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THE PSYCHOLOGICAL EFFECTS OF AN EARTHQUAKE ON TURKISH COLLEGE STUDENTS

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ABSTRACT

On August 17th, 1999, an earthquake measuring 7.4 on the Richter scale killed approximately 15,000 people in Turkey. The effects of this earthquake on 420 Turkish college students were investigated by the Impact of Events Scale-Revised (IES-R; Weiss & Marmar, 1997) and some demographic questions. Subjects' responses were studied in terms of intrusion, avoidance, and hyperarousal. Results show that students had intense experiences related to the event. More specifically, women showed more symptoms compared to men; displayed significantly more indications of post-traumatic stress disorder (PTSD); and showed more vulnerability. The present study showed that higher achieving students were affected more severely than lower achieving counterparts from the earthquake. Results were discussed in relation to the relevant literature.

Key Words: *Earthquake, The Impact of Events Scale, College Students, PTSD*

ÖZET

17 Ağustos 1999'da 7.4 Rikter ölçeğinde bir deprem, Türkiye'de yaklaşık 15.000 insanın ölümüne neden olmuştur. Bu depremin psikolojik etkileri, 420 üniversite öğrencisi üzerinde, Revize Edilmiş Olayın Etkileri Ölçeği kullanılarak incelenmiştir. Öğrencilerin bu ölçeğe verdikleri cevaplar, ölçeğin üç alt boyutu olan Zorlama (Intrusion), Sakınma (Avoidance) ve Aşırı Uyarılma (Hyperarousal) açısından incelenmiştir. Sonuçlar öğrencilerin olaydan (deprem) aşırı etkilendiklerini göstermiştir. Sonuçlar cinsiyet boyutunda karşılaştırıldığında, bayan öğrencilerin erkeklere oranla daha çok semptom belirtisi ve daha çok travma sonrası stres hastalığı belirtileri gösterdiklerini belirtmektedir. Bu da, kız

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öğrencilerin depremden daha çok etkilendiği sonucunu doğurmaktadır. Ayrıca, sonuçlar akademik anlamda yüksek başarılı öğrencilerin düşük başarılılara oranla bu olaydan daha fazla etkilendiklerini göstermektedir. Sonuçlar ilgili literatür bağlamında tartışılmıştır.

Anahtar Sözcükler: *Deprem Etkisi, Olayın Etkileri Ölçeği, Üniversite Öğrencileri, Travma Sonrası Stres Hastalığı*

After normal populations' exposure to traumatic disasters such as earthquakes, fire, and thunderstorms, psychological distress may be experienced by the members of the society (Goenjian, Najarian, Pynoos, Steinberg, Manoukian, Tavosian, & Fairbanks, 2000; Karancı & Rüstemli, 1995). Among these, posttraumatic stress disorder (PTSD), depression, and anxiety are the most common psychological symptoms. In assessing the effects of such traumatic events, two of the most commonly used measurement instruments are the Impact of Events Scale (IES; Horowitz, Wilner, & Alvarez, 1979) and the IES-Revised (IES-R; Weiss & Marmar, 1997). More specifically, studies of earthquakes have employed the IES and the IES-R to measure the impact of these disasters on the different samples (e.g., Carr, Lewin, Carter, & Webster, 1992; Kaltreider, Gracie, & LeBreck, 1992; Lundin & Bodegard, 1993; Paton, 1990).

On August 17th, 1999, an earthquake measuring 7.4 on the Richter scale killed around 15,000 people in the northern part of Turkey. The epicenter of the earthquake was approximately 150 kilometers distant from the Turkey's most populous city, Istanbul. Although, there have been few studies that have specifically investigated the effects of the earthquake in Turkey among general population (i.e., Başoğlu, Kılıç, Şalcıoğlu, & Livanou, 2004; Başoğlu, Şalcıoğlu, & Livanou, 2002; Livanou, Başoğlu, Şalcıoğlu, & Kalender, 2002), the event's psychological effects was not studied in relation to college students.

