

Posttraumatic Phenomena in a Longitudinal Study of Children Following a Natural Disaster

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Abstract. This longitudinal study examined the prevalence of posttraumatic phenomena and how they relate to symptomatic and behavioral disorders in a population of schoolchildren exposed to an Australian bushfire disaster. The prevalence of these phenomena did not change over an 18-month period, suggesting that they were markers of significant developmental trauma. The mothers' responses to the disaster were better predictors of the presence of posttraumatic phenomena in children than the children's direct exposure to the disaster. Both the experience of intrusive memories by the mothers and a changed pattern of parenting seemed to account for this relationship. *J. Amer. Acad. Child Adol. Psychiat.*, 1987, 26, 5:764-769. **Key Words:** posttraumatic disorders, disasters, parenting, life events stress, imagery.

The effects of extreme adversity, such as disasters, on children's psychological development can be viewed from several perspectives. First, children may develop psychiatric symptoms or behavioral disturbances (Burke et al., 1982; Ziv and Israeli, 1973). These may be documented using questionnaires and structured interviews and are therefore the favored focus of epidemiologists. Alternatively, nightmares and recurrent memories of the traumatic event as well as play centered on the trauma may indicate attempts to master the experience (Newman, 1976; Terr, 1979). The clinical method has been the main avenue for investigating these posttraumatic phenomena. For example, Terr has extensively studied the victims of the Chowchilla school bus kidnapping using this technique (Terr, 1979; 1981a). Thus the first method has focussed on readily observable disturbances, whereas the second has investigated the psychodynamic process of adaptation in the child, which is more difficult to document reliably, although it is an equally valid determinant of the child's long-term adjustment (Newman, 1976).

Terr (1981a) has emphasized that there are a number of overt posttraumatic phenomena that are indicative of children's failure to adapt to a traumatic event. Clinicians have long noted such phenomena in children observed to be clinically disturbed after a traumatic event (Bloch et al., 1956; Bodman, 1941; Carey-Trefzer, 1949) but have not systematically studied their relationship to symptom formation. Examination of this association is important for three reasons.

First, the clinical significance of symptoms experienced after extreme adversity may be quite different from those observed in a normal clinical setting (McFarlane, 1985). For example, most reports of children exposed to threat of death (e.g., by bombing or shelling in war) indicate that there is apathy or decreased activity (Dunsdon, 1941) and no evidence of increased anxiety or panic (Ziv and Israeli, 1973). Hence such children could score low on most symptom counts

despite their difficulties. Therefore, the study of posttraumatic phenomena may be a valid and sensitive measure of the effects of psychic trauma on children, in addition to observations of symptomatic disorder.

Second, whereas Davidson et al. (1985) have suggested that a concurrent psychiatric disorder can intensify posttraumatic imagery, Horowitz (1973) and others (Brett and Ostroff, 1985) have emphasized the important role that posttraumatic phenomena play in the etiology and maintenance of symptoms after exposure to extreme adversity. Therefore, the possible reciprocal association of posttraumatic phenomena with symptom formation in children after a natural disaster is likely to be of particular interest in assessing levels of morbidity caused by such an event and the etiological process involved.

Third, investigation of the etiology of posttraumatic phenomena in children exposed to extreme adversity could help clarify the mechanisms of symptom formation in such settings. Previous research suggests several possibilities. The indirect effect of the parents' reaction to the trauma has previously been noted to be of primary importance (Ziv and Israeli, 1973). Rosenbeck and Nathan (1985), for example, described a child who developed the same posttraumatic imagery as his Vietnam veteran father when the child had obviously never been exposed to the war. Similarly, one child who has been exposed to a traumatic event can trigger posttraumatic behavior in unexposed children by involving them in posttraumatic play that powerfully depicts the repeat anxiety of the trauma (Terr, 1981b).

Parents could convey this anxiety to their children by becoming overprotective, a common parental response in disaster (Silber et al., 1958) and concentration camp victims (Phillips, 1978). Thus, parents' ability to contain the anxiety generated by an extreme threat may be the major factor influencing their children's responses.

Against this background, this project aimed to investigate longitudinally the psychological morbidity in a population of primary school children who were exposed to an Australian bushfire disaster. In this paper, the prevalence of posttraumatic phenomena and their relationship to symptoms and behavior problems are reported. The determinants of these posttraumatic phenomena are also examined.

