumatic Exposure in the War Zone

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Data from the National Vietnam Veterans Readjustment Study on 1,198 Vietnam theater veterans were used to examine the psychological benefits and liabilities of traumatic exposure in the war zone. Psychological benefits and liabilities were found to be largely independent of one another and to be related positively to the dose of traumatic exposure. Additionally, there was a curvilinear trend in the form of an inverted U, such that psychological benefits, most notably solidarity with others, were stronger at intermediate compared to high and low levels of exposure. Psychological benefits counteracted and psychological liabilities passed through the effects of traumatic exposure on posttraumatic stress disorder (PTSD). The psychological benefit of self-improvement moderated the effects of the psychological liability of self-impoverishment on PTSD.

KEY WORDS: psychological benefits; positive effects; trauma; PTSD; veterans.

Conventional wisdom as well as the professional literature have long recognized and focused on the negative consequences of stress. Coincident with this dominant theme, however, has been the less well-known but recurrent theme that stress can have positive consequences as well. Alfred Adler was one of the first to incorporate this latter theme into a theory of human development (Ansbacher & Rowena, 1956). According to Adler, the helplessness and vulnerability that inevitably accompanies people's entry into the world infuses them with a profound sense of inferiority. A major

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focus of their lives is on trying to compensate for the sense of inferiority by striving to become superior. When the agents of socialization direct this striving into constructive channels, people develop a social interest that is prosocial in content. Another theorist who has made much of the positive potential of not only stressful, but truly horrific, experiences is Viktor Frankl (1963). Crystallized out of his experiences as an inmate in Nazi concentration camps is Frankl's belief that people's chances of surviving such experiences are increased, or even enabled, by the act of finding some positive meaning to the experiences themselves. One way that he summarizes the essence of his belief is by quoting from Nietzsche that "That which does not kill me makes me stronger" (p. 130).

Making something positive out of something negative plays an important role in the conceptualizations of more recent theorists as well. For instance, Hobfoll (1989) postulates that people strive to foster their well-being by adding to or conserving their resources. Stress is viewed as a loss or threat of loss of resources, conditions which people try to reverse or compensate for as much as possible. People try to replace lost resources, if possible, or to reframe the threat cognitively as a challenge so that their focus is on the possibilities for gain. Baltes addresses the positive consequences of stress by including people's attempts at compensating for losses in skills and abilities in his model of successful coping (Baltes & Baltes, 1990). He points out that the need for coping with some losses often leads to the discovery or recognition of reserves that people did not realize that they had.

The history of trauma studies parallels the history of stress studies in that the negative consequences of traumatic exposure in the war zone have been documented over and over again (e.g., Archibald & Tuddenham, 1965; Brill & Beebe, 1955; Kulka et al., 1990a). A few authors have proposed, however, that exposure to traumatic experiences in the war zone can have positive consequences as well (e.g., Gal, 1986; Lyons, 1991). Surprisingly, empirical studies have suggested that the strength of positive consequences is directly proportional to the strength of traumatic exposure (Aldwin, Levenson, & Spiro, 1994; Elder & Clipp, 1989; Joseph, Williams, & Yule, 1993; Sledge, Boydstun, & Rabe, 1980; Tedeschi & Calhoun, 1996). The mechanism for this paradoxical relationship is said to be the strengthening of beliefs in one's abilities specifically and the increase in one's self-esteem generally that comes from either simply surviving or from otherwise coping successfully with the traumatic circumstances (Aldwin et al., 1994; Elder & Clipp, 1989; Lazarus & Folkman, 1984). A major class of positive consequences proceeding from traumatic exposure, therefore, involves *learning* something which transforms one's self-image, one's ways of relating to oth-

ers, or one's attitudes and beliefs (e.g., Sledge et al., 1980; Tedeschi & Calhoun, 1996).

Aldwin et al. (1994) investigated the relationship between positive consequences and traumatic exposure in depth by examining it for a quadratic trend in the shape of an inverted "U," such that higher positive consequences were postulated for intermediate levels of exposure compared to high or low levels of exposure. Theoretically, an intermediate level of exposure was expected to invoke a level of threat which required substantial coping skills but which was not so high that it could not be coped with without feeling overwhelmed by it (Aldwin & Stokols, 1988). Despite the theoretical appeal of this formulation, their data revealed minimal signs of such a trend.

Aside from providing a more complete and balanced view of people's reaction to trauma, a greater understanding of the positive consequences of traumatic exposure holds promise of providing clues for inoculating people prospectively against the development of symptomatic reactions or for treating persons retrospectively who have already developed symptomatic reactions (Lyons, 1991). A first step in this direction would be to determine if positive consequences are related to a reduced severity of symptomatic reactions to exposure. Aldwin et al. (1994) found fewer psychiatric symptoms among veterans who reported positive consequences of traumatic exposure, but other studies have failed to find a significant correlation (Elder & Clipp, 1989; Joseph et al., 1993; Tedeschi & Calhoun, 1996; Ursano, Wheatley, Sledge, Rahe, & Carlson, 1986).

