

## Long-Term Psychological Outcome for Non-Treatment-Seeking Earthquake Survivors in Turkey

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This study examined the incidence of posttraumatic stress disorder (PTSD) and depression in 586 earthquake survivors living in prefabricated housing sites a mean of 20 months after the 1999 earthquake in Turkey. The estimated rates of PTSD and major depression were 39% and 18%, respectively. More severe PTSD symptoms related to greater fear during the earthquake, female gender, older age, participation in rescue work, having been trapped under rubble, and personal history of psychiatric illness. More severe depression symptoms related to older age, loss of close ones, single marital status, past psychiatric illness, previous trauma experience, female gender, and family history of psychiatric illness. These findings suggest that catastrophic earthquakes have long-term psychological consequences, particularly for survivors with high levels of trauma exposure. These findings lend further support to the need for long-term mental health care policies for earthquake survivors. Outreach service delivery programs are needed to access non-treatment-seeking survivors with chronic PTSD.

—*J Nerv Ment Dis* 191:154–160, 2003

Posttraumatic stress disorder (PTSD) and depression are common psychiatric conditions following major earthquakes that cause large-scale devastation. Various studies of earthquake survivors have reported rates of PTSD ranging from 2% to 87% (Başoğlu et al., 2002; Carr et al., 1995; Durkin, 1993; Goenjian et al., 1994, 2000; McMillen et al., 2000; Sharan et al., 1996; Wang et al., 2000). The rates of major depression in earthquake survivors range from 13% to 22% (Başoğlu et al., 2002; Durkin, 1993; Goenjian, 1993). The variability in the range of PTSD and depression rates in these studies could be explained by the differences in their methodology, the extent of devastation caused by the earthquake, and the time since the earthquake.

Few studies have examined the longitudinal course of PTSD in earthquake survivors. A prospective cohort study (Goenjian et al., 2000) that examined the rates of PTSD in Armenian earthquake survivors with high trauma exposure 1.5 and 4.5 years after the disaster found rates of 87% and 73%, respectively. This study, however, was based on only 78 survivors. Following the 1989 Newcastle earth-

quake, 48% of the survivors who had PTSD at 6 months postearthquake still had PTSD at 2-year assessment (Carr et al., 1997a). This study showed that earthquake-related morbidity declined over time and stabilized at about 18 months postdisaster. Wang et al. (2000) studied longitudinally the rates of PTSD in two villages after the 1998 north China earthquake and reported PTSD rates of 19% within 3 months and 24% within 9 months after the disaster. There is also some evidence from other studies (Bland et al., 1996; Kato et al., 1996) to suggest that earthquake-related psychological distress is persistent.

Among the reported risk factors for postdisaster psychological problems in earthquake survivors are female gender (Başoğlu et al., 2002; Carr et al., 1997b; Sharan et al., 1996), older age at trauma (Carr et al., 1997b), low level of education (Armenian et al., 2000; Başoğlu et al., 2002), previous psychological problems (Başoğlu et al., 2002; Nolen-Hoeksema and Morrow, 1991), exposure to threat of injury or actual injury (Armenian et al., 2000; Başoğlu et al., 2002; Goenjian et al., 1994), disruption in life (Bland et al., 1996; Goenjian et al., 2000), resource loss (Carr et al., 1995; Freedy et al., 1994; Lima et al., 1989; Maj et al., 1989), financial loss (Armenian et al., 2000; Bland et al., 1996), disruption in social network (Bland et al., 1997), and lack of governmental support (Wang et al., 2000). The variability in these findings possibly reflects differences in methodology and disaster characteristics.

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Supported by CORDAID and the Spunk Fund, Inc.

