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Special Education Service
He Tohu Ūmanga Mātauranga

The Psychological Consequences of Earthquakes and Other Disasters On Children and Youth

Making a difference for people with special needs.

The Psychological Consequences of Earthquakes and Other Disasters On Children and Youth

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Abstracts

Technical Abstract

This report examines the psychological impact of disasters on children and adolescents. It reviews the cognitive, affective, behavioural, and physiological effects of disasters as documented in the literature and puts relevant research in historical perspective. Diagnosable disorders including posttraumatic stress disorder, anxiety and depression may occur after disasters involving severe life-threat, death, injury, or extreme destruction. Influences on children's responses include characteristics of the disaster (degree of exposure, extent of bereavement, separation, injury), child factors (age, sex, ability, predisaster psychological adjustment, prior trauma), family factors (parental response, family atmosphere and communication, need for evacuation and relocation), and the extent of community support. Issues in the identification of traumatised children are discussed and various methods for assessment are evaluated. The report summarises and evaluates disaster-related psychological interventions with children and adolescents. Intervention models are divided into four main groups according to the time intervals surrounding the disaster: predisaster, post-impact, short-term, and long-term. Relatively little systematic evaluation of disaster-related interventions with children has been published. Conclusions and future research directions are discussed.

Abstract For Less Formal Purposes

Earthquakes and other disasters can result in very substantial consequences for communities and individuals including widespread property damage, financial loss, and in the worst cases injury and death. These are immediate impacts. A less obvious consequence of disaster can be a negative effect upon the mental health of the community. Children would likely be a particularly vulnerable group but have been ignored in the past. This report reviews the international literature on the psychological effects of disasters on children and adolescents and concludes that disasters can result in a wide range of emotional and behavioural disturbances among the younger population. Specific clinical disorders such as posttraumatic stress disorder, anxiety and depression are generally present in only a small proportion of children, with the incidence increasing after disasters involving extreme threat to life, and significant levels of death, injury and property destruction. This report also examines the issues involved in the identification and assessment of traumatised children and summarises the methodological difficulties involved in conducting disaster research with children. Various treatment and intervention programmes designed for children following disaster are discussed. The report summarises the main conclusions that can be drawn from the international literature and suggests directions for future research.

Introduction

Two decades ago, the professional health and welfare communities took little interest in the impact of psychological and developmentally damaging experiences such as disasters on children. However, in recent years clinicians and researchers have become more interested in understanding the impact of disasters on children and adolescents.

Children are the focus of this report. While many of their responses to disaster may be similar to an adult's, the developmental and age-related needs of children make the impact of disaster qualitatively different for them. Consequently, there are specific requirements for the management and treatment of traumatised children. Planning in advance is crucial and efforts must be made to incorporate mental health components in disaster recovery.

The immediate circumstances after a major disaster are likely to have important implications for the planning and delivery of mental health services for children. For instance, an estimated 200,000 people would be stuck in the central business district for 72 hours in the event that a major earthquake hits the Wellington region during business hours (Bradwell, 1995). Consequently, schools may have to care for large numbers of children until parents are able to collect them. Schools themselves may suffer severe damage. Most schools in the Los Angeles central district were closed for more than a week due to structural damage after the 1994 Northridge earthquake, and some remained closed for months (Los Angeles Times, 1994). A recent Wellington conference presented delegates with a scenario of the potential effects of a severe earthquake on the Wellington region (Earthquake Commission & Centre For Advanced Engineering, 1995). The scenario depicted 1600 deaths, 10,000 injured people, over 3000 uninhabitable houses, and 40,000 damaged properties. Water, sewerage, electricity, telecommunications, and gas services were projected to be restricted for several weeks and road, rail, and air access into the Wellington region were projected to be severely restricted for some months. It is within scenarios such as these that the psychological impact of disasters on children must be considered.

This report does not restrict its analysis of the psychological effects of disaster to an examination of the literature concerning earthquakes. Fortunately, earthquakes are rare events, but consequently empirical research on their impact is limited. All available research on the psychological effect of earthquakes on children has been included in this report but the report as a whole adopts a broader approach to the study of disaster. Children's reactions to earthquakes share many similarities to children's reactions to other highly disruptive, relatively sudden traumatic events. Therefore, this report examines the posttraumatic stress reactions in children following a range of disasters in an attempt to enhance understanding of the sort of reactions that could be expected after a severe earthquake.

The definition of disaster adopted by this report is restricted to events that are relatively sudden, highly disruptive, time-limited (although the effects may be long-lasting), and public (affecting children from more than one family). This includes natural disasters such as hurricanes, floods, and earthquakes; failures of technology or human error, as in plane crashes and toxic

contamination; and sudden, unpredictable acts of human violence, such as sniper shootings on a school playground and the kidnapping of a bus-load of children. The definition of disaster excludes family violence, such as physical and sexual abuse, and the murder of a parent. Although reactions to these highly stressful events are likely to share elements with the impact of disasters discussed in this report, there are also likely to be significant differences when stressors occur repeatedly rather than once, or when the perpetrator is a family member (Terr, 1991).

The report begins by placing research trends into historical perspective then examines children's response to disaster in detail. Factors that influence children's disaster response and techniques for identifying traumatised children are also discussed. Finally, the possibilities for intervention that exist within individual, family and school contexts are examined.

Historical Perspective

Conclusions regarding the effect of traumatic events on children have shifted considerably over time. Early studies, beginning in the 1950s, concluded that the psychological effects of disasters on children were mild and transient. However, by the 1970s and 1980s, evidence emerged that the effects of disasters might be more severe and longer lasting for some children. These findings became increasingly significant with the introduction of the diagnosis of posttraumatic stress disorder (PTSD) and the shift from a reliance on parental report of children's responses to disaster to a direct examination of the children themselves. The following sections document these trends.

Early Studies

There exists little systematic research on the psychological consequences of disasters on children prior to the 1950s. One of the earliest studies was conducted in the United States after a tornado hit Vicksburg, Mississippi in 1953 causing considerable damage and loss of life (Bloch, Silber & Perry, 1956). A movie theatre filled with children watching a Saturday matinee was particularly affected; several children were killed and others were injured. One week after the tornado, Bloch et al. (1956) distributed questionnaires to the parents of children in an elementary school about their children's reactions. Subsequently, 91 parents were interviewed, providing information about children from 1 to 15 years of age. The five principal emotional responses reported by parents were: (1) increased dependency on parents, including wanting to sleep in parents' bed and not wanting to leave the home; (2) regressive behaviour, including enuresis; (3) nightmares; (4) fears, including specific fears of stimuli associated with the tornado such as wind and rain, as well as fears of stimuli only marginally related to the tornado such as open-air movies; and (5) tornado games in children's play.

Psychiatrists rated the emotional disturbance of the 185 children on the basis of the questionnaires and interviews and concluded that the emotional response was severe for only a small proportion (13%). Severe reactions were more likely for children who were in the area that received the greatest tornado impact, children who were seriously injured, or children who experienced the death or injury of a family member. A parental response in which parents "went to pieces", fainted or asked for help *from* their child rather than giving aid or support *to* the child was also associated with more severe emotional disturbance in children (Silber, Perry & Bloch, 1958).

Milne (1977) investigated children's reactions to Cyclone Tracy that hit Darwin, Australia on Christmas Eve in 1974. In total, 65 people died, 140 were seriously injured and 45 000 were left homeless (Raphael, 1986). Information about the emotional reaction of the children was obtained by questionnaire from parents 7 to 10 months after the cyclone. Parents were required to identify whether the reactions in their children were temporary or still present at the time of the interview. Milne (1977) concluded that "although there were many emotional casualties among Darwin children, there is no evidence that the vast majority of disturbances were other than reactive, fear-conditioned responses fading with time" (p. 61).

Garnezy and Rutter (1985) conducted an influential review of initial studies investigating the responses of children to disaster and concluded on the basis of the available research that any psychological reactions were fairly mild, short-term and affected only a small proportion of children. The researchers reported that behavioural disturbances were less intense than might have been anticipated, and fear, anxiety, and regressive behaviour often occurred immediately after the disaster but soon subsided.

Emergence of Evidence for More Severe Symptoms

Between 1972 and 1981, three influential reports indicated that children may show severe and long lasting psychological consequences as the result of disasters (Gleser, Green & Winget, 1981; Lacey, 1972; Terr, 1979).

In the first of these reports, Lacey (1972) described his clinical work with 56 children who were referred to a child guidance clinic in the four years after the 1966 Aberfan, Wales mining disaster. In October 1966, a huge coal slag heap collapsed after heavy rains and travelled as an avalanche down a mountain side above the Welsh village of Aberfan and engulfed the town schools. Mainly affected was the primary school as it lay in the direct path of the avalanche. Of the 250 primary school pupils, 107 were killed; five teachers at the primary school also died leaving four surviving. In total, 116 village school children and 28 adults died as a result of the disaster. Referrals to the child guidance clinic came slowly at first but increased as the surviving children's difficulties persisted. The most common symptoms included sleeping difficulties, nervousness, lack of friends, unwillingness to go to school or out to play, and enuresis. Wind, rain and snow were very frightening for some of the children because a period of bad weather had preceded the disaster.

The second of these reports by Gleser et al. (1981) was an account of the extensively studied 1972 Buffalo Creek disaster in the United States. In February of 1972, a slag mining dam across Buffalo Creek collapsed after heavy rain and consequently flooded the small West Virginia mining community. 125 people died and thousands were left homeless as a result of the flood which lasted several hours before emptying into a nearby river. Residents filed a lawsuit against the mining company that included claims of "psychic impairment", but subsequently settled out of court. As the lawsuit proceeded, a wealth of clinical information was gathered. Mental health professionals for each side of the lawsuit evaluated 381 adults and 207 children approximately two years after the disaster. Gleser et al. (1981) utilised the data from the psychiatric reports and reported substantial psychological impairment in both adults and children. Gleser et al.'s (1981) finding supports the conclusions reached by earlier descriptive studies and clinical observations of Buffalo Creek survivors (e.g., Newman, 1976).

The third report (Terr, 1979) was the first of a series of articles by Lenore Terr on the Chowchilla kidnapping. Terr's work has had a major influence on the understanding of children's posttraumatic responses to disaster. In July 1976, 25 children aged 5 to 14 and their bus driver were kidnapped at gunpoint from their school bus in Chowchilla, California. Three men hijacked the bus and held the children and the driver for 27 hours, first driving around in

darkened vans for 11 hours and then moving them to a buried truck-trailer. They were buried for a further 16 hours until two of the oldest boys dug a way out. There were no deaths and all of the group emerged physically unharmed.

Between 5 and 13 months after the kidnapping, Terr (1979) interviewed all of the children who had remained in Chowchilla after the incident (23 out of 26) and one or both parents. Terr found all the children to be traumatised, with 74% showing moderately severe or severe symptoms. All of the children reported kidnapping-related fears and nightmares. Eight children suffered from panic attacks. Reenactment of aspects of the experience was common and included repetitive play themes and somatic complaints in children who had had somatic problems during the kidnapping. Terr also observed perceptual distortions in children's memories of the kidnapping and development of beliefs in 'omens' that had foretold the kidnapping. Some of the children reported compensatory fantasies such as revenge against the kidnappers or wish-fulfilment such as retrospectively fantasising that they had been unafraid during the kidnapping. Some children displayed physical symptoms that appeared to be associated with anxiety such as weight gain or loss, cramps and incontinence. Eight children reported a decline in school performance.

These three studies were important for providing evidence of severe and long term psychological consequences of disasters on children. In contrast to earlier studies, the conclusions of these reports were based on clinician's evaluations of the children rather than parents' perceptions. Each of the studies outlined above include descriptions of symptoms that would now be identified as symptoms of posttraumatic stress disorder, a diagnosis not available at the time these studies were undertaken.

Introduction of the Diagnosis of PTSD

In 1980, posttraumatic stress disorder (PTSD) was introduced as a diagnostic category in the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III; American Psychiatric Association, 1980). The diagnostic classification drew attention to a cluster of psychiatric symptoms not always considered systematically in earlier studies. Beginning with reports of "shell-shock" and "traumatic neurosis" among combat veterans, psychologists identified a similar clinical picture among adults exposed to disaster and community violence (Pynoos, 1990). The diagnostic criteria, formulated exclusively for adults in DSM-III (1980), were rewritten in the revised third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III-R; American Psychiatric Association, 1987) so as to apply to children and adolescents as well. This revision incorporated many of Terr's (1979) observations of posttraumatic symptoms in the children of Chowchilla.

According to the most recent edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 1994), a diagnosis of PTSD is warranted when, following exposure to a traumatic event, the individual demonstrates a number of symptoms in three major categories:

1. intrusive reexperiencing of the event

2. avoidance of stimuli associated with the trauma and/or numbing of general responses
3. increased arousal.

A person must experience at least one symptom indicative of the first category, at least three symptoms indicative of the second, and at least two symptoms indicative of the third to meet the requirements for diagnosis of PTSD. The symptoms must last for at least one month (DSM-IV, 1994).

A traumatic event is defined as one which "the person has experienced, witnessed, or been confronted with...that involve[s] actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others" (DSM-IV, 1994, p. 427). For a diagnosis of PTSD, the DSM-IV (1994) requires the person's response to involve intense fear, helplessness, or horror but notes that in children, trauma may be expressed instead by disorganised or agitated behaviour. The DSM-IV (1994) recognises the importance of individual differences in response to the traumatic event and as such has greatly clarified the DSM-III-R (1987) definition of the traumatic event as one that is "outside the range of usual human experience and that would be markedly distressing to almost anyone" (DSM-III-R, 1987, p. 250). It is important to note that a person can be traumatised by an event at which they were not actually present (Lyons, 1987). Generally, such cases of PTSD occur in "near miss" situations. For example, Terr (1983a) describes the occurrence of PTSD in a boy who was let off the Chowchilla school bus just before all the children on board were kidnapped. However, traumatic stress may also be induced by learning of harm or the threat of harm to others (Figley, 1986). For instance, Saigh (1991) investigated 230 cases of PTSD in which the children were traumatised following either direct experience of the event, observation of the event or information transmission regarding the event. Analysis revealed that each group had higher levels of morbidity than a clinical control group but no significant differences were observed between the groups on measures of PTSD. Saigh (1992) also describes a case of verbally mediated PTSD in an 11-year-old girl who heard about the war-related death of her uncle.

While adult diagnostic criteria are for the most part adequate in describing children's response to trauma, several modifications in the criteria that more accurately portray symptomatology in children will be discussed.

Intrusive Reexperiencing

Reexperiencing symptoms include recurrent and intrusive thoughts and recollections of the traumatic event (DSM-IV, 1994). Distressing thoughts can occur at any time but particularly in situations when the child is quiet such as falling asleep at night, quiet times at school or when home alone (Yule, 1994). Intrusions may also take the form of nightmares and sleep difficulties in children. In younger children, the distressing dreams of the event may change into generalised frightening nightmares several weeks after the event (Keppel-Benson & Ollendick, 1993).

Traumatised children and adolescents may experience a sudden acting or feeling as if the traumatic event was recurring (DSM-IV, 1994). Such feelings can be the result of illusions, hallucinations, and dissociative flashbacks. However, Lyons (1987) notes that flashback

experiences occur less frequently in children than in adults. Environmental cues such as sounds or smells may also trigger children to feel as if the event was recurring and result in intense psychological distress (Keppel-Benson & Ollendick, 1993). Younger children do not usually have the sense that they are reliving the past; instead, repetitive play may occur in which aspects of the trauma are expressed (DSM-IV, 1994).

Internal and external cues that are associated with the traumatic event may also result in physiological reactions such as increased heart rate, blood pressure and nausea, although few studies have investigated such reactions in children (Keppel-Benson & Ollendick, 1993).

Avoidance and/or Numbing Symptoms

The characteristic symptoms of avoidance include: avoidance of thoughts, feelings or conversations associated with the trauma and avoidance of activities, places, and people that serve as reminders of the event. Avoidance may also be characterised by an inability to remember important aspects of the trauma (DSM-IV, 1994).

Following a traumatic experience, children may also show a general numbing of responsiveness. This may take the form of decreased interest or participation in activities that were once enjoyed or a decline in the maintenance of relationships that were valued (DSM-IV, 1994). In younger children, decreased responsiveness is broadened to include loss of recently acquired developmental skills, such as toilet training, independence or talking (Motta, 1994; Pynoos, 1990). Such developmental regression is most frequently reported in children under seven years (Keppel-Benson & Ollendick, 1993). Decreased responsiveness may also take the form of emotional withdrawal or a restricted emotional range (DSM-IV, 1994). Because it may be difficult for children to articulate diminished interest in significant activities and relationships, or emotional withdrawal, the DSM-IV (1994) recommends that these symptoms be carefully evaluated with reports from parents and teachers.

Children may display a sense of a foreshortened future (DSM-IV, 1994). Characteristic of this symptom is limited expectation about the future, such as: never marrying, having children, having a career or even living a normal adult life span (Pynoos, 1990).

Milgram (1989) notes that the phenomena of psychological numbing and avoidance and intrusive reexperiencing would seem to be polar opposites: "An intrusion is equivalent to behaving as if the original traumatic event were still taking place....Numbing is behaving as if neither the traumatic event nor anything else important to the child were happening" (p. 407). Horowitz (1991) suggests that memories of a stressful event recur until a control mechanism such as denial protects the child against the intolerable levels of distress and results in avoidance symptoms and numbing of general responsiveness. Unavoidable external or internal cues linked to the traumatic event may subsequently trigger further intrusive reexperiencing. Thus, intrusive reexperiencing and denial periods may appear phasically in children suffering from PTSD. However, Terr (1979, 1983, 1985) disputes that children present the alternating pattern of intrusion and denial in her experience with the Chowchilla kidnapping.

Increased State of Arousal

Symptoms of increased arousal include sleep difficulties and difficulty concentrating. After a traumatic event, many children may experience a transitory increase in anxiety at bedtime and difficulty going to sleep. However, the true sleep disturbance of PTSD reflects a more serious disturbance that may last for weeks, months or years (Pynoos, 1990). Sleep and concentration difficulties are particularly important for children as a cause of school problems.

Hypervigilance may occur in children following a traumatic incident. Children often remain "on alert" so as to respond to threat and may also appear fearful and anxious. An exaggerated startle response is characteristic of increased arousal and occurs when children startle in response to various loud noises, including car backfires, thunder and dropped objects (Pynoos, 1990).

Children may display outbursts of anger and irritability that may be the result of heightened fears of losing control, blaming others for what happened, or increased agitation due to the child's own feelings of guilt (Milgram, 1989). Symptoms of increased arousal seem to alternate with avoidant/numbing symptoms in children with PTSD (Keppel-Benson & Ollendick, 1993). The symptoms of increased arousal and their associated behaviours may continue for years after the trauma (Pynoos, 1990).

Associated features and disorders

The DSM-IV (1994) narrative suggests several additional features for children, including somatic complaints such as headaches or stomachaches, and a belief in omens that foretold the traumatic event. For adults and children, painful guilt feelings about surviving when others did not survive, self-destructive behaviour, anxiety and depression are listed as sometimes associated with PTSD (DSM-IV, 1994).

Types of PTSD

The DSM-IV (1994) makes a distinction between acute, chronic, and delayed PTSD. Acute PTSD is diagnosed if the duration of symptoms is less than three months. Chronic PTSD is diagnosed if the duration of symptoms is three months or more. PTSD with delayed onset is diagnosed if the onset of symptoms is at least six months after the stressor. The distinction between acute, chronic and delayed PTSD has been supported by several authors (e.g., Rothbaum & Foa, 1993; van der Kolk, 1987).

Differences seem to exist in the frequency with which particular symptoms are present in the acute and chronic forms of PTSD. Famularo, Kinscherff and Fenton (1990) report that children with the acute form of PTSD present more frequently with acting as though the trauma were recurring, difficulty falling asleep, nightmares, hypervigilance, exaggerated startle response, and generalised anxiety and agitation. Children presenting with the chronic form of PTSD show more symptoms of detachment, restricted emotional range, thoughts that life will be too hard, dissociative episodes and sadness. The authors note that the acute form of PTSD in children is most consistent with a generalised anxiety/agitation state. In contrast, the chronic subtype has many similarities to depression and detachment. However, despite this trend, any child with acute or chronic PTSD may present with any of the symptoms.

The delayed PTSD subtype has gained little support from empirical studies of disasters. In a study of American school children following a sniper attack on the school playground in which one child was killed and thirteen injured, children who did not have an acute PTSD reaction rarely reported a reaction 14 months later (Nader, Pynoos, Fairbanks and Frederick, 1990). That is, PTSD was present at the 14 month assessment only in those children who were diagnosed with PTSD at a one month assessment.

PTSD is a relatively new diagnosis and the diagnostic criteria are still evolving. Green (1991) notes that the symptoms which are critical for the syndrome and those that are more peripheral or associated with particular populations are still being established. Green recommends considering the diagnosis of PTSD as tentative and adopting a broad approach by presenting as much information as possible about the separate categories of the disorder (ie: intrusive reexperiencing, avoidance and numbing, arousal). In this way, each of the categories can be assessed for their contribution to PTSD and for their relationships to disasters of different types and magnitudes.

Recent Trends

From the 1980s, children's responses to disasters have been studied more frequently. Disaster research has progressed from early descriptive studies to include ones that are methodologically more sophisticated. The emphasis on relatively mild responses has evolved toward an acknowledgment of more severe reactions. In addition, recent research has asked children directly about their postdisaster reactions rather than relying on parent or teacher report. Many of the recent studies have included measures of PTSD symptoms and increasingly there has been use of standardised measures of PTSD. Increasingly sophisticated methodology has been used such as systematically examining groups that have differed in degree of exposure (e.g., Pynoos et al., 1987) or employing carefully matched control groups (e.g., Terr, 1983a).

A body of knowledge now exists describing children's reactions to disaster and the following sections of this report will discuss this recent research into the psychological consequences of disasters on children. Patterns of reactions that have begun to emerge and factors likely to influence the nature, severity and duration of disaster response in children will also be examined.

Children's Responses to Disaster

Disasters can result in a wide range of traumatic responses in children. As the historical review suggests, the most common disaster responses for children are specific fears, separation difficulties and symptoms that are on a continuum of stress response syndromes and PTSD.

The following sections examine the myths regarding children's reactions to disaster, then differentiate observed posttraumatic reactions of children and adolescents into four main groups: cognitive effects, affective effects, behavioural effects and physiological-somatic effects. It is acknowledged that many of the effects could logically fall under two or more categories.

There are many effects of trauma that may be severe and long lasting which are documented from studies of children and adolescents who experience various traumatising situations. Many of these commonly occurring symptoms are recognised in the DSM-IV (1994) as comprising PTSD in children. However, in evaluating postdisaster responses, it is more useful to consider a broader definition of posttraumatic states. In this way symptoms that are not currently part of the PTSD criteria are included in addition to symptoms that are part of the PTSD diagnosis, as currently defined.

It is important to note that few children will exhibit all of these symptoms and none of the responses detailed in the following sections are the inevitable result of experiencing a traumatic event.

Myths

An event such as a severe disaster can be considered inherently stressful but the aspect of the experience that actually traumatises the child may not be obvious. Each child's encounter with the trauma is unique. The particular aspects of the trauma interact with the characteristics of the individual child to create that child's response. Gordon and Wraith (1993) note that a traumatic event is so far removed from a child's normal experience and expectation that past experience and methods of overcoming difficulty no longer apply. Wraith (1994) describes the environment as a "nurturing cocoon" (p. 102) for the young child. If the environment is disrupted or compromised there may be an emotional, psychological or physical impact on the child. In this way, trauma can violate a child's normal assumptions about the safety and security of their environment and their expectations for the future.

However, a number of myths about children's reactions to trauma are prevalent in cultural attitudes. Wraith (1994) describes four primary misconceptions that have been encountered in disaster-affected communities, health, education and welfare workers, and even trained mental health professionals.

Children are often considered to be too young to be aware of or appreciate what is going on around them. Thus, disasters are assumed to have little impact on them. This myth particularly

applies to younger, pre-school children who are often unable to verbalise their experience and thus are perceived as uncomprehending of its significance. Age and limited cognitive resources are believed to be a barrier of protection against trauma. However, although children may not be aware of the total context of what is happening around them, they are nonetheless sensitive to changes in their world (Gordon & Wraith, 1993). Eth and Pynoos (1985a) effectively illustrate the understanding pre-verbal children may have of traumatic situations in the case of a boy, aged two years three months, who witnessed the murder of his mother by her estranged second husband. One year later he spoke vividly of the tragedy for the first time with his recently acquired language skills. Similarly, a parent described her 2½-year-old child's recollection of Hurricane Hugo 14 months after it happened:

Last week, she laid down 4 small wooden houses that I keep on the coffee table and told me that was what Hurricane Hugo did. I was amazed! After 14 months, she still remembers, I never called the storm by name; I hate saying it; I call it the bad storm, so I was really surprised she knew it by name. (Saylor, Swenson & Powell, 1992, p. 144)

Young children may be aware of what is going on around them but their capacity for logical thinking is immature and consequently they may construct inaccurate and disturbing explanations to make sense of the situation. For example, Wraith (1994) describes the reaction of a 4-year-old child who was held hostage for twenty minutes with 17 other children in an Australian kindergarten in 1989:

The child believed that if she had taken action more promptly to open a door to escape, four other children who were subsequently held for seven hours would have avoided this ordeal. This was not the situation, but until she became aware of and accepted the facts, she assumed total responsibility in the event and the disturbing outcome for her friends. (p. 103-4)

A second myth involves a belief that children are resilient and will naturally recover from any effects of trauma by forgetting the experience, getting over it, or growing out of it. Stallard and Law (1994) suggest it is possible adults may find it painful to acknowledge prolonged and significant distress in children and may cope by denying that traumatic events can adversely affect children for any length of time. Related to this assumption is a third myth that a lack of obvious behavioural response means that the experience has not negatively impacted upon the child. However, as Wraith (1994) notes, relying on overt signs of distress to indicate whether a child has been influenced by their experience means that the child's thoughts, feelings and ideas have not been recognised. A lack of observable behaviour does not mean that the child has come to terms with the trauma.

A fourth myth involves a belief that talking about the traumatic event and the child's reactions create problems where there are none. For instance, McFarlane (1987b) reported that teachers in a rural Australian community destroyed by bush fire argued that it was not in the children's interest to remind them of what had happened.

An unfortunate implication of these assumptions is that children do not need assistance integrating their experiences nor do they need assistance with their recovery process following a traumatic incident.

Cognitive Effects

Intrusive Traumatic Thoughts

Intrusive imagery in the form of recurrent thoughts is a central component of children's posttraumatic reactions to disaster. Most commonly the intrusion concerns a specific vivid image or sound related to the disaster or its aftermath (Pynoos & Nader, 1988). Traumatic thoughts may occur at any time but particularly when the child is otherwise quiet or trying to fall asleep (Yule, 1994). At other times, distressing thoughts may be triggered by something in the environment that reminds the child of the disaster (e.g., Yule & Williams, 1992). Fourteen months after a sniper attack at an elementary school in California in 1984, children in the playground where one child was killed and 13 were injured described continued thoughts and images of the dead child, injured and bleeding classmates, bullets striking the nearby pavement, sounds of gunfire, and cries for help (Nader et al., 1990).

Bradburn (1991) investigated the reactions of 10 to 12-year-old children 6 to 8 months after the 1989 Loma Prieta earthquake. 64% reported feeling upset when they thought about the event and 50% reported having thoughts about the earthquake that came to them even when they "did not want them to" (p. 176). One and a half years after the 1988 earthquake in Armenia, Pynoos et al. (1993) screened 231 children from three cities to determine the frequency and severity of posttraumatic reactions. The children commonly reported continuing distress caused by intrusive images of sights, sounds and smells of adults and children crushed between floors of collapsed buildings and screams for help. The children described their concentration as being chronically interrupted because of the renewed thoughts, images and sounds of the disaster.

Frequently, repetitive thoughts about the disaster are triggered by environmental reminders of the incident. Stallard and Law (1994) investigated the reactions of nine adolescents involved in a minibus accident while travelling on an educational school trip. The minibus veered off the road, down a ditch and rolled three times before coming to rest upside down. None of the students were fatally or seriously physically harmed although the researchers note that the psychological effects of this disaster on the children were substantial. Five months after the accident all the adolescents reported experiencing vivid flashbacks and intrusive thoughts about the accident. Many of the intrusive memories and thoughts were set off by reminders of the accident:

One girl reported that the branches of a tree brushing against the windows on top of a bus set off vivid images of the accident and caused her great panic since she clearly recalled a similar sound when the minibus rolled over. (Stallard & Law, 1994, p. 92)

Yule and Williams (1992) report that all children who survived the *Herald of Free Enterprise* capsized were troubled by repetitive thoughts about the accident. The *Herald of Free Enterprise*

was a roll-on roll-off car ferry that regularly sailed between England and Belgium. In March 1987 it capsized in Zeebrugge harbour killing approximately half of the passengers and crew on board (Yule, 1993). Distressing thoughts about the disaster were reported to occur at any time, but they were often triggered by environmental stimuli such as movement on a bus, noise of glass smashing, sound of rushing water or sight of tables laid out like the ship's cafeteria (Yule & Williams, 1992).

The unwanted imagery concerning the event can be extremely distressing and distracting (Monahan, 1993). For instance a parent reported the distress her children felt at weather patterns similar to Hurricane Hugo:

Both of my children often remark on the weather in terms of similarity to "Hugo". "Those look like Hugo clouds." "The water is flooding like Hugo." "This wind is like Hugo." In addition they pay close attention to weather reports and are fearful of *all* storms or storm warnings. (Saylor et al., 1992, p. 144)

Children and adolescents may use various defensive mechanisms to avoid thinking about the disaster. Typically traumatised children will try to consciously suppress thoughts about what happened, especially those aspects of the trauma that have continued to intrude (Pynoos, 1990). Yule (1994) describes the case of a 14-year-old girl who had experienced the sinking of a cruise ship. In October 1988, a party of over 400 British school children accompanied by more than 60 teachers set sail from Athens, Greece in the cruise ship *Jupiter* for an educational cruise of the eastern Mediterranean. Twenty minutes out of the harbour, the *Jupiter* sank after being hit by an oil tanker. One pupil, one teacher, and two seamen helping with the rescue were killed. Many children had to jump into the water as the ship sank and they were not reunited with their classmates or teachers for many hours (Yule & Gold, 1993). Yule (1994) reported that a 14-year-old girl told the therapist that she carried out a continuous monologue throughout the day to block out the distressing intrusive thoughts and images of the disaster.

Children may also try to defend themselves against distressing thoughts and memories by avoiding situations people or objects that remind them of the traumatic incident (Pynoos et al., 1987; Terr, 1983a). Specific avoidance behaviours are discussed in the section *Withdrawal and Avoidance* (p. 33). Intrusive images are not always simple replications of an aspect of the traumatic event. Some repetitive images are infused with imagined aspects (Pynoos & Nader, 1993). For instance, Pynoos and Nader (1989) investigated children's memory for events during and after the 1984 sniper attack on a Californian elementary school. Some of the intrusive repetitive images reported by the children contained elements of fantasy. For example, children placed themselves further away from the injured victims or out of the most immediate zone of danger.

The intrusion of distressing repetitive thoughts concerning the disaster is not the only form of intrusive imagery experienced by children after a major catastrophe. Some children may also experience flashbacks. Flashbacks are distinguished from intrusive thoughts or memories by a sudden acting or feeling as if the trauma were recurring and are reported to occur less frequently in children than in adults (Lyons, 1987). Environmental cues such as sounds or smells similar

to those present during the trauma may trigger children to feel as if the event were happening all over again (Keppel-Benson & Ollendick, 1993). There is some disagreement in the literature as to whether children experience flashbacks as distinct from intrusive thoughts. The percentages of children who have reported flashbacks range from 0% (Terr, 1979) to 100% (Stallard & Law, 1994) in studies which have investigated the phenomenon. Terr (1979, 1983a, 1985) found no evidence of flashbacks in her clinical work with the children of Chowchilla and other traumatised children. In fact, Terr (1985) considered the lack of flashbacks in children to constitute one of the primary differences in the presentation of posttraumatic stress disorder in adults and in children. A small percentage of children after a school shooting (Schwarz & Kowalski, 1991a), and the sinking of the *Jupiter* cruise ship (Yule, Bolton & Udwin, 1992 as cited in Yule, 1994) have reported experiencing flashbacks of the traumatic event.

Memory Disturbances

One criterion for PTSD in adults is an inability to recall important aspects of the trauma (DSM-IV, 1994). It is relatively uncommon for single-incident trauma to result in amnesia in children (Pynoos, 1990) although instances have been reported. Yule and Williams (1990) describe the case of a 13-year-old girl who survived the capsizing of the *Herald of Free Enterprise* in 1987. She had been sitting in the cafeteria with her parents when the boat capsized and she and her mother were catapulted out of their seats, through a glass partition and into the water.

She remembers being close to her mother in the water in the dark with all the noise around. She must have been close to her mother when her mother drowned, but she cannot recall any details after getting in the water where she remained for over two hours. (p. 286)

Preschool children may be mute and reluctant to discuss the trauma, but this should not be mistaken for amnesia (Eth & Pynoos, 1985a). Terr (1988) investigated memory of the trauma in 20 children who had experienced a traumatic event before age five and compared it with documentation of the same event. The average interval between the traumatic incident and memory assessment was 4 years, 5 months, with a range of 5 months to 12 years. Based on this preliminary study, Terr (1988) drew several conclusions. Firstly, the approximate age of 28 to 36 months served as a cut-off point for the capacity for full verbal recollections of the traumatic experience. Children who experienced or witnessed a traumatic event at or after this approximate age were able to retrieve and verbalise detailed and full memories years later. However, at any age including infancy, behavioural memories of trauma remained quite accurate and true to the events that stimulated them. Terr (1988) noted that 18 of the 20 children demonstrated in their play, fears, or personality changes what they had retained from the traumatic incidents. Although this research is preliminary it clearly refutes the notion that a lack of a verbal recollection means that young children and infants are immune to the effects of trauma.

Many children experience more general memory problems. Survivors of both the *Herald of Free Enterprise* and the *Jupiter* disasters reported difficulties in memorising new material and also some difficulty in remembering old skills such as reading music (Yule & Williams, 1992). Yule (1994) describes in detail the case of a 14-year-old girl attending individual therapy for

over 3 years after the sinking of the *Jupiter* cruise ship. Yule (1994) notes the deterioration in her academic achievement due to a disruption in her ability to memorise new material:

She...did badly in her A-level examinations and so was unable to get a place at university as she had planned. These examinations put much greater emphasis on memory load, whereas the earlier examinations had involved a high proportion of continuous assessment and course work that she could complete in her own time. She went to college to study at a lower level and again found she could do well in course work and practicals, but badly in formal examinations that demanded memorising lots of technical material. (p. 224)

Similar findings of memory disturbance have been reported by Shannon, Lonigan, Finch and Taylor (1994) in their large scale study of children's reactions to Hurricane Hugo. Of the 5687 school-age children surveyed about their experiences and reactions related to the storm, 29% indicated that they experienced memory disturbances some or much of the time, and 30% endorsed memory disturbances as occurring most of the time.

