Brief Treatment for Elementary School Children with Disaster-Related Posttraumatic Stress Disorder: A Field Study

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Effective psychological intervention is needed to help children recover from disaster-related posttraumatic stress disorder (PTSD). This controlled study evaluated the effectiveness of a brief intervention for disaster-related PTSD. At one-year follow-up of a prior intervention for disaster-related symptoms, some previously treated children were still suffering significant trauma symptoms. Using a randomized lagged-groups design, we provided three sessions of Eye Movement Desensitization and Reprocessing (EMDR) treatment to 32 of these children who met clinical criteria for PTSD. The Children's Reaction Inventory (CRI) was the primary measure of the treatment's effect on PTSD symptoms. Associated symptoms were measured using the Revised Children's Manifest Anxiety Scale (RCMAS) and the Children's Depression Inventory (CDI). Treatment resulted in substantial reductions in both groups' CRI scores and in significant, though more modest, reductions in RCMAS and CDI scores. Gains were maintained at six-month

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follow-up. Health visits to the school nurse were significantly reduced following treatment. Psychosocial intervention appears useful for children suffering disaster-related PTSD. Conducting controlled studies of children's treatment in the postdisaster environment appears feasible. © 2002 John Wiley & Sons, Inc. J Clin Psychol 58: 99–112, 2002.

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Psychological intervention is needed to help children recover from disaster and to prevent the development of chronic psychopathology (Pfefferbaum, 1997; Vernberg & Vogel, 1993). To date, only one study has compared treated to untreated groups of children following natural disaster (Galante & Foa, 1986) while one other study compared treated to untreated adolescents (Goenjian et al., 1997). The only randomized controlled study was a public health inspired psychosocial intervention conducted two years after Hurricane Iniki, one of the largest disasters in U.S. history (Chemtob, Nakashima, & Hamada, 1996). All three previous studies targeted postdisaster symptoms rather than PTSD.

In the Iniki study, the population of elementary public school children living on Kauai was screened for disaster-related symptoms. Children reporting the most trauma symptoms were selected for treatment and were randomly assigned to one of three treatment groups. The children were treated in consecutive waves, using a school-based, counselor-administered, brief psychosocial treatment. Following treatment, children reported significant reductions of trauma-related symptoms. At one-year follow-up, some children (defined here as treatment nonresponders) were still exhibiting significant trauma symptoms, though more than three years had elapsed since the hurricane and despite having received a treatment effective for the large majority of children.

We report on the intervention provided to those children who were (a) treatment nonresponders, (b) met criteria for disaster-related PTSD (American Psychiatric Association, 1994), and (c) for whose treatment parental consent could be obtained. The treatment used was Eye Movement Desensitization and Reprocessing (EMDR), a brief psychotherapy that incorporates elements of cognitive-behavioral and of psychodynamic treatments (Shapiro, 1995).

Despite significant controversy about EMDR's efficacy (Lohr, Kleinknecht, Tolin, & Barrett, 1995) and about the nature of its active components, strong and rapid treatment effects have been reported in controlled studies with adult victims of single trauma (Wilson, Becker, & Tinker, 1995) as well as with chronic PTSD (Carlson, Chemtob, Rusnak, Hedlund, & Muraoka, 1998). Moreover, a case series reporting on using EMDR following Hurricane Andrew suggested its potential usefulness (Greenwald, 1994).

We emphasize that this study was not designed to establish the efficacy of EMDR. Our reasons for using EMDR were pragmatic: (a) A treatment manual could be easily developed, facilitating controlling for treatment integrity; (b) treatment capacity limitations required a treatment promising rapid effectiveness (Possible alternative cognitive-behavioral treatments were not manualized and appeared to require a greater number of sessions.); and (c) efficacy data using EMDR with single event trauma seemed highly promising (Wilson et al., 1995). Thus, the present design does not address what components of the treatment were effective nor can it address the merits of this brief treatment relative to other treatments. Our aim was to evaluate the usefulness of brief psychosocial

treatment for children with disaster-related PTSD. To our knowledge, the present study is the first to address treating children with disaster-related PTSD.

