

Health & Wellness Resource Center

Posttraumatic stress disorder in adolescents after Hurricane Andrew.

Carol Z. Garrison, Elizabeth S. Bryant, Cheryl L. Addy, Pamela G. Spurrier, John R. Freedy, Dean G. Kilpatrick. *Journal of the American Academy of Child and Adolescent Psychiatry*. Sept 1995 v34 n9 p1193(9).

Author's Abstract:

Objective: To examine rates and correlates of posttraumatic **stress** disorder (PTSD) in adolescents after Hurricane Andrew. Method: A random-digit dialing sample of 158 Hispanic, 116 black, and 104 white adolescent-parent pairs were surveyed in high- and low-impact areas within Dade County, Florida, 6 months after Hurricane Andrew. Subjects completed a structured telephone interview focused on within-disaster experiences and emotional reaction, disaster-related losses, lifetime exposure to violent or traumatic events, recent stressful experiences, and psychiatric symptomatology. Results: Approximately 3% of males (95% confidence interval 0.4 to 5.3) and 9% of females (95% confidence interval 4.6 to 13.7) met the criteria for PTSD. Rates were highest among blacks (8.3%, 95% confidence interval 2.3 to 14.2) and Hispanics (6.1%, 95% confidence interval 2.2 to 9.9) and increased with age (odds ratio of 1.34, 95% confidence interval 1.04 to 1.72) and the number of undesirable events reported (odds ratio of 1.38, 95% confidence interval 1.21 to 1.57). Conclusions: While only a relatively small percentage of adolescents reported symptoms consistent with a diagnosis of PTSD, most reported some posttraumatic symptoms. Postdisaster planning should recognize that common stressful events occurring after disasters may be more strongly associated with PTSD than magnitude of contact with the actual disaster. *J. Am. Acad. Child Adolesc. Psychiatry*, 1995, 34, 9:1193-1201.

Key Words: adolescent, disaster, posttraumatic **stress** disorder.

Full Text: COPYRIGHT 1995 Lippincott/Williams & Wilkins

Few empirical studies have documented the frequency and correlates of posttraumatic **stress** disorder (PTSD) in community samples of young adolescents after a natural disaster. Yet natural disasters are relatively common events, affecting millions of adults and children annually (Solomon, 1989). Most experts agree that in the immediate aftermath of a natural disaster, a wide array of intense psychological reactions are normative (Freedy et al., 1992a; Maida et al., 1989). Unresolved is whether diagnosable cases of mental disorder and/or significant **stress**-induced symptomatology occur over a longer period of time (Earls et al., 1988; Green et al., 1990).

Previous studies of children and adolescents have reported postdisaster frequencies of PTSD ranging from 0 to 37%, with up to 80% of subjects experiencing disabling psychiatric symptoms, maladjustment, and developmental problems (Earls et al., 1988; Green et al., 1991; Titchener and Kemp, 1976). Existing data also suggest that age, gender, ethnicity, the intensity of the exposure to

the disaster, previous exposure to other traumatic events, undesirable life events and losses following the disaster, as well as parental reactions to the disaster, may affect the eventual response of the adolescent (Burke et al., 1982; Dohrenwend et al., 1981; **Garrison** et al., 1993; Green et al., 1991; Lipovsky, 1991; Milgram and Milgram, 1976). These findings must be viewed cautiously, however, as most of the existing investigations have failed to use representative samples and to operationally define PTSD. Furthermore, to date there have been no large-scale studies using standardized assessment procedures to investigate adolescents' psychological functioning within the first several months after a natural disaster.

Accordingly, the purposes of our study were to estimate the prevalence of PTSD in a community sample of adolescents 6 months after a major hurricane, to compare rates of PTSD symptoms and diagnoses by gender and ethnicity, and to describe the relation of PTSD to a series of within- and postdisaster experiences.

METHOD

Sample

The sample consisted of adolescents aged 12 to 17 years who were residents of Dade County, Florida, at the time of Hurricane Andrew. To examine the impact of the disaster exposure, the county was geographically stratified into high- and low-impact areas. The high-impact area was operationalized to include 22 zip codes located south of SW 88th Street. The remaining zip codes comprised the low-impact area.

A random-digit dialing sample was drawn in equal proportions from both the high- and low-impact areas. There were 87,988 listed numbers within zip codes specifying the high-impact area, compared with 326,957 listings in the remainder of the county. A total of 459 households with adolescents were identified out of 5,569 households with screening information. Interviews were completed with 400 adolescent-parent pairs. When more than one adolescent lived in a household, the child with the most recent birthday was chosen for participation.

Instrumentation

Parent and adolescent permission were obtained before all interviews. Data were collected via 40-minute telephone interviews completed approximately 6 months after the hurricane. Telephone interviews were selected as an appropriate and efficient means of collecting trauma-related data in a multicultural sample based on previous findings in other populations (Weeks et al., 1983). Professional survey research staff at Schulman, Ronca, and Bucuvalas, Inc., carried out the interviews. Both English- and Spanish-speaking interviewers were available to conduct the interviews. A total of 16 interviews were conducted in Spanish. Interviews focused on within-disaster experiences and emotional reactions, disaster-related losses, lifetime exposure to violent or traumatic events, recent stressful experiences, and psychiatric symptomatology.