In particular, it was hypothesized that posttraumatic phenomena in children would be related more to posttraumatic morbidity in their parents and overprotective parenting than to the direct effects of the disaster, such as property loss, bereavement, or the physical threat of death or injury. Chil-

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dren who were separated from their parents in the first 3 days after the fire were hypothesized to be at risk of having a greater degree of preoccupation with the disaster in the long run, because parents play a major role in the containment of children's distress immediately after extreme trauma.

Method

The Sample

This project aimed to study all the children from one well-demarcated area devastated by bushfire on February 16, 1983. In this region, 120,000 hectares of agricultural and planted forest lands were burnt, 200,000 stock were killed or destroyed, 14 people died, 40 homes were destroyed, many others were damaged, and 359 farming properties were fully or partially devastated. The fire was extremely intense; flames 800 feet high were measured and the cyclonic strength winds snapped the trunks of mature radiata pines.

The sample consisted of 808 children who attended the 6 state primary schools serving the region. All but one school had been physically threatened during the fire. The children were studied on three separate occasions, 2, 8, and 26 months after the fire. The complete sample was not studied on each occasion, with two schools not being examined in the third stage ($N = 365$). The sampling procedure is described in more detail elsewhere (McFarlane et al., 1987).

Questionnaire

The parent and teacher questionnaires, developed and validated by Rutter and associates (Rutter et al., 1970; Rutter and Graham, 1967), were administered on each occasion. These instruments were chosen because they had been previously validated in an Australian rural setting (Connell et al., 1982). In the 8- and 26-month stages, a further 4 and 3 questions, respectively, were added to the parent and teacher questionnaires inquiring about posttraumatic phenomena. They were scored in the same way as the other items of the questionnaires (*doesn't apply*, *applies somewhat*, *certainly applies*). The last two replies were interpreted as meaning that the phenomena were present. The items were selected on the basis of observations of previous reports (Bloch et al., 1956; Bodman, 1941; Carey-Trefzer, 1949; Newman, 1976; Terr, 1979; Terr, 1981a) during the first stage of the project and reports of parents in another clinical setting (McFarlane, 1986). In the parents questionnaire, the items were: 1. *Has dreams or nightmares about the fire*, 2. *At times plays games about the fire or paints pictures about it*, 3. *Is upset or worried by reminders of the fire* (e.g., sirens, strong winds, etc.), 4. *Spontaneously talks about the fire*. In the teachers questionnaire, items 2 and 3 were combined to read, *Continues to play, talk, or paint about the fire*. These questions had established face validity.

To investigate the reliability of these items, all the teachers were interviewed when the 8-month questionnaires were collected, and problems about these items were discussed. In summary, affirmative responses appeared to be highly reliable, but there was potential for a substantial false negative response, because teachers may not have been aware of some of the children's experiences.

The 2-month questionnaire also included 31 questions that

recorded the extent of personal and property losses, exposure of the child and parents to the fire, the duration and nature of the separation between the children and parents during and after the fire, as well as the nature and site of temporary accommodation. The 8- and 26-month questionnaires documented the continuing impact of the disaster on the parents and their livelihood. The extent of reconstruction, parental attitudes to losses, intrusive thoughts and memories about the fire, family functioning (measuring irritability and withdrawal), (McFarlane, 1987), and overprotectiveness toward the children were recorded. The details, scoring, and raw data of these items are to be reported in more detail elsewhere. At 26 months, the parents were asked to record whether any of 14 life events likely to have an effect on the children's adjustment had occurred in the past 18 months. These items were taken from a children's life events inventory (Monaghan et al., 1979). For analytical purposes, the number of life events was added with no weightings, a method shown to be acceptable in other life events research (Tausig, 1982).

Statistical Method

To investigate the effect of time on the prevalence of posttraumatic phenomena, the mean score for the individual items and total scores on the parent and teacher scales were compared at 8 and 26 months using paired t tests. The relationship between posttraumatic phenomena and symptoms was then investigated using several methods of analysis.

First, the prevalence of posttraumatic phenomena in children defined as "cases" was compared with those who were not cases at 8 months, as defined by the Rutter questionnaire (Table 2).

Next, the nature of continuous relationship between symptoms and posttraumatic phenomena was examined, using Pearson product moment correlation coefficients (Tables 3 and 4) and step-wise multiple regression analysis.