Method

Participants

There were 40 potentially eligible children. Five families declined consent. One child did not meet PTSD criteria. Two children did not complete treatment. Thus, 32 children completed treatment. All participating families provided written consent. The children attended seven schools representing every island region. Twenty-two girls and 10 boys ranging in age from 6 to 12 years (M = 8.4) took part in the study. Participants were ethnically diverse, comprising Filipino (28.1%), Hawaiian and part Hawaiian (31.3%), Japanese (12.5%), Caucasian (18.8%), and mixed (9.4%) ethnic origins. About 49.4% of the children received subsidized lunches (indicating income below $17,430 for a family of four).

Exposure Questions

Six questions reflecting hurricane exposure and the revision of Criterion A for PTSD diagnosis in the Diagnostic and Statistical Manual, fourth edition (DSM-IV; American Psychiatric Association, 1994) were included. The questions were: Were you living in Hawaii during Hurricane Iniki? Where were you when Hurricane Iniki hit Kauai? During the hurricane, did you think you would die or get hurt? During the hurricane, did you think your mom or dad or brother or sister, or other close relatives, would die or get hurt? How much did the hurricane hurt your home? How scared were you during the hurricane? The latter two questions were rated on 5-point scales.

Screening Measure

Kauai Recovery Inventory (KRI; Hamada, Kameoka, & Yanagida, 1996). This measure was used to identify children in the initial screening and at one-year follow-up. The KRI is a 24-item self-report scale derived from Frederick's Reaction Index (Frederick, 1985) which adapts that instrument to elementary-school-aged children while incorporating the DSM-IV PTSD criteria. Children rate on a 3-point scale (*No, Sometimes, Almost all the time*) the frequency with which they experienced hurricane-related symptoms in the previous week. The KRI has adequate internal reliability (Cronbach's alpha = .84) and test-retest reliability (r = .77 over 28 days).

Diagnostic and Outcome Measures

Child Reaction Index (CRI; Pynoos et al., 1987). The CRI is a semistructured interview for assessing posttrauma symptoms and PTSD in school-aged children (Frederick, 1985). It was used to structure the diagnosis of PTSD. Pynoos et al. (1987) report test-retest inter-item agreement over seven days as 94% with a kappa coefficient of .88. Cronbach's alpha for the CRI in the present study was found to be .87. The CRI has been used to measure the impact of hurricanes on children (Vernberg, La Greca, Silverman, & Prinstein, 1996).

The Revised Children's Manifest Anxiety Scale (RCMAS, Reynolds & Richmond, 1985). The RCMAS is a 37-item self-report instrument designed to assess the level and nature of anxiety in children and adolescents from 6 to 19 years of age and appears to measure trait anxiety. The RCMAS yields a total anxiety score and three subscale scores: Physiological Anxiety, Worry-Oversensitivity, and Social Concerns/Concentration. The scale demonstrates good internal and test-retest reliability (Reynolds & Richmond, 1985).

The Children's Depression Inventory (CDI, Kovacs, 1992). The CDI is a 27-item self-report scale designed to measure depressive symptoms and normed for children ranging from 7 to 17 years of age. The scale yields a total and five subscale scores: Negative Mood, Interpersonal Problems, Ineffectiveness, Anhedonia, and Negative Self-Esteem. The CDI demonstrates adequate internal and test-retest reliability as well as good concurrent validity (Kovacs, 1992).

Visits to the School Health Nurse. Health care visits are often used as a measure of treatment impact (Pennebaker, 1993). We counted school health visits made to the school nurse during the 1995–1996 school year by participants. This was compared to school health visits in the 1996–1997 school year. Data were available for 28 participants (Four moved in the second year.)

Child Ratings of Treatment Helpfulness. At posttreatment and at follow-up, we asked the children whether treatment had helped with respect to each PTSD symptom using a 4-point scale. We also asked whether treatment helped overall on a 3-point scale (*yes, a little bit, no*).

Procedure

Design. This study was conducted using two groups in an ABA design plus follow-up: Group 1 was assessed at pretreatment, provided treatment, and reassessed at posttreatment. Group 2, consisting of wait-listed participants, was assessed at baseline, then following treatment for Group 1 (about one month later), was reassessed at pretreatment, then provided treatment, and reassessed at posttreatment. Both groups were given follow-up assessments at six months.

