

## Posttraumatic, Dissociative and Grief Symptoms in Turkish Children Exposed to the 1999 Earthquakes

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Grief and dissociation after traumatic exposures are among the most important predictors of posttraumatic stress disorder (PTSD). This article introduces the Traumatic Dissociation and Grief Scale (TDGS), a 23-item measure easily administered. The TDGS, the Child PTSD-Reaction Index (CPTSD-RI), and a questionnaire concerning risk factors related to the event (losses, injury, and witnessing death and injuries) were administered to school-aged children who had been directly exposed to the 1999 earthquakes in Turkey and to a nonexposed control group. Factor analysis of the TDGS yielded four factors: perceptual distortions, body-self distortions, irritability, and guilt and anhedonia. A moderate positive correlation was noted between the TDGS and the CPTSD-RI. Different sets of risk factors were associated with the different scale factors. The results suggest that the assessment of psychopathology in children following a disaster requires the complementary evaluation of symptoms of posttrauma, dissociation, and grief.

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The past two decades have witnessed a growing interest in the psychological consequences of mass disasters for children. Researchers have investigated the effects of natural events such as floods (Green et al., 1991), hurricanes (Shannon et al., 1994), and earthquakes (Galante and Foa, 1986; Pynoos et al., 1993) and human-made disasters such as nuclear waste disaster (Korol et al., 1999), sniper shooting (Pynoos et al., 1987a), war (Sack et al., 1999), bombing (Pfefferbaum et al., 1999), and missile attacks (Laor et al., 1996).

Challenging earlier conclusions that children under traumatic conditions generally exhibit mild responses (Garmezy and Rutter, 1985), recent empirical studies have shown that the psychological effects of stress can be severe and long lasting and can be observed even in preschool children (Nader et al., 1990; Pfefferbaum, 1997; Scheeringa et al., 1995; Vogel and Vernberg, 1993; Yule et al., 1999). Some children are more prone to severe symptoms than others. Risk factors include trait anxiety; a severe psychological response in the parents; exposure to life-threatening or grotesque situation; expe-

rience of loss, separation, and displacement; and personal injury during the event (Laor et al., 1996, 1997; Lonigan et al., 1994; Udwin, 1993; Vogel and Vernberg, 1993; Yule et al., 1999). The symptoms most commonly observed in children after disasters are depression, fears, regression, somatic complaints, separation difficulties, play reenactment, and a variety of stress responses; the latter includes symptoms constitutive of the clusters of posttraumatic stress disorder (PTSD) (Vogel and Vernberg, 1993; Yule and Williams, 1990).

Two additional symptoms reported under trauma, dissociation and grief, have been found to predict the intensity of chronic posttraumatic stress (Freedman et al., 1999; Ursano et al., 1999). The presence of dissociative symptoms at the time of a traumatic event (*e.g.*, emotional detachment, alterations in memory or in perception) is considered one of the best predictors of chronic PTSD (Ursano et al., 1999). Such responses may serve to shield victims from the full impact of the trauma and help them maintain a sense of control under conditions of complete helplessness. However, in the setting of massive grief, dissociation may severely fragment the trauma-related mental representations, thereby impairing the necessary sequence of the grieving process (Horowitz, 1986; Tampo and Irwin, 1999).

Symptoms of grief are normally expected to appear after traumatic events, and their nature and frequency are similar in children and adults (Pynoos et al., 1987b). The grieving mood reaction may be the

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result of different kinds of loss: human life, self-esteem, or elements of the nonhuman environment (*e.g.*, the house). Grief and posttraumatic stress symptoms may appear independent of one another, or they may intertwine.

Prompted by this observation, Pynoos et al. (1987b) developed the Grief Reaction Inventory as a screening and follow-up tool to specifically assess the reactions of children to the death of a child by a sniper attack in the school. Their findings highlighted grief as a central theme coloring all symptomatology following a traumatic loss of human life. For a more general assessment of the affective response to loss following disaster, the specific formulation needs to be somewhat modified. In addition, following a disaster, the assessment of grief-related dissociative symptoms seems very relevant.

