

Six weeks following a major wildfire, children's psychosocial functioning was examined. Employing a multimethod assessment approach, the short-term mental health consequences of the fire were evaluated. Individual adjustment was compared between families who reported high levels of loss as a result of the fire (high-loss group) and families who reported relatively low levels of loss resulting from the fire (low-loss group). Standardized assessment procedures were employed for children and adolescents as well as their parents. In general, high-loss participants reported slightly higher levels of post-traumatic stress disorder (PTSD) symptoms and significantly higher scores on the Impact of Events Scale. PTSD symptoms reported by parents were generally significantly correlated with (but not concordant with) PTSD symptoms reported by their children. The high-loss group scored significantly higher on the Resource Loss Index than did the low-loss group. Preexisting and comorbid disorders and previous stressors are described. A methodological framework for future studies in this area is discussed.

Psychological Impact of Fire Disaster on Children and Their Parents

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Recent efforts targeting the impact of manmade and natural disaster on children have documented a range of maladaptive reactions (Aptekar, 1991; Green, 1993; Greenberg, 1994; Greenberg & Keane, 1997; March, Amaya-Jackson, Terry, & Costanzo, 1997; McNally, 1991; Pfefferbaum, 1997; Vernberg, Silverman, LaGreca, & Prinstine,

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1996; Yule, 1993). Although some theorists have maintained that the psychological distress following disasters is often minimal and short-lived (Garnezy & Rutter, 1985), others have stated that such consequences are relatively dramatic and long lasting (Green, Lindy, Grace, & Leonard, 1992; Yule & Williams, 1990). More recently, research has concluded that major disasters often lead to a wide range of stress responses, if not diagnosable disorders, including post-traumatic stress disorder (PTSD) (Giaconia et al., 1995; Solomon & Green, 1992). Other investigations, however, have found little evidence that disasters routinely produce PTSD (McNally, 1993). Conflicting findings in current research demonstrate the need for continued study to define more precisely the mediators, moderators, and consequences of children's functioning following disaster.

Little research has been conducted regarding the psychological impact of fire disaster on children's functioning (Greenberg & Keane, 1997; Jones & Haney, 1984; Jones & Ribbe, 1991; Jones, Ribbe, & Cunningham, 1994). However, negative consequences resulting from loss due to fire-related disasters with adults have been found. For example, consequences of fire include threat to life or bodily integrity (Green, Grace, & Gleser, 1985; Maida, Gordon, Steinberg, & Gordon, 1989; McFarlane, Policansky, & Irwin, 1987), severe physical harm or injury (Green et al., 1985), and sudden loss of a loved one (Green et al., 1985; Green, Lindy, Grace, & Gleser, 1989). Although the classic work by McFarlane and colleagues (1987) provides data attesting to the psychological consequences of bush fires among children in Australia, no data regarding symptoms of PTSD were provided. To date, few investigations have been published that specifically address PTSD among children exposed to fire disaster in the United States (e.g., Greenberg & Keane, 1997; Jones & Ribbe, 1991; March et al., 1997). Until recently, the assessment of PTSD in children has been relatively rare.

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Attention to both conceptual and methodological shortcomings that have plagued child- and adult-focused disaster studies may enhance the accuracy of conclusions drawn. This pilot investigation, which was designed to assess the impact of wildfire on children and their parents, addresses some of the shortcomings found in many earlier efforts. Among shortcomings targeted were (a) lack of a conceptual framework, (b) failure to obtain reports from parents, (c) lack of standardized assessment measures and procedures to assess children's reactions (Rubonis & Bickman, 1991), and (d) inability to account for preexisting levels of psychopathology in disaster victims (Earls, Smith, Reich, & Jung, 1988).

A major flaw in the study of the psychological impact of fire disaster in particular and disaster in general is the lack of an empirically based conceptual framework. Based on our earlier work (Jones & Ribbe, 1991), in which we examined the impact of fire on youths, we found that the degree of distress following fire was dependent on a number of variables, including the level of exposure to and loss following the event, the age and gender of the participants, coping strategies employed, and the extent of parental support. Therefore, we felt it essential to examine a range of potential mediators and moderators of individuals' functioning. Shortly after publishing this report, we became aware of the Psychosocial Model of Disaster (Korol, Green, & Grace, 1999), which nicely encompasses a number of these factors.