Although, children are capable of verbally recalling the circumstances of the disaster after about the age of 2½ years (Terr, 1988) they may demonstrate several types of memory distortions. They may omit moments of extreme life threat, distort their proximity to the violence or the duration and sequencing of events, and in other ways minimise their life threat.

Pynoos and Nader (1989) examined 133 school-age children's memory of a sniper attack at their elementary school. Proximity to the violence had a significant influence on memory. Children who were directly exposed to the violence (on the playground in the line of sniper fire) tended to decrease their own degree of life threat when recalling the incident. The children who were most in danger reduced their life threat by not mentioning their own injuries, increasing their distance from the dead child and other injured children, not mentioning moments of direct danger, or situating themselves in a safe location. For instance, one child who had actually only been feet away, placed the child who was fatally wounded far across the playground. Another child saw the deceased girl fall and ran to the side of the school and went through a safe gate. In her recall, she placed herself at the exit gate from the beginning of the sniper attack.

In contrast, Pynoos and Nader (1989) observed that the children who were least in danger (in the school buildings) tended to increase their life threat by bringing themselves closer to the danger or imagining the danger moving closer to them.

Distortion of Time

A distortion in children's sense of time has been reported in several studies of disasters. Some children have experienced alterations in the perception or memory of the time duration of the disaster. Children in Pynoos and Nader's (1989) school sniper study distorted their temporal recall so that the possibility of aiding the fatally wounded girl was increased. For instance, one child, said that the ambulance arrived within minutes of the fatal shooting, when the girl had been dead for some time before the paramedics arrived. Terr (1983b) noted that four of the

Chowchilla children expressed the feeling that the kidnapping seemed shorter than 27 hours and two additional children confused day and night during the experience.

Some children and adolescents report memories of the perception that time had slowed during the traumatic experience. One week after the Loma Prieta earthquake, college students reported alterations in time perception. A sense of timelessness during the earthquake was described by 38%, and 51% reported that the duration of the earthquake seemed to expand (Cardena & Spiegel, 1993). Similarly, a 12-year-old girl who was hit by a car as she crossed a busy street reported a sense of the prolongation of time: "I get a picture of the accident, ... I feel real slow. I'm fading. Going away somewhere. I cross that street very slowly" (Terr, 1983b, p. 250).

Confusion about the sequencing of events surrounding a disaster has also been reported. Many children demonstrate a phenomena in which an event that actually came after the disaster is mentally reordered into a time frame preceding the trauma. This distortion has been termed "time skew" (Terr, 1983). Children who were not at school during the 1984 school sniper attack remembered themselves as being closer to the violence in time (Pynoos & Nader, 1989). For instance, a boy who had been on vacation said that he had been on his way to school, had seen someone lying on the ground, had heard the shots and turned back. In addition, many of the children who had not been at school came to examine the schoolyard the next day. They often recalled this visit as occurring on the day of the shooting. Younger children seem to display greater misperception of time duration and sequencing (Sugar, 1989). For instance, one parent described her 3-year-old child's distortion of the sequence of events after Hurricane Hugo:

My child was sound asleep during the worst part of the storm, in fact for the whole night....In the night while all the adults were awake, the wind blew a tree down on the roof of the house - right over the room where she would have been sleeping under normal circumstances - directly over her bed. Although she was not sleeping in that room nor was she even awake during the incident, she tells the story that she woke up in time to run back to her room and watch the tree fall on the house and then she ran back to the mattress where she slept the rest of the night. She acts as if she believes that is the way it actually happened. (Saylor, Swenson & Powell, 1992, p. 144)

Terr (1983b) suggested that time skew can lead children to conclude that events are predictive. For example, an 11-year-old girl who was kidnapped at Chowchilla expressed the belief that a crank caller had actually predicted the kidnapping. Terr (1983) describes the situation:

In her first follow-up interview she said, "Sometimes, I think someone else with those men is after me. Like the lady who called me right before." Her mother interrupted her, "After!" Her mother explained that a disturbed woman who had read the children's names in the newspaper after the kidnapping had threatened at least three of them on the phone. Leslie insisted, "I'm *sure* it was before. It seemed like a warning." (p. 1547)

Another common misperception in the sequencing of events after a disaster is the development of omens. Omens are formed in retrospect by the child, who looks back for a way he or she could have anticipated or controlled the unexpected event (Terr, 1983b). In retrospect, children may start to feel that they had premonitions of the disaster and the sense of helplessness caused by a disaster can be diminished by this process. In their attempt to find clues as to why the disaster happened, they may give undue emphasis to certain details in remembering the event (Pynoos, 1990).

Omens can include both actual events that take on symbolic meaning and fantasies. For instance, four years after the Chowchilla kidnapping one girl who was nine at the time of the kidnapping said, "That day I stepped in a bad luck square....I think if I hadn't have stepped in that square, it would have happened, but not to me!" (Terr, 1983b, p. 1547). Another child recalled, "I was 8-years-old when I was kidnapped. It was almost the last day of school. It was real fun. You could go swimming. That day there was a treasure hunt and candy in a box, and everybody was trying to find it. I didn't find any. I was thinking, 'Nothing ever happens to me.' Then I got kidnapped" (p. 1547). Many of the children investigated by Galante and Foa (1987) after the Italian earthquake spoke of omens. One boy said, "Ten days before the earthquake my uncle said that we would all die together. He died with my aunts and cousins" (p. 358). 30% of the school-aged children surveyed about their experiences and reactions to Hurricane Hugo indicated that a sense of foreshadowing was true for some, much or most of the time (Shannon et al., 1994). Monaco and Gaier (1987) analysed the conversations and comments of children aged 5 to 15 years old one day after the Space Shuttle Challenger disaster in 1986. A sense of foreshadowing was attributed to the daughter of the teacher who died as evidenced in comments such as, "Mrs. McAuliffe's daughter didn't want her mom to go because she was scared or something".

Intellectual and Cognitive Functioning

After severe disasters, children may show a decline in school performance. A group of girls who survived the *Jupiter* cruise ship sinking had had superior performance before the disaster but had obtained only average grades a year later, a decrease not shown by classmates with a similar initial performance who had not experienced the disaster. Although a smaller effect, the disaster survivors also had lower scores than the controls on general scholastic examinations 2 years after the disaster (Tsui, Dagwell & Yule, in preparation as cited in Yule & Gold, 1993). In a clinical report of the effect of the Armenian earthquake on the mental health of children, Kozlovskaja, Bashina, Goriunova, Kireeva, Novikova and Skoblo (1991) noted that "only rarely did the children sustain their former level of achievement and maintain their interest in schoolwork" (p. 19).

Postdisaster disruption and discontinuity in schooling can contribute to school problems. Seven to nine months after Cyclone Tracy hit Darwin, Australia in 1974, parents reported school problems for more than one third of the children who had been evacuated and had not returned to Darwin, but for relatively few children who had not been evacuated or who were evacuated and returned (Milne, 1977). Decreased school performance was most likely for the children with the most persisting postdisaster symptoms and those with the highest levels of parental symptoms after the Buffalo Creek flood in 1972 (Gleser et al., 1981). Green et al. (1991) rated

the psychiatric reports of the children involved in the lawsuit two years after the Buffalo Creek disaster for symptoms of posttraumatic stress disorder. They concluded that the disaster had severely effected the school performance of 22% of the children.

Changes for the worse in school performance were observed in 8 of the 22 children examined by Terr (1979) after the Chowchilla kidnapping. Four years later, four of the children still exhibited school problems that could be connected to the kidnapping (Terr, 1983a). One girl lost eight months of reading experience because of daydreaming the year after the event and remained consistently one-half to one year behind from then on.

A deterioration of school performance can sometimes be linked to a avoidance of school (Terr, 1979, 1983a; Yule, 1994). Terr (1983a) observed that a 13-year-old girl missed so much school, due to hiding from the school bus the year following the kidnapping, that she had to repeat one year in school.

Children commonly report acute difficulties concentrating in school. The frequent deterioration in school performance is often attributed to these concentration difficulties although the link is rarely studied empirically (Yule & Gold, 1993). Both intrusive imagery and lack of sleep are also suggested to interfere with concentration and performance (Pynoos, 1990).

All of the survivors of a school minibus accident reported extreme and persistent difficulties concentrating (Stallard & Law, 1994). Concentration difficulties included listening in class, completing homework and assignments and concentrating on previously enjoyable pastimes such as painting. Most children reported a reduction in their grades and one girl had dropped three of her school subjects since the accident. Stallard and Law (1994) noted that many of the teachers perceived the decline in school performance differently, attributing it to "conscious laziness and determined wilfulness" (p. 95).

Mallon and Best (1995) examined the reactions of secondary school pupils to the intrusion of an armed man. In July 1993, a man entered a Birmingham secondary school for girls armed with a machete, a meat cleaver and a firearm and held hostage two classes of girls. No one was killed or injured but the man caused considerable damage, smashing classroom equipment, while threatening the pupils and their teacher. At one stage he asked pupils, 'Who wants to die first?' (p. 231). Mallon and Best (1995) describe the decrease in concentration several weeks after the incident:

In class, teachers noted that the children lacked concentration, talked to each other more frequently and rarely completed set tasks. In a science lesson, one of the authors noted excessive joke telling, out of seat behaviour, lack of concentration on the given task and a crescendo of a 'Mexican Wave'; this from a class of normally quiet, diligent pupils. (p. 232)

Nine months after a fatal school bus accident, 65% of children reported difficulty in concentrating (Milgram, Toubiana, Klingman, Raviv & Goldstein, 1988). Pynoos et al. (1993) also found evidence of concentration difficulties and thoughts of the disaster interfering with

learning after the Armenian earthquake. The researchers further reported that the presence of concentration difficulties were significantly correlated with a diagnosis of posttraumatic stress disorder. Bradburn (1991) examined the reactions of 10 to 12-year-old children from three Bay Area communities after the Loma Prieta earthquake. None of the children had suffered any personal loss or serious injury as a result of the earthquake but 23% reported difficulty concentrating. A much smaller percentage (9%) reported that thoughts of the event distracted them from school work. Concentration difficulties have been reported after a variety of other disasters including school shootings (Nader et al., 1990; Pynoos et al., 1987; Schwarz & Kowalski, 1991a); Hurricane Hugo (Shannon et al., 1994); a lightning strike (Dollinger, 1986a); floods (Ollendick & Hoffmann, 1982) and the *Herald of Free Enterprise* shipping disaster (Yule & Williams, 1990).

Sense of a Foreshortened Future

Studies of childhood trauma have often found a marked change in orientation toward the future, including a sense of a foreshortened future, negative expectations and altered attitudes toward marriage, career, and having children (Eth & Pynoos, 1985a; Terr, 1983).

Galante and Foa (1987) examined the effect of the November, 1980 earthquake in Italy on 300 elementary school children from six villages. The earthquake struck a rural mountain region. Over 4000 people lost their lives and tens of thousands lost their homes in the 116 villages damaged by the earthquake. A pessimism about the future was expressed by many of the children. For instance, many believed that, "On Nov. 23, there will be another one" (p. 358). One boy commented, "The end of the world is coming in 19 years" (p. 358).

Schwarz and Kowalski (1991a) studied the impact of the fatal school shooting of one child and the wounding of five others on students in a suburban elementary school in Winnetka, Illinois in May 1988. As a part of a day-long terror spree, a young woman with a psychiatric history, entered the school classroom, killed one child and wounded five others. Children's attitudes toward the future were not assessed directly. However, of interest, is that 6 to 14 months after the incident, 14% reported they would live to be less than 70, 19% would not have children, 13% would not get married, and 2% saw the future as all bad.

Survivors of disasters have learned that life is very fragile. This can lead to a loss of faith in the future. Some feel they should live each day to the full and not plan too far ahead. Janoff-Bulman (1992) noted that survivors of disasters realise they have been over-concerned with materialistic or petty matters and resolve to rethink their values. Stallard and Law (1994) observed that 45% of adolescents who survived a school minibuss accident reported being more acutely aware of their lives. Many reported living life to the fullest, cramming in as much as possible rather than putting off anything until another day. Others reported becoming more questioning about the importance of things in everyday life. Similarly, survivors of the *Herald of Free Enterprise* shipping disaster also reported feeling that they should live each day to the full and not plan far ahead (Yule & Williams, 1992). Some studies have found much lower levels of future foreshortening. Green et al. (1991) noted only 2% of children reporting a sense of a foreshortened future two years after the Buffalo Creek disaster and Yule, Bolton and

Udwin (1992 as cited in Yule, 1994) reported an 8% prevalence in survivors of the *Jupiter* cruise ship disaster.

Children and adolescents often clearly state their sense of vulnerability. A 17-year-old boy who had survived an automobile accident that had killed his best friend was plagued with bad dreams and fears of future disasters. When the therapist closed a session with the words, "See you next week," he said:

How do you know it will be next week? Who knows? I may die on my way out of your office. I may be killed out there on the sidewalk. I don't count on seeing you next week. I live day to day - day to day. (Terr, 1991, p. 14)

Four years after the Chowchilla kidnapping, a 12-year-old boy remarked, "I worry I'm going to die when I'm young. I don't think I want a wife. If I do, I would always have to take care of her. If there was an emergency, I wouldn't have time. Only for myself" (Terr, 1983b, p. 1547). Similarly, an 11-year-old girl declared, "I think I'm going to die young. I'm sure of this. Maybe 12 years old. Someone will come along and shoot me" (p. 1547). Terr (1983b) observed that 23 of 25 survivors of the Chowchilla kidnapping suffered from severe philosophical pessimism and the sense that their futures would be greatly limited.

Greening and Dollinger (1992) conducted a controlled study investigating the sense of fragility experienced by disaster survivors. The researchers examined the effect of experiencing a natural disaster (lightning strike, tornado, and flood) on adolescents' perceived risk for future events. 455 adolescents estimated the likelihood of dying from 24 lethal events including weather disasters, accidents, disease and acts of human agency. Results showed that personal experience with a disaster predicted elevated subjective risks for death from future events. A sub-group of the study participants were adolescents who had experienced the 1980 lightning strike disaster (e.g., Dollinger, O'Donnell & Staley, 1984; Dollinger, 1985). Separate analyses of these subjects suggested that a sense of increased vulnerability can last as long as seven years.

Affective Effects

Fears

Extreme fear, usually experienced as terror, is central to psychological trauma. Children tend to reexperience their original state of terror in ways that disrupt their sense of safety after the event (Monahan, 1993). Fear can take many forms following a trauma. Fear that the traumatic event will recur is one of the most general postdisaster responses. Some children became pervasively fearful. Others develop specific, isolated fears of stimuli connected to the traumatic incident.

Many children fear and believe that the original trauma will occur again. Children lack the perspective to appreciate the probability of a rare disaster occurring again and therefore are not comforted by reassurances of a low probability of recurrence.

Pynoos et al. (1987) found that fear of recurrence was characteristic of almost all children involved in a school sniper incident in the United States. This study is particularly interesting because the researchers concluded that fear of recurrence was unrelated to the degree to which children were exposed to the incident. In February 1984, a sniper began firing from a second-storey window across the street from a Los Angeles elementary school. The shooting began right after the school dismissal bell and the school playground was targeted by the sniper. One child and one passerby were killed and 13 children were injured. The majority of the children escaped the playground and ran to classrooms or their homes but many were pinned to the playground under gunfire. Many children were separated from their brothers and sisters, and parents were denied access to the school grounds by police for several hours until the siege was declared over. Pynoos and his colleagues reported that fear of recurrence was present in the majority of children trapped on the playground or who were present but managed to escape. The school operated on a year round schedule so 25% of children enrolled at the school were on vacation at the time of the incident. However, a fear of recurrence was as prevalent in these children as it was in the children actually exposed to the trauma. The researchers suggest a "symptom contagion" effect whereby fear is spread between groups of children or between parent and child in the community at large.

Terr (1979) reported that all the children in the group of 23 interviewed after the Chowchilla kidnapping exhibited kidnap-related fears. Twenty children feared being kidnapped again; 12 were afraid a fourth kidnapper existed and had not been caught; 6 believed that the arrested kidnappers themselves were coming back; and 10 believed that there would be a second unrelated kidnapping. A 10-year-old girl reported "I'm afraid about it. Since the kidnapping I don't like to walk too far because I think someone may try to kidnap me" (p. 566).

Monahan (1993) notes that an obsessive fear of further trauma can create a state of perpetual fearfulness that may seem maladaptive. However she also suggests that, from a child's point of view, it allows them to search for signs that will prepare them for a recurrence of the trauma. This state of internal preparation may give the child a needed sense of readiness and power.

Specific fears are a salient feature of children's reactions to disasters. Children affected by a disaster often have increased frequency and intensity of fears of stimuli directly or tangentially related with the disaster. For instance, Saylor et al. (1992) examined parents' and preschoolers' reactions following Hurricane Hugo. Hurricane Hugo was a Class IV hurricane that struck the South Carolina coast in the United States in September 1989. The destruction was widespread with an estimated 30 000 people out of their homes, at least temporarily. Thirty-five people died as a result of the storm and the property damage was an estimated 6 billion dollars (US). Parents completed a child behaviour checklist eight weeks after the storm in which they were required to confirm the frequency of 50 child behaviours before and after the hurricane. Parents reported that 67% of pre-school children presented new and unusual fears following Hurricane Hugo. Fear of storms and night-time were common. The preschool children also showed high incidence of fear of water, often extending to refusals to take baths or showers.

Dollinger et al. (1984) studied the development of fear following a fatal lightning strike in Illinois in September 1980. During the second half of a children's soccer match, the centre of

the field was struck by lightning which knocked down all the players (aged 10 to 12 years) and most of the children and adults who were spectators. Six children required urgent medical attention and two more were hospitalised for more than a week. One boy, hit directly by a bolt, never regained consciousness and died one week after the incident. Twenty seven players, two same-age sibling observers and 58 control children completed a fear survey approximately one month after the lightning strike. Children on the soccer field showed more fear of storms than did the matched control children and these fears were more intense. So real was the threat of the storm for one of these boys that he put on a football helmet and retreated to the basement during subsequent storms. In addition, fears of sleep, noise, death and disasters were more prominent in the lightning strike group.

Yule, Udwin and Murdoch (1990) reported a similar pattern of intense fear of stimuli directly related to a traumatic event after the 1988 sinking of the *Jupiter* cruise ship. Twenty five girls aged 14 to 16 years who survived the sinking were compared on the Revised Fear Survey Schedule for Children (Ollendick, 1983) with three other groups of girls: 71 controls from a separate school; 46 girls in the same school who had not wanted to go on the cruise ship; and 13 girls who were in a 'near miss' group in that they wanted to go but did not get places. Survivors developed significantly greater fears of stimuli related to the traumatic event such as deep water or ocean, travelling by boat or ship, swimming, loud noises, having to go to school, choking, closed places and being alone.

Similar findings have been reported in other studies. Terr (1979) reported that many of the children involved in the Chowchilla kidnapping displayed persistent fears of the dark, the wind and all vehicles (the kidnappers had blocked the road in front of the bus with a seemingly broken-down van). Jones and Peterson (1993) identified a generalised fear of all cars, trucks, vans and motorcycles in a 3-year-old girl involved in an automobile accident. Blaufarb and Levine (1972) observed fears of being alone, of the dark and of going to sleep in children after the 1971 San Fernando earthquake.

Some children's specific fears seem unrelated in content or meaning to their actual trauma. Fears of the dark, of going to sleep, of being alone, of monsters, "bogeymen", spiders or the supernatural are typical of indirectly related "mundane fears" following trauma (Terr, 1990).

Some children are pervasively fearful. They are suddenly afraid of many aspects of their everyday experience. These children appear to have undergone a personality change following the trauma as routine activities they may have enjoyed in the past become feared and avoided (Monahan, 1993).

Fear is not necessarily a simple, unitary reaction (Pynoos et al., 1987). Many of the immediate responses of children to a traumatic event described in the following sections such as separation difficulties, attempts to avoid reminders of the event and intrusive reexperiencing can be seen as a type of extreme fear response.

Isolation, Anger and Irritability

Additional emotional responses including feelings of isolation and estrangement, anger, and irritability are common reactions in children after disasters.

Children can feel very isolated after a disaster. Pynoos (1990) observed that even while appearing to cling to their parents more, children may still feel a sense of estrangement. They may feel that others, including their parents, cannot fully understand or even recognise what they went through. Three months after Hurricane Hugo, 25% of children aged 9 to 19 years old reported that they felt emotionally isolated some, much or most of the time (Shannon et al., 1994). The researchers also found significant differences in the prevalence of emotional isolation in different age groups and between girls and boys. Children aged 9 to 12 years were significantly more likely to report feeling emotionally isolated than 13 to 15-year-olds or 16 to 19-year-olds and females more than males. Of children on the playground during a sniper attack on their school, 59% reported feelings of estrangement including feeling more distant from their parents and friends and more alone with their feelings (Pynoos et al., 1987).

Feelings of isolation can persist for many months after a major disaster. For instance, 41% of 10 to 12-year-old children reported feeling alone with their feelings 6 to 8 months after the Loma Prieta earthquake (Bradburn, 1991). One and a half years after the Armenian earthquake, Pynoos et al. (1993) reported that feelings of estrangement from others was virtually absent in children whose reactions were categorised as mild to moderate but was very prominent in children with very severe reactions.

Although child survivors experience a need to talk about their experiences, they can also find it very difficult to talk with their parents and peers about the disaster. Yule and Williams (1992) reported that teenagers who survived the *Herald of Free Enterprise* capsizing often found it very hard to share their feelings with their parents and would even go out of the house to avoid talking about it. Often children do not want to upset adults by talking about the disaster and so parents may not be fully aware of the extent of their children's suffering (Jessup, 1992). For instance, Yule and Williams (1990) describe the case of an 11-year-old boy who survived the *Herald of Free Enterprise* disaster:

James was 11 at the time of the accident. He had gone on the day trip with his mother. When seen, he was very quiet and well mannered. ... Like his mother, he was intent on saying that he was coping very well and denied that he was suffering any ill effects. However, in retrospect, it was a mistake to conduct both interviews with them together and it was felt that James was not describing all he was feeling for fear of distressing his mother. This suspicion was confirmed many months later during a group meeting when he described some definite intrusive thoughts and images to the other children. (p. 286)

Stallard and Law (1994) investigated the reactions of nine adolescents who were involved in a minibus accident whilst travelling on an educational school trip. All but two of the young people reported difficulties talking about this event with their parents. The researchers

described the case of one girl who protected her parents by not discussing the accident since it made her mother too upset.

Children may socially withdraw and appear unmotivated to meet with their friends. Pynoos et al. (1987) reported that 66% of children in the playground and 50% of children at school during the sniper attack reported a loss of interest in previously enjoyed activities. Peer difficulties have been observed to persist long term. Eight to fourteen months after a fatal school shooting in Illinois, 16% of school-age children reported that they got along less well with others, and 14% reported that they had fewer friends (Schwarz & Kowalski, 1991a). Yule (1994) noted that peers may hold back from asking what happened in case they upset the child further and the survivor often feels this as a rejection.

Children may be more irritable and easy to anger after a disaster. As a result they may show a reduced tolerance of the normal behaviours and demands of peers and family members (Pynoos, 1990). Six to fourteen months after a fatal school shooting, 59% of children reported feeling angry (Schwarz & Kowalski, 1991a). Two years after the Buffalo Creek disaster, irritability and outbursts of anger were observed in 37% of children aged 2 to 15 years. Similarly a principal of an Auckland intermediate described the reactions of the children after a fire destroyed their school, "They were subdued for a while, the kids, and very, very quiet. And then they were very, very angry" (Smith, 1990). Likewise, children aged 3 to 12 years who lived near the site of the 1982 Pan Am plane crash were very clear in directing anger at the aeroplanes and Pan Am (Sugar, 1989).

Increased irritability, including increased temper tantrums, has been reported in some studies (e.g., Milne, 1977; Ollendick & Hoffmann, 1982). When it does occur, this symptom may reflect the increased arousal associated with stress responses but also may be in reaction to the disruption and changes that occur in the aftermath of some disasters. Over 50% of parents reported that their preschoolers were more stubborn, sullen and irritable after Hurricane Hugo than previously (Sullivan, Saylor & Foster, 1991). Similarly, 59% of adolescent survivors of the *Jupiter* cruise ship disaster reported feeling irritable and angry with both parents and peers (Yule, Bolton & Udwin, 1992 as cited in Yule, 1994).

Guilt and Shame

Some children experience excessive guilt often resulting from the fact that they have survived a major disaster when others have not. The experience of guilt has been also reported for children who are unable to aid a victim or had to endure pleas for help from others whom they could not help. The presence of guilt is of diagnostic importance because it appears to increase the severity of children's posttraumatic stress reactions (e.g., Pynoos et al., 1987; Pynoos et al., 1993).

Pynoos et al. (1987) reported that 17% of the children in the playground during the sniper attack and 28% of children in the classrooms reported feeling guilty. Children reported "feeling bad" at being unable to provide aid, being safe when others were harmed, or taking actions that they believed endangered others. Although relatively infrequent, the presence of guilt was significantly associated with a severe posttraumatic reaction (Pynoos et al., 1987). Fourteen

months after the sniper attack, 14% of all the children were still harbouring feelings of guilt (Nader et al., 1990).

Similarly, Pynoos et al. (1993) reported that the presence of feelings of guilt was significantly correlated with a diagnosis of posttraumatic stress disorder in children one and a half years after the Armenian earthquake. Six to fourteen months after the Illinois school shooting, Schwarz and Kowalski (1991a) noted that 40% of elementary school children experienced feelings of guilt. Guilt was also significantly related to increased startle response and increased physical reactivity in these children.

Children can feel intensely guilty when they feel that some specific action of theirs increased the threat to others. Pynoos and Nader (1988) report the tremendous sense of guilt experienced by a sixth-grade boy who, prior to the sniper attack, had sent his younger brother to get their cousin. Both were then pinned on the playground under the gunman's fire. Dollinger (1985) described a case in which a boy's reaction to a lightning strike disaster was exacerbated by guilt over predisaster behaviour toward a sibling who was killed. Pynoos et al. (1993) also noted that guilt appeared to be linked to specific behaviour after the Armenian earthquake. For example, one boy stated that he felt guilty because, "If I had run left instead of right, my mother would not have died" (Pynoos et al., 1993, p. 244).

In a particularly extreme case, Grigorian (1992) reported the following clinical example, of survivor guilt in a school-age girl (Mariam) who attempted suicide 16 months after the Armenian earthquake:

The reason she gave for her despair was the deaths of her 2-year-old cousin and 22 of her 30 classmates in the earthquake. She herself was miraculously rescued, and her leg was saved from amputation. The parents of her dead classmates repeatedly asked her how was it that she survived and their children did not. Did she know where to go in the falling building in order to escape? They made comments to her mother such as, "How lucky you are that both your children survived. Why couldn't Mariam die and my son be alive?" Her aunt who had lost a child would comment frequently, "All the beautiful and bright children died. The ugly and dumb survived." Mariam felt guilty for living. (p. 162)

Behavioural Effects

Disruptive Behaviour

After major disasters, one frequent evaluation strategy has been to examine overall levels of behaviour problems using standardised problem behaviour checklists.

Researchers investigating the reaction of preschoolers to Hurricane Hugo (Sullivan et al., 1991; Saylor et al., 1992) collected data on 278 preschool children aged 2 to 6 years. Questionnaires completed by parents six weeks after the disaster included a modified version of the Child Behaviour Checklist (Achenbach, Edelbrock & Howell, 1987). The children were found to display a significant increase in the number and severity of problem behaviours after the

hurricane, including dependent and demanding behaviour, frustration, irritability and temper tantrums.

Adolescents may embark on a period of post-traumatic acting out behaviour in the form of school truancy, substance abuse and delinquency (Pynoos, 1990). Terr (1979) described a 9-year-old Chowchilla kidnap victim who became a prank phonecaller: the girl would breath hard on the phone, whispering, "Help me, help me," and then hang up. Muller (1987) describes the marked increase in juvenile delinquency after the March 1987 Bay of Plenty earthquake in New Zealand. He observed a substantial increase in the number of teenagers running away from home, arson attacks and acts of serious burglary committed by adolescents.

Aggressive behaviour such as bullying and fighting has also been reported in studies of children during the aftermath of a wide variety of disasters. Burke, Borus, Burns, Millstein and Beasley (1982) made a predisaster-postdisaster assessment of children exposed to a severe blizzard and subsequent flood in Revere, Massachusetts in February 1978. Children's scores on a parent and teacher rated aggressive conduct subscale (Conners, 1969) increased significantly after the disaster compared to predisaster levels. The subscale is composed of seven items including such behaviours as bullying, being mean, fights constantly and picks on other children. Ollendick and Hoffmann (1982) found similarly increased levels of temper tantrums, fighting and breaking things in children rated by their mothers after a severe thunderstorm hit the city of Rochester, Minnesota in July 1978.

Durkin, Khan, Davidson, Zaman and Stein (1993) conducted a prospective study of the effects of disaster on children. In September 1988, six months after the researchers completed a population-based study of child health and disability in Bangladesh, a flood disaster occurred. More than three-quarters of the land was submerged, much of it for 20 days or more. Throughout the country, millions of people were left homeless and more than 2000 people died as a result of the flood. The population based study evaluated 2667 two to nine-year-old children from a rural agricultural area of Bangladesh. Five months after the disaster, a representative sample of 162 surviving 2 to 9-year-old children was reevaluated. Between the pre- and post-flood assessments, the prevalence of aggressive behaviour increased from 0% to nearly 10%. The increases in aggression occurred in both boys and girls but the rates tended to be higher in boys.

Similarly, Blom (1986) discussed the effects of the collapse of a pedestrian overbridge on schoolchildren who were either on the walkway at the time or who witnessed the accident from the school playground. Thirteen days after the accident, questionnaire data was obtained on 156 of the 294 children involved. The children mainly showed anxiety about walking near walkways but high levels of aggression were found in boys although not in girls.

It is important to note that the behaviour checklists used in many of these studies are designed to detect parent or teacher perceptions of the frequency of behaviour problems associated with a wide range of mental disorders. The behaviour checklists are broad screening instruments and they are not designed to assess the reactions to relatively rare but severe stressors such as

disasters (Yule & Williams, 1990). Unfortunately, few studies have examined children's scores on subscales that measure symptoms that tend to be associated with disasters.

Withdrawal and Avoidance

Children frequently avoid activities, social interactions, situations, people and places that are reminders of the traumatic event. This can involve withdrawing from previously enjoyed activities because they are linked to the disaster.

Children frequently react to trauma with a generalised response of distrust (Johnson, 1989). Terr (1979) reports that the vast majority of children involved in the Chowchilla kidnapping believed that they could be kidnapped again. A 14-year-old boy summarised "I'm much more cautious now. I know it can happen to me. Before I thought it could only happen to other people" (p. 570). Consequently they avoided situations that reminded them of the kidnapping. The mother of one 10-year-old boy described the following situation:

Before Christmas during vacation he was biking with a friend riding sandhills. A station wagon, two guys, and a dog were there. He abandoned his bike and ran home. He said he didn't want to be kidnapped again. He cried a lot. I advised him not to panic and run. Just before the Fair in May, there were strangers on the road, and he gave up biking there and refused to go further. (p. 570)

Children may avoid activities which remind them of the traumatic event. For instance children would walk out of their way to avoid a house where a sniper had shot at their school (Nader et al., 1990). Mallon and Best (1995) described the reactions of girls at a single-sex secondary school in England following an intrusion by an armed man. Many of the pupils avoided reminders of the trauma. In particular, pupils were refusing to walk up the stairs to the classroom where the incident occurred.

Bradburn (1991) investigated the reactions of 22 children aged 10 to 12 years from three Bay Area communities 6 to 8 months after the Loma Prieta earthquake in California. Fifty-five percent felt that they actively tried to avoid things that reminded them of the event, including bridges, walking under highways, or being where they thought the earthquake hit. Similarly, Dollinger (1985) examined the emotional and behavioural reactions of children to the fatal lightning strike during a children's soccer match in Illinois in September 1980. Nine months after the disaster, those who were most upset by the incident were more likely to refuse to play soccer - deliberately avoiding the field and the game which they associated with the trauma.

Refusal to play soccer is a fairly specific avoidance behaviour. However, reminders of a traumatic event can sometimes result in very generalised and debilitating avoidance behaviours. Keppel-Benson and Ollendick (1993) describe the case of a 12-year-old boy who refused to accompany his mother on car trips to visit his sister as they would have to pass by the site of their automobile accident, which occurred 8 months earlier. Another 8-year-old, who had been struck by a car 14 months earlier, did not participate in trick-or-treating on Halloween because he was afraid of crossing streets.

A reduction in interest in usual activities may be both a response to a depressed mood, and indicate an effort to avoid further trauma by reducing involvement with the external world. School-age children may discontinue pleasurable activities to avoid any chance of encountering another painful or frightening situation (Pynoos, 1990). Furthermore, children may exhibit marked inhibitions in play and stop playing familiar games. Play can seem dangerous to children who feel a strong need to avoid any activity that could trigger reminders of a trauma. Monahan (1993) describes the case of a 5-year-old boy who had seen his sister's drowning during a hurricane. For several years he would have periods of nightmares and daytime recall that were so disturbing for him that his play behaviour would be totally transformed:

Often the bouts of recall began when it was rainy or windy. Over time, his mother noticed that Duncan would stop his usual wild and fun play for the duration of each of these episodes of recall, which generally lasted four or five days. During these sieges of memory, Duncan would avoid any toys that might be used for dramatic play. Safer for Duncan at these times were passive activities like watching videos, which helped him avoid feelings altogether. (p. 37)

Avoidance behaviour can frequently take the form of truancy from school. Especially if the incident occurred during school hours or is linked to the school (e.g., a school bus accident). For instance, absenteeism after the February 1984 sniper attack on a Los Angeles elementary school peaked at 32% of pupils per day for the first week after the incident (Pynoos et al., 1987). Absenteeism didn't return to normal levels of 64 pupils per day until one month after the sniper attack. Milgram et al. (1988) reported an absenteeism rate of 11% for several days after a catastrophic school bus accident. Muller (1987) also described large rates of absenteeism after the March 1987 Bay of Plenty earthquake in New Zealand. Although many of these absences were due to families moving out of the area for an extended period of time to stay with relatives (Muller, 1987). Unfortunately, children who stay (or are kept) at home following a disaster run the risk of delays in resuming their normal roles as students, as well as the benefits of social support from other children and adults outside the family.