Assessment of Participants. Initial eligibility was based on a KRI score at or above 45 at the one-year follow-up for the prior treatment. This score demarcated the most severe 20% and was chosen because of limitations in treatment capacity. Three of the follow-up-evaluated children were accepted into the project despite having lower KRI scores because their parents and teachers referred them for additional help with PTSD symptoms. After eligibility was determined, parents provided written consent for the child's participation.

Children then were scheduled for diagnostic evaluation and treatment. The initial diagnostic CRI was administered by the child's assigned therapist. Therapists received several hours of training in its use (from C.M.C.). The initial interview was administered by the therapists to minimize intrusiveness in the child's life and to have PTSD status be determined by experienced doctoral-level clinicians. To offset possible interviewer biases, we videotaped all interviews. Diagnostic interviews were reviewed (by C.M.C.) to establish concurrence in the diagnosis. There was 100% agreement between the two clinicians that the children included met criteria for PTSD. (One child was excluded.)

All outcome measures, except the initial diagnostic CRI, were administered by independent examiners (experienced master's-level teachers functioning as consultants on behavioral matters to other teachers). For posttreatment measures, examiners did not know which children had been treated. Thus, the examiners administered the CDI and RCMAS at pretreatment, posttreatment, and follow-up. They administered the CRI at posttreatment and at follow-up. The examiners received training in the administration of the CRI, which included supervised role playing and viewing videotapes to learn rating.

Approximately half of the participants (Group 1, $n = 17$; Group 2, $n = 15$) were randomly assigned to a waiting list for treatment until the first group's treatment was completed. Participants were randomly assigned to therapists. Treatment sessions were conducted weekly in the child's school and were videotaped. Subsequent to the completion of follow-up, we obtained the records of each child's visits to the school nurse.

Therapist Training. Four doctoral-level clinicians (three male, one female) participated as therapists. They averaged over ten years of clinical experience with children. All had completed Level 1 of EMDR training (two had completed Level II training) and were experienced clinicians. The therapists had more limited actual clinical experience using EMDR. To assure treatment fidelity, an additional 16 hours of child EMDR training for the therapists were conducted by a highly experienced child clinical psychologist (Robert Tinker, PhD) who participates in the EMDR Institute's training courses. Training consisted of a detailed review of EMDR, live rehearsal of EMDR procedures, adaptations with children, review of videotaped EMDR sessions with children, and cooperative development of a standardized protocol for EMDR treatment in the study.

Treatment. EMDR is a client-paced exposure treatment which incorporates elements of psychodynamic treatments. A patient is asked to identify a distressing memory and related imagery and sensations, and assess its associated subjective distress on a 11-point Subjective Units of Distress (SUD) scale (Shapiro, 1995). Trauma-related negative self-cognitions are then identified as well as corresponding positive self-cognitions. The latter are rated on how much the client believes them to be true on a 7-point scale (Validity of Cognition Scale, VOC). Next, sets of eye movements are induced by asking the patient to track the back and forth movements of the therapist's hand while concentrating on memory-related images, thoughts, and sensations. The number of eye movements in each set typically is not less than 24. With very young children whose eye coordination is not fully developed, "hand tapping" may be substituted during which the therapist taps each hand (or the patient taps the therapist's hands) in a left-right-left sequence. Between sets of eye movements, or hand taps, the person reports the content of thoughts, images, feelings, and sensations as they occurred. In later stages of treatment, called "reprocessing," the patient is asked to focus on positive cognitions regarding the memory during further sets of eye movements.

The study protocol comprised one diagnostic session and three weekly treatment sessions. Treatment encompassed four stages: I. Introduction and Assessment; II. Worst Memory; III. Current Reminders; and IV. Future Events. The diagnostic session was used to establish rapport, outline the rationale for the treatment, evaluate the presence/absence of PTSD utilizing the CRI, and establish an imaginal "safe place" utilizing EMDR-like procedures. In the following initial treatment session, each child was first started with the safe place installation (two sets of eye movements). Next, the memory which most bothered the child about Iniki was subjected to the EMDR protocol. The emotional processing concluded with focusing on the positive cognition. In the second treatment session, if the child had not completed the worst memory desensitization, the EMDR protocol was

continued. Next, the worst reminders of Iniki were processed. In the third session, if the child had not completed the worst memory or current reminders desensitization, the EMDR protocol was continued. If the child had completed processing the worst memory or current reminders (SUD rating below 2), the session focused on fears about future hurricanes. If other upsetting memories emerged, these were addressed using the EMDR protocol. At the end of three treatment sessions, gains were reviewed and feelings about termination addressed.