Within-disaster experiences included the adolescent's and parent's location during the storm, the child's and adult's perception of safety for themselves and others, and emotional and physiological reactions during the disaster.

Disaster-related resource loss was assessed using a modified version of the Resources Questionnaire (Freedy et al., 1992b). Loss of resources was operationalized as two separate

variables, objective resource loss and personal-social resource loss. Subjects were asked whether, as a result of the disaster, they suffered any loss of belongings such as furniture and clothing (six objective resource losses) or of activities such as time for sleep or free time (16 personal-social resource losses). Responses were made on a 4-point scale ranging from 0 or none at all, to 3 or quite a bit of loss. Each variable was operationalized as the count of the number of losses reported (possible range 0 through 18 for objective resource loss and 0 through 48 for personal-social resource losses). The number of days the adolescent was without electricity, telephone, adequate water, and clothing was separately ascertained.

Lifetime exposure to violent or traumatic events was assessed using eight questions, five of which asked about specific types of events (being attacked with a weapon, being attacked without a weapon, having a serious accident in a car or elsewhere; seeing someone seriously injured or violently killed, and experiencing another natural disaster), while three were open-ended (other situations in which the subject was seriously injured, feared he or she might be killed or seriously injured, or was exposed to extraordinary stressors). Adolescent victimization histories were operationalized as a count of the experiences reported.

A modified version of the Johnson and McCutcheon (1980) Life Events Checklist was used. The checklist included 25 negative events. The occurrence of each event was dated in order to differentiate events that preceded versus followed the hurricane. This variable was operationalized as a count of the number of undesirable events reported since the hurricane.

A modified version of the Diagnostic Interview Schedule was used to assess PTSD (Kilpatrick et al., 1989). Since Solomon and Canino's (1990) findings suggest that linking requirements are associated with an underreporting of PTSD symptoms, the modified interview schedule did not require subjects to link symptoms to a specific stressor. A computer algorithm that applied DSM-III-R decision rules to the symptoms reported was used to assign a diagnosis of PTSD and to designate the number of individuals meeting the PTSD reexperiencing, avoidance, and arousal criteria. To obtain a diagnosis of PTSD, subjects had to report at least one reexperiencing, three avoidance, and two arousal symptoms occurring within the same 1-month period.

Parents were questioned regarding fear for themselves and others during the hurricane, their own personal-social and objective resource losses, and their current level of PTSD symptomatology. Instrumentation for the parents paralleled that of the adolescents in all of the above domains except for PTSD symptomatology. Parental symptomatology was ascertained using a nine-item PTSD symptom scale (Saunders et al., 1990). Previous use with 355 subjects indicated that the scale had good internal consistency (reliability coefficient [α] = .93) and discriminative ability (Saunders et al., 1990).

Statistical Analyses

Means and frequency tabulations were calculated by gender for demographic and disaster exposure variables, individual symptoms and symptom counts within each diagnostic criteria, and the overall diagnosis of PTSD. To generate population estimates for the county, a correction for the differential likelihood of selection (i.e., telephone numbers from the high-impact area represented 51.5% of the completed residential contacts, although listed numbers in the target area represented only 21% of all listed numbers in the county) was applied. Thus, all means and percentages reported reflect weighted estimates. A series of logistic regression analyses were used to explore the relation between within-disaster experiences, disaster-related resource losses, lifetime exposure to violent or traumatic events, and undesirable life events since the storm on the one hand and

DSM-III-R-defined PTSD in the adolescent on the other. All variables were first examined in univariable models. Stepwise backward elimination procedures were used to consider independent variables significant in simple logistic models in more complex multivariable models. The final logistic model included all variables retaining significance at the .05 level.

RESULTS

Subjects

The sample consisted of 189 males and 211 females; 44% were Hispanic, 33% were black, and 19% were white. The mean age was 14.5 years. Forty percent reported family incomes at or below \$25,000 a year (Table 1). All subjects reported being a resident of Dade County at the time of the hurricane. A combined participation rate (obtained by multiplying the screening completion, 87%, and interview completion, 87%, rates) was 76%. The completion rate varied, with 241 individuals in the high-impact area and 159 in the low-impact area participating.

Disaster Exposure and Mediators

A large percentage of the adolescents reported experiencing fear for their own safety (42%) or the safety of significant others (62%) during the hurricane. Twenty-six percent reported actual threats to their safety. Four percent of subjects saw or personally knew someone who was injured as a result of the storm; 7% saw or knew of someone who had died.

More than 16% were displaced from their home for some period of time, the average displacement time being 9.1 days ($SD = 1.3$). The average time without electricity, telephones, clothing, transportation, or drinkable water ranged from 3 to 18 days, with 84% of subjects reporting being without one or more of these necessities for at least a week. The most frequently reported objective resource losses were bedroom furniture ($n = 186$, 31%), clothing ($n = 162$, 26%), and sentimental possessions ($n = 127$, 21%). The most frequently reported personal-social resource losses were loss of companionship ($n = 153$, 41%) and loss of an understanding teacher ($n = 129$, 27%).