Sometimes, avoidance behaviour may include amnesia of important aspects of the trauma (DSM-IV, 1994). This will be discussed in the section *Memory Disturbances* (p. 20).

Regression

Behavioural patterns associated with earlier developmental levels have been observed in children who have experienced trauma. Children can react to stress with a temporary setback in age-appropriate skills and behaviours. In younger children, the most common of these behaviours are reversion to bed-wetting, thumb sucking, a loss of previously mastered academic and/or language skills, and clinginess and dependence on parents. Older children and adolescents can also demonstrate an increased dependency on parents.

Toileting accidents are common for younger children following a trauma. Durkin et al. (1993) reported increasing rates of enuresis for all age groups in their study of Bangladesh children after the September 1988 flood. Among younger children, 3 to 8 years at the time of the flood,

37% to 45% developed enuresis. At the oldest ages, 9 to 10 years, the percentage of children developing enuresis was lower but still substantial (21%).

Cornely and Bromet (1986) investigated the prevalence of long-term behaviour problems in 2½ to 3½-year-old children living near Three Mile Island (TMI) 2½ years after a nuclear accident. In March 1979, a series of mishaps occurred at the TMI nuclear power plant in central Pennsylvania. A partial meltdown of the reactor core led to a plume of radioactive material a half-mile wide being released into the atmosphere (Handford, Mayes, Mattison, Humphrey, Bagnato, Bixler & Kales, 1986). Two days after the release of the radioactive material, women and children under five years of age living within a five-mile radius were evacuated. There were no direct injuries or deaths outside the plant. Toileting problems (soiling) were significantly greater in the TMI children compared to control groups of children living near another nuclear plant in Pennsylvania and children living near a fossil-fuel site.

Toileting problems have also been found in studies of the behavioural problems of children after earthquakes (Blaufarb & Levine, 1972; Kozlovskaja et al., 1991), floods (Gleser et al., 1981; Newman, 1976; Ollendick & Hoffmann, 1982), cyclones (Milne, 1977; 1979), mud slides (Lacey, 1972), school disasters (Blom, 1986) and a kidnapping (Terr, 1979, 1983a).

A reversion to thumb sucking (Milne, 1979; Schwarz & Kowalski, 1991a) and assuming a foetal position (Dollinger, 1985) are also common behaviours found in children who have experienced traumatic events.

Regressive behaviours do not only refer to physical actions but also intellectual and social responses. An important developmental step in early childhood and then again in adolescence is a decreasing dependency on parents and an ability for the child/adolescent to explore situations for themselves (Mowbray, 1988). There is considerable research indicating that a central aspect of the child's sense of security is the emotional support that the child derives from contact with their parents (Eth & Pynoos, 1985a). The presence of the parent and the security they represent, facilitates the child's ability to gradually explore unfamiliar situations. Fear of separation from parents or other trusted caretakers is a particularly common reaction for children of all ages following trauma. Anything that threatens separation from the security of the parent's presence is likely to cause severe anxiety in the child (Farberow & Gordon, 1981). A disaster is a sudden and unexpected situation which threatens a child's feelings of safety. Therefore, the child will stay close to an adult in subsequent unfamiliar or potentially stressful circumstances. Although this is a frequently reported regressive behaviour in infants and pre-schoolers, it is also seen in older children and adolescents.

Separation fears are a signal that feelings of safety are available only in the presence of a parent (Monahan, 1993). Separation anxiety is often exemplified by clingy behaviour and an increased dependency on parents. For example, children may want to sleep with parents or show reluctance to go to school.

Schwarz and Kowalski (1991a) studied the impact of the fatal school shooting of one child and the wounding of five others on students in a suburban elementary school in Winnetka, Illinois

in May 1988. Of the 64 children aged 5 to 14 years old, 41% reported a loss of recently developed skills or regressive behaviour (e.g., thumb sucking or sleeping in their parent's bed). Similarly, Muller (1987) describes children wanting to sleep in their parents' bed after the 1987 Bay of Plenty earthquake. The security represented by parents was evident in the words of a 9-year-old girl after that earthquake:

After school when I was in the car I felt quite safe because I was with my mum.
At home I made a bed under the table so I would be safe. At nighttime I slept in
mum and dad's bed. (Rudman, 1987, p. 34)

Increased separation difficulties and clingy, dependent behaviours were reported by parents in more than 50% of pre-schoolers after Hurricane Hugo (Sullivan et al., 1991). For some school-age children as well, separation difficulties are a significant postdisaster symptom (e.g., Dollinger, 1985; Ollendick & Hoffmann, 1982; Bloch et al., 1956). For example, separation difficulties were judged to be the central symptom for two of the eight children who showed severe reactions after a fatal lightning strike at a children's soccer game; one boy refused to let his parents out of his sight, a symptom that abated gradually over the next two months (Dollinger, 1985).

Separation anxiety can affect older as well as young children following trauma. Yule and Williams (1990) reported their experience in assessing and treating the children who survived the capsizing of the *Herald of Free Enterprise* in Zeebrugge harbour in March 1987. They assessed thirteen of the then known 22 surviving children under the age of 16 years. Initially, most children (regardless of age) wanted to be physically close to their surviving parents, often sleeping in the parental bed over the first few weeks. The researchers noted that some parents who were distressed themselves found their children's 'clinginess' difficult to cope with.

Monahan (1993) describes intense separation anxiety in an older girl traumatised by a severe attack by a dog:

Maggie was a brilliant young girl in her sophomore year of boarding school who had been viciously attacked by her cousin's doberman. The dog had done severe damage to Maggie's ear, resulting in numerous painful reconstructive surgeries. A year following the dog's attack, Maggie was embarrassed to admit that she was unable to cross the rural school ground by herself. Dogs ran loose at this school, and she was terrified of encountering them. ...Midyear, Maggie suddenly decided to leave this school which she had loved and return to the public high school in her home town. Overwhelmed by the feelings of danger that invaded her days...Maggie simply wished to be closer to home. (p. 28-9)

Evidence of regression can sometimes be found in the intellectual functioning of children. Children can forget previously mastered academic skills (Terr, 1983a). Young children may lose recently developed language skills or show a slowing down of language development. For instance, a 6-year-old Chowchilla victim reverted to "baby talk" for several months after the incident (Terr, 1979). Kozlovskaja et al. (1991) investigated 1900 children's reactions to the

Armenian earthquake. The researchers reported that children frequently developed speech disorders in the immediate period after the earthquake.

Repetition

A common reaction of children to traumatic events is a repetition and reenactment of the incident through play or verbalisation.

Posttraumatic Play

Traumatic play consists of the redramatisation in play of episodes of a disaster or the repetition in play of traumatic themes (Pynoos & Nader, 1993). Reenactment of aspects of a disaster in play is frequently reported for both preschool and school-age children (e.g., Saylor et al., 1992; Terr, 1979, 1981). Many children use play as a way to solve the problems and worries of everyday life (Monahan, 1993). However, ordinary play is characterised by light, easy feelings and a sense of enjoyment. Posttraumatic reenactment in play frequently lacks both pleasure and relief and often has a seriousness and intensity uncharacteristic of ordinary play (Schaefer, 1994).

Terr (1979) first described maladaptive posttraumatic play in her investigation of the children 'buried alive' during the Chowchilla kidnapping. For instance, a 5-year-old girl would bury her Barbie doll: "There is a cement place at my grandma's which is like a hole. I put clothes in it and my Barbie dolls. I pretend they're stuck in the hole" (p. 577).

Six months after the Italian earthquake the researchers noted that many children played an "earthquake" game in which everyone was killed. Similarly, Saylor et al. (1992) reported that preschool children who experienced Hurricane Hugo in 1989 engaged in repetitive "hurricane" games. For instance, eight weeks after the hurricane: "a mother reported her four year old's repeated replay of Hugo with every medium available, including the broccoli spears at dinner, which represented the trees being ravaged again and again" (p. 143). A number of the preschool children who survived the sinking of the *Herald of Free Enterprise* were reported by teachers and parents to get involved in repetitive play involving themes about the ship (Yule & Williams, 1992). One 4-year-old girl involved her playmates in endless games of nurses patching up the injured, and this went on for many months.

In 1982, a Pan Am plane crashed shortly after takeoff from New Orleans, killing 142 passengers and 8 people on the ground including 6 children. Children who lived near the crash area engaged in fire setting and plane crashing play with siblings and others (Sugar, 1989). Several children attending a child guidance clinic four years after the Aberfan mine collapse and subsequent engulfing of the town school played "burying" in the sand games (Lacey, 1972). Likewise, reenactment of the trauma in play has been observed in children experiencing a tornado (Bloch et al., 1956), an Australian bushfire (McFarlane, 1987b), and a school shooting (Schwarz & Kowalski, 1991a).

Posttraumatic play can be retraumatising and create rather than relieve anxiety (Terr, 1981). The differentiating factor is likely to be the course of the play over time. Symptomatic posttraumatic play is described as "stuck" (Terr, 1981). Expanding upon Terr's observations

through their work with children experiencing the 1984 school sniper attack, Pynoos and Nader (1993) suggest that children's posttraumatic play may either provoke anxiety or provide relief for the child depending on the degree of perceived control over outcome, the degree a satisfactory ending is achieved, and the degree a cognitive reworking of the trauma is facilitated. For instance, a boy who attempted to engage his peers in shooting games following the sniper attack became agitated whenever his friends would not allow him to be the successful good guy (Pynoos & Nader, 1993). In contrast a boy who enacted the successful rescue of the school by police and firemen and a girl who played at being nurse and helped the injured both experienced a sense of relief (Nader & Pynoos, 1991).

Another example of adaptive posttraumatic play was reported by Saylor et al. (1992) after Hurricane Hugo. One family of young children progressed from playing "hurricane" games in which they verbalised the noises of trees falling and pretended the hurricane was coming to games in which they were making the repairs to the damaged houses as workmen and homeowners. Similarly, a group of preschoolers played an earthquake game after the San Francisco earthquake in 1989. One child was designated "it" and shouted "Earthquake!" then all the other children had to duck and take cover. The last player to duck and take cover became "it" for the next round of play (Schaefer, 1994).

Terr (1981) noted several features of anxiety provoking posttraumatic play. In particular, posttraumatic play is characterised by compulsive repetitiveness. Children who have been traumatised play their game repetitively until they are told to stop by teachers or parents or until they reach an understanding of the connection of their play to the original trauma. In addition, posttraumatic play can involve nontraumatised children as well. For instance 25 children were playing "Kidnap Tag" at one of the Chowchilla schools but only one of the children had been kidnapped. The kidnapped child consistently played the part of the kidnap victim, while the other children interchanged roles of kidnappers, police and the bus driver. Terr (1990) reports that the children shrieked, squealed, and looked so "weird" that, after about a month of watching it, one of the teachers banished the game.

Some children try to undo the most difficult aspects of the traumatic event through play. The children's play may include changes that represent wishfulfilling fantasies (Schaefer, 1994) or denial (Pynoos, 1990). For instance, a preschooler who had witnessed the Pan Am plane crash played extensively with toy aeroplanes which took off and landed without incident (Sugar, 1988). A month after the Chowchilla kidnapping, a 7-year-old girl developed a "bus driver" game which she played with her younger sister several times a week. The game consisted of placing two chairs on top of the kitchen table and 'driving' the 'bus' to various passenger stops. When asked if she thought the game might be related to the kidnapping, the girl replied, "Oh, no. I drive a *safe* bus. No one on my bus ever gets kidnapped!" (Terr, 1979, p. 576). Children often retrospectively search for any actions they could have taken to prevent the traumatic incident and incorporate these into their play.

Sometimes generalised changes may be noticed in a traumatised child's play. For instance, a 3-year-old girl involved in an automobile accident became more violent and aggressive in her

play and would often run at her 5-year-old sister and hit her repeatedly (Jones & Peterson, 1993).

Posttraumatic play may also involve drawing. Newman (1976) described the representation of the Buffalo Creek disaster in the drawings of the children. The drawings often portrayed wish fulfilment fantasies of safe houses and people. The drawings by children six months after the 1980 earthquake in Italy portrayed symbolic representations of their actual losses (Galante & Foa, 1987). For instance, a seemingly cheerful 8-year-old girl drew two figures and omitted the lower half of their bodies when asked to draw a person. Her mother had remained paralysed from the waist down as the result of earthquake injuries.

Retelling

In another form of repetitive behaviour, children who have experienced trauma often tell and retell stories associated with the traumatic event. The need to retell can appear insatiable and the story may need numerous retellings for the child to experience some control over it (Monahan, 1993). Several children involved in the Chowchilla kidnapping took any opportunity to retell their story to the news media and at school assemblies (Terr, 1979). A similar need was observed in children after the Italian earthquake (Galante & Foa, 1987).

Children who spend an inordinate amount of time discussing the details of the traumatic event may be temporarily protecting themselves from feelings of anxiety and grief (Eth & Pynoos, 1985a). Often this can lead to unemotional, journalistic accounts of the event. For instance, Eth and Pynoos (1985a) describe one 8-year-old boy who would always introduce himself by saying, "I'm Tommy, my father killed my mother" (p. 45). Galante and Foa (1987) reported that many of the children who had experienced the Italian earthquake discussed details of the earthquake six months to one year after the event. The researchers noticed a repetitious, monotonous, well-rehearsed air to the earthquake stories. Pynoos (1990) notes that the need to regulate emotion can inhibit pleasant as well as distressful feelings and hence children who have experienced disaster are often described as having a restricted emotional range.

Retelling can concern the central traumatic event or it can relate to one aspect of the disaster which is especially important or meaningful to the child. Children's concerns about the disaster can be very personal and day-to-day. For instance, one parent described a story told repetitively by a 2-year-old boy after Hurricane Hugo in 1989: "We used to have a little red car before Hugo. Unfortunately, a pine tree smashed it completely. It was my child's favourite colour and his favourite to ride in. Every time we see a red car on the road we have to hear the story about how Hugo smashed our car" (Saylor et al., 1992, p. 146).

Retelling can also be invested with aspects of wish fulfilment and fantasy. Pynoos and Nader (1989) asked 113 children to freely recall their experiences of the 1984 school sniper attack between 6 and 16 weeks after the traumatic incident. The researchers report two cases in which children who witnessed the death of a classmate incorporated imagined actions into their representations of the event. One 11-year-old girl described standing over her fatally wounded classmate and saying, "I love you," before she died. The researchers noted that, in fact, no one could get near the dying child because of the continued rapid gunfire. Another classmate stated

that someone had moved the fatally injured girl into a protected area where she could have received help when the paramedics arrived.

Some children may not talk about the actual traumatic event they have experienced but instead attempt to compensate for their feelings of helplessness by telling stories in which they have some control over events. Monahan (1993) described a 9-year-old boy who had witnessed his infant brother's accidental death:

In his first session of play therapy, he suddenly began talking about a young child whom he had seen swimming without supervision. Collin described his fantasized heroic rescue of this child from the water in great detail. Only later in therapy could he describe the helplessness he experienced as he watched his brother's fall from a fourth-story window. (p. 35)

Reenactment

Reenactment behaviour in which children act out specific repetitious fears, fantasies, or behaviours that had occurred just before or during traumatic events are frequently reported (Pynoos, 1990).

Pynoos (1990) describes the case of a teenage boy who had been in an automobile accident which had killed his friend when the car had rolled over. Several weeks after the accident the boy found himself compulsively riding the 'corkscrew' roller coaster. Pynoos suggests that the boy was repeating the sense of rolling in the car, only this time with a guaranteed safe outcome.

In a similar behavioural reenactment, a 10-year-old girl ran away from home four years after the Chowchilla kidnapping (Terr, 1983). She left in the night and hitchhiked a ride from a stranger. The next morning her mother reported her missing daughter as kidnapped. However, the girl saw no connection between the kidnapping and the escapade: "The kidnapping was that they were taking *me*...this was that *I* was going" (p. 274, Terr, 1990).

Physiological / Somatic Effects

Sleep Disturbances

Disruptions in sleep, occurring in various forms, have been reported as immediate and long-term effects of disaster. Sleep problems include reluctance to sleep alone, problems getting to sleep, superficial and fitful sleep, night terrors, nightmares, and repeated dreams related to the disaster. Sleep disturbances are reported by researchers who work with all traumatised groups and are considered to be the hallmark of posttraumatic stress disorder (Ross, Ball, Sullivan & Caroff, 1989).

Sleep disturbances were observed in all age-groups after the Armenian earthquake (Kozlovskaja et al., 1991; Pynoos et al., 1993) and reports of children sleepwalking and experiencing recurrent nightmares were frequent after the 1987 Bay of Plenty earthquake (Muller, 1987). Similarly, Blaufarb and Levine (1972) observed that sleep disturbance was the most common problem for children after the 1971 San Fernando earthquake. Significant sleep disturbances

were reported by parents of 10 to 12-year-old children one to two months after experiencing a fatal lightning strike during a soccer match (Dollinger, 1986a). These included talking in sleep, bad dreams, restless sleep, difficulty going to sleep, not wanting to go to bed, afraid of the dark, refusing to sleep without a nightlight, and wanting to sleep in parents' bed.

Likewise, sleep disturbances have been observed in pre-school and school-age children after Hurricane Hugo (Joyner, 1991; Shannon et al., 1994; Sullivan et al., 1991); school bus accidents (Milgram et al., 1988; Stallard & Law, 1994); automobile accidents (Jones & Peterson, 1993); floods (Ollendick & Hoffmann, 1982); the Buffalo Creek Dam disaster (Newman, 1976); a pedestrian overbridge collapse (Blom, 1986); a fatal school sniper attack (Pynoos et al., 1987); the Chowchilla kidnapping (Terr, 1979); and the sinking of the *Jupiter* cruise ship (Yule, 1992a; Yule & Udwin, 1991).

Sleep disturbances can persist for many months after a disaster. Bradburn (1991) investigated the long-term response of children aged 10 to 12 years to the Loma Prieta earthquake in 1989. Six to eight months after the earthquake, 27% of the children recalled dreaming about earthquakes in the past month and the same percentage had sleep-related difficulties; children reported lying in bed "staring at cracks", thinking about earthquakes and hearing sounds that made them worry about the approach of another earthquake. One mother described the sleep disturbances of her daughter a year after Hurricane Hugo: 'My 3 year old still calls out at night in her sleep such things as "No, Hurricane Hugo", or "Go away, Hurricane Hugo" ' (Saylor et al., 1992 p. 143).

Many sleep disturbances seem to result from persistent intrusive traumatic dreams (Brett & Ostroff, 1985). Although nightmares are common in childhood, posttraumatic nightmares occur more frequently and include events that are trauma-specific (Keppel-Benson & Ollendick, 1993). Pynoos et al. (1987) reported that over 75% of children involved in the sniper attack who suffered severe posttraumatic reactions reported bad dreams involving the trauma. In fact, nightmares and sleep difficulties were the symptoms that best differentiated severe posttraumatic reactions from moderate reactions in this group.

In a study investigating nightmares among university students after the Loma Prieta earthquake, nightmare frequency was found to be twice as high among Californian college students than among control subjects in Arizona (Wood, Bootzin, Rosenham, Nolen-Hoeksema & Jourden, 1992). Over a three-week period, about 40% of those in the San Francisco Bay area reported one or more nightmares about earthquakes, compared with only 5% of those in Arizona. However, the students reported that nightmares about earthquakes were not more emotionally intense than other nightmares.

Distressing dreams of the disaster may change into generalised nightmares after a period of time. Terr (1983a) noted that four years after the Chowchilla kidnapping, fewer trauma-related dreams were reported and none were exact playbacks of the incident; instead the dreams became predominantly terror dreams or dreams of death.

Sleep disturbances may become intermittent over a long period of time and the return of the difficulties may be associated with the occurrence of traumatic reminders at night. Pynoos (1990) describes the case of one boy who witnessed a fatal industrial explosion and suffered from the return of agitated sleep each year during summer thunderstorms. Fourteen months after a school sniper attack, prevalence of dreams with a traumatic content had diminished but the dreams did recur sporadically in response to traumatic reminders (Nader et al., 1990).

The studies reviewed above suggest that sleep disturbances are a common traumatic response in children of various ages after a major disaster. However, it is important to note when interpreting preschoolers' postdisaster sleep problems that general sleep disturbances are frequent for this age group (Udwin, 1993) and baseline rates of sleep disturbance are unknown in most studies. However, there is some evidence that the extent of sleep problems is associated with overall severity of disaster response for school-age children (Dollinger, 1986a; Pynoos et al., 1987). There is also evidence that severe sleep problems are specifically associated with daytime concentration difficulties in this age group (Pynoos et al., 1987).

Somatic Complaints

Psychosomatic complaints result from a process called somatization in which mental experiences or states are converted into bodily symptoms (Miller & Keane, 1987). If there are no obvious organic conditions, symptoms such as recurrent abdominal pain or headaches may be the result of somatization of emotional responses to a traumatic event (Ryan-Wenger, 1990). The assumption is that children are generally not comfortable or skilled in talking about psychological pain, and therefore bodily concerns can provide them with an outlet for their distress (Monahan, 1993). In this way, somatic complaints are considered signs of anxiety (Dollinger, 1986a). Somatic complaints have also been suggested as one reason for increased school absences in the time period after a disaster (McFarlane et al., 1987).

Somatic complaints such as headaches and stomachaches have been studied relatively infrequently after disasters. However, when examined they have been found with substantial frequency for school-age children. One week after a fatal school bus accident, 42% of the surviving children reported these symptoms (Milgram et al., 1988). Three weeks after the Armenian earthquake, somatic complaints of headaches and diffuse, dull and transient pain in other parts of the body were present in 85% of school children in one village (Kozlovskaja et al., 1991). One to two months after a lightning strike disaster, mothers' ratings of the somatic complaints of their 10 to 12 year olds were significantly related to a mental health professional's ratings of the severity of the children's disaster responses (Dollinger, 1986a). Dollinger (1986a) reported that 31% of the children complained of muscle aches and pains, the same percentage complained of head aches, and 21% of the children had other physical complaints. Many children were observed to stutter after the Armenian earthquake (Grigorian, 1992).

Somatic complaints have been observed to persist into the long term period after a disaster. Six to eight months after the Loma Prieta earthquake, 23% of the 10 to 12 year old children interviewed reported somatic complaints (Bradburn, 1991). An increase in somatic complaints has been noted 8 months or more after two instances of school shootings (Nader et al., 1990;

Schwarz & Kowalski, 1991a) and 8 and 26 months after the 1983 bushfires in Australia (McFarlane et al., 1987).

Age and sex differences in the prevalence of somatic complaints have been observed. In a large-scale survey of the experiences and reactions of 5687 school-aged children three months after Hurricane Hugo, girls were significantly more likely to report somatic complaints than boys and younger school aged children more likely than early adolescents and late adolescents (Shannon et al., 1994).

Increased State of Arousal

A final set of physiological reactions concern a state of hyperarousal. Three primary symptoms of hyperarousal are an exaggerated startle response, hypervigilance, and a physiological reactivity to trauma-related stimuli.

Exaggerated Startle Response

Exaggerated startle response is characterised by a sudden involuntary shuddering or tensing of the body (Monahan, 1993). Children of all ages may show such dramatic startle responses to loud noises (Pynoos, 1990). Pynoos et al. (1987) reported that 91% of children trapped in the playground during a sniper attack demonstrated exaggerated startle responses one month after the event and 53% were jumpy and nervous at a one year followup (Nader et al., 1990). In a related study, Ornitz and Pynoos (1989) conducted the first laboratory research of startle responses in children. They measured the blink reflexes to bursts of white noise of six children who developed posttraumatic stress disorder after exposure to the sniper fire and six control children. The research confirmed that the traumatised children displayed a significant disruption in the ability to modulate the startle response. The researchers noted that the modulation of the startle response is a developmentally acquired function that matures when the child is about 8 years old and they also suggested that severe stress may cause long-lasting dysfunction in the brainstem and hence an inability to modulate the startle response.

Studies investigating the reactions of children after a wide range of disasters have also found evidence of a startle response. For instance, 64% of 10 to 12-year-old children reported being more jumpy, nervous and easily startled 6 to 8 months after the Loma Prieta earthquake than they did before the disaster (Bradburn, 1991). Similarly, 51% of adolescents assessed clinically following the sinking of the *Jupiter* cruise ship demonstrated an exaggerated startle response to loud noises (Yule, 1994). Exaggerated startle responses have also been observed in children after the Armenian earthquake (Pynoos et al., 1993); a pedestrian overbridge collapse (Blom, 1986); and Hurricane Hugo (Shannon et al., 1994).

Hypervigilance

For some children following a trauma every sound or sudden movement becomes meaningful (Monahan, 1993). These children remain "on alert" and ready to respond to any sign of environmental threat (Pynoos, 1990). This reaction is called hypervigilance and is common among traumatised children.

Children may display symptoms of hypervigilance when exposed to events that symbolise or resemble aspects of the trauma. Children who have been in car accidents are reported by parents to mimic putting on the brakes in the back seat when the driver must stop suddenly (Jones & Peterson, 1993; Stallard & Law, 1994). Yule and Williams (1990) describe an 8-year-old boy who became terrified when riding on a double-decker bus. When the bus swayed as it turned a corner the boy shouted, "It's going over, Dad!" (p. 285), and had to be taken off the bus because he was so terrified. The incident reminded him of the capsizing of the *Herald of Free Enterprise* ferry which he and his family had survived three months earlier.

Other children who survived the capsizing of the *Herald of Free Enterprise* also displayed a heightened alertness to danger. In particular, they were wary of all forms of transport and were unwilling to put their safety into anyone else's hands (Yule & Williams, 1992). Milgram et al. (1988) reported that 39% of children involved in a school bus accident in Israel in which 19 children and 3 adults died reported feeling restless and unable to relax nine months after the incident.

Mallon and Best (1995) described the reactions of students following the intrusion of an armed man into a girl's secondary school. Several weeks after the incident, pupils were displaying many symptoms of increased arousal including 'fright and flight' reactions on seeing a kitchen knife in their own home and persistent vigilance and anxiety regarding intruders into the school. The authors note that the latter was slightly alleviated when the school employed a security guard to check all those entering the school buildings. Perhaps the most graphic illustration of hypervigilance and a heightened state of arousal occurred when the fire alarm accidentally sounded during the counselling sessions run by the authors:

Mass panic was obvious, with firm commands having no effect whatsoever. One of the authors had to ride physical assault in order to open a fire door which the pupils had failed to open. Outside the most vulnerable were in a state of collapse. (p. 223)

The extreme reaction of pupils to the fire alarm can be linked to the triggering of the alarm during the incident by a staff member in order to evacuate pupils not held hostage by the intruder.

Physiological Reactivity

The third indication of a heightened state of arousal is physiological reactivity. In this situation trauma-related stimuli or memories actually bring on physical sensations. In addition to the distress caused by reminders, children may also become aware of their heartbeat or feel shaky, ill, lightheaded or nauseated (Pynoos, 1990).

Physiological reactivity in children after disasters has been studied relatively infrequently. However, Eth and Pynoos (1985a) suggested that physiological reactivity and startle responses may be experienced to the same degree in response to reminders as they were during the traumatic event. Kidnapped children (Terr, 1979) who were denied bathroom facilities for several hours continued to have bladder problems after release. Many continued to experience

startle responses, breathing difficulties in small spaces, and distressing physical sensations at reminders of the traumatic event four years afterwards (Terr, 1983a). Following the sinking of the *Jupiter* cruise ship, 51% of children and adolescents assessed clinically showed evidence of physiological reactions on exposure to reminders of the trauma (Yule, 1994). Similarly, physiological reactivity was observed in 43% of children after a fatal school shooting (Schwarz & Kowalski, 1991a).

PTSD Symptoms and Diagnosis

Many of the responses to trauma described in the previous sections fit into one of the three categories comprising a diagnosis of posttraumatic stress disorder (PTSD): intrusive reexperiencing, avoidance/numbing, and increased arousal (see section *Introduction of the Diagnosis of PTSD* p. 11). However, this report adopts a broader based approach to children's reactions rather than a strict PTSD formulation. This approach has been taken for several reasons. Firstly, some researchers have cautioned that PTSD as it applies to adults may not be applicable to children (Pynoos & Nader, 1988). In addition, other researchers suggest that it is being overapplied to all survivors of all stressful events (Terr, 1987). These arguments centre on differences observed in children's and adults' behaviours and emotions following various traumatic incidents (e.g., Terr, 1985). Secondly, not all of the reactions that have been reviewed meet the criteria for PTSD yet many are also valid indicators of response to trauma in a child or adolescent. For example, aggressiveness, somatic complaints, academic difficulties, guilt, distortions in time sequencing or belief in omens that predict the event may be emotionally or socially distressing to the child or adolescent but are not included in a diagnosis of PTSD. On the other hand, further refinement of theory and models will aid researchers and clinicians in understanding children's response to traumatic experiences and for this reason, the PTSD model warrants consideration.

The evidence concerning children's PTSD symptoms after disasters is based primarily on three measures: the PTSD Reaction Index (Frederick, 1985), the Impact of Events Scale (Horowitz, Wilner & Alvarez, 1979), and the Diagnostic Interview for Children and Adolescents (Herjanic & Reich, 1982).

Studies Using the Reaction Index

There are two versions of the PTSD Reaction Index (PTSD RI). The original version of the Reaction Index is a 16-item inventory of symptoms based on the DSM-III (1980). The total number of symptoms a child reports is recorded as his or her Reaction Index score. The revised version of the Reaction Index provides a weighted symptom count on a 20-item inventory of symptoms based primarily on diagnostic criteria in the DSM-III-R (1987). Responses vary from 0 to 4 ("None of the time," "Little of the time," "Some of the time," "Much of the time," "Most of the time"), and a total score is calculated by a summing of the responses. The Reaction Index score is classified as representing no, mild, moderate or severe PTSD according to guidelines for each version.

Pynoos et al. (1987) investigated posttraumatic stress in children one month after a fatal sniper attack on their elementary school playground. Each child was interviewed using the original

version of the PTSD Reaction Index. The researchers reported that 38% of the children had either moderate or severe PTSD symptoms after the event, 22% reported mild symptoms; and 39% had no PTSD.

One and a half years after the Armenian earthquake, Pynoos et al. (1993) screened 231 children from three cities at increasing distances from the epicentre for the frequency and severity of posttraumatic stress reactions, using the revised children's PTSD Reaction Index in translation. A systematic clinical assessment of PTSD based on DSM-III-R (1987) criteria was also conducted on approximately half of this sample (111 children). The earthquake occurred late in the morning on a school day and most children were in their classrooms. The researchers described the damage to the three cities, which varied in distance from the epicentre of the earthquake. Spitak, a city very near the epicentre, was virtually destroyed. Nearly all the schools were demolished, and in some schools more than half the children were killed. Gumri, the next closest large city, was considerably damaged but with less total destruction of homes and schools and lower rates of injury and loss of life. Yerevan, the capital city of Armenia, was at the periphery of the earthquake zone and sustained only mild damage and no significant loss of life. High rates of chronic, severe posttraumatic stress reactions were found among the children in Spitak and Gumri. Of the children assessed by DSM-III-R (1987) criteria, 70% were given a diagnosis of PTSD. 91.5% of children in Spitak and 68.4% of children in Gumri had severe or very severe levels of PTSD symptoms. A high RI score was strongly correlated with a clinical diagnosis of PTSD thus supporting the validity of the RI for detecting PTSD in this sample. The researchers noted that these findings indicate that after a catastrophic natural disaster, posttraumatic stress disorder in children may reach epidemic proportions and remain high for a long period of time.

In June, 1985 a school bus in a convoy of four buses of seventh graders on an end of year outing collided with a passing train. Nineteen children and three adults died and the remaining 14 children were critically injured. One week after the accident, Milgram et al. (1988) screened 108 children who were in the other three buses and witnessed the accident for PTSD using the original PTSD Reaction Index. The researchers reported that 57% of children had minimal to mild PTSD and 43% had moderate to severe PTSD. At a nine months followup 94% had mild to moderate PTSD and 6% had moderate to severe PTSD. Six to eight months after the Loma Prieta earthquake, 27% of 10 to 12-year-old children living in three Bay Area communities reported moderate levels of PTSD and 8% reported mild PTSD. No children fell into the more severe range (Bradburn, 1991).

Self-report data for 5687 children ranging in age from 9 to 19 years collected three months after Hurricane Hugo using the revised PTSD Reaction Index indicated that for children most exposed, 29% had mild PTSD and 14% had moderate to severe PTSD (Lonigan, Shannon, Finch, Daugherty & Taylor, 1991). A study by Belter, Dunn and Jeney (1991) investigated the reactions of children from three schools that were identified as being at high risk for psychological reactions due to their location in communities most severely damaged by Hurricane Hugo. Belter et al. (1991) collected both parent and child reports of the children's posttraumatic symptoms on the original version of the PTSD Reaction Index. Based on the cut-off scores identified for the reaction index, 89% of the children were classified as experiencing

severe PTSD by their own report. The scores obtained in the parent report were significantly lower but 69% of the parents reported their children to be experiencing severe PTSD.

Studies Using the Impact of Events Scale

The IES measures intrusive thoughts and avoidance of reminders of a traumatic event. Children rate the frequency with which 15 items have occurred over the last seven days. Total scores are computed by the summing of item responses for each subscale.

Yule and Williams (1990) assessed 22 children aged 8 to 16 years who survived the capsizing of the *Herald of Free Enterprise* using the IES. The mean scores for the children 3 to 6 months after the disaster were 19.3 on the intrusion subscale, 27.6 on the Avoidance subscale and 46.9 overall. These compare with average scores of approximately 21, 17, and 38 recorded as norms by Horowitz et al. (1979) using adult patients attending Horowitz's stress clinic for victims of trauma. On the basis of this evidence, the researchers noted that the children reported on average as much intrusion and avoidance as adults who are diagnosed as suffering PTSD.

One month after a major wildfire destroyed 420 homes in Southern California, an average IES score of 35.3 was found for children aged 7 to 18 years whose homes had sustained significant damage or total destruction compared with a average score of 22 for control subjects with compatible demographic variables whose homes did not burn (Jones, Ribbe & Cunningham, 1994)

Similarly, 5 to 9 months after the sinking of the cruise ship, *Jupiter*, Yule (1992a) reported IES scores of 29% for boys and 36% for girls. Follow-up studies a year after the accident reveal that nearly half the children met the DSM-III-R (1987) criteria for PTSD.