The presence of a negative correlation between the positive consequences of traumatic exposure and psychiatric symptoms would suggest a mediational role for positive consequences, whereby positive consequences ameliorated the severity of symptoms along the entire range of traumatic exposure. The absence of a significant correlation, however, would still leave open the possibility of a moderational role for positive consequences. Moderation of the impact of traumatic exposure by positive consequences would be evidenced if positive consequences served to ameliorate the severity of symptoms predominantly in the high range of exposure. Although the latter possibility has not received much attention to date, Aldwin et al. (1994) sought but failed to find evidence of such a moderational role in their sample of World War II and Korean Conflict veterans.

The understanding of positive consequences would be enhanced further by determining their relation to negative consequences. Prior work has suggested that positive and negative consequences are not merely mirror images, but that the two represent largely independent sets of reactions to traumatic exposure. Aldwin et al. (1994) reported a significant positive correlation between positive and negative consequences, although it was

small in magnitude (r = .06); while Joseph et al. (1993) failed to find a significant relationship.

Before proceeding to an empirical examination of these issues, however, it is necessary to clarify our terminology in reference to the particular classes of positive and negative consequences of traumatic exposure which are the foci of interest in this paper. Some authors have referred to positive consequences as positive effects (Aldwin et al., 1994; Elder & Clipp, 1989; Gal, 1986), while others have chosen to refer to them as benefits (Sledge et al., 1980; Tedeschi & Calhoun, 1996; Ursano et al., 1986).

We prefer the term "psychological benefits" rather than "positive effects" or simply "benefits" for the following reasons. In addition to effects such as gaining greater self-confidence, serving in a war zone can have other types of positive consequences, among which are experiences such as an opportunity to travel and outcomes such as receiving educational benefits upon returning home. Conceptually, it is easy to lose the distinctions between effects on the one hand and experiences and outcomes on the other (Aldwin et al., 1994; Elder & Clipp, 1989). This interferes with the clarity with which issues can be discussed and with the unambiguous determination of empirical relationships. Further, we wish to focus on psychological changes in the person as the hallmark of the consequences of interest (Sledge et al., 1980; Tedeschi & Calhoun; 1996). We have found it helpful, therefore, to distinguish among constructs in the following way. We define *psychological benefits* and *psychological liabilities* as positive and negative changes, respectively, in the kind of person one considers oneself to be, either through the acquisition of new attitudes, ideas, feelings, habits or skills or through changes in existing ones. In our view, psychological benefits and liabilities are the psychological results of having learned or acquired something from an experience or set of experiences. Psychological benefits and liabilities exclude *experiences* themselves, which we define as events that happen to people, or as conditions to which people are exposed, or as specific activities in which people engage. Also excluded from psychological benefits and liabilities are *outcomes*, which we define as health or illness, and economic or social gains or losses in areas such as education, marriage, parenting and employment. We view most outcomes as occurring after psychological benefits and liabilities, sometimes years after. Our conception of psychological benefits and liabilities, then, explicitly excludes positive and negative experiences and outcomes.

Prior studies have focused on some of the above issues in depth while not addressing other issues at all. Our goal in this study is to examine empirically all of the issues discussed above on a data set of sufficient size to yield stable estimates. The National Vietnam Veterans Readjustment Study

(NVVRS) (Kulka et al., 1990a) of nearly 1,200 male theater veterans provides such a data set. Specifically, the issues we address are:

1. What is the magnitude and direction of the relationship between the psychological benefits and liabilities of traumatic exposure?
2. Is there a linear relationship between either psychological benefits or liabilities and the dose of traumatic exposure?
3. Is there a curvilinear relationship between either psychological benefits or liabilities and dose of traumatic exposure in the form of an inverted-U?
4. Do either psychological benefits or liabilities mediate the relationship between traumatic exposure and posttraumatic stress disorder (PTSD)?
5. Do psychological benefits moderate the relationship between psychological liabilities and PTSD; that is, do psychological benefits interact with psychological liabilities to diminish the relationship between psychological liabilities and PTSD?

Method

Subjects

The NVVRS includes a nationally representative sample of 1,198 male Vietnam theater veterans who were selected from military personnel records. Vietnam theater veterans are those who served in Vietnam or its surrounding waters or airspace for some period of time from 1964 to 1975. African-American and Hispanic veterans were oversampled deliberately in the NVVRS to ensure stable values for prevalence estimation in these two subgroups. Veterans averaged 40.1 (SD = 5.3) years of age, with 13.4 (SD = 2.4) years of education. Ethnically, 48.9% were Caucasian; 26.8% were African-American and 22.9% were Hispanic, reflecting the oversampling; and 1.4% were of other ethnicity. In terms of their marital status, 71.3% were married, 21.3% were divorced or separated, and 6.8% had never been married. Using the unadjusted prevalence data from the NVVRS, 21% were suffering from PTSD at the time of the survey, which was conducted from 1986 to 1988.