In the recent years, several research studies investigated the aftermath effects of earthquakes in different parts of the world on various populations (i.e., Goenjian *et al.*, 2000; Lima, Pai, Santacruz, & Lorano, 1991; Shaley, Freedman, Peri, Brandes, Sahar, Orr, & Pitman, 1998; Sharan, Chaudhary, Kavathekar, & Saxena, 1996; Wang, Gau, Shinfuku, Zhang, Zhao, & Shen, 2000). For example, Goenjian *et al.* (2000) assessed the frequency and severity of posttraumatic stress reactions among 179 elderly and younger adult victims after the 1998 earthquake in Armenia. Subjects were interviewed regarding the PTSD symptoms 1.5 years after the earthquake. The authors found a strong and significant association between high intensity scores and a diagnosis of PTSD. In the study, 88% of the 40 subjects met the PTSD criteria of the American Psychiatric Association (2000). Analyses also indicated that the

elderly, who had the highest exposure, scored significantly higher than the other groups.

In another study, Wang *et al.* (2000) found that PTSD was a common response after exposure to an earthquake in China. They described the rates of PTSD in two groups with different levels of severity of exposure to the earthquake. Samples were collected from two villages: Village A was 10 km away from the epicenter, and village B, located 0.5 km from the epicenter. The assessments took place three months and nine months after the earthquake. Six months later, the subjects were reassessed. A comparison of PTSD rates between subjects from the two villages revealed that the residents of village A had higher PTSD rates than the residents of village B had throughout the study. Residents in both villages showed the same trend of an increasing rate over time, although the difference was more pronounced among the residents of village B, where the rate increased from 8.5% to 14.3% between three and nine months after the earthquake. Overall, the rates of onset of earthquake related PTSD were 18.8% within 3 months and 24.2% within nine months. Thus, the rate of PTSD was found to be 41.4% within nine months. This study also suggested that it took time for some victims to develop the full criterion symptoms of PTSD after the traumatic exposure. The most significant finding was that the residents of the village with the lower initial exposure to the effects of the earthquake had a higher PTSD rate.

Sharan *et al.* (1996) studied psychiatric morbidity after the '93 earthquake in India. The researchers used an open-ended interview to question the subjects on variables such as anxiety, depression, delusional thinking, and neurocognitive disturbances. Subjects were asked to refer to only the past two weeks when answering such questions. They found that the most frequent symptoms were sadness (75%), sleep disturbance (75%), autonomic symptoms (61%), diminished appetite (52%), reduced involvement with the external world (52%), preoccupation with the dead and property loss (50%), aches and pains (39%), avoidance of site and feelings (39%), startle reaction (38%), and intrusive imagery (34%). Thirty-three subjects (59%) had psychiatric disorders. The most frequent diagnosis were PTSD (23%), major depression (21%), adjustment disorder with anxious mood (11%), adjustment disorder with mixed emotional features (9%), and panic disorder (2%). Psychiatric morbidity was most frequent in females. There was also a relation between the death of a first-degree relative and major depression.

Başoğlu *et al.* (2002) examined the severity of PTSD and depression among the '99 earthquake survivors in Turkey with a sample of 1,000 people. They found that the estimated rates of PTSD and depression were 43% and 31%, respectively. They also found that traumatic stress symptoms related to more intense fear during the earthquake, being a female, having been trapped under rubble, decease of a family member, previous psychiatric illness, participation in the rescue work, and educational level. Avoidance was the

most common symptom. In another study, Başoğlu *et al.* (2004) studied the prevalence of PTSD and depression after a period of 14 months from the earthquake. The samples of the study were similar to the present study's sample in that they were selected from the epicenter and a suburb of Istanbul, 100 km from the epicenter. The rates of PTSD and depression comorbid with PTSD were 23% and 16% at the epicenter, respectively and 14% and 8% in Istanbul. The strongest predictor of traumatic stress symptoms was fear during the event. Significant relations were also found in relation to being a female, previous psychiatric illness, damage to home, participation in the rescue work, and the loss of close ones.