Studies Using Structured Interviews

The Diagnostic Interview for Children and Adolescents (DICA, DICA-R) are structured interviews administered to children or their parents that assess DSM-III (1980) symptoms (DICA) or DSM-III-R (1987) symptoms (DICA-R). The DICA and DICA-R are highly structured and can be administered by nonspecialists with relatively brief training (Finch & Daugherty, 1993).

Jones and Ribbe (1991) compared 25 boys aged 14 to 19 whose dormitory had been totally destroyed by fire with 13 boys from the same school who were nonresidents. Residents had significantly more PTSD symptoms than nonresidents as measured by the DICA-R. In addition, 12% of the residents met the criteria for a diagnosis of PTSD, while none of the nonresidents were diagnosed as suffering from PTSD. In contrast, one month after a major wildfire, children aged 7 to 18 years whose homes had sustained significant damage or total destruction did not differ from control subjects whose homes did not burn in number of symptoms or incidence of diagnosable PTSD reported on the DICA-R (Jones et al., 1994). PTSD was diagnosed for 9% of children whose homes were destroyed and 10% of the control group. While this result seems counterintuitive, the researchers noted that all residents were likely to be negatively affected to some degree by the fire regardless of house damage. It is interesting that a significant difference in IES scores (see previous section) did not correspond

with differences in the number of symptoms or incidence of PTSD as measured by the DICA-R between the two groups. The researchers suggested that the IES and the DICA-R may represent two different modes of assessing PTSD. While the IES assesses the intensity of some aspects of PTSD symptomatology, the DICA-R primarily assesses the presence or absence of PTSD symptoms. The different results found on the different measures of PTSD in this study highlight the need for diagnoses to be made on all available data rather than on a single source of information.

Some studies have used structured interviews specifically designed for the particular situation. For instance, Schwarz and Kowalski (1991a) screened 64 children for posttraumatic disorder 8 to 14 months after a school shooting in Illinois in 1988. A children's version of the RI was specially tailored for this particular school shooting and administered as part of a structured clinical interview conducted by school psychologists and social workers. Of children aged 5 to 14 years, 27% were given a diagnosis of PTSD.

Similarly, Green et al. (1991) examined the psychiatric reports of 179 children aged 2 to 15 who were exposed to the Buffalo Creek dam collapse and subsequent flood in 1972. Structured interviews of nearly 600 adults and children had been performed two years after the dam collapse as a result of a lawsuit taken by residents against the mining company. Two evaluations were available (from mental health professional on each side of the lawsuit) and information from both was used to rate the children for the presence of PTSD symptoms. A diagnosis of 'probable' PTSD was given to 37% of the children.

Summary

By definition, PTSD cannot be diagnosed unless symptoms have lasted for at least one month. In addition, a diagnosis of PTSD is a somewhat artificial distinction (Green, 1991). For a diagnosis of PTSD to be made, six symptoms (one reexperiencing, three avoidance, and two arousal) are required. The person with five symptoms is not assigned the label. Even children who show relatively high levels of PTSD symptoms as assessed by measures such as the Reaction Index or the Impact of Events Scale may not have diagnosable PTSD. For example, Schwarz and Kowalski (1991a) assessed children's reactions 8 to 14 months after a deadly school shooting incident. Ninety-two percent met the DSM-III-R (1987) criteria for intrusive reexperiencing, but only 27% met the full PTSD diagnosis. Martini, Ryan, Nakayama and Ramenofsky (1990) described the effects of the Pittsburgh Regatta accident in which a powerboat went out of control and veered into the crowds watching the race. Five children were among those hit by the boat. On the PTSD Reaction Index, four of the five children, aged 3 to 9, had scores indicating they suffered PTSD. However, when the response to the Reaction Index were reexamined using the DSM-III-R (1987) criteria for PTSD, only three of the five children satisfied the criteria.

In addition, PTSD diagnostic criteria are still evolving. Schwarz and Kowalski (1991b) recently demonstrated that the proportion of children whose symptoms met criteria for a PTSD diagnosis after a school shooting incident varied substantially depending on whether DSM-III (1980), DSM-III-R (1987), or DSM-IV (1994) criteria were used.

The studies reviewed show substantial variation in the incidence of diagnosable PTSD. Disasters that differ in terms of severity and threat to life seem to produce differing levels of PTSD. Eighteen months after a catastrophic earthquake involving extreme life threat and the witnessing of injury and death to others, the incidence of PTSD was 90% in children of the two cities closest to the epicentre (Pynoos et al., 1993). Incidence 8 months to 2 years after the event was 27% and 37% respectively for two disasters involving substantial life threat and exposure to danger: a school sniper shooting in which five children were wounded and one killed (Schwarz & Kowalski, 1991a), and the Buffalo Creek flood (Green et al., 1991). Incidence was substantially lower after a night-time dormitory fire in which there was loss of possessions only (12%; Jones & Ribbe, 1991) and a wildfire that caused much property damage but no fatalities (9%; Jones et al., 1994). Consistent with this pattern, Yule (1992a) estimated that diagnosable PTSD was present for approximately 50% of a group of female survivors a year after a ship sinking that involved substantial life threat and some deaths.

The incidence estimates of diagnosable PTSD need to be treated with caution. For the Buffalo Creek data (Green et al., 1991), estimates are of 'probable PTSD' based on at least one symptom in each category. More precise classification was not possible because of the limits of the data which were collected before the formulation of PTSD as a diagnosis.

Other Disorders

Posttraumatic stress reactions are not the only set of reactions to occur in the aftermath of a traumatic event. Elevated scores on scales measuring symptoms of depression and anxiety have been observed in children and adolescents experiencing disaster.

Twenty-four girls aged 14 to 15 who survived the sinking of the *Jupiter* cruise ship in 1988 were screened 10 days after the accident on the Birleson Depression scale (Birleson, 1981) and the Revised Children's Manifest Anxiety Scale (Yule & Udwin, 1991). Ten days after the disaster, the *Jupiter* survivors showed significantly elevated levels of depression compared to a control group of 126 British girls aged 12 to 16. Five months after the disaster, the scores for the survivor group on both the depression and anxiety scales had significantly increased. The researchers noted that this accords with other anecdotal descriptions of the psychological consequences of disasters in which it is claimed that survivors often experience a period of numbness before the full impact of the disaster hits them. In a follow-up study, 334 children who survived the sinking completed the Birleson Depression Inventory and the Revised Children's Manifest Anxiety Scale (RCMAS, Reynolds & Richmond, 1978) among other measures for litigation purposes 5 to 9 months after the disaster (Yule, 1992a). Compared with age- and sex-matched controls, the children who survived the sinking showed significantly higher scores on the measure of depression and girls, but not boys, showed significantly higher scores on anxiety.

Clinical anxiety has been described as a notable aspect of some children's postdisaster responses (e.g., Dollinger, 1985). Elevated anxiety has been reported after a contamination scare with high continuing uncertainty (Handford et al., 1986). However, degree of exposure and gender appear to effect anxiety scores. Three months after Hurricane Hugo, Lonigan et al.

(1991) found significantly higher anxiety scores for children who experienced more severe exposure to the hurricane. In this study, girls reported more anxiety regardless of exposure level than boys did. Similarly, ten months after a blizzard and flood disaster, there was a significant elevation of anxiety measured by clinical ratings of stories about "this coming winter" for girls from the flooded area than girls from a nonflooded area; for boys there was no difference between flooded and nonflooded groups (Burke, Moccia, Borus & Burns, 1986).

Several studies have investigated the effect of different coping styles on depression after a major disaster. Nolen-Hoeksema and Morrow (1991) conducted a prospective study of depression after the Loma Prieta earthquake. Measures of depression and styles of responding to negative moods were obtained for 137 students 14 days before the earthquake, then 10 days after the earthquake. Forty-one of the students then completed the measures again seven weeks after the earthquake. Regression analyses showed that students who, before the earthquake, already had elevated levels of depression and a ruminative style of responding to their symptoms had more depression at both follow-ups. (A ruminative style of responding is defined by the researchers as one in which people focus on their depressive symptoms and dwell on the causes and implications of these symptoms). Students who were exposed to more dangerous or difficult circumstances because of the earthquake also had elevated depression levels ten days after the earthquake. Similarly, students who, during the 10 days after the earthquake, had more ruminations about the earthquake were still more likely to have high levels of depressive symptoms seven weeks after the earthquake.

Similarly, Jeney-Gammon, Daugherty, Finch, Belter and Foster (1993) examined the relationship between third to fifth grade children's coping styles and self-reported levels of depression five months after Hurricane Hugo. Although the overall depression level in the sample did not exceed that of normative samples, the number of coping strategies employed was positively related to depression. In particular, social withdrawal, self-blaming, and emotional regulation were associated with more severe depressive symptoms.

Significant levels of depression and anxiety are often present in children after a disaster although they are generally less common than PTSD symptoms. Fewer children showed significantly elevated depression and anxiety scores after the *Jupiter* sinking than showed elevated PTSD symptoms (Yule, 1992a; Yule & Udwin, 1991). Similarly, after a dormitory fire, dormitory residents differed from nonresidents with respect to PTSD symptoms but not symptoms of depression or anxiety as measured by the DICA-R (Jones & Ribbe, 1991).

Although symptoms of posttraumatic stress disorder may be more frequent after a disaster, the coexistence of depression or anxiety can result in diagnostic errors and even inappropriate treatment (Kendall, Kortlander, Chansky & Brady, 1992; de Mesquita & Gilliam, 1994). One of the reasons for the overlap of other disorders with PTSD may be that a number of separate symptom criteria overlap (Green, Lindy, Grace & Leonard, 1992). For instance, 21 adolescents diagnosed with posttraumatic stress disorder also showed associated symptoms of depression and anxiety (Atlas, Di Scipio, Schwartz and Sessoms, 1991). In a similar vein, Keane and Wolfe (1990) suggested that a possible explanation for the high rates of comorbidity associated

with the PTSD diagnosis is that people simply present a global and far-ranging picture of distress which broadly reflects many diverse symptoms.

Comorbidity makes it difficult to determine which disorders are primary and which are secondary. Symptoms of depression and anxiety may place children at greater risk for developing PTSD when exposed to an extreme stressor. Conversely depression and anxiety may develop as a function of PTSD symptomatology and the child's attempts to manage the distress. Lonigan, Shannon, Taylor, Finch and Sallee (1994) concluded that children's tendency to experience anxiety plays a large role in the development of posttraumatic phenomenon after a disaster. More than three-quarters of the children who were classified as exhibiting posttraumatic stress disorder three months after Hurricane Hugo scored in the upper quarter of the distribution of RCMAS scores. The researchers concluded that the RCMAS scores reflected levels of anxiety unrelated to the hurricane as the scores for the whole sample were not higher than normative levels for children of similar gender, race and age. Similarly, Breslau, Davis and Andreski (1991) found that both a family and a personal history of anxiety were significant risk factors for the development of PTSD after exposure to a traumatic event in a community sample of adolescents.

Time Course of Trauma

Longitudinal studies using repeated measurements are crucial in the study of disaster effects. To date, only a small proportion of the disaster literature has examined the natural course of children's psychological reactions to disaster. It is important to investigate whether mental health effects occur immediately after exposure or are delayed and how long they persist. Whether or not long-term effects are observed may depend on the severity of the disaster and the timing of follow-up interviews. As Baum et al. (1993) note: "If data are collected only once, the nature of the findings will depend on *when* the interview takes place" (p. 131).

The limited number of studies that have examined the time course of children's reactions to disaster. Generally, children's disaster-related symptoms decrease over time, although some exceptions have been noted. Typically, there is considerable decrease in symptomatology 9 to 14 months postdisaster according to parent reports (Dollinger, 1985; Milne, 1977; Ollendick & Hoffmann, 1982; Sullivan et al., 1991) and child responses (Milgram et al., 1988; Nader et al., 1990). According to parent reports following natural disasters, there can be close to complete symptom abatement by one year afterward (e.g., Dollinger, 1985; Sullivan et al., 1991). For example, in telephone follow-ups 9 months after a lightning strike disaster, parents reported that 32 of the 33 ten to twelve year olds were coping satisfactorily with almost complete remission of symptoms other than persisting fears (Dollinger, 1985). Such fears were present for the majority of children but were reported to be pronounced for only five of them. Other studies have shown substantial decrease in symptoms over a 9 to 12 month period, but with significant persisting symptoms in children highly exposed to the disaster (Milgram et al., 1988; Nader et al., 1990).

The major exceptions to the steady decrease in symptoms over time appear to be in instances where one or both of two factors are present: (1) very high levels of life threat, as was the case

for survivors of a shipwreck (Yule, 1992a; Yule & Udwin, 1991; Yule & Williams, 1990), or (2) substantial destruction and bereavement as was the case during the Australian Ash Wednesday bushfire (McFarlane, 1987a; McFarlane et al., 1987) and the Armenian earthquake (Pynoos et al., 1993). For instance, Yule and Udwin (1991) show an increase in anxiety and depression and no change in PTSD symptoms from 10 days to 5 months after the disaster for 24 survivors of the sinking of the *Jupiter* cruise ship. Similarly, after the Australian bushfires, parents reported significantly more behaviour problems at 8 months than at 2 months after the fire. Furthermore, there was no decrease from 8 to 26 months in behaviour problems or PTSD symptoms (McFarlane, 1987a; McFarlane et al., 1987).

The children who show the most severe initial disaster response are generally the ones who show more persisting symptoms 5 to 12 months postdisaster (Dollinger, 1985; Milgram et al., 1988; Nader et al., 1990; Yule, 1992a). The limited available evidence suggests that in the long-term, children recover even after disasters that cause long-lasting community disruption. In a 20-year follow-up of the children who survived the dam collapse and flooding of Buffalo Creek, Honig, Grace, Lindy, Newman and Titchener (1993) concluded that the rates of posttraumatic stress disorder had sharply declined as the children moved to adulthood.

Issues in Disaster Research

Disaster research faces unique obstacles and challenges that may compromise scientific integrity in comparison to other research. A number of methodological and conceptual problems have been identified. In particular, the validity of predisaster baseline data, representative samples, the definition of victim and comparison groups, and the nature of assessment instruments are important issues confronting researchers.

Many disasters are unpredictable thus there is seldom systematically collected baseline or predisaster data to compare with postdisaster observations. A few investigators have been able to acquire pre- and postdisaster data when a catastrophe has occurred in an area where a study was already underway. For instance, Durkin et al. (1993) were able to compare data collected for a population based study of child health and disability in Bangladesh with the reactions of children to a flood disaster occurring six months later. Similarly, Nolen-Hoeksema and Morrow (1991) had fortuitously assessed a group of students on measures of depression and styles of responding to negative moods 14 days before the Loma Prieta earthquake. The researchers were subsequently able to reassess the emotional health of a subset of these subjects shortly after the earthquake.

For the most part, however, researchers must rely on the retrospective report of children or their parents regarding predisaster functioning (e.g., Sullivan et al., 1991). Baum et al. (1993) notes that it is sometimes possible to access existing records on survivors of a disaster (e.g., physician, school, hospital) and examine this data for indicators of the level of predisaster functioning. It may also be possible to supplement retrospective reports with corroborating information, for example, by showing that the measure of trauma relates to other more objective indicators such as the amount of exposure or the destruction of various parts of a town (e.g., Pynoos et al., 1987; Pynoos et al., 1993). Raphael (1985) suggests that it may be possible to

investigate predisaster functioning when there is some anticipation of the likelihood of disaster. However, some evidence exists that the threat of disaster can result in anticipatory stress in children and adolescents thus measures taken during a warning period may not be appropriate for use as indicators of predisaster functioning. For instance, Kiser, Heston, Hickerson, Millsap, Nunn and Pruitt (1993) investigated the psychological effect of the prediction of a major earthquake along the New Madrid fault line on December 3, 1990. The researchers found mild but prevalent PTSD symptoms in children and adolescents exposed to the prediction.

Locating a representative study sample can be particularly problematic in disaster research (Solomon, 1989). Researchers investigating the psychological effects of disasters on adults generally work through an agency with the ability to identify victims of the disaster such as the Red Cross (Baum et al. 1993). Investigators of children's reactions to disaster frequently approach the children through schools (e.g., Belter et al., 1991; Galante & Foa, 1987; Yule, 1992a). However, children may be reluctant to share their painful disaster experiences and parents and teachers may be reluctant for children to participate in the research. Several studies have reported that teachers would not permit evaluation of the children in their classrooms because they believed that there was no need for the research or that it was not in the children's interest to remind them of what had happened (McFarlane, 1987b; Pynoos et al. 1987; Yule, 1992a). Similarly, Schwarz and Kowalski (1991b) saw only 23.5% of children after a school shooting in a study in which parents were the referral agents. Lindy, Grace and Green (1981) formulated the concept of a 'trauma membrane' to describe this phenomenon after observing that only 5% of individuals felt to be affected by a fatal supper club fire stepped forward for evaluation. This conclusion was based on an investigation by the researchers into the success of an outreach program for survivors of the fire and families of the deceased. Lindy et al. (1981) describe the trauma membrane as follows:

Severely traumatised individuals were often found to be surrounded by a small network of trusted people or an individual - a spouse, older children, parents, a special friend or professional. These people served to protect and buffer the survivor from perceived further external psychic stress, and attended to and monitored their needs. Those who functioned at the membrane tended to define for the survivor what was helpful and what constituted further trauma. (p. 475)

Rozensky, Sloan, Schwarz and Kowalski (1993) suggest that the trauma membrane can serve either an insulating function or, conversely a helpful opening function if those monitoring the trauma membrane see research as helpful.

An additional difficulty for longitudinal studies is dealing with attrition. The loss of subjects due to death, disinterest, illness, physical incapacity or migration can be critical in introducing bias in some instances. Baum et al. (1993) note that in most epidemiological studies, death is not a source of bias since the sample continues to be representative of the surviving cohort. However, if the death is linked to the disaster, either directly or indirectly, then it is a potential source of bias. Migration as a cause of attrition is particularly problematic. Firstly, migration may be an important outcome of disaster in its own right and secondly it is not presently known what type of families leave the disaster area; the 'best-off' who have the assets that allow them

to leave or the 'worst-off' who perceive themselves as unable to cope with remaining in the area (Baum et al., 1993).

Defining disaster-affected and comparison groups can also be a problem. Comparison groups of children who have not experienced the disaster are needed to increase confidence that the prevalence rate observed in the target group is not merely a function of the particular assessment method or the population base rate (Kulka & Schlenger, 1993). An additional need for comparison groups arises from the possibility that the development of distress symptomatology may be related to a wide variety of background and other predisposing characteristics in the child. Studies that do not use comparison groups can not reject the notion that observed differences in symptoms between groups might be due to differences in such characteristics.

Many studies of disaster define the target sample in terms of the extent to which the children have experienced injury, property damage or life threat (e.g., Bradburn, 1991; Pynoos et al., 1987; Pynoos et al., 1993). However, disasters are community events with the potential to result in change and stress even among individuals not directly exposed to them (Baum et al., 1993). For this reason it can be very difficult for researchers to identify appropriate comparison groups. Some studies draw comparison groups from a neighbouring area in an attempt to select a comparison group as similar as possible to the target group in all respects except for the experience of the disaster (e.g., Bradburn, 1991; Yule, 1992a). However, these groups may reflect "less affected" rather than unaffected populations due to indirect exposure to the disaster (Baum et al., 1993). For instance, Pynoos et al. (1993) selected a comparison group of children from a city on the outskirts of the area of Armenia affected by the 1988 earthquake. The researchers found that 24% of children in this comparison group exhibited severe PTSD symptomatology. The researchers suggested that many of these children had in fact been indirectly exposed to the disaster through accompanying a relative to search for family in other cities, helping in the relief effort and prolonged exposure to graphic viewing of the destruction and death from television and other media coverage.

A further methodological difficulty concerns the potential for experimenter bias in the assessment of disaster reactions. Garnezy (1986) suggests maintaining experimenters 'blind' as to an individual's degree of exposure to the trauma or whether subjects are in the traumatised or control group. However, this is rarely possible in disaster research as subjects in nontraumatised comparison groups generally live in another area (e.g., Bradburn, 1991) or go to another school (e.g., Yule, 1992a) and thus are assessed in different places and at different times. In addition, assessment of PTSD requires a detailed discussion of the trauma therefore interviewers cannot remain blind (Baum et al., 1993).

The selection of appropriate assessment instruments is particularly important as there are advantages and disadvantages in each. Researchers seeking to assess the consequences of exposure to disaster have relied upon a wide range of measures of psychological functioning. Typically these measures have been psychological symptom oriented, although some researchers have attempted to evaluate factors such as change in attitudes (Dollinger, 1986b; Joseph, Williams & Yule, 1992) and biological correlates of exposure (Ornitz & Pynoos, 1989).

Many researchers have had to 'make do' with inadequate measures due to the limited resources available in the postdisaster environment (Green, 1991). Assessment should include in addition to measures of disaster-related reactions, a detailed assessment of the nature and severity of the disaster, and individual and environmental factors that may enhance or impede recovery.

Researchers often deal with catastrophic trauma as if it were undifferentiated (Baum et al., 1993). For instance, floods, fires and earthquakes are treated as if they are equivalent events. In order for knowledge regarding the effects of disasters on children to develop, results from various studies must be able to be compared. Wide variation in the types of disaster studied, the measures used to assess trauma, and the time frames for assessing long-term functioning has made cross-study comparisons difficult (Solomon, 1989). These differences contribute to the difficulty in drawing valid conclusions regarding the extent of distress resulting from the different types of disaster experiences.

Factors Influencing Children's Disaster Response

The research on individual differences in children's responses to traumatic events, and the factors which make some children more vulnerable to developing posttraumatic stress reactions than others is still developing. In the original formulation of posttraumatic stress disorder, the condition was assumed to occur in any person provided the traumatic event was sufficiently threatening (DSM-III, 1980). However, the nature of the traumatic event and the child's experience of it varies tremendously and therefore children may not respond to a traumatic event in the same way. The following sections differentiate possible factors influencing the response of children into three main groups: characteristics of the disaster, characteristics of the child, and the family and community context.

Disaster Characteristics

Life Threat and Degree of Exposure

The severity of children's exposure to the disaster and the often horrific scenes of destruction or death seems to result in an increase in posttraumatic reactions. The element which seems to underlie the relationship between exposure and symptomatology seems to be the degree to which the children feel their own lives are in danger. The primacy of exposure to danger has been demonstrated for adults (Shore, Tatum & Vollmer, 1986) and studies have now confirmed this feature of stress response syndromes for children (e.g., Bradburn, 1991; Pynoos et al., 1987; Pynoos et al., 1993). Keppel-Benson and Ollendick (1993), however, noted that this relationship may not always be direct and that the child's subjective experience and interpretation of the event must also be taken into consideration.

Pynoos et al. (1987) reported a significant relationship between degree of exposure to a traumatic event and reports of posttraumatic symptoms. The degree of exposure was defined as proximity to the murdered child during the sniper attack (e.g., on the playground with the victim, in the school buildings, not at school, and on vacation). The number of posttraumatic stress symptoms increased as the degree of exposure increased. In addition, analysis indicated significant differences in the proportions of no, mild, moderate and severe PTSD across the four exposure levels. Severe or moderate PTSD was experienced by 77% of the children in the playground group and 67% of those in the school building, whereas mild or no PTSD was experienced by 74% of those not at school and 83% of those on vacation. Fourteen months after the sniper attack, level of exposure remained the primary predictor of ongoing posttraumatic reactions (Nader et al., 1990). The children who had been on the playground continued to have significantly higher reaction index scores than all other groups although the overall severity of the posttraumatic stress responses had decreased for all four groups.

One and a half years after the Armenian earthquake, Pynoos et al. (1993) used the PTSD Reaction Index (in translation) with three groups of children - one from a city at the epicentre where buildings were totally demolished and there was a high loss of life, one from a city with less destruction and lower rates of injury and loss of life, and one control group from a city at

the periphery of the devastation. The researchers found a strong positive correlation between proximity to the epicentre and overall severity of posttraumatic reaction. High rates of severe PTSD, measured by the Reaction Index, were found among the children of the two most damaged cities, Spitak (91.5 %) and Gumri (68%). Interestingly, 24% of children in Yerevan, a city with only mild damage and no significant loss of life, received a severe PTSD rating on the Reaction Index. The researchers suggested several factors contributing to the unexpectedly high rates of children and adolescents in Yerevan suffering from severe PTSD symptoms. These were all factors that increased personal exposure to the horrific effects of the earthquake including accompanying a relative to search for family in the other cities, helping in the relief effort and prolonged exposure to graphic viewing of the destruction and death from television and other media coverage.

Five months after the sinking of the cruise ship *Jupiter*, Yule et al. (1990) studied self-reported fears, anxiety, and depression in a party of 24 adolescent girls from one school. This group was compared to girls who had wanted to go on the cruise (but did not get a place), other girls in the same school who expressed no interest in the cruise (but may have been upset by subsequent events), and controls from a similar school elsewhere. In addition to examining the psychological consequences of the disaster on survivors, the researchers investigated the effect of subjective exposure. It was hypothesised that the girls who had wanted to go on the cruise but had not got a place might regard themselves as psychologically involved even though not present and hence more adversely affected than those who never showed interest in the cruise. The 'subjective exposure' effect was found for depression and anxiety but not for fears. Thus, depression and anxiety increased as exposure increased.

Bradburn (1991) found that children who lived in close proximity to an area substantially damaged in the Loma Prieta earthquake were more likely to experience a greater degree of stress 6 to 8 months after the earthquake, than children who lived further away. Lonigan et al. (1991) also found significantly higher anxiety scores and more PTSD symptomatology in children who reported greater exposure to a hurricane (determined according to the children's ratings of subjective severity of the hurricane, degree of home damage and parental job loss as a result of the hurricane). In a much earlier study, Bloch et al. (1956) found significant associations between children's disturbance following a tornado and having been in the impact zone. Similarly, higher levels of persisting symptoms have been found to be associated with higher degrees of exposure during the Buffalo Creek disaster (Gleser et al., 1981; Green et al., 1991).

Other factors can overshadow physical proximity and degree of exposure to the disaster. After a fatal collision between an Israeli school bus and a train, children did not show more severe reactions if they had been on accompanying buses rather than buses taking a different route to the same outing (Milgram et al., 1988). More important than proximity was the personal loss of schoolmates; and nine months later, children who had lost six or more friends were most likely to show persisting symptoms.

Bereavement

While there have not been systematic studies of children's bereavements in disaster, there are a number of observations and findings that are relevant. Children are more likely to show severe reactions when disasters result in a family member's injury or death (Bloch et al., 1956; Eth & Pynoos, 1985a). Loss of extended family members or friends can also increase the severity of disaster response (Milgram et al., 1988).

Six months after the Italian earthquake, Galante and Foa (1987) found a significant correlation between deaths in the family and high scores on the Rutter Children's Behaviour Questionnaire for Completion by Teachers although these differences disappeared eighteen months after the earthquake. Green et al. (1991) found that the loss of a close friend or extended family did not predict posttraumatic symptomatology two years after the Buffalo Creek disaster. However, for children who lived in the Armenian cities of Spitak and Gumri (where there was widespread loss of life), those who lost a member of their nuclear family as a result of the earthquake had significantly higher scores on the PTSD Reaction Index 1½ years later than those who did not.

Suggestive evidence that children who experience bereavement during disasters may be at risk for subsequent depression has been presented by Yule and Williams (1990). Of six child survivors of the *Herald of Free Enterprise* sinking who completed a depression scale, the five who showed high levels of depression all had lost a family member or travelling companion; the one child without a high level of depression had not.

Reactions after the disaster-related death of a peer may depend on the closeness of the relationship. A year after a school sniper shooting, less exposed children showed more persisting PTSD symptoms if they had known well the child who had been killed (Nader et al., 1990). For children who had been on the playground, there was no significant difference between acquaintance levels.

Bereavement results in an important interplay between traumatic reactions and grief reactions (Pynoos & Nader, 1993). Gudas (1993) notes that the child's efforts at relieving the traumatic anxiety can complicate the mourning process. For example, Pynoos, Nader, Frederick, Gonda and Stuber (1987, as cited in Pynoos & Nader, 1988) compared the course of posttraumatic stress and grief reactions of children exposed to mass violence. The posttraumatic stress reactions appeared to disappear sooner than the grief reactions in less exposed groups of children, whereas both remained high among those most exposed. The researchers' noted that efforts at relieving traumatic anxiety seemed to take psychological priority over mourning.

Researchers stress the clinical differences between trauma and grief (e.g., Weller & Weller, 1990) but the two processes also share salient features such as intrusive thoughts, avoidance of reminders of the deceased, and guilt (Eth & Pynoos, 1985b). However, disaster-related bereavement may lead to posttraumatic responses that differ from general disaster reactions. For instance, after a school sniper attack in which a child was killed, children who had known the dead girl reported intrusive thoughts and dreams about her (in contrast to intrusive dreams about being the target of the attack) and avoidance of activities associated with her (Pynoos et al., 1987). The interrelation between disaster-related trauma and grief is further complicated by

research suggesting that PTSD may be a component of the natural grieving process for many children who have lost a family member. Applebaum and Burns (1991) investigated posttraumatic stress disorder in surviving siblings who had lost a brother or sister to accidental death. All the surviving siblings reported PTSD symptomatology, with 45% meeting DSM-III-R (1987) criteria for a diagnosis of PTSD (although this study failed to control for the manner of death).

Children exposed to both death and disaster are frequently denied the opportunity for or discouraged from grieving all their losses (Gudas, 1993). Raphael (1986) notes that the suddenness, shock, and trauma of disaster-related deaths and the fact that the child may have had little opportunity to see the body or participate in rituals of farewell, may add to the difficulty in comprehending what has happened. Children who have lost a loved one as a result of disaster may experience what is referred to as disenfranchised grief (Doka, 1989; Ellis, 1989), where grief is not openly acknowledged, publicly mourned, or socially supported. This lack of recognition of the child's grief can sometimes result from adults' lack of awareness of the psychological impact of the loss on children (Benedek, 1985). For instance, a 17-year-old girl whose best friend died, felt little support from her parents: "I need time to deal with losing [her]. My parents don't understand that; they think I'm dragging it out and that really hurts" (Oates, 1993, p. 27).

Separation

Children between the ages of 6 months and 4 years typically show strong reactions when separated from parents under stressful circumstances, in unfamiliar settings, and with uncertainty about the parents' whereabouts (Emde, 1989; Farberow & Gordon, 1981). Thus separation from their families during disasters is likely to be particularly stressful for young children although few studies have systematically examined this. In the weeks after the Loma Prieta earthquake, 4-year olds showed more behaviour problems if they had been separated from their parents during the quake (Junn, Guerin & Rushbrook, 1990 as cited in Hofmann & Rogers, 1991).

Disaster separation is stressful for older children as well. After a devastating bushfire, many families sent their children to relatives for several days while the parents coped with the damage. Twenty-six months later, children and parents who had been separated showed more persisting symptoms (McFarlane, 1987b). Children reported that during a school sniper attack, worry about siblings who might have been in danger was a major concern and lead to a subsequent tendency to worry about the siblings (Pynoos et al., 1987).

Injury

Few studies have investigated the impact of personal injury on posttraumatic reactions to a disaster and results have been inconsistent. Bloch et al. (1956) found significant associations between children's disturbance following a tornado and having been personally injured. Martini et al. (1990) examined the effects of a traumatic event on five children who were among 24 people injured when a speedboat lost control and veered into the crowd at the 1988 Pittsburgh Regatta. This study investigated the association between severity of injury and PTSD but unfortunately did not compare these children with others who were highly exposed to

the accident but escaped injury. Parents of four of the five children described varying degrees of PTSD in their children. There appeared to be no relationship between the severity of injury and the presence of PTSD symptoms. One child who suffered fractures to both legs reported no symptoms whereas two children who suffered superficial injuries reported the highest levels of PTSD symptoms. Martini et al. (1990) suggested that factors other than the degree of physical injury may determine whether a particular child will suffer PTSD. However, the findings of this study are limited in generalisability due to the small sample size.

Damage to Property

There exists conflicting evidence concerning the relationship between damage to property and posttraumatic stress reactions in children after a disaster. Some evidence for the association of damage to stress reactions has been reported. For instance, home damage was significantly related to extent of behavioural symptoms by preschoolers within the weeks after the Loma Prieta earthquake (Junn et al., 1990 as cited in Hofmann & Rogers, 1991). The presence of PTSD symptoms three months after Hurricane Hugo was strongly related to the degree of home damage sustained (Lonigan et al., 1994). Property damage was related to PTSD symptoms in primary school children 8 months but not 26 months after the Australian Ash Wednesday bushfire (McFarlane, 1987b). Interestingly, Belter et al. (1991) found that children's self-report of posttraumatic symptoms five months after Hurricane Hugo was not correlated with the amount of damage caused to their homes, but the parents' perspective differed in this regard. The level of PTSD reported by the parents in their children was significantly correlated with the amount of damage sustained.

Other studies have found no association between damage to property and posttraumatic stress reactions. Six months after the Italian earthquake, Galante and Foa (1987) examined the reactions of children from six villages. The amount of destruction in each community was not significantly related to 'at-risk' scores provided by teachers on the Rutter Children's Behaviour Questionnaire. Similarly, destruction of residence was not associated with differences in mean PTSD Reaction Index for children after the Armenian earthquake (Pynoos et al., 1993) and property damage after the Buffalo Creek flood was not related to severity of children's symptoms 1½ to 2 years later (Gleser et al., 1981). None of the 10 to 12-year-old children examined by Bradburn (1991) experienced extensive damage to their homes as a result of the Loma Prieta earthquake although many reported the presence of new cracks in the walls, broken windows, broken china or minor chimney damage. However, the degree of personal damage experienced by the children did not predict PTSD symptoms.

Child Characteristics

Age

The relationship between age and trauma is complex. Evidence concerning age differences in disaster responses is limited, but some age differences are suggested. In particular, the form of the posttraumatic reactions seems to vary with age. Several studies have examined whether children of different ages are at different risk of developing posttraumatic stress symptoms but findings are inconsistent in this regard.