TABLE 1

Demographic Characteristics of the 400 Dade County, Florida, Adolescents

	Observed Frequency	Weighted Percent
Gender		
Male	189	44
Female	211	56
Race/ethnicity		
Hispanic	158	43
White	104	19
Black	116	33
Other	22	5

Household income

[less than]25,000/year	147	40
------------------------	-----	----

Approximately two thirds of all respondents reported lifetime exposure to at least one other violent or traumatic event. Sixteen percent (68 subjects) reported exposure to three or more events in this category. The most frequently experienced violent and traumatic events were seeing someone killed or injured (n = 101, 26%), being involved in a serious accident (n = 78, 19%), and experiencing a previous natural disaster (n = 69, 18%). More than 80% of subjects reported experiencing one or more undesirable life events since the storm, and 25% had experienced five or more undesirable events. The most frequently reported undesirable events were receiving a failing grade in school (n = 154, 37%), parental absence (n = 117, 24%), breaking up with a girlfriend or boyfriend (n = 107, 24%), arguments with one's parents (n = 103, 23%), and trouble with one's teachers (n = 88, 20%) (Table 2).

A high percentage of parents reported fear for their own safety (58%) or that of others (38%) during the storm (Table 3). More than two thirds of the responding parents were female, with one fifth reporting less than a high school education.

Frequency of PTSD Symptoms and Diagnoses

The most frequently reported PTSD symptoms were difficulty concentrating (36%), diminished interest in significant activities (35%), irritability or outbursts (30%), recurrent and intrusive recollections (20%), and avoidance of thoughts (29%). The least frequently reported PTSD symptoms were physiological reactivity upon exposure to events that symbolize or resemble an aspect of the traumatic event (9.2%), psychological distress at exposure to events symbolizing or resembling the traumatic event (8.8%), and sense of a foreshortened future (8.6%). With two exceptions (sense of a foreshortened future and diminished interest in significant activities), each PTSD symptom was reported more frequently in females than in males (Table 4). Patterns of symptomatology were less consistent across the four ethnic groups, but black, non-Hispanic subjects tended to report more avoidance symptoms than subjects in other groups (Table 5).

[TABULAR DATA FOR TABLE 2 OMITTED]

According to DSM-III-R criteria for PTSD, subjects had to report at least one reexperiencing, three avoidance, and two arousal symptoms occurring within the same time period. Approximately 44% of subjects reported one or more reexperiencing symptom. Twenty percent reported three or more symptoms relating to persistent avoidance of stimuli associated with the trauma or numbing of general responsiveness. Forty percent of all subjects reported two or more symptoms of increased arousal. Of the 66 subjects satisfying all three symptom count criteria, 43 reported the symptoms clustered within 1 month during their lifetimes; 29 reported the symptoms occurring since Hurricane Andrew. Females satisfied each of the diagnostic criteria more frequently and had a higher rate of PTSD (9.2% versus 2.9%) than males. Rates of PTSD were highest among black non-Hispanics (8.3%) and Hispanics (6.1%) and lowest among other non-Hispanics (2.5%) and white non-Hispanics (4.9%). Blacks also satisfied each of the diagnostic criteria more frequently than did the other ethnic groups.

Correlates of PTSD

TABLE 1
Demographic Characteristics of the 400 Dade County,
Florida, Adolescents

	Observed Frequency	Weighted Percent
Gender		
Male	189	44
Female	211	56
Race/ethnicity		
Hispanic	158	43
White	104	19
Black	116	33
Other	22	5
Household income <25,000/year	147	40

Results from the univariable logistic regression analyses indicated that increasing age (odds ratio [OR] = 1.32), being female (OR = 2.50), decreased feelings of safety during the storm (OR = 3.80), fear for others' safety during the storm (OR = 5.31), personal-social resource loss (OR = 1.06), lifetime exposure to violent or traumatic events (OR = 1.39), and undesirable life events since the hurricane (OR = 1.38) were significant correlates of PTSD. No other variables approached statistical significance and no parental variables were significant. In the multivariable model, only age (OR = 1.41) and undesirable life events since the storm (OR = 1.38) retained significant effects (Table 6).

[TABULAR DATA FOR TABLE 3 OMITTED]

DISCUSSION

Little information exists concerning the prevalence and correlates of PTSD among children and adolescents after exposure to traumatic events. Existing studies typically have not been based on representative samples, have not defined PTSD using DSM-III criteria, and have not used standardized instrumentation to assess the presence of disorder. Results of this study indicate that during the 6 months after Hurricane Andrew, 7.3% of the youths reported symptoms consistent with a diagnosis of PTSD. These rates are higher than the 0% among children aged 6 to 17 years, 1 year after a flood (Earls et al., 1988), and the 5% among adolescents aged 11 to 17 years, 1 year after a different hurricane (Garrison et al., 1993). Conversely, rates are much lower than the 27% reported among black youths aged 7 to 18 years living in an inner-city environment (Fitzpatrick and Boldizar, 1993); the 37% among children aged 2 to 15 years, 2 years after the Buffalo Creek Dam collapse (Green et al., 1991); and the 33% among school-age children exposed to brush fires (McFarlane et al., 1987).