More specifically, Korol et al. (1999) hypothesized that four primary factors interacted to determine both short-term functioning and long-term adaptation to the traumatic event. These factors include (a) characteristics of the stressor (i.e., loss, life threat), (b) cognitive processing of the event (i.e., magical thinking), (c) individual characteristics (i.e., age, gender), and (d) characteristics of the environment (i.e., reactions of family members). Unlike previous models in the disaster literature in which only adult reactions were examined, the present model engaged a developmental perspective whereby children's reactions could also be explored. It is hoped that the use of this conceptual model will better able us to determine the consequences of residential fire.

Regarding the role of the parent, research has shown that children's reactions to traumatic events may be more a function of their parents'

reactions (typically the mother) than the event itself (Kinston & Rosser, 1974). Keppel-Benson and Ollendick (1991), studying child survivors of motor vehicle accidents, found parental vigilance to be associated positively with distress among children. In addition, McFarlane et al., (1987) reported that mothers' reactions to disaster were better predictors of children's PTSD than children's direct exposure to bush fires. Indeed, the impact of parents' reactions on their children needs to be more precisely determined.

With reference to loss, the Conservation of Resources model promoted by Hobfoll (1988, 1989) would predict that the loss of an external (or object) resource such as a home depletes coping options, leading to greater psychological distress (Freedy, Saladin, Kilpatrick, Resnick, & Saunders, 1994). In a series of systematic investigations of the relationship of resource loss to psychological adjustment following a natural disaster (Hurricane Hugo), Freedy, Shaw, Jarrell, and Masters (1992) and Freedy et al. (1994) found that resource loss is significantly and positively associated with psychological distress. In addition, they found that resource loss as a predictor of psychological distress among adults was more robust than were personal characteristics, low magnitude life stressors, high magnitude trauma, life threat to self or family members, and coping variables. Assessment of degree of loss following residential fire is an obvious need for future efforts.

Regarding methodological shortcomings, although some innovations have led to a gradual emergence of standardized assessment batteries (Lyons, 1991), much continued progress is warranted (McNally, 1991; Pfefferbaum, 1997). For example, the lack of standardized assessment batteries, consisting of psychometrically sound instruments and standard clinical interviews administered by experienced clinicians, continues to lead to invalid conclusions. When nonstandardized instruments are used, elevated symptom levels are often reported (McNally, 1991), making it difficult to generalize findings across studies and disaster types.

In addition, reporting children's reactions to disaster is a major problem affecting the validity of many disaster-related studies (Green, Grace, Crespo da Silva, & Gleser, 1983). For the most part, reports of children's reactions to disaster have been limited to those made by parents and/or teachers (McNally, 1991; Sack, Angell, Kinzie, &

Rath, 1986; Terr, 1985). Earls et al. (1988) found that parents tended to underestimate the degree of distress experienced by children. In addition, discrepancies have been documented between child and adult reports of children's distress (Handford et al., 1986; Sack, McSharry, Clarke, Kinney, & Lewinsohn, 1994). The need to assess child disaster victims directly is obvious.

Failure to account for victims' previous psychological adjustment is another major shortcoming in disaster research. Data have shown that children with preexisting psychiatric disorders are more vulnerable to the development of other psychiatric symptoms following disaster (Earls et al., 1988; Jones & Ribbe, 1991). Although explanations for this phenomenon exist, such as the diathesis-stress model of psychopathology, assessment strategies that control for previous and present psychopathology are warranted.

Therefore, the major goal of this study was to examine two factors within a developmentally based conceptual model. More specifically, within "characteristic of the environment," the role of the parent was examined, whereas within the "characteristic of the stressor," loss was ascertained. Although examination of the other two factors within this model, characteristics of the individual and cognitive processing of the event, are of extreme relevance and would afford a full test of the model, due to the small *n* size they will not be examined within the context of this pilot study. Regarding the loss variable, we compared parents who reported relatively low levels of destruction of property, deprivation of time, insult to health, and/or internal or external resources resulting from the wildfire (low loss [LL]) to families who reported relatively high levels of each these variables (high loss [HL]). It was expected that parents and their children in the HL group would evidence greater psychological distress than those in the LL group. An attempt was made to match HL participants with LL participants on variables such as income level, insurance coverage, age, and grade. Concerning the influence of parents' reactions on their children, we hypothesized that elevated levels of parents' PTSD symptomatology would be correlated with elevated levels in their children.

In addition, standardized assessments were carried out in which children and parents were individually interviewed using a multimethod strategy that employed standardized diagnostic assess-

ment instruments as well as widely used self-report measures. Attempts were made to account for major types of preexisting and current psychopathology potentially related to PTSD.

