

# Outcome of Psychotherapy Among Early Adolescents After Trauma

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***Objective:** The authors evaluated the effectiveness of brief trauma/grief-focused psychotherapy among early adolescents exposed to the 1988 earthquake in Armenia. **Method:** Posttraumatic stress and depressive reactions among treated and not treated subjects were evaluated pre- and postintervention, at 1½ and 3 years after the earthquake, respectively. **Results:** Severity of posttraumatic stress symptoms significantly decreased among the subjects given psychotherapy, while severity of these symptoms increased significantly among the subjects not treated with psychotherapy. The improvement in posttraumatic stress symptoms was attributable to improvement in all three symptom categories (intrusion, avoidance, and arousal) of posttraumatic stress disorder (PTSD). There was no change in severity of depressive symptoms among subjects given psychotherapy. However, depressive symptoms among subjects not treated with psychotherapy significantly worsened over time. The changes in severity of posttraumatic stress and depressive symptoms were positively correlated within both groups. **Conclusions:** The findings demonstrate the efficacy of trauma/grief-focused brief psychotherapy in alleviating PTSD symptoms and preventing the worsening of comorbid depression among early adolescents after a catastrophic disaster. The results support the broad use of such school-based interventions after major disasters and demonstrate the cross-cultural applicability of Western psychotherapeutic approaches.*

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On December 7, 1988, an earthquake with a magnitude of 6.9 on the Richter scale struck Armenia (population 3.5 million). It caused the destruction of four cities and 350 villages and killed at least 25,000 people in a region populated by approximately 550,000 people. The second largest city of Armenia, Gumri, was 20 miles from the epicenter. At least 18,000 people (7% of the city's total population) were killed in this city. Approximately 50% of the buildings in Gumri were destroyed. The earthquake occurred late in the morning when children and adolescents were in school. Nearly all of the children experienced extreme direct threats to their life and were exposed to horrifying sights and sounds during the earthquake and for several days thereafter.

The literature indicates that there can be serious and long-lasting psychiatric consequences among children and adolescents after natural and man-made disasters (1–

3). Our previous studies in Armenia have documented severe posttraumatic reactions and high rates of comorbid depression 1½ years after the earthquake among children and adolescents in cities that were close to the epicenter (4, 5). The severity of their symptoms was attributable to extreme disaster-related experiences during, and in the aftermath of, the earthquake. Such findings indicate the need for provision of mental health services.

To date, there is a paucity of controlled treatment outcome studies in children or adolescents after disasters (6, 7). After the 1980 earthquake in Italy, Galante and Foa used monthly structured classroom interventions over 1 academic year and reported a reduction in earthquake-related fears (8). This study did not specifically measure posttraumatic stress or depressive reactions. Yule (2) reported results of cognitive-behavioral treatment among girls after the sinking of the cruise ship *Jupiter*. After 5–9 months, the group who received treatment had lower scores on the Impact of Event Scale and on a fear survey. These findings would have been more definitive had the baseline scores for subjects not given treatment been included in a treatment-by-time interaction analysis.

The Psychiatric Outreach Program of the Armenian

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Relief Society conducted periodic school-based mental health screenings and provided therapy to students in the earthquake zone. This study evaluated the effectiveness of this intervention by comparing posttraumatic stress and depressive reactions pre- and postintervention among treated and not treated early adolescents in the city of Gumri.

#### SCHOOL-BASED MENTAL HEALTH INTERVENTION PROGRAM

Before initiation of this school-based mental health intervention, individual consultations were held with the principals of the schools regarding their own earthquake-related reactions, those of their staff and students, and their current difficulties. This was followed by four group sessions with the principals and teachers and frequent informal meetings. These sessions began before initiation of therapy for the students and continued during the course of the intervention.

The intervention program included classroom group psychotherapy and individual psychotherapy sessions. Students received four half-hour group sessions and an average of two 1-hour individual sessions, which were conducted over a 3-week period. The most symptomatic students received up to four individual sessions. The treatment provided was completed within a 6-week period and began after the mental health screening in 1990, 1½ years after the earthquake.

