

## Psychological Consequences of the Bam Earthquake on Professional and Nonprofessional Helpers

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This study compared the psychological status of rescue personnel who had formal training (Red Crescent workers, i.e., Red Cross workers, and firefighters) with university student volunteers who had no formal training in handling traumatic situations in the Bam earthquake. One hundred student volunteers, 18 Red Crescent workers, and 36 firefighters participated in this study. Participants completed the Civilian Mississippi Scale, the General Health Questionnaire (GHQ-28), and the Anxiety Sensitivity Index. Helpers without formal training showed higher scores on posttraumatic stress disorder (PTSD) and GHQ subscales compared to trained rescue personnel. In addition, a significant number of volunteers without formal training met criteria for a possible PTSD diagnosis by scoring above the cut-off point for the Mississippi scale. Those who had higher scores on the Anxiety Sensitivity Index showed greater adverse psychological effects.

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Catastrophic earthquakes have long-term psychological consequences, particularly for survivors with high levels of trauma exposure. The 2004 Bam earthquake disaster in the Kerman province of Iran was totally unexpected and resulted in mass confusion and terror. Effective communication and transportation modalities fell apart immediately. The arrival of experienced rescue personnel to the site took a substantial period of time, and many victims died before they reached a hospitals. Many young student volunteers from nearby cities without any training in rescue services arrived early at Bam to rescue those buried under the ruins.

Trauma refers to extreme or severe events that are so powerful, harmful, and threatening that they demand ex-

traordinary coping efforts. While the figures vary across situations and across types of traumas, only a substantial minority of trauma victims develop serious associated difficulties or are diagnosed with psychiatric disorders (Davidson & Baum, 1994).

In an early report, Durham, McCammon, and Allison (1985) examined 79 rescue, fire, and medical personnel and police officers who treated victims of an apartment building explosion. Eighty percent (80%) of the subjects had at least one symptom of posttraumatic stress disorder (PTSD). Eight of 21 PTSD symptoms were present in at least 10% of respondents. The most frequently reported symptom, intrusive thoughts about the disaster, occurred in 74% of those working with or searching for alive or dead victims at the disaster site.

Hodgkinson and Shepherd (1994) examined the impact of disaster-related stress on disaster support personnel offering psychological support to victims of two major disasters. Results showed that rescue workers experienced two major sources of disaster-related stressors: role-related difficulties and contact with clients' distress. Coping style, prior life events, and the aforementioned

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aspects of disaster may all serve as predictors of the level of stress experienced by disaster support workers.

Ursano, Fullerton, Vance, and Kao (1999) reported that disaster workers who work with deceased victims are at increased risk of PTSD. Disaster workers who reported identification with the deceased as a friend were more likely than others to develop more intrusive and avoidant symptoms and somatization. Disaster workers who reported identification with the deceased as a family member had greater intrusive symptoms one month after the disaster than those who did not. There were no differences between those who did and did not identify with the deceased as self. Identification with the dead as a friend was specifically associated with higher risk for these workers.

It has also been shown that interacting with seriously traumatized people has the potential to affect health care workers' mental health (Collins & Long, 2003). Post-traumatic stress disorder is one of the possible negative consequences of exposure to traumatic events. The potential adverse consequences for support workers who strive to help traumatized people are *vicarious traumatization* (Pearlman, 1995), *secondary traumatic stress*, *traumatic countertransference* (Pearlman & Saakvitne, 1995), *burnout* and *compassion fatigue* (Figley, 1995, 1999). As Pearlman (1995) has noted, vicarious traumatization may be observed in people who have a cumulative impact of involvement with traumatized people. The most prominent features of vicarious traumatization include depression, despair, cynicism, alienation, physical symptoms, withdrawal, and an increased sense of vulnerability.

Haslam and Mallon (2003) studied the PTSD symptoms of firefighters in relation to traumatic events they experienced and the availability of social support. Fire service personnel were at risk for developing some symptoms of PTSD; however, most did not experience severe enough symptoms for PTSD to be diagnosed. The authors suggest that high levels of social support (from within the service and outside) may play a role in buffering firefighters from the development of PTSD.