The present report is based on a group of survivors of the 1999 earthquake that caused widespread devastation and casualties in Turkey. In a previous study (Başoğlu et al., 2002) involving 1000 survivors, we found PTSD and depression in 43% and 22%, respectively, of the survivors at a mean of 10 months postdisaster. In a second study (Livanou et al., 2002) involving 1027 treatment-seeking survivors, the rates of PTSD and depression were 63% and 42%, respectively. In the present report, we examined the rates of PTSD and depression and the associated risk factors in a further group of 586 non-treatment-seeking survivors at a mean of 20 months after the disaster. We hypothesized that earthquake survivors still have elevated rates of PTSD and major depression at a mean of 20 months after the disaster.

### Methods

On August 17, 1999, an earthquake measuring 7.4 on the Richter scale hit the most densely populated and industrial region of Marmara in Turkey. The epicenter was in Gölcük, a town of 130,000 in Kocaeli, situated 100 km from Istanbul. The death toll was 17,127 according to official sources (Government Crisis Management Center, Press Release, October 19, 1999). About 44,000 people were injured and 250,000 buildings were damaged, leaving tens of thousands of people homeless. A second major earthquake (7.2 on the Richter scale) occurred in the Marmara region on November 12, 1999, causing an additional death toll of 832. A further 4,950 people were injured, and 13,000 buildings either collapsed or were severely damaged (Government Crisis Management Center, Press Release, December 22, 1999).

The present report is based on a project designed to provide psychological help for earthquake survivors. This project was launched in September 1999, and since then, service delivery has taken place in 12 field sites in Gölcük (3 "tent cities", 7 prefabricated housing sites, and 2 permanent housing sites) and in 1 community center. The 7 prefabricated housing sites where project work took place were among the 20 camps that were set up in the region. These camps accommodated about 16,000 families. In a previous report (Başoğlu et al., 2002), we examined the prevalence of PTSD in 1000 survivors from two of these prefabricated housing sites and three "tent cities." The present report is based on 586 survivors from a further three prefabricated housing sites. Site I was in Değirmendere (a small town 3 km from the epicenter) and accommodated 172 survivors. Sites II and III were in Izmit (a city situated 10 km from the epicenter) and provided shelter for 320 and 350 adults, respectively.

Random sampling was not attempted because the study was carried out as part of a service delivery program that aimed at screening the whole camp population, identifying those in need, and offering them psychological treatment. In each camp, the project workers visited the prefabricated houses consecutively, and if they could not find anyone in a particular house, they moved on to the next one. In subsequent days, they made further attempts to find those who could not be contacted in the previous rounds. At the three project sites, 158 (92%), 155 (48%), and 273 (78%) survivors, respectively, were screened. The screening was conducted between October 2000 and November 2001, approximately 1 to 2 years after the earthquake (mean, 605 days; range, 414 to 829). Overall, the study took about 13 months to complete. Four psychologists and four psychology students conducted the screening.

No inclusion criteria were employed for screening. For 23 (4%) illiterate survivors, the scale items were read out and the responses noted. The purpose of the screening was explained to the survivors, and verbal consent was obtained. Only 17 survivors refused to complete the screening form.

### Assessment

The assessments were carried out using the Screening Instrument for Traumatic Stress in Earthquake Survivors (SITSES; Başoğlu et al., 2001). The SITSES consisted of three parts: a) Survivor Information Form (SIF)—28 items concerning demographics, personal and family history, trauma characteristics, and intensity of fear during the earthquake (0 = none, 1 = mild, 2 = somewhat severe, 3 = severe, 4 = extremely severe); b) Traumatic Stress Symptom Checklist (TSSC)—17 DSM-IV PTSD and 6 depression symptoms in the past week, all measured on an intensity scale (0 = not at all bothered to 3 = very much bothered); and c) Severity of Disability Scale (SDS)—2 items measuring the global severity of subjective distress related to PTSD and depression symptoms (0 = not distressed at all to 3 = extremely distressed) and the degree of disability in work, family, and social functioning (0 = not at all impaired to 3 = extremely impaired).