THE WILDFIRE

At 6 p.m. on June 27, 1990, a wildfire raced toward a small city in Southern California. The fire swept down dry brush on a mountainside, fueled by wind gusts of up to 60 miles per hour and ambient temperatures exceeding 100° Fahrenheit. Conditions were very dry because the area had been experiencing a severe drought for 5 years. The fire quickly reached the outskirts of the city, where it proceeded to cut a swath through single-family dwellings to a major highway, where it was finally halted on July 1. The evacuation of several thousand residents caused considerable difficulty for the fire-fighting teams and fire-fighting equipment. Losses included 1 fatality, 420 single-family homes, 4 public buildings, 1 mobile home, 2 farm buildings, 10 business structures, and 26 apartment units. Early property damage estimates exceeded \$250 million.

METHOD

PARTICIPANTS

Target subjects were those families and individuals whose homes had sustained significant loss as a result of the wildfire. These people were classified as HL participants compared to families who had experienced relatively little loss resulting from the fire. HL participants were recruited primarily with the aid of the local chapter of the American Red Cross when they came to the relief center to apply for aid. The LL group consisted of a purposeful sample of participants who were recruited via the local newspaper, schools, and individual referrals.

All participants were volunteers. Some HL participants initially agreed to participate when contacted by telephone but later declined the interview. Others were not available because they had passed through the Red Cross relief center prior to the study. Efforts to recruit

HL participants through television, newspapers, churches, university departments, school systems, mental health departments, and the fire recovery center yielded additional participants. Among explanations of participants who declined interviews were the following: lacking time, being in the process of rebuilding, parents not wanting their children “retraumatized” by discussing the fire, and being away on vacation. Based on census data of income level and location of damaged or destroyed homes, however, this sample is representative of the population of families who lost their homes.

In an attempt to control for extraneous variables that may have affected reporting of psychological symptoms and to focus on the impact of the fire, HL and LL families and individuals were matched as closely as possible on demographic characteristics (including age, gender, income level, and fire insurance coverage). Table 1 reflects the variables matched between the HL and LL groups.

The demographic characteristics of the HL and LL groups were similar. Most participants were of middle-class status, with similar income levels and insurance coverage. There were a total of 13 children in the HL group, ranging in age from 7 to 12 years (mean age = 9.1 years). Four were male; 9 were female. Nine were Caucasian, and 4 were Mexican American. The HL group consisted of 7 families with one child each and 3 families with two children each. The LL group was composed of 9 children from 7 to 12 years of age (mean age = 9.8 years). Four were male; 5 were female. Two were African American, 4 were Mexican American, and 3 were Caucasian. All came from families with only one child.

MEASURES

A multimethod strategy was used to examine the psychosocial adjustment of children and their parents. For children, selected portions of a structured diagnostic interview, the Diagnostic Interview for Children and Adolescents–Revised (DICA-R) (Reich & Welner, 1990), were individually administered by trained interviewers. Comorbid disorders assessed were (a) past major affective disorder (past MAD), (b) present major affective disorder (present MAD), (c) conduct disorder (CD), (d) oppositional defiant disorder (ODD), (e)

TABLE 1
Means of Matched Variables
Between High and Low Loss Groups

<i>Variable</i>	<i>High Loss</i>		<i>Low Loss</i>	
	M	SD	M	SD
Age	9.08	1.55	9.78	1.72
Academic grade	3.23	1.69	3.89	1.45
Parent-reported income	\$46,569	\$29,045	\$42,000	\$39,330
Parent-reported insurance	\$325,552	\$190,152	\$292,340	\$201,412

NOTE: High-loss $n = 13$ (4 females, 9 males); low-loss $n = 9$ (4 males, 5 females).

overanxious disorder (OAD), and (f) PTSD. To assess the impact of the fire, comorbid disorders were evaluated as preexisting (prior to the fire) and current (within the past month). Self-report instruments included the Impact of Events Scale (IES) (Horowitz, Wilner, & Alvarez, 1979), the State-Trait Anxiety Inventory for Children (STAI-C) (Spielberger, Gorsuch, & Lushene, 1970), and the Fire Questionnaire-Child Form (FQ-C) (Jones & Ribbe, 1990). The PTSD portion of the Diagnostic Interview Schedule (DIS) (Robins, Helzer, Croughan, & Ratcliff, 1981) was administered to parents to assess their level of PTSD symptomatology and to compare parents' PTSD symptomatology with their children's. In addition, the adult version of the Fire Questionnaire (FQ-A) (Jones & Ribbe, 1990) and the adult version of the IES (Horowitz et al., 1979) were administered. Last, the Children's Behavioral Questionnaire for Completion by Parents (CBQ) (Rutter, 1967) was filled out. A post hoc measure of resource loss was constructed to compare HL and LL groups. For the purposes of this measure, resource loss was defined as destruction of property, deprivation of time, insult to health, and/or internal or external resources resulting from the fire.

