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Brief report

Posttraumatic reactions among injured children and their caregivers 3 months after the terrorist attack in Beslan

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Abstract

This report describes symptoms of posttraumatic stress disorder (PTSD) among a group of Beslan's children ($N=22$) and their primary caregivers ($N=20$) 3 months after the children had been taken hostage in their school by a group of terrorists. Attention and memory were also measured. Children and their caretakers showed high levels of ongoing PTSD symptoms. Children also showed difficulties in sustaining attention and in short-term memory (digit span). These scores strongly indicate the need for appropriate interventions and ongoing monitoring of course of recovery.

Keywords: Terrorism; Trauma; Cognitive functioning

1. Introduction

On September 1, 2004, a group of terrorists attacked School Number 1 in Beslan, Russia, where 1300 children and adults were attending a party for the opening of the school year. The terrorists took children and parents hostage for 3 days, where they were denied water, food and medication. Other parents and relatives stood nearby the school, heard the shooting, and witnessed corpses being thrown out from the school building. The ordeal ended when the terrorists exploded widely dispersed mines, collapsing part of the school, and prompting the army to intervene. Of the 330 people killed, 186 were children.

This is a pilot study providing information about the effects of this terrorist attack on the children and caregivers' mental health measured 3 months after the attack. In addition, children's cognitive deficits regarding digit span memory and attention have been measured.

The scant literature on children's reactions to terrorism identifies four main aetiological and risk factors for developing posttraumatic stress disorder (PTSD) (La Greca et al., 2002; Gurwitch et al., 2002): (1) the aspects of traumatic exposure, (2) the pre-existing characteristics of the child, (3) the child's psychological resources, and (4) the characteristics of the postdisaster environment. Each factor is defined by several components; we report here some examples of relevance for this study. The first factor includes the physical proximity to the disaster and perceived threat to life: research after the terrorist attack of September 11 in the United States showed that children's reactions varied in severity according to direct

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exposure, exposure to someone who was involved in the attack, and watching it on TV. In particular, higher levels of exposure corresponded to a higher prevalence for all probable anxiety/depressive disorders; the logistic regression analyses showed that the child's exposure and the exposure of a child's family member were the most related to increased likelihood of probable anxiety/depressive disorders (Hoven et al., 2005; Pynoos et al., 1987). Another example is represented by the loss of significant others: one year after the Oklahoma City bombing, elementary students had clinically significant levels of posttraumatic stress symptoms, with higher levels of symptoms among those children who had a family member or relative injured or killed during the bombing (Pfefferbaum et al., 1999). The second factor includes, for example, age; responses to trauma have been shown to depend in part on the child's age and level of psychological maturity; as a matter of fact, knowledge and language abilities influence children's understanding and appraisal of traumatic events (Salomon and Bryant, 2002). The third factor includes, for example, children's coping skills or their communication abilities. The last factor regarding the postdisaster recovery environment includes, for example, the parental response. Children's responses to violent events and their ability to cope are influenced by their parents' responses to trauma; a supportive parent has been demonstrated to be one of the most important factors contributing to a less severe form of PTSD (Allwood et al., 2002; Gurwitch et al., 2002). It has also been shown that there is a positive correlation between the symptoms of the child and those of the parent (Bryce et al., 1989).

Furthermore it is useful to reference a couple of the studies that recently took place regarding the early assessment of trauma-exposed children. Even after a short event and even if they are not directly exposed, school-aged children can develop negative reactions (Phillips et al., 2004) and high rates of PTSD that follow a protracted course. Seven weeks after the attack, children that were at school during the Oklahoma City bombing presented levels of distress symptoms related to the degree of exposure to the event (Pfefferbaum et al., 1999). Two months after they were taken hostage in their school, children reported high levels of PTSD symptoms that decreased gradually between 2 and 4 months. All symptoms except intrusion scores were significantly lower 7 months after the traumatic event (Vila et al., 1998).