Prigerson et al. (1995) also developed the Inventory of Complicated Grief to assess maladaptive symptoms in reaction to human loss. This scale and the criteria proposed for the diagnosis of traumatic grief (Prigerson et al., 1999) await further validation, particularly in children, and generalization for responses to other types of losses (*e.g.*, nonhuman, mixed). Other groups have implemented symptom-screening measures to enable mental health professionals to assess large populations in a short period of time and, thereby, to identify rapidly the more severely affected victims (Breslau et al., 1999; Pynoos et al., 1987b; Stallard et al., 1999; Yule and Udwin, 1991).

This study introduces the Traumatic Dissociation and Grief Scale (TDGS) as a measure additional to those assessing specific posttraumatic symptoms in children following mass disaster.

### Materials and Methods

In August 17, 1999, the East Marmara region of Turkey suffered a devastating earthquake measuring 7.4 on the Richter scale. Some 30,000 people died, and 150,000 homes were destroyed, leaving 600,000 people homeless. These effects, combined with its numerous aftershocks and rumors that the country's largest city, Istanbul, would be next, sent waves of fear and alarm throughout the whole nation. Local and international help were deployed to rescue and meet the basic needs of the survivors in temporary tent-cities. Months later, thousands of families were relocated a second time to prefabricated houses in temporary villages. The data of this study were collected 4 to 5 months after the earthquake.

#### Subjects

The sample included 303 school-aged children: 202 who were displaced to a prefabricated village

near the city of Adapazari after the earthquake destroyed their homes (44% boys, 56% girls; mean age  $\pm$  SD = 8.20  $\pm$  1.3 years), and 101 children who were residents of the city of Izmir, located approximately 300 miles from the epicenter and not directly affected by the earthquake (46% boys, 54% girls; mean age  $\pm$  SD = 8.83  $\pm$  1.13 years). All the children present in their respective schools were assessed after approval by the Ministry Board of Education. Further, 1 year after the earthquake we assessed a group of 104 children (41% boys, 59% girls; mean age  $\pm$  SD = 9.26  $\pm$  1.34 years) and their mothers from a school in a nonexposed neighborhood in Istanbul. This group was used to validate the children's grief response with an external informant. Being experiential, the dissociative symptoms of the children were assumed to be concealed for parents.

#### Instruments

The screening kit included the following instruments: a) questionnaire on demographics (*e.g.*, age, sex, past trauma experiences, predisaster functioning) and the traumatic exposure (*e.g.*, personal losses, home damage, personal injury, seeing severe injury and death, experiencing hunger, and lack of sleep after the earthquake); and b) the TDGS (Table 1), which consists of 23 items that cover dissociation and grief reactions and do not overlap the items of the CPTSD-RI. Some of the items relate to mood changes that are not limited to specific losses (*e.g.*, I feel depressed or have irritable mood; I feel worthless), and others relate specifically to the dissociative reaction to loss (*e.g.*, When I'm awake I feel like I'm dreaming; I feel confused as to who really I am; I misrecognize people for others I know who died). In the TDGS, symptoms are rated on a 3-point scale: 1 = absent, 2 = sometimes present, and 3 = often present. All responses refer to the previous 2 weeks. The demographic questionnaire and the TDGS were translated into Turkish and then back into English to ensure that the two versions were identical. Also included was c) the validated Turkish version (Erden et al., 1999) of the CPTSD-RI (Pynoos et al., 1987a), which covers 20 reactions to the traumatic event that match the diagnostic criteria for PTSD: intrusion, avoidance and numbing, and arousal.

#### Procedures

Four months after the earthquake (1 year in the case of the Istanbul group), before the children received any organized mental health intervention, teachers specially trained by the authors interviewed the children individually in the school with

TABLE 1  
*Traumatic Dissociation and Grief Scale: Factorial Structure and Loadings*

	Factor	Loading
1. I feel depressed or have irritable mood.	Irritability	.711
2. When I'm awake, I feel like I'm dreaming.	Perceptual distortions	.562
3. My appetite has increased significantly.	Guilt/anhedonia	.362
4. I find myself in places without knowing how I got there.	Body/self distortions	.362
5. My appetite has decreased significantly.	Irritability	.573
6. I feel as if I am two "persons" inside.	Body/self distortions	.648
7. I have sleep difficulties.	Irritability	.447
8. It's like I really hear the voice of my close relatives who died.	Perceptual distortions	.459
9. I sleep excessively.	Guilt/anhedonia	.367
10. It is as if I see myself from the outside.	Body/self distortions	.495
11. I have difficulty sitting in one place.	Irritability	.705
12. I feel like I'm in a movie and not in real life.	Perceptual distortions	.630
13. I feel fatigue or loss of energy.	Guilt/anhedonia	.565
14. I feel confused as to who I really am.	Body/self distortions	.711
15. I feel worthless.	Guilt/anhedonia	.738
16. I feel like my body or parts of it have changed.	Body/self distortions	.763
17. I feel very guilty.	Guilt/anhedonia	.620
18. Hours or days seem to be missing and I can't remember them.	Perceptual distortions	.775
19. My ability to think or concentrate has decreased.	Irritability	.683
20. I have sensations in my body like I was buried in a grave.	Body/self distortions	.577
21. I have recurrent thoughts of death.	Irritability	.472
22. I misrecognize people for others I know who died.	Perceptual distortions	.455
23. My interest or pleasure in almost all activities have diminished.	Guilt/anhedonia	.403