Not everyone exposed to a traumatic event develops PTSD. Previous studies have found an association between neuroticism and PTSD. This has been demonstrated in two ways. First, studies comparing PTSD patients to non-PTSD traumatized controls found significantly higher neuroticism scores for the former group. This holds for exposure to combat (Casella & Motta, 1990), bush-fire (McFarlane, 1992), receiving HIV-diagnosis (Kelly et al., 1998), and other traumatic events in a community sample (Breslau, Chilcoat, Kessler, & Davis, 1999). Second, studies examining the degree of PTSD symptoms found higher neuroticism for individuals with more

symptoms. This holds for exposure to combat (Hyer et al., 1994), earthquake (Lewin, Carr, & Webster, 1998), plane crash (Chung, Easthope, Chung, & Carter, 1999), bush-fire (McFarlane, 1989), burn injury (Roca, Spence, & Munster, 1992), and traumatic war events experienced by parents (Mook et al., 1997). More specifically, neuroticism has been related to arousal symptoms (Charlton & Thompson, 1996; Ormel & Wohlfarth, 1991), and less to reexperiencing (McFarlane, 1992), or avoidance (Roca et al., 1992) symptoms.

The other factor that has recently been associated with PTSD symptoms is anxiety sensitivity. Anxiety sensitivity is a specific fear of anxiety-related bodily sensations due to beliefs that such sensations will lead to catastrophic outcomes such as physical illness, social embarrassment, or loss of mental control (Reiss, Peterson, Gursky & McNally, 1986). Taylor, Koch, and McNally (2002) found that PTSD patients along with other groups of anxious patients scored higher than normal groups in an index of anxiety sensitivity. These results supported the Reiss and McNally's expectancy theory that indicates a high level of anxiety sensitivity (fear of anxiety) increases the risk for anxiety disorders, and plays a particularly important role in panic disorder (Taylor et al., 2002).

Finally, coping strategies might help rescue personnel to cope with the stress of their work. North et al. (2002) studied postdisaster adjustment in the context of psychiatric disorders after the Oklahoma City bombing. The firefighters had relatively low rates of PTSD and described little functional impairment, positive social adjustment, and high job satisfaction.

Clohessy and Ehlers (1999) examined the relationship of coping strategies and responses to intrusive memories with posttraumatic stress disorder (PTSD) and other psychiatric symptoms in ambulance service workers. Of the participants, 21% met the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition Revised (DSM-III-R; American Psychiatric Association, 1987)* criteria for PTSD, and 22% met screening criteria on the General Health Questionnaire (GHQ; Goldberg & Williams, 1988) for psychiatric symptoms. Wishful thinking and mental disengagement when confronted with critical incidents at work, negative interpretations of intrusive memories, and maladaptive responses to these memories (rumination, suppression, and dissociation) correlated with PTSD severity. A substantial subgroup of emergency service personnel may need support in psychological processing of distressing incidents at work and may benefit from information that normalizes posttraumatic symptoms such as intrusions.

The negative effects of traumatic events on rescue personnel and health workers who are usually experienced

and trained to work with traumatized victims indicates that such effects might be more devastating on those rescue workers who are not experienced and trained to deal with traumatic events. In the 2004 southern Iran, Bam earthquake, people spontaneously rushed to help victims of the disaster. Many of these volunteers (including university students) had no experience or training in how to deal with victims of mass trauma. To formulate a comprehensive disaster plan for organizing rescue forces, it may be helpful to study the performance and psychological status of those who participated in the rescue efforts after the Bam earthquake.

The aim of this study was to compare the psychological status of those rescue personnel who had formal rescue experience and training (the Red Crescent, i.e., Red Cross workers, and the firefighters) with those rescue workers who had no formal rescue training and experience in handling traumatic situations (university student volunteers) in the Bam earthquake. It was hypothesized that the Red Crescent workers and the firefighters who participated in helping Bam's victims would show less psychological adverse effects than would university student volunteers. In addition, it was postulated those who have greater anxiety sensitivity scores would show more adverse psychological effects.

## Method

### Participants

A large number of student volunteers, residents of two national universities at Kerman, the nearest city to Bam, arrived at Bam within days after the disaster. Almost all of them had no affiliation to an emergency, rescue, or humanitarian organization. Most of them could not be reached because they returned to their university at the

end of the first day. About one third of them, however, remained at the scene of the earthquake for several days and 100 student volunteers were screened for the present study. Eighteen Red Crescent workers and 36 firefighters who moved from Shiraz City, Fars province, to Bam on the day of the disaster were also recruited to take part in the study (almost all of the rescue personnel moved to the scene from Shiraz). The professional rescues arrived at the day after the event.

As can be seen in Table 1, the mean ages of the three groups were significantly different. Post hoc comparisons showed that firefighters were older than the student volunteers,  $t(134) = 17.23$ ,  $p < .01$ , and the Red Crescent workers,  $t(52) = 5.46$ ,  $p < .01$ , but the mean age of the student volunteers and the Red Crescent workers did not differ significantly,  $t(17.33) = 0.99$ , *ns*. The three groups were significantly different in terms of the years of education. Post hoc comparisons showed that firefighters were significantly less educated (i.e., years of formal education) than the student volunteers and the Red Crescent workers.