In the attack in Beslan, terrorism was specifically directed towards children in their natural setting — the school. These children were exposed to a highly traumatizing event that lasted for 3 days and involved them as the principal target but also the entire community. All of the children in our study experienced a high degree of trauma during the siege and additional distress in the weeks after it due to injuries. We expected that most of the children would report numerous PTSD symptoms, as would their primary caregivers. Cognitive functioning, measured by performance on neuropsychological instruments has not been extensively studied in traumatized children, but significant deficits in attention and memory have been found in children with PTSD symptoms (Beers and De Bellis, 2002). Very little is known about children who survived terrorism, but we expected to find some cognitive impairment in Beslan children due to the severity of their experience.

2. Method

2.1. Participants

Participants in this study included 42 subjects (22 children and 20 of their primary caregivers) selected because a trip in Italy was offered to them to recover from the trauma. All 22 children (13 boys and 9 girls) had been hostages in the school. Their ages ranged from 6 to 14 with mean of 9.36 (SD = 3.17). All children had spent 1–2 months at a pediatric hospital, where they were treated for injuries received during the attack. The children had undergone repeated surgery, mainly due to mine fragments that had caused severe damage. They had injuries that were established by health care professionals to be of a medium severity level; thus, the group was fairly homogeneous in regard to their physical condition and medical treatment. None of the children were on medication known to influence cognitive functioning at the time of the assessment.

The caregivers had a lower level of exposure since they were not inside the school during the assault; all of them stood outside the school observing the siege.

2.2. Procedure

This study was conducted 3 months after the terrorist attack. Subjects were recruited during a 40-day stay in Trento, Italy, organised by an Italian non-governmental agency operating in the Russian Children's Clinic and Hospital of Moscow. Assessments included semi-structured interviews with parents lasting about 90 min, and neuropsychological testing of the children.

2.3. Instruments

The UCLA Posttraumatic Stress Disorder Index for DSM-IV-TR (Revision 1, Parent Version) by Stein-

berg et al., (2004) was used to interview the primary caregivers in order to assess the children's trauma. The instrument is divided into two main sections: the first is composed of 27 items aimed at identifying the severity of the traumatic experience, for criterion A. The second is composed of 21 items designed to assess posttraumatic stress reactions of children. The frequency of occurrence of each symptom is rated on a 5-point scale ranging from "none" (0) to most of the time (4). Scores for the B (Intrusion), C (Avoidance), and D (Arousal) categories as defined in DSM-IV-TR are derived by grouping items related to these categories and calculating the mean item score for each symptom category.

Children were not interviewed directly because they were still highly shocked, and not enough time had passed since the siege. More specifically parents would not allow us to ask their children about the recent trauma. Primary caregivers also reported on their own levels of symptoms following the same instrument used for children. Both measures were observer rated. Interviews were simultaneously translated from Italian to Russian and back by a professional interpreter.

Seventeen school-aged children were tested using the WISC-R digit memory span (Rubini and Padovani, 1986) and the Attention Bell Test (Biancardi and Stoppa, 1997). The first is a simple digit memory span test with a sequence of numbers to be memorized forward and backward. The second test is an attention test composed of four sheets of paper, each containing one-dimensional scattered figures of several objects (e.g. bell, apple, tree). The child is asked to find as many bells as he can in a fixed time for each sheet (30, 60, 90, 120 s). A score on attention rapidity is given on the basis of the number of bell recognized in the 30-s sheet, while the attention accuracy score depends on the 120-min sheet.

Informed consent was obtained from all caregivers, and children gave their assent to participate in the study.

3. Results

Table 1 presents the mean PTSD scores for children and their primary caregivers. According to previously published guidelines (Pynoos et al., 1993), six children (27.3%) had a moderate level of PTSD (scores from 25 to 36). The remaining 16 children (72.7%) scored in the severe range (scores from 40 to 59). Six caregivers (30.0%) had a moderate level of PTSD (scores from 31 to 39), and the remaining 14 (70.0%) had PTSD scores in the severe range (scores from 40 to 70). The mean score for children was 44.23 (SD = 10.29). The mean score among caregivers was 41.79 (SD = 12.73). Using cut-off scores established for a structured diagnostic interview (Steinberg et al., 2004), 17 children (77.3%) met full diagnostic criteria for PTSD and the remaining five (22.7%) met criteria for sub-clinical PTSD as criteria A, B and D were all met. These five children suffered from fewer than avoidance symptoms. Nineteen caregivers (95%) met full diagnostic criteria for PTSD; all the remaining caregivers met criteria for sub-clinical disorder.