PROCEDURE

All interviews were conducted at the local Red Cross headquarters or at one of two local churches 6 weeks after the fire. Interviewers included one trained licensed clinical psychologist, two Ph.D. candi-

dates, and one advanced psychology major with previous experience in evaluation of trauma situations. Each was trained over a 2-week period to an interrater reliability criterion (κ) averaging .91 and interviewed participants individually. Interviews lasted approximately 60 minutes, with a range of 45 to 90 minutes each.

RESULTS

HL and LL groups did not differ on any of the following demographic characteristics: income level, fire insurance, age, and gender (see Table 1). Of the 13 HL participants, an 8-year-old female and a 7-year-old male met the diagnostic criteria for PTSD (see the appendix). HL participants reported an average of 5.0 PTSD symptoms ($SD = 2.4$, range = 3 to 10). LL participants reported an average of 4.2 PTSD symptoms ($SD = 5.4$, range = 0 to 14). Table 2 shows the percentage of HL and LL participants reporting individual PTSD symptoms.

In addition, HL and LL participants were compared on the number of symptoms reported on each of four comorbid disorders, including ODD, CD, OAD, and past and present MAD. Table 3 shows the number of DICA-R symptoms reported by HL and LL participants.

HL participants scored a mean total score of 39.9 ($SD = 12.6$) on the IES; LL participants scored a mean total score of 23.4 ($SD = 19.7$), $t(31) = 2.21$, $p < .035$, 19. Horowitz (1982) suggested cutoff scores for determining low, medium, and high symptom levels using the total IES score (less than 8.5 = low, between 8.6 and 19.0 = medium, and greater than 19.0 = high). According to Horowitz's schema, no HL participants were classified as low impact, 1 (8%) was classified as medium impact, and 12 (92%) were high impact. In comparison, 4 (44%) LL participants were classified as low impact, none as medium impact, and 5 (56%) as high impact. The means and standard deviations for the 1-month postdisaster IES subscores for participants are summarized in Table 4. Table 5 reflects the percentage of HL and LL participants who had experienced symptoms at least once in the 7 days prior to the date of assessment.

STAI-C data indicated that anxiety levels were near normal for both HL and LL participants. Table 6 shows the means and standard devia-

TABLE 2
Percentages of High Loss and Low Loss Participants
Reporting Post-traumatic Stress Disorder (PTSD)
Symptoms on the Diagnostic Interview for Children
and Adolescents—Revised 1 Month Postdisaster

<i>PTSD Symptoms</i>	<i>High Loss (%) (n = 13)</i>	<i>Low Loss (%) (n = 9)</i>
Reexperiencing		
Thinking about it a lot	92.3	66.7
Dreaming about it repeatedly	46.2	33.3
Sense of event recurring	30.8	33.3
Upset by reminders of fire	66.7	22.2
Avoidance		
Thinking about it when trying not to	76.9	33.3
Avoided things associated with the fire	30.8	33.3
Amnesia for details of fire	23.1	11.1
Loss of interest in usual activities	30.8	22.2
Loss of interest in people	25.0	11.1
Loss of caring feelings	0	0
Outlook on future changed	7.7	11.1
Increased arousal		
Trouble falling/staying asleep	69.2	33.3
Increased irritability and temper outbursts	38.5	22.2
Decreased attention	25.0	44.4
Increased restlessness	38.5	44.4
Increased startle reflex	46.2	33.3
Increased autonomic activity	53.8	0

tions of HL and LL participants in relation to normative samples (Spielberger, 1973).