The three groups were significantly different in terms of the length of time lapse between Bam earthquake and their arrival to the site. Post hoc comparisons showed that the student volunteers arrived at Bam earlier than the Red Crescent workers and the firefighters. However, the three groups were also significantly different in terms of the length of time being in Bam. Post hoc comparisons showed that the student volunteers stayed a shorter period of time in Bam than the Red Crescent workers and the firefighters. In addition, the Red Crescent workers stayed a shorter period of time in Bam than the firefighters (see Table 1).

Among the student volunteers, 96 (96%) were single and 4 (4%) were married. Among the Red Crescent workers, 16 (89%) were single and 2 (11%) were married. Among the firefighters 3 (9%) were single and 30 (91%) were married.

**Table 1.** Demographic Characteristics of the Sample

	Firefighters ( <i>n</i> = 36)		Red Crescent ( <i>n</i> = 18)		Students ( <i>n</i> = 100)		Comparison ( <i>df</i> = 2, 150)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Age	34.3	7.2	22.8	7.5	21.1	1.7	116	.001
Education	10.1	2.2	13.1	1.9	14.1	1.6	58.7	.001
Length of time since arrival at earthquake site (hours)	215.8	293.4	148.5	315	15.8	23.4	18.6	.001
Length of time at site in Bam	224.4	54.4	165	109.6	52.8	48.7	116	.001

## Measures

### *The Civilian Mississippi Scale for PTSD–Persian Version*

The Civilian Mississippi Scale (CMS) for PTSD–Persian Version (ESHEL) has 39 items. The CMS was originally developed by Keane, Caddel, and Taylor (1988) and measures self-reported symptoms of posttraumatic stress in a civilian population. Its original version has 35 items. The 39-item version of the scale was translated to Persian by Goodarzi (2003) and is known as ESHEL. The ESHEL showed adequate validity and reliability. A principal component analysis also revealed four factors for ESHEL that explained 58% of the total variance. These factors were Intrusive Thoughts, Problems in Interpersonal Relationships, Inability to Control Emotions, and Depressive Symptoms.

### *General Health Questionnaire*

A Persian version of the General Health Questionnaire (GHQ-28; Goldberg & Williams, 1988) was administered. The Persian version of GHQ-28 was prepared by Mosavi (1998) in London for the Iranian and Afghan populations. The validity and reliability of the GHQ-28 Persian version was documented in several Iranian publications, including that by Noorbala, Mohammad, Bagheri Yazdi, and Yasami (2002) in a nationwide study. A Likert scoring (0–3) was used for the present study, scores ranged from 0 to 21 for the subscales (Physical Health, Anxiety, Social Functioning, and Depression) and from 0–84 for the total score (see also, Kalafi, Hagh-Shenas, & Ostovar, 2002).

### *Anxiety Sensitivity Index*

The Anxiety Sensitivity Index (ASI) has 16 items each specifying a possible negative consequence to the experience of anxiety. These consequences include Additional Anxiety or Fear, Illness, Embarrassment, and Loss of Control. The ASI is required to rate each item according to a 5-point Likert scale: 0 (*very little*), 1 (*a little*), 2 (*some*), 3 (*much*), and 4 (*very much*). The Anxiety Sensitivity score is the sum of the scores on the 16 items. Reiss, Peterson, Gursky, and McNally (1986) report test–retest reliabilities of .71 for 54 men, .74 for 73 women, and a .75 total. The results of a principal component factor analysis revealed a single factor structure in which 13 of the 16 items had a loading of .4 or more on the first factor. The translated version of this scale also showed adequate reliabilities in Iran ( $\alpha = .89$  for all SS). The total scores

of the ASI also showed a significant correlation with the total scores of the Mississippi scale as expected in the current study ( $R = .66$ ,  $N = 151$ ,  $p < .001$ ).

### *Demographic Questionnaire*

The Demographic Questionnaire measures features such as gender, age, years of formal education, the duration of time being in Bam, the level of earlier experiences for rescue operations, the history of previous physical or psychiatric disorders.

## Procedure

The participants completed the above scales in one session about 90 days (range 75 to 103 days) after the earthquake. Measures were administered in a standard order as follows: Demographic Questionnaire, the ESHEL, GHQ, and ASI.