Reported differences may reflect particular characteristics of a specific traumatic experience. The impact of natural disaster may differ substantially when compared with the impact of crime-related victimization. Similarly, different types of natural disasters may elicit diverse psychological effects. Even with similar disasters, the degree of exposure may vary widely. Although both this and Garrison and colleagues' (1993) earlier study focused on hurricanes, Andrew was more intense and destructive, Andrew subjects were more likely to live close to the center of the hurricane, and 84% of subjects reported being without basic necessities for at least 1 week. Degree of exposure has been linked to severity of psychological reactions for both natural (Goenjian et al., 1994) and manmade (Nader et al., 1990) disasters.

TABLE 2
 Frequencies, Weighted Percents, and Weighted Mean Values for 400 Dade County, Florida, Adolescents Reporting Specific Disaster-Related Experiences and Losses, Lifetime Exposure to Violent or Traumatic Events, and Recent Undesirable Life Events

	Males (n = 189)		Females (n = 211)	
	Observed Frequency	Weighted Percent	Observed Frequency	Weighted Percent
Disaster-related experiences				
Fear for self	82	38	108	46
Fear for others	111	56	145	66
Safety threatened	63	28	66	24
Own health affected	22	10	26	9
Saw other injured	8	4	8	4
Saw other killed	16	7	13	6
Displaced	50	18	52	15
	Weighted Mean	SD	Weighted Mean	SD
Disaster mediators				
Resource loss				
Personal-social	6.4	0.5	6.7	0.6
Objective	2.1	0.2	2.0	0.2
Time without (days)				
Electricity	20.2	1.7	17.1	1.5
Telephone	17.5	2.1	12.2	1.8
Water	15.4	1.6	13.8	1.5
Clothing	3.2	0.8	3.6	0.9
Transportation	3.7	0.9	4.0	1.1
History of other life events				
Lifetime violent events	1.3	0.1	1.2	0.1
Undesirable events since storm	2.7	0.2	3.1	0.2

Methodological

differences between studies may also account for some reported disparities. Time elapsed between disaster and assessment has varied from 6 months to 2 years (Green et al., 1991). The findings of Steinglass and Gerrity (1990) suggest that posttraumatic symptoms decrease with time. Sampling and case detection techniques also affect rates of disorder. Population-based samples such as this one are not subject to bias introduced by using a convenience sample, such as individuals seeking services. Case detection methods have encompassed record review (Green et al., 1991), use of symptom scales such as the PTSD Reaction Index (Goenjian et al., 1994; Nader et al., 1990; Schwarz and Kowalski, 1991), and structured diagnostic instruments (Breslau et al., 1991; Earls et al., 1988). Various researchers have focused on measuring point (Fitzpatrick and Boldizar, 1993; Norris, 1992) rather than period prevalence of disorder. While some researchers have required subjects to meet criterion A (experience of a traumatic event) and to link each symptom to the event (Norris, 1992), others have not included the event in the diagnostic algorithm (Fitzpatrick and Boldizar, 1993). In the present study, all subjects were presumed to have met criterion A [TABULAR DATA FOR TABLE 4 OMITTED] because of their direct exposure to Hurricane Andrew, but linking of reported symptomatology to the hurricane was not required.

Current study findings suggest that while only a small proportion of adolescents report symptoms indicating a clinical level of PTSD, the majority of subjects report some posttraumatic symptoms. Comparisons with other studies are limited by the lack of reported symptom distributions. The one study for which a direct comparison may be made (Garrison et al., 1993) shares only one of the four most commonly reported symptoms. Different degrees of exposure to the hurricanes, or the ethnic and cultural differences between the South Carolina and Florida samples, may explain the varying distributions of symptoms.

The specific constellation of posttraumatic symptoms may vary according to the nature of the triggering stressor(s). For example, children exposed to single, sudden traumatic events (type I) may respond differently from those exposed to chronic trauma (type II) (Terr, 1991). McLeer et al. (1992) have also suggested that the distribution of the symptoms may change as time elapses after

the stressor.

Fewer subjects met the criteria for avoidance symptoms than for reexperiencing or arousal symptoms, making the required three avoidance symptoms the key determinant of caseness. This phenomenon has been observed previously by others (Garrison et al., 1993; McLeer et al., 1992; Norris, 1992). Solomon and Canino (1990) suggest that the reporting of fewer than three avoidance symptoms could result from difficulty in linking avoidance symptoms to the triggering event. This does not explain present study findings, for which event-symptom linking was not required. However, requiring three avoidance symptoms to be present for diagnosis, rather than two, may result in missed PTSD cases.

TABLE 3
Frequencies, Weighted Percents, and Weighted Mean Values for 400 Dade County, Florida, Parents Reporting Specific Disaster-Related Experiences and Losses and Posttraumatic Stress Disorder (PTSD) Symptomatology

	Adolescent Males (n = 189)		Adolescent Females (n = 211)	
	Observed Frequency	Weighted Percent	Observed Frequency	Weighted Percent
Parent's gender				
Male	70	37	56	27
Female	119	63	154	73
Less than high school education	37	20	38	20
Fear for self	112	53	142	62
Fear for others	88	36	107	40
	Weighted Mean	SD	Weighted Mean	SD
Personal-social resource loss	9.9	0.7	10.4	0.8
PTSD symptom score	4.5	0.3	5.5	0.3

The higher rate of PTSD observed among female than male adolescents was in keeping with previous findings for both youths (Fitzpatrick and Boldizar, [TABULAR DATA FOR TABLE 5 OMITTED] 1993; Green et al., 1991) and adults (Breslau et al., 1991; Steinglass and Gerrity, 1990). Most studies of postdisaster adjustment in children and adolescents have not examined the possibility of ethnic variability (Burke et al., 1982; Dollinger et al., 1984; Earls et al., 1988; Green et al., 1991; McFarlane et al., 1987; Newman, 1976). In fact, Neal and Turner (1991) note that most of the limited information that exists on PTSD among blacks has focused on veterans of the Vietnam war. Recent studies by Breslau and colleagues (1991) and Norris (1992) did not find significant differences in rates of PTSD between black and white adults after exposure to traumatic events; however, Norris did report that black men reported the highest levels of impact from traumatic events. In addition, studies of adult survivors of the Buffalo Creek flood found less pathology among blacks than whites initially (Gleser et al., 1981); however, blacks were more likely to have a delayed form of PTSD and were less likely to recover (Green et al., 1990).

The present study was the first to include large enough proportions of Hispanic (43%), white (19%), and black (33%) adolescents, to compare across three ethnic groups. Rates of PTSD were higher, though not significantly so, among Hispanics and black non-Hispanics than among whites or other non-Hispanics. The observed lack of significance may reflect the small numbers of PTSD cases. Conversely, the similarity found across the ethnic groups with regard to specific symptomatology supports evidence that there may be more similarities than differences in postdisaster psychopathology among the four ethnic groups.

Only one other investigation of PTSD among adolescents exposed to disaster has examined racial differences. Garrison and colleagues (1993) found that white adolescents were twice as likely to have a DSM-III-R diagnosis of PTSD as black adolescents, even after controlling for gender,

extent of exposure to the disaster, and exposure to other traumatic events. The contradictory findings between the present study and the previous work by **Garrison** and colleagues (1993) may be attributable to differing cultural patterns within ethnic groups between the two study sites (South Carolina and Florida). While Florida is geographically located in the Southeast, the influx of individuals from other parts of the United States, as well as immigrants from Central America, creates a cultural milieu quite different from the rest of the Southeast region. Ethnographic work could clarify the differing ethnic patterns in psychopathology between these locations.

TABLE 6

Logistic Regression Analysis of Posttraumatic Stress Disorder with Demographic, Disaster Exposure, and Life Event Variables

	Odds Ratio	95% Confidence Interval
Significant univariable models		
Age(a)	1.32	1.04-1.68
Gender	2.50	1.08-5.79
Fear for others' safety	5.31	1.58-17.88
Feeling of safety	3.80	1.58-9.11
Health affected	3.15	1.31-7.58
Violent/traumatic events(a)	1.39	1.13-1.71
Undesirable life events(a)	1.38	1.21-1.57
Personal-social resource loss(a)	1.06	1.02-1.10
Final multivariable models		
Age(a)	1.41	1.09-1.83
Undesirable life events(a)	1.38	1.21-1.58

a Continuous variables.

Findings indicate that frequency of PTSD increased significantly with age. This coincides with findings of Gleser and colleagues (1981), who observed that older children exposed to the Buffalo Creek floods were more severely affected on a variety of measures. However, the inability of younger children to articulate the symptoms may affect the results of both these studies. Schwarz and Kowalski (1991) found that older children endorsed reexperiencing and arousal symptoms more than younger children. Conversely, Pynoos and Nader (1988) found that in children who witnessed the rape of their mothers, symptoms decreased with increasing age.

While several specific measures of disaster exposure were significantly associated with PTSD in univariable models, none remained statistically significant in the multivariable model. Individual exposure variables explored in the current study may not be as strongly related to PTSD as a more comprehensive measure of exposure would be (**Garrison** et al., 1993). In addition, it is possible that psychological preparedness, a variable not measured in the current study, may protect individuals from disaster-related posttraumatic **stress**.

TABLE 4
Observed Frequencies and Weighted Percentages of the Specific *DSM-III-R* Reexperiencing, Avoidance,
and Arousal Symptoms and Diagnostic Criteria by Gender

	Males (n = 189)		Females (n = 211)	
	Observed Frequency	Weighted Percent	Observed Frequency	Weighted Percent
Reexperiencing				
Distress in recollections	51	22.7	82	33.9
Dreams of event	22	11.1	38	16.3
Feelings of recurrence	32	15.4	45	20.8
Psychological distress	14	8.3	24	9.2
One or more symptoms	81	39.9	104	47.0
Avoidance				
Avoid thoughts of event	47	23.2	71	33.5
Avoid feelings of event	18	9.4	31	13.1
Avoid activities that arouse recollections	21	10.9	36	17.1
Inability to recall part of event	24	12.5	33	12.9
Detachment	35	16.9	46	18.0
Restricted range of affect	22	10.4	31	13.7
Foreshortened future	21	10.2	20	7.2
Diminished interest in activities	66	36.7	81	33.7
Three or more symptoms	36	17.2	54	23.3
Arousal				
Sleep difficulties	40	20.6	62	26.1
Irritability/anger	48	20.4	85	37.6
Difficulty concentrating	50	25.5	92	44.5
Hypervigilance	40	18.3	43	19.8
Startle response	28	12.8	69	28.8
Physiological arousal at reminders	16	8.9	22	9.4
Two or more symptoms	64	31.5	104	48.2
Posttraumatic stress disorder diagnosis (95% confidence interval)	8	2.9 (0.4-5.3)	21	9.2 (4.6-13.7)

Freedly et al.

(1992b) postulate that the psychological impact of disaster is mediated primarily by loss of material and emotional resources. However, while personal-social resource loss was significantly associated with PTSD in the univariable model, it did not remain significant in the multivariable model.

Many studies have shown parental functioning to be a stronger predictor of a child's adjustment after a disaster than the child's direct exposure to the disaster (Galante and Foa, 1986; Green et al., 1991; McFarlane, 1988; Newman, 1976). However, neither parental exposure to the disaster nor parental symptom levels were significantly associated with PTSD in this population.

While both the violent/traumatic event count and the undesirable life event count were associated with PTSD in univariable models, only undesirable events remained significant at the multivariable level. Solomon and Canino (1990) found that "common" stressful events were more strongly related to PTSD symptoms than traumatic events. Koopman et al. (1994) found stressful life events occurring after a storm were more strongly associated with posttraumatic **stress** symptoms than magnitude of contact with the fire. It is possible that the impact of traumatic events are mediated by common, undesirable life events. For example, events such as moving to a new home and changing schools could take place as a consequence of victimization or a natural disaster. Undesirable events may be difficult to disentangle from traumatic events; however, individuals who have been exposed to disasters or other traumatic events may benefit from help in preparing to cope with other life events that follow.

The high prevalence of victimization reported by these youths underscores the need to account for other traumatic events when studying the effects of natural disasters. More than two thirds of the youths in this sample had experienced at least one traumatic event apart from the hurricane. These findings confirm the results of other researchers (Fitzpatrick and Boldizar, 1993; Norris, 1992; Resnick et al., 1993).

TABLE 5
Observed Frequencies and Weighted Percentages of the Specific *DSM-III-R* Reexperiencing, Avoidance, and Arousal Symptoms and Diagnostic Criteria, by Ethnic Group

	White, Non-Hispanic (<i>n</i> = 104)		Black, Non-Hispanic (<i>n</i> = 116)		Other, Non-Hispanic (<i>n</i> = 22)		Hispanic (<i>n</i> = 158)	
	Observed Frequency	Weighted Percent	Observed Frequency	Weighted Percent	Observed Frequency	Weighted Percent	Observed Frequency	Weighted Percent
Reexperiencing								
Distress in recollection	32	30.5	43	31.4	10	32.6	48	26.1
Dreams of event	18	14.7	21	17.6	2	5.0	19	12.1
Feelings of recurrence	16	13.4	25	19.0	3	15.0	33	20.5
Psychological distress	5	3.1	12	10.3	1	2.5	20	10.8
One or more symptoms	43	40.9	57	45.5	11	42.6	74	44.0
Avoidance								
Avoid thoughts of event	24	22.0	43	36.6	7	17.6	44	27.4
Avoid feelings of event	9	9.1	17	14.1	2	5.0	21	11.1
Avoid activities that arouse recollections	10	9.8	20	17.2	3	15.0	24	14.2
Inability to recall part of event	14	10.4	22	19.0	3	7.6	18	9.5
Detachment	24	18.3	22	15.9	5	27.5	30	17.4
Restricted range of affect	16	17.1	13	8.6	2	12.5	22	12.9
Foreshortened future	8	6.7	13	7.6	3	7.6	17	10.0
Diminished interest in activities	38	34.2	49	40.7	11	50.0	49	29.5
Three or more symptoms	22	18.9	31	25.2	3	7.6	34	19.2
Arousal								
Sleep difficulties	27	23.8	26	21.4	9	37.5	40	24.0
Irritability/anger	31	26.3	44	34.8	7	25.1	51	28.4
Difficulty concentrating	40	35.4	43	39.6	7	39.9	52	33.4
Hypervigilance	18	14.7	26	21.4	4	24.9	35	18.7
Startle response	21	16.5	31	27.2	3	15.0	42	20.6
Physiological arousal at reminders	7	4.3	15	12.4	2	12.5	14	8.4
Two or more symptoms	38	32.4	53	45.2	9	45.0	68	40.8
Posttraumatic stress disorder diagnosis (95% confidence interval)	5	4.9 (0.0-10.1)	9	8.3 (2.3-14.2)	1	2.5 (0.0-7.5)	14	6.1 (2.2-9.9)

Findings are

limited in several ways. Information about individuals who refused to participate is not available, and it is possible that they were more heavily impacted by the disaster than those who agreed to participate. Adolescents in families whose households were more heavily damaged may have moved to another location and would not have been part of the sample. Use of single informants for assessing symptoms and of lay interviewers might have decreased diagnostic accuracy. Although the modified version of the Diagnostic Interview Schedule used for assessment had been piloted with a large sample of adults (Kilpatrick et al., 1989; Resnick et al., 1993), it has not been validated for use with adolescents. Conclusions may not be drawn about the prevalence of other psychiatric disorders after a natural disaster. Finally, the cross-sectional design of the study makes it impossible to attribute posttraumatic symptoms directly to the natural disaster, a weakness that is difficult to avoid because of the lack of predisaster measures. Where possible, longitudinal studies should be conducted incorporating clinical diagnostic interviews, multiple informants, and information of a wide array of potential risk factors including the extent to which a sense of psychological preparedness protects individuals from posttraumatic **stress**.

REFERENCES

- Breslau N, Davis G, Andreski P et al. (1991), Traumatic events and post-traumatic **stress** disorder in an urban population of young adults. *Arch Gen Psychiatry* 48:216-222
- Burke JD, Borus JF, Burns BJ et al. (1982), Changes in children's behavior after a natural disaster. *Am J Psychiatry* 139:1010-1014
- Dohrenwend BP, Dohrenwend BS, Warheit GJ et al. (1981), **Stress** in the community: a report to the President's Commission on the accident at Three Mile Island. *Ann NY Acad Sci* 365:159-174
- Dollinger SJ, O'Donnell JP, Staley AA (1984), Lightning-strike disaster: effects on children's fears and worries. *J Consult Clin Psychol* 52:1028-1038

Earls F, Smith E, Reich W et al. (1988), Investigating psychopathological consequences of a disaster in children: a pilot study incorporating a structured diagnostic interview. *J Am Acad Child Adolesc Psychiatry* 27:90-95

Fitzpatrick KM, Boldizar JP (1993), The prevalence and consequences of exposure to violence among African-American youth. *J Am Acad Child Adolesc Psychiatry* 32:424-430

Freedy JR, Resnick HS, Kilpatrick DG (1992a), Conceptual framework for evaluating disaster impact: implications for clinical intervention. In: *Responding to Disaster: A Guide for Mental Health Professionals*, Austin LS, ed. Washington, DC: American Psychiatric Press, pp 3-23

Freedy JR, Shaw DL, Jarrell MP, Masters CR (1992b), Towards an understanding of the psychological impact of natural disasters: an application of the Conservation Resources **Stress** Model. *J Traumatic Stress* 5:441-453

Galante R, Foa D (1986), An epidemiological study of psychic trauma and treatment effectiveness for children after a natural disaster. *J Am Acad Child Psychiatry* 25:357-363

TABLE 6
Logistic Regression Analysis of Posttraumatic Stress Disorder
with Demographic, Disaster Exposure, and Life Event Variables

	Odds Ratio	95% Confidence Interval
Significant univariable models		
Age ^a	1.32	1.04-1.68
Gender	2.50	1.08-5.79
Fear for others' safety	5.31	1.58-17.88
Feeling of safety	3.80	1.58-9.11
Health affected	3.15	1.31-7.58
Violent/traumatic events ^a	1.39	1.13-1.71
Undesirable life events ^a	1.38	1.21-1.57
Personal-social resource loss ^a	1.06	1.02-1.10
Final multivariable models		
Age ^a	1.41	1.09-1.83
Undesirable life events ^a	1.38	1.21-1.58

^a Continuous variables.

Garrison CZ, Weinrich MW, Hardin SB, Weinrich S, Wang L (1993), Post-traumatic **stress** disorder in adolescents after a hurricane. *Am J Epidemiol* 138:522-530

Gleser GC, Green BL, Winger C (1981), *Prolonged Psychosocial Effects of Disaster: A Study of Buffalo Creek*. New York: Academic Press

Goenjian AK, Najarian LM, Pynoos RS et al. (1994), Post-traumatic **stress** disorder in elderly and younger adults after the 1988 earthquake in Armenia. *Am J Psychiatry* 151:895-901

Green BL, Korol M, Grace MC et al. (1991), Children and disaster: age, gender, and parental effects on PTSD symptoms. *J Am Acad Child Adolesc Psychiatry* 30:945-951

Green BL, Lindy JD, Grace M et al. (1990), Buffalo Creek survivors in the second decade: stability of **stress** symptoms. *Am J Orthopsychiatry* 60:43-54

Johnson JH, McCutcheon SM (1980), Assessing life **stress** in older children and adolescents: preliminary findings with the life events checklist. In: **Stress** and Anxiety, Sarason IG, Spielberger CD, eds. Washington, DC: Hemisphere, pp 111-127

Kilpatrick DG, Resnick HS, Saunders BE, Best CL (1989), The National Women's Study PTSD Module. Charleston: Crime Victims Research and Treatment Center, Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina

Koopman C, Classen C, Spiegel D (1994), Predictors of post-traumatic **stress** symptoms among survivors of the Oakland/Berkeley, Calif, firestorm. *Am J Psychiatry* 151:888-894

Lipovsky JA (1991), Post-traumatic **stress** disorder in children. *Fam Community Health* 14:42-51

Maida CA, Gordon NS, Steinberg A, Gordon G (1989), Psychosocial impact of disasters: victims of the Baldwin Hills fire. *J Traumatic Stress* 2:37-48

McFarlane AC (1988), Recent life events and psychiatric disorder in children: the interaction with preceding extreme adversity. *J Child Psychol Psychiatry* 29:677-690

McFarlane AC, Policansky SK, Irwin C (1987), A longitudinal study of the psychological morbidity in children due to a natural disaster. *Psychol Med* 17:727-738

McLeer SV, Deblinger E, Henry D, Orvaschel H (1992), Sexually abused children at high risk for post-traumatic **stress** disorder. *J Am Acad Child Adolesc Psychiatry* 31:875-879

Milgram RM, Milgram NA (1976), The effect of the Yore Kippur war on anxiety level in Israeli children. *J Psychol* 94:107-113

Nader K, Pynoos R, Fairbanks L, Frederick C (1990), Children's PTSD reactions one year after a sniper attack at their school. *Am J Psychiatry* 147:1526-1530

Neal AM, Turner SM (1991), Anxiety disorders research with African Americans: current status. *Psychol Bull* 109:400-410

Newman CJ (1976), Children of disaster: clinical observations at Buffalo Creek. *Am J Psychiatry* 133:306-312

Norris FH (1992), Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. *J Consult Clin Psychol* 60:409-418

Pynoos RS, Nader K (1988), Children who witness the sexual assaults of their mothers. *J Am Acad Child Adolesc Psychiatry* 27:567-572

Resnick HS, Kilpatrick DG, Dansky BS, Saunders BE, Best CL (1993), Prevalence of civilian trauma and post-traumatic **stress** disorder in a representative national sample of women. *J Consult Clin Psychol* 61:984-991

Saunders BE, Arata CM, Kilpatrick DG (1990), Development of a crime-related post-traumatic **stress** disorder scale for women within the Symptom Checklist-90-Revised. *J Traumatic Stress* 3:439-448

Schwarz ED, Kowalski JM (1991), Post-traumatic **stress** disorder after a school shooting: effects of symptom threshold selection and diagnosis by DSM-III, DSM-III-R, or proposed DSM-IV. *Am*

J Psychiatry 148:592-597

Solomon SD (1989), Research issues in assessing disaster's effects. In: Psychosocial Aspects of Disaster, Gist R, Lubin B, eds. New York: John Wiley, pp 308-340

Solomon SD, Canino G (1990), The appropriateness of DSM-III-R criteria for post-traumatic **stress** disorder. Compr Psychiatry 31:227-237

Steinglass P, Gerrity E (1990), Natural disasters and post-traumatic **stress** disorder: short-term vs long-term recovery in two disaster-affected communities. J Appl Soc Psychol 20:1746-1765

Terr LC (1991), Childhood trauma: an outline and overview. Am J Psychiatry 148:10-20

Titchener JL, Kemp FT (1976), Family and character change at Buffalo Creek. Am J Psychiatry 133:295-299

Weeks MF, Kulka RA, Lessler JT, Whitmore RW (1983), Personal versus telephone surveys for collecting household health data at the local level. Am J Public Health 73:1389-1394

Dr. **Garrison** is Associate Provost and Dean of the Graduate School, University of South Carolina, and Professor of Epidemiology, Department of Epidemiology and Biostatistics, School of Public Health, University of South Carolina, Columbia. Dr. Bryant is Research Assistant Professor, Dr. Addy is Associate Professor and Interim Chair, and Ms. Spurtier is a research associate, Department of Epidemiology and Biostatistics, School of Public Health, University of South Carolina, Columbia. Drs. Freedy and Kilpatrick are Assistant Professor and Professor, respectively, Crime Victims Research and Treatment Center, Charleston, SC.

- Green BL, Korol M, Grace MC et al. (1991). Children and disaster: age, gender, and parental effects on PTSD symptoms. *J Am Acad Child Adolesc Psychiatry* 30:945-951
- Green BL, Lindy JD, Grace M et al. (1990). Buffalo Creek survivors in the second decade: stability of stress symptoms. *Am J Orthopsychiatry* 60:43-54
- Johnson JH, McCutcheon SM (1980). Assessing life stress in older children and adolescents: preliminary findings with the life events checklist. In: *Stress and Anxiety*. Sarason IG, Spielberger CD, eds. Washington, DC: Hemisphere, pp 111-127
- Kