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School-Based Intervention for the Treatment of Tsunami-Related Distress in Children: A Quasi-Randomized Controlled Trial

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Key Words
Tsunami-related distress · School-based intervention · Posttraumatic symptomatology · Depression

Abstract
Background: On December 26, 2004, a tsunami hit the southern coast of Sri Lanka, leaving thousands dead and injured. Previous research has found significant mental health problems among children exposed to major disasters. School-based universal interventions have shown promise in alleviating distress and posttraumatic symptomatology in children and adolescents. This study evaluated the efficacy of a school-based intervention in reducing stress-related symptomatology among Sri Lankan children exposed to the tsunami. ***Methods:*** In a quasi-randomized controlled trial 166 elementary school students (ages 9–15) with significant levels of tsunami exposure and previous traumatic background were randomly assigned to a 12-session structured program 'ERASE Stress Sri Lanka' (ES-SL) or to a waiting list (WL) religious class control group. Students were assessed 1 week prior and 3 months after the intervention on measures of posttraumatic symptomatology [including posttraumatic stress disorder (PTSD) and severity of posttraumatic symptomatology], depression, functional problems, somatic problems and hope. ***Results:*** This study shows a significant reduction on all outcome variables. PTSD severity, functional problems, somatic complaints, depression and hope scores were all significantly improved in the ES-SL group compared to the WL group. No new cases of PTSD were observed in the experimental group. ***Conclusion:*** This study adds to the growing body of evidence suggesting the efficacy of school-based universal approaches in helping children in regions touched by war, terror and disaster and suggests the need to adopt a two-stage approach toward dealing with trauma-exposed students, namely, starting with a universal intervention followed by targeted specialized interventions for those still suffering from posttraumatic distress.

R. Berger and M. Gelkopf contributed equally to this study.

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In 2004, Sri Lanka experienced an unexpected tsunami causing a death toll of 35,000 [1], including 10,000 children [2], resulting in bereavement, lack of social and family support and significant economical insecurity [3, 4]. Previous disaster research revealed significant mental health problems among children exposed to major disasters including posttraumatic stress disorder (PTSD) [5–13], behavioral problems [14], anxiety [6], depression [15, 16], fears [17], and learning difficulties [18]. PTSD prevalence rates among Thai children 2 and 9 months after the tsunami were between 10 and 13% [19] and in children from severely affected areas of Sri Lanka the prevalence rates were between 14 and 39% 3–4 weeks after the tsunami [20]. This highlights the urgent need to provide Sri Lankan youth exposed to the disaster with broad community-based services in order to reduce the risk of developing long-term posttraumatic symptoms. Unfortunately, psychosocial resources in Sri Lanka have been lacking [21]. Considering this, we chose a universal approach that would strengthen resilience as well as reduce tsunami-related distress. Situating the intervention within the school helps to make these services available, feasible and affordable [22] as well as minimizes stigma [23], increases the likelihood of program adherence and provides peer support [24, 25]. Despite the advantages of such an approach, few universal school-based programs were developed for children in the aftermath of disasters [6, 26] or war and terrorism [27–30] and very few programs provided empirical evidence regarding their efficacy [26, 31]. In a quasi-randomized controlled trial we demonstrated significant declines in PTSD-related symptoms among elementary school students exposed to terror in Israel following such an intervention [24]. Unfortunately, when we applied our intervention in regions where exposure to terror and war was more direct, intense and wide-ranging, we encountered difficulties in program adherence and some students became sensitized and needed individual attention. Consequently, we developed the ERASE Stress program [32], which avoids the direct processing of traumatic experiences, focusing on building resiliency and strengthening resources. Since students in our study came from an area severely exposed and affected by the tsunami, we decided to utilize the ERASE Stress program for the current study.

The current study has two main contributions. First, to the best of our knowledge, it is the only study that examines the impact of a school-based intervention to provide relief to Sri Lankan children exposed to the 2004 tsunami. Second, it evaluates the efficacy of a present-focused intervention which avoids the direct processing of children's traumatic experiences.

Methods

The study was conducted from February to May 2006 in the local Buddhist school in Welligama, a small Sri Lankan town that suffered a direct hit from the tsunami in 2004. Almost all the children in this school lost their homes and many lost family members or relatives in the tsunami. The study was first presented to the principal and teachers. Due to prior academic commitment of the school to teach a regular religious program and following consultation with the local Ministry of Education, the principal decided to implement the intervention in two stages: half of the classes in the current school year and half of the classes in the following school year. We then explained the rationale to the entire school staff and stressed the potential of the program to alleviate students' distress and to improve their academic functioning. In order to elicit their motivation, we promised to give them a certificate of treatment completion as well as the adapted manual (ERASE Stress Sri Lanka; ES-SL) translated to Sinhalese.