The psychometric properties of the TSSC were described elsewhere (Başoğlu et al., 2001). The items showed optimal sensitivity and specificity when symptom presence was determined by an item score of 2 or higher. When the diagnosis of PTSD was based on a cutoff point of 25 in the total scores of the 17 PTSD items, the scale showed sensitivity of .81 and specificity of .81. Similarly, a diagnosis of major depressive episode (MDE) based on a cutoff

TABLE 1  
Sample characteristics

	Total (n = 586)			Males (n = 249)			Females (n = 337)			df	$\chi^2$	t	p
	M	(SD)	n (%)	M	(SD)	n (%)	M	(SD)	n (%)				
Demographic characteristics													
Age	38.1	14.6		38.5	15.43		37.7	13.99		1		.62	ns
Education <sup>a</sup>	4.1	1.23		4.4	1.09		3.8	1.28		1		5.78	.001
Marital status (married)			(394) 67			172 (69)			222 (66)	1	.46		ns
Personal history													
Past psychiatric illness			56 (10)			14 (6)			42 (13)	1	6.68		.01
Psychiatric illness in family			39 (7)			10 (4)			29 (9)	1	4.22		.05
Previous trauma experience			116 (20)			57 (23)			59 (18)	1	2.38		ns
Trauma characteristics													
Trapped under rubble			56 (10)			22 (9)			34 (10)	1	.15		ns
Lost family members			74 (13)			27 (11)			47 (14)	1	.98		ns
Lost second degree relatives			212 (37)			76 (31)			136 (41)	1	5.81		.01
Lost friends and/or neighbors			479 (82)			201 (81)			278 (83)	1	.22		ns
Lost property			392 (67)			172 (69)			220 (66)	1	.60		ns
Participated in rescue work			199 (34)			133 (53)			66 (20)	1	71.06		.001
Current status of home <sup>b</sup>	3.8	1.09		3.7	1.13		3.9	1.06		573		-1.53	ns
Time since the earthquake (days)	605	114.2		608	116.76		603	112.4		583		.49	ns
Intensity of fear during the earthquake (0-4)	3	1.22		2.8	1.29		3.2	1.13		489		-4.08	.001

<sup>a</sup> 1 = no schooling/illiterate, 2 = no schooling/literate, 3 = primary school, 4 = secondary school, 5 = high school, 6 = university/postgraduate studies.

<sup>b</sup> 1 = no damage, 2 = minimal damage, 3 = moderate damage, 4 = severe damage, 5 = reduced to rubble.

point of 38 in the total scores of the 23 TSSC items yielded sensitivity of .83 and specificity of .73. The same cutoff points were used to predict the symptom presence and the diagnoses of PTSD and MDE in the present study.

### Statistics

A factor analysis of the TSSC (principal axis factoring) was conducted to examine the traumatic stress symptom clusters and also to derive uncorrelated measures of postearthquake psychological outcome. The factors were then rotated (Varimax), and the respondents' scores on the rotated factors were computed for use as dependent variables in subsequent multiple regression analyses. Multiple regression analyses (simultaneous entry method) were conducted to examine the factors related to post-earthquake psychological status. For between-group comparisons, chi-square tests were used for categorical variables, and *t*-tests were used for continuous variables.

## Results

### Sample Characteristics

The sample characteristics are presented in Table 1. Women slightly outnumbered men because men were at work when the assessments were conducted during the day. The study group included survivors

with high trauma exposure. More than 90% of the survivors were in a building during the earthquake because the disaster occurred at 3:00 a.m. In 31% of the cases, the house collapsed, and according to local government expert reports, in 56% of cases, it sustained "moderate" to "severe" damage, which rendered the house uninhabitable. Thus, 87% of the survivors were left homeless after the earthquake. The characteristics of the study group were similar to those in our previous study (Başoğlu et al., 2002).