Clinical research suggests that children's responses to trauma do reliably vary across preschoolers, school-aged children and adolescents (e.g., Eth & Pynoos, 1985a; Eth, 1992; Monahan, 1993). Children of all ages seem to show an increase in fears and worries, although the content of their fears may be related to age (Mowbray, 1988). Preschoolers are more likely than older children to show internalising behaviours such as separation anxiety, somatic complaints, and social withdrawal (Eth & Pynoos, 1985a) as well as regressive behaviour such as bedwetting, thumb sucking, and a loss of previously mastered skills (Mowbray, 1988). Preschool children typically engage in reenactment and play around traumatic themes (Turkel & Eth, 1990). Eth and Pynoos (1985a) note that the school-age child displays a greater variation in cognitive, behavioural and emotional responses to psychic trauma. School-aged children are reported to experience many of the classic symptoms of posttraumatic stress including reexperiencing symptoms, avoidance and hyperarousal and in some cases, decreased school performance (Keppel-Benson & Ollendick, 1993). Specifically, anger, hostility and belligerence are more frequently displayed in older children as well as interpersonal problems, chronic sadness and depression (Monahan, 1993). The posttraumatic response of adolescents is considered to begin to resemble the adult posttraumatic stress syndrome (Eth & Pynoos, 1985a). Adolescents are most likely to exhibit both internalising and externalising behavioural extremes (Lyons, 1987). Symptomatic adolescents may show increased anxiety, decreased energy, and greater depression, as well as aggressive and acting-out behaviour (Eth & Pynoos, 1985a).

Some studies have investigated age differences in the overall severity of children's responses to disaster. Early studies used measures such as behavioural checklists and unstructured clinical interviews and have generally reported greater distress in older children. For instance, 4 to 6 weeks after the collapse of a school pedestrian overbridge, 5 to 8-year-olds had fewer stress symptoms compared to 9 to 12-year-olds but they had more phobias and somatic behaviour. Those aged 9 to 12 had more sleep disturbances, worries about friends, and more thought about the accident (Blom, 1986). Similarly, two years after the Buffalo Creek flood, symptoms of depression (as noted in clinical interviews) increased with age from preschool to adolescence, and anxiety was higher for adolescents than the other age groups (Gleser et al., 1981).

Differences in children's responses may depend in part on the type of symptoms examined. Problem behaviours were most frequent for preschoolers and decreased with age after Cyclone Tracy (Milne, 1977). However, the frequency of problem behaviours was measured by parental response to a question that appeared to emphasise problems particularly characteristic of younger children. Bloch et al. (1956) obtained parental reports of more severe symptoms for school age children than preschoolers after the Vicksburg tornado. However, age was probably confounded with exposure in this study as exposure was greatest for children attending a Saturday movie, a more likely activity for school-age children.

Later studies have investigated age differences in severity of disaster response using measures of PTSD symptoms. Unfortunately, PTSD symptoms have been more often evaluated for older children. Evaluation of preschoolers, even when verbal, is complicated by their limited ability to provide verbal reports of their internal states and some young children's tendency to deny intrusive thoughts even though they show repetitive trauma-related themes in their play (e.g., Terr, 1990). Most studies of preschooler's disaster reactions still depend primarily on parental

report and as will be discussed in the section *Parent, Teacher or Child Report* (p. 69) parents tend to underestimate children's reactions to trauma (e.g., Burke et al., 1982). However, PTSD reactions in preschoolers have been observed after disasters in studies that have investigated them. A 3½-year-old child showed diagnosable PTSD and significant depression two months after a speedboat in the Pittsburgh Regatta veered into the crowd and seriously injured her (Martini et al., 1990). Scheeringa, Zeanah, Drell and Larrieu (1995) proposed an alternative set of criteria for assessing PTSD in infants and concluded that infants and young children show symptoms of PTSD if a developmentally sensitive set of criteria is used.

With respect to age differences in PTSD symptoms, two years after the Buffalo Creek flood, the 2 to 7-year-olds showed fewest PTSD symptoms. An analysis by type of symptom revealed that the youngest children did not differ from older children and adolescents in terms of the number of intrusive reexperiencing or arousal symptoms, but showed fewer avoidant symptoms (Green et al., 1991). However, Keppel-Benson and Ollendick (1993) note that young children's cognitive development will influence their ability to report symptoms.

Within school age populations, levels of PTSD symptoms typically have not shown systematic changes with age (Nader et al., 1990; Pynoos et al., 1987; Pynoos et al., 1993; Schwarz & Kowalski, 1991a). Although, three months after Hurricane Hugo, younger school-age children (9 to 12-year-olds) reported higher overall levels of PTSD symptoms than early adolescents (13 to 15-year-olds) or late adolescents (16 to 19-year-olds) (Shannon et al., 1994). The youngest children were significantly more likely to report getting upset by thoughts of the hurricane, bad dreams, repetitive intrusive thoughts about the hurricane, fear of recurrence, emotional isolation, sleep difficulties, behavioural avoidance, getting upset by reminders of the hurricane, and reckless behaviour than both the early adolescent and late adolescent groups. Overall, the self-reported symptoms of PTSD were highly similar for the early and late adolescent groups.

Sex

Sex differences in disaster response have emerged at least in studies with large samples. By school-age, girls report more anxiety (Burke et al., 1986; Gleser et al., 1981; Yule, 1992a), depression (Gleser et al., 1981; Yule, 1992a), specific fears (Milgram et al., 1988; Yule, 1992a), PTSD symptoms (Green et al., 1991; Shannon et al., 1994; Pynoos et al., 1993; Yule, 1992a), and overall symptoms (Gleser et al., 1981; Milgram et al., 1988). However, several studies have reported no sex differences in response to trauma (Galante & Foa, 1987; Goodyer, Kolvin & Gatzanis, 1987; McFarlane, 1988; Milne, 1977; Pynoos et al., 1987). In addition, girls have been found to be more severely affected by increasing levels of disaster exposure as indicated by Reaction Index scores (Lonigan et al., 1991). The greater frequency of symptoms for girls in many studies parallels adult sex differences after disaster (Gibbs, 1989; Steinglass & Gerrity, 1990). This could be a result of differences either in the experiencing of symptoms or willingness to report them.

Some studies have investigated sex differences at the symptom level and several have found a greater prevalence of particular symptoms in boys. Boys have been more likely to show acting-out symptoms - for instance, more belligerence after the Buffalo Creek flood (Gleser et al., 1981) and more aggressive behaviour after the 1988 Bangladesh flood (Durkin et al., 1993).

Similarly, 4 to 6 weeks after the collapse of a school pedestrian overbridge, Blom (1986) noted that boys took longer to recover than girls, showed more sleep disturbances, fighting and fears whereas girls showed more startle reactions, asked many questions, and thought frequently about the accident.

Shannon et al. (1994) suggested a pattern in the sex differences in symptomatology. Three months after Hurricane Hugo, females were significantly more likely to report symptoms associated with emotional processing and emotional reaction to the disaster including feeling upset by thoughts of the hurricane, repetitive thoughts about the hurricane, fear of recurrence, emotional isolation, emotional avoidance, emotional numbing, guilt, and avoidance of reminders of the hurricane. Males were significantly more likely to report symptoms related to cognitive and behavioural factors including loss of interest in previously enjoyed activities, memory difficulties and attentional difficulties. Similarly, 18 months after the Armenian earthquake, Pynoos et al. (1993) found that girls reported more bad dreams, being more afraid when thinking about the earthquake, a greater fear of recurrence, and being more upset when thinking about the earthquake.

Few studies have investigated sex differences in the disaster response of preschoolers. However, Cornely and Bromet (1986) investigated the prevalence of long-term behaviour problems in 2½ to 3½-year-old children living near the TMI reactor 2½ years after the nuclear accident and reported that boys were significantly more likely than girls to be soiling and having difficulty with moods.

Ability and Adjustment

Few studies have investigated the effect of ability on postdisaster functioning. Although it might be expected that more able children will be more affected by having a better understanding of what has happened, the limited evidence available suggests that it is the less able child who is more adversely affected. On the basis of measures of depression, anxiety and posttraumatic stress symptoms, Yule and Udwin (1991) identified 10 girls as being at high risk of psychological problems after the sinking of the *Jupiter* cruise ship. When the predisaster academic attainment of all 24 survivors of one school was examined it was found that the girls identified as at high risk had significantly lower attainment than the rest of the group. The researchers suggested that lower attainment could be seen as a high-risk factor and by implication higher ability, could be seen as a protective factor in this group of disaster survivors.

The effects of predisaster personality and adjustment variables have also been studied infrequently. The influence of prior pathology on children's risk for symptoms after a disaster is unclear. Information obtained retrospectively has sometimes suggested a relationship. For instance, Burke et al. (1982) found that children identified as having special needs by their parents were more likely to show increased behaviour problems following a severe winter storm. In contrast, prior adjustment or learning difficulty did not significantly effect the degree of upset at a fatal lightning strike (Dollinger, 1985). Earls et al (1988) found that children aged 6 to 17 with a pre-existing psychiatric disorder were at greater risk of developing posttraumatic stress symptoms following a flooding disaster in Missouri. Breslau et al. (1991) also found that

preexisting pathology such as anxiety or depression significantly increased the risk of the development of PTSD following exposure to a traumatic event in a large scale study of adolescents. As Yule (1992b) notes, from a methodological point of view, it is difficult to disentangle the extent scores on measures assessing the psychological consequences of disaster reflect the effects of the disaster or reflect premorbid functioning.

Several authors have considered the predisaster personality of children from the opposite perspective and examined the characteristics of resilient children. Rachman (1980) concludes that children who have a high level of self-efficacy and are broadly competent should have fewer problems than those who do not have these attributes. Kimchi and Schaffner (1990) reviewed the literature on protective factors in children's responses to stress and developed profiles of resilient children of different ages. They describe the resilient preschooler as self-confident, independent, highly involved in play and advanced in communication and self-help skills. Resilient school-age children are similarly constructive and creative, get along well with others and develop good friendships. Resilient adolescents are described as active, energetic, future-oriented, achievement-oriented, and responsible individuals with a positive self-concept and an internal locus of control. There are few studies to date of the factors that contribute to resilience in children after a disaster.

Prior Trauma

It has been suggested that previous traumatic events will have an impact on children's adjustment to disaster (Keppel-Benson & Ollendick, 1993). The limited empirical evidence does not support this view although anecdotal evidence suggesting that exposure to disaster leads to renewed thoughts and images of previous trauma has been presented.

Bradburn (1991) investigated whether prior traumatic experience influenced the reactions of 10 to 12-year-old children 6 to 8 months after the Loma Prieta earthquake. Whether or not a child had experienced prior psychological trauma was assessed through the question, "What is the worst or scariest thing that ever happened to you?". Examples of severe experiences included witnessing the homicide of a family member, jumping from the window of a burning house, and a near-drowning. However, prior experience was not found to be related to PTSD symptomatology.

Similarly, after the school sniper incident, previous trauma was not significantly related to the severity of reactions (Pynoos et al., 1987). However, children who reported trauma in the past year, including violent incidents, sudden unexpected death, or physical injury, described having renewed thoughts and images of that event. Many also reported difficulties in having to contend with posttraumatic stress symptoms related to both events. Pynoos and Nader (1989) described the reactions of several children (absent as well as present during the sniper attack) in whom details of the shooting served as reminders of previous trauma:

A boy who had been at home focused his free recall entirely on whether there was any blood left on the playground. The thought of blood reminded him of his own appendectomy and the surgical wound, and he was frightened by fantasies of having to return to the hospital if he had been hurt. (p. 239)

One child began by talking about the time that he fell into a fire, burned his hand, and required skin grafting. Another immediately began to cry, describing his mother's death and his longing for her. (p. 239)

The researchers noted that children who had been at home or in safe areas of the school during the incident sometimes recalled the previous trauma or loss before they even described the school episode (Pynoos & Nader, 1989).

McFarlane (1988) investigated the role of further adverse life events experienced in the aftermath of a disaster in determining the long-term adjustment in children. Life events experienced after the disaster were not found to contribute to the number of emotional or behavioural problems when the effect of the disaster was taken into account. On the basis of this result, McFarlane suggested that life events may not have a simple additive psychological effect.

The Family and Community

Parental Response

The response of the parent appears to be an important variable influencing the child's ability to cope with disaster. Wraith (1994) suggests that an important component of a child's response to disaster is his or her experience of the parents' disaster experience:

This may include the parents' behaviour and management of the actual impact and recovery phases, but is frequently determined by the quality of the parents' psychological availability to the child after the event. (p. 108)

Several studies have reported that the severity of parental response to disaster is correlated with the severity of children's reactions (Breton, Valla & Lambert, 1993; Cornely & Bromet, 1986; Earls et al., 1988; Gleser et al., 1981; Green et al., 1991; McFarlane, 1987b; Sullivan et al., 1991). Green et al. (1991) reviewed the Buffalo Creek data and concluded that while age, sex and severity of flood experience were all related to the number of PTSD symptoms at two years follow-up, one of the strongest predictors of outcome was the parents' level of functioning. Both mother's and father's overall severity of disaster response were related to the child's PTSD symptoms, although father's functioning contributed only marginally after the mother's had been accounted for. Conflicting evidence was reported by Bradburn (1991) after the Loma Prieta earthquake. In this study, the degree of parental distress was not significantly related to traumatic stress outcome in 10 to 12-year-old children (although parental distress was not assessed directly, instead children's perception of the degree of stress their parents were experiencing was recorded). These correlations have generally been discussed in terms of the impact of parental distress on the children, but children's upset may also contribute to parents' distress (Brende & Goldsmith, 1991; Fiese & Sameroff, 1989).

Family Atmosphere and Levels of Communication

Particular family atmospheres have also been found to be associated with more persisting symptoms in children. Handford et al. (1986) reported that the intensity of the children's reactions to the TMI nuclear disaster was not found to be significantly related to the severity of their parents' reactions but were affected by the degree of consistency in the reactions of both parents to this disaster. In cases where the parents differed from each other in their intensities of reaction to the disaster or differed in mood, the child's reaction was more severe. The researchers suggested that children may feel less secure where there is parental discord in reactions to the disaster. Eight months after the 1983 Australian bushfires, the interaction in the disaster-affected families was characterised by increased levels of conflict, irritability and withdrawal (McFarlane, 1987a). Maternal overprotection was also a common feature of the pattern of care in disaster-affected families (McFarlane, 1987c). In addition, irritability and distress was associated with more persisting symptoms in children (McFarlane, 1987b). Clinical observation of the families of children severely injured during the Pittsburgh Regatta suggested that the level of family stress, coping styles of both the child and the family, and family experience in having effectively dealt with stressful episodes in the past all contributed to the presence of PTSD symptoms in the children (Martini et al., 1990). Disasters may have a dramatic impact on the functioning of families as units. For instance, Adams and Adams (1984) noted that there were dramatic increases in illnesses, domestic violence, and alcohol abuse following the eruption of Mount Saint Helens in 1980.

An association between communication patterns within families after disasters and children's subsequent responses has been suggested. Bromet, Hough and Connell (1984 as cited by Bromet, 1989) found that for families in the vicinity of the Three Mile Island nuclear accident, supportive family communication strongly moderated the relationship between immediate postdisaster stress and the children's behaviour problems and self-esteem 2½ years later. Both child's upset and mother's upset immediately after the accident were associated with lower subsequent self-esteem and more behaviour problems - but only in families without a milieu of supportive communication. Similarly, McFarlane (1987b) observed that families who found it difficult to share their immediate reactions had more difficulties in coming to terms with the devastating bushfires in South Australia.

After the Vicksburg tornado, some parents were described as showing strong emotional distress and not taking charge to help their children, but depending on them instead (Bloch et al., 1956; Silber et al., 1958). These parents were more likely to have children with severe disaster reactions. After the tornado, many of the parents reported that they felt the best strategy was to avoid discussion of the disaster with the children; it was the researchers' impression that this contributed to symptoms (Silber et al., 1958).

Parents may have played a key role in the shifts described by Saylor et al. (1992) in preschoolers' posttraumatic play after Hurricane Hugo. As reported by parents, this play progressed from acting out the blowing down of trees and houses to acting out rebuilding. Saylor et al. (1992) observed that these relatively high functioning families seemed to be able to facilitate their children's adjustment without outside intervention.

Evacuation and Relocation

Homes have enormous psychosocial and practical importance in the lives of families and having to evacuate the family home or relocate entirely as the result of a catastrophic event can have a lasting impact on family members (Gerrity & Steinglass, 1994). Raphael (1986) recognised the issues involved in relocation or evacuation after disaster and wrote:

The loss of home, a strange environment, the breakdown of family ritual, separation from parents, from familiar neighbourhood and environment, and from school and friends, the loss of toys and treasures, and crowded and strange accommodations are likely to be stressful for children in the post-disaster period. If these experiences are prolonged by evacuation and temporary shelter, especially if there are repeated disruptions and moves that affect school and family life, the impact on the child is likely to be substantial. (p. 165).

Unfortunately few studies have systematically investigated the effect of relocation or evacuation after disaster on children. Seven to 10 months after Cyclone Tracy, children whose families evacuated and had not returned to Darwin showed the most symptoms, and children who had not been evacuated or who were evacuated and returned showed least symptoms (Milne, 1977). Differences were significant for a number of specific symptoms including persisting fears. Milne (1977) suggested that lack of subsequent exposure to the site of the disaster may have contributed to the persisting fears of evacuees. Clinical observations made by Galante and Foa (1987) after the 1980 earthquake in Italy suggested that the eagerly anticipated move into prefabricated schools and houses seemed to result in regression to earlier exaggerated ways of behaving.

The length of time out of the family home was significantly related to the extent of behavioural difficulties and PTSD symptoms the parents observed in their children after Hurricane Hugo although not to the children's self-report of these problems (Belter et al., 1991). Lonigan et al. (1994) conducted a large scale study of the effects of Hurricane Hugo on 5687 school-aged children. Continued displacement from the family home at the time of the study (three months after the hurricane) was significantly associated with a greater percentage of children meeting the criteria for each of the three DSM-III-R (1987) clusters for PTSD (reexperiencing, emotional numbing/avoidance and increased arousal) and also an increased rate of posttraumatic stress diagnosis in children.

In a situation such as the Three Mile Island nuclear accident in which there was no observable destruction, a family's decision to evacuate is likely to reflect parental assessment of high risk. Adolescents reported higher psychological distress immediately after the disaster if their family evacuated than if they did not (Bromet, 1989).

Community Support

The extent of the social support available in the community for children and their parents is likely to affect children's responses although few studies have examined this issue empirically. After the Italian earthquake, the amount of physical damage did not predict the level of problem behaviours of the children. Post hoc examination suggested that the critical variables were the

degree of organised community effort at rebuilding and the supports available to children (Galante & Foa, 1987).

Breton et al. (1993) examined the mental health of children and their parents one year after exposure to an industrial fire which released a cloud of toxic smoke into the atmosphere and resulted in the evacuation of over 1500 families in the nearby communities. Many parents were dissatisfied with the information provided by government representatives and the support from official organisations. There was a significant correlation between the negative appraisal of support received from official bodies and the number of PTSD symptoms attributed to the child by the parent.

Schools can be a crucial source of community support for children and parents in the intermediate and long-term periods after a disaster. Yule (1992a) compared the reactions of different schools to the sinking of the *Jupiter* cruise ship. Yule presents preliminary findings contrasting one school that accepted and organised outside help immediately with a similar school that resisted all offers of help. The pupils in the former school showed slightly lower scores on scales measuring depression and anxiety and significantly lower rates of PTSD symptoms. Similarly, pupils in the supportive school reported significantly fewer disaster-related fears five months after the incident. As Yule (1994) notes these findings provide suggestive evidence for the value of early intervention as well as suggesting that the way schools react to disaster can be important in maintaining distress caused by disaster.

Assessment of Children Following Disaster

Rapid and accurate identification of children who are experiencing excessive stress following a disaster is crucial (Finch & Daugherty, 1993). It may be necessary to screen large numbers of children for posttraumatic stress quickly and effectively so that services can be targeted to those most in need. The postdisaster environment is not an ideal situation for considering the advantages and disadvantages of various methods of assessment. Consequently, time pressure and disaster-related limitations on resources have meant that researchers and mental health professionals have frequently had to 'make do' with less than adequate screening methods (Green, 1991). Recent research has demonstrated that parent or teacher assessment of children's symptoms may not equate with the children's own report and thus it is important to ask children directly about their postdisaster reactions. The following sections examine issues relating to parent and teacher assessment of children's postdisaster reactions and the relative merits of different methods for the assessment of posttraumatic stress.

Parent, Teacher or Child Report

Recent research has demonstrated the importance of asking children directly about their postdisaster reactions rather than relying exclusively on parent or teacher report or using such reports as the primary source of information. By school age, children generally report higher levels of postdisaster stress than parents report for them. Earls et al. (1988) examined the reactions of children after a flooding disaster in Missouri. Both parents and children were interviewed separately using parallel versions of a structured diagnostic interview. Children between 6 and 17 years were given the Diagnostic Interview for Children and Adolescents (DICA; Herjanic & Reich, 1982). A parent's version, the DICA-P, was administered to the children's parents. Children reported significantly more symptoms than their parents reported for them. Edelbrock, Costello, Dulcan, Conover and Kalas (1986) concluded that as children grow older the level of parent-child agreement decreases. Although, Reich & Earls (1987) noted that children as young as six still report emotional problems of which their parents appear to be unaware. These results may be due to the tendency of adults to deny the impact of disastrous events on children (Bloch et al., 1956; Burke et al., 1982).

Similar findings have been reported in studies of a variety of disasters. Handford et al. (1986) found that children consistently reported stronger and more symptomatic response to the Three Mile Island nuclear accident than their parents reported for them. Belter et al. (1991) also reported significant variation in parent and child reports of PTSD symptoms five months after Hurricane Hugo. The parent-report of the number of PTSD symptoms displayed by their children yielded scores on the Reaction Index which were significantly lower than the scores obtained by child self-report. In contrast, Dollinger et al. (1984) reported a significant positive correlation between mothers' and children's reports of storm related fears after a fatal lightning strike and suggested that the disaster had made mothers more attentive to their child's distress.

Parents, however, are more likely than teachers to report postdisaster problems in their children. Parental report of children's response to the Australian bushfires were significantly greater than

teacher report at both 8 and 26 months after the disaster (McFarlane et al., 1987). Five months after the capsizing of the *Herald of Free Enterprise*, initial assessments of the children who survived were gathered from parents and teachers of the children (Yule & Williams, 1990). According to the parents, 55% of the children scored above the cut-off point on the Rutter Children's Behaviour Questionnaire for Completion by Parents usually taken as indicating a high risk of psychiatric disorder. In contrast the teachers rated 25% of the children above the cut-off on the parallel Rutter Children's Behaviour Questionnaire for Completion by Teachers.

Understandably, parent-child agreement is generally better for external symptoms than for internal symptoms. Symptoms such as intrusive thoughts and dreams concern internal states which others may be unaware of. For example, Edelbrock et al. (1986) examined the levels of agreement between 299 disturbed children aged 6 to 18 and their parents regarding the level and severity of the child's psychiatric symptoms as measured by the Diagnostic Interview Schedule for Children (DISC). The researchers found that agreement was higher on behaviour and conduct problems than on internalising symptoms such as anxiety and fears.

Children may even try to protect their parents from knowledge of their distress after a disaster. Yule and Williams (1990) observed that children who had survived the capsizing of the *Herald of Free Enterprise* ferry were more forthcoming about their symptoms when interviewed privately than they had been when interviewed with their parents present. Parents, however, may be more aware of and more likely to report some behavioural symptoms, such as posttraumatic play and avoidance, than the children themselves (Nader & Pynoos, 1991).

Methods of Assessment

It is important to be able to identify the children who are the most in need of services following a disaster. A variety of methods have been used by researchers examining children's postdisaster reactions, among the most common are rating scales, structured interviews, self-report measures, self-monitoring, projective assessments, and physiological measures. Many of these measures are used to identify children suffering posttraumatic stress symptoms following a traumatic event and the reliability and validity of the measures for this purpose will be discussed.

Rating Scales and Checklists

General behaviour problem rating scales and checklists have been used to assess children's postdisaster responses. Behaviour rating scales are most commonly completed by significant others in the child's life (e.g., parents or teachers). They are generally used to assess behaviour problems although many of these scales contain items related to diverse areas of functioning such as school achievement, peer relationships, activity level and self-control (Ollendick & Greene, 1990). Specific rating scales and behaviour checklists that have been used in disaster research include the Rutter Children's Behaviour Questionnaire, the Child Behaviour Checklist and the Conners Teacher and Parent Questionnaire.

The Children's Behaviour Questionnaires (Rutter & Graham, 1967 as cited in McFarlane, 1987b) were designed to screen for behavioural problems at home and school through parent

and teacher report versions. The two questionnaires each include 26 examples of behavioural problems which are rated 0 to 2 ("Does not apply", "Applies somewhat", "Certainly applies"). Responses are summed and a total of 9 or above is taken to suggest a risk of behavioural or emotional disturbance. Several studies using the questionnaires have found increased scores in children following disasters (Galante & Foa, 1987; McFarlane, 1987b; McFarlane et al., 1987; Yule & Williams, 1990).

The Child Behaviour Checklist (Achenbach et al., 1987) contains both social competency and behaviour problem items. Separate editions of the scale are available for children aged 2 to 3 and 4 to 16. The behaviour problem scale of the checklist consists of 118 items which the teacher or parent indicate are untrue (0), sometimes true (1), or often true (2) of the child. Factor analyses of the items have revealed a variety of response clusters that differ with the age and sex of the child, however, broad grouping reflects internalising (e.g., anxiety and withdrawal) and externalising (acting-out) dimensions (Achenbach & Edelbrock, 1989). Sullivan et al. (1991) found a significant increase in the number and severity of problem behaviours after Hurricane Hugo using a modified version of the Child Behaviour Checklist.

The Conners Teacher and Parent Questionnaire (Conners, 1969) lists 93 items of problematic behaviour, which are rated 0 to 3 ("not at all", "just a little", "pretty much", "very much") according to their perceived presence. A total score is calculated, with higher scores indicating greater behavioural difficulties. Scores on eight subscales can also be obtained for specific types of problem behaviours; these subscales are Aggressive Conduct, Anxiety, Impulsive-Hyperactive, School Behaviour, Psychosomatic, Perfectionism, Anti-social, and Muscular Tension. Burke et al. (1982) made a predisaster-postdisaster assessment of children exposed to a severe blizzard and subsequent flood in Massachusetts. Anxiety scores for boys increased and the entire group had significantly increased Aggressive Conduct subscale scores after the disaster.

Behaviour rating scales and checklists seem to be sensitive to disaster associated behaviour problems but they have limited viability as screening instruments for posttraumatic stress reactions. For instance, McFarlane (1987b) found no correlation between PTSD and factor scores on the Children's Behaviour Questionnaires. The inability of these scales to differentially screen children for posttraumatic stress reactions may be indicative of the many symptoms of PTSD that are subjective experiences and hence not observable by others. However, as Yule and Williams (1990) note, these scales are broad based instruments for the assessment of general behaviour problems, they were never intended to measure the effects of trauma on children. Another disadvantage is the vulnerability of behaviour rating sales and checklists to a number of measurement errors (Finch & Daugherty, 1993). Measurement errors discussed by Finch and Daugherty (1993) include the *halo effect*, in which a rater's overall opinion of the child can be unduly influenced by a single favourable or unfavourable characteristic; the *error of central tendency* which refers to the reluctance of raters to use the extreme points of the rating scales; and the tendency for raters to vary in their conception of normal behaviour.

On the other hand, rating scales and behaviour checklists have some advantages. They are relatively inexpensive, require little of the researcher or clinician's time, and are completed by someone who is familiar with the child thus providing the 'outside' investigator with the benefit of this experience (Finch & Daugherty, 1993).

Structured Interviews

Interviewing has long been the standard method of assessing children's emotional, behavioural, and social functioning (Caddell & Drabman, 1993; Ollendick & Greene, 1990). However, unstructured interviews are subject to broad variations in content, style and coverage (McNally, 1991). Attempts to reduce information variance in interviews have focussed on structuring the interview. Structuring typically involves defining the phenomena to be assessed, limiting the order and wording of questions, and standardising the rating and recording of responses (Edelbrock & Costello, 1990).

Structured interviews have the advantage that clinical insight is maintained even though clinician variance is reduced (Finch & Daugherty, 1993). Many highly structured interviews can also be conducted by minimally trained individuals and still retain their reliability which can be useful when large numbers of people need to be assessed. However, a high degree of structure can also be a disadvantage. If the interviews are highly structured and clinical judgement is minimised, considerable information from highly trained clinicians may be lost (Finch & Daugherty, 1993).

There are several structured interviews for assessing PTSD in children. The most common instruments appear to be the Diagnostic Interview for Children and Adolescents (DICA; Herjanic & Reich, 1982) and the Diagnostic Interview Schedule for Children (DISC; Costello, Edelbrock & Costello, 1985).

The DICA is a highly structured interview covering a wide range of symptoms and DSM-III (1980) diagnoses. A revised version based on DSM-III-R (1987) criteria has been developed (Reich, 1991 as cited in Saigh, 1991). Information on the presence/absence of more than 250 specific symptoms is recorded, as well as their severity, onset, duration and associated impairments (see Herjanic & Reich, 1982). The questions are grouped according to specific disorders so that selected portions of the interview can be administered (e.g., Earls et al., 1988). Diagnoses are made by directly comparing item responses to DSM criteria for the symptoms, severity, onset and duration of specific disorders. The DICA provides the interviewer with specific wording of questions and explicit categories for response coding. Symptom items are coded 1 (No), 2 (Yes), or 3 (Uncertain). Responses coded "Uncertain" can be clarified by subsequent questions and recoded either "Yes" or "No" (Herjanic & Reich, 1982). The role of clinical judgement has been minimised so that the DICA can be administered by lay interviewers (Herjanic & Reich, 1982). Parallel interview schedules for interviewing the child (DICA-C) and parent about their child (DICA-P) are available and show good agreement (Welner, Reich, Herjanic, Jung & Amado, 1987) although diagnoses are formulated separately rather than combining parent and child information. Several studies have used the DICA to investigate PTSD in children after disaster. Earls et al. (1988) interviewed children one year after a flooding disaster in Missouri. Although several children were experiencing PTSD

symptoms, none met full criteria for the disorder. Stoddard, Norman and Murphy (1989) used the DICA to diagnose 30 children aged 7 to 19 years, who had been severely burned. DSM-III (1980) criteria for PTSD were met by 6.7% and interrater reliability for the diagnosis was 92%.

The DISC is also a highly structured interview in which the order, wording and coding of all items is specified and can similarly be administered by lay interviewers. In a similar way to the DICA, the DISC covers most psychiatric diagnoses applicable to children and adolescents and was designed for large scale epidemiological surveys. Diagnoses are generated by computer algorithms applied to the data although scores in symptoms areas are also generated. Parallel versions have been developed for separately interviewing children (DISC-C) and parents about their children (DISC-P). However, the agreement between child and parent versions is not consistent with regard to symptom type (Edelbrock et al., 1986; Edelbrock, Costello, Dulcan, Kalas & Conover, 1985). The DISC covers a broad range of symptoms and assesses their severity thus specific information about onset and duration is sought. Most items are coded 0 (no or never), 1 (somewhat, sometimes, or a little), and 2 (yes, often, or a lot). In addition, descriptions and examples offered by the child or parent are recorded verbatim (Costello et al. 1985). Unlike the DICA, questions are not grouped according to specific disorders, although the specific questions for a particular diagnosis can be lifted from the main text and administered (Husain & Kashani, 1992).

Some specific structured interviews have been developed by researchers for particular purposes (e.g., Famularo et al., 1990; Pynoos & Eth, 1986) although as Finch and Daugherty (1993) note it may be more useful to validate existing options rather than continually developing alternatives.

Self-report Measures

Self-report measures require individuals to respond to a number of statements as they apply to themselves. Such measures generally have a true-false, yes-no format or require a selection from a number of options (Finch & Daugherty, 1993). Self-report measures have been used more frequently than other assessment instruments in disaster research. The most common include the PTSD Reaction Index (RI; Frederick, 1985), the Impact of Events Scale (IES; Horowitz et al., 1979), the Children's Posttraumatic Stress Disorder Inventory (CPTSDI; Saigh, 1989a), and the Revised Fear Survey Schedule for Children (FSSC-R; Ollendick, 1983).

There are two versions of the Reaction Index (RI). The original version of the RI is a 16-item inventory of symptoms based on the DSM-III (1980). The total number of symptoms a child reports is recorded as his or her RI score. The RI can be administered in an interview format or in a paper and pencil self-report format. Comparisons of RI scores with independent clinical assessments for severity level of PTSD established the following guidelines: a score less than 7 indicated no PTSD; a score of 7 to 9 indicated a mild level of PTSD; a score of 10 to 12 suggested a moderate level; and a score over 12 indicated a severe level (Frederick, 1985).

The revised version of the RI provides a weighted symptom count on a 20-item inventory of symptoms based primarily on diagnostic criteria in the DSM-III-R (1987). Responses vary from 0 to 4 ("None of the time," "Little of the time," "Some of the time," "Much of the time,"

"Most of the time"), and a total score is calculated by a summing of the responses.

Comparisons of the revised RI with a diagnosis of PTSD in clinical populations suggested the following guidelines: a score of 12 to 24 indicates a mild level of PTSD; a score of 25 to 39 suggests a moderate level; a score of 40 to 59 indicates a severe level and a score over 60 indicates a very severe reaction (Pynoos et al., 1993). There exists substantial evidence for the interrater reliability (Applebaum & Burns, 1991) and internal consistency of the RI (Lonigan et al., 1991). The validity of the RI has also been demonstrated. Frederick (1985) reported a .91 correlation of reaction index scores with confirmed clinical cases of PTSD. In addition, Pynoos et al. (1993) reported a significant association between the severity categories of the revised RI and DSM-III-R (1987) diagnoses of PTSD. RI scores are also predicably related to the amount of exposure to disaster (Bradburn, 1991; Lonigan et al., 1991; Nader et al., 1990; Pynoos et al., 1987; Pynoos et al., 1993).

The IES measures intrusive thoughts and avoidance of reminders of a traumatic event. When it has been completed by children and adolescents within a few weeks to a year after disasters, the mean scores have been close to those of adult stress clinic subjects and at least as high as scores of adult disaster victims. The IES is a 15-item scale initially developed for adults, with both self-report and clinician-report versions. The scale measures two features of PTSD: intrusion (7 items) and avoidance (8 items). The response format requires the subjects to indicate the frequency of symptoms over the last 7 days as "Not at all" (0), "Rarely" (1), "Sometimes" (3), or "Often" (5). Total scores are computed by the summing of item responses for each subscale. Several studies have used the IES to assess children's reactions to disaster (Jones et al., 1994; Yule, 1992a; Yule & Williams, 1990). Psychometric properties of the IES are sound for adults (Zilber, Weiss & Horowitz, 1982) but have yet to be adequately established for child and adolescent populations (Finch & Daugherty, 1993).