The longitudinal relationship between the emotional and behavioral phenomena observed at 2 months and subsequent posttraumatic item scores was then examined using cross-lagged correlational analyses. This allowed an investigation of the degree to which posttraumatic phenomena observed in close proximity to a disaster might predict subsequent emotional and behavioral problems, an important test of the etiological role these phenomena might play in the onset of psychiatric impairment.

The etiological association among the children's experience of the disaster, its effects on their parents and families, and the children's posttraumatic phenomena observed by the parents was next examined using Pearson's product moment correlation coefficients (Table 5). Multiple regression analysis was then used to examine these etiological relationships in more detail because of the interdependence of many of the disaster related variables. All the variables listed in Table 5 were included in the regression equations according to the time period being investigated. Only those variables that loaded significantly in the regression analysis are reported ($p < 0.05$).

The data were analyzed using the Statistical Package for the Social Sciences (SPSS Inc., 1983), and a probability level of less than 0.05 was taken to be significant.

Results

Sample Characteristics

The mean age of the 808 children was 8.2 years (S.D. = 2.2), 52.8% were boys, and 94.1% of the parents were married. The impact of the disaster on these children's families was substantial: 32% (150) had sustained property damage; 25% (118) of fathers, 13% (60) of mothers, and 8% (37) of the children had had an intense exposure to the fire or come close to death; 27% (128) were bereaved; and 25% (118) of the children had been separated from their parents for up to 3 days after the fire.

Return rates of 43.2%, 57.6%, and 55.5% were obtained on the parents' questionnaires at 2, 8, and 26 months, respectively. No significant sampling bias was found to exist when comparing the teacher scores for children whose parents responded with the scores for nonresponders (McFarlane et al., 1987).

Prevalence of Posttraumatic Phenomena

The prevalence of posttraumatic phenomena in these children at 8 and 26 months is shown in Table 1. The prevalence had not decreased in this period as measured by either the parent total (paired $t = 0.15$, $p = 0.8$) or the teacher total (paired $t = 0.34$, $p = 0.7$).

Relationship of Posttraumatic Phenomena to Symptoms

The prevalence of posttraumatic phenomena in children defined as cases by the parent and teacher Rutter questionnaires is shown in Table 2. With one exception, posttraumatic phenomena were more common in children defined as cases. This was not so for the prevalence of posttraumatic phenomena rated by the parents in children defined as cases by the teacher questionnaire ($t = 1.90$, $p = 0.07$).

The correlational relationships between emotional/behavioral problems and posttraumatic phenomena are reported in Table 3 for the parent items and in Table 4 for the teacher items. The parent posttraumatic items correlated very significantly with the parents' symptom scores both cross-sectionally and longitudinally (Table 3). However, the 8-month total symptom score did not correlate with the 26-month posttraumatic item score ($r = 0.10$, $p > 0.05$).

In contrast, the 8-month posttraumatic items as scored by the teachers did not significantly predict the 26-month teacher symptom score ($r = 0.01$, $p > 0.05$, Table 4), whereas the 8-month teacher symptom score was highly correlated with the 26-month posttraumatic item score ($r = 0.60$, $p < 0.001$). A high degree of cross-sectional association existed (Table 4).

Using multiple regression analysis, 8 months after the disaster, the parent symptom scores accounted for 19% of the variance of the posttraumatic phenomena, whereas this had

TABLE 1. Prevalence of Posttraumatic Phenomena and Rutter Parent and Teacher Scores at 8 and 26 Months After Disaster

	8 Months		26 Months	
	Mean (S.D.)	Frequency Percentage	Mean (S.D.)	Frequency Percentage
No. of subjects with parent questionnaires	N = 467		N = 241	
Total parental posttraumatic	1.26 (1.67)	52.8%	1.4 (1.72)	57.2%
Dreams	0.16 (0.44)	12.9%	0.21 (0.47)	18.4%
Games	0.16 (0.44)	13.3%	0.11 (0.34)	9.8%
Reminders upset	0.44 (0.65)	34.9%	0.65 (0.76)	47.4%
Talks about	0.51 (0.65)	43.1%	0.44 (0.64)	35.9%
Rutter Parent score	6.9 (6.2)	-	7.6 (6.7)	-
No. of subjects with teachers questionnaire	N = 719		N = 309	
Teacher total	0.43 (0.94)	29.5%	0.41 (0.77)	26.3%
Plays, talks	0.07 (0.22)	6.1%	0.02 (0.13)	1.6%
Dreams	0.04 (0.22)	3.6%	0.03 (0.18)	1.7%
Afraid of sirens	0.03 (0.20)	3.2%	0.04 (0.22)	3.7%
Rutter Teacher score	3.2 (4.3)	-	3.3 (4.4)	-

