IMPACT OF A NATURAL DISASTER ON PRESCHOOL CHILDREN: Adjustment 14 Months After a Hurricane

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Fourteen months after a hurricane, young children who had experienced the storm showed significantly higher anxiety and withdrawal and more behavior problems than did children who had not. Behavioral problems decreased steadily over the six months following the storm. Mothers' distress in the hurricane's aftermath was associated with the longevity of their children's emotional and behavioral difficulties.

On September 21, 1989, a Class IV hurricane, Hugo, struck the South Carolina coast, carrying 175 mile-per-hour winds and a tidal surge between 12 and 23 feet. The eye of the hurricane entered the mainland north of Charleston. In a nearby national forest, from 70% to 80% of all trees were destroyed. In Charleston County, 80% of all structures endured roof damage, 6,000 homes were destroyed, over 12,000 homes were rendered uninhabitable, and 65,000 people required temporary shelter *(Mullins & Burbage, 1989)*.

Since Terr's *(1981)* seminal study on the effects of the Chowchilla bus kidnapping on children, several studies have documented short-term negative consequences *(Belter & Shannon, 1993; Kendall-Tackett, Williams, & Finkelhor, 1993; Klingman, 1992; Pynoos et al., 1987; Yule & Udwin, 1991)* and long-term behavioral and emotional changes *(Conte & Berliner, 1987; Green et al., 1994; Honig, Grace, Lindy, Newman, & Titchener, 1993; Nader, Pynoos, Fairbanks, & Frederick, 1990; Vogel & Vernberg, 1993; Yule & Williams, 1990)* among school-aged children who experience various types of trauma.

Previous research specific to natural disaster and school-aged children reveals short-term effects that include apathy and aggression *(Bloom, 1986; Galante & Foa, 1986)*, sleep disturbances, decrease in appetite, increase in somatic complaints *(Dollinger,*

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1985; Dollinger, O'Donnell, & Staley, 1984), and separation anxiety *(Dollinger, 1985; Sugar, 1988)*. Children have also been shown to demonstrate an increase in fears *(Bloom, 1986; Dollinger, 1985; Dollinger et al., 1984)* and some have exhibited play involving the traumatic event *(Galante & Foa, 1986; Saylor, Swenson, & Powell, 1992; Sugar, 1988)*. Although some children have long-term emotional difficulties, few children exhibit psychiatric disorders as a result of disaster *(Earl, Smith, Reich, & Jung, 1988)*. Children's symptoms following a disaster have been shown to relate to their reported experience of the impact of the trauma *(Lonigan, Shannon, Taylor, Finch, & Sallee, 1994)*, their proximity to the disaster *(Burke, Moccia, Borus, & Burns, 1986)*, their reported emotional experiences during the trauma *(Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991)*, the severity of exposure to the event *(Daugherty, Lonigan, Finch & Shannon, 1991)*, and the severity of parental symptoms *(Belter & Shannon, 1993; Handford et al., 1986; Honig et al., 1993)*.

A number of factors relate to the impact of trauma on children, and children may respond to stress in developmentally specific ways *(Compas & Epping, 1993; Pynoos & Eth, 1985)*. However, until recently, empirical research across developmental levels has been limited.

An increase in group research on the short-term effects of disaster on young children has been evident in the last five years. Eight weeks after a major hurricane in South Carolina, Sullivan, Saylor and Foster *(1991)* found that parents reported an increase in the incidence and severity of problem behavior among their preschool-aged children. This included demanding and dependent behavior, frustration, temper tantrums, irritability, whining, and sleep difficulties. Two to six weeks following the 1989 Loma Prieta earthquake, Guerin, Junn, and Rushbrook *(1991)* found similar patterns in preschool children. Over 50% of the parents surveyed reported that their two- and three-year-olds had difficulty sleeping alone, resisted going to bed, whined and clung to adults, demanded more attention, and expected their demands to be met more quickly than hitherto. Over 50% of the preschool directors and teachers reported that the preschoolers showed increases in clinging, activity level, disobedience, aggressiveness, crying, irritability, and sensitivity to noises. They also had difficulty concentrating and in separating from parents. Fifteen percent of the preschoolers showed significantly elevated scores on at least one scale of the Child Behavior Checklist, somatic complaints and sleep problems being the most commonly reported symptoms.