Fidelity. Therapists followed a written step-by-step treatment protocol. Each therapist reviewed a minimum of five videotaped sessions provided by other therapists on a rotating schedule. All videotapes were reviewed by C.M.C., who gave feedback frequently to therapists on adherence to EMDR. Finally, therapists met weekly for four hours to review each other's treatment tapes, in rotation, for clinical issues and for adherence to the written protocol.

Follow-Up of Participants

The participants were readministered the CRI, RCMAS, and CDI six months after the posttreatment assessment. The follow-up assessment was conducted in each child's school by the same assessors.

Results

Participants

Exposure. These items are relevant to Category A of the PTSD criteria. In this assessment, 85.2% of the children reported fearing death or being physically hurt while 92.7% feared that a family member would die or be physically hurt. The hurricane was a very frightening experience, with 11.5% reporting being scared, 23.1% reported being very scared, and 38.5% reported panicking. In addition, 44.4% of the children reported that their homes had suffered a lot of damage, 18.5% reported that their homes had been rendered unlivable, and 7.4% reported that their homes were still unlivable.

Comparing the Immediate and Delayed Treatment Groups. Using χ^2, we evaluated group differences in gender, grade, socioeconomic level (as measured by free-lunch status), and exposure. The delayed treatment group (n = 15) and immediate treatment group (n = 17) did not differ significantly on any of these variables. Using t tests, we also found no differences between groups with respect to age, their KRI score in the initial population-based screening, or the KRI score they received at the one-year follow-up for the initial treatment.

General Data Analysis Considerations

The alpha level for all statistical tests was set at .05 unless otherwise indicated. There were three main dependent variables consisting of total scores on the CRI, the RCMAS, and the CDI. To evaluate whether there were differences in means found during the waiting period for the wait-list control group, the means of the total scores on each treatment outcome variable for Group 2 (the wait-listed participants) at the time of pretreatment for Group 1 (first set of means for Group 2) and at the time of posttreatment for Group 1 (second set of means for Group 2) were subjected to individual t tests. These

were nonsignificant, reflecting stability across the first two times of testing for the variables; RCMAS total, $t(12) = .73$, $p = .48$, CDI total, $t(11) = .96$, $p = .36$. Analyses for each of the subscales also yielded nonsignificant differences. There were no apparent statistical differences due to the mere passage of time. Thus, to simplify the ANOVAs and subsequent contrasts, this baseline set of means for Group 2 was no longer included.

Scores were subjected to separate mixed-model ANOVAs in which the between-subjects factor was groups and the within-subjects factor was time of testing (pretreatment, posttreatment, and follow-up). All factors involving repeated measures were corrected with the Huyhn-Feldt adjustment (Huyhn & Feldt, 1976). Contrasts of time of testing effects were conducted using Bonferroni's adjustment (Dunn, 1961) which, for three contrasts (pretreatment vs. posttreatment, pretreatment vs. follow-up, and posttreatment vs. follow-up) rendered an alpha of $.05/3 = .017$. If a particular contrast is not mentioned, it was not statistically significant. Marginal effects relative to the conservative Bonferroni levels are noted. We also provide η^2 and Cohen's d (Cohen, 1988) as indices of treatment effect sizes. The methods described by Dunlap, Cortina, Vaslow, and Burke (1996, see Eq. 3, p. 171) were used to calculate Cohen's d for the correlated measures. The means of scores on each scale and subscales for each group at pretreatment, posttreatment, and follow-up are given in Table 1. Mean total scores by group across assessments are in Figure 1.

CRI

As seen in Figure 1, both groups showed a substantial decrease on the CRI from pretreatment to posttreatment. Group 1 decreased at posttreatment by an average of 54.93%. Group 2 decreased by an average of 42.93%. These decreased levels were maintained at follow-up (Group 1, 71.0%; Group 2, 52.3%). The mixed model ANOVA yielded nonsignificant groups and Groups × Time of Testing effects. The time of testing effect was significant, $F(2,60) = 38.63$, $p < .0009$, $\eta^2 = .56$. Contrasts on the means shown in Figure 1 yielded a significant pretreatment versus posttreatment difference, $F(1,30) = 37.35$, $p < .0009$, $d = 1.55$, and a significant pretreatment versus follow-up difference, $F(1,30) = 51.14$, $p < .0009$, $d = 2.04$. There was a trend towards significance for the posttreatment versus follow-up contrast, $F(1,30) = 6.18$, $p = .019$, $d = .41$.