The CPTSDI is a structured inventory designed to explore DSM-III (1980) PTSD symptoms. Exposure to the trauma, unwanted anxiety provoked by recollections of the trauma, general affect, and symptoms developed subsequent to the trauma are assessed (Saigh, 1989a). The CPTSDI is administered as an interview during which the presence or absence of symptoms as well as information about the severity and occurrence of the traumatic event is established. Diagnosis is based on total symptom score and is either rated acute (if the trauma occurred less than 6 months ago) or chronic (more than 6 months ago). Saigh (1989c) used the CPTSDI to interview 840 Lebanese children, ranging from 9 to 13 years old, who had been exposed to war-related trauma and had been referred for psychological assessment. Of these children, 273 were diagnosed as having PTSD. Two experienced clinicians who were familiar with childhood PTSD reviewed the written and taped transcripts of the interviews and concluded that 231 of the children did meet criteria for the disorder yielding an agreement rate of 85%. Using the CPTSDI, Saigh (1989b) diagnosed 24 war-traumatised Lebanese adolescents as having PTSD. These children scored higher than nonclinical control subjects on measures of anxiety and depression.

The FSSC-R is designed to be used with young and school-age children. The child rates his or her fear of each of 80 items on a 3-point scale. Children are asked whether a specific fear item (e.g., having to stay after school, going to bed in the dark, spiders, getting lost, going to the

dentist) frightens them “not at all,” “some,” or “a lot.” Factor analyses of the scale has revealed five primary factors; fear of failure and criticism, fear of the unknown, fear of injury and small animals, fear of danger and death, and medical fears (Ollendick, 1983). Investigation of the scale’s reliability across gender and age has reported good internal consistency (Ollendick, King & Frary, 1989). The instrument can also be used to differentiate subtypes of specifically fearful children (Ollendick & Greene, 1990). For instance, children whose fear of school is related to separation anxiety (e.g., death, having parents argue) compared to those whose fear is due to specific aspects of the school situation (e.g., taking a test, making a mistake, being sent to the principal). Studies using the FSSC-R support the applicability of the scale to the measurement of PTSD-related fears in children (Ollendick, Yule & Ollier, 1990; Yule et al., 1990).

The self-report method has a number of advantages including the direct obtaining of information from the child and the potential to access subjective feelings such as fears, intrusive thoughts, dreams that are rarely observable and may not be disclosed to others (Finch & Daugherty, 1993). In paper and pencil format, self-report measures are relatively inexpensive and take little time. The primary disadvantage of the self-report method concerns the potential inability or unwillingness of children to report accurately. In particular, symptoms of denial, such as avoidance of thoughts or feelings associated with the disaster, avoidance of reminders, or an inability to recall part of the event, are likely to be particularly difficult to assess (Green, 1991). By definition denial symptoms are attempts to ward off the impact or reminders of the disaster and hence they may be under reported.

Self-Monitoring

Self-monitoring differs from self-report in that it constitutes an observation of the relevant symptoms at the time of occurrence (Ollendick & Greene, 1990). Self-monitoring requires the child to observe his or her own behaviour and then record its occurrence systematically. Behaviours that might be monitored in assessing PTSD include intrusive thoughts, nightmares, and nighttime awakenings.

The specific monitoring method may vary but any procedure that allows the child to record the presence of the targeted behaviour can be used. For instance, Saigh (1987 as cited in Saigh, 1992a) used a pocket frequency counter as a self-monitoring device of intrusive thoughts. Other techniques include asking the child to keep a diary or using parents as surrogate self-monitors for observable behaviours such as nightmares, requests to sleep with parents, or separation refusals (Caddell & Drabman, 1993).

Self-monitoring has the advantage of being a direct method of obtaining information about specific symptoms. However, younger children may have difficulty remembering exactly what behaviours to monitor and how those behaviours are defined. For these reasons, it is generally considered desirable to provide the child with a brief description of the target behaviour and have the child record only one or two behaviours at a time (Ollendick & Greene, 1990).

Projective Assessment

Projective assessment refers to any test, device or set of procedures which allows the individual to respond in an unrestricted manner to unstructured or ambiguous objects and situations

(Reber, 1985). Projective techniques are now being reexamined after concern over their validity resulted in their abandonment for several decades (Finch & Daugherty, 1993). Common projective assessment techniques include drawing, storytelling, play, and specific tests such as the Rorschach.

The primary disadvantages of projective assessment concern issues of reliability and validity. Responses generated by projective techniques need to be quantified and coded to be useful for screening children after traumatic incidents. This process may be very complex and difficult (Finch & Daugherty, 1993). In addition, reliability of interpretation is crucial. Finch and Daugherty (1993) note that it is difficult to ensure that examiners using projective techniques interpret data to mean the same thing.

Projective techniques have several advantages over more direct methods such as the self-report, interview or behavioural checklist. In particular, projective techniques provide the opportunity for children to communicate in an alternative form. This can be especially useful for younger children who may lack the verbal ability to respond accurately to direct questioning. The use of defense mechanisms may protect children from emotional upset (Dollinger & Cramer, 1990). Although, high defense use might be a valuable initial reaction, Dollinger and Cramer (1990) note that the use of strong defense mechanisms may have subsequent negative effects, such as emotional numbness and misinterpretation of reality. Children employing a high level of defense may escape detection by direct assessment methods and thus projective techniques may be more useful (Finch & Daugherty, 1993).

Holaday, Armsworth, Swank and Vincent (1992) provide evidence suggesting that the Rorschach test may be useful for identifying traumatised children. However, Finch and Daugherty (1993) note that there exist two diametrically opposed systems for interpreting children's Rorschach responses and thus results must be treated with caution.

Several studies have used free composition as a projective tool for assessing the reactions of children after disaster. Ten months after a blizzard and flood disaster, Burke et al. (1986) asked children to write stories about "What this coming winter will be like". The stories were assessed by mental health clinicians on 13 separate 7-point scales for signs of distress, including fear, depression, and anxiety. Using this method, children from the flooded area showed significantly more distress than controls from a nonflooded area.

Similarly, Klingman (1994) investigated the response of 253 Israeli children at risk from missile attacks during the 1991 Gulf War. During the fifth week of the war, children were asked to write a short composition in class about their personal experience since the beginning of the war. Compositions were coded on the expression of anxiety, coping strategies, social support, negative/positive experiences and composition length. Klingman (1994) concluded that compositions may have considerable practical value for both psychological assessment and school-based intervention. The results concurred with the findings of studies using conventional methods as well as providing some unique information. For instance, boys tended to report more fears than girls via compositions in contrast to the sex difference found via conventional methods (e.g., Milgram et al., 1988; Yule, 1992a) suggesting that this form of assessment elicits experiences not usually elicited by other methods. Teachers who supervised

the compositions noted that children were highly focussed on the task, enthusiastic and cooperative suggesting that writing may have therapeutic value for children in a traumatic stress situation (Klingman, 1994).

Oral story-telling has been used as a projective assessment technique in conjunction with other measures in a study by Dollinger (1985). One month after a fatal lightning strike disaster, stories told by survivors aged 10 to 12 about pictures of lightning revealed projections of the children's emotional upset, the presence of defensive reactions to the incident, and an increased sense of vulnerability for injuries from lightning strikes.

Play and drawing have also been used as methods for projective assessment although evidence of their usefulness is largely anecdotal. For instance, Saylor et al., (1992) reported play in children who had experienced Hurricane Hugo that seemed to be projective representations of their experiences and fears. Nader and Pynoos (1991) discuss the usefulness of drawing as an assessment tool:

Drawings allow clinicians to see the child's spatial representation of the event. They show which part of the event remains most troubling to the child, how and when the child experienced the greatest amount of helplessness, and when the child felt the most ineffectual, as well as indications of the child's own self-blame. ...They permit depiction of the series of actions that occurred and help to understand the circumstances of the child's life into which the trauma intrudes. (p. 379)

In addition, play and drawings can serve as a monitor of the child's processing and resolution of the traumatic event (Nader & Pynoos, 1991).

Physiological Measures

Signs of physiological arousal are among the most dramatic manifestations of PTSD, yet they have only been recently studied in children.

One of the main advantages of physiological measures is that they avoid response bias. The physiological measures do not require verbal response from the child and thus avoidance and denial are circumvented (Finch & Daugherty, 1993). Unfortunately, the expense associated with the equipment can be prohibitive and the physical demand of the procedures (e.g., keeping very still) can be difficult for younger children (Caddell & Drabman, 1993).

In one of the few studies to employ physiological measures, Ornitz and Pynoos (1989) investigated the startle reflex in children exposed to a sniper attack in their school playground and in nontraumatized children. In contrast to nontraumatized children, those with PTSD failed to exhibit inhibition of the startle response. Ornitz and Pynoos noted that loss of the inhibitory modulation of the startle response is consistent with chronic brainstem dysfunction. Measurement of startle modulation is promising, but as Finch and Daugherty (1993) note more research is needed to explore its reliability and application to the assessment of PTSD in children.

Intervention

This section of the report summarises and evaluates existing psychological intervention and treatment programmes for responding to the needs of children and their families following disaster. The interventions are divided into four main groups according to the time intervals relating to the disaster: predisaster, post-impact, short-term, and long-term.

Predisaster Intervention

The predisaster phase is an important period for establishing relationships within emergency response networks and developing specific ways to address children's mental health as a part of the emergency response. Effective predisaster planning to meet the psychological needs of children and adolescents involves two essential tasks. Firstly, mental health components must be incorporated into disaster response plans at both a national and community level. Secondly, effective methods need to be developed to prepare children and their families to respond effectively to the psychological aspects of disasters.

The incorporation of mental health components into disaster plans involves negotiation with emergency planners and public officials, gaining sponsorship and legitimacy, developing a network of mental health providers with expertise in postdisaster interventions with children, and establishing procedures to be followed in the aftermath of disaster (Lebedun & Wilson, 1989). Planning is crucial, as existing mental health agencies and community support services may not be capable of rapid response to the needs of disaster survivors due to funding shortfalls and outpatient services that are already stretched to capacity (Scott, 1995).

In addition, it is important that mental health professionals develop a working relationship with emergency services and other leaders in the local community before disaster strikes. Offers from mental health providers to provide assistance during or after disasters have sometimes been turned down (McFarlane, 1987a; Yule, 1992a). Rejection of these offers has been attributed to beliefs that psychological effects of disasters are nonexistent or insignificant (Wraith, 1994) and failure to gain support from the officials of disaster intervention efforts (Lebedun & Wilson, 1989). On the other hand it is important for mental health providers to participate in advanced planning in order to avoid a convergence of well-intentioned 'experts' offering services after disaster (Taylor, 1989).

Minimisation of psychological trauma in children and adolescents also requires widespread knowledge in the community of how to prepare for and cope with disasters. Predisaster preparation information provided by disaster and emergency agencies typically focuses on minimising physical danger during natural disasters. The emphasis on reducing physical danger is believed to have beneficial psychological effects by reducing anxiety through increased perceptions of control (Myers, 1989). However, education regarding psychological reactions to disaster and positive styles of coping with the threat or occurrence of a disaster is also needed.

A number of preventative techniques have been proposed by researchers to help minimise psychological distress in general. Unfortunately few studies have utilised these techniques in an effort to prevent postdisaster distress. The first of these strategies involves education about general stress reactions and specific disaster reactions. This technique is labelled *anticipatory guidance* and can be adapted for adults or children (Myers, 1989). Such education might include information about loss, including losses that are less apparent than loss of life and property, such as loss of income, loss of the sense of safety and security, or loss of family history through destruction of photographs and mementos. The individual might be informed of the potential for additional stress on family life consequential to the disaster such as the demands inherent in rebuilding a damaged home. Education would also include the phases of adjustment to be expected. Simulation of emergency situations and drills can also be considered a form of anticipatory guidance (Klingman, 1978; Snyder, 1993). Myers (1989) notes that education and guidance about the possible psychological reactions to disaster may "provide a type of emotional inoculation by evoking ahead of time an anticipation of the experience, with its associated feelings of anxiety" (p. 219).

Another preventative approach involves *behavioural training* (Catalano & Dooley, 1980). This technique involves teaching relaxation in the face of stressful stimuli. The child or adult is taught to monitor systematic mental and physical reactions and to control them through deep breathing, muscle relaxation and cognitive strategies such as distraction of mental imagery. This technique can provide a feeling of psychological preparation and a sense of control (Catalano & Dooley, 1980).

A final technique involves strengthening an individual's coping capacity through *cognitive restructuring*. This technique involves modifying the internal statements people make to themselves (Jason, 1980). It assists the individual to identify negative self-statements and replace them with more positive ones. In this way the individual is provided with internal coping skills to handle both present and future stressful situations.

Klingman and Hochdorf (1993) assessed the effectiveness of a school-based psychological education programme designed to improve adolescents' coping with distress through cognitive restructuring techniques. The programme aimed to help students develop a repertoire of coping skills such as transforming self-defeating internal thoughts and self-talk and refuting irrational beliefs. Comparison of pre- and post-training assessments indicated that the programme had positive effects on attitudes, emotions, and knowledge of distress coping skills.

Psychological techniques may be subject to the same problems affecting public response to preparation information provided by disaster and emergency agencies. Gregory (1995) notes that the majority of the general public adopt few of the self-protective behaviours recommended by civil defence authorities. A prominent factor is likely to be the community's denial that disaster could affect them (Myers, 1989). In addition, individuals at the most risk may cope with the resultant anxiety by ignoring the disaster threat or denying its seriousness. For instance, Lehman and Taylor (1987) conducted a study of Californian university students living either in dormitories rated seismically as 'very poor' or 'good'. Those living in 'very poor' seismic structures were significantly more likely to endorse coping items such as, 'I don't think

about the earthquake' and, 'Los Angeles was fine in the 1971 earthquake and it will be fine in the next one too'. In addition, greater seismic risk in living quarters was inversely related to the level of earthquake preparedness. Lehman and Taylor (1987) suggested that these perceptions were efforts to cope with the threat posed by poor seismic structures.

Preventative efforts need to be based on an understanding of the factors that influence perception of risk and preparatory behaviour. Many predisaster efforts to minimise potential distress following a disaster are directed toward parents and teachers rather than children (e.g., pamphlets on common reactions in children) and even techniques that attempt to directly enhance children's coping skills (e.g., behaviour training or cognitive restructuring) are likely to require teacher or parent approval. Thus, it is important that parents and other significant adults recognise the need for predisaster prevention efforts. Myers (1989) has identified several factors that are useful in combating the denial and lack of interest about disaster preparedness prevalent in the general population. In particular, predisaster prevention strategies should take advantage of incidents which heighten public interest in preparedness such as disasters in other countries or the return of the hurricane season after a previous year of bad storms. In addition, public education messages must be frequent and consistent, must be given by people with credibility and authority and must provide specific information about what to do in a given situation. The emphasis of the things that are most important to people can also help cut through denial and motivate people to prepare. Motivators include concern for the safety of loved ones, especially children, concern for protecting homes, and concern for protecting family keepsakes, mementos, photograph and other irreplaceable objects. Fear is often listed as a primary motivator for people to adopt preparatory measures (Myers, 1989) although a balance must be struck in using fear as a motivational factor. Raising some anxiety will get people's attention but too much fear may result in denial (Gregory, 1995).

Post-Impact Intervention

The period immediately following disaster is often marked by a high degree of emotional and physical arousal, uncertainty and fear. This section considers the ways in which mental health professionals can supplement the emergency response of schools and other institutions that may be responsible for children in the event of a disaster. Many of these tasks can be considered psychological or emotional first aid (Pynoos & Nader, 1988). The concept of psychological first aid has sometimes been used to include interventions several weeks or months following a disaster (Pynoos & Nader, 1988), however, this section examines only the interventions conducted during the acute period after disaster in which the nature and extent of injury and property damage is first known. This period has sometimes been labelled the impact phase of a disaster (Klingman, 1987).

Psychological first aid needed in the immediate period following a disaster includes support for community leaders such as school administrators, gathering and providing information to people affected by the disaster, and conducting initial interviews with children and adolescents who have experienced the disaster.

Support for School Crisis Managers

Schools are often forced to make difficult decisions quickly regarding the management of various aspects of disaster situations. The actions of schools during and immediately after a disaster have great potential either to worsen or improve the coping of children and adolescents (Pynoos & Nader, 1988; Yule, 1992a). An early step in a school's response to the disaster situation should be the gathering together of a preplanned crisis-intervention team (Klingman, 1993; Purvis, Porter, Authement & Boren, 1991). Crisis intervention teams are most effective after large-scale disasters if they include a combination of staff who regularly work in the school and outside professionals (Klingman, 1987). As part of the crisis-intervention team, mental health personnel are in a useful position to provide support and advice for school staff in the immediate postdisaster environment.

It is particularly important that outside mental health professionals do not take over the management of the postdisaster environment during this period but instead leave most decision making in the hands of the school (Yule & Gold, 1993). This approach allows mental health personnel to provide postcrisis counselling and decreases the feelings of helplessness among school staff (Weinberg, 1990). Outsiders in schools can be perceived as intrusive and as evidence of less concern on the part of the school (Toubiana, Milgram, Strich & Edelstein, 1988). Although Alexander (1990) notes that early psychological assistance from mental health personnel in the form of support for the school decision makers may enhance credibility in a way which is likely to facilitate subsequent work with the children.

Providing Information

Providing information during and immediately following a disaster is a crucial task. Family members separated during disasters are often desperate for information regarding each other's safety, and rumours can spread easily, heightening anxiety and creating feelings of panic.

Mental health personnel can serve a critical function in the process of notifying families of deaths or injuries. Procedures followed after a school bus accident provide useful guidelines for notifying parents of fatalities (Klingman, 1987). These include attending to the physical safety of parents as they are informed, briefing police about ways to notify parents, having a mental health worker stay with parents during the entire notification process, having a medical team on call, and activating natural support networks for the parents. Fewer suggestions have been made for notifying children of deaths or injuries to family members or friends although Raphael (1986) notes that children should be fully informed about the death or injury and given repeated opportunities to discuss the implications of the disaster. In disasters where a parent or sibling has died, children who were also seriously injured and in hospital are sometimes not told of deaths until they ask to know (Fornari, 1991).

Initial Contact with Children

Immediate and direct contact between mental health personnel and children who experience the disaster is another potentially important intervention during the post-impact phase (Gillis, 1993). In an example of this type of intervention, mental health professionals attempted to meet children who survived or observed a fatal bus crash as soon as the children returned to the

school and were reunited with their parents (Klingman, 1987). These meetings, conducted in groups, focused on ventilation and acknowledgment of strong feelings as a means to reduce anxiety. The meetings also served to present factual information to the children and identify children with exceptionally severe reactions. Information provided at meetings such as these may have to be repeated several times owing to a reduced capacity to absorb information in the aftermath of disaster (Lundin, 1994). Lundin (1994) also suggests that attempts should not be made to coverup the full extent of the disaster as this might result in children developing unnecessary and frightening fantasies about what has occurred.

This type of meeting differs from the debriefing interviews described later, which typically are conducted several days after the disaster and involve a more detailed retelling of disaster events. Initial contact in the post-impact phase may not be possible in all disaster situations. However, as soon as possible children should be given an opportunity to discuss the facts surrounding the disaster and clarify misconceptions (Blom, Etkind & Carr, 1991).

Intervention in the Short-Term

The third intervention stage is the short-term adaptation phase beginning 24 hours or more after the disaster and lasting for several months. Interventions during this period are designed to facilitate adaptive coping and include classroom, small group activities, family approaches, and individual treatment. Psychological tasks facing children during this period include acceptance of the events that have occurred, appropriate identification, labelling and expression of emotions, regaining a sense of mastery and control, and the resumption of age-appropriate roles and activities (Klingman, 1987; Pynoos and Nader, 1988).

Classroom Interventions

School-based groups for children are often advocated as the preferred setting for psychological intervention following disaster (Pynoos & Nader, 1988; Weinberg, 1990). Classroom interventions employing teachers as therapists and involving mental health professionals are both described in the literature.

Teacher as Therapist

For children who have experienced disaster, the school is the most natural support system beyond the family. Klingman (1993) identifies several advantages of teacher based classroom interventions: pupils spend as much time with their teachers and classmates as with their own families, teachers have many opportunities to observe the children's reactions to the disaster, teachers are also well equipped to serve as caregivers attending to the psychological implications of a crisis, appropriate tools and materials (class discussions, art, free writing) are available as part of the school curriculum, teachers already have experience in relating to children in their classes who have gone through situational and developmental crises, and a response through therapeutic activities by familiar people prevents the 'psychiatrization' of the situation.

Ideally school and classroom operation is resumed as soon as possible after a disaster so that children can reestablish normal patterns. Teachers can help children to recover after disaster in

a number of ways. However, teachers need to cope with their own feelings about the disaster (Lystad, 1985). It is important to provide psychological services to the teachers in the form of group and individual consultation. Children may carefully observe their teacher's responses to the disaster, thereby making the teachers' recovery important to the welfare of the children (Pynoos & Nader, 1988). Through the use of classroom activities, teachers can help put the disaster in context and start the healing process for children traumatised by the experience. The teacher is in an ideal position to identify children who may need the intervention of mental health professionals beyond the classroom. In any case, teachers need to be aware that classroom interventions are not a substitute for individual or family interventions when needed (Pynoos & Nader, 1993).

The immediate goal of classroom intervention is to defuse emotions and provide a means of acknowledging feelings concerning the disaster (Klingman, 1993). Techniques may include focusing on the traumatic event verbally through classroom discussions or nonverbally through other activities. Teachers can directly help children work through their feelings about the disaster by giving pupils accurate and up-to-date information, acknowledging their distress including listening actively to personal accounts, encouraging children to label their feelings and recollections, facilitating discussion about the disaster, correcting any misconceptions detected especially regarding personal responsibility, and gradually resuming the school programme (Klingman, 1988).

A variety of indirect school-based techniques and exercises have also been used in classroom interventions after a disaster but they should be age-appropriate (Eth & Pynoos, 1985a). For young children, techniques include encouraging them to express their fears and anxieties regarding the disaster through stories, drawings, and the use of colouring books. At the most general level, allowing children to tell their own stories of a disaster and to draw their own pictures of what happened to them or how they felt about the disaster enables them to share their experiences (Lystad, 1985). It may also be useful in large-scale screening for high-risk children and may eventually assist mental health professionals in diagnosis and counselling (Klingman, 1993). Books are also valuable resources. For instance, the school librarian could put together a list of available books about disaster, separation, loss, adaption and coping. Likewise dolls, puppets and toys can be used in play to elicit children's concerns and to help resolve them. Care must be taken to conduct psychologically constructive interventions. For example, children can be helped to redramatise an earthquake, but then they need the opportunity to rebuild the neighbourhood in play (Pynoos, 1990).

Older primary school children should also be given the opportunity to tell stories and draw pictures concerning their feelings about the disaster and its meaning to them. In addition, children in this age group can develop games, skits, information bulletin boards, group murals, puppet shows, and school projects about the disaster (Brodkin & Coleman, 1994). For secondary school children more sophisticated projects about various aspects of the disaster such as common stress reactions, community impact, geological impact and government assistance agencies can be incorporated into any subject.

Few concrete descriptions of classroom based programmes implemented by teachers following disaster exist in the literature. A study by Klingman, Koenigsfeld and Markman (1987) investigated the role of art as a first-order school-based intervention with a large group of Israeli school children who had witnessed a fatal school bus accident. In June, 1985 a school bus in a convoy of four buses of seventh graders on an end of year collided with a passing train. Nineteen children and three adults died and the remaining 14 children were critically injured. The children in the three other buses observed the entire incident. The art works analysed for the study included graphic portrayals of the accident, name lists of the dead pupils, illustrated graves and gravestones, and friends who were killed. Klingman et al. (1987) noted that the opportunity for children to express their feelings about the disaster in art form facilitated affective and cognitive aspects of the recovery process:

The children...were aided by their art expression to understand what had happened to their friends. Their art sessions helped them both to overcome emotional upheaval and to find new ways of adjusting to their situation. (p. 163)

Klingman (1985) conducted a preliminary study on the feasibility of using free writing in a classroom situation following a crisis. In this study, children were asked to write a composition entitled, "I had a frightening experience", after the shelling of their town in northern Israel. Klingman (1985) observed that for these pupils, writing was a socially accepted medium of expression and seemed to facilitate recall of the stressful event, expressions of feelings, and the conceptualisation and sharing of a highly personal experience.

Support and training for teachers involved in classroom interventions is crucial. Seroka, Knapp, Knight, Siemon and Starbuck (1986) describe an outreach programme that was implemented three months after a tornado hit Illinois in 1982. Children were considered the greatest single at-risk group so an immediate priority was in-service training for teachers on classroom based interventions that they could implement. Seroka et al. (1986) note that "initially, many school personnel were extremely reluctant to discuss the tornado with their students. Some teachers mistakenly believed that "all those problems have gone away by now"; others feared that they would not be able to handle the emotionality of their students" (p. 40). The in-service training involved discussing expected student reactions to the disaster and the techniques teachers might use to deal with these issues in the classroom and emphasising the normality of these reactions. Handouts provided the teachers with information on disaster reactions, coping skills, and procedures for referring students for individual counselling.

Mega and McCammon (1992) described a similar outreach programme after a tornado hit North and South Carolina in 1984 killing 44 people and injuring 800. School personnel were actively involved in the Children's School Outreach Project in detecting symptoms and providing support and education for the children. Two weeks after the tornado training workshops were held for teachers, principals and school counsellors on the symptoms of posttraumatic stress disorder, the possible variation in children's susceptibility and reactions to the disaster, and the identification of those most at risk for emotional problems. The teachers were taught ways to encourage their students to express their feelings. These included asking the children to draw pictures of things that reminded them of the tornado, drawing a group mural entitled "The

Tornado of 1984", and expressing their feelings through writing a composition on the tornado. For pre-school and early school-age children, play activities were described as more effective and less frightening than discussions. Teachers were also encouraged to watch for delayed reactions such as decreases in school achievement or behaviour changes that may occur at a later date.

Interventions with Mental Health Professionals

Several researchers have described interventions by mental health professionals in the classroom (e.g., Eth, 1992; Klingman, 1987; Pynoos & Nader, 1988; Shulman, 1990; Toubiana et al., 1988; Weinberg, 1990). The classroom group provides a naturally occurring cluster of children and thus intervention can occur in a familiar setting without singling children out.

Pynoos and Nader (1988) identify four aims of classroom consultation with mental health professionals: (1) to provide permission to express feelings; (2) to clarify cognitive confusions; (3) to screen children for severe reactions; and (4) to promote renewed classroom cohesion and ongoing learning.

Classroom interventions typically begin with a discussion of the recent disaster events as a means to explain the presence of outsiders in the classroom (Eth, 1992). Klingman (1987) distributed newspaper accounts of the disaster to older students to initiate discussion. Opportunities for nonverbal expression of thoughts and feelings are a prominent feature of most postdisaster classroom interventions conducted by mental health personnel. Drawing is a commonly used method for promoting nonverbal expression. For instance, Eth (1992) advocates free drawing after initial discussion of the disaster, with therapists circulating to talk with children individually about their productions. For those children who have been deeply affected by the disaster it is assumed that their drawing will contain a reference to the trauma and asking the child to describe the drawing or to make up a story about it may clarify possible connections to the event (Eth, 1992).

Pynoos and Nader (1988) present a three stage outline for classroom intervention. The first stage aims to address specific posttraumatic symptomatology. Steps to be taken by the mental health professional include: (1) enhancing cognitive coping by correcting rumours, incomplete information, cognitive distortions and age-appropriate misunderstandings concerning the disaster; (2) facilitating sharing of common fears concerning personal safety; and (3) identifying common traumatic reminders. Attempts are then made to normalise the children's feelings and thoughts by discussing the variety of potential responses after a traumatic event and noting that these early reactions will pass although the time course may vary according to individual experience. The second stage addresses issues relating to death and loss. Steps to be taken include: (1) discussing death in age appropriate themes possibly through drawing and story telling; (2) talking with the children about their sadness and anger over the loss; (3) discussing ways to memorialise the dead; and (4) acknowledging the unfairness of death. The third stage addresses the worry about others that children may have experienced during and after the disaster and attempts to legitimise this concern. Steps to be taken include: (1) inquiring whether children felt this worry; (2) inviting children to share how it made them feel; (3)

discussing the moment of reunion; and (4) identifying moments of continued worry common to the children.

Goenjian (1993) describe a similar mental health programme implemented in classrooms after the Armenian earthquake. The dual purpose of the programme was to identify children who needed further treatment and provide the classes with a form of psychological first aid. Mental health professionals met with the entire class to discuss the earthquake, their present psychological, social and family problems, and their view of the future. The children were then involved in disaster-related play and drawings of the earthquake or of their house or family. The drawings were subsequently discussed in a class group. Approximately 75% of all the children treated in the schools received followup group or individual therapy.

Other techniques used by mental health professionals to facilitate expression of thoughts and feelings in classroom settings include role-playing various aspects of the disaster-related events (Galante & Foa, 1987), writing free-verse poetry or stories (Klingman, 1985), and task-focused discussions of topics such as memorialising victims of the disaster (Klingman, 1987).

Small-Group Interventions

Small-group interventions with groups of 4 to 12 children are typically reserved for high-risk children or those showing unusually strong emotional or behavioural difficulties after the disaster (Gillis, 1993). The small group can be an important therapeutic intervention during the immediate weeks or months after disaster because it offers the opportunity to reinforce the normality of the children's reactions and recovery, to share common concerns and traumatic reminders, and to address common fears and avoidant behaviour (Pynoos & Nader, 1993). Many small-group interventions are run in schools but may be differentiated from classroom interventions in that they rarely take advantage of the natural class group instead consisting of subsets of high-risk children (Gillis, 1993), or self-selecting children (e.g., Yule & Udwin, 1991).

Guidelines for small group interventions have been described by several authors (Gillis, 1993; Terr, 1989; Yule & Williams, 1990). All of these descriptions emphasise the need to provide a safe context for children to express their thoughts and feelings about the disaster and its aftermath. Most recommend grouping children by age and level of exposure to the disaster (Terr, 1989), with some suggesting different groups for boys and girls (Gillis, 1993).

Small-group interventions are often viewed as useful for some, but not all, aspects of recovery. Benefits of groups include reassurance that others experienced similar events and cognitive and emotional reactions, and opportunities to learn different coping skills (Gillis, 1993; Terr, 1989). Sharing experiences conveys the notion that it is normal to feel despondent and distressed after a disaster, but that it is also normal to make a good recovery (Taylor, 1988). The finding that children whose families moved away after Cyclone Tracy developed more severe psychological reactions than those who stayed in the community (Milne, 1977) supports the notion that contact with others who experienced the disaster is beneficial. Small-group work also allows the group leader an opportunity to assess whether a child needs more intensive treatment (Weinberg, 1990). Several concerns and limitations regarding group interventions following

disasters have also been raised. In particular, there exists concern that additional fears may be created by hearing about other children's disaster experience and a lack of attention to individual psychological responses (Terr, 1989).

A limited number of specific small-group interventions have been described in the literature. Galante and Foa (1987) developed a relatively structured small-group intervention in their treatment of primary school children after the Italian earthquake. Groups of four children met once a month for one hour. Sessions were highly structured with a clearly stated objective and an accompanying activity. For example, for one session, the objective was "to openly discuss fears and to demonstrate that being afraid was a common shared reaction" (Galante & Foa, 1987, p. 356). The accompanying activity consisted of children drawing while listening to a story about a child who is afraid but too timid to ask for help. This was followed by a discussion of the drawings and the children's feelings. Other objectives included discussing myths and misconceptions about earthquakes, active discharge of emotions about the earthquake, releasing the power of the image of death, and talking about how children can take an active part in their own survival. The activities involved drawing, listening to stories, structured play, role playing, discussion, and the use of rituals.

Yule and Williams (1990) developed a less structured approach with children who survived the *Herald of Free Enterprise* capsizing that involved addressing important themes as they emerged during the group process. The first session began with the children and therapists introducing themselves and saying where each was on the boat when it went over, who was lost, and what happened immediately after. The children were very supportive of each other when some cried describing what had happened. For instance, during the first meeting, one boy became very upset and told of his having been "teased at school by another child who said such things as, 'I wish you had died on the ferry'" (p. 290). The group then attempted to solve this problem, and it was agreed that the group leader would approach the boy's parents and ask them to talk to the head teacher about the incident. The subsequent group meetings involved time alone for the children without the leader present and tended to impose less direct discussion of the traumatic event. Yule and Williams (1990) noted that one of the most important things the children seemed to gain from the group meetings was the opportunity to be in the company of other survivors without any pressure to talk of the disaster.

Hofmann and Rogers (1991) described in detail a children's play group intervention that took place in a temporary shelter following the Loma Prieta earthquake. (Shelters were created by the Red Cross in converted gymnasiums, church community centres and city halls. They generally housed up to 300 people during the day and had beds for 30 to 100 people at night). The aims of the play group as described by the authors were to diffuse the fear of the earthquake, help children discharge their feelings, and give parents some respite. The initial task for all children entering the play group was to introduce themselves, describe where they were during the earthquake and what they had experienced. Activities focussed on drawing and making books of their earthquake experiences. Children then shared their earthquake books with the group and participated in structured interactive exercises such as the Scribble Game in which children scribble on a blank piece of paper and pass the scribble to their neighbour who tries to find a picture within.

After the first day children were grouped together by age and degree of trauma and new children joined an ongoing group working on their earthquake stories. The groups offered the children an opportunity to express their feelings and gain support from others who had undergone similar experiences. The authors noted that the families also benefited from the groups to the extent that parents participated with their children or observed group processes.

Direct empirical evidence of the outcome of small-group interventions in treating disaster survivors is rare. One of the few studies to address this issue compared survivors of the *Jupiter* cruise ship disaster who received small-group intervention with child survivors from another school who received no treatment (Yule, 1992a). Group sessions were held with high-risk children within a few weeks of the disaster. A five-month follow-up assessment found significantly lower scores in the Impact of Events Scale and a fear survey for treated children compared with those from the school which refused intervention.

Family Interventions

The family plays a major role in children's postdisaster functioning. The nature of short-term family interventions depends on the effects of the disaster on an individual's family. Death or injury of a family member as a result of disaster is distressing for parents and children alike (Terr, 1989). In addition, the destruction of the family home can disrupt family routines for months. A number of family intervention techniques for addressing the needs of children within the family context have been described in the literature including the distribution of educational materials, absenteeism outreach and brief family therapy.

Educational Materials

Several fact sheets and pamphlets for various aspects of postdisaster adjustment have been written (American Academy of Child and Adolescent Psychiatry, 1991; Federal Emergency Management Agency, 1986). These materials typically include factual information about the disaster that has occurred, anticipated reactions of children to the disaster, symptoms that might suggest the need for professional intervention, and suggestions to comfort and spend extra time with children. Some brochures include suggestions of ways for parents to encourage their children to express their thoughts about the disaster (Kliman, Oklan & Wolfe, 1989) and materials (e.g., colouring books) to help parents facilitate children's expression of disaster-related feelings (Kiwanis Club of Coalinga, 1984). Although fact sheets and pamphlets are often distributed following disasters there has been little research on their efficacy (Joyner & Swenson, 1993).