Instruments

Psychological benefits and liabilities. The NVVRS attempted to assess positive and negative consequences of war zone service through a series of questions with structured response categories. The usefulness of the ma-

jority of these questions is limited in the present study, however, by two characteristics: 1) many have bipolar response categories forcing respondents to choose either the positive or the negative end rather than allowing the reporting of each; and 2) many refer to experiences or outcomes rather than to psychological benefits or liabilities. Fortunately, the NVVRS also obtained free-form answers to the questions: "First, what were some of the *positive* things you gained from your Vietnam experience?" and "And, what were some of the *negative* things?" Many of these answers contained more than one theme. When more than one theme was mentioned, we coded the response for each theme.

Although themes were coded according to experiences and outcomes as well as psychological benefits and liabilities, 74% of the themes fell into the class of psychological benefits and liabilities. Coding was conducted in four stages. First, the senior author worked with two coders on 100 responses to each of the questions to devise the coding guidelines and content categories. A theme was coded as either present or absent. Second, the coders applied the guidelines to another 100 responses to each of the questions. Disagreements and ambiguities were identified and their resolution led to a revision of the guidelines. Third, the coders applied the revised guidelines to another 100 responses to each question. Kappas were calculated for interjudge reliability and were found to be acceptable. Fourth, the coders applied the guidelines to the remaining responses. After each stage, disagreements between the coders were reconciled among the senior author and the coders.

Psychological benefits were coded dichotomously for each of three categories: affirmation of patriotic beliefs (10%), self-improvement (47%) and solidarity with others (17%). Affirmation of patriotic beliefs (kappa = .96) included themes such as appreciating the United States or freedom more, being proud to have served one's country or to have fought against Communism, and believing that the war was worthwhile. Self-improvement (kappa = .92) consisted of themes such as becoming more self-confident, more assertive, more mature, and more responsible; and strengthened religious faith. Solidarity with others (kappa = .83) comprised themes such as becoming more tolerant, less prejudiced, and more compassionate; and learning to get along with different kinds of people, to trust or feel closer to other people, and to cooperate with other people. In addition, the three categories were collapsed into a dichotomous category of overall psychological benefit (65%) representing the presence of any psychological benefit of service in the Vietnam theater.

Psychological liabilities were coded into three corresponding dichotomous categories: disillusionment of patriotic beliefs (23%), self-impoverishment (7%) and alienation from others (8%). Disillusionment of patriotic beliefs (kappa = .89) consisted of themes such as incompetence in the con-

duct of the war, lack of commitment to winning, making money off the war, and the war seeming like a waste of lives and not worth the cost. Self-impoverishment (kappa = 1.00) included themes such as becoming less ambitious, less carefree and happy-go-lucky, more fearful of death; valuing or appreciating life less, and weakened religious faith. Alienation from others (kappa = .92) comprised themes such as becoming more prejudiced, developing problems in relating to authority figures, and becoming more cynical about the goodness of mankind. The original plan to collapse the three categories into a dichotomous category of overall psychological liability was altered, because disillusionment was found to be related significantly negatively to impoverishment, $r = -.10$, and alienation, $r = -.10$, and to be related to exposure in an opposite direction than impoverishment and alienation (see Table 1). Therefore in order to represent the relationships of psychological liabilities with other variables most accurately, impoverishment and alienation were collapsed into a dichotomous category of overall liabilities (15%) and disillusionment was retained as a separate category for data analysis.

Construct validity for the free-form categories was determined by comparing them to the responses to the available structured questions which corresponded to them in content. Specifically, self-improvement and overall psychological benefit were compared to responses to the question, "Do you feel that your service in the military has helped you become a better person?"; self-improvement was compared to responses to "It [military service] allowed me or forced me to grow up socially or emotionally"; solidarity was compared to responses to "It [military service] taught me how to get along with different kinds of people"; and alienation from others was compared to responses to "It [military service] made me more hateful toward certain types of people." Chi-square analyses revealed that all comparisons were significant in the expected direction at $p < .0001$.

Traumatic exposure. Five types of traumatic exposure were measured: fighting, killing, perceived threat to oneself, death/injury of others, and atrocities. Potential items for each type were reviewed for content in common, and items were assigned to the one type that matched their content most closely (Fontana & Rosenheck, 1996). In this way, comparison of exposure types would not be confounded by overlapping content.