RESOURCE LOSS

As a test of the impact of resource loss, responses to the following nine questions from the FQ-A related to the loss of property, time, health, and other internal or external resources were coded and summed to create an index of resource loss: (a) Were you evacuated from your home? (yes or no), (b) Degree of damage to your home (none, moderate, total), (c) Was your home insured for fire damage? (yes or no), (d) Percentage of fire damage not covered by insurance (1 minus dollar coverage divided by dollar damage), (e) Did the fire burn

TABLE 3
Number of Comorbid Symptoms Reported on
the Diagnostic Interview for Children and
Adolescents—Revised: High Loss Versus Low Loss

<i>Disorder</i>	<i>N</i>	<i>X</i>	<i>SD</i>	<i>F Value</i>	<i>p Value</i>
Oppositional defiant disorder					
Group 1	12	0.92	1.00	0.84	.37
Group 2	9	0.55	0.73		
Conduct disorder					
Group 1	12	0.17	0.39	0.06	.81
Group 2	9	0.22	0.67		
Overanxious disorder (past)					
Group 1	13	1.00	0.91	1.03	.32
Group 2	9	1.67	2.12		
Major affective disorder (past)					
Group 1	13	2.77	2.39	0.04	.85
Group 2	9	3.00	3.24		
Major affective disorder (present)					
Group 1	13	1.92	1.89	1.71	.21
Group 2	9	1.00	1.12		
Post-traumatic stress disorder (symptoms)					
Group 1	13	5.00	2.35	0.04	.85
Group 2	9	4.22	5.36		
Post-traumatic stress disorder (criteria)					
Group 1	13	3.38	0.87	10.10	.005
Group 2	9	1.67	1.66		

NOTE: Group 1 = high loss; Group 2 = low loss.

something of value to you? (yes or no), (f) Was anyone hurt during the fire? (yes or no), (g) Did you have to move after the fire? (yes or no), (h) How many times have you moved since the fire? (none, moderate, high), (i) How many times have you missed work since the fire? (none, moderate, high). Each response was coded as 0 (representing no loss), .5 (moderate loss), or 1 (high loss). Coded responses to items were totaled to create the resource loss index. Total scores could range from 0 to 9.

The HL group scored significantly higher on the resource loss index than did the LL group, $t = 11.5(25.0)$, $p < .0001$. Furthermore, the number of PTSD symptoms endorsed was correlated with the resource loss index, $r = .51$, $p < .0014$ ($n = 36$).

TABLE 4
Means and Standard Deviations of 1-Month
Postdisaster HIES Subscales: High Loss Versus Low Loss

<i>Subscale</i>	N	X	SD
Intrusion			
Group 1	13	17.1	6.1
Group 2	9	12.0	11.2
Avoidance			
Group 1	13	22.8	7.5
Group 2	9	11.4	11.3
Total			
Group 1	13	39.9	12.6
Group 2	9	23.4	19.7

NOTE: Group 1 = high loss; Group 2 = low loss.

TABLE 5
Reported Frequency (%) of HIES Symptoms
in Past 7 Days: High Loss Versus Low Loss

<i>Subscale</i>	<i>High Loss (n = 13)</i>	<i>Low Loss (n = 9)</i>
Intrusion		
I thought about it when I didn't mean to	100.0	88.9
I had trouble falling asleep or staying asleep because of pictures or thoughts about it that came into my mind	84.6	44.4
I had waves of strong feelings about it	84.6	55.6
I had dreams about it	53.8	55.6
Pictures about it popped into my mind	92.3	66.7
Other things kept making me think about it	61.5	44.4
Any reminder brought back feelings about it	69.2	22.2
Avoidance		
I avoided letting myself get upset when		
I thought about it or was reminded about it	84.6	44.4
I tried to remove it from memory	84.6	44.4
I stayed away from reminders of it	92.3	44.4
I felt as if it had not happened or it wasn't real	69.2	66.7
I tried not to talk about it	69.2	55.6
I was aware that I still had a lot feelings about it, but I didn't deal with them	84.6	55.6
I tried not to think about it	69.2	55.6
My feelings about it were kind of numb	84.6	66.7

TABLE 6
Means and Standard Deviations on the State-Trait
Anxiety Inventory for Children (STAI-C):
Fire Sample Compared to Normative Sample

<i>STAI-C Scale</i>	<i>Painted Cave Fire</i>		<i>Elementary School Children</i>	
	<i>Victims (n = 11)</i>	<i>Controls (n = 9)</i>	<i>Boys (n = 456)</i>	<i>Girls (n = 457)</i>
State				
<i>X</i>	32.8	31.1	31.0	30.7
<i>SD</i>	6.9	3.0	5.7	6.0
Trait				
<i>X</i>	36.9	37.9	36.5	38.0
<i>SD</i>	6.9	6.7	6.3	6.7

PARENT-CHILD PTSD SYMPTOM COMPARISONS

Parents' self-report of PTSD symptoms they experienced following the fire and children's self-report of PTSD symptoms were compared in terms of the number of symptoms reported on the DIS and the DICA-R, respectively. An independent *t* test showed that as a group, parents reported significantly more PTSD symptoms than did children, $t = 2.42, p = .04$. When parent-child dyads (pairs of parents and their child) were compared in terms of the total number of PTSD symptoms reported, a dependent *t* test based on difference scores revealed that on average, parents reported 2.1 more symptoms than their children, which was significant, $t = 2.74, p = .02$. To examine further the degree of association between symptom agreement in parent-child dyads, the number of PTSD symptoms reported by parents and their children were correlated. There was a significant association between the number of PTSD symptoms reported by parents and children, $r = .55, p = .02$.