### Estimated Rates of PTSD and Major Depression

The estimated rates of PTSD and MDE were 40% and 28%, respectively. Taking into account the fact that 58% of the respondents were women, the adjusted rates for PTSD and MDE were 39% and 27%, respectively. A further adjustment needed to be made to the rate of depression, given that the TSSC overestimates the diagnosis of depression by 9% (Başoğlu et al., 2001). Thus, correcting for this margin of error, the estimated rate of depression in our sample is 18%.

As the study group included more than one person from the households that were screened, the analyses were repeated, including only one randomly selected person from each household ( $N = 308$ ). These analyses yielded a rate of 43% for PTSD and 30% for depression. Thus, the figures based on the entire

TABLE 2  
*Rates of PTSD and depression symptoms (n = 586)*

PTSD Symptoms	N	%	Adjusted %
<b>Re-experiencing symptoms</b>			
Intrusive thoughts	345	59	59
Nightmares	150	26	28
Flashbacks	311	53	19
Distress when reminded of trauma	328	56	60
Physiological reactivity	185	32	36
1 or more re-experiencing symptoms	433	74	69
<b>Avoidance symptoms</b>			
Avoidance of trauma reminders	259	44	58
Avoidance of trauma thoughts	270	46	48
Loss of interest	216	37	51
Detachment	149	26	22
Emotional numbing	171	29	0
Psychogenic amnesia	132	23	22
Sense of foreshortened future	247	42	17
3 or more avoidance symptoms	261	45	29
<b>Arousal symptoms</b>			
Insomnia	193	33	37
Irritability	311	54	46
Memory/concentration difficulty	281	48	38
Hypervigilance	222	38	38
Startle	301	52	46
2 or more arousal symptoms	356	61	56
<b>Symptoms of Depression</b>			
Guilt	65	11	10
Depressed mood	214	37	23
Loss of pleasure	250	43	32
Suicidal ideas	47	8	4
Loss of energy	157	27	18
Hopelessness	220	38	—

sample did not reflect an overestimation caused by possible familial factors.

*Estimated Rates of PTSD and Major Depression Symptoms*

The rates of PTSD and depression symptoms are presented in Table 2. Symptom presence was determined by a TSSC item score of 2 or higher. Because the TSSC over- or under-estimates the rates of some symptoms (Başoğlu et al., 2001), column 3 shows the symptom rates adjusted according to the margin of error noted in our previous study. The rates of emotional numbing, detachment, and psychogenic amnesia were low. Reexperiencing symptoms were the most frequently reported symptoms, followed by arousal and avoidance/numbing symptoms.

*Factor Analysis of the TSSC*

A factor analysis of the TSSC was conducted for two reasons. In our previous studies (Başoğlu et al., 2002; Livanou et al., 2002), factor analyses of the TSSC yielded two factors representing PTSD and depression symptoms. We wanted to examine if similar factors could be obtained so that we could use

TABLE 3  
*Factor analysis of the Traumatic Stress Symptom Checklist (n = 586)*

TSSC Symptoms	Factor 1	Factor 2
Hypervigilance	.75	.23
Startle	.74	.23
Avoidance of trauma reminders	.71	.20
Distress when reminded of the trauma	.71	.30
Flashbacks	.70	.31
Intrusive memories	.70	.33
Physiological reactivity	.64	.40
Nightmares	.58	.31
Avoidance of trauma thoughts	.56	.26
Insomnia	.49	.44
Psychogenic amnesia	.45	.23
Emotional numbing	.35	.78
Hopelessness	.28	.77
Loss of pleasure	.36	.76
Loss of interest	.42	.70
Detachment	.34	.69
Loss of energy	.33	.68
Depressed mood	.38	.66
Memory/concentration difficulty	.44	.56
Irritability	.45	.54
Suicidal thoughts	.01	.50
Guilt feeling	.19	.45
Sense of foreshortened future	.47	.47
<hr/>		
Eigen value	6.1	5.9
Total variance explained	27%	26%

them as uncorrelated measures of current psychological status in regression analyses to examine possible differential stressor-response relationships. In addition, the present study provided further opportunity to cross-validate the previously derived factors in a new sample.