## Results

### *Posttraumatic Stress Disorder Symptoms*

To compare the scores of the three groups in the subscales and total ESHEL score, a MANOVA was carried out. The independent variable was Group (i.e., the student volunteers, the Red Crescent workers, and the firefighters) and the dependent variables were the participant's scores in the ESHEL subscales (the four subscales). Results showed significant effect for Group in total,  $F(2, 150) = 4.92$ ,  $p < .01$ , and three of the subscales. Table 2 shows the means and the standard deviations of the three groups in the ESHEL subscales and also the results of the MANOVA analysis.

Post hoc analyses showed that the mean of Intrusive Thoughts subscale was greater for the student volunteers than the Red Crescent workers,  $t(67.21) = 7.51$ ,  $p < .01$ , and the firefighters,  $t(120.2) = 4.82$ ,  $p < .01$ . Also, the mean of Inability to Control Emotions was greater for the student volunteers than the Red Crescent workers,  $t(116) = 4.03$ ,  $p < .01$ , and the firefighters,  $t(89.91) = 5.41$ ,  $p < .01$ . Finally, the mean of the Depressive Symptoms subscale was greater for the student volunteers than the Red Crescent workers,  $t(57.9) = 4.55$ ,  $p < .01$ , and the firefighters,  $t(78.2) = 3.35$ ,  $p < .01$ . When the time since arrival and the duration of time stayed in Bam were inserted into the analysis as covariates, the results did not change.

**Table 2.** Means, *SDs*, and Results of Analyses of Variance for PTSD, GHQ, and Anxiety Sensitivity Scores

Variables	Firefighters ( <i>n</i> = 36)		Red Crescent ( <i>n</i> = 18)		Students ( <i>n</i> = 100)		Comparison ( <i>df</i> = 2, 150)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
ESHELL scales								
Intrusive Thoughts	11.2	3.2	8.7	2.5	15.2	6.5	14.9	.001
PIR	4.1	1.4	4.3	1.4	4.9	2	3.0	.052
ICE	12.8	3.6	11.9	4.2	17.1	5.2	16.5	.001
DSym	8.1	3.1	7.8	1.7	10.3	3.9	7.3	.001
GHQ scales								
Physical health	3.6	3.6	3.4	4.6	6.3	5	6.8	.002
Anxiety	2.7	3.7	2.1	4.7	7.1	5.8	13.6	.001
Social Dysfunction	6.4	1.8	5.6	2.8	8.7	4.1	9.7	.001
Depression	1.5	2.5	2.3	5.4	4.7	4.9	7.5	.001
Anxiety Sensitivity	15.3	8.4	13.6	6.3	21.1	12.3	6.0	.003

*Note.* PIR: Problems in Interpersonal Relations; ICE: Inability to Control Emotions; DSym: Depressive Symptoms.

To examine whether there were differences between groups in terms of a PTSD diagnosis, a cut-off point of 107 was used as suggested by Goodarzi<sup>1</sup> (2003). Using this criteria, 34 out of 100 student helpers, 1 out of 18 Red Crescent workers, and 1 out of 36 firefighters had a possible PTSD diagnosis,  $\chi^2(2, N = 154) = 18.02$ ,  $p < .01$ . This implies that a greater number of student volunteers developed PTSD symptoms compared to the Red Crescent workers and the firefighters.

### Anxiety Sensitivity

To compare the scores of the three groups in ASI, a one-way ANOVA was used. As shown in Table 2, the Anxiety Sensitivity scores differ between the three groups. Post hoc comparisons showed that the student volunteers scored significantly higher than the Red Crescent workers,  $t(45.51) = 3.85$ ,  $p < .01$ , and the firefighters,  $t(91.78) = 3.08$ ,  $p < .01$ . When the factors—time length since earthquake to arrival, the time length in Bam, and age—were submitted as a covariate variable in a simple factorial design, the results did not change. Therefore, the results cannot be attributed to the difference between the groups in terms of the time length since earthquake to arrival, the time length in Bam, or the age of the subjects.

<sup>1</sup>Goodarzi (2003) reported that the sensitivity of the scale was 69% and its specificity was 74% at this cut-off point. He estimated the sensitivity and specificity of several cut-off points suggested by different authors, but found that the one suggested by Keane et al. (1988) was more appropriate for differentiation.

### General Health Questionnaire

To compare the scores of the three groups in the total GHQ-28 score and its subscales a MANOVA was carried out. The independent variable was Group (i.e., the student volunteers, the Red Crescent workers, and the firefighters) and the dependent variables were the participant's scores in the GHQ subscales. Results showed significant effects for Group,  $F(8,296) = 3.81$ ,  $p < .01$ , and all subscales. Table 2 shows the means, *SDs*, and the results of the MANOVA for the three groups in the GHQ-28 subscales.