In addition, another, more conservative means of assessing the degree of agreement on individual PTSD symptoms between parent-child dyads was employed. Because the DICA-R and DIS yield yes or no (dichotomous) data, the phi coefficient was used to determine the strength of association between parents' responses to individual PTSD symptoms and those of their children. This statistic was employed to examine the degree to which specific PTSD symptom

concordance existed between parents and their children in this disaster sample.

Parent-child dyads were constructed from the 19 families represented in the study. When there were two children from one family included in the study, the child with the most recent birthday was paired with the parent (in all cases, the mother). For each parent-child dyad, a phi coefficient was determined by constituting 2×2 matrices of yes-no responses for all PTSD symptoms. The mean phi coefficient was only -0.09 , indicating no agreement with parent-child dyads on either the presence or absence of specific PTSD symptoms. When the degree of agreement within the dyad was tested against the hypothesis that it was equal to 0, the Wilcoxon matched-pairs signed-rank test revealed that any agreement between parent-child dyads on PTSD symptoms was insignificant, $z = 0.78$, $p = .23$.

PREEXISTING PSYCHIATRIC DISORDERS

Four HL participants could be diagnosed with preexisting psychopathology. Of these, 3 met the diagnostic criteria for overanxious disorder. The 4th HL child met the criteria for previous PTSD resulting from a severe injury (a fall from a tree). Of the 2 HL participants with current PTSD, 1 had no preexisting psychiatric disorders and the other had preexisting PTSD. The 1 LL child who met diagnostic criteria for current PTSD could be diagnosed with preexisting ODD. The latter child was a resident in a group home.

According to parents' ratings on the CBQ, 6 participants in the sample scored 13 or more, which is a cutoff point that usually indicates a high risk of psychiatric disorder. Three participants scoring above the cutoff were from the HL group; 3 were from the LL group. The mean total score on the CBQ was higher for LL participants (8.3) than for HL participants (5.2).

PREVIOUS STRESSORS

Using the FQ-C, participants were asked if they had ever experienced stressful life events such as another disaster or severe trauma other than the wildfire. Events included earthquake, other fire, flood,

TABLE 7
Mean HIES Subscale and Total Scores Across
Two Studies Varying in Severity of Consequences

<i>HIES Subscale</i>	<i>Jones and Ribbe (1991)^a</i>		<i>Yule and Williams (1990)^b</i>
	<i>Victims (n = 25)</i>	<i>Controls (n = 13)</i>	<i>Victims (n = 13)</i>
Intrusion	13.4	11.3	19.3
Avoidance	14.6	10.9	27.6
Total	28.0	22.0	46.9

a. Ages 14 to 19.

b. Ages 5 to 15.

mudslide, severe storm, toxic waste, severe injury, car accident, “getting beat up,” the witnessing of injury to other, severe illness, or “other.” Comparisons were made between HL and LL groups of those reporting and those not reporting previous stressor(s). One-way ANOVAs revealed no significant differences in psychosocial functioning as defined by PTSD symptoms, IES scores, or STAI-C scores.

DISCUSSION

This pilot investigation was based on an extremely small sample, which significantly decreases power to detect differences and obviates exploration of developmental and gender differences. Consequently, the external validity is restricted. The fact that this sample was not assessed longitudinally also presents a major limitation of this study.

Notwithstanding these tentative findings, several features of this study may serve as a model for future efforts. That is, employment of the conceptual model, fine-grained analyses of loss, obtainment of parent’s reactions, assessment of children’s reactions based on their actual responses, use of standardized assessment instruments, and assessment of premorbid functioning provide important components to this study.