TABLE 2. Comparison of Children Defined as Cases by Rutter Questionnaires for Total Posttraumatic Items With Noncases at 8 Months^a

	Cases		Noncases		<i>t</i>	<i>p</i>
	<i>N</i>	Mean (S.D.)	<i>N</i>	Mean (S.D.)		
Parent cases						
Parent posttraumatic items	70	2.41 (2.17)	347	1.06 (1.48)	6.37	0.000
Teacher posttraumatic items	62	0.82 (1.06)	315	0.48 (1.00)	2.48	0.01
Teacher Cases						
Parent posttraumatic items	35	1.77 (2.24)	374	1.24 (1.60)	1.90	0.07
Teacher posttraumatic items	64	1.42 (1.55)	641	0.40 (0.80)	8.67	0.00

^aCases defined using 12/13 and 8/9 cutoffs for the parent and teacher questionnaire, respectively (Connell et al., 1983).

TABLE 3. Pearson Correlation Coefficients of Parent Posttraumatic Items and Factors of Parents Rutter Questionnaires^a

	Posttraumatic Items, 8 Months (N = 467)	Posttraumatic Items, 26 Months (N = 235)
Parent Rutter score, 8 months	0.47***	0.10
Factor 1 Antisocial	0.26***	0.17**
Factor 2 Restless	0.19***	0.12*
Factor 3 Angry	0.26***	0.07
Factor 4 Neurotic	0.35***	0.21**
Factor 5 Phobic	0.37***	0.19**
Factor 6 Somatic	0.25**	0.18**
Parent Rutter score, 26 months	0.36***	0.51***
Factor 1 Antisocial	0.22***	0.18**
Factor 2 Restless	0.18***	0.23***
Factor 3 Angry	0.31***	0.17**
Factor 4 Neurotic	0.36***	0.44***
Factor 5 Phobic	0.37***	0.48***
Factor 6 Somatic	0.16**	0.30***

^a Factor structure of Rutter questionnaires is to be reported elsewhere (McFarlane et al., 1987).

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

TABLE 4. Pearson Correlation Coefficients of Teacher Posttraumatic Items and Factors of Teacher Rutter's Questionnaires

	Posttraumatic Items, 8 Months (N = 719)	Posttraumatic Items, 26 Months (N = 309)
Teacher Rutter score, 8 months	0.50***	0.60***
Factor 1 Antisocial	0.17***	0.22***
Factor 2 Neurotic	0.29***	0.15**
Factor 3 Distractible	0.30***	0.46***
Factor 4 Unpopular, antisocial	0.21***	0.23***
Teacher Rutter score, 26 months	0.01	0.60***
Factor 1 Antisocial	0.05	0.38***
Factor 2 Neurotic	0.09	0.40***
Factor 3 Distractible	0.05	0.56***
Factor 4 Unpopular, antisocial	0.03	0.46***

** $p \leq 0.01$; *** $p \leq 0.001$.

risen to 25% of the variance 18 months later. Phobic symptomatology was consistently most strongly predictive of these phenomena (8 months, adjusted $R^2 = 0.14$, $F = 73.36$; 26 months, adjusted $R^2 = 0.23$, $F = 71.58$).

Further examination of the longitudinal relationship between the Rutter scores at 2 months and subsequent posttraumatic item scores demonstrated a significant correlation between the 2-month teacher symptom score and both the 26-month teacher ($r = 0.49$, $p < 0.00$) and parent ($r = 0.28$, $p < 0.000$) posttraumatic items. In contrast, no significant correlation existed between the 2-month parent posttraumatic symptom scores ($r = 0.07$, $p = 0.5$) and the 26-month parent posttraumatic scores.