RCMAS

Total Score. Figure 1 shows that both groups manifested a decrease from pretreatment to posttreatment. Gains were maintained for both groups at follow-up. The ANOVA showed nonsignificant effects for both groups and Groups × Time of Testing. The time of testing effect was significant, $F(2,60) = 11.95$, $p < .0009$, $\eta^2 = .29$. Subsequent contrasts on this effect yielded a significant effect for the pretreatment-posttreatment difference, $F(1,30) = 15.30$, $p < .0009$, $d = .78$, and a significant pretreatment-follow-up difference, $F(1,30) = 17.85$, $p < .0009$, $d = 1.07$.

Physiological. Paralleling the total RCMAS, the physiological symptom subscale showed a time of testing effect, $F(2,60) = 9.10$, $p < .0009$, $\eta^2 = .23$, and nonsignificant effects due to groups and the interaction of groups with time of testing. Subsequent contrasts showed this was due to significant differences between pretreatment and posttreatment, $F(1,30) = 12.09$, $p < .003$, $d = 1.23$, and between pretreatment and follow-up, $F(1,30) = 14.00$, $p < .002$, $d = 1.32$.

Table 1
Means and (Standard Deviations) for Pretreatment, Posttreatment, and Follow-Up for CRI, RCMAS, and CDI by Groups

	Groups					
	Immediate Tx			Delayed Tx		
	Pre	Post	Follow-Up	Pre	Post	Follow-Up
Child Reaction Index						
	36.54	16.47	10.59	39.60	22.60	18.87
	(11.57)	(12.98)	(8.23)	(21.04)	(20.21)	(20.39)
Revised Children's Manifest Anxiety Scale						
Total	18.00	14.29	10.00	18.07	11.78	13.57
	(5.87)	(8.26)	(8.28)	(8.17)	(10.99)	(9.47)
Cognitive	4.00	3.59	2.35	4.00	2.64	3.36
	(2.15)	(2.42)	(2.45)	(2.45)	(3.03)	(3.03)
Physiological	5.59	4.41	3.35	5.86	3.93	4.36
	(2.40)	(2.78)	(2.76)	(3.25)	(4.01)	(2.98)
Worry	8.41	6.29	4.29	8.21	5.21	5.86
	(3.79)	(3.95)	(3.57)	(3.33)	(4.46)	(3.92)
Children's Depression Inventory						
Total	55.94	48.71	48.35	59.73	53.87	51.67
	(9.86)	(13.03)	(14.22)	(19.84)	(21.82)	(18.34)
Negative Mood	55.76	51.00	48.29	59.53	56.33	51.73
	(12.47)	(14.95)	(15.34)	(20.77)	(23.76)	(17.35)
Interpersonal Problems	52.18	45.76	50.29	54.80	54.27	56.73
	(10.55)	(4.35)	(10.06)	(13.50)	(14.07)	(17.70)
Ineffectiveness	51.23	48.41	49.53	57.87	51.67	51.00
	(12.55)	(9.15)	(9.59)	(15.74)	(13.38)	(14.92)
Anhedonia	58.41	50.82	48.71	58.27	52.33	49.67
	(9.86)	(14.62)	(14.50)	(16.35)	(16.98)	(15.00)
Negative Self-Esteem	53.71	47.00	47.47	55.73	51.33	50.73
	(10.58)	(10.75)	(9.55)	(17.60)	(19.25)	(13.96)

Worry. The worry subscale of the RCMAS showed a time of testing effect, $F(2,60) = 11.05$, $p < .0009$, $\eta^2 = .27$, and nonsignificant effects due to groups and the interaction of groups with time of testing. In subsequent contrasts, the difference between pretreatment and posttreatment was significant, $F(1,30) = 16.90$, $p < .0001$, $d = .65$, as was the difference between pretreatment and follow-up, $F(1,30) = 14.98$, $p < .002$, $d = .87$.