The trauma/grief-focused treatment incorporated recommendations from the literature (9–13) and consisted of measures that addressed five major areas. 1) *Trauma* was addressed by a reconstructing and reprocessing of the traumatic experience and associated affects, clarifying distortions and misattributions (e.g., excessive guilt), addressing resultant maladaptations and avoidance, and legitimizing posttraumatic stress reactions. 2) *Traumatic reminders* were addressed by identifying reminders and links to traumatic experiences, assisting with cognitive discrimination of these reminders, enhancing tolerance for expectable reactivity, and increasing support-seeking behavior during and after reminders. 3) *Postdisaster stresses and adversities* were addressed by promoting acceptance of and adaptation to changes and losses, using proactive measures to assist in coping, and assisting teachers and parents in addressing practical and interpersonal problems that compromise the child's adaptation and the recovery environment. 4) *Bereavement and the interplay of trauma and grief* were addressed through assistance with grief resolution by helping the bereaved reconstitute a nontraumatic mental representation of the deceased person. 5) *Developmental impact* called for identification of missed developmental opportunities (due to traumatic avoidance, loss of family members, and the collapse of the community infrastructure) and the promotion of normal developmental progression.

The initial classroom session consisted of an opening phase of general discussion about the students' earth-

quake experiences and current problems, followed by a period during which the therapists spent time with each student while they engaged in a trauma-focused activity. At the end of the session, the therapist provided a summation and conducted a rediscussion with the classroom group. For the trauma-focused activity, the children drew a picture of their earthquake experiences, their families, the city before the earthquake, and how they perceived the city in the future. This activity was used to explore trauma-related imagery and avoidance, memories, emotions, distortions, omissions, misattributions, and maladaptations. Subsequently, students were encouraged to engage in constructive thoughts and to plan constructive actions. Typically, working through the traumatic aspects of their experiences was followed by a discussion of issues of loss and grief to increase group awareness of common aspects of bereavement, including disbelief, reunion fantasies, and preoccupations with memories of last interactions with significant others and the associated feelings, e.g., sadness or anger. The discussion initiated efforts to restore a more intact, nonmutilated image of deceased relatives and friends. Care was taken to limit introduction of graphic details of any one student's extremely horrifying traumatic experiences to the group in order to minimize vicarious traumatization.

As the classroom sessions progressed, the students were actively engaged in discussion of how this disaster and its aftermath had interfered with their development and affected their aspirations. They were assisted in problem solving with regard to peer and family relationships, managing aggression, improving academic functioning, handling current stresses and adversities, and resuming activities that countered their passivity and pessimism. They were also taught to use relaxation techniques (e.g., muscle relaxation, controlled breathing) when they felt anxious and before going to sleep. In addition, they were encouraged to explore ways to relax, such as listening to music and playing with peers.

During the individual sessions, students engaged in a more in-depth exploration of the traumatic narrative to identify the various traumatic moments and their association with current distress, physiological arousal, traumatic reminders, avoidant behavior, and ongoing personal meaning. In between sessions, they were encouraged to keep track of their reactions to traumatic reminders so that the therapist and student could become more aware of their contextual significance.

Subsequently, the most traumatic moments were reframed in terms of the underlying traumatic helplessness and conflict. Omissions, distortions, and intervention fantasies were examined. One or two key issues in regard to traumatic bereavement were pursued in more detail. The therapist asked the students to consider lost developmental opportunities and would then actively assist them in developing coping strategies. Specific consideration was given to termination issues, in which resurgence of symptoms was addressed. The mental health intervention was conducted by two highly skilled mental health professionals from the United States.

## CASE PRESENTATION

Anna was 12 years old at the time of treatment. She had experienced extreme life-threat during the earthquake and lost her mother and brother. During the first classroom session, she appeared detached, with a fixed and incongruous smile. She did not participate in drawing or describing her earthquake experiences, stating, "I don't want to talk about the earthquake. Why did you have to come so long after, just to remind us about what happened?" At the end of the session, she accepted the therapist's invitation to meet individually.

During the individual session, Anna began to talk about her earthquake experiences. On the day of the earthquake, her grandmother had come to their house to help her mother bake a cake for Anna's birthday. Suddenly, "the earth shook," and the house collapsed on top of them. Anna and her grandmother held on to each other under the collapsed building for 2 days. She remembered her grandmother's constant prayers to God to save her grandchild. In recounting this, Anna said, "God, why didn't you take me away? Is it because I am not good enough? You made me live and suffer and remember everything. God, I love my mother and I was teasing her when it happened, telling her that I loved grandmother more than her."