Fighting was measured by modifications of two scales: the Revised Combat Scale (Laufer, Yager, Frey-Wouters, & Donnellan, 1981) (M = 7.71, SD = 4.38), and the Combat Exposure Scale (Keane et al., 1989) (M = 19.45, SD = 11.97). For the most part, these scales measure traditional aspects of fighting such as firing on the enemy, being fired upon by the enemy, being ambushed and going on patrols. They also include other aspects of traumatic exposure such as seeing others being killed or injured, being threatened with death, and being wounded oneself. These items were

deleted from the calculation of these two combat scales. The modified combat scales correlated .83 with each other in the present study. Therefore, they were standardized and summed to produce a composite fighting score (M = 101.42, SD = 18.55).

Killing/injuring others was determined from several items asking whether the veteran was responsible personally for this action. The items did not permit a clear distinction between killing/injuring in the course of traditional warfare from doing so in the course of participating in atrocities. In addition, the overlap among items did not permit confident determination of the amount of killing/injuring. For these reasons, this type was measured dichotomously and includes all killing/injuring of others (M = .55, SD = .50).

Perceived threat of death or injury to oneself (M = 3.38, SD = .92) was measured by six items (alpha = .87) such as exposure to danger and risk of casualty, fear of being injured or killed, and fear of surprise attack.

Exposure to death and injury of others (M = 27.38, SD = 11.38) was measured by 12 items (alpha = .95) such as the sight and sound of dying men, responsibility for taking care of and/or evacuating casualties, knowing Americans who were killed or wounded, and seeing the dead bodies of the enemy.

Participation in atrocities aside from killing were determined from several items which involved harassment of civilians, destruction of property or the mutilation of enemy bodies. As in the case of killing/injuring, the overlap among items did not permit confident determination of the amount of abusive violence. Therefore, this type was measured dichotomously (M = .28, SD = .45).

PTSD. PTSD was measured as the predicted probability of being diagnosed as a case as computed by the NVVRS. This variable was derived in the NVVRS by optimizing the prediction of PTSD, as determined by psychiatric interview in a clinical subsample, from other variables that were available in both the clinical subsample and the total survey sample (Kulka et al., 1990b). The resulting logistic regression equation from the clinical subsample was then applied to the same variables in the survey sample to generate the probability, ranging from .001 to .999, of being diagnosed with PTSD. The mean probability was .21 (SD = .32).

Control variables. Three measures were included as control variables for possible response biases to the free-form answers: social desirability response set, a single item indicating ease in talking about oneself to others, and years of education. Social desirability was measured by ten items from the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960). This abbreviated scale (M = 15.27, SD = 2.46) had an internal consistency of .67. Ease in talking about oneself to others was answered on a four-point scale (M = 2.49, SD = .77).

Table 1. Bivariate Correlations Among Study Variables[a]

	Soc. Des.	Ease	Educ	Fight	Kill	Threat	Death	Atroc.	Ben.	Affirm.	Self-Improv.	Solidar.	Liab.	Disill.	Self-Improv.	Alien.	PTSD
Social disability	—																
Ease in talking	.17	—															
Years of education	.10	.10	—														
Fighting	−.10	−.16	−.07	—													
Killing	−.13	−.15	−.07	.70	—												
Perceived threat	−.06	−.12	−.07	.78	.55	—											
Death of others	−.09	−.16	−.03	.78	.62	.72	—										
Atrocities	−.18	−.14	.01	.45	.58	.36	.45	—									
Benefits	.00	−.02	0.07	.08	.09	.07	.10	.00	—								
Affirmation	.02	.00	−.05	.00	.03	.01	−.04	−.04	.25	—							
Self-improvement	−.04	−.04	.07	.11	.08	.08	.13	.03	.70	−.14	—						
Solidarity	.06	.04	.03	−.01	.00	.01	−.02	.01	.33	−.11	−.09	—					
Liabilities	−.06	−.03	.08	.08	.12	.08	.08	.11	.11	.02	.11	.03	—				
Disillusionment	−.03	.06	.12	−.05	−.03	−.05	−.04	−.02	.03	.02	.00	.04	−.15	—			
Self-improverishment	−.04	−.05	.05	.07	.08	.07	.06	.07	.03	.00	.05	−.01	.69	−.10	—		
Alienation	−.05	.00	.07	.05	.10	.05	.07	.09	.11	.02	.09	.04	.69	−.10	−.02	—	
Probability of PTSD	−.21	−.32	−.07	.41	.37	.42	.46	.35	−.02	.00	−.01	−.02	.14	−.10	.10	.10	—

[a] $N = 1113$; $r = .06$ ($p < .05$); $r = .08$ ($p < .01$).

Data Analysis

Bivariate relationships were calculated first as simple correlations in order to maximize correspondence with other studies. Then, they were calculated as beta coefficients in multiple regression analyses in which the effects of the covariates were controlled. Hierarchical polynomial regression analyses were used to test for quadratic trends which might reveal an inverted U relationship between either psychological benefits or liabilities and traumatic exposure (Pedhazur, 1982).