Although the awareness of the impact of natural disaster on children is increasing and some studies have been conducted with school-aged children and adolescents, data on the adjustment of young children who experience a natural disaster are limited. In particular, the longevity of adjustment difficulties and factors predicting them are unknown *(Gillis, 1993)*.

The present study examined the general behavioral problems and trauma-related emotional symptoms among preschool-aged children, 14 months after hurricane Hugo, to determine the duration of emotional and behavioral problems, and to assess factors that predict longevity of these problems.

METHOD

Subjects

Mothers' ratings of 331 children from three sites provided the data for this study. Those from site one concerned 161 students aged two to six (M=42 months) at two preschools in Charleston County who had experienced the hurricane and therefore were assigned to the Hurricane group.

Those from site two concerned children enrolled in a university-affiliated developmental kindergarten in the Boston area, and those from site three concerned children attending a university-sponsored school in Utah. The 170 children from these two

sites, who had no known history of exposure to natural disaster or such other traumas as child abuse or witnessing domestic violence, were assigned to a nontrauma group; they ranged in age from two to ten (M=72 months).

Measures

Behavioral problems and trauma symptoms. The 21-item Pediatric Emotional Distress Scale (PEDS) assesses the presence of specific behavioral problems and trauma-related symptoms. Items are rated on a Likert format, including almost never, sometimes, often, and very often, with a total score ranging from 0 to 84. In addition to a total behavior score, this scale has three factors that reflect clusters of behavior: acting out, anxious/withdrawn, and fearful. Psychometric studies on the PEDS indicate strong reliability (coefficient alpha=.85 for the total scale and .72 to .78 for the factors), strong concurrent validity with parent ratings on the Reaction Index *(Frederick, 1985)*, and strong criterion validity *(Friedman, Alderman, Saylor, Pantell, & Sugar, in press; Saylor, Swenson, & Stokes, 1994; Stokes, 1994)*. Although items on this scale include trauma-related symptoms, the scale is not considered a measure for diagnosing post-traumatic stress disorder.

Effects of the hurricane. A Hurricane Related Experiences questionnaire was developed specifically for this study. It gathered such information as whether families were living in the area at the time of the storm and stayed in town through the hurricane; whether the respondent experienced significant distress or believed they or their loved ones might die; length of time out of the home as a result of the storm; and the extent of any property loss, income loss, disruption of routine, or distress due to the hurricane aftermath.

Life Stressors. The occurrence of life stressors in the 14-month period following the hurricane was assessed on another questionnaire developed for this study. These life events included marriage, separation or divorce, death of a loved one, serious illness of a loved one, pregnancy, birth of a baby, serious health problem, financial trouble, move of home or business, and change of jobs. Parents were also asked to make a global rating of their current life situation on a five-point Likert Scale ranging from "things are very bad right now" to "things are very good."

Duration of symptoms. A Longevity of Symptoms scale was developed for the present study to assess the duration of symptoms consistent with a grief reaction *(Kubler-Ross, 1981)* in the parents of the children in the Hurricane group, and to assess the duration of children's behavior specific to the hurricane. On the parent section of this scale, participants were asked to check blocks of time after Hugo over which they experienced the following symptoms: household disruption by Hugo-related tasks, feeling shocked or in a daze, denying what happened, feeling angry or frustrated, feeling sad or depressed, and feeling exhausted or overwhelmed. Participants were also asked to check blocks of time after Hugo over which their child experienced general emotional or behavioral problems.

Procedure

Fourteen months after the hurricane, teachers at site one gave a packet of questionnaires to parents of all children in their class who experienced the hurricane. It should be noted that some of the children rated had been subjects in a previous study assessing short-term hurricane effects but, due to steps taken for subjects' anonymity, data were not available to examine the effects longitudinally. Packets for the current study were accompanied by a letter from the investigators requesting that one parent in the household complete all forms. Families in which a parent completed the questionnaires were given an opportunity to enter a ticket into a drawing for two free dinners at a local restaurant plus free babysitting. Of the families approached, 35% completed survey packets. Since 98% of these

Table 1

PARENT CHARACTERISTICS OF HURRICANE AND NON-TRAUMA GROUPS

CHARACTERISTIC	HURRICANE	NONTRAUMA
Marital Status		
Married	96%	93%
Divorced/separated	4%	7%
Education		
Mother		
College degree	76%	86%
Some college	15%	12%
High school only	9%	2%
Father		
College degree	74%	90%
Some college	16%	5%
High school only	10%	4%
Hrs Out of Home[a]		
Mothers	25%	25%
Fathers	45%	44%

[a]Average hours per week at work out of the home

were completed by mothers, the fathers' data were dropped and only the mothers' ratings were used in the study. Data cited elsewhere *(Saylor, Swenson, & Stokes, 1994)* directly evaluated agreement between mothers' and fathers' ratings on the PEDS with nontrauma children. Results indicate strong inter-rater reliability.