Etiology of Posttraumatic Phenomena

As shown in Table 5, there was a strong association among posttraumatic phenomena in the parents, overprotective par-

TABLE 5. Pearson Product Moment Correlations of Posttraumatic Item Total With Disaster and Family Related Variables at 2, 8, and 26 Months

	8-Month Posttraumatic Items	26-Month Posttraumatic Items
2-month variables (N = 430)		
Age	-0.14*	0.27***
Personal loss	0.15*	0.23**
Property loss	0.15*	0.11
Separation after disaster	0.25***	0.30*
Maternal coping	0.13**	0.13*
Child's exposure	0.19***	0.20**
Parental exposure	0.26***	0.20**
8-month variables (N = 446)		
Complete reconstruction	0.17***	0.19**
Regaining income	0.17***	0.20**
Resolution of personal loss	0.20***	0.23***
Anxiety of future fires	0.28***	0.34***
Material intrusive thoughts	0.38***	0.35***
Maternal coping	0.13**	0.13*
Family functioning	0.43***	0.30***
Overprotection	0.32***	0.26***
26-month variables (N = 229)		
Completion of reconstruction	-	0.19**
Preoccupation with property loss	-	0.24***
Resolution of bereavement	-	0.16**
Maternal intrusive thoughts	-	0.38***
Maternal interfering imagery	-	0.35***
Paternal interfering imagery	-	0.28***
Maternal coping	-	0.23**
Family functioning	-	0.34***
Overprotection	-	0.37***
Life events	-	0.38***

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

enting, changed family functioning, parents' and children's exposure to the fire, and posttraumatic phenomena in the child.

The correlation between these variables and the individual posttraumatic items, although not presented, was generally of a magnitude similar to the total. A notable exception was the presence of playing games about the fire, which was only correlated with parental coping at 2 months ($r = 0.18$, $p = 0.01$) and parental overprotectiveness at 8 months ($r = 0.25$, $p = 0.01$).

When the 8-month posttraumatic phenomena were regressed against the 2-month fire related variables, the family being split up (adjusted $R^2 = 0.11$, $F = 35.7$), parental exposure (adjusted $R^2 = 0.15$, $F = 25.2$), and age (adjusted $R^2 = 0.16$, $F = 19.5$) accounted for 16% of the variance. Separation of the child from the parents was highly related to the other variables because this separation was most likely to have occurred in those families that sustained property damage.

Regression analysis of the 8-month variables against the 8-month posttraumatic items indicated that changed family functioning (adjusted $R^2 = 0.17$, $F = 83.8$), maternal intrusive thoughts (adjusted $R^2 = 0.20$, $F = 52.4$), and continuing unrepaired property damage (reconstruction) (adjusted $R^2 = 0.21$, $F = 3.09$) all contributed significantly to the variance.

When the 26-month posttraumatic items were regressed against the 2-month variables, the family being split up (adjusted $R^2 = 0.13$, $F = 22.3$) was the only variable predicting a significant percentage of variance. Regression analysis of the 26-month posttraumatic items against the 8-month variables indicated that both maternal fears of future fires (adjusted $R^2 = 0.12$, $F = 20.5$) and continuing loss of income because of the fire (adjusted $R^2 = 0.14$, $F = 14.2$) accounted for a significant percentage of the variance.

When the 26-month parental posttraumatic items were regressed against the 26-month variables, intrusive thoughts of the disaster in the mother (adjusted $R^2 = 0.12$, $F = 29.4$), life events in the preceding 18 months (adjusted $R^2 = 0.18$, $F = 23.26$), and family functioning (adjusted $R^2 = 0.21$, $F = 19.6$) all contributed significantly to the variance.

Discussion

Approximately one third of the children in this study were found to have a continuing preoccupation with their exposure to a bushfire 26 months after the disaster. This suggested that the meaning and impact of this event were continuing to play a role in the psychological and personality development of these children. There appeared to have been little working through of traumatic memories between 8 months and 26 months after the fire—18% of the children continued to dream about the fire, indicating the involuntary nature of their preoccupation. These posttraumatic phenomena possibly served an adaptive function. For example, playing games about the fire seemed to be particularly associated with the child's mother not coping with the fire and being overprotective, rather than with the physical impact of the disaster. Such play may have been important to the children's attempts to work through an event that had undermined their mother's role as the mediator between the child and danger.

The data indicated that there was no one-to-one relationship between posttraumatic phenomena and psychological disorder as measured by the Rutter questionnaires. Although such phenomena were significantly more common in children defined as cases, they were present in many children who did not exhibit disorders. Similarly, they accounted for, at the most, 25% of the symptomatic disturbance in these children. However, this relatively small relationship may in part be caused by the diluting effect of the background psychological morbidity that would have existed in this community independent of the disaster. Thus because these phenomena are not invariably associated with symptoms, they should be investigated in any study wishing to document the effects of extreme adversity on children.