the screening kit for about 20 minutes. After the interview, all personal identification was removed from the questionnaires, and a code was assigned to each child.

## Results

### *Factor Analysis and Internal Consistency of the Scales*

Principal components factor analysis with Varimax rotation tested the factor structure of the TDGS with the Adapazari-Izmir sample ( $N = 305$ ). A four-factor structure provided the best theoretical and psychometric solution (Table 1). Irritability accounted for 11.6% of the variance and consisted of six items (*e.g.*, I feel depressed or have irritable mood; I have difficulty sitting in one place). Body-self distortions accounted for 11% of the variance and included six items (*e.g.*, I find myself in places without knowing how I got there; It is as if I see myself from the outside). Perceptual distortions (10% of the variance) consisted of five items (*e.g.*, I feel like I'm in a movie and not in real life; I misrecognize people for others I know who died). Guilt and anhedonia accounted for 9% of the variance and included six items (*e.g.*, I feel very guilty; I feel fatigue or loss of energy). The Cronbach alpha coefficient of internal consistency for the whole scale was .79, and for the factors .72, .71, .66, and .61, respectively.

### *Correlations Between the Scales*

Pearson correlations computed between the TDGS and the CPTSD-RI yielded moderate significant correlations (Table 2). The total scores of the two scales shared only 12% of their variance ( $r = .34$ ,  $p < .001$ ). Within the TDGS, the highest correlations were between the factors of body-self distortions, and perceptual distortions ( $r = .57$ ) and between the factors of irritability, and guilt and anhedonia ( $r = .45$ ; both  $p < .001$ ). To complement this finding, we factor analyzed the items of the TDGS and the CPTSD-RI. There were no factors that attracted items from the two scales. One factor included all the perceptual distortions, and the body-self distortion items. A second factor was composed by all the irritability, and guilt and anhedonia items except "excessive sleep." The CPTSD-RI items were distributed in three factors: one with items reflecting avoidance, numbing, concentration problems, and somatization; one with symptoms of intrusion and hypervigilance; and a third factor with changes in sleep, concentration, and enjoyment of activities.

### *Effect of Risk Factors*

*Sex.* Multivariate analysis of variance (ANOVA) revealed that scores for boys and girls were similar for the total TDGS and the scale factors ( $F[4,198] = .181$ ,  $p > .05$ ). Means  $\pm$  SD for boys and girls,

TABLE 2  
*Pearson Correlations between the TDGS<sup>a</sup> and the CPTSD-RI<sup>b</sup> (N = 305)*

	Total	Perceptual Distortions	Body/Self Distortions	Irritability	Guilt/Anhedonia
TDGS					
Perceptual Distortions	.63**	—	—	—	—
Body/Self Distortions	.57**	.57**	—	—	—
Irritability	.79**	.24**	.19**	—	—
Guilt/Anhedonia	.68**	.16*	.09	.45**	—
CPTSD-RI					
Total	.34**	.24**	.26**	.32**	.09
Intrusion	.26**	.22**	.22**	.21**	.08
Avoidance	.25**	.17*	.23**	.24**	.05
Arousal	.30**	.19**	.18*	.36**	.05

<sup>a</sup> Traumatic Dissociation and Grief Scale

<sup>b</sup> Child Post Traumatic Stress Disorder-Reaction Index

\* $p < .01$

\*\* $p < .001$

respectively, were as follows: total TDGS,  $1.35 \pm .21$  and  $1.35 \pm .25$ ; perceptual distortions,  $1.26 \pm .29$  and  $1.28 \pm .34$ ; body-self distortions,  $1.14 \pm .24$  and  $1.13 \pm .27$ ; irritability,  $1.67 \pm .44$  and  $1.68 \pm .44$ ; and guilt and anhedonia,  $1.29 \pm .31$  and  $1.30 \pm .29$ .