The analysis yielded two factors, which explained 46% and 6% of the total variance. The factors were then rotated (Varimax) for simpler solution. The item loadings are shown in Table 3. As in our previous studies (Başoğlu et al., 2002; Livanou et al., 2002), the analysis achieved a fairly clear separation between the PTSD and depression symptoms, with symptoms of loss of interest, emotional numbing, and detachment loading on the depression factor. The composition of the PTSD factor was similar to that observed in the previous studies. Thus, the TSSC had satisfactory factorial stability across different samples.

*Factors Predictive of Postearthquake Psychological Outcome*

The predictor variables were selected from the SIF, which included some of the risk factors for traumatic stress. These included age, gender, education (1 to 6), marital status (0 = single, 1 = married), past psychiatric illness, family history of psychiatric

illness, history of previous trauma, having been trapped under rubble, loss of family members, loss of second-degree relatives, loss of friends and/or neighbors, material loss, participation in rescue work (all coded as 0 = no or 1 = yes), extent of damage to home (1 = no damage, 2 = minimal, 3 = moderate, 4 = severe, 5 = collapsed), location during the earthquake (0 = outside, *e.g.*, on the street, in a car, etc. or 1 = in a building), proximity to epicenter (1 = epicenter, 2 = in the Marmara region but outside the epicenter area, 3 = out of the Marmara region), and number of days since the earthquake.

The respondents' scores on the two TSSC factors were selected as the outcome measures. The dichotomous measures of PTSD/non-PTSD and MDE/non-MDE were not selected because of their high intercorrelation. Indeed, 99.7% of the 351 respondents without PTSD did not have MDE, and 69% of the 235 respondents with PTSD also had MDE; chi-square (1,  $N = 586$ ) = 324.16,  $p < .001$ . Thus, uncorrelated outcome measures were needed to examine the possible differential predictions on PTSD and depression symptoms.

Two separate multiple regression analyses were performed using the PTSD and depression factor scores as the dependent variables in turn and the SIF items as the independent variables. The predictor variables explained 29% of the total variance in PTSD symptoms; multiple  $R = .56$ ,  $F(18,526) = 13.12$ ,  $p < .001$ . More severe PTSD symptoms were predicted by greater fear during the earthquake ( $\beta = .39$ ,  $p < .001$ ), female gender ( $\beta = .21$ ,  $p < .001$ ), older age ( $\beta = .12$ ,  $p < .01$ ), participation in rescue work ( $\beta = .11$ ,  $p < .01$ ), loss of friends or neighbors ( $\beta = .12$ ,  $p < .01$ ), and history of psychiatric illness ( $\beta = .09$ ,  $p < .05$ ). Having been trapped under rubble just failed to reach the significance level ( $\beta = .08$ ,  $p = .051$ ). This was because being trapped under rubble and loss of friends and/or neighbors were intercorrelated variables ( $r = .09$ ,  $p < .05$ ), reflecting the co-occurrence of these events in the hardest hit residential areas in the epicenter region. Indeed, when the regression analysis was repeated excluding loss of friends and/or neighbors, having been trapped under rubble entered the equation explaining a significant portion of the variance in PTSD ( $\beta = .09$ ,  $p < .05$ ).

Using the depression component scores as the dependent variable, the predictor variables explained 13% of the total variance in depressive symptoms; multiple  $R = .40$ ,  $F(18,526) = 5.46$ ,  $p < .001$ . More severe depressive symptoms were predicted by older age ( $\beta = .19$ ,  $p < .001$ ), death of a family member ( $\beta = .16$ ,  $p < .001$ ), being single, divorced, or widowed ( $\beta = .11$ ,  $p < .05$ ), past psychiatric

illness ( $\beta = .10$ ,  $p < .05$ ), previous trauma experience ( $\beta = .09$ ,  $p < .05$ ), female gender ( $\beta = .10$ ,  $p < .05$ ), and family history of psychiatric illness ( $\beta = .09$ ,  $p < .05$ ). Thus, PTSD and depression related to different earthquake-related stressors. PTSD was strongly associated with greater fear during the earthquake, while depression was related more to loss of close ones.