After sharing what had been important to her about her experience and the initial reconstruction of her trauma narrative, Anna began to talk about her current feelings and concerns. She described her difficulty in falling asleep, her nightmares about the earthquake, her problem with bedwetting, her recurrent stomachaches, and her difficulty in paying attention in the classroom and concentrating on homework. She described the onset of her menstruation as a "bad" event that she wished she could talk about with her mother. She described her ambivalence about her father's plan to remarry and how she saw herself as an obstacle to his finding a new wife. She confided in the therapist that she felt obliged to keep smiling for the benefit of her father.

During the following sessions, Anna was able to describe some of her worst traumatic moments and their associated catastrophic emotions. She recollected being embraced in her grandmother's arms and hearing her grandmother's cries grow weaker until she died. She remembered how much it hurt to have the weight of her grandmother's dead slumping body on top of her and how she felt desolate, terrified, and fearful that, in addition to her grandmother, her mother and baby brother were also dead.

The therapist gave special attention to clarifying distortions and misattributions. In regard to Anna's numerous self-attributions of guilt, the therapist assisted Anna in clarifying the relationship of her guilt feelings to excessive self-blame in reaction to her experience of extreme helplessness during the earthquake. The therapist assisted Anna in resolving feelings about having teased her mother just before her death about something as important as her love for her, and identified her recurrent discomfort over angry feelings toward her mother for no longer being there to care for her. The therapist clarified that another key source of guilt that had been imparted by surviving family members—who had told Anna that if it were not for her birthday, the family might not have been home that day—stemmed from their own grief reactions. As Anna improved, the therapist actively engaged her in adopting more effective strategies to cope with current stresses and adversities. While Anna was in treatment, the therapist met with Anna's father to address some of his trauma- and grief-related problems and suggested ways to be more responsive to his daughter, including specific ways to improve communication with her.

Over the course of psychotherapy, Anna's affect became more animated, she exhibited less estrangement, and her nightmares subsided. She resumed the dance lessons that she had ceased after the earthquake. She and her father became closer, and, for the first time, in a moment of poignant mutual grief, she joined him to visit the grave of her mother. The reconstruction and reappraisal of her traumatic experiences, in reducing her conflict over traumatic helplessness, appeared to facilitate suspended grief work. As a result, Anna was able to 1) reconstitute a nontraumatic mental representation of her mother, one that was less contaminated by images and emotions associated with the traumatic lethal circumstances of the death, and 2) repair the artificial estrangement that had been created by the teasing exchange in her last contact with her.

## METHOD

*Subjects*

A total of 64 early adolescents from four schools in Gumri were selected for inclusion in this study. These schools were among the 90% of schools in Gumri that were severely damaged. Early adolescents were selected because 1) their cooperation with the research protocol and comprehension of the instruments would be better than those of younger children, and 2) they would be available for longitudinal follow-up through their remaining school years, whereas older adolescents would likely be lost to follow-up after graduation.

At 1½ years after the earthquake, the students had been evaluated for posttraumatic stress and depressive reactions. After these evaluations, students in two of the schools received trauma/grief-focused brief psychotherapy (N=35), while students at the other two schools were not treated with psychotherapy (N=29). Because of the limited number of mental health personnel in our program, mental health services were provided in the two schools that were closest to our clinics. The extent of damage to the four schools and their neighborhoods was equivalent, and there were no socioeconomic differences between the areas. After another 18 months (3 years after the earthquake), the students were reevaluated for posttraumatic stress and depressive reactions. Each group consisted of all the students from one 6th and one 7th grade class. All subjects who received treatment completed the entire course of therapy.

None of the subjects in this study had received mental health treatment outside of the school-based intervention, and no student had a history of substance abuse. None of the students received psychotropic medication during the study period. All subjects had resided in Gumri at the time of the earthquake and thereafter. All were exposed to serious direct threats to life, horrifying experiences of witnessing mutilating injuries and grotesque deaths, and hearing agonizing screams for help and cries of distress from victims.

The mean age of the 64 subjects 3 years after the earthquake was 13.2 years (SD=1.3). The group that received psychotherapy included 11 male and 24 female subjects whose mean age was 13.2 years (SD=1.1). The group not treated with psychotherapy included 11 male and 18 female subjects whose mean age was 13.3 years (SD=1.6). Because a few subjects had incomplete or missing data either 1½ or 3 years after the earthquake, the number of subjects included in specific statistical analyses differs slightly.