*Age.* One-way ANOVA revealed significant differences in the total TDGS scores among the age groups (6-, 7-, 8-, 9-, and 10-year-old groups;  $F[4,182] = 2.50$ ,  $p < .05$ ). On Tukey post hoc tests, the 6-year-old age group reported on more symptoms than the 8-year-old group (mean  $\pm$  SD =  $1.46 \pm .31$  and  $1.30 \pm .22$ , respectively). Analyses pertaining to the scale factors revealed that the youngest group reported more perceptual distortions than the 7-year-old group ( $F[4,182] = 2.44$ ,  $p < .05$ ; mean  $\pm$  SD =  $1.39 \pm .40$  and  $1.16 \pm .30$ , respectively), and more body-self distortions than the other age groups ( $F[4,182] = 5.19$ ,  $p < .001$ ; mean  $\pm$  SD =  $1.32 \pm .46$ ,  $1.07 \pm .13$ ,  $1.08 \pm .19$ ,  $1.11 \pm .21$ , and  $1.12 \pm .19$ , respectively).

Table 3 shows the relationship between the TDGS and risk factors related to the event and past traumatic experiences.

*Differences in Exposure.* Children exposed directly to the earthquake (Adapazari) had significantly higher scores on the CPTSD-RI than the children not directly exposed (Izmir) ( $F[1,303] = 11.98$ ,  $p < .001$ ). ANOVA comparing the total TDGS scores yielded similar scores for the two groups ( $F[1,303] = .75$ ,  $p > .05$ ). Analysis of the TDGS factors showed that compared with the control subjects the exposed children had more symptoms of perceptual distortion ( $F[1,303] = 7.18$ ,  $p < .01$ ), body-self distortions ( $F[1,303] = 3.70$ ,  $p < .05$ ), and irritability ( $F[1,303] = 5.87$ ,  $p < .05$ ) and fewer symptoms of guilt and anhedonia ( $F[1,303] = 19.5$ ,  $p < .001$ ).

*Number of Personal Losses.* There were significant differences in the total TDGS score between children with different numbers of human losses ( $F[2,101] = 3.46$ ,  $p < .05$ ). (We could not analyze the types of loss separately because of the small numbers in each subgroup.) Tukey post hoc tests revealed that children with two or more losses reported more symptoms than children with no losses or one loss. Analysis of the four factors yielded significantly higher scores for the perceptual distortion factor in children with two losses compared with children with no or with one loss.

*Seeing Severely Injured or Dead People.* Seeing severely injured people was not associated with differences in the total TDGS ( $F[1,193] = 2.19$ ,  $p > .05$ ), but it was associated with higher scores for the irritability and the guilt and anhedonia factors. Seeing dead people led to higher scores on the total TDGS ( $F[1,197] = 4.34$ ,  $p < .05$ ) and on the irritability factor ( $F[1,197] = 5.97$ ,  $p < .02$ ).

*Being Under the Rubble and Suffering Physical Injury.* Children who were caught under the rubble had higher scores for the total TDGS ( $F[1,198] = 5.06$ ,  $p < .03$ ) and for the perceptual distortions ( $F[1,198] = 5.16$ ,  $p < .03$ ) and the body-self distortions ( $F[1,198] = 7.94$ ,  $p < .005$ ) factors. Children who sustained physical injuries had higher scores on the total TDGS ( $F[1,190] = 5.77$ ,  $p < .02$ ), more perceptual distortions ( $F[1,190] = 4.15$ ,  $p < .05$ ), and more body-self distortions ( $F[1,190] = 4.68$ ,  $p < .05$ ) than children who were not injured.