As in our previous reports (Başoğlu et al., 2002; Livanou et al., 2002), fear during the earthquake was also the strongest predictor of PTSD. To examine if the retrospective rating of fear merely reflected recall biases caused by PTSD symptoms, a multiple regression analysis (simultaneous entry method) used age, sex, education, location at the time of the earthquake, having been trapped under rubble, proximity to the epicenter, and the TSSC scores as the independent variables and the intensity of fear during the earthquake as the dependent variable.

The TSSC scores were included in the analysis to control for the possible effects of PTSD symptoms on retrospective ratings of fear. If the fear ratings merely reflected a confound of PTSD symptoms, then the other potential predictors of fear would not be expected to explain independent significant variance in the fear ratings. The predictor items explained 22% of the variance in the fear ratings; multiple  $R = .48$ ,  $F(7,563) = 25.54$ ,  $p < .001$ . Higher TSSC scores ( $\beta = .36$ ,  $p < .001$ ), being in a building at the time of the earthquake ( $\beta = .16$ ,  $p < .001$ ), being closer to the epicenter ( $\beta = .11$ ,  $p < .01$ ), and lower education level ( $\beta = .10$ ,  $p < .05$ ) significantly related to greater fear during the earthquake. These findings provided further support for the validity of the fear rating.

## Discussion

In our previous study (Başoğlu et al., 2002), which was conducted at a mean of 8 months after the earthquake, we found PTSD in 43% and depression in 22% of the survivors. In as much as the present study group is comparable with the previous one, the rate of PTSD does not seem to have shown a substantial decrease from 8 to 20 months post-earthquake. This finding may reflect the chronic nature of PTSD. Such high rates of PTSD may also be explained in part by the particularly severe nature of the earthquake and the extent of devastation in Turkey. Indeed, other studies of earthquake survivors with high trauma exposure (Armenian et al., 2000; Goenjian et al., 2000) have also reported high rates of chronic PTSD. In addition, widespread fear in the community of yet another major earthquake in Turkey, closer to Istanbul this time, and the regular

occurrence of smaller-scale earthquakes in other parts of the country may also have contributed to the maintenance of traumatic stress responses.

The present study provided an opportunity to re-examine the risk factors for PTSD in earthquake survivors, using the same measure and methods of analysis, in yet another sample of earthquake survivors. In all the studies we have conducted so far, we examined possible differential predictions on uncorrelated measures of PTSD and depression symptoms. In our first study (Başoğlu et al., 2002) of non-treatment-seeking survivors, no differential predictions on these measures were noted, so we used the TSSC total scores to examine the factors related to overall psychopathology. These were fear during the earthquake, female gender, having been trapped under rubble, death of a family member, past psychiatric illness, having participated in rescue work, longer time since the earthquake, and lower education level. In a subsequent study of 1027 treatment-seeking survivors (Livanou et al., 2002), however, PTSD and depression did relate to different risk factors. PTSD was associated with greater fear during the earthquake, female gender, lower education level, loss of friends and/or neighbors, shorter time since earthquake, and material loss, whereas depression related to female gender, longer time since the earthquake, lower education level, death of a family member, and past psychiatric illness. These findings were largely replicated in the present study. Earthquake-related traumatic stressors related to PTSD, whereas loss of close ones predicted depression. The implications of a differential stressor-response relationship for treatment have been reviewed in our previous report (Livanou et al., 2002). The finding of a strong association between fear during the earthquake and PTSD may have important implications for mechanisms of traumatic stress in earthquake survivors and its treatment (see Başoğlu et al., 2001, 2002; Livanou et al., 2002 for a review).