Cognitive. The cognitive subscale of the RCMAS yielded significant effects for time of testing, $F(2,60) = 4.13$, $p < .022$, $\eta^2 = .12$, but not for group or Group $\times$ Time interaction. Bonferroni-corrected contrasts of the time of testing yielded nonsignificant differences, although there was a trend towards significance for pretreatment versus follow-up, $F(1,30) = 5.93$, $p < .022$, $d = .64$.

CDI

Total Score. As shown in Figure 1, both groups decreased from pretreatment to posttreatment and continued to show a trend towards a decrease from posttreatment to follow-

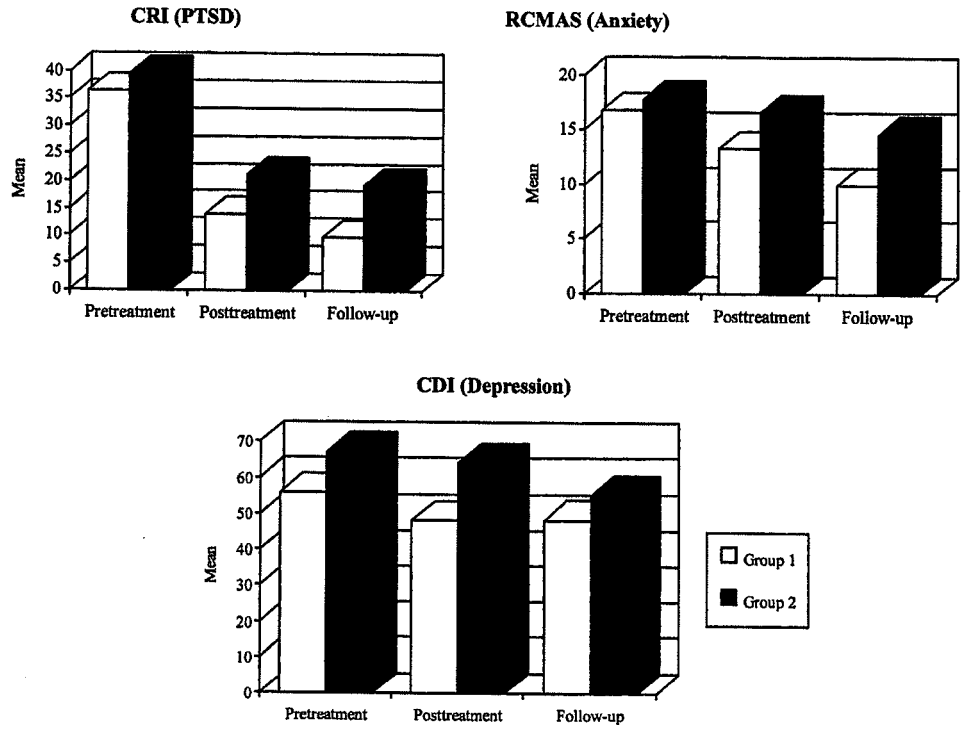

Figure 1. Means on each measure for children treated first (Group 1) and those wait listed, then treated (Group 2).

up. The ANOVA showed nonsignificant effects for groups and Groups × Time of Testing. The time of testing was significant, $F(2,60) = 12.93$, $p < .0001$, $\eta^2 = .30$. Subsequent contrasts yielded a significant effect for pretreatment-posttreatment, $F(1,30) = 13.30$, $p < .002$, $d = .54$, and a significant pretreatment versus follow-up difference, $F(1,30) = 18.05$, $p < .0009$, $d = .69$.

Negative Mood. Negative Mood yielded nonsignificant groups and Groups × Time of Testing interactions. The time of testing effect was significant, $F(2,60) = 7.91$, $p < .002$, $\eta^2 = .21$. Subsequent contrasts showed this effect to be attributable to the difference between pretreatment and follow-up, $F(1,30) = 16.35$, $p < .0001$, $d = .64$.

Interpersonal Problems. No significant effects for groups, time of testing, and the Group × Time interaction were found in the mixed model ANOVA. In addition, none of the contrasts on the group means at time of testing were significant.