Sample

From the 9- to 14-year-old school population (n = 182), 166 participated in the study (ES-SL intervention, n = 84; waiting list, WL, n = 82). Given the school decision to implement the intervention in half of the 12 classes (2 classes per age group), the randomization procedure was done by coin tossing and choosing 1 class for each age group. Six classes were assigned to the active intervention and the remaining 6 classes to the WL that included participation in regular religious study. Classroom randomization between the ES-SL and the WL groups was performed after completion of the teachers' training.

The Welligama education board reviewed the program and approved the study. All parents were invited to the school and were explained the rationale of the study by the principal. Parents were then asked to sign a consent form. All present caretakers (n = 166, 91.1%) signed the consent form. Sixteen (8.9%) pupils for whom caretakers were not present did not fill in the questionnaires nor partake in the intervention.

Instruments

Local trained volunteers blinded to the experimental conditions administered questionnaires about 1 week before and 3 months after the 12 training sessions. This was done in groups of 5–10 students in their classrooms. Questionnaires were coded for confidentiality and took about 30 min to complete.

Objective exposure to the tsunami: two exposure-related questions were asked, i.e. (1) whether the participants were present in the region when the tsunami occurred and whether they were physically hurt, and (2) whether any of their close acquaintances (family or friends) were present in the region and whether they were hurt or killed. Both questions were analyzed as two Guttman scales in order of severity ranging from 0 to 2 for the personal exposure variable and from 0 to 3 for the significant other exposure variable.

Subjective exposure to the tsunami was measured with a questionnaire adapted from Pat-Horencyck et al. [33]. Three yes/no questions were asked: whether exposure to the tsunami had resulted in the fear that he/she, a family member or a close friend would be killed or injured. One positive response was regarded as meeting criterion A1 of PTSD (exposure to a traumatic event), as specified in DSM-IV-TR.

Significant distress, helplessness and horror experienced due to tsunami exposure were assessed with 3 questions [33] querying whether participants experienced any of those emotions as related to the tsunami, using a 5-point scale from 1 (did not experience this emotion at all) to 5 (experienced this emotion often). So as to avoid overinclusion, one score of at least 4 was necessary to fulfill criterion A2 of PTSD [33].

Major traumatic life events were assessed with a questionnaire developed for this study which queried whether the student was exposed to one of the following traumatic situations, not related to the losses sustained due to the tsunami disaster: death of a close family member, having been in a death-threatening situation or injury, severe car accident, victim of a terrorist incident, having had a life-threatening illness, victim of a serious crime, parents or caregivers went through an important financial collapse, a close acquaintance performed a suicide attempt, drug or alcohol use problems, sexual assault. This questionnaire was answered on a yes/no basis and the date of the exposure was noted.

The number and severity of PTSD symptoms were assessed using the basic version of the UCLA PTSD Index for DSM-IV (child version) [34]. This is a 17-item self-report questionnaire, used in the assessment of PTSD and traumatic stress in children. Respondents indicate how frequently they experience a symptom using a 5-point Likert scale ranging from never experienced (0) to experienced very often (4). A Cronbach's alpha score of 0.90 was reported and test-retest reliability ranged from good to excellent [35]. Internal consistency of the Sinhalese version was similarly highly satisfactory (Cronbach's alpha = 0.82). A categorical measure of probable PTSD was constructed by assessing whether the reported symptoms met the criteria required for a DSM-IV diagnosis. A score of at least 3 was necessary for an item to be considered both as symptom criterion for probable PTSD and a distinct symptom of traumatic stress.

Subjective functional impairment was measured using the sum of 7 items derived from the Child Diagnostic Interview Schedule [social relationships, school performance (effort and marks), family relationships, chores at home, and after-school activities] [36]. Ratings were based on a 5-point scale ranging from 1 (not at all impaired) to 5 (very much impaired). Cronbach's alpha for the scale was 0.73.

Somatic complaints related to terrorism were assessed using 5 yes/no categorical items from the Diagnostic Predictive Scales [36] that included stomach, respiratory problems, headaches, sleeping problems, excessive eating or appetite loss and 'other problems'. Cronbach's alpha for the scale was 0.64.

Hope was assessed with a 6-item self-report questionnaire assessing children's dispositional hope [37]. Cronbach's alpha for the scale was 0.64.

Depression was measured with the 7-item brief Beck Depression Inventory (BDI) [38]. This self-report measure shortens the BDI without loss of reliability or validity [39]. The items are scored from 0 to 3; higher scores indicate increased depression. Beck et al. [39] reported that the long form and the 7-item version correlate at 0.90. Cronbach's alpha of the scale in our sample was 0.72.