The mental health screenings and treatment interventions were approved by the Ministry of Health and the Ministry of Education of Armenia. The principals of the schools gave their approval for the program. Parents were informed of the evaluations and intervention program and gave written informed consent for their child's participation. The students who participated also gave their assent.

*Instruments*

Posttraumatic stress symptoms were evaluated by using the Child Posttraumatic Stress Disorder (PTSD) Reaction Index (14). A high level of agreement between a Child PTSD Reaction Index score of 40

TABLE 1. Scores on the Child PTSD Reaction Index 1½ and 3 Years After the 1988 Earthquake in Armenia for Adolescents Who Were and Were Not Treated With Trauma/Grief-Focused Psychotherapy at 1½ Years

Group	Score at 1½ Years <sup>a</sup>		Score at 3 Years	
	Mean	SD	Mean	SD
Male subjects				
Treated	41.6	9.9	30.4	14.7
Not treated	38.5	7.7	40.9	11.3
Female subjects				
Treated	47.1	11.3	33.1	10.9
Not treated	42.7	9.5	51.1	9.2
All subjects				
Treated	45.3	11.0	32.2 <sup>b</sup>	12.1
Not treated	41.1	9.0	47.2 <sup>c</sup>	11.1

<sup>a</sup>Before initiation of treatment for subjects given psychotherapy.

<sup>b</sup>Significantly lower than pretreatment ( $t=6.69$ ,  $df=59$ ,  $p<0.01$ ) and significantly lower than 3-year scores of adolescents not given psychotherapy ( $t=-7.64$ ,  $df=59$ ,  $p<0.01$ ).

<sup>c</sup>Significantly higher than score at 1½ years ( $t=-3.12$ ,  $df=59$ ,  $p<0.01$ ).

and above and the presence of DSM-III-R PTSD has been reported (4). Scores for the three symptom categories of PTSD (intrusion, avoidance, and arousal) were derived by grouping items related to these categories and calculating the mean item score for each symptom category (5). Ratings of depressive symptoms were obtained by using the Depression Self-Rating Scale (15). Psychometric properties of this instrument have been reported, and a score of 17 or above has been found to be highly sensitive in the detection of DSM-III depressive syndromes (15, 16). A demographic profile was obtained that included information regarding exposure, age, and gender. The instruments were administered in small groups by trained mental health professionals. We have previously described our translation and reliability procedures for these instruments (4, 5).

### Statistical Analysis

Effects of treatment on Child PTSD Reaction Index and Depression Self-Rating Scale scores were assessed by using multivariate analysis of variance (MANOVA), with treatment and gender as between-group factors and time as a within-group factor. Differential effects of treatment on mean scores for the PTSD symptom categories were evaluated by using MANOVA, with treatment as a between-group factor and symptom category as a within-group factor. Post hoc contrasts were performed by using pooled error terms derived from the MANOVA results (17), with  $p$  levels adjusted for multiple comparisons. The relationship within groups between Child PTSD Reaction Index and Depression Self-Rating Scale scores was determined at each time period with Pearson correlations.

## RESULTS

MANOVA results for scores on the Child PTSD Reaction Index by treatment, gender, and time indicated that there were significant between-group main effects for treatment ( $F=4.68$ ,  $df=1$ ,  $56$ ,  $p<0.05$ ) and gender ( $F=5.39$ ,  $df=1$ ,  $56$ ,  $p<0.05$ ), a within-group main effect for time ( $F=4.98$ ,  $df=1$ ,  $56$ ,  $p<0.05$ ), and a significant within-group interaction effect of treatment by time ( $F=31.16$ ,  $df=1$ ,  $56$ ,  $p<0.01$ ). Post hoc contrasts indicated that the two groups did not differ significantly on mean Child PTSD Reaction Index score at 1½ years; at 3 years, however, the group treated with psychotherapy had significantly lower Child PTSD Reaction Index

TABLE 2. Scores on the Child PTSD Reaction Index by PTSD Symptom Category 1½ and 3 Years After the 1988 Earthquake in Armenia for Adolescents Who Were and Were Not Treated With Trauma/Grief-Focused Psychotherapy at 1½ Years

PTSD Symptom Category	Score at 1½ Years <sup>a</sup>		Score at 3 Years	
	Mean	SD	Mean	SD
Intrusion				
Treated	2.5	0.7	1.6 <sup>b</sup>	0.8
Not treated	2.2	0.6	2.5 <sup>c</sup>	0.6
Avoidance				
Treated	2.0	1.0	1.5 <sup>d</sup>	0.8
Not treated	2.1	0.7	2.1	0.8
Arousal				
Treated	2.2	0.8	1.5 <sup>e</sup>	0.8
Not treated	1.8	0.6	2.2 <sup>f</sup>	0.8

<sup>a</sup>Before initiation of treatment for subjects given psychotherapy.