Ineffectiveness. Nonsignificant differences were found for group and the Group × Time of Testing interaction while the effect for time was significant, $F(2,60) = 5.01$, $p < .011$, $\eta^2 = .14$. Subsequent contrasts were significant for pretreatment-posttreatment differences, $F(1,30) = 6.76$, $p = .014$, $d = .48$, and for pretreatment-follow-up, $F(1,30) = 6.67$, $p = .015$, $d = .46$.

Anhedonia. On the Anhedonia subscale, the time of testing effect in the mixed model ANOVA was significant, $F(2,60) = 9.13, p < .0009, \eta^2 = .23$. Contrasts showed this was due to significant differences for pretreatment versus posttreatment, $F(1,30) = 8.15, p < .009, d = .65$, and pretreatment versus follow-up, $F(1,30) = 12.34, p < .002, d = .92$.

Negative Self-Esteem. The self-reported self-esteem subscale yielded a significant time of testing effect, $F(2,60) = 7.23, p < .003, \eta^2 = .19$. This effect owed to significant differences between the means at pretreatment versus posttreatment, $F(1,30) = 10.54, p < .004, d = .52$, and pretreatment versus follow-up, $F(1,30) = 8.72, p < .007, d = .59$.

Clinical Significance

A stringent way to evaluate the treatment is to ask how many children no longer met criteria for PTSD on the CRI at follow-up. Eighteen of the 32 study children (56.3%) had follow-up scores below the CRI cutoff of 12. Thus, 14 were still above the cutoff for PTSD (i.e., greater than 11) specified for the CRI. To determine how these two groups differed, we conducted a series of Bonferroni-corrected post hoc t tests on pretreatment total CRI, total CDI, and total RCMAS (adjusted p of .017). No significant differences were found between those with follow-up CRI scores above 11 and those scoring less than 12 on the follow-up CRI.

Visits to the School Health Nurse

There was a significant reduction in the number of health care visits made by the children from the 1995–1996 school year ($M = 6.57$) to the posttreatment 1996–1997 school year as shown by a t test for related measures ($M = 5.04$), $t(27) = 2.29, p = .03, d = .61$. Because it is possible that all children would have had reduced health visits due to the passage of time, and independent of the effectiveness of treatment, we evaluated reductions in health visits using separate t tests for related measures among (a) the remitted children no longer meeting criteria for PTSD on the CRI (remitted children), $t(15) = 2.83, p = .013, d = 1.00$, and (b) among nonremitted children, whose symptoms exceeded the CRI PTSD criteria, $t(11) = .63, p = .55$. The t tests suggest that the change in health visits was largely accounted for by the remitted group.

Children's Perception of the Helpfulness of Treatment

At posttreatment and follow-up assessments, the children were asked whether the treatment helped with each of the CRI indexed symptoms. The mean helpfulness rating on a 5-point scale (0–4; 2 = *somewhat helpful*) was 2.33 at posttreatment and 2.13 at follow-up. Children who no longer met CRI criteria for PTSD rated helpfulness 2.78 at posttreatment and 2.61 at follow-up, in contrast to the other children who rated helpfulness at posttreatment as 1.76 and 1.52 at follow-up. As might be expected, the recovered children's rating of treatment helpfulness was significantly higher than the ratings of helpfulness provided by children still included in the CRI definition of PTSD both at posttreatment, $t(30) = 2.16, p < .04, d = .77$, and at follow-up, $t(30) = 2.42, p < .03, d = .86$. The children also were asked to give a global rating of the treatment's helpfulness. Twenty-three (71.9%) children said treatment helped, 5 (15.7%) said it helped a "little bit," and 3 (9.4%) said the treatment had not been helpful. We asked the children what changed as a result of treatment. Typical responses included "the way I think about

Iniki—not as scary," "stopped rubbing my pillow and sucking my thumb too much," "getting better grades, hurricanes are OK," "less nightmares," and "I could not 'handle' before." Comments reflected reduced anxiety, better sleeping, more effective coping, and fewer regressive behaviors.

Discussion

Children who were not improved three and a half years after exposure to a hurricane and a year after first receiving a school-counselor–administered treatment were this study's participants. Though they had failed to respond to a prior effective treatment, the disaster-affected children in this study showed large reductions in levels of symptoms of PTSD following three sessions of brief treatment. The children also showed significant, though less dramatic, reductions in the levels of associated symptoms of PTSD, specifically anxiety and depression. These changes were evident at posttreatment and were maintained at six-month follow-up. The reduction in school health visits in the year following treatment buttresses the phenomenological measures of outcome.