In the current study, questionnaires were returned to a covered box in the principal's office. To assure confidentiality, each family was assigned an identification number and no names appeared on any page of the packet, and investigators made no direct contacts with the families. No suggestion was initially made to any family regarding the availability of psychological services but referral sources were cited in a follow-up letter to parents summarizing the results of the study.

At sites two and three (origins of the Nontrauma group) packets were distributed through the schools in a similar fashion. In addition to completing the PEDS, parents were asked to complete demographic information and selected measures. Sixty percent of surveys were completed and returned.

Analyses

Because the Hurricane group was significantly younger than the Nontrauma group, age was included as a covariate in ANCOVA comparisons. Results indicated significantly higher scores by the Hurricane group than by the Nontrauma group on the total PEDS score (F=6.66, p<.01) and on the anxious/withdrawn factor (F=18.17, p<.0001).

RESULTS

Demographic Variables

The Hurricane and Nontrauma groups were comparable on gender and race. In the Hurricane group, 47% of the children were female and 53% male, 99% white and 1% nonwhite. In the Nontrauma group, 44% of the children were female and 56% male, 92% white and 8% nonwhite. Children in the Hurricane group were significantly younger than those in the Nontrauma group (M=42 months and 72 months, respectively).

Families in the two groups were comparable in socioeconomic and marital status, in parental education, and in the number of work hours parents spent out of the home (see TABLE 1).

Hurricane-Related Experiences

Of the families in the Hurricane group, 61% remained in town during the storm. Significant distress during the storm was reported by 58% of the respondents, while 16% believed they might die and 26% believed that loved ones might die. Thirty-six percent of the families were out of their homes for at least one week and 1% for at least 56 weeks, while 2% were still out of their homes 14 months after the hurricane. Thirty-four percent of the participants reported significant property loss, 16% significant loss of income, and 81% significant disruption of routine. Fifty-two percent reported significant distress from the hurricane's aftermath. Since participants were not asked to report their own or their child's history of contact with physicians or mental health counselors before or after the hurricane, it is unclear whether any of these families were treated for difficulties related to the hurricane.

Table 2

COMPARISON OF HURRICANE AND NONTRAUMA CHILDREN'S SPECIFIC BEHAVIOR PROBLEMS

	HURRICANE CHILD		NONTRAUMA CHILD	
BEHAVIOR	OFTEN	VERY OFTEN	OFTEN	VERY OFTEN
Act whiny	21%	7%	11%	3%*
Wants things right away	30%	15%	23%	6%*
Refuses to sleep alone	8%	9%	4%	3%*
Trouble going to bed/falling asleep	7%	8%	5%	2%*
Bad dreams	6%	1%	2%	1%
Seems fearful without good reason	2%	2%	0%	1%*
Seems worried	2%	0%	1%	1%
Cries without good reason	5%	2%	2%	1%
Seems sad/withdrawn	0%	0%	0%	0%
Clings to adults/doesn't want to be left alone	8%	1%	4%	1%*
Seems "hyperactive"	9%	3%	3%	1%
Has temper tantrums	9%	3%	6%	1%
Frustrated too easily	15%	3%	10%	1%
Complains about chest pains	5%	1%	5%	0%
Acts younger-than used to for age	5%	2%	1%	0%*
Easily startled	5%	1%	1%	1%*
Aggressive	10%	2%	4%	2%
Creates games, stories, or pictures about the hurricane	8%	1%	—	—
Brings up hurricane in conversation	8%	1%	—	—
Avoids talking about hurricane even when asked	0%	0%	—	—
Seems fearful of storms or reminders of hurricane	8%	6%	—	—

Longevity of Trauma-Related Behavior

To assess the presence of specifically trauma-related behavior in Hurricane children 14 months after Hugo, descriptive statistics were examined on the trauma-related items of the PEDS scale. Nine percent of the Hurricane children continued to play hurricane games and to bring up the hurricane in conversation, while 14% continued to show fear of storms or reminders of the hurricane.