There have been few studies that have investigated the effects of the earthquake in Turkey (i.e., Başoğlu, et al., 2002; 2004; Livanou, et al., 2002). However, a review of the literature showed no research study that focused specifically on the college students and investigated how they were affected from the earthquake in Turkey. Therefore, the major purpose of the present study was to investigate the effects of the earthquake on college students in Turkey, three or four months after the disaster, in relation to intrusion, avoidance, and hyperarousal.

METHOD

Sample

Four hundred twenty Turkish college students whose ages ranged from 17 to 32 years (M = 20.44, SD = 2.10) responded to the Impact of Events Scale-Revised (IES-R; Weiss & Marmar, 1997). Of the students, 203 were men (48.3%) and 217 were women (51.7%). The majority enrolled in the colleges of business (27.6%) followed by the colleges of physical sciences (18.3%), and education (16.4%). Approximately 70% of the students had grade point averages of 3.00 or higher out of 4.00.

Instrument

The IES-R was used to collect the data in the present study. The original scale was developed by Horowitz and colleagues in 1979 as a short self-report to measure the levels of responses to specific traumatic events. The original form had two categories: Intrusion and avoidance as the primary domains of measurement. Weiss and Marmar (1997) suggested that despite the usefulness of the original IES, complete assessment of the response to traumatic events would require the assessment of response in the domain of hyperarousal symptoms and they developed a set of seven additional items to measure hyperarousal. These items were randomly interspersed with the existing seven intrusion and eight avoidance items of the original IES. Therefore, the Impact of

Event Scale-Revised (IES-R) consisted of 22 items, all the items from the original IES plus 7 new items.

There are several studies that investigated the psychometric properties of the original IES (Dyregrov, Kuterovac, & Barath, 1996; Horowitz, et al., 1979; McDonald, 1997; Schwarzwald, Solomon, Weisenberg, & Mikulincer, 1987; Zilberg, Weiss, & Horowitz, 1982). The psychometric properties of the IES-R have also been investigated by Weiss and Marmar (1997) with the data from two different studies. The first study was on 429 emergency personals, including policemen, firefighters, paramedics, and emergency medical technicians. Internal consistency coefficients for Intrusion, Avoidance, and Hyperarousal were .87, .85, .79 (for time I data), respectively and .87, .86, .79 (for the second wave). The second group of subjects comprised of people who experienced the Northridge earthquake in LA area. There was a total of 197 workers who participated in the study. For this group, estimated internal consistency coefficients for Intrusion, Avoidance, and Hyperarousal were also found as .91, .84, and .90,respectively.

The scale's validity and reliability for the Turkish college students were recently investigated (Baloğlu, 2003) by an exploratory factor analysis and internal consistency and split-half reliability. An exploratory factor analysis was conducted to investigate the IES-R's construct validity on the Turkish sample. A principal component analysis and an oblimin rotation with Kaiser normalization indicated three components that accounted for 43.41% of the total variance. The first component (Intrusion) had an eigenvaule of 6.68 and accounted for 30.36% of the total variance. The second component (Avoidance) had an eigenvalue of 1.67 and accounted for 7.66% of the total variance. The last component (Hyperarousal) had an eigenvalue of 1.18 and accounted for 5.38% of the total variance. Table 1 shows the three components and the item loadings.

The scale's reliability was investigated by internal consistency and split-half reliability scores. Both Cronbach alpha and Spearman-Brown split-half reliability scores for the total scale were .88. When each scale's reliability was investigated, it was found that the Intrusion had a Cronbach alpha score of .68 and split-half reliability score of .69. The Avoidance had a Cronbach alpha score of .79 and split-half reliability score of .79. The Hyperarousal had a Cronbach alpha score of .81 and split-half reliability score of .81.

Table 1: IES-R Item Loadings Among the Three Components

Items	Component I (Intrusion)	Component II (AVoidance)	Component III (Hyperarousal)
I avoided letting myself get upset when I thought about it or was reminded of it.	.53		
I felt as if it hadn't happened or wasn't real.	.58		
I stayed away from reminders about it.	.34		
I tried not to think about it.	.45		
I was aware that I still had a lot of feelings about it, but I didn't deal with them.	.43		
My feelings about it were kind of numb.	.58		
I tried to remove it from my memory.	.42		
I tried not to talk about it.	.51		
Any reminder brought back feelings about it.		.40	
I had trouble staying asleep.		.43	
Other things kept making me think about it.		.44	
I thought about it when I didn't mean to.		.44	
Pictures about it popped into my mind.		.48	
I had waves of strong feelings about it.		.57	
I had dreams about it.		.42	
I felt irritable and angry.			.58
I was jumpy and easily startled.			.52
I found myself acting or feeling like I was back at that time.			.64
I had trouble falling asleep.			.68
I had trouble concentrating.			.61
Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.			.57
I felt watchful and on-guard.			.61

Procedure

One month after the earthquake in Turkey, the survey packets (including the IES-R and a set of demographic questions) were sent to Turkey. Students were contacted in their classes and informed about the study. Most administrations were conducted three (79.9%) or four (19.8%) months after the

earthquake. Volunteer participants signed a release form and filled out the packets in their classrooms. After the completion of the surveys, they were debriefed and given more detailed information about the purpose of the study. They were also told to contact the investigator if they needed more help.

RESULTS

Descriptive Results

The participants were relatively young, single Turkish men and women. At the time of the earthquake, approximately 47% of them were living within 100 kilometers of the epicenter of the earthquake. Most students had relatively intense experiences with the event: 62.2% visited the disaster area and 53.8% personally helped the people of the disaster area. About 27 % of the students knew more than five people who died and approximately 45% knew more than five people who were injured as a result of the earthquake. An overwhelming majority of the students expected another severe earthquake in the near future (83.6%). Over 67 % of the students believed that they could have died during the earthquake.

Relationships between the study variables were investigated. It was found that "number of people that you knew who died" was significantly related with scores on Avoidance (r = .22, p < .01) and Hyperarousal (r = .16, p < .01), but not with Intrusion (r = .08, p > .05). "number of people that you knew who were hurt" was significantly related only with Avoidance (r = .17, p < .01). Physical location at the time of the earthquake was negatively related both with Avoidance (r = -.11, p < .05) and Arousal (r = - .13, p < .05).

Group Comparisons

Comparisons were made based on the students' gender, age, course of study, and grade point averages (GPA). When compared on gender, statistically significantly more women "felt as if they were in a dream" (Chi square = 3.27, p < .04) and were "seeing things in a tunnel or other kind of strange view" (Chi square = 4.72, p < .02). Older students felt significantly more "as if they were watching things like an observer or spectator" than younger students (Chi square = 9.55, p < .01).

IES-R Comparisons

Table 2 shows the means and standard deviations for the total group, men and women on the IES-R.

Table 2: IES-R Means and Standard Deviations for the Total Group, Men, and Women

	Total Group		Men		Women	
	M	***SD***	***M***	***SD***	***M***	***SD***
Intrusion	20.20	6.01	19.29	5.89	21.05	6.01
Avoidance	17.23	6.10	15.86	5.80	18.52	6.11
Hyperarousal	15.71	6.46	14.64	6.03	16.71	6.70

On all three IES-R scales, women scored significantly higher than men: Avoidance (t = 4.69, p < .0005), Intrusion (t = 3.14, p < .0005), and Hyperarousal (t = 3.40, p < .0005). The only significant difference regarding students' age was found for the Intrusion scale (F = 4.76, p < .009), where students younger than 19 years scored significantly higher (M = 21.6, SD = 5.9) than students older than 21 years (M = 19.4, SD = 6.2).