*Past Traumatic Experiences.* An index of past traumatic experiences (car accident, parental di-

TABLE 3  
*TDGS<sup>a</sup> According to Risk Factors: Mean ± SD*

	Total	Perceptual Distortions	Body/Self Distortions	Irritability	Guilt/Anhedonia
<b>Exposure</b>					
No (N = 101)	1.33 ± .21	1.17 ± .27	1.08 ± .17	1.55 ± .39	1.47 ± .37
Yes (N = 204)	1.35 ± .23	1.27 ± .31	1.14 ± .26	1.68 ± .44	1.30 ± .29
F <sub>1,303</sub>	0.75	7.18*	3.70*	5.87*	19.4*
<b>Losses</b>					
None (N = 164)	1.34 ± .23 <sup>b</sup>	1.25 ± .30 <sup>b</sup>	1.13 ± .24	1.66 ± .45	1.30 ± .29
One (N = 35)	1.36 ± .22	1.28 ± .32 <sup>c</sup>	1.14 ± .29	1.72 ± .43	1.28 ± .27
Two or more (N = 5)	1.61 ± .14 <sup>b</sup>	1.72 ± .30 <sup>b,c</sup>	1.37 ± .38	1.90 ± .15	1.47 ± .43
F <sub>2,101</sub>	3.45*	5.58**	2.14	0.91	0.93
<b>Seeing severe injury</b>					
No (N = 89)	1.32 ± .24	1.28 ± .31	1.15 ± .28	1.61 ± .42	1.25 ± .27
Yes (N = 106)	1.37 ± .22	1.27 ± .33	1.14 ± .25	1.73 ± .45	1.34 ± .31
F <sub>1,193</sub>	2.19	0.01	0.15	3.77*	4.08*
<b>Seeing dead people</b>					
No (N = 138)	1.33 ± .23	1.26 ± .31	1.13 ± .25	1.64 ± .43	1.29 ± .30
Yes (N = 61)	1.40 ± .23	1.31 ± .32	1.15 ± .27	1.80 ± .44	1.34 ± .29
F <sub>1,197</sub>	4.34*	1.44	0.23	5.97*	1.16
<b>Buried under rubble</b>					
No (N = 174)	1.34 ± .22	1.25 ± .29	1.12 ± .23	1.66 ± .45	1.30 ± .30
Yes (N = 26)	1.44 ± .27	1.40 ± .45	1.27 ± .39	1.79 ± .38	1.31 ± .29
F <sub>1,198</sub>	5.06*	5.16*	7.94**	1.96	0.04
<b>Personal injury</b>					
No (N = 161)	1.34 ± .23	1.26 ± .31	1.13 ± .25	1.68 ± .45	1.29 ± .29
Yes (N = 31)	1.45 ± .21	1.39 ± .33	1.24 ± .32	1.80 ± .35	1.37 ± .32
F <sub>1,192</sub>	5.77*	4.15*	4.69*	1.98	1.60
<b>Past trauma</b>					
None (N = 51)	1.34 ± .46 <sup>b,c</sup>	1.25 ± .32	1.11 ± .21	1.57 ± .38 <sup>b,c</sup>	1.20 ± .24 <sup>b,c</sup>
One (N = 79)	1.47 ± .48	1.25 ± .29	1.10 ± .20	1.61 ± .40 <sup>d</sup>	1.27 ± .29 <sup>d</sup>
Two (N = 55)	1.67 ± .47 <sup>b</sup>	1.31 ± .30	1.20 ± .29	1.78 ± .46 <sup>b</sup>	1.37 ± .30 <sup>b</sup>
Three or more (N = 19)	1.75 ± .43 <sup>c</sup>	1.28 ± .44	1.18 ± .40	1.95 ± .54 <sup>c,d</sup>	1.46 ± .29 <sup>c,d</sup>
F <sub>3,200</sub>	6.21**	0.43	1.98	5.55**	5.60**

<sup>a</sup> Traumatic Dissociation and Grief Scale Groups in the same column with the same superscript letter are significantly different according

to Tukey post-hoc tests

\*p < .05

\*\*p < .005

orce, birth of sibling, past disaster, loss of close family member, and hospitalization) showed that 51 children had no past trauma experiences, 79 had one experience, 55 had two experiences, and 19 had three or more. ANOVA yielded significant results for the total TDGS ( $F[3,200] = 6.21, p < .001$ ). On Tukey post hoc tests, children who experienced no past traumas had significantly fewer symptoms than children who experienced two and three or four traumas. Children with no past trauma experiences reported fewer symptoms of irritability ( $F[3,200] = 5.55, p < .001$ ) and guilt and anhedonia ( $F[3,200] = 5.60, p < .001$ ) than children with two and three or four past traumas, and children reporting one past traumatic experience reported fewer symptoms of irritability and guilt and anhedonia than children with three or four past traumas.