The longitudinal nature of this project allowed a preliminary examination of the causal interaction between symptoms and posttraumatic phenomena. At both 2 and 8 months after the fire, the level of anxiety and behavioral disturbance demonstrated by a child at school but not at home was significantly associated with the intensity of posttraumatic phenomena 26 months after the disaster. This suggests that the level of emotional or behavioral distress experienced by children soon after disaster predicts the later presence of posttraumatic phenomena, particularly if the disturbances are manifest when the children are separated from the reassuring presence of their parents (e.g., at school).

In contrast, the intensity of posttraumatic phenomena observed by the parents 8 months after the disaster was significantly correlated with symptoms 18 months later. This raises the possibility that the posttraumatic phenomena observed by parents are a predictor of subsequent symptomatic disturbance, supporting Horowitz's (1973) etiological hypothesis. These combined observations suggest a possible reciprocal relationship between symptoms and posttraumatic phenomena in children where a high level of anxiety soon after a disaster predicts imprinting of memories of the event, which subsequently serves to maintain and predict future symptomatic disorder.

The findings that separation from parents in the days immediately after the fire, continuing maternal preoccupation with the disaster, and changed family functioning were more powerful determinants of posttraumatic phenomena in the children than were exposure to the disaster or the losses sustained provides some support for the previous observation that children's responses to traumatic events are determined more by their parents' attitudes than by the intensity of the danger experienced (Ziv and Israeli, 1973). This suggests that children's ability to maintain a barrier against psychic trauma is critically dependent upon their parents' response to the event.

Several mechanisms could explain this process. First, if a mother were continuing to experience intrusive and unwanted memories of the fire, she would find it very difficult to contain her child's anxieties and memories of the disaster. Second, children's preoccupations about the disaster may be determined by their awareness of their parents' recurring imagery of the event, independent of their own experience of the fire (Rosenbeck and Nathan, 1985).

Third, the mothers with the most posttraumatic imagery were also the most overprotective, perhaps because of their continuing sense of foreboding and vulnerability. Such maternal anxiety is likely to be easily perceived by children, making it more difficult for them to resolve their own anxieties and heightening their sensitivity to further trauma. Twenty-six months after the fires, adverse life events, unrelated to the disaster and experienced in the previous 18 months, were predictors of children's continuing preoccupation with the disaster. Further distressing events may interfere with children's ability to contain the sense of threat caused by the original disaster, as well as impairing their adjustment to subsequent traumas, a phenomenon noted by Newman (1976) after the Buffalo Creek disaster. Such events may also maintain the mothers' preoccupation with their vulnerability, indirectly eroding the children's attempts at mastery.

The role played by the pattern of interactions in the family was examined in more detail using the family function scale, which measured irritability and withdrawal, two common interpersonal manifestations of posttraumatic stress disorders in adults. Although irritability in the parents was of particular importance as a predictor of their children's posttraumatic symptoms at 8 months, the mother's preoccupation with the fire and fear of future fires were of greater significance in predicting the children's symptoms at 26 months. This suggests that the direct conveyance of the parents' traumatic anxiety to the child may be as important as any increased expression of hostility and withdrawal in the family in the

etiology of the child's distress. This contrasts with the finding of Rutter and Quinton (1984) that the patterns of interaction in a family, rather than psychiatric disorder in a parent, are more important determinants of disorder in children.

Finally, 21%, at most, of the variance of the predictors of posttraumatic phenomena in children could be accounted for at any one time. Other factors require future investigation. The child's own temperament is one factor not examined in this study. In particular, the association between the responses of mother and child may, in part, reflect genetic factors influencing both the child's personality and his or her anxiety proneness.

These results need to be considered against the background of methodological problems inherent in the study. In particular, the reliability of reporting of posttraumatic items was not tested extensively, although sufficient reliability existed to make the observations of some value. Furthermore, the response rates were not particularly high. However, no bias appeared to have been introduced by this problem when the teacher questionnaires were used to examine the characteristics of the nonresponders. On the other hand, the validity of the findings is supported by their confirmation of the reports of other clinical and anecdotal studies (Bloch et al., 1956; Bodman, 1941; Carey-Trefzer, 1949; Newman, 1976; Silber et al., 1958; Terr, 1979).