Intervention

The intervention ES-SL is a classroom-based program designed to help children cope with the threat and the exposure to disaster and trauma [32, 40, 41]. This program provides psychoeducational material, cognitive-behavioral skills, meditative practices and bio-energetic exercises as well as processing traumatic experiences by utilizing art therapy and narrative techniques. Perhaps most important and unique for this intervention, it incorporates home assignments thereby attempting to actively involve the children's caregivers. The program was adapted to the Sri Lankan context in two phases. A few months prior to the current study, we applied the intervention on 37 mental health volunteers [41] and worked in different schools and refugee camps with convenience samples of children. Based on this experience, we created a work group of several Sri Lankan professionals familiar with the population in the region that helped us adapt our Israeli version of the program to both the culture and the local context.

The twelve 90-min sessions (18 h) included homework review, warm-up exercises, experiential group activity, psycho-educational presentations, practical coping skills training, and a closure exercise followed by a new home assignment. Each class included 12–16 pupils. The students' sessions started on a weekly basis immediately following the teachers' training. The content of each session is presented in figure 1. Previous interventions with teachers and a pilot intervention with children showed the program to be easily learned by teachers, coherent, feasible and applicable to students aged 6–18 years [41, 42].

Teacher training was administered to all 12 homeroom teachers in 3 days of 8-hour training sessions (24 h) for the ES-SL course. Each of the teachers was responsible for one class only. Six of the 12 teachers were asked to apply the protocol without the assistance of the trainers in their classes, in accordance with the manual, and the other half were asked not to apply the training at this point in time, but instead to have religious classes at the same time.

In order to prevent potential spillover effect due to the fact that all 12 homeroom teachers received the ES-SL training, we encouraged the teachers in the control classes to refrain from applying the program until the following year. Throughout the application of the program, teachers were supervised on a weekly basis by two local mental health professionals previously trained by the researchers [41] to insure program fidelity. During the first two sessions of the intervention, all teachers in the active group participated in two 3-hour supervisory sessions delivered by the trainers and assisted by two local mental health professionals to insure reliability of application of the protocol and to overcome potential problems. Adherence to protocol was monitored during these sessions which included a point-by-point discussion of the training procedure by the trainers. Because the trainers could not remain in Sri Lanka for the entire intervention period, further fidelity was monitored by the local professionals and by periodic phone and Internet supervision with the first author (R.B.).

Data Analyses

The ES-SL and WL groups' pretest scores (baseline) on demographic, exposure and clinical variables were compared using univariate analysis. To assess treatment effect we used a mixed-design repeated-measure ANOVA with the intervention as the between-group factor and time as the within-group factor. Further tests were performed to assess the interaction of time and group with gender and grade level as between-subject factors, as well as covariance analyses with initial baseline measures as covariants. We did not use a nested design as this would have sig-

Session 1 – Getting Started: Introducing group leaders, participants and the program. Presenting an overview of the program and setting ground rules. Describing the stress continuum in an interactive format

Session 2 – Strengthening Your Personal Resources: Identifying students' personal resource profiles and providing them with new coping skills. Students will learn how to enhance their coping repertoire via a resourcing model (the M-O-S-T B-A-S-I-C model)

Session 3 – Inhabiting Your Body: Learning the role of the body and its function during stress, becoming aware of somatic reactions pertaining to stress and developing sensory-motor strategies to control the body during stressful situations

Session 4 – Knowing Your Feelings: Enhancing students' emotional awareness, identifying and clarifying feelings and becoming aware of the connections between sensations and feelings. Learning various modalities to express feelings

Session 5 – Controlling Your Emotions with Your Mind: Exploring relationships between sensations, thoughts and feelings and learning cognitive coping skills

Session 6 – Dealing with Fears: Normalizing fears and learning new ways to deal with them and to create an inner sense of safety

Session 7 – Dealing with Anger and Rage: Confronting anger and rage and expressing them in a controlled manner. Learning and practicing assertiveness

Session 8 – Coping with Grief and Loss: Exploring grief and loss experiences and providing an opportunity to express these feelings within a safe context

Session 9 – Building a Social Shield: Exploring social needs and ways to strengthen our support system. Learning to ask for help and to become more emphatic

Session 10 – Boosting Your Self-Esteem: Exploring self-image and the way it impacts our coping styles. Learning to accept deficits and acknowledge strengths

Session 11 – Turning Crisis into an Opportunity: Becoming aware of negative thought patterns and learning how to reframe them positively

Session 12 – Seeking a Better Future: Exploring future dreams and fantasies and learning how to build a plan toward achieving them. Reviewing the program and providing an opportunity for closure

Fig. 1. Program description of ES-SL.

nificantly reduced the power of the analysis, because the classes were small and because we subsequently did not find any differences in change scores between the classes on any of the outcome measures within the ES-SL or the control procedure. No intent-to-treat analyses could be performed as we had no data regarding students that did not participate in the intervention, and did not complete baseline questionnaires, and secondly because we had no dropouts among those who completed the questionnaires. There were no missing data.