Table 1
Mean severity of PTSD symptoms in 22 Beslan's children survivors and in 20 primary caregivers

Symptom	Range	Child severity	SD	Adult severity	SD
Trauma (A)	0–17	13.05	.23	10.79	1.87
Intrusion (B)	0–5	12.63	5.11	12.05	2.78
Avoidance (C)	0–7	7.41	1.33	10.35	4.69
Arousal (D)	0–5	11.14	3.62	8.60	3.39
TOTAL	0–34	44.23	10.29	41.79	12.73

A Wilcoxon test revealed that the children had significantly more severe exposure (criterion A) than their caretakers ($Z = -3.81$, $P < 0.0001$). No other significant differences were found. Spearman's correlations did not reveal any significant association between child and caregiver for PTSD scores in any of the four criteria. As compared with the standardized scores, Beslan's children could sustain attention normally for 30 s (mean of detected items in the normative population = 12.17, SD = 2.20; mean of detected items in Beslan's children = 11.05, SD = 3.22) but had difficulties in sustaining attention for 2 min (Mean of detected items in the normative population = 31.29, SD = 3.35; mean of detected items in Beslan's children = 26.79, SD = 5.74; Wilcoxon $Z = -3.58$, $P = 0.0001$). Also their short-term memory was significantly below average (Wilcoxon $Z = -3.42$, $P = 0.001$). Beslan's children were able to recall a mean of five digits (SD = 1.41) against the normative performance of seven (SD = 2) for school-age children (standardized measure). A negative correlation, corrected by age, was found between the children's ability to sustain attention and their score on the number of avoidance symptoms, both for the 30-s task ($r = -0.496$, $P = 0.043$) and for the 2-min task ($r = -0.570$, $P = 0.017$). The same relation was found between the ability to sustain attention for 2 min and the score obtained for the arousal criterion ($r = -0.525$, $P = 0.030$).

4. Discussion

The three main contributions of this pilot study are as follows: First, it indicates that injured children and

their caretakers have high levels of PTSD symptoms 3 months after a catastrophically violent hostage terrorist attack. These children have also undergone extensive medical treatment and rehabilitation, which may have constituted an additional contributing factor. It is worth emphasizing that even if, as commonly happens in pediatric populations (Aaron et al., 1999), part of the children of our sample did not meet criteria for a full diagnosis of PTSD, Carrion et al. (2002) demonstrated that children with subthreshold criteria did not differ significantly from children meeting all three cluster criteria with regard to impairment and distress. Second, although caregivers had less exposure to the traumatic event than their children (criterion A) since they were not in the school, caregivers and children had the same overall level of PTSD symptoms — thus indicating that terrorism affects the whole family even when only the children are under attack. Third, Beslan's children showed neuropsychological impairment 3 months after the attack in basic attention and memory processes. These results indicate the necessity for an early assessment of traumatized children's possible impairments in working memory and sustained attention because they are likely to affect children's response to psychotherapy and, in time, also school performance (Beer and De Bellis, 2002). It might be worth mentioning that this is the first study to investigate neuropsychological deficits associated with PTSD in children following the same sequence of traumatic events as opposed to multiple kinds of traumas.

Due to a number of limitations, these results must be viewed with great caution. The small sample size must be taken into consideration as well as the fact that the children not only experienced a traumatic event but also underwent medical procedures. However, this last aspect may help to generalize these results to a population that experiences trauma and secondary trauma.

We must underline that there is a need for ongoing monitoring of the course of recovery in these children and in their caretakers. We have planned a further data collection in Beslan that will allow us to extend the investigation in a much larger sample of children and to do further interviews at 1 year from the first sample.

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