*Experiencing Hunger and Lack of Sleep in the Days After the Earthquake.* On ANOVA, the experience of hunger was associated with higher TDGS

scores ( $F[2,185] = 3.95, p < .03$ ). Tukey tests revealed that children who described their experience of hunger as “strong” ( $N = 20$ , mean ± SD = 1.47 ± .34) reported more symptoms than children who experienced “no” hunger ( $N = 118$ , mean ± SD = 1.32 ± .20). For the scale factors, differences were significant for perceptual distortions (“strong” > “no”;  $F[2,185] = 5.00, p < .009$ ) and guilt and anhedonia (“a little” > “no”;  $F[2,185] = 4.58, p < .01$ ).

With regard to lack of sleep, significant differences appeared for the total TDGS ( $F[2,183] = 7.67, p < .001$ ). Children who experienced a “strong” lack of sleep in the days following the earthquake ( $N = 78$ , mean ± SD = 1.42 ± .23) reported more symptoms than children experiencing “no” ( $N = 86$ , mean ± SD = 1.30 ± .22) or “some” ( $N = 22$ , mean ± SD = 1.27 ± .20) lack of sleep. These differences were significant also for two factors: irritability (“strong” > “no” or “some”;  $F[2,183] = 5.54, p < .005$ ) and guilt and anhedonia (“strong” > “no”;  $F[2,183] = 8.47, p < .001$ ).

We also performed stepwise multiple regressions

TABLE 4  
*TDGS<sup>a</sup> Scores According to CPTSD-RI<sup>b</sup> Category*

	Total	Perceptual Distortions	Body/Self Distortions	Irritability	Guilt/Anhedonia
CPTSD-RI category					
Doubtful (N = 13)	1.18 ± .17 <sup>c</sup>	1.11 ± .13	1.05 ± .19	1.40 ± .40 <sup>c</sup>	1.14 ± .21 <sup>c</sup>
Mild (N = 54)	1.28 ± .19 <sup>d</sup>	1.23 ± .26	1.12 ± .20	1.52 ± .37 <sup>d</sup>	1.26 ± .28
Moderate (N = 74)	1.33 ± .18 <sup>e</sup>	1.28 ± .27	1.10 ± .15 <sup>c</sup>	1.67 ± .39 <sup>e</sup>	1.28 ± .24
Severe (N = 63)	1.46 ± .28 <sup>c-e</sup>	1.33 ± .41	1.21 ± .38 <sup>c</sup>	1.88 ± .48 <sup>c-e</sup>	1.38 ± .35 <sup>c</sup>
F <sub>3,200</sub>	9.77**	2.36	3.13*	9.67**	3.48*

<sup>a</sup> Traumatic Dissociation and Grief Scale

<sup>b</sup> Child Post Traumatic Stress Disorder—Reaction Index

<sup>c-e</sup> Groups in the same column with the same superscript letter are significantly different according to Tukey post-hoc tests

\*p < .05

\*\*p < .001

with the TDGS and the CPTSD-RI scores as dependent variables and the risk factors as predictors.

Analyses revealed that four variables entered the equation for the TDGS ( $R = .446$ ;  $F[4,195] = 12.12$ ,  $p < .001$ ): experiencing hunger and lack of sleep after the earthquake, past traumatic experiences, and witnessing severely injured people. Three variables predicted significantly the CPTSD-RI score ( $R = .351$ ;  $F[3,196] = 9.19$ ,  $p < .001$ ): lack of sleep, past traumatic experiences, and number of losses.

#### *TDGS Scores by PTSD Category*

Children were classified as suffering from doubtful, mild, moderate, and severe posttraumatic symptoms according to the guidelines proposed by Pynoos et al. (1987b). (The severe and the very severe categories were collapsed because of the small number of children in the latter category.) As summarized in Table 4, ANOVA with Tukey post hoc test revealed that children in the severe category reported significantly higher total TDGS scores than children in the other three categories ( $F[3,200] = 9.77$ ,  $p < .001$ ). Significant differences appeared also in three factors: body-self distortions (severe > moderate), irritability (severe > doubtful, mild, and moderate), and guilt and anhedonia (severe > doubtful).