Our findings are also consistent with previous reports of female gender (Başoğlu et al., 2002; Carr et al., 1997b; Sharan et al., 1996), older age (Carr et al., 1997b), and history of psychiatric illness as risk factors for PTSD (Başoğlu et al., 2002; Nolen-Hoeksema and Morrow, 1991). Participation in rescue efforts independently contributed to PTSD, as in our previous study (Başoğlu et al., 2002). The fact that it was still a significant predictor of PTSD symptoms 20 months after the earthquake deserves attention. Several possible situational stressors involved in rescue work may have contributed to PTSD. Participation in rescue efforts involved additional exposure to intensely disturbing scenes of alive or dead

people trapped under rubble. Second, the process evoked intense anxiety, feelings of helplessness, desperation, anger, self-blame, and guilt arising from the inability to rescue most of the people trapped under rubble. Many experienced frustration and anger toward the local and national government authorities for their slow response in coming to the rescue of the survivors. Some spent days frantically trying to rescue their loved ones or others, often with primitive tools or even bare hands. Some knew their loved ones were trapped alive because they could hear their voices but were unable to help them. Finally, participation in rescue efforts involved exposure to some people's behavior that was perceived as selfish, insensitive, or even inhuman. For example, a survivor felt deeply disappointed by a neighbor's behavior when he refused to help her in getting her husband out of the rubble. Witnessing such events often led to anger, disillusionment, or loss of faith in people. We have observed in our clinical work that these issues are important for the treatment of earthquake survivors who have been exposed to such stressors and thus need more attention in the future, especially in countries where earthquakes cause widespread devastation.

Being trapped under rubble was also a particularly traumatic experience, which for some people lasted as long as 10 days. Because the earthquake happened at 3:00 a.m., most people were caught in their sleep. Some people stated they did not even feel the shock because their house collapsed within the first few seconds of the earthquake. Some survivors were trapped under the rubble with their close ones, and in some cases, they witnessed their severe injuries and slow death. Others spent days under the rubble without water, and there were reports of people who had to drink their urine to survive. For some survivors, the situation was so intolerable that they considered suicide, and some even attempted it. Thus, it is understandable that this experience still related to PTSD 20 months after the earthquake. To the best of our knowledge, no other study has examined the independent effects of this stressor, so we cannot compare our study with others in this respect.

As we used a self-rated measure of posttraumatic stress responses, the rates of PTSD and depression found in our study are only estimations of the true prevalence of these conditions in the study group. A further study using standardized interviews for PTSD and depression is currently underway. Nevertheless, our results are consistent with those of other studies and also with our own findings from previous studies. In addition, our results cannot be generalized to the entire survivor population in the

region because our study involved mostly survivors with high trauma exposure. Indeed, the estimated rates of PTSD and depression are higher than those in an epidemiological study (Başoğlu M et al., submitted)<sup>2</sup> involving a random sample of survivors in the epicenter region.

### Conclusions

The literature evidence and our findings viewed together suggest that catastrophic earthquakes of the kind that occurred in Turkey have long-term psychological consequences, particularly in survivors with high levels of trauma exposure. These findings lend further support to the need for long-term mental health care policies for earthquake survivors (Livanou et al., 2002). The fact that similarly high rates of PTSD and depression were observed in treatment-seeking and non-treatment-seeking survivors in the community points to the need for further study of the reasons as to why some survivors seek help from mental health professionals and others do not. Our findings also highlight the importance of outreach service delivery programs for earthquake survivors who do not seek help despite chronic traumatic stress responses.

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<sup>2</sup> Başoğlu M, Kılıç C, Şalcioğlu E, Livanou M (submitted) Prevalence of posttraumatic stress disorder and major depression in earthquake survivors in Turkey: Two epidemiological studies.