Differences in specific behavioral difficulties of children in the Hurricane and Nontrauma groups were assessed using Chi Square analyses. In the Hurricane group, children showed significantly greater difficulties on nine types of behavior: whining (χ^2=10.83, p<.01); wanting things immediately (χ^2=11.92, p<.008); refusing to sleep alone (χ^2=9.59, p<.02); trouble going to bed or falling asleep (χ^2=10.09, p<.02); fearful without good reason (χ^2=15.46, p<.001); clinging to adults (χ^2=13.50, p<.004); hyperactive (χ^2=28.73, p<.001); acting younger than formerly for age (χ^2=17.77, p<.001); easily startled (χ^2=12.86, p<.005). These results should be interpreted with caution, however, since the Nontrauma group contained a larger number of older children than did the Hurricane group and the variance due to trauma alone is unclear. For clinical interest, TABLE 2 shows each item on the PEDS and the percentages of children in each group who were rated as exhibiting specific types of behavior often or very often.

Predictors of Behavioral Difficulties

To assess predictors of total behavioral difficulties in the Hurricane group children, as represented by the total score on the PEDS, a forward stepwise regression was conducted. Predictors were selected from hurricane-related experiences and included mothers' disruption of routine, believing they or loved ones might die, and distress due to the aftermath of the hurricane. Only one variable, significant distress of the mother due to the hurricane aftermath, was a significant predictor of behavioral difficulties, accounting for 9% of the variance in Hurricane children's behav-

Table 3

LONGEVITY OF HURRICANE CHILDREN'S DIFFICULTIES AT SPECIFIC TIME INTERVALS

INTERVAL	SHOCK[a]	EBP[b]
Immediately after Hugo	67%	38%
Oct-Dec	34%	29%
Jan-Mar	14%	16%
Apr-Jun	6%	9%
Jul-Sept	5%	6%
1-yr anniversary to present	5%	6%
Not at all	25%	52%

Note Percentages are of mothers reporting the problem for this period
[a]Shocked/upset
[b]Emotional/behavioral problems

ioral problems 14 months after the hurricane (adjusted R^2=.089, p<.001).

Longevity of Behavioral/Emotional Difficulties

The duration of behavioral and emotional difficulties for the Hurricane children, as rated on the Longevity Scale, was assessed by descriptive statistics (see TABLE 3). Mothers' reports indicated that 67% of the children rated were shocked or upset the first week following the hurricane. This behavior steadily decreased until, six months after the storm, it was seen in 6% of the children. At the one-year anniversary, 5% of the children still exhibited shock and upset. In regard to general emotional and behavioral problems, 38% of the Hurricane children showed such difficulties immediately after the hurricane, with sizeable decreases over the next six months. Nine percent of the children were showing emotional and behavioral problems six months after the hurricane. At the one-year anniversary, 6% still exhibited emotional/behavioral problems.

Predictors of Longevity in Behavioral/Emotional Problems

Predictors of the duration of general behavioral and emotional difficulties were assessed by use of a forward stepwise regression. Two types of predictors were used in two different regressions. First, stressful events were considered. These included whether the family stayed in town during Hugo, length of time out of the home, whether the family was still out of their home, property or income loss, and the occurrence of life stressors in the period since the hurricane (a composite of all life stressors noted earlier).

Two variables were significant predictors of longevity in the emotional and behavioral problems of children in the Hurricane group. Life stressors following the hurricane accounted for 4% of the variance (adjusted R^2=.036, p<.01), and significant property loss added another 2% of the variance (adjusted R^2=.054, p<.01).

In the second regression, the mothers' emotional experiences were considered as independent variables. These included: significant distress during the hurricane and in the hurricane aftermath, believing they or loved ones might die, feeling shocked or in a daze, denying what happened and how they felt, feeling angry or frustrated, feeling sad or depressed, and feeling exhausted or overwhelmed.

Three of these variables were significant predictors of longevity for the child showing behavioral or emotional problems: duration of sadness or depression in the mother accounted for 18% of the variance (adjusted R^2=.176, p<.001) and duration in the mothers' denial of what happened and how they felt accounted for another 5% (adjusted R^2=.225, p<.001). Duration in the mothers' feeling shocked or in a daze added another 2% of the variance (adjusted R^2= .239, p<.001).