Structural equation modeling (e.g., Bollen, 1989; Hayduk, 1987) was used to test for mediation of traumatic exposure by psychological benefits and/or liabilities. Before the model's parameters were estimated, the data were checked for outliers and none were detected, making deletion of cases unnecessary. The data were centered prior to estimation in order to minimize multicollinearity among the variables (Cohen & Cohen, 1983). Parameter estimation on the covariance matrix was performed by generalized least squares according to the CALIS procedure (SAS Institute, 1989). Moderation of psychological liabilities by psychological benefits was tested by factorial analysis of covariance.

Results

Relationship of Psychological Benefits and Liabilities to Each Other

The bivariate correlations among psychological benefits and liabilities are presented in Table 1. There was one significant correlation among the individual categories, namely, a positive association between self-improvement and alienation from others, $r = .09$. With regard to the collapsed categories, psychological benefits and liabilities overall were correlated positively and significantly with each other, $r = .11$. The same pattern of significant findings was obtained when the relationships were controlled for covariates.

Linear Relationship Between Either Psychological Benefits or Liabilities and Dose of Traumatic Exposure

The bivariate correlations of psychological benefits and liabilities with dose of traumatic exposure can be found in Table 1. They revealed significant relationships for both self-improvement and psychological benefit overall with fighting, killing, perceived threat and death of others. No significant relationships were found between any category of psychological

benefits and participation in atrocities. The same pattern of significant findings held when the relationships were controlled for covariates. Among psychological liabilities, significant relationships were found between disillusionment and fighting and perceived threat; between self-impoverishment and fighting, killing, perceived threat and atrocities; between alienation from others and killing, death of others and atrocities; and between psychological liabilities overall and all categories of exposure. The same pattern was obtained when the relationships were controlled for covariates, with the exception of the two relationships involving disillusionment which dropped to nonsignificance.

Curvilinear Relationship between Psychological Benefits and/or Liabilities and Dose of Traumatic Exposure

Curvilinearity was examined with regard to the three continuous measures of traumatic exposure: fighting, perceived threat and death of others. Hierarchical polynomial regression analyses were conducted on the linear and quadratic trends for each of the psychological benefit and liability categories. These analyses revealed significant quadratic trends for solidarity, $F(1, 1167) = 4.48, p < .05$, according to the dose of perceived threat, for self-improvement, $F(1, 1167) = 9.51, p < .003$, and psychological benefits overall, $F(1, 1167) = 14.27, p < .0002$, according to the dose of death of others, and for disillusionment, $F(1,1168) = 5.51, p < .02$, according to the dose of death of others. No significant quadratic trends were found according to dose of fighting.

Each significant quadratic trend was checked to determine the extent to which it conformed to the pattern of the inverted U. The distributions for perceived threat and death of others were divided into quintiles, and the means were derived for each significant category of benefits and liabilities. Inspection of the means in Table 2 reveals that the quadratic trend for solidarity and perceived threat conforms very closely to the pattern of the inverted U. The means show a steep rise from low to moderate to

Table 2. Psychological Changes by Quintile of Traumatic Exposure

		Quintile of Exposure				
Exposure	Psychological Change	1	2	3	4	5
Perceived threat	Solidarity	0.16	0.17	0.18	0.19	0.14
Death of others	Self-improvement	0.35	0.44	0.48	0.56	0.56
	Overall benefit	0.52	0.64	0.68	0.70	0.72
	Disillusionment	0.24	0.22	0.27	0.24	0.19

moderately high levels of exposure and then a drop at the highest level of exposure. The quadratic trends for death of others, however, conform only partially to the inverted U pattern. The means in the case of disillusionment satisfy the conditions for the inverted U, while the means in the case of both self-improvement and overall benefits categories show a steep rise as the dose of exposure to the death of others increases and then a leveling off or peaking at high levels of exposure. What is missing for completion of the inverted U pattern is a drop in psychological benefits at the highest level of traumatic exposure.

Mediation of the Relationship Between Traumatic Exposure and PTSD by Psychological Benefits and Liabilities

Mediation of the relationship between traumatic exposure and PTSD by psychological benefits and/or liabilities was tested by structural equation modeling in which the following hypothesized associations were specified. Traumatic exposure was hypothesized to contribute to psychological benefits and liabilities, which in turn, were hypothesized to contribute to the development of PTSD. Additionally, the model hypothesized that there would be additional direct effects of traumatic exposure on PTSD that were not mediated by psychological benefits and liabilities. Fighting, killing, perceived threat, death of others and atrocities were combined in the model to produce a latent variable named exposure. Social desirability, ease of talking about oneself, and years of education were hypothesized to potentially affect the reporting of all other variables. These three variables were combined in the model to produce a latent variable named controls. Bivariate correlations among all model variables can be found in Table 1.