<sup>b</sup>Significantly lower than pretreatment score ( $t=11.0$ ,  $df=59$ ,  $p<0.01$ ).

<sup>c</sup>Significantly higher than score at 1½ years ( $t=-4.38$ ,  $df=59$ ,  $p<0.01$ ).

<sup>d</sup>Significantly lower than pretreatment score ( $t=5.38$ ,  $df=59$ ,  $p<0.01$ ).

<sup>e</sup>Significantly lower than pretreatment score ( $t=7.75$ ,  $df=59$ ,  $p<0.01$ ).

<sup>f</sup>Significantly higher than score at 1½ years ( $t=-5.50$ ,  $df=59$ ,  $p<0.01$ ).

scores (table 1). In addition, the treated group had scores on the Child PTSD Reaction Index at 3 years that were significantly lower than their pretreatment scores, while the scores at 3 years of the group not treated with psychotherapy were significantly higher than their scores at 1½ years. With a score of 40 or above indicating a diagnosis of PTSD, the estimated rates of PTSD at 1½ years among subjects who were and were not treated with psychotherapy were 60% and 52%, respectively; after 3 years, the rates for the two groups were 28% and 69%, respectively. While MANOVA results showed a significant gender effect for Child PTSD Reaction Index scores (higher scores for female subjects), female and male subjects within each group exhibited similar patterns of change in scores from 1½ to 3 years. None of the interactions of gender with treatment or time was statistically significant.

MANOVA results for Child PTSD Reaction Index scores grouped by PTSD symptom category by treatment and time indicated a significant between-group main effect for treatment ( $F=5.06$ ,  $df=1$ ,  $58$ ,  $p<0.05$ ), significant within-group main effects for time ( $F=4.89$ ,  $df=1$ ,  $58$ ,  $p<0.05$ ) and symptom category ( $F=6.50$ ,  $df=2$ ,  $116$ ,  $p<0.01$ ), and significant within-group interaction effects of treatment by time ( $F=29.83$ ,  $df=1$ ,  $58$ ,  $p<0.01$ ) and treatment by symptom category by time ( $F=3.69$ ,  $df=2$ ,  $116$ ,  $p<0.05$ ). Post hoc contrasts indicated that for the group given psychotherapy, the decrease in total score on the Child PTSD Reaction Index was attributable to significant decreases in the mean scores of all three PTSD symptom categories (table 2). The increase in total score on the Child PTSD Reaction Index among the group not treated with psychotherapy was attributable to significant increases in mean scores for the PTSD symptom categories of intrusion and arousal.

MANOVA results for scores on the Depression Self-Rating Scale by treatment, gender, and time indicated that there was a significant between-group main effect

TABLE 3. Scores on the Depression Self-Rating Scale 1½ and 3 Years After the 1988 Earthquake in Armenia for Adolescents Who Were and Were Not Treated With Trauma/Grief-Focused Psychotherapy at 1½ Years

Group	Score at 1½ Years <sup>a</sup>		Score at 3 Years	
	Mean	SD	Mean	SD
Male subjects				
Treated	15.5	6.2	13.0	4.3
Not treated	12.7	5.1	17.7	4.8
Female subjects				
Treated	17.4	11.3	17.4	4.8
Not treated	16.4	5.4	21.3	5.7
All subjects				
Treated	16.8	5.9	16.0 <sup>b</sup>	5.0
Not treated	15.3	5.5	20.2 <sup>c</sup>	5.6

<sup>a</sup>Before initiation of treatment for subjects given psychotherapy.  
<sup>b</sup>Significantly lower than 3-year scores of adolescents not given psychotherapy ( $t=-4.09$ ,  $df=54$ ,  $p<0.01$ ).  
<sup>c</sup>Significantly higher than score at 1½ years ( $t=-4.80$ ,  $df=54$ ,  $p<0.01$ ).