Post hoc analyses showed that the mean of the Physical Health subscale was significantly greater for the student volunteers than the Red Crescent workers,  $t(116) = 2.32$ ,  $p < .05$ , and the firefighters,  $t(102.42) = 3.92$ ,  $p < .01$ . Also, the mean of the Anxiety subscale was greater for the student volunteers than the Red Crescent workers,  $t(27.89) = 4.21$ ,  $p < .01$ , and firefighters,  $t(96.11) = 5.24$ ,  $p < .01$ . Finally, the mean of the Social Functioning subscale was greater for the student volunteers than the Red Crescent workers,  $t(116) = 3.4$ ,  $p < .01$ , and the firefighters,  $t(127.38) = 4.60$ ,  $p < .01$ . However, on the mean of the Depression subscale only the student volunteers scored greater than the firefighters,  $t(118.35) = 5.00$ ,  $p < .01$ , but not the Red Crescent workers,  $t(116) = 1.96$ ,  $p < .05$ .

### Discussion

This study was carried out to compare the psychological status of rescue personnel who had formal rescue experience and training (Red Crescent workers and

firefighters) with that of rescue workers who had no formal training and experience in handling traumatic situations (university student volunteers). It was hypothesized that the Red Crescent workers and the firefighters who participated in helping victims of the earthquake would show less adverse psychological effects than would the university student volunteers. The results supported this hypothesis.

University student volunteers scored higher than the firefighters and the Red Crescent workers on three ESHEL subscales, Intrusive Thoughts, Inability to Control Emotions, and Depressive Symptoms, as well as on Anxiety Sensitivity Index and the GHQ subscales, Physical Health, Anxiety, Social Dysfunction, and Depression.

The other important result of this study is the large number of students who could be candidates for a PTSD diagnosis at the time of the study. Thirty-four out of 100 students scored higher than the cut-off point suggested by Goodarzi (2003) for a probable PTSD diagnosis. Allowing for false positive, a more conservative estimate is 23%. The students who participated in this study were volunteers who joined the scene and left the area individually. In contrast, the firefighters and the Red Crescent groups arrived at the scene with their colleagues and leaders and returned together to their respective homes. A number of nonspecific group interaction effects (i.e., debriefing, group support, identification) are expected to work when a group of rescue volunteers travel together. Of course, these effective interactions are strengthened in the presence of an experienced team supervisor (i.e., both Red Crescent workers and firefighters had team leaders while the university student volunteers did not). This is consistent with the findings of Haslam and Mallon (2003), who reported on the beneficial effects of social support for rescue personnel.

The results emphasize the significance of formal training and experience in handling traumatic situations as a protective factor against developing PTSD. However, two other explanations in addition to the above comment might also be plausible. One, is that the two professional groups might be self-selected by longstanding trait qualities (coping style, past experience with trauma, ego strength). This possibility is supported by our finding of greater sensitivity to anxiety—as a trait quality—in students than in rescue personnel. Anxiety sensitivity might be considered as a predisposing factor for the development of PTSD or it might co-occur with PTSD and trauma. Although, there is a large body of literature about the anxiety sensitivity concept as a personality factor, it is not possible to conclude which of the above explanations is plausible in the current study. It is also possible that the results reflect the interplay of state and trait anxiety. However,

previous results that indicate higher neuroticism for individuals with more PTSD symptoms in different disasters (Chung, Easthope, Chung, & Carter, 1999; Hyer et al., 1994; Lewin et al., 1998; McFarlane, 1989; Mook et al., 1997; Roca et al., 1992) are supportive of a trait explanation for the results because anxiety sensitivity is related to neuroticism (e. g., Breslau et al., 1991; Hyer et al., 1994; Lewin et al., 1998; Ormel & Wohlfarth, 1991).

The differences between the student volunteers and the rescue personnel in terms of their age, education, maturity and marital status could provide another explanation. Previous studies (e.g., Haslam & Mallon, 2003; Hodgkinson & Shepherd, 1994) have shown that those who received greater social support demonstrated less-severe adverse effect in the wake of traumatic situations. Factors such as age and years of formal education also might provide an explanation for the results. Although when age and education were entered into analyses as covariates, the results did not change; it might be necessary to study the effect of these variables when the groups have been matched in terms of their age and education.

In general, the results of this study suggest that inexperienced volunteer rescuers in disasters like the Bam earthquake experience adverse psychological effects. These effects are greater for those who have a high level of anxiety sensitivity. Future research should address the actual training experiences of the volunteers, past traumatic experiences (past history of PTSD), and also baseline characteristics including coping style and anxiety sensitivity.

### Acknowledgment

This project was supported by Research Committee and Psychiatry Research Center of Shiraz University of Medical Sciences, Shiraz, Iran.

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