Results

Description of the Population

There were 35 (41.7%) females and 49 (58.3%) males in the ES-SL group and 44 (56.3%) females and 38 (43.7%) males in the WL group. There were 12–16 students in each of the ES-SL or WL classes. Sixty-nine (82.1%) of the ES-SL group and 70 (85.4%) of the WL group had been present and physically hurt during the tsunami; 12 (14.3%) of the ES-SL group and 8 (9.8%) of the WL group were present during the tsunami, but were not hurt; 3 (3.6%) of the ES-SL group and 4 (4.9%) of the WL group were not personally exposed to the tsunami. Fifty-six (66.7%) of the ES-SL group and 44 (53.7%) of the WL group knew someone close who had died due to the tsunami; 15 (17.9%) of the ES-SL group and 30 (36.3%) of the WL group knew someone close who was physically hurt during the tsunami; 9 (10.7%) of the ES-SL group and 6 (7.3%) of the WL group knew someone close who was present during the tsunami but was not hurt; only 3 (3.6%) of the ES-SL group and 4 (4.9%) of the WL group knew no one close who was personally exposed to the tsunami. No differences between the ES-SL experimental group and the WL control group were found for gender, grade level and personal or important other exposure to tsunami. A majority of the children had been physically hurt and had close family members or friends who died during the tsunami. 89.2% had been exposed to a major traumatic incident not related to the tsunami. Further analyses show no difference in outcome measures at the first assessment between the ES-SL and WL groups (table 1).

Treatment Effects

Table 1 shows the mean scores for each of the outcome variables at the first and second assessment by group (ES-SL vs. WL). PTSD severity, functional problems, somatic complaints, depression and hope scores were all significantly improved in the ES-SL group compared to the WL group. In addition, 23/28 probable PTSD cases in the ES-SL group improved and could no longer be classified as probable PTSD, compared to 6/26 in the WL group. No new probable PTSD could be observed in the second assessment in the ES-SL group, but 3 new cases of probable PTSD could be found in the WL group at post-measure-

Table 1. Comparison of the ES-SL (n = 84) and WL groups (n = 82) on PTSD symptom severity, functional problems, somatic complaints, and BDI at the first and second assessment 2 months after the 12-week trials

Measures	First assessment	Second assessment	Main effect for time F(1, 164)	Main effect for group F(1, 164)	Interaction time × group F(1, 164)
PTSD severity (0–68)					
ES-SL	44.94 ± 8.7	36.21 ± 7.4	107.84***	28.73***	53.52***
WL	47.23 ± 7.2	45.71 ± 7.5			
Functional problems (7–35)					
ES-SL	11.29 ± 3.9	8.58 ± 2.4	59.50***	12.14***	40.73***
WL	12.05 ± 4.7	11.79 ± 4.0			
Somatic complaints (0–5)					
ES-SL	1.46 ± 1.0	0.64 ± 0.7	16.90***	4.53*	44.80***
WL	1.26 ± 1.0	1.45 ± 1.3			
Hope (6–36)					
ES-SL	17.07 ± 3.4	23.49 ± 4.1	447.87***	38.08***	54.46***
WL	15.89 ± 2.6	19.00 ± 2.7			
Beck depression (0–21)					
ES-SL	4.44 ± 3.2	2.55 ± 2.3	48.90***	0.71	23.55***
WL	4.04 ± 3.3	3.70 ± 3.0			
			Statistics[a]	d.f.	p
Probable PTSD					
ES-SL	28 (33.3)	5 (6.0)	$\chi^2 = 14.02$	2	0.001
WL	26 (31.7)	23 (28.1)			

* $p < 0.05$; *** $p < 0.001$. Figures in parentheses are percentages.