In conclusion, this epidemiological study suggests that posttraumatic phenomena are an important marker of developmental trauma in latency-aged children exposed to extreme adversity. Such phenomena should be systematically documented in any future study of the impact of disasters on children as one measure of morbidity.

References

- Bloch, D. A., Silber, E. & Perry, S. E. (1956). Some factors in the emotional reaction of children to disaster. *Amer. J. Psychiat.*, 113:416-422.
- Bodman, F. (1941). War conditions and the mental health of the child. *Brit. Med. J.*, Oct.: 486-488.
- Brett, E. A. & Ostroff, R. (1985). Imagery and post-traumatic stress disorder: an overview. *Amer. J. Psychiat.*, 142:417-424.
- Burke, J. D., Boris, J. F., Burns, B. J., et al. (1982). Changes in children's behaviour after a natural disaster. *Amer. J. Psychiat.*, 139:1010-1014.
- Carey-Trefzer, C. J. (1949). The results of a clinical study of war-damaged children who attended the child guidance clinic. The Hospital for Sick Children, Great Ormond Street, London. *J. Ment. Sci.*, 95:535-559.
- Connell, H. M., Irvine, I., & Rodney, J. (1982). The prevalence of psychiatric disorder in rural school children. *Aust. N. Z. J. Psychiat.*, 16:43-46.
- Davidson, J., Swartz, M., & Stack, M. (1985). A diagnostic and family study of post-traumatic stress disorder. *Amer. J. Psychiat.*, 142:90-93.
- Dunsdon, M. I. (1941). A psychologist's contribution to air raid problems. *Ment. Hlth.*, 2:37-41.
- Horowitz, M. J. (1973). Phase orientated treatment of stress response syndromes. *Amer. J. Psychother.*, 27:506-515.
- McFarlane, A. C. (1985). The effects of stressful life events and disasters: research and theoretical issues. *Aust. N. Z. J. Psychiat.*, 19:409-421.
- (1986). Posttraumatic morbidity of a disaster. A study of cases presenting for psychiatric treatment. *J. Nerv. Ment. Dis.*, 174:4-14.
- (1987). Family functioning and overprotection following a natural disaster: the longitudinal effects of posttraumatic morbidity. *Aust. N. Z. J. Psychiat.*, 21: 210-218.
- Policansky, S. K. & Irwin, C. I. (1987). A longitudinal study of the psychological morbidity in children due to a natural disaster. *Psychol. Med.*
- Monaghan, J. H., Robinson, J. O. & Dodge, J. A. (1979). The children's life events inventory. *J. Psychosom. Res.*, 23:63-68.
- Newman, C. J. (1976). Children of disaster: clinical observations at Buffalo Creek. *Amer. J. Psychiat.*, 133:306-312.
- Phillips, R. E. (1978). Impact of Nazi holocaust on children of survivors. *Amer. J. Psychiat.*, 32:370-378.
- Rosenbeck, R. & Nathan, P. (1985). Secondary traumatization in children of Vietnam veterans. *Hosp. Community Psychiat.*, 36:538-539.
- Rutter, M. & Graham P. (1967). A children's behaviour questionnaire for completion by teachers: preliminary findings. *J. Child Psychol. Psychiat.*, 8:1-11.
- & Quinton, D. (1984). Parental psychiatric disorder: effects on children. *Psychol. Med.*, 14:853-880.
- Tizard, J. & Whitmore, K. (1970). *Education, Health and Behaviour*. London: Longman.
- Silber, E., Perry, S. E. & Bloch, D. A. (1958). Patterns in parent-child interaction in a disaster. *Psychiatry*, 21:159-167.
- SPSS Inc. (1983). *SPSS User's Guide*. New York: McGraw Hill.
- Tausig, M. (1982). Measuring life events. *J. Hlth. Soc. Behav.*, 23:62-64.
- Terr, L. C. (1979). Children of Chowchilla. *The Psychoanalytic Study of the Child*, 34:547-627.
- (1981a). Psychic trauma in children: observation following the Chowchilla school-bus kidnapping. *Amer. J. Psychiat.*, 138:14-19.
- (1981b). "Forbidden games": posttraumatic child's play. *This Journal*, 20:741-760.
- Ziv, D. & Israeli, R. (1973). Effects of bombardment on the manifest anxiety level of children living in Kibbutzim. *J. Consult. Clin. Psychol.*, 40:287-291.