The treatment effects do not appear to owe to the mere passage of time as (a) the symptoms had persisted for three and a half years since the hurricane itself, (b) the children had undergone prior psychotherapy with minimal effect at one-year follow-up, and (c) the wait-list group showed no changes in depression and anxiety symptoms from baseline to pretreatment as verified statistically. In this regard, it should be noted that the CRI was significantly correlated with both the CDI ($r = .55, p < .001$) and the RCMAS ($r = .62, p < .0001$) at pretreatment. In addition, once treated, the wait-list group demonstrated change in all three outcome measures commensurate with the effects of treatment on the first treated group.

Study Limitations

This study only addressed the helpfulness of clinical treatment for disaster-related PTSD in children. No comparative statements about the present treatment (EMDR) relative to other potential treatments can be made as this was not a comparative evaluation. Nor can we assert any conclusions about what treatment components might have been effective. Any of a number of active ingredients may have been involved, including active social support by trained clinicians, imaginal exposure, and rehearsal of the trauma-related experience.

Second, the present study relied on a wait-list design. A frequent objection to wait-list designs is that they do not control for demand characteristics (placebo) inherent in simply receiving attention. Because the participants had not responded to a prior treatment which was effective for other children, suggesting their symptoms were persistent, this concern is mitigated.

Third, research in postdisaster environments is constrained by sensitivity to intrusiveness and to feelings of exploitation. For example, although these children had unremitted persistent symptoms a year after the prior treatment indicating symptom stability, the study's design would have been improved by using a diagnostic interview for PTSD at baseline and at pretreatment for the wait-list group. We were prevented from this by the strong concerns of educators that such re-interviewing would cause the children potential distress, justified only by research needs. Similarly, we did not include families in treatment or in outcome assessment despite the likely value of so doing.

Study Strengths

This is the first controlled study of treatment for disaster-related PTSD, and one of very few studies of childhood PTSD treatment (American Academy of Child and Adolescent Psychiatry, 1998; March, Amaya-Jackson, Murray, & Schulte, 1998). The study's participant selection and recruitment were extraordinarily systematic. Participants were initially selected on the basis of a population-wide screening of elementary school students on Kauai. Participants with the most trauma symptoms then participated in a psychosocial intervention which improved hurricane-related PTSD symptoms for most. The previously treated children whose symptoms had not remitted and who met criteria for PTSD were the study's participants. Additional study strengths include a manual-guided treatment protocol, systematic training provided therapists, multifaceted and systematic oversight of treatment fidelity, use of independent evaluators to obtain measures of treatment outcome, randomized group and therapist assignment of participants, and measures of the treatment's impact on multiple symptom domains. Moreover, treatment effect sizes were substantial, given that these children had not responded to prior treatment and received only three sessions of treatment. Finally, this was a field study conducted in multiple schools in a research-resistant, postdisaster context.

Clinical Implications

There appears to be a growing recognition that a school-based, public health-inspired approach is the most effective way to address the needs of children after major disasters (Chemtob et al., 1996; Pynoos, Goenjian, & Sternberg, 1998). This strategy is demonstrated in our multistage response to Hurricane Iniki. First, a population screening using the schools was implemented to identify children with trauma symptoms. Second, school-based, counselor-administered psychoeducational treatment (secondary prevention) was used to treat the most symptomatic children. Third, this was followed by screening for nonresponders. Fourth, a clinical level of intervention (tertiary prevention) was provided to treatment nonresponders. This persistent and time-extended approach is counterintuitive in disaster-affected contexts because the dominant wish postdisaster is to "get the disaster behind us." Consequently, the needs of children whose recovery has not proceeded apace are often unrecognized and remain unaddressed. Although the current practice is to deploy substantial psychological resources early after a disaster, this study suggests studying the timing of postdisaster recovery interventions and providing sustained support.

This study also indicates that controlled treatment research in postdisaster environments is feasible. However, our experience suggests that such research must be subordinated to a primary intervention mandate to be accepted. Finally, we presented preliminary data suggesting treatment-related reductions in health care use. The need for intervention after disasters may be indicated to alleviate emotional suffering *and* to reduce health care costs.

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