Statistically, the model achieved a very good fit to the data (root mean square residual = .06 and normed fit index = .99 (Bentler & Bonett, 1980)), coupled with substantial parsimony (parsimonious normed fit index = .68; James, Mulaik, & Brett, 1982). A diagram of the model with significant paths ($p < .05$) is presented in Fig. 1. The small arrows that are attached to a variable but do not proceed from another variable indicate the disturbance (that is, the proportion of variance unaccounted for by the model) associated with each variable.

Reference to Fig. 1 shows that all hypothesized associations were significant. The paths between the control variables and both traumatic exposure and PTSD suggest that the control variables affected the reporting of these other variables. Not affected by the control variables, however, were the reporting of either psychological benefits or liabilities. Traumatic exposure was related significantly to psychological benefits and liabilities,

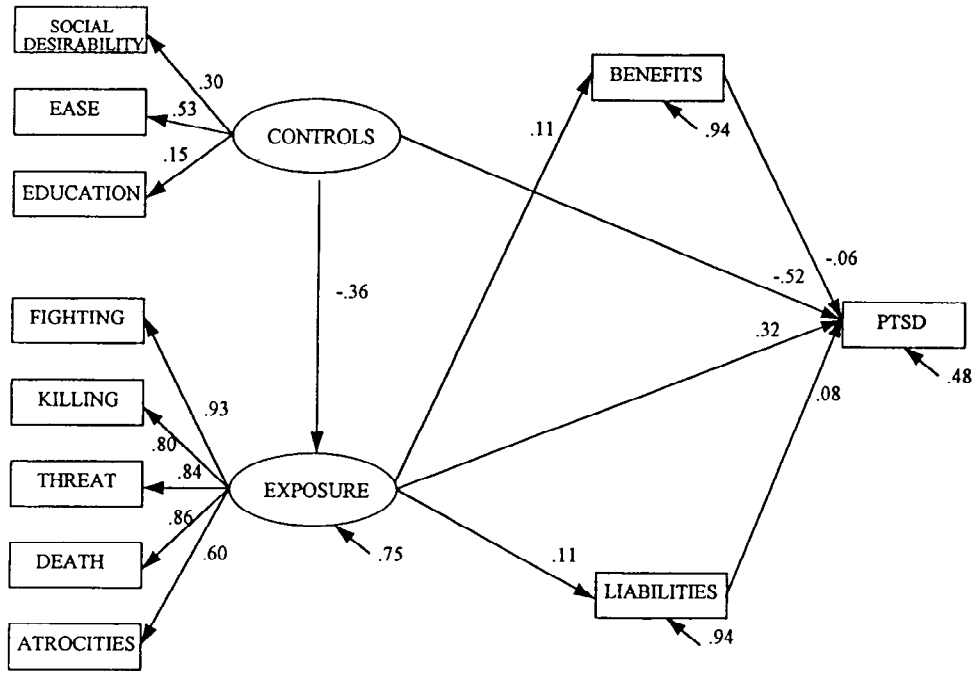

Fig. 1. Mediation of the effects of exposure on PTSD by benefits and liabilities.

suggesting that exposure contributes to the development or elicitation of both types of psychological changes. In addition, the direct association between exposure and PTSD suggests that exposure has effects on the development of PTSD that are not mediated by these psychological changes. The associations of psychological benefits and liabilities with PTSD suggest that psychological benefits help to protect against the development of PTSD while psychological liabilities help to foster the disorder's development. It is noteworthy that the significant association for liabilities is consistent with the strength of the bivariate correlation, but the significant association for benefits is much stronger than the bivariate correlation. This circumstance is due to the fact that liabilities was acting as a suppressor variable; that is, the bivariate association between benefits and PTSD was being suppressed by the association of each of these variables with liabilities. [We are indebted to an anonymous reviewer for alerting us to this possibility.] Thus, the association between benefits and PTSD is only detectable when the association with liabilities is taken into account. This suppression may help to explain why most studies reviewed above have reported no significant association between positive consequences of traumatic exposure and PTSD.

Finally, we also tested the limits of the model by replacing the overall psychological benefits and liabilities scores with separate analyses of pairs of the individual categories which were related conceptually as opposites. When the overall scores were replaced with affirmation and disillusionment, neither category score had a significant association with PTSD. When improvement and impoverishment were included, only improvement had a significant association with PTSD. When solidarity and alienation were included, only alienation had a significant association with PTSD. Thus, the associational pattern for overall psychological benefits and liabilities does not generalize intact to each pair of individual categories that comprise them.