#### *Children's and Mothers' Report*

Within the Istanbul group ( $N = 104$ ), high and significant correlations appeared between the reports of the children and their mothers on the irritability ( $r = .67$ ,  $p < .001$ ) and the guilt and anhedonia ( $r = .51$ ,  $p < .001$ ) factors. Further, paired  $t$ -tests revealed no significant differences (both  $p > .05$ ) between the means reported by the children and those observed by the mothers (mean ± SD: irritability =  $1.34 ± .29$  and  $1.35 ± .29$ , respectively; guilt and anhedonia =  $1.34 ± .31$  and  $1.28 ± .27$ , respectively).

## Discussion

To provide rapid, cost-effective, and flexible intervention after mass disasters, mental health workers need to be able to assess large populations in as brief a time as possible. Such interventions can reduce the risk of the development and the entrenchment of severe psychopathology and, thereby, improve victims' quality of life.

The pathological response of children to traumatic experiences can take several forms. Some may develop specific posttraumatic symptoms (*e.g.*, reexperiencing, avoidance, numbing), grief and depressive symptoms, or dissociative phenomena. Most others will show some mix of these symptoms. The personal reaction depends on the nature of the event, the social context, and the personality structure and coping style of the person (Horowitz et al., 1993). Under mass disaster, children must cope with different kinds of losses: of people, home, support systems, socioeconomic status, normal routines, and basic assumptions of safety and regularity. The resulting clinical picture, the disaster syndrome, may be different and more pervasive than the PTSD, involving all aspects of the child's developing cognitive structures and capacities. Children may become withdrawn and alienated from the reality they perceive as having betrayed them: nature, parents, society, and its technology (Laor and Wolmer, 2002).

The grief reaction has usually been studied in the context of human loss. It consists of specific phases, namely denial and avoidance, alarm reaction, search for the lost person, anger and guilt, feelings of internal loss, adoption of traits of the deceased, and finally acceptance and resolution (Parkes and Weiss, 1983). Horowitz (1990) discerned five phases, in accordance with those described for stress response syndromes in general: outcry, denial, intrusion, working-through, and completion. However, when massive losses are involved, the resulting clinical

response of trauma, grief, and dissociation may develop along a complex pathological course. The massive shock may lead to a reaction akin to anaclitic loss, characterized by helplessness and despair (Blatt, 1974; Krystal, 1968). The TDGS is based on this notion and is intended to cover the mood-grief and the dissociative reactions, complementing the assessment of posttraumatic symptoms.

In this study, the TDGS was used to evaluate symptoms of children affected by the August 1999 earthquakes in Turkey. The internal consistency of the TDGS and its four factors (perceptual distortions, body-self distortions, irritability, and guilt and anhedonia) were satisfactory, and the intercorrelations among the factors suggested that perceptual distortions and body-self distortions reflect the dissociative quality of the traumatic response, and irritability and guilt and anhedonia reflect the affective counterpart.

As expected, the TDGS correlated positively with the CPTSD-RI. However, the small variance shared by the two scales (12%) supports the idea that after traumatic events, children (and adults) respond with some combination of the symptomatic domains assessed. The results of the factor analysis performed with both scales show that the dissociative, affective, and specific posttraumatic symptoms constitute related yet independent components of the postdisaster syndrome. It may well be that this phenomenology is relevant to the clinical picture following any trauma, reflecting different pathological processes determined by the specific combination of vulnerabilities, protective factors, and traumatic circumstances.

Findings for sex differences after trauma have been conflicting (Vogel and Vernberg, 1993). In this study, the severity of dissociation and grief symptoms was similar for boys and girls. With regard to age, the youngest age group (aged 6 years) was characterized by more perceptual and body-self distortions. Assuming that young children were able to understand correctly the meaning of the items, this finding indicates that affective and cognitive developmental vulnerabilities that distinguish very young children may represent a risk factor for the normal processing of information under conditions of trauma and disaster.

The total TDGS score was similar in the children directly exposed to the earthquake, relocated due to damage to their homes (Adapazari) and the children living in a distant city from the epicenter (Izmir). This seems surprising, since the exposed children reported more severe posttraumatic symptoms (CPTSD-RI). This finding may be explained by the pattern of scores obtained for the different factors

of the TDGS. Whereas the exposed children reported more perceptual distortions, body-self distortions, and irritability, the nonexposed children scored higher in the guilt and anhedonia factor. The latter may have been due to this group's indirect exposure via the visual media or survivors' guilt owing to being intact survivors of a national catastrophe.