One of the major strengths of this pilot study was the employment of an empirically based conceptual framework. Consistent with this

conceptual model where loss was hypothesized to affect outcome, the HL group reported relatively higher levels of distress than did the LL group. Although the limited *n* size prevented us from testing the entire model, the roles of loss and parent influence were systematically examined. More specifically, in an attempt to provide a more fine-grained analysis of the loss data using a loss index as a form of resource loss, we believe that a more precise measure of this variable was obtained. That is, instead of simply defining loss as homes that sustained significant damage or total destruction, as done by Jones et al. (1994), in the present study we defined it more broadly as those families and individuals who reported significant levels of destruction of property, deprivation of time, insult to health, and/or internal or external resources resulting from the wildfire. This conceptualization of loss is more consistent with Hobfoll's (1988, 1989) notion of resource loss. It is hoped that similar objective measures of loss will be employed in future studies.

Our tentative findings are consistent with earlier results documenting children's distress following fire disaster (Jones & Ribbe, 1991; March et al., 1997; McFarlane, 1987; McNally, 1993) as well as those found in other disaster-related research (Earls et al., 1988; Green et al., 1991; Vernberg et al., 1996). These levels of distress may well be an underestimation of the impact of the wildfire on children given the middle-class status of the sample. Evidence of the buffering role of social status and life events (Norris & Kaniasty, 1992) substantiates this assertion.

The validity of these findings is strengthened by our attempts to enhance the methodological sophistication through the employment of a multimethod assessment strategy, allowing children to report their own symptomatology; the employment of an LL group; and the use of a structured interview (DICA-R), which assisted in isolating the impact of the fire by accounting for several types of preexisting psychopathology.

Although two individuals in the HL group met the criteria for PTSD as a result of the fire, extreme caution must be taken when interpreting these findings. These children were quite young, ages 7 and 8. As pointed out by Green and colleagues (1991, 1993) and others, young children may have difficulty expressing their reactions to disaster.

This may be due to several different factors, including inability to perceive an event as harmful and/or threatening, inability to process the event as a function of cognitive deficiencies, inability to understand interview questions, inability to verbalize their feelings, and/or cultural differences. The fact that both of these children were minorities (Mexican American) raises the often-overlooked issue of culture. The expression of symptoms following stressful life events in general (Neal & Turner, 1991) and disaster in particular (Bravo, Rubio-Stipec, & Canino, 1990) may be influenced by one's culture. In addition, the possibility of minorities being more negatively affected by crisis because of an ongoing confrontation with hostility, prejudice, and neglect has been posited by several investigators (Norris & Kaniasty, 1991; Penk & Allen, 1991). Hence, the need to consider cultural issues when assessing the impact of disaster on culturally different groups is important in future research.

Another reason for cautious interpretation is due to a preexisting psychiatric disorder in the 8-year-old diagnosed with PTSD who experienced a traumatic event (a fall resulting in a broken arm). The degree to which this preexisting psychopathology may have contributed to overall group levels of PTSD symptomatology is uncertain. These findings underscore the issue raised by Solomon and Canino (1990) concerning the extent to which psychiatric sequelae resulting from exposure to an extraordinary traumatic event, such as a fire disaster in this instance, differs from the sequelae resulting from exposure to more common stressors (injury).

It is important to consider the relatively comparable levels of PTSD symptoms endorsed by both the HL (5.0 symptoms) and LL (4.2 symptoms) groups as assessed by the DICA-R, a finding similar to that obtained by Jones and Ribbe (1991). A potential explanation for this finding is related to degree of exposure. Previous reports have documented the "dose-response" effect discussed by Pynoos and Nader (1990). For example, several investigations, including Hurricane Andrew (LaGreca, Vernberg, Silverman, & Prinstein, 1996), industrial fire (March et al., 1997), Three Mile Island (Bromet, 1980), a sniper attack at school (Pynoos, Nader, Frederick, Gonda, & Stuber, 1988), nuclear waste disaster (Davidson, Fleming, & Baum, 1985), and fire (Maida et al., 1989) have shown that greater exposure to the

traumatic event has led to greater levels of PTSD symptoms. All the participants in this investigation were exposed to the wildfire because of its widespread influence throughout the city. HL participants, however, may have experienced a greater level of stress resulting from the consequences of losing their homes to the fire in addition to exposure to threat and danger from the fire. Participants' reports of fear on the FQ-C reinforce this assertion. Future reports need to differentiate exposure from loss to separate the impact of each.

Regarding PTSD symptoms assessed by the IES, unlike previous findings in which intrusion symptoms typically outnumber avoidance symptoms (Green et al., 1991; Solomon & Canino, 1990), a greater number of avoidance symptoms were endorsed in this study. A possible explanation stems from the fact that HL participants' homes were either destroyed or damaged, forcing all residents to relocate, which may increase feelings of detachment or estrangement from others. This finding highlights the need to examine the interaction of the type of traumatic event and symptom expression.