of gender ( $F=6.91$ ,  $df=1, 51$ ,  $p=0.01$ ) and a significant within-group interaction of treatment with time ( $F=9.92$ ,  $df=1, 51$ ,  $p<0.01$ ). Post hoc contrasts indicated that the two groups did not differ significantly on mean Depression Self-Rating Scale score at 1½ years; at 3 years, however, the group treated with psychotherapy had significantly lower Depression Self-Rating Scale scores (table 3). For subjects given psychotherapy, there was no significant change over time in mean score on the Depression Self-Rating Scale. However, at 3 years the group not treated with psychotherapy had scores on the Depression Self-Rating Scale that were significantly higher than their scores at 1½ years. With a score of 17 or above indicating a depressive diagnosis, the estimated rates of depressive disorder at 1½ years among subjects who were and were not treated with psychotherapy were 46% and 35%, respectively; after 3 years, the rates for the two groups were 46% and 75%, respectively.

As was the case for the Child PTSD Reaction Index, girls had significantly higher Depression Self-Rating Scale scores than boys. Despite this difference, girls and boys within each group exhibited similar patterns of change in scores from 1½ to 3 years. None of the interactions of gender with treatment or time was statistically significant.

Scores on the Child PTSD Reaction Index and Depression Self-Rating Scale were significantly positively correlated within groups at 1½ years and 3 years (table 4). There was also a significant positive correlation within groups between change in score on the Child PTSD Reaction Index from 1½ to 3 years and change in score on the Depression Self-Rating Scale over the same period.

DISCUSSION

To our knowledge, this is the first published study to compare outcome among subjects who were and were not treated with psychotherapy after a catastrophic

TABLE 4. Correlation of Child PTSD Reaction Index and Depression Self-Rating Scale Scores and of Change in Scores of Both Scales From 1½ to 3 Years After the 1988 Earthquake in Armenia for Adolescents Who Were and Were Not Treated With Trauma/Grief-Focused Psychotherapy at 1½ Years

Group	Correlation					
	Scores at 1½ Years		Scores at 3 Years		Change From 1½ to 3 Years	
	N	r	N	r	N	r
Treated	35	0.52*	34	0.68*	34	0.44**
Not treated	19	0.71*	29	0.65*	19	0.73**

\* $p<0.01$ . \*\* $p<0.001$ .

natural disaster by using pre- and postintervention assessments of posttraumatic stress and depressive reactions. The findings demonstrate a robust effect of trauma/grief-focused brief psychotherapy in alleviating posttraumatic stress symptoms and preventing the worsening of depressive symptoms. In contrast, those who were not treated with psychotherapy had a worsening course of both posttraumatic stress and depressive symptoms. Of special note, students who received treatment had been experiencing chronic posttraumatic stress symptoms before initiation of therapy. Further, the benefits of treatment did not appear to be transient and were still in evidence 1½ years after intervention.

A clinical mental health intervention program had been implemented in Armenia within 2 months of the earthquake (18). However, systematic research was not undertaken during the first 18 months because of the large number of victims in need of mental health services and the limited clinical resources available. In addition, systematic research had to await the alleviation of subsistence problems and physical hardships as well as recovery of the school and community environments.

The significant reduction in severity of overall posttraumatic stress reaction among subjects treated with psychotherapy was attributable to improvement in all three PTSD symptom categories. The benefit with regard to intrusion symptoms is most likely explained by the trauma focus of the intervention, in which strategies were employed to increase tolerance of reexperiencing phenomena and reduce physiological and psychological reactivity to traumatic reminders. The beneficial effects of therapy on avoidance symptoms may have been due to multiple factors within the group and individual therapies. Students were encouraged by the therapists and their peers to express themselves, to engage in activities with their families and peers, and to seek support from family members at times of renewed distress. Improvement in the symptom categories of intrusion and arousal may have also contributed to the reduction of avoidance symptoms.

The beneficial effects of therapy on arousal symptoms may have resulted from several components of the intervention. These include the use of reexposure techniques under supportive circumstances, assistance with identification of traumatic reminders, and utilization of

relaxation techniques at times of renewed distress, especially at bedtime. Identification of interpersonal conflicts and exploration of appropriate coping skills, including the management of aggression, may have contributed to improvement in sleep, which, in turn, may have improved daytime concentration and reduced irritability. Reduction of intrusive symptoms may have resulted in improvements in certain arousal symptoms and vice versa. From a neurobiological perspective, intrusive symptoms have been associated with hypothalamic-pituitary-adrenal axis alterations (19), while arousal symptoms have been associated with noradrenergic alterations (20). Krystal et al. (21) have reviewed data concerning the interaction of these two systems.