Telephone hotlines may be useful as soon as telephone services are reinstated after a disaster. Ponton and Bryant (1991) described the establishment of an information hotline staffed by mental health professional following the Loma Prieta earthquake. The hotline was established two days after the earthquake and provided crisis consultation, referrals and advice on educational literature. Those staffing the hotline reported that 19% of calls were from parents requesting information about children and adolescents. Callers were notified about community support groups running seminars on the effects of the earthquake on children, and mental health professionals who would provide free or low-cost consultation (Ponton & Bryant, 1991).

Absenteeism Outreach

Children who stay at home or are kept at home following a disaster run the risk of delays in resuming their normal roles as students, as well as the benefits of social support from other children. In an interesting outreach program to combat sustained absences after disaster, Klingman (1987) described the strategy of asking other children to visit or call absent pupils to enquire about postdisaster absences after a fatal school bus disaster. These children reported to teachers the reason for the absence. Pupils whose absence was suspected of being connected with the disaster were contacted by their homeroom teachers or a truancy officer if these informal contacts did not produce a return to school.

Brief Family Therapy

Treatment sessions involving the child and their immediate family have been recommended (e.g., Terr, 1989) although relatively few descriptions or models for family therapy focussing on distressed children appear in the disaster literature. The most likely symptoms to subside using family therapy are behavioural disturbances, fears, separation anxiety and trauma-related grief (Pynoos & Nader, 1988; Terr, 1989). Symptoms such as intrusive thoughts, posttraumatic play and sense of a limited future have been described as less easily resolved through family therapies (Terr, 1989). Open discussion of trauma related feelings among family members is thought to be beneficial if this allows children or adolescents to disclose fears and painful emotions (Gillis, 1993).

Figley (1988; 1995) proposes several important roles for the family in the recovery from disasters. The first role for the family is to detect signs of traumatic stress, such as changes in characteristic patterns of behaviour. A second role is to help the child make the connection between the traumatic event and the signs of distress by pointing out the connection directly, or indirectly such as a parent exposing the child to materials suggesting the link. A third role involves urging the child to think and talk about what has happened and how the family might cope if the disaster was to occur again. A fourth role involves helping the child to work through the issues raised by memories of the disaster. This includes reframing the disaster from a more accurate perspective and correcting cognitive distortions.

Brief Individual Intervention

Individual interventions immediately following disaster are typically reserved for children who show high levels of distress, who have experienced a high degree of exposure to the disaster, or who have experienced the loss of an important person. Several brief individual intervention techniques are described in the following sections.

Debriefing Interviews

In-depth interviews regarding the child's experience of the disaster are often the starting point for individual intervention. These interviews have sometimes been called debriefing interviews after procedures used with emergency personnel (Mitchell & Everly, 1993). Debriefing interviews have been conducted both in small-groups (Yule & Udwin, 1991) and individually (Pynoos & Eth, 1986). Techniques differ but generally debriefing interviews focus on having the child retell frightening events under conditions where anxiety can be maintained at a reasonable level. Yule and Udwin (1991) describe the use of debriefing with girls who survived

the sinking of the *Jupiter*. Self-report data five months after the incident suggest that this intervention reduced levels of stress, particularly those manifested in intrusive thoughts (Yule, 1992a). Stallard and Law (1993) show more convincing evidence that debriefing greatly reduced the distress of girls who survived a school bus crash.

The timing of these interviews is a subject of debate (Yule, 1994). Yule (1993) suggests that 7 to 14 days after traumatic events is optimal and that most children (and adults) are too numb to benefit from debriefing interviews within 48 hours after the disaster occurred. In contrast, Pynoos and Eth (1986) report good response from children interviewed just a few hours after traumatic events took place.

Creativity Rooms

For children exhibiting marked declines in verbal expressivity following a school bus disaster, Klingman et al. (1987) set up a creativity room at school that provided materials to express thoughts and feelings through drawing, collages, poems and free writing. Children were referred to this setting by staff who observed noticeable isolation and a lack of oral expressivity.

Pharmacological Interventions

Little systematic research has assessed the utility of pharmacological interventions in treating traumatised children. Drugs are sometimes used to treat posttraumatic symptoms of anxiety, fear and depression (Terr, 1989). Indication for using medications with traumatised children are not clear. For traumatised adults, the presence of reactions that are destructive to present or future coping has been proposed as a general indication for medication (Roth, 1988).

Reactions in adults that have been treated with medication during the short-term include insomnia, panic attacks, excessive startle responses, and severe depression (Roth, 1988). These reactions occur in some traumatised children and adolescents and are treated with medication in some instances (Terr, 1989).

Individual Therapy

The optimal time for beginning individual therapy for traumatised children and adolescents after a disaster is not easily identified (Gillis, 1993). It is possible that placing children in the patient/client role soon after a disaster could send messages to the child, family and school that the child's response to the traumatic event is abnormal. At the same time, individual therapy beginning soon after a disaster could possibly prevent a period of prolonged distress by intervening before avoidance symptoms and maladaptive cognitions are fully incorporated into the child's psychological makeup. Children and adolescents who exhibit the most pronounced symptoms of distress in the first few weeks after a disaster appear to be at greatest risk for long-term difficulties (Yule & Udwin, 1991; Yule 1992a) and therefore it may be useful to consider individual therapy beginning soon after the disaster for this high-risk group. Fornari (1991) suggests that even with severely traumatised children a more informal mode of delivery may be preferable. The issues regarding this type of therapy will be discussed in the section on individual psychotherapy as an intervention in the long-term.

Long-Term Intervention

The effects of disasters on psychological adjustment of children and adolescents may persist for months or even years, and a variety of interventions have been carried out 3 or more months after the actual disaster. This section describes common forms of interventions implemented after the acute phase of disaster recovery has ended. Three months after the disaster, is offered as a chronological dividing point for acute versus chronic psychological reactions (Rothbaum & Foa, 1993).

Psychodynamic Approaches

Many case reports of the treatment of traumatised children along psychodynamic or psychoanalytic principles exist in the disaster literature (e.g., Fornari, 1991; Terr, 1990). Play therapy is a common treatment approach with younger children, whereas verbal therapies are more common with adolescents. Materials allowing nonverbal expression (e.g., art) or indirect verbal expression of thoughts and feelings (e.g., poetry, free-writing) can also be helpful for adolescents (Terr, 1989). Therapeutic goals in both play and verbal therapies include helping the child to express frightening thoughts and feelings related to the disaster, accepting the random nature of certain events, and developing flexible coping skills (Terr, 1989). The clinician must provide the context in which such goals can be achieved without retraumatising the child or confronting him/her with more trauma-based material than he/she can process (Gillis, 1993). In line with this principle, Gillis (1993) notes that it is crucial to respect the child's defenses and coping styles with regard to the confronting of highly emotional material.

The need for direct interpretation connecting the disaster to a child's symptoms in treatment session is an area of debate among psychodynamically oriented clinicians (Terr, 1989). Play therapy with no interpretations has been advocated for very young children (Terr, 1989). Terr (1990) reports successful treatment when interpretations were limited to the play metaphor (i.e., the thoughts, actions and feelings of the characters involved in the play were interpreted without direct reference to the child). Other indirect methods such as acted out scenarios and stories have also been described as effective techniques for traumatised children (Brandell, 1993). Gillis (1993) suggests direct interpretation should be used when a child becomes stuck in a repetitive pattern of behaviours over an extended period of time.

The persistence of guilt and perceptual distortions has been identified as a frequent difficulty in psychodynamic treatments of traumatised children and adolescents (Gillis, 1993). Terr (1983a, 1989) views these symptoms as defenses against helplessness and offers interpretations based on an underlying hope for control or an attempt to reestablish a sense of personal control. Eliciting a detailed description of the situations leading to guilt is also believed to be useful, allowing the therapist to point out the child's feelings of fear and helplessness during the disaster.

Cognitive-Behavioural Approaches

Behavioural and cognitive-behavioural approaches share numerous techniques and goals with psychodynamic techniques although the rationale leading to these techniques differ (Gillis, 1993). The concept of emotional processing is useful in describing cognitive and behavioural

approaches to treating traumatised children (Rachman, 1980; Yule, 1994). From this perspective, frightening or otherwise disturbing events are processed in such a way that disaster-related distress declines over time. Decline in distress is credited to the cognitive processing of emotional images associated with the disaster, so that exposure to reminders no longer produces excessive arousal or avoidance (Rachman, 1980).

While group and individual psychotherapies with children to talk through the traumatic experience would seem to be helpful, there is also a need to address the child's traumatic preoccupations, anxieties, phobias and other symptoms more directly. In this way behavioural and cognitive-behavioural strategies are extremely useful including relaxation training for anxiety and panic attacks, and desensitisation or flooding techniques to address intrusive thoughts and specific fears.

Unfortunately, few studies have been published on the use of such methods in the treatment of traumatised children following disaster. In the single study of in vitro flooding for traumatised children, Saigh (1986) successfully treated a 6-year-old boy who had been traumatised by a bomb blast in Lebanon. In-vitro flooding consists of imagining the anxiety-provoking stimuli until it is no longer disturbing. Unlike systematic desensitisation, the anxiety-provoking stimuli is not presented in a graduated fashion. Sessions began with 10 to 15 minutes of relaxation training, followed by 24 minutes of imagining the traumatic event and conclude with 5 to 10 minutes of relaxation. Results indicated improvement on a variety of outcome measures including self-monitoring of intrusive thoughts, the Revised Children's Manifest Anxiety Scale and the Children's Depression Inventory (Saigh, 1986).

A major symptom of traumatisation that requires attention is sleep disturbance. A careful analysis will reveal whether the problem is mainly one of getting to sleep or of being awakened by intrusive nightmares related to the disaster. Implementing relaxation routines before bed and masking thought with music may help children get to sleep (Yule and Williams, 1990) and dream reorganisation in which positive mastery endings are attached to the dream content is a promising technique for alleviating nightmares (Palace & Johnston, 1989).

Operant techniques have also been used to increase desired behaviours and reduce dysfunctional behaviour (Caddell & Drabman, 1993). Behaviour management strategies would be particularly useful for treating avoidance symptoms in traumatised children. For example, Caddell and Drabman (1993) describe a contingency management program for children who will not sleep alone following a disaster. Successive approximations to staying in bed throughout the night are reinforced until the child's behaviour is shaped to produce the desired result.

Issues in Disaster Intervention

Several issues need to be considered when considering how best to help children and their families following disaster.

Primary Survival Needs

An issue that is often overlooked is that primary survival needs must be met before psychological needs can be addressed. Saylor (1993) notes that a flurry of activity aimed at meeting the psychological needs of disaster victims often precedes the provision of basic needs such as food and shelter:

After hurricane Andrew, local counsellors and members of the Miami press frequently called ... to inquire into the psychological impact of the this event on the children. Although their concern was important, it occurred at a time when thousands of children and their families had no water, food, shelter, diapers, medicine, and/or electricity (p. 6).

Saylor (1993) concludes that apart from acute crisis intervention, intensive intervention with child disaster survivors may need to wait until families have been able to adjust to their new situation. Joyner and Swenson (1993) suggest that those wanting to assist the psychological needs of disaster populations may need to begin by getting out of traditional roles and settings to provide practical assistance such as cleanup, food preparation, home repairs, and child care.

Cultural Issues

Disaster literature is lacking in studies that examine cultural differences in children's response to disaster. Investigation is also needed into developing relevant and effective treatment approaches for children from a wide variety of cultures (Minas & Klimidis, 1994). Children from different cultural groups are likely to have different attitudes toward expressing feelings and different explanations for the occurrence of the disaster, thus it is particularly important that intervention programmes are culturally sensitive (Palmer, 1983). The success of postdisaster interventions will also be influenced by cultural value systems, role expectations, and support systems (Cohen, 1992).

From a New Zealand perspective, Gardiner (1995) notes that the extended family play a crucial role in Maori society and will be of tremendous support to children in the period after disaster. Maori response is likely to be centred on the marae and it is there that Maori in their largest numbers can be reached by social services and outreach programmes. Gardiner (1995) further notes that:

It is important for planners to make provisions now to identify where Maori are concentrated, where they work and what their likely reactions are to disaster. ... When disaster strikes, it is better for Maori to deal with Maori. The introduction of task force members from out of the area with no Maori members might also pose difficulties, and, therefore, planning should ensure that, should these be necessary, wherever possible local Maori liaison officers should accompany them. (p. 178)

Media Attention

Ruben (1992) notes that the media figure prominently in every disaster:

It is through the print and electronic media that the public and the involved community first learn about the extent of the disaster, what the likely consequences will be, how extensive the disruption to community life has been, and what resources are available to help people cope with this disaster. (p. 135)

However, after a disaster, children who have survived the initial trauma may be subjected to intense media exposure. Libow (1992) outlines several potentially damaging consequences of such attention including a sense of shame, vulnerability, and helplessness that can impact negatively upon recovery.

Conclusion

Studies which have been conducted on children and adolescents to assess the psychological impact of disasters have all found emotional and behavioural consequences to varying degrees. The more recent, more rigorously designed studies have confirmed the impressions made by clinical reports that children's psychological reactions to disasters are significant.

In general, diagnosable psychopathology is usually present in only a small group of children who experience disaster although the incidence increases for severe disasters involving substantial death, injury and property destruction. However, when their inner concerns related to the disaster are assessed, most children report significant levels of emotional distress. Thus, the immediate and direct psychological impact of disaster is substantial for most children. Some general conclusions can be drawn on the nature of children's postdisaster reactions.

General Conclusions

The psychological impact of disasters on children seems to consist of a broad range of cognitive, affective, behavioural and physiological difficulties. Frequently recurring distressing thoughts about the disaster are a central aspect of the cognitive disturbances experienced by many children. Other cognitive effects include varying degrees of amnesia and memory distortion, a distortion in the sense of disaster duration, confusion over the sequencing of events surrounding the disaster, and a retrospective belief in omens that foretold the disaster. Deterioration in school performance is frequently described in the disaster literature and commonly attributed to postdisaster disruption and discontinuity in schooling, concentration difficulties, or sleep disturbance as a result of the disaster. Children who have experienced disaster may also display a sense of a foreshortened future. Characteristic of this pessimism is a limited expectation of living a normal adult life-span, marrying, having children, or having a career.

Fear is a prominent emotional response found in children following disaster. Fear that the disaster will recur, pervasive fearfulness of many aspects of everyday life, and specific, isolated fears of reminders of the traumatic experience are common postdisaster responses. Other emotional consequences of disaster include feelings of isolation, anger, and irritability. Some children also experience intense feelings of guilt often resulting from the fact they have survived when others have not. The experience of guilt has similarly been reported by children who were unable to aid a victim, believed that an action of their own endangered another, or had to endure pleas for help from others whom they could not help.

Behavioural disturbances following disaster have been frequently documented in the literature. In younger children, these can include increases in aggression, dependent and demanding behaviour, and temper tantrums. Adolescents may embark on a period of posttraumatic acting out behaviour in the form of school truancy, substance abuse and delinquency. Other behavioural manifestations include active avoidance of activities, situations, people and places that are reminders of the disaster, and regression to earlier developmental levels as indicated by

increases in bed-wetting, separation anxiety, and the loss of previously mastered academic skills. Posttraumatic play in which episodes of the disaster are dramatised and repetitive retelling of disaster stories are also common.

The hallmark of traumatisation following disaster is considered to be disruptions in sleep, including reluctance to sleep alone, problems getting to sleep, superficial and fitful sleep, night terrors, nightmares and repeated dreams related to the disaster. Somatic complaints such as headaches, stomachaches, muscle aches and pains, and stuttering have also been reported in the literature. A final set of physiological reactions relate to a state of hyperarousal. Children of all ages may exhibit a dramatic startle reaction in response to loud noises, remain hypervigilant and alert to any sign of threat, and actually experience physical sensations such as feeling shaky, lightheaded, ill, nauseated, and have an increased heart rate in response to disaster-related reminders or memories.

Studies examining the incidence of diagnosable psychopathology following disaster have reported substantial variation in the prevalence of posttraumatic stress disorder, anxiety and depression in child populations. Higher levels of diagnosable disorder are found after disasters involving extreme life threat, death, injury or destruction such as the Armenian earthquake and school sniper shootings. Thus, the more directly experienced, personally threatening or disruptive the disaster, the greater the psychological impact on the child.

There is a general trend for the psychological impact of disasters to diminish over time, with long-term effects for most children being minimal. Again, the major exceptions to the steady decrease in posttraumatic symptoms appear to be in instances of bereavement, high degree of life-threat during the disaster, or major continuing impact on family functioning as a result of the disaster.

Separation from the family during or after the disaster seems to contribute to the severity of children's reactions. However, studies investigating the impact of personal injury and damage to personal property on children's postdisaster reactions have been inconsistent.

In most studies, younger school-age children and preschoolers were reported to be affected by disaster to a greater degree than older school-age children and adolescents. This finding is consistent with expectations that younger children are more vulnerable to disruptions in family stability and routine. The only study reviewed which found younger children to be less distressed, was the Vicksburg Tornado study (Bloch et al., 1956), with conclusions based on unstructured interviews with the children's parents.

Sex differences in disaster response have emerged in studies with large samples. In general, girls report higher levels of overall distress, anxiety, depression and symptoms of posttraumatic stress disorder. Boys seem more likely to exhibit acting-out behaviour, aggression, and attentional difficulties.

There seems to be an association between the child's psychological adjustment prior to the disaster and the extent to which the child experiences difficulty coping with the disaster. The

child who is having difficulties before the disaster can be at greater risk for negative and prolonged reactions. Empirical evidence does not support the common suggestion that the experience of previous traumatic incidents affects children's postdisaster adjustment. Although anecdotal evidence suggests that exposure to disaster may lead to renewed thoughts and images of the prior traumatic experience.

The extent to which children's parents are negatively impacted by the disaster appears to be related to the impact of the disaster on the child. It would seem that parents who are having difficulty coping themselves, convey that distress to their children. In addition, the parent who is unable to cope effectively may be less available to support their child.

Children tend to report higher levels of specific symptoms and emotional distress than their parents report for them. This would suggest that after disaster, parents have a tendency to under-report or be less aware of the extent to which their children are affected. It may also be true that children over-report their distress. In either case, both perspectives need to be considered in assessing the impact of disaster on children.

The assessment of children's disaster responses can be approached using several different methods of measurement. Psychometric properties of various self-report measures such as the PTSD Reaction Index and the Impact of Events Scale have been established. However, self-report scales are vulnerable to the potential unwillingness or inability of children to accurately report their postdisaster level of functioning. Behavioural rating scales and checklists are useful and sensitive to many of the behaviour problems associated with trauma but have limited viability as screening instruments for other posttraumatic symptoms. Structured interviews have long been the standard method for assessing children's emotional, behavioural, and social functioning but can be costly and time-consuming. Other promising methods of assessment include self-monitoring, projective techniques and physiological measures.

Ideally the choice of assessment method is guided by careful consideration of the advantages and disadvantages inherent in each method as well as empirical evidence concerning the psychometric properties of each specific instrument. In general, the assessment of the impact of disasters on children should be based on all available data, rather than on a single source of information.

Disaster research faces unique obstacles that may compromise scientific integrity. A number of methodological and conceptual difficulties have been identified. These include the lack of systematically collected baseline or predisaster data to compare with postdisaster observations of levels of personal functioning, difficulties locating a representative sample due to the reluctance of many parents and schools to allow children to participate in the research, dealing with attrition in longitudinal research, defining unaffected comparison groups, and the selection of appropriate assessment instruments.

Psychological intervention and treatment programmes for responding to the needs of children following disaster have been described for the predisaster, post-impact, short-term and long-term periods. The predisaster phase is an important period for establishing relationships within

emergency response networks and developing specific ways to address children's mental health in the emergency response. The primary task is to incorporate a mental health component into national and community disaster plans. Education regarding psychological reactions to disaster and the promotion of positive styles of coping with the threat or occurrence of disaster include preventative techniques such as anticipatory guidance, behavioural training, and cognitive-restructuring.

Psychological aid in the post-impact period includes support for school administrators and community leaders and gathering and providing information for people affected by the disaster. Immediate contact with children and adolescents to provide the opportunity for the ventilation of feelings and to present factual information is another important intervention that can occur during the post-impact period.

Intervention in the short-term is designed to facilitate adaptive coping and may include classroom activities, as well as small-group, family and individual approaches. Classroom activities administered by the teacher can help put the disaster in context, start the healing process for children traumatised by the experience, and identify children who may need the intervention of a mental health professional beyond the classroom. Techniques for teacher implemented classroom interventions include free-writing, drawing, play, class discussion, projects on the disaster, skits, and information bulletin boards. The classroom is often the preferred setting for psychological intervention by mental health professionals. Professional intervention in the classroom aims to provide permission for the expression of feelings, clarify cognitive confusions, screen children for severe reactions, promote classroom cohesion, and focus on the resumption of learning.

Small-group interventions in the short-term phase are typically reserved for high-risk children or those showing significant emotional or behavioural difficulties. In a similar way to classroom intervention, the aim of small-group intervention is to reassure children that others experience similar cognitive and emotional reactions, and to provide the opportunity to learn different coping skills.

Family interventions in the short-term aim to address the needs of children within the family context and include the distribution of educational material on anticipated reactions and methods for coping, outreach programmes to combat absenteeism, and brief family therapy.

Brief individual interventions in the short-term phase are generally reserved for children who show high levels of distress and may include debriefing interviews, creativity rooms, pharmacological intervention and brief individual therapy.

Long-term individual therapy has been approached from both a psychodynamic and a cognitive-behavioural viewpoint. A central goal of the psychodynamic approach is to help the traumatised child rework the thoughts and feelings associated with the disaster. This goal can be achieved through a number of different processes. Although, establishing a link between posttraumatic play and the disaster is a central component of the psychodynamic approach. In this way, children are assisted to achieve a fuller understanding of the nature of their

experience, achieve a measure of control over it, experience a sense of mastery, and finally create a measure of psychological distance from the event.

Behavioural and cognitive-behavioural approaches have similar goals to psychodynamic therapies but aim to address the child's preoccupations, anxieties, phobias, and other symptoms more directly. Behavioural and cognitive-behavioural strategies include relaxation training, systematic desensitisation, flooding, dream reorganisation, and behaviour management techniques.

Future Directions

Despite the wide body of literature investigating the psychological impact of disasters on children and adolescents and the possibilities that exist for intervention within different settings, there are still significant gaps in disaster knowledge. Two particularly prominent gaps are information about children's cognitive appraisals of disasters and coping mechanisms, and the influence of disaster on subsequent development. Research on the impact of disasters on children has focussed primarily on children who have been negatively affected. However, there are some children who appear to cope well with disaster and display considerable resilience in response to stress. These children are a group that need to be studied so that factors which foster effective coping can be identified.

There is also a need to further develop standardised screening questionnaires and structured interviews, and to test the existing measures across a range of disasters. In addition, systematic, carefully controlled evaluations of the success of different types of interventions with children and adolescents following disaster are required. Clinical reports attest to the value of a wide range of post-impact, short-term and long-term interventions such as psychological debriefing and group therapy with children. The effectiveness of cognitive-behavioural strategies for treating children's recurring dreams and intrusive thoughts and fears has also been demonstrated in some studies. However, there is a need for controlled research comparing treatment strategies in different populations of children and using appropriate pre- and post-intervention measures to show the relative efficacy of available interventions.

References

- Achenbach, T. M., & Edelbrock, C. (1989). Diagnostic, taxonomic and assessment issues. In T. H. Ollendick and M. Hersen (Eds.), Handbook of child psychopathology (2nd ed.). (pp. 53-69). New York: Plenum Press.
- Achenbach, T. M., Edelbrock, C., & Howell, K. T. (1987). Empirically-based assessment of the behavioural/emotional problems of 2-3 year old children. Journal of Abnormal Child Psychology, 15, 629-650.
- Alexander, D. A. (1990). Psychological intervention for victims and helpers after disasters. British Journal of General Practice, August 1990, 345-348.
- American Academy of Child and Adolescent Psychiatry. (1991). Facts for families: Helping children after a disaster. Washington, DC: Author.
- American Psychiatric Association. (1980). Diagnostic and statistical manual of mental disorders (3rd ed.). Washington, D.C: Author.
- American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders (3rd ed. revised). Washington, D.C: Author.
- American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4th ed.). Washington D.C: Author.
- Anthony, E. J. (1987). Risk, vulnerability, and resilience: An overview. In E. J. Anthony & B. J. Cohler (Eds.), The invulnerable child. (pp. 3-48). New York: The Guilford Press.
- Applebaum, D. R., & Burns, G. L. (1991). Unexpected childhood death: Posttraumatic stress disorder in surviving siblings and parents. Journal of Clinical Child Psychology, 20, 114-120.
- Atlas, J. A., di Scipio, W. J., Schwartz, R., & Sessoms, L. (1991). Symptom correlates among adolescents showing posttraumatic stress disorder versus conduct disorder. Psychological Reports, 69(3, Pt 1), 920-922.
- Baum, A., Solomon, S. D., Ursano, R. J., Bickman, L., Blanchard, E., Green, B. L., Keane, T. M., Laufer, R., Norris, F., Reid, J., Smith, E. M., & Steinglass, P. (1993). Emergency / disaster studies: Practical, conceptual, and methodological issues. In J. P. Wilson & B. Raphael (Eds.), International handbook of traumatic stress syndromes. (pp. 125-133). New York: Plenum Press.
- Belter, R., Dunn, S., & Jeney, P (1991). The psychological impact of Hurricane Hugo on children: A needs assessment. Advances in Behaviour Research and Therapy, 13(3), 155-161.
- Benedek, E. (1985). Children and disaster: Emerging issues. Psychiatric Annals, 15(3), 168-172.
- Birleson, P. (1981). The validity of depressive disorder in childhood and the development of a self-rating scale: A research report. Journal of Child Psychology and Psychiatry, 22, 73-78.
- Blaufarb, H., & Levine, J. (1972). Crisis intervention in an earthquake. Social Work, 17, 16-19.
- Bloch, D. A., Silber, E., & Perry, S. E. (1956). Some factors in the emotional reaction of children to disaster. American Journal of Psychiatry, 113, 416-422.
- Blom, G. E. (1986). A school disaster - intervention and research aspects. Journal of the American Academy of Child Psychiatry, 25, 336-345.

- Blom, G. E., Etkind, S. L., & Carr, W. J. (1991). Psychological interventions after child and adolescent disasters in the community. Child Psychiatry and Human Development, 21, 257-266.
- Bradburn, I. (1991). After the earth shook: Children's stress symptoms 6-8 months after a disaster. Advances in Behaviour Research and Therapy, 13(3), 173-179.
- Bradwell, J. (1995, December 1). Workers would be stranded in 'quake. Contact, p. 1.
- Brandell, J. R. (1993). The unfolding of the narrative in the psychotherapy of a traumatised preadolescent child. Journal of Analytic Social Work, 1(4), 49-68.
- Brende, J. O., & Goldsmith, R. (1991). Post-traumatic stress disorder in families. Journal of Contemporary Psychotherapy, 21(2), 115-124.
- Breslau, N., Davis, G. C., & Andreski, P. (1991). Traumatic events and post-traumatic stress disorder in an urban population of young adults. Archives of General Psychiatry, 48, 216-222.
- Breton, J. J., Valla, J. P., & Lambert, J. (1993). Industrial disaster and mental health of children and their parents. Journal of the American Academy of Child and Adolescent Psychiatry, 32(2), 438-445.
- Brett, E. A. & Ostroff, R. (1985). Imagery and posttraumatic stress disorder: An overview. American Journal of Psychiatry, 142, 417-424.
- Brodkin, A. M., & Coleman, M. (1994). Kids in crisis: Helping children cope with loss. Instructor, 103(5), 24-25.
- Bromet, E. J. (1989). The nature and effects of technological failures. In R. Gist & B. Lubin (Eds.), Psychosocial aspects of disaster (pp. 120-139). New York: Wiley.
- Burke, J. D., Borus, J. F., Burns, B. J., Millstein, K. H., & Beasley, M. C. (1982). Changes in children's behavior after a natural disaster. American Journal of Psychiatry, 139(8), 1010-1014.
- Burke, J., Moccia, P., Borus, J., & Burns, B. (1986). Emotional distress in fifth-grade children ten months after a natural disaster. Journal of the American Academy of Child Psychiatry, 25(4), 536-541.
- Caddell, J. M., & Drabman, R. S. (1993). Post-traumatic stress disorder in children. In R. T. Ammerman and M. Hersen (Eds.), Handbook of behaviour therapy with children and adults: A developmental and longitudinal perspective. (pp. 219-235). Boston: Allyn and Bacon.
- Cardena, E., & Spiegel, D. (1993). Dissociative reactions to the Bay Area earthquake. American Journal of Psychiatry, 150, 474-478.
- Catalano, R., & Dooley, D. (1980). Economic change in primary prevention. In R. H. Price, R. F. Ketterer, B. C. Bader, and J. Monahan (Eds.), Prevention in mental health: Research, policy and practice. (pp. 21-40). Beverley Hills, California: SAGE Publications.
- Cohen, R. E. (1992). Training mental health professionals to work with families in diverse cultural contexts. In L. S. Austin (Ed.), Responding to disaster: A guide for mental health professionals (pp. 69-80). Washington, DC: American Psychiatric Press.
- Conners, C. K. (1969). A teacher rating scale for use in drug studies of children. American Journal of Psychiatry, 126, 884-888.
- Cornely, P., & Bromet, E. (1986). Prevalence of behaviour problems in three-year old children living near Three Mile Island: A comparative analysis. Journal of Child Psychology and Psychiatry, 27, 489-498.

- Costello, E. J., Edelbrock, C., & Costello, A. J. (1985). The validity of the NIMH Diagnostic Interview Schedule for Children. Journal of Abnormal Child Psychology, 13, 579-595.
- de Mesquita, P. B., & Gilliam, W. S. (1994). Differential diagnosis of childhood depression: Using comorbidity and symptom overlap to generate multiple hypotheses. Child Psychiatry and Human Development, 24(3), 157-172.
- Doka, K. J. (1989). Disenfranchised grief. Lexington, MA: Lexington Books.
- Dollinger, S. J. (1985). Lightning strike disaster among children. British Journal of Medical Psychology, 58(4), 375-383.
- Dollinger, S. J. (1986a). The measurement of children's sleep disturbances and somatic complaints following a disaster. Child Psychiatry and Human Development, 16, 148-153.
- Dollinger, S. J. (1986b). The need for meaning following disaster: Attributions and emotional upset. Personality and Social Psychology Bulletin, 12, 300-310.
- Dollinger, S. J., & Cramer, P. (1990). Children's defensive responses and emotional upset following a disaster: A projective assessment. Journal of Personality Assessment, 54(1-2), 116-127.
- Dollinger, S. J., O'Donnell, J. P., & Staley, A. A. (1984). Lightning strike disaster: Effects on children's fears and worries. Journal of Consulting and Clinical Psychology, 52, 1028-1038.
- Durkin, M., Khan, N., Davidson, L., Zaman, S., & Stein, Z. (1993). The effects of a natural disaster on child behavior: Evidence for posttraumatic stress. American Journal of Public Health, 83(11), 1549-1553.
- Earls, F., Smith, E., Reich, W., & Jung, K. (1988). Investigating psychopathological consequences of a disaster in children: A pilot study incorporating a structured diagnostic interview. Journal of the American Academy of Child and Adolescent Psychiatry, 27(1), 90-95.
- Earthquake Commission & Centre for Advanced Engineering (1995). Wellington after the quake: The challenge of rebuilding cities. Christchurch, New Zealand: Author.
- Edelbrock, C., & Costello, A. J. (1990). Structured interviews for children and adolescents. In G. Goldstein & M. Hersen (Eds.), Handbook of psychological assessment (2nd ed.). (pp. 308-323). New York: Pergamon Press.
- Edelbrock, C., Costello, A. J., Dulcan, M. K., Conover, N. C., & Kalas, R. (1986). Parent-child agreement on child psychiatric symptoms assessed via structured interview. Journal of Child Psychology and Psychiatry, 27, 181-190.
- Edelbrock, C., Costello, A. J., Dulcan, M. K., Kalas, R., & Conover, N. C. (1985). Age differences in the reliability of the psychiatric interview of the child. Child Development, 56, 265-275.
- Ellis, R. R. (1989). Young children: Disenfranchised grievers. In K. J. Doka (Ed.), Disenfranchised grief: Recognising hidden sorrow (pp. 201-211). Lexington, MA: Lexington Books.
- Emde, R. N. (1989). The infant's relationship experience: Developmental and affective aspects. In A. J. Sameroff & R. N. Emde (Eds.), Relationship disturbances in early childhood: A developmental approach. (pp. 33-51). New York: Basic Books.
- Eth, S. (1992). Clinical response to traumatised children. In L. S. Austin (Ed.), Responding to disaster: A guide for mental health professionals (pp. 101-123). Washington, DC: American Psychiatric Press.