#### *Differential Effect of Risk Factors*

In terms of the predictive validity of risk factors, a higher score in the total TDGS was associated with younger age, two or more losses, witnessing dead people, having been caught under the rubble, reports of personal injuries, lack of sleep or hunger immediately after the earthquake, and experience of two or more past traumas.

Symptoms associated mainly with the mood component of the scale (irritability, guilt and anhedonia) occurred more often in children who saw severely injured or dead people, had had more traumatic experiences in the past, and experienced marked lack of sleep or hunger in the days after the earthquake. Risk factors that were specifically associated with increased symptoms of perceptual distortions and body-self distortions (the dissociation factors) included young age, two or more personal losses, being caught under the rubble, sustaining personal physical injury, or experiencing hunger in the days after the earthquake. (Unfortunately, we have no record of head injuries that may clarify this association.) The dissociation factors were not predicted by seeing severely injured people or dead people, more traumatic events in the past, or experiencing marked lack of sleep after the earthquake.

Our findings suggest that each of the two main domains of the TDGS has its own set of risk factors. The dissociation factors seem to be associated with the most severe, self-threatening experiences, whereas the mood factors seem to be associated with more indirect and less immediate threats. The predictors that entered the regression analyses for the total scale were related to the physiological state of the children following the disaster (lack of sleep and hunger), the exposure to severe injury, and to past traumatic experiences. Lack of sleep and past traumatic experiences entered the regression equation for the CPTSD-RI as well. In addition, specific posttraumatic symptoms were predicted by the number of losses in the event. The significance of these findings will be discussed below.

The high correlations between the reports of the children and the observation of the mothers and the lack of difference in their perceived symptom intensity provided further validation to the irritability and

the guilt and anhedonia factors. Mothers were not asked about their children's dissociative symptoms. These are rarely recognized by an external observer. Future studies including clinical interviews are needed to further validate the two dissociation factors.

#### *Symptoms of Posttrauma, Dissociation, and Grief*

Children classified as suffering from severe posttraumatic symptoms had higher scores in the TDGS than children with doubtful, mild, and moderate posttraumatic symptoms; there were no significant differences among the latter three categories. Since the severe and very severe categories are those associated with a diagnosis of PTSD (Pynoos et al., 1987a), it seems that children who display the whole PTSD syndrome are more prone to report symptoms of dissociation and grief.

Our data suggest that children who score low for posttraumatic symptoms may still be suffering from affective or dissociative symptoms. Predictive factors like lack of sleep, hunger, past trauma, and exposure to severe injury should sensitize us to the presence of such pathology. Hence, following a disaster, it behooves clinicians and researchers to assess risk factors and symptoms of child survivors in a comprehensive manner. The different clinical pictures may also invite the implementation of intervention protocols that address the more pervasive pathology.

Our findings do not show how the symptom domains develop in response to trauma, or how any one domain may have impact on the other. However, previous studies have suggested that the experience of depression and grief and dissociative symptoms after trauma are predictors of PTSD (Freedman et al., 1999; Ursano et al., 1999).

Our results have specific implications. First, the assessment of posttraumatic, dissociative, and grief symptoms following a disaster may provide the leadership of relief efforts with important information concerning the needs of the surviving community. The clinical researcher serves a crucial role in mediating between administrative and specific socio-clinical needs. Second, identified specific clinical needs may guide the development or adaptation of intervention programs. For example, the resolution of trauma, dissociation, and grief may give rise to a cognitive-emotional complex consisting of anxiety, anger, hate, guilt, and shame (Krystal, 1988). This complex may not be overcome unless approached specifically and in parallel with the specific posttraumatic symptoms. Sophisticated treatment protocols need to be developed to this effect.

#### *Conclusions and Future Directions*

This study introduced the TDGS, a brief scale for screening symptoms of dissociation and grief in young victims of trauma and disaster. The TDGS is intended for use as a complementary tool to the assessment of posttraumatic symptoms and their risk factors. The psychometric data of the scale in terms of internal consistency and validity are encouraging, and its factors seem to be related to different sets of risk factors. More research is needed to evaluate the consistency of the scale over time (test-retest reliability) and to extend its validity (convergent and discriminant). To serve as a measure for assessing the natural course of massive psychic trauma, the instrument should be enriched by items covering anger and grief resolution. Future studies may also assess symptomatic changes after psychological intervention and apply the scales with a sample of adolescents or adults.

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