Moderation of the Relationship Between Traumatic Exposure and PTSD by Psychological Benefits

Two conditions have to be met in order for the data to support the possibility that psychological benefits might moderate the effects of psychological liabilities on PTSD: (1) psychological benefits and liabilities must interact significantly; and (2) the pattern of the interaction must show that there is a smaller difference in the prevalence of PTSD among those with liabilities than among those without liabilities. Regarding the first condition, a significant interaction was obtained when improvement and impoverishment were the categories of benefits and liabilities involved, $F(1, 1141) = 4.26$, $p < .05$. Second, the means for combinations of impoverishment and improvement followed the hypothesized pattern, which is illustrated in Figure 2. There is a difference in prevalence of PTSD of only .01 among subgroups of veterans who were not impoverished; but there is a difference in prevalence of .15 among subgroups of veterans who were impoverished, with the higher probability of PTSD occurring in the absence of self-improvement. Solidarity and alienation showed the same pattern of means, but neither they nor any other pairing yielded an interaction that was significant.

Discussion

Psychological benefits, particularly in the form of self-improvement, have been shown to be associated positively with most types of traumatic exposure in the war zone. The one exception among the types of traumatic exposure is participation in atrocities. It is understandable that the universal moral condemnation of atrocities would make it very difficult to derive psychological benefits, especially a sense of self-improvement, from participating in them. Successful coping is heavily represented in the themes coded

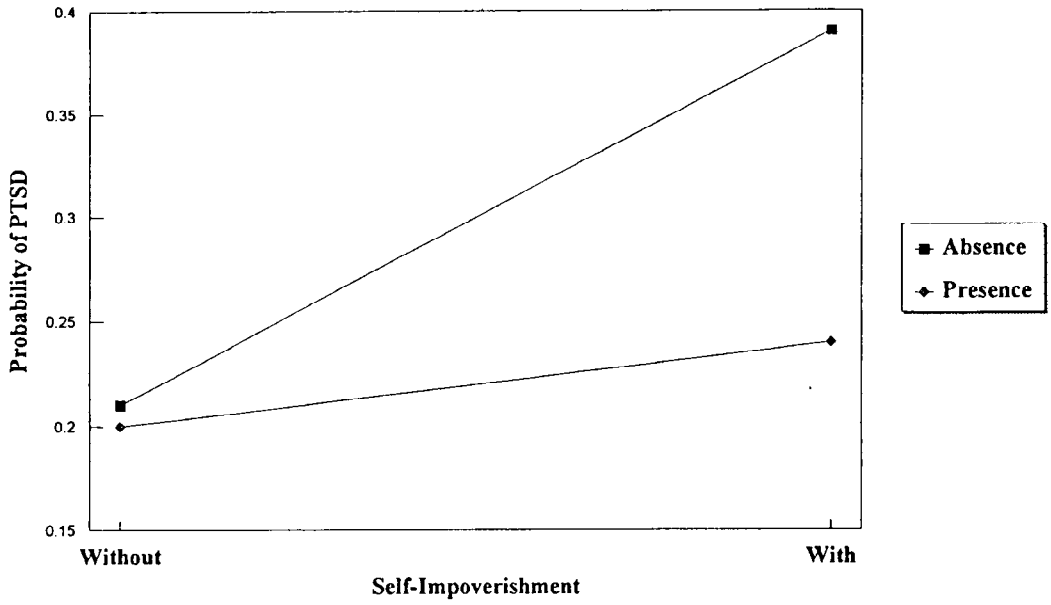

Fig. 2. Probability of PTSD among veterans with and without self-impoverishment according to presence or absence of self-improvement.

for self-improvement and would seem, therefore, to be a major basis for deriving psychological benefits from traumatic exposure. Several of the theories that have been proposed would seem to point to actual success in coping as the mechanism accounting for the sense of self-improvement. For example, Adlerian theory would predict that the feeling of inferiority derived from traumatic exposure would stimulate people to perform those actions that would generate a counteracting feeling of superiority. Hobfoll's theory would suggest that people would act so as to replace losses in so far as possible; and Baltes' theory would predict that people would try to compensate for their losses in some way, perhaps discovering abilities that they didn't know that they had in the process.

Another view, not mutually exclusive with the preceding, is that people would engage in a cognitive reframing of their behavior and the trauma in order to regain a sense of control and mastery over their lives that had been lost due to their not having been able to cope effectively with the trauma in actuality. Frankl's theory would suggest that people might redefine their passivity or acquiescence as reflecting courage in enduring the suffering inflicted by the trauma. Likewise, Hobfoll's theory provides for the possibility that people might recast the trauma as a challenge in some manner and might look for the "silver lining" to be found in it.

Psychological benefits played a mediational role by counteracting the effects of traumatic exposure on PTSD. In this regard, the present results are similar to those of Aldwin et al. (1994), but different from those reported in other studies. As we have suggested above, the lack of a significant association in other studies might be due to the possibility of suppression of the relationship between psychological benefits and PTSD by psychological liabilities. The sense of self-improvement was the particular category that was primarily responsible for the counteracting effects of psychological benefits overall. These results suggest, then, that the sense that one coped successfully with the trauma appears to be the best insulation against developing PTSD from the exposure. A more precise identification of the nature of this sense of successful coping would seem to be a fruitful area for further research.