It is interesting to see how these findings compare with related studies assessing children's reaction to disaster. From Table 7, it is clear that reactions may be closely related to the severity of the consequences of the event. For example, reactions were significantly lower among boys who experienced a nighttime dorm fire where the major consequence was loss of personal belongings, such as clothing, books, and stereos (Jones & Ribbe, 1991), versus more intense reactions by children following the sinking of the *Herald of Free Enterprise* where several casualties resulted (Yule & Williams, 1990). This finding highlights the need to examine not only the type of the event (i.e., fire, shooting, earthquake) but also the potential moderating or mediating effect of the severity of the consequences of the event. Concerning the mediating role of parents' behavior on their children's functioning, these findings are consistent with several previous reports. Indeed, McFarlane et al. (1987) reported that mother's reactions to disaster were better predictors of children having PTSD than children's direct exposure to the disaster itself. Similarly, Pynoos et al. (1988) stated that children are likely to respond similarly to adults in both the nature and frequency of grief reactions up to 1 year following the incident. In the present study, these findings were tentatively supported, in that a

moderate correlation was found between the number of children's PTSD symptoms and those of their parents.

A question arises when summarizing the results of this study as well as several others where relatively mild levels of PTSD result from similar disasters: Why is there such a low level of PTSD symptomatology reported by children? One explanation stems from the fact that no residents were injured or killed. In addition, children may not have perceived the fire as a threat to their survival or as threatening separation or abandonment (Janoff-Bulman, 1992). Even though families were evacuated, they were able to remain intact during the fire.

An important implication for this study is the need to develop intervention programs at the primary, secondary, and tertiary levels (Terr, 1991). Given the relative effectiveness of several primary preventative investigations in the area of child injury prevention (Jones & Haney, 1984; Peterson, 1988; Roberts, Fanurik, & Layfield, 1987) and postfire intervention (Jones, 1993), these efforts may provide initial guidelines for future research.

APPENDIX

Case Studies

Two of the 13 victims were diagnosed with post-traumatic stress disorder (PTSD). The first PTSD victim was an 8-year-old Mexican American female. Even though the participant refused to answer some questions concerning PTSD symptoms—one intrusion, one avoidance, and one arousal symptom question—she still met criteria. In addition, she endorsed many secondary symptoms, including sleep disturbance, depressive symptomatology (both dysphoric and anhedonic), separation anxiety, excessive guilt, omen formations, pervasive sense of apprehension of future events concerning another fire, and peer reactions (e.g., worrying about what friends think about her). The participant also expressed difficulty with episodes described as “spells” when she was reminded of the fire. In these spells, she would experience fear of a reoccurring fire, uncontrollable crying, and heightened separation anxiety. As reported by the participant, these spells would subside when she was reunited with her mother.

The second PTSD victim was a 7-year-old male, also of Mexican American descent. Again, in addition to meeting PTSD criteria, he also met criteria

for oppositional disorder and adjustment disorder. The participant expressed depressive symptomology, including dysphoria, anhedonia, and appetite and sleep disturbances. Also, a sense of excessive guilt was reported during the first 2 weeks following the fire.

In an attempt to discern a particular pattern of symptomatology related to the wildfire, an exploratory analysis was performed. Using data from the PTSD section of the Diagnostic Interview for Children and Adolescents-Revised (DICA-R), all participants were categorized accordingly as reporting either low symptomology (less than four items endorsed), moderate symptomology (between four and eight items endorsed), or high symptomology (more than eight items endorsed). One-way ANOVAs were performed using level of PTSD symptomology as the dependent variable, and symptoms from the following sections of the DICA-R: oppositional defiant disorder, conduct disorder, dysphoria, pervasive anhedonia, appetite disturbance, sleep disturbance, psychomotor problems, fatigue, worthlessness or excessive guilt, trouble concentrating or indecisiveness, overanxious disorder (present), suicidal ideation, and psychosocial stressors sections of the DICA-R as the independent variables. There was a significant effect for trouble concentrating or indecisiveness, $F(2, 14) = 3.60, p = .05$; worthlessness or excessive guilt symptomology, $F(2, 11) = 5.43, p = .02$; and present overanxious symptomology, $F(2, 13) = 10.26, p < .01$. Also there was a noticeable yet insignificant trend at $p < .05$, in the categories of suicidal ideation, psychomotor problems, and sleep and appetite disturbances.

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