- Eth, S., & Pynoos, R. S. (1985a). Developmental perspective on psychic trauma in childhood. In C. R. Figley (Ed.), Trauma and its wake. Vol 1: The study of post-traumatic stress disorder. (pp. 36-52). New York: Brunner/Mazel.
- Eth, S., & Pynoos, R. S. (1985b). Interaction of trauma and grief in childhood. In S. Eth & R. S. Pynoos (Eds.), Post-traumatic stress disorder in children. (pp. 171-183). Washington, DC: American Psychiatric Press.
- Famularo, R., Kinscherff, R., & Fenton, T. (1990). Symptom differences in acute and chronic presentation of childhood PTSD. Child Abuse and Neglect, 14, 439-444.
- Farberow, N. L., & Gordon, N. S. (1981). Manual for child health workers in major disasters. Washington, DC: U. S. Government Printing Office.
- Federal Emergency Management Agency. (1986). Coping with children's reactions to earthquakes and other disasters. Northridge, California: Author.
- Fiese, B. H., & Sameroff, A. J. (1989). Family context in pediatric psychology: A transactional perspective. Journal of Pediatric Psychology, 14, 292-314.
- Figley, C. R. (1986). Traumatic stress: The role of the family and social support system. In C. R. Figley (Ed.), Trauma and its wake. Vol 2: Traumatic stress theory, research and intervention. (pp. 39-54). New York: Brunner/Mazel.
- Figley, C. R. (1988). Post-traumatic family therapy. In F. Ochberg (Ed.), Post-traumatic therapy and victims of violence. New York: Brunner/Mazel.
- Figley, C. R. (1995). Systemic PTSD: Family treatment experiences and implications. In G. S. Everly and J. M. Lating (Eds.), Psychotraumatology: Key papers and core concepts in post-traumatic stress. (pp. 341-358). New York: Plenum Press.
- Finch, A. J., & Daugherty, T. K. (1993). Issues in the assessment of posttraumatic stress disorder in children. In C. F. Saylor (Ed.), Children and disasters (pp. 45-66). New York: Plenum Press.
- Fornari, V. (1991). The aftermath of a plane crash - helping a survivor cope with deaths of mother and sibling. In N. Boyd-Webb (Ed.), Play therapy with children in crisis: A casebook for practitioners. (pp. 416-434). New York: Guilford Press.
- Frederick, C. J. (1985). Children traumatised by catastrophic situations. In S. Eth & R. S. Pynoos (Eds.), Post-traumatic stress disorder in children. (pp. 73-99). Washington, DC: American Psychiatric Press.
- Galante, R., & Foa, D. (1987). An epidemiological study of psychic trauma and treatment effectiveness for children after a natural disaster. Annual Progress in Child Psychiatry and Development, 1987, 349-364.
- Gardiner, W. (1995). Earthquakes: A Maori dimension. In Earthquake Commission & Centre For Advanced Engineering (Eds.), Wellington after the 'quake: The challenge of rebuilding cities. (pp. 175-179). Christchurch, New Zealand: Earthquake Commission and Centre for Advanced Engineering, University of Canterbury.
- Garnezy, N. (1986). Children under severe stress: Critique and commentary. Journal of the American Academy of Child Psychiatry, 25, 384-392.
- Garnezy, N., & Rutter, M. (1985). Acute reactions to stress. In M Rutter and L. Hersov (Eds.), Child and adolescent psychiatry: Modern approaches (2nd ed.). (pp. 152-176). Oxford: Blackwell Scientific Publications.

- Gerrity, E. T., & Steinglass, P. (1994). Relocation stress following natural disasters. In R. J. Ursano, B. G. McCaughey & C. S. Fullerton (Eds.), Individual and community responses to trauma and disaster: The structure of human chaos (pp. 220-247). Cambridge: Cambridge University Press.
- Gibbs, M. S. (1989). Factors in the victim that mediate between disaster and psychopathology: A review. Journal of Traumatic Stress, 2(4), 489-514.
- Gillis, H. M. (1993). Individual and small-group psychotherapy for children involved in trauma and disaster. In C. F. Saylor (Ed.), Children and disasters (pp. 165-186). New York: Plenum Press.
- Gleser, G. C., Green, B. L., & Winget, C. (1981). Prolonged psychosocial effects of disaster: A study of Buffalo Creek. New York: Academic Press.
- Goenjian, A. (1993). A mental health relief programme in Armenia after the 1988 earthquake: Implementation and clinical observations. British Journal of Psychiatry, 163, 230-239.
- Goodyer, I., Kolvin, I., & Gatzanis, S. (1987). Do age and sex influence the association between recent life events and psychiatric disorders in children and adolescents? A controlled enquiry. Journal of Child Psychology and Psychiatry, 27, 681-687.
- Gordon, R., & Wraith, R. (1993). Responses of children and adolescents to disaster. In J. P. Wilson & B. Raphael (Eds.), International handbook of traumatic stress syndromes. (pp. 561-575). New York: Plenum Press.
- Green, B. L. (1991). Evaluating the effects of disasters. Psychological Assessment, 3(4), 538-546.
- Green, B. L., Korol, M., Grace, M., Vary, M., Leonard, A., Gleser, G., & Smitson-Cohen, S. (1991). Children and disaster: Age, gender, and parental effects on PTSD symptoms. Journal of the American Academy of Child and Adolescent Psychiatry, 30(6), 945-951.
- Green, B. L., Lindy, J. D., Grace, J. D., & Leonard, A. C. (1992). Chronic post-traumatic stress disorder and diagnostic comorbidity in a disaster sample. Journal of Nervous and Mental Disease, 180, 760-766.
- Greening, L., & Dollinger, S. J. (1992). Illusions (and shattered illusions) of invulnerability: Adolescents in natural disaster. Journal of Traumatic Stress, 5(1), 63-75.
- Gregory, G. (1995). Persuading the public to make better use of natural hazards information. Prometheus, 13, 61-71.
- Grigorian, H. M. (1992). The Armenian earthquake. In L. S. Austin (Ed.), Responding to disaster: A guide for mental health professionals (pp. 157-167). Washington, DC: American Psychiatric Press.
- Gudas, L. J. (1993). Concepts of death and loss in childhood and adolescence: A developmental perspective. In C. F. Saylor (Ed.), Children and disasters (pp. 67-84). New York: Plenum Press.
- Handford, H. A., Mayes, S. D., Mattison, R. E., Humphrey, F. J., Bagnato, S., Bixler, S., Bixler, E. O., & Kales, J. D. (1986). Child and parent reaction to the Three Mile Island nuclear accident. Journal of the American Academy of Child Psychiatry, 25, 346-356.
- Herjanic, B., & Reich, W. (1982). Development of a structured psychiatric interview for children: Agreement between child and parent on individual symptoms. Journal of Abnormal Child Psychology, 10, 307-324.

- Hofmann, J., & Rogers, P. (1991). A crisis play group in a shelter following the Santa Cruz earthquake. In N. Boyd-Webb (Ed.), Play therapy with children in crisis: A casebook for practitioners. (pp. 379-395). New York: Guilford Press.
- Holaday, M., Armsworth, M. W., Swank, P. R., & Vincent, K. R. (1992). Rorschach responding in traumatised children and adolescents. Journal of Traumatic Stress, 5(1), 119-129.
- Horowitz, M. J., Wilner, N., & Alvarez, W. (1979). Impact of events scale: A measure of subjective stress. Psychosomatic Medicine, 41, 200-218.
- Husain, S. A., & Kashani, J. H. (1992). Anxiety disorders in children and adolescents. Washington, DC: American Psychiatric Press.
- Janoff-Bulman, R. (1992). Shattered assumptions: Towards a new psychology of trauma. New York: The Free Press.
- Jason, L. A. (1980). Prevention in the schools: Behavioural approaches. In R. H. Price, R. F. Ketterer, B. C. Bader, and J. Monahan (Eds.), Prevention in mental health: Research, policy and practice. (pp. 109-134). Beverley Hills, California: SAGE Publications.
- Jeney-Gammon, P., Daugherty, T., Finch, A., Belter, R., & Foster, K. Y. (1993). Children's coping styles and report of depressive symptoms following a natural disaster. Journal of Genetic Psychology, 154(2), 259-267.
- Jessup, P. (1992, August 12). Forgotten victims. New Zealand Herald, p. B2.
- Johnson, K. (1989). Trauma in the lives of children. Alameda, California: Hunter House.
- Jones, R. T., & Ribbe, D. P. (1991). Child, adolescent, and adult victims of residential fire: Psychosocial consequences. Special issue: Environmental risk factors in the development of psychopathology. Behavior Modification, 15(4), 560-580.
- Jones, R. T., Ribbe, D. P., & Cunningham, P. (1994). Psychosocial correlates of fire disaster among children and adolescents. Journal of Traumatic Stress, 7(1), 117-122.
- Jones, R. W., & Peterson, L. W. (1993). Post-traumatic stress disorder in a child following an automobile accident. Journal of Family Practice, 36(2), 223-225.
- Joseph, S., Williams, R., & Yule, W. (1992). Crisis support, attributional style, coping style and post-traumatic symptoms. Personality and Individual Differences, 13, 1249-1251.
- Joyner, C. D. (1991). Individual, group, and family crisis counselling following a hurricane: Case of Heather, age 9. In N. Boyd-Webb (Ed.), Play therapy with children in crisis: A casebook for practitioners. (pp. 396-415). New York: Guilford Press.
- Joyner, C. D., & Swenson, C. C. (1993). Community level intervention after a disaster. In C. F. Saylor (Ed.), Children and disasters (pp. 211-232). New York: Plenum Press.
- Keane, T. M., & Wolfe, J. (1990). Comorbidity in post traumatic stress disorder: An analysis of community and clinical studies. Journal of Applied Social Psychology, 20, 1776-1788.
- Kendall, P. C., Kortlander, E., Chansky, T. E., & Brady, E. U. (1992). Comorbidity of anxiety and depression in youth: Treatment implications. Journal of Consulting and Clinical Psychology, 60(6), 869-880.
- Keppel-Benson, J. M., & Ollendick, T. H. (1993). Posttraumatic stress disorder in children and adolescents. In C. F. Saylor (Ed.), Children and disasters (pp. 29-44). New York: Plenum Press.
- Kimchi, J., & Schaffner, B. (1990). Childhood protective factors and stress risk. In L. E. Arnold (Ed.), Childhood stress. (pp. 475-500). New York: Wiley.
- Kiser, L., Heston, J., Hickerson, S., & Millsap, P. et al. (1993). Anticipatory stress in children and adolescents. American Journal of Psychiatry, 150(1), 87-92.

- Kiwanis Club of Coalinga. (1984). Safety and survival; Earthquakes. Coalinga, California: Author.
- Kliman, G., Oklan, E., & Wolfe, H. (1989). My earthquake story: A guided activity workbook for children, families, and teachers. Kentfield, California The Psychological trauma Center Press.
- Klingman, A. (1978). Children in stress: Anticipatory guidance in the framework of the educational system. Personnel and Guidance Journal, 52, 22-26.
- Klingman, A. (1985). Free writing: Evaluation of preventive programs with elementary school children. Journal of School Psychology, 23, 167-175.
- Klingman, A. (1987). A school-based emergency crisis intervention in a mass school disaster. Professional Psychology: Research and Practice, 18(6), 604-612.
- Klingman, A. (1988). School community in disaster: Planning for intervention. Journal of Community Psychology, 16, 205-216.
- Klingman, A. (1993). School-based intervention following a disaster. In C. F. Saylor (Ed.), Children and disasters (pp. 187-231). New York: Plenum Press.
- Klingman, A. (1994). Children's response to the Gulf War: Assessment via ordinal and nominal quantification of compositions. School Psychology International, 15(3), 235-246.
- Klingman, A., & Hochdorf, Z. (1993). Coping with distress and self harm: The impact of a primary prevention program among adolescents. Journal of Adolescence, 16(2), 121-140.
- Klingman, A., Koenigsfeld, E., & Markman, D. (1987). Art activity with children following disaster: A preventive oriented crisis intervention modality. The Arts in Psychotherapy, 14, 153-166.
- Kozlovskaja, G. V., Bashina, V. M., Goriunova, A. V., Kireeva, I. P., Novikova, E. V., & Skoblo, G. V. (1991). The effect of the earthquake in Armenia on the mental health of the juvenile population of the effected areas. Soviet Neurology and Psychiatry, 24(3), 11-23.
- Kulka, R. A., & Schlenger, W. E. (1993). Survey research and field designs of posttraumatic stress disorder. In J. P. Wilson & B. Raphael (Eds.), International handbook of traumatic stress syndromes. (pp. 145-155). New York: Plenum Press.
- Lacey, G. N. (1972). Observations on Aberfan. Journal of Psychosomatic Research, 16, 257-260.
- Lebedun, M., & Wilson, K. E. (1989). Planning and integrating disaster response. In R. Gist & B. Lubin (Eds.), Psychosocial aspects of disaster (pp. 268-279). New York: Wiley.
- Lehman, D. R., & Taylor, S. E. (1987). Date with an earthquake: Coping with a probable and unpredictable disaster. Personality and Social Psychology Bulletin, 13, 546-555.
- Lindy, J. D., Grace, M. C., & Green, B. L. (1981). Survivors: Outreach to a reluctant population. American Journal of Orthopsychiatry, 51(3), 468-478.
- Lonigan, C., Shannon, M., Finch, A., Daugherty, T., & Taylor, C. M. (1991). Children's reactions to a natural disaster: Symptom severity and degree of exposure. Advances in Behaviour Research and Therapy, 13(3), 135-154.
- Lonigan, C., Shannon, M., Taylor, C., Finch, A., & Saltee, F. R. (1994). Children exposed to disaster: II. Risk factors for the development of post-traumatic symptomatology. Journal of the American Academy of Child and Adolescent Psychiatry, 33(1), 94-105.
- Los Angeles Times. (1994). 4:31: Images of the 1994 Los Angeles earthquake. Los Angeles, California: Author.

- Lundin, T. (1994). The treatment of acute trauma: Post-traumatic stress disorder prevention. Psychiatric Clinics of North America, 17(2), 385-391.
- Lyons, J. A. (1987). Posttraumatic stress disorder in children and adolescents: A review of the literature. Developmental and Behavioral Pediatrics, 8, 349-356.
- Lystad, M. (1985). Special programs for children. In M Lystad (Ed.), Innovations in mental health services to disaster victims. Rockville, Maryland: National Institute of Mental Health: Centre for Mental Health Studies of Emergencies.
- Mallon, F., & Best, C. (1995). Trauma in school: A psychological service response. Educational psychology in practice, 10(4), 231-237.
- Martini, D. R., Ryan, C., & Nakayama, D. et. al. (1990). Psychiatric sequelae after traumatic injury: The Pittsburgh Regatta accident. Journal of the American Academy of Child and Adolescent Psychiatry, 29, 70-75
- McFarlane, A. C. (1987a). Family functioning and overprotection following a natural disaster: The longitudinal effects of post-traumatic morbidity. Australian and New Zealand Journal of Psychiatry, 21(2), 210-218.
- McFarlane, A. C. (1987b). Posttraumatic phenomena in a longitudinal study of children following a natural disaster. Journal of the American Academy of Child and Adolescent Psychiatry, 26(5), 764-769.
- McFarlane, A. C. (1987c). The relationship between patterns of family interaction and psychiatric disorder in children. Australian and New Zealand Journal of Psychiatry, 21, 383-390.
- McFarlane, A. C. (1988). Recent life events and psychiatric disorder in children: The interaction with preceding extreme adversity. Journal of Child Psychology and Psychiatry, 29(5), 677-690.
- McFarlane, A., Policansky, S., & Irwin, C. (1987). A longitudinal study of the psychological morbidity in children due to a natural disaster. Psychological Medicine, 17(3), 727-738.
- McNally, R. J. (1991). Assessment of PTSD in children. Psychological Assessment: A Journal of Clinical and Consulting Psychology, 3, 531-537.
- Mega, L. T., & McCammon, S. L. (1992). Tornado in Eastern North Carolina: Outreach to school and community. In L. S. Austin (Ed.), Responding to disaster: A guide for mental health professionals (pp. 211-230). Washington, DC: American Psychiatric Press.
- Milgram, N. (1989). Children under stress. In T. H. Ollendick and M. Hersen (Eds.), Handbook of child psychopathology (2nd ed.). (pp. 399-415). New York: Plenum Press.
- Milgram, N. A., Toubiana, Y. H., Klingman, A., Raviv, A., & Goldstein, I. (1988). Situational exposure and personal loss in children's acute and chronic stress reactions to a school bus disaster. Journal of Traumatic Stress, 1, 339-352.
- Miller, B. F., & Keane, C. B. (1987). Encyclopedia and dictionary of medicine, nursing, and allied health. Philadelphia: W. B. Saunders.
- Milne, G. (1977). Cyclone Tracy: II the effects on Darwin children. Australian Psychologist, 12(1) 55-62.
- Milne, G. (1979). Cyclone Tracy: Psychological and social consequences. In J. Reid (Ed.), Planning for people in natural disaster (pp. 116-123). Townsville, Australia: Department of Behavioural Sciences, James Cook University.

- Minas, I. H., & Klimidis, S. (1994). Cultural issues in posttraumatic stress disorder. In R. Watts & D. J. de L. Horne (Eds.), Coping with trauma: The victim and the helper. (pp. 137-154). Brisbane, Australia: Australian Academic Press.
- Mitchell, J., & Everly, G. (1993). Critical incident stress debriefing. Ellicott City, MD: Chevron Publishing Corp.
- Monaco, N. M., & Gaier, E. L. (1987). Developmental level and children's responses to the explosion of the space shuttle Challenger. Early Childhood Research Quarterly, 2, 83-95.
- Monahan, C. (1993). Children and trauma: A parent's guide to helping children heal. New York: Lexington Books.
- Motta, R. W. (1994). Identification of characteristics and causes of childhood posttraumatic stress disorder. Psychology in the Schools, 31(1), 49-56.
- Mowbray, C. T. (1988). Post-traumatic therapy for children who are victims of violence. In F. Ochberg (Ed.), Post-traumatic therapy and victims of violence. (pp. 196-212). New York: Brunner/Mazel.
- Muller, A. (1987). Quake pt 2: The aftermath. Bay of Plenty: Edgecumbe College.
- Myers, D. G. (1989). Mental health and disaster. In R. Gist & B. Lubin (Eds.), Psychosocial aspects of disaster (pp. 190-228). New York: Wiley.
- Nader, K., & Pynoos, R. S. (1991). Play and drawing techniques as tools for interviewing traumatised children. In C. E. Schaefer, K. Gitlin & A. Sangrond (Eds.), Play, diagnosis and assessment (pp. 375-389). New York: Wiley.
- Nader, K., Pynoos, R. S., Fairbanks, L. & Fredericks, C. (1990). Children's PTSD reactions one year after a sniper attack at their school. American Journal of Psychiatry, 147(11), 1526-1530.
- Newman, C. J. (1976). Children of disaster: Clinical observations at Buffalo Creek. American Journal of Psychiatry, 133(3), 306-312.
- Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. Journal of Personality and Social Psychology, 61, 115-121.
- Oates, M. D. (1993). Death in the school community: A handbook for counsellors, teachers, and administrators. Alexandria, VA: American Counselling Association.
- Ollendick, D. G., & Hoffmann, M. (1982). Assessment of psychological reactions in disaster victims. Journal of Community Psychology, 10, 157-167.
- Ollendick, T. H. (1983). Reliability and validity of the revised fear schedule for children (FSSC-R). Behavior Research and Therapy, 21(6), 685-692.
- Ollendick, T. H., & Greene, R. (1990). Behavioral assessment of children. In G. Goldstein & M. Hersen (Eds.), Handbook of psychological assessment (2nd ed.). (pp. 403-422). New York: Pergamon Press.
- Ollendick, T. H., King, N. J., & Frary, R. B. (1989). Fears in children and adolescents: Reliability and generalizability across gender, age and nationality. Behaviour Research and Therapy, 27, 19-26.
- Ollendick, T. H., Yule, W., & Ollier, K. (1990). Fears in British children and their relationship to manifest anxiety and depression. Journal of Child Psychology and Psychiatry and Allied Professions, 32, 321-331.
- Ornitz, E. M., & Pynoos, R. S. (1989). Startle modulation in children with posttraumatic stress disorder. American Journal of Psychiatry, 146(7), 866-870.

- Palace, E. M., & Johnston, C. (1989). Treatment of recurrent nightmares by the dream reorganisation approach. Journal of Behaviour Therapy and Experimental Psychiatry, 20, 219-226.
- Palmer, J. O. (1983). The psychological assessment of children. New York: Wiley.
- Ponton, L., & Bryant, E. (1991). After the earthquake: Organising to respond to children and adolescents. Psychiatric Annals, 21(9), 539-546.
- Purvis, J. R., Porter, R. L., Authement, C. C., & Boren, L. C. (1991). Crisis intervention teams in the schools. Psychology in the Schools, 28, 331-339.
- Pynoos, R. S. (1990). Post-traumatic stress disorder in children and adolescents. In B. D. Garfinkel, G. A. Carlson & E. B. Weller (Eds.), Psychiatric disorders in children and adolescents. (pp. 48-63). Philadelphia, PA: W. B. Saunders.
- Pynoos, R. S., Frederick, C., Nader, K., Arryo, W., Steinberg, A., Eth, S., Numez, F., & Fairbanks, L. (1987). Life threat and posttraumatic stress in school-aged children. Archives of General Psychiatry, 144, 1057-1063.
- Pynoos, R. S., Goenjian, A., Tashjian, M., Karakashian, M., et. al. (1993). Post-traumatic stress reactions in children after the 1988 Armenian earthquake. British Journal of Psychiatry, 163, 239-247.
- Pynoos, R. S., & Eth, S. (1986). Witness to violence: The child interview. Journal of the American Academy of Child Psychiatry, 25, 306-319.
- Pynoos, R. S., & Nader, K. (1988). Psychological first aid treatment approach to children exposed to community violence: Research implications. Journal of Traumatic Stress, 1(4), 445-473.
- Pynoos, R. S., & Nader, K. (1989). Children's memory and proximity to violence. Journal of the American Academy of Child and Adolescent Psychiatry, 28, 236-241.
- Pynoos, R. S., & Nader, K. (1993). Issues in the treatment of posttraumatic stress in children and adolescents. In J. P. Wilson & B. Raphael (Eds.), International handbook of traumatic stress syndromes. (pp. 535-549). New York: Plenum Press.
- Rachman, S. (1980). Emotional processing. Behaviour Research and Therapy, 18, 51-60.
- Raphael, B. (1985). Psychological responses to disaster: What are the key parameters for research. In Report of proceedings of a research workshop on human behavior in disaster in Australia. (pp. 29-49). Mount Macedon: Australian Counter Disaster College.
- Raphael, B. (1986). When disaster strikes: How individuals and communities cope with catastrophe. New York: Basic Books.
- Reber, A. S. (1985). The Penguin dictionary of psychology. London: Penguin.
- Reich, W., & Earls, F. (1987). Rules for making psychiatric diagnoses in children on the basis of multiple sources of information: Preliminary strategies. Journal of Abnormal Child Psychology, 15(4), 601-616.
- Reynolds, C., & Richmond, B. (1978). What I think and feel: A revised measure of children's manifest anxiety. Journal of Abnormal Child Psychology, 6, 271-280.
- Ross, R. J., Ball, W. A., Sullivan, K. A., & Caroff, S. N. (1989). Sleep disturbances as the hallmark of posttraumatic stress disorder. American Journal of Psychiatry, 146, 697-707.
- Roth, W. T. (1988). The role of medication in post-traumatic therapy. In F. Ochberg (Ed.), Post-traumatic therapy and victims of violence. (pp. 39-56). New York: Brunner/Mazel.

- Rothbaum, B. O., & Foa, E. B. (1992). Cognitive-behavioral treatment of posttraumatic stress disorder. In P. A. Saigh (Ed.), Posttraumatic stress disorder: A behavioral approach to assessment and treatment (pp. 85-110). Boston: Allyn and Bacon.
- Rothbaum, B. O., & Foa, E. B. (1993). Subtypes of posttraumatic stress disorder and duration of symptoms. In J. Davidson & E. Foa (Eds.), Posttraumatic stress disorder: DSM-IV and beyond (pp. 23-35). Washington, DC: American Psychiatric Press.
- Rozensky, R. H., Sloan, I. H., Schwarz, E. D., & Kowalski, J. M. (1993). Psychological response of children to shootings and hostage situations. In C. F. Saylor (Ed.), Children and disasters (pp. 123-136). New York: Plenum Press.
- Rudman, B. (1987). The day our buildings 'came to life'. NZ Listener, 115, 31-34.
- Ryan-Wenger, N. M. (1990). Children's psychosomatic responses to stress. In L. E. Arnold (Ed.), Childhood stress (pp. 109-138). New York: Wiley.
- Saigh, P. A. (1986). In vitro flooding of a 6-year-old boy's posttraumatic stress disorder. Behaviour Research and Therapy, 24, 685-689.
- Saigh, P. A. (1989a). The development and validation of the Children's Posttraumatic Stress Disorder Inventory. International Journal of Special Education, 4, 75-84.
- Saigh, P. A. (1989b). The validity of the DSM-III posttraumatic stress disorder classification as applied to adolescents. Professional School Psychology, 3, 283-290.
- Saigh, P. A. (1989c). The validity of the DSM-III posttraumatic stress disorder classification as applied to children. Journal of Abnormal Psychology, 98, 89-192.
- Saigh, P. A. (1991). The development of posttraumatic stress disorder following four different types of traumatisation. Behaviour Research and Therapy, 29(3), 213-216.
- Saigh, P. A. (1992). Verbally mediated childhood post-traumatic stress disorder. British Journal of Psychiatry, 161, 704-706.
- Saylor, C. F. (1993). Introduction: Children and disasters: Clinical and research issues. In C. F. Saylor (Ed.), Children and disasters (pp. 1-10). New York: Plenum Press.
- Saylor, C., Swenson, C., & Powell, P. (1992). Hurricane Hugo blows down the broccoli: Preschoolers' post-disaster play and adjustment. Child Psychiatry and Human Development, 22(3), 130-149.
- Schaefer, C. E. (1994). Play therapy for psychic trauma in children. In K. J. O'Connor and C. E. Schaefer (Eds.), Handbook of play therapy. Volume 2: Advances and innovations (pp. 297-318). New York: Wiley.
- Scheeringa, M. S., Zeanah, C. H., Drell, M. J., & Larrieu, J. A. (1995). Two approaches to the diagnosis of posttraumatic stress disorder in infancy and early childhood. Journal of the American Academy of Child and Adolescent Psychiatry, 34, 191-200.
- Schwarz, E. D., & Kowalski, J. M. (1991a). Malignant memories: PTSD in children and adults after a school shooting. Journal of the American Academy of Child and Adolescent Psychiatry, 30(6), 936-944.
- Schwarz, E. D., & Kowalski, J. M. (1991b). Posttraumatic stress disorder after a school shooting: Effects of symptom threshold selection and diagnosis by DSM-III, DSM-III-R, or proposed DSM-IV. American Journal of Psychiatry, 148(5), 592-597.
- Scott, R. (1995). Coordination and accessibility of post-disaster counselling and community support services. In Earthquake Commission & Centre for Advanced Engineering (Eds.), Wellington after the 'quake: The challenge of rebuilding cities (pp. 183-190). Christchurch, New Zealand: Earthquake Commission and Centre for Advanced Engineering, University of Canterbury.

- Seroka, C., Knapp, C., Knight, S., Siemon, C. et. al. (1986). A comprehensive program for postdisaster counselling. Social Casework, 67(1), 37-44.
- Shannon, M., Lonigan, C., Finch, A., & Taylor, C. (1994). Children exposed to disaster: I. Epidemiology of post-traumatic symptoms and symptom profiles. Journal of the American Academy of Child and Adolescent Psychiatry, 33(1), 80-93.
- Shore, J. H., Tatum, E., & Vollmer, W. M. (1986). Evaluation of mental health effects of disaster: Mount St. Helen's eruption. American Journal of Public Health Supplement, 76, 76-83.
- Shulman, N. M. (1990). Crisis intervention in a High School: Lessons from the Concord High School experiences. In A. R. Roberts (Ed.), Crisis intervention handbook: Assessment, treatment and research. (pp. 63-77). Belmont, CA: Wadsworth.
- Silber, E., Perry, S., & Bloch, D. (1958). Patterns of parent-child interaction in a disaster. Psychiatry, 21, 159-167.
- Smith, T. (1990). Gone to blazes. NZ Listener, 127, 14-17.
- Snyder, J. (1993). Taking the initiative: Preparing schools for earthquakes. Emergency Preparedness Digest, 20(4), 16-18.
- Solomon, S. D. (1989). Research issues in assessing disaster's effects. In R. Gist & B. Lubin (Eds.), Psychosocial aspects of disaster (pp. 308-340). New York: Wiley.
- Stallard, P., & Law, F. D. (1993). Screening and psychological debriefing of adolescent survivors of life-threatening events. British Journal of Psychiatry, 163, 660-665.
- Stallard, P., & Law, F. D. (1994). The psychological effects of traumas on children. Children and Society, 8, 89-97.
- Steinglass, P., & Gerrity, E. (1990). Natural disasters and post-traumatic stress disorder: Short-term versus long-term recovery in two disaster-affected communities. Journal of Applied Social Psychology, 20, 1746-1765.
- Stoddard, F. J., Norman, D. K., & Murphy, J. M. (1989). A diagnostic outcome study of children and adolescents with severe burns. The Journal of Trauma, 29, 471-477.
- Sugar, M. (1988). A preschooler in disaster. American Journal of Psychotherapy, 42(3), 619-629.
- Sugar, M. (1989). Children in a disaster: An overview. Child Psychiatry and Human Development, 19, 163-179.
- Sullivan, M., Saylor, C., & Foster, K. (1991). Post-Hurricane adjustment of preschoolers and their families. Advances in Behaviour Research and Therapy, 13(3), 163-171.
- Taylor, A. J. W. (1988). Coping with the earthquake. In Q. Ruscoe (Ed.), Walking on jelly. Wellington: DSIR.
- Taylor, A. J. W. (1989). Disasters and disaster stress. New York: AMS Press.
- Terr, L. C. (1979). Children of Chowchilla: A study of psychic trauma. The Psychoanalytic Study of the Child, 34, 547-623.
- Terr, L. C. (1981). 'Forbidden games': Post-traumatic child's play. Journal of the American Academy of Child Psychiatry, 20, 741-760.
- Terr, L. C. (1983a). Chowchilla revisited: The effects of psychic trauma: Four years after a school-bus kidnapping. American Journal of Psychiatry, 140(12), 1543-1550.
- Terr, L. C. (1983b). Time sense following psychic trauma: A clinical study of ten adults and twenty children. American Journal of Orthopsychiatry, 53(2), 244-261.
- Terr, L. C. (1985). Children traumatised in small groups. In S. Eth & R. S. Pynoos (Eds.), Post-traumatic stress disorder in children. (pp. 47-70). Washington, DC: American Psychiatric Press.

- Terr, L. C. (1987). Childhood Psychic Trauma. In J. D. Noshpitz (Ed.), Basic handbook of child psychiatry (Vol 5). (pp. 262-272). New York: Basic.
- Terr, L. C. (1988). What happens to early memories of trauma? A study of twenty children under age five at the time of documented traumatic events. Journal of the American Academy of Child and Adolescent Psychiatry, 27, 96-104.
- Terr, L. C. (1989). Treating psychic trauma in children: A preliminary discussion. Journal of Traumatic Stress, 2(1), 3-20.
- Terr, L. C. (1990). Too scared to cry: Psychic trauma in childhood. New York: Harper and Row.
- Terr, L. C. (1991). Childhood traumas: An outline and overview. American Journal of Psychiatry, 148, 10-20.
- Toubiana, Y. H., Milgram, N. A., Strich, Y., & Edelstein, A. (1988). Crisis intervention in a school community disaster: Principles and practices. Journal of Community Psychology, 16, 228-240.
- Turkel, S. B., & Eth, S. (1990). Psychological responses to stress: Adjustment disorder and post-traumatic stress disorder in children and adolescents. In L. E. Arnold (Ed.), Childhood stress. (pp. 52-71). New York: Wiley.
- Udwin, O. (1993). Annotation: Children's reactions to traumatic events. Journal of Child Psychology and Psychiatry and Allied Disciplines, 34(2), 115-127.
- van der Kolk, B. (1987). Psychological trauma. Washington, D.C: American Psychiatric Press, Inc.
- Weinberg, R. B. (1990). Serving large numbers of adolescent victim-survivors: Group interventions following trauma at school. Professional Psychology: Research and Practice, 21(4), 271-278.
- Weisaeth, L. (1994). Psychological and psychiatric aspects of technological disasters. In R. J. Ursano, B. G. McCaughey & C. S. Fullerton (Eds.), Individual and community responses to trauma and disaster: The structure of human chaos (pp. 72-102). Cambridge: Cambridge University Press.
- Weller, E. B., & Weller, R. A. (1990). Grief in children and adolescents. In B. D. Garfinkel, G. A. Carlson & E. B. Weller (Eds.), Psychiatric disorders in children and adolescents. (pp. 37-47). Philadelphia, PA: W. B. Saunders.
- Welner, Z., Reich, W., Herjanic, B. et. al. (1987). Reliability, validity, and parent-child agreement studies of the Diagnostic Interview for Children and Adults (DICA). Journal of the American Academy of Child and Adolescent Psychiatry, 26, 649-653.
- Wood, J. M., Bootzin, R. R., Rosenhan, D., Nolen-Hoeksema, S., & Jourden, F. (1992). Effects of the 1989 San Francisco earthquake on frequency and content of nightmares. Journal of Abnormal Psychology, 101(2), 219-224.
- Wraith, R. (1994). The impact of major events on children. In R. Watts & D. J. de L. Horne (Eds.), Coping with trauma: The victim and the helper. pp. 101-120). Brisbane, Australia: Australian Academic Press.
- Yule, W. (1991). Work with children following disasters. In M. Herbert (Ed.), Clinical child psychology: Social learning, development and behaviour. (pp. 349-363). Chichester: Wiley.
- Yule, W. (1992a). Post-traumatic stress disorder in child survivors of shipping disasters: The sinking of the "Jupiter". Psychotherapy and Psychosomatics, 57(4), 200-205.

- Yule, W. (1992b). Resilience and vulnerability in child survivors of disasters. In B. Tizard & V. Varma (Eds.), Vulnerability and resilience in human development: A festschrift for Ann and Alan Clarke. (pp. 182-198). London: Jessica Kingsley Publishers.
- Yule, W. (1993). Technology-related disasters. In C. F. Saylor (Ed.), Children and disasters (pp. 105-122). New York: Plenum Press.
- Yule, W. (1994). Posttraumatic stress disorder. In T. H. Ollendick, N. J. King and W. Yule (Eds.), International handbook of phobic anxiety disorders in children and adolescents. (pp. 223-240). New York: Plenum Press.
- Yule, W., & Gold, A. (1993). Wise before the event: Coping with crises in schools. London: Calouste Gulbenkian Foundation.
- Yule, W., & Udwin, O. (1991). Screening child survivors for post-traumatic stress disorders: Experiences from the "Jupiter" sinking. British Journal of Clinical Psychology, 30(2), 131-138.
- Yule, W., Udwin, O., & Murdoch, D. (1990). The "Jupiter" sinking: Effects on children's fears, depression and anxiety. Journal of Child Psychology and Psychiatry, 31, 1051-1061.
- Yule, W., & Williams, R. M. (1990). Post-traumatic stress reactions in children. Journal of Traumatic Stress, 3, 279-295.
- Yule, W., & Williams, R. M. (1992). The management of trauma following disasters. In D. A. Lane and A. Miller (Eds.), Child and adolescent therapy: A handbook. Psychotherapy handbook series. (pp. 157-176). Buckingham, England: Open University Press.
- Zilberg, N. J., Weiss, D. S., & Horowitz, M. J. (1982). Impact of event scale: A cross-validation study and some empirical evidence supporting a conceptual model of stress response syndromes. Journal of Consulting and Clinical Psychology, 50, 407-414.