In contrast to the subjects not treated with psychotherapy, depressive symptoms among treated subjects did not increase in severity over time. This may have been a direct effect of therapy, which was flexible in dealing with a variety of current problems and concerns that contribute to depression, e.g., lost opportunities and interpersonal problems. Also, the alleviation of persistent posttraumatic stress symptoms may have curbed the escalation of secondary depression (5). Involvement of parents and teachers in the therapeutic program may have improved the home and school milieu, thereby facilitating recovery from depression (22, 23).

Both posttraumatic stress and depressive reactions worsened among subjects not treated with psychotherapy. This finding indicates that mental health intervention may be beneficial in preventing a progressive worsening course of PTSD and comorbid depression. The child and adolescent literature is scant with regard to the course of untreated postdisaster psychological sequelae. Green et al. (1, 24) found that the rate of PTSD among victims of the Buffalo Creek flood after 17 years was less than that found 2 years after the disaster. Shaw et al. (25) reported that posttraumatic symptoms remained relatively high throughout the school year after Hurricane Andrew. McFarlane et al. (26) found a higher rate of emotional and behavioral problems at 8 months than at 2 months after the Australian bush fires. Yule's data suggest that symptoms of PTSD among untreated adolescents who experienced trauma during the sinking of the cruise ship *Jupiter* were greater at 5-9 months than found after 10 days (2).

The worsening course of posttraumatic stress symptoms among the students in Armenia who were not treated with psychotherapy may be related to the omnipresence of traumatic reminders, such as destroyed buildings. Although the treated students were also exposed to traumatic reminders, therapeutic efforts were directed at assisting them to reduce their reactivity. The nonworsening of avoidance symptoms among the students not treated with psychotherapy may have been due to the values placed on a tightly knit family structure and community involvement that are inherent in the culture, which discourages isolation and promotes interpersonal interaction.

The worsening course of posttraumatic stress symptoms found among subjects not treated with psycho-

therapy in this study may not be generalizable. Disasters that involve less severe traumatic exposures and postdisaster conditions may be associated with less severe acute reactions and a benign symptom course. Longitudinal studies across a spectrum of disasters would help to further clarify factors that mediate the onset and course of untreated posttraumatic stress symptoms.

The increase in severity of depressive symptoms among the students not treated with psychotherapy may have been secondary to the increase in severity of posttraumatic stress symptoms, as has been contended previously (5). The present findings of high direct correlations of posttraumatic stress and depressive reactions, and their change over time within both groups, lends some support to this contention. Alternatively, the worsening of depression may have been related to persistent severe posttraumatic stress symptoms interfering with grief resolution and/or the ability to cope with secondary stresses.

The benefits of therapy may extend beyond those of symptom reduction and prevention of symptom exacerbation to encompass areas of adjustment, emerging personality, and a variety of aspects of proximal and distal development. For example, reduction of posttraumatic stress and depressive symptoms may improve children's ability to cope with postdisaster stresses and adversities. Abatement of symptoms may also have beneficial effects through reduction of distress among parents, thus rendering them more available and supportive. Remediation of PTSD symptoms may help to prevent or curtail academic decline and, in so doing, may minimize consequent loss of self-esteem, family disturbance, and peer rejection.

Even though there was a reduction in severity of posttraumatic stress symptoms from severe to moderate levels among subjects treated with psychotherapy, they did remain symptomatic. This suggests that they may have benefited from additional intervention. Such interventions may include longer-term dynamic psychotherapy, cognitive behavioral therapy, pharmacotherapy, and additional services for parents and caretakers. The school-based intervention program may have benefited from providing additional booster sessions, determined by anticipated or reported reminders, and subsequent adversities.

In conclusion, this study demonstrates that trauma/grief-focused brief psychotherapy is effective in reducing the severity of posttraumatic stress symptoms and preventing the worsening of depressive symptoms among adolescents exposed to a major disaster. The results also demonstrate the cross-cultural applicability of Western therapeutic approaches in a non-Western culture. Further, the findings indicate that after a catastrophic disaster with pervasive unremitting postdisaster adversities, untreated posttraumatic stress and depressive symptoms may worsen over time. The results provide support for the broad use of school-based trauma/grief-focused interventions for children and adolescents after major disasters.

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