[a] A differential score was calculated to assess the trajectory of change regarding probable PTSD over the two measurements: improvement, no change and worsening. χ^2 analysis was performed comparing ES-SL and WL groups on these trajectories.

ment. A χ^2 analysis of the differential score (a 3 × 2 improvement-no change, worsening × experimental status) showed this to be a significant effect. No interactions were observed between gender and age and any of the outcome measures. A covariance analysis with baseline measures as covariance on each outcome measure also showed a distinct time × group × baseline interaction for PTSD severity ($F = 65.24$; $p < 0.001$), depression ($F = 58.08$; $p < 0.001$), somatic symptoms ($F = 51.62$; $p < 0.001$), functional problems ($F = 132.00$; $p < 0.001$) and hope ($F = 35.67$; $p < 0.001$). Pearson correlation within the ES-SL group showed that higher scores at baseline were highly related with the differential scores (second assessment – first assessment) on the PTSD severity scale ($r = 0.70$), the depression scale ($r = 0.72$), the somatic scale ($r = 0.71$), the functional problem scale ($r = 0.67$) and the hope scale ($r = 0.56$). In addition, students with probable PTSD reduced their posttraumatic symptomatology more so than those without PTSD [$t = 2.8$; mean reduction in children with PTSD = –11.93 (SD = 7.60); mean reduction in children without PTSD = –7.10 (SD = 7.35); $p = 0.006$].

Discussion

The study has both limitations and strengths. First, we could not evaluate whether the short-term impact was maintained over time. Second, not all measures were standardized, nor did we assess students' functioning using more objective data. Third, our results may not be generalizable to other schools and regions in Sri Lanka. Fourth, there may have been a spillover effect since all the homeroom teachers participated in the training. Conversely, this study has significant strengths including a quasi-randomized design within a naturalistic setting,

the use of a structured program, clearly defined target outcomes and a comprehensive reliable and valid assessment battery. Despite these limitations, our results illustrate that students with prior traumatic background who were exposed to the tsunami and who received the ES-SL intervention reported significant reductions on all outcome measures compared to the control group. None of the students in the active group showed significant symptomatic worsening, suggesting that the intervention had no detrimental effect. Additionally students with higher levels of symptomatology profited most from the intervention. Consistent with other studies [42, 43], this indicates that skill-focused and present-oriented interventions may be helpful in alleviating posttraumatic symptomatology. Research is warranted to evaluate the conditions under which present-oriented skill-based interventions or past-oriented exposure-based interventions should be employed.

There is growing recognition that schools should play a central role in identifying traumatized children and in providing mental health services following traumatic events [44]. Given the fact that universal approaches are more accessible, feasible and affordable and that they can be easily learned and implemented by teachers [45], this approach may be an important venue in providing public mental health services for traumatized children in general and in developing countries in particular.

As in previous studies [24, 42, 45], our results suggest that even after implementing an effective school-based intervention, some students may continue to need individualized treatment. A two-stage approach in dealing with trauma-exposed students, namely, starting with a universal intervention followed by targeted specialized interventions for those who still suffer from posttraumatic distress may thus be warranted.

Our study also illustrates the importance of adapting a psychosocial program constructed in a different culture to the needs, priorities and cultural character of local communities [21, 46–48]. We spent a great deal of effort exploring how emotions are transmitted and processed, how views are expressed and how rituals regarding emotional pain, mourning and death are manifested in the Sri Lankan society. For example, in sessions dealing with various negative feelings, we changed some of the experiential exercises emphasizing more body processes because we were informed that this is a more accessible mode of emotional expression [49]. We also incorporated in the program spiritual and religious practices such as meditation and prayers. Instead of utilizing CBT confrontational techniques such as 'challenging negative thoughts' or 'stop thinking', we employed the Buddhist belief of accepting and making peace with one's destiny. Likewise, we adapted the Buddhist view of disaster, trauma and loss and framed it as being a natural human experience, which should be gracefully accepted [50, 51]. This approach is in concordance with recent studies demonstrating the value of incorporating mindfulness in the treatment of physical disorders modulated by stress [52–54], anxiety disorders [55] and child behavior problems [56]. Finally, we learned that within the Sri Lankan culture acknowledging one's strengths in public and utilizing self-affirmation are considered ostentatious. We, therefore, had to balance our tendency to encourage children to take pride in their strengths with acknowledging their weaknesses, as well as teach them how to indirectly elicit compliments from others.

In sum, his study shows that a universal school-based intervention may be significantly helpful in mitigating trauma-related symptoms in children aged 9–15. The evident lack of trained mental health workers in developing countries [57], the urgent need to develop interventions for disaster-traumatized populations [58] coupled with the tendency of victims, particularly children and adolescents, not to seek psychosocial services [44, 57, 59, 60] has limited governments' capacities to provide much needed psychosocial support for their citizens. Community-based preventive programs such as ES-SL should play a central role in providing mental health services and identifying traumatized children following traumatic events [44, 61] in need of targeted interventions [62, 63].

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