DISCUSSION

Fourteen months following hurricane Hugo, a small percentage of preschoolers who had experienced the hurricane continued to play hurricane games (9%), show fear of storms or reminders of the hurricane (14%) and talk about the hurricane in conversation (9%). In addition, the children in the Hurricane group showed significantly greater problems with anxiety or withdrawal and general behavioral problems

than did their peers in the group of children with no reports of trauma experience.

Mothers' reports on longevity indicated that trauma-related behavior did not dissipate immediately after the hurricane. One-third of the children who experienced the hurricane continued to exhibit emotional and behavioral problems three months after the storm. Six months following the storm, 16% of the children continued to show such problems but they were evident in only a small number of the children (9%) seven to nine months after the hurricane.

Although some children continued to show significant symptoms following the hurricane, the general trend was a decrease in behavioral problems and an increase in adjustment over time. The longevity of children's behavioral problems was significantly related to mothers' distress level during the hurricane aftermath. Those children in the Hurricane group who experienced additional life stressors, such as a marriage or a death in the family, or whose families suffered loss of property, were also more likely to exhibit long-term behavioral and emotional problems. In addition, children whose mothers had an extended difficulty with depression, denial, or feeling shocked or in a daze tended to show longer-term behavioral and emotional problems.

The relationship between children's behavioral difficulties and their mothers' distress level is consistent with previous research on short-term effects of natural disaster *(Belter & Shannon, 1993)*, as well as with research in several areas of childhood disorders *(Fendrich, Warner, & Weissman, 1990; Hammen et al., 1987; Hammen, Burge, & Stansbury, 1990; Orvaschel, Weissman, & Kidd, 1980; Rutter & Quinton, 1984)*. Parents may avoid discussing traumatic events in an effort to protect their children. Also, they may be so overwhelmed with their own concerns and with the tasks to be accomplished in the aftermath of the disaster, that the children may be left to interpret the situation for themselves and to cope on their own. At preschool age, children are dependent on the adults in their life, particularly since their understanding of events is limited, as are their coping skills *(Gillis, 1993)*. They tend to rely on the actions of persons with whom they spend time to guide their understanding and responses, and when their parents are themselves unable to cope, they are not likely to be able to help their children *(Friedman, Alderman, Saylor, Pantell, & Sugar, in press)*. The children may then respond with reflections of the behavior and coping strategies they observe in their parents.

Thus, help from mental health professionals for these families may be most effective if it can be given fairly intensively during the six months or thereabouts immediately following a natural disaster. Helping the parents to cope adaptively with the immediate aftermath of the disaster, to recognize their children's needs, and to discuss the event openly are important foci of this kind of intervention.

Several design limitations influence the interpretation and restrict the generalizability of this study. First, the families in this study were primarily Caucasian and of an upper-middle-class socioeconomic status. Most were able to rebuild and return to their homes within 6–12 months. Thus, they probably had more resources to assist with recovery than would families lower on the socioeconomic scale. Research assessing the long-term impact of natural disaster on young children from culturally diverse populations from multiple socioeconomic levels is necessary. Such research, by examining perceived social support, resources available, and coping styles from a variety of people could provide a broader perspective on the effects of natural disaster.

Second, additional exploration regarding parent gender should be conducted. In the present study, only one parent in each household was asked to complete the survey questionnaires. Although both mothers and fathers worked in most families, it was the mothers who completed the survey in

98% of the cases, and a positive relationship between mothers' and children's distress was shown. A previous normative study on the PEDS *(Saylor, Swenson, & Stokes, 1994)* has indicated strong agreement between mothers' and fathers' ratings. It is plausible that father factors influence coping and children's distress level; however, the unique contribution of fathers' experiences could not be discovered in this study. Expanding the scope of the research to address the effect of fathers' stress level on children's adjustment would provide insight into the role fathers play in adjustment to traumatic experiences.

Third, in the present study, the survey return rate, even in the Nontrauma population, was modest. It is unclear whether the families who participated in this study were those feeling greater or lesser stress as a result of the storm. A broader sample of families would be desirable in future research.

The present study sheds some light on the current state of research with young children and natural disaster. It represents a significant first step toward understanding the long-term adjustment of young children in the face of natural disaster and the role that their mothers play in that adjustment.

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