Mediating between traumatic exposure and PTSD in the opposite direction were psychological liabilities, particularly alienation from others. The mediational role of liabilities was to pass through the effects of traumatic exposure on PTSD. Interpretively, there are two possibilities. One is that alienation from others constitutes a psychological state which fosters the pathogenic effects of traumatic exposure. The other is that the association is due to a conceptual overlap between alienation from others and the criterion symptom of estrangement from others. This second possibility springs largely from a definitional ambiguity. While the components of alienation from others (e.g., racial or ethnic prejudice, problems relating to authority figures, cynicism about the goodness of mankind) were intended to be separate from the components of estrangement from others as a symptom for PTSD, it is possible that the two sets of components are drawn from the same psychological domain. The criteria for PTSD symptoms are defined by examples of thoughts, feelings and behaviors rather than by a precise and exclusive listing of these features to be included.

Their mediating roles aside, there is evidence for a moderational role for psychological benefits on psychological liabilities, especially when the benefits are self-improvement and the liabilities are self-impoverishment. Self-improvement made virtually no difference to the probability of developing PTSD when self-impoverishment was absent; but when self-impoverishment was present, the probability of developing PTSD was much higher when self-improvement was also absent. The presence of self-improvement, therefore, appeared to largely offset a concomitant sense of self-impoverishment. Again, the sense of success and failure in coping appears to be a highly influential set of reactions for the development of PTSD.

The presence of both self-improvement and self-impoverishment concomitantly reflects the largely independent status of psychological benefits and liabilities as reactions to traumatic exposure. In the present study, there

were no significant relationships between corresponding content categories of psychological benefits and liabilities, and there was only a significant but low relationship between psychological benefits and liabilities overall. The weak association between psychological benefits and liabilities parallels findings elsewhere regarding the concomitance of positive and negative affects (e.g., Bradburn, 1969; Warr, Barter, & Brownbridge, 1983). This body of evidence warns against interpreting logical opposites as psychological opposites, that is, against assuming that the presence of the positive means the absence of the negative and vice versa. It is probably because of the multidimensional nature of most sets of circumstances that people are quite capable of having both positive and negative reactions to the same set of circumstances. Nonetheless, it is striking that even a set of circumstances as fearful and horrific as the trauma of war can produce positive and negative reactions side by side.

While it is clear that there is a strong linear trend to the associations of psychological benefits and liabilities with traumatic exposure, there is evidence of a quadratic trend in some cases as well. In each case of a quadratic trend, there was a leveling off or peaking of psychological benefits or liabilities at high levels of exposure. In the cases of solidarity with others and disillusionment, the quadratic trend showed a decline at the highest level of exposure to conform to the inverted U. The inverted U suggests that threat to one's own life and limb contributed to solidarity with others up to a certain point, but that threat at its highest level generated egocentric reactions for survival which overwhelmed sociocentric reactions for solidarity.

The inverted U pattern for the relationship between disillusionment and exposure to death of others poses somewhat of an interpretive problem. In the case of a benefit, it is understandable that the negativity of traumatic exposure would oppose and diminish the possible benefit at the highest levels of exposure. In the case of a liability, however, there is little reason to expect traumatic exposure to have the same effects at its highest levels. The negative bivariate correlation between disillusionment and exposure is opposite in direction to the correlations between exposure and both self-impoverishment and alienation from others. Disillusionment, therefore, does not appear to be a liability in the same sense as the other two categories, and so the theoretical expectations regarding a liability would not seem to apply to disillusionment. Disillusionment would seem to be an important reaction in its own right, and further research into its nature would seem to be worthwhile.

Finally, it is necessary to consider both the self-report and the retrospective nature of the NVVRS data set. First, by their nature, self-reports are subject to questions of veridicality with objective measures. This is just

as true of psychological benefits and liabilities as it is of traumatic exposure or of PTSD or of any other category of responses. Whether veterans actually changed to the extent and in the ways which they reported is open to empirical investigation. Most conservatively, we may conclude that the psychological benefits and liabilities that they reported reflect their perceptions of how they were affected by their war zone service and how these perceptions have become part of their self-images.

Second, one must consider the extent to which the retrospective nature of the NVVRS data set may have been responsible for the empirical relationships found. That is, the retrospective nature of the data raises the question as to whether veterans' PTSD at the time of reporting may have affected their memory and/or reporting of traumatic exposure and psychological benefits and liabilities so as to create relationships with PTSD which did not exist historically. It is not possible to ascertain the likelihood of such a bias within the constraints of a retrospective data set, and so we must accept its possibility as a limitation. Granting this limitation, however, we believe that the present results have value in pointing to an additional set of reactions to traumatic exposure that might help to expand our understanding of its effects. Additionally, the findings provide the basis for important hypotheses to be tested prospectively in future data sets.

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