Regarding GPA, significant differences among groups were found on the Intrusion and Hyperarousal scales (p < .05). Students whose GPAs were B scored significantly higher (M =21.3, SD = 5.8) than students whose GPAs were C or below (M = 19.4, SD = 7.1) on the Intrusion scale. Similarly, students with A averages scored significantly higher on the Hyperarousal scale (M = 16, SD = 6.9) and B (M = 15.6, SD = 6.1) than those with C or below average grades (M = 14, SD = 6.3). No significant difference was found among different study majors.

DISCUSSION

The present study investigated the effects of an earthquake on college students in Turkey. The study was an important step in analyzing the aftermath effects of the event because it was conducted only after a short period of time from the disaster. The results show that students reported intense experiences with the earthquake and this finding is confirmed by the current literature on psychological distress among the victims of such events (e.g., Başoğlu, et al., 2002; Lima, et al., 1989; McMillen, North, & Smith, 2000). When it is considered that half of the sample were living within the 100 kilometers from the epicenter, intensity that the students were experiencing was not surprising because more than half visited the disaster area and helped the victims, and almost one third knew more than five people died. The finding is in agreement with the literature that as the victims get physically closer to the disaster area, the impact of the event increases (Wang, et al., 2000). In addition, because of the indications of personal exposure to this traumatic event and high coverage in the media, an overwhelming majority of the students expected another severe earthquake in near future. This expectation might also be a cause of the feelings of intrusion, avoidance, or hyperarousal.

Significant positive relationships were found between "number of people that you knew who died" and "number of people that you knew who were hurt" and the scores of Avoidance and Intrusion. Also, the students' physical distance from the epicenter was negatively related both with Avoidance and Arousal. This indicated that greater proximity to the epicenter caused more severe avoidance and hyperarousal symptoms. This finding is also supported by the previous study conducted on a Turkish sample by Başoğlu *et al.* (2004), where it was concluded that fear during the earthquake, damage to home, participation in rescue work, and the loss of close ones were significant contributors to PTSD. However, the findings are different from those of Wang *et al.* (2000), where the investigators found that despite lower initial exposure, there were higher effects of PTSD among subjects who were further away from the epicenter. In the present study, students who were further away from the epicenter reported lesser symptoms of avoidance and hyperarousal. Unaccounted cultural factors might be the reason for the discrepancies between these studies.

Women in the study reported more symptoms than men: They displayed significantly more indications of PTSD such as feelings of being in a dream and seeing things in a tunnel, or other kind of strange views. In all three scales (i.e., Intrusion, Avoidance, Hyperarousal), women scored significantly higher. The results of the presents study indicate that the disaster had significantly more effects on this group and previous literature supports this conclusion (Başoğlu, et al., 2002; Sharan, et al., 1996). However, in other types of disasters, this conclusion might not be appropriate (Madakasira & O'Brien, 1987; Phifer, 1990).

The present study did show that higher achieving students were affected more severely and reported more intrusion and hyperarousal symptoms compared to their lower achieving classmates. No difference was found in terms of avoidance among these groups. Also, no significant difference was found regarding intrusion, avoidance, or hyperarousal across different study majors. Such knowledge argues for the need of intervention across all students. It is suggested that intervention programs should be developed to help these students.

The present study was limited in several ways. First, the study used convenient sampling method to recruit participants. The sample included volunteer students and as some studies show, volunteer responses might be different from those of the non-volunteers (Scheier, 1959). In addition, college students' responses might be different from those of the general population. Regarding research design-related limitations, it is of note that all variables were assessed through the items of a self-report instrument. Physiological measures were not performed; and thus, discrepancies, if any, are not known between the self-report measures and other measures. Finally, other sources that might have affected the participants were not controlled since the present study was

not experimental in nature. Finally, the long term effects of the earthquake are still unknown because a follow-up of the sample was not done. This study showed the effects of the event within a limited time period.

As a conclusion, the present study was an important step in investigating the effects of the earthquake among college students. No other previous study had done that. Results should be used with caution due to the limitations of the study; however, most findings were supported by the literature. Further studies that use more detailed research designs to investigate longer effects of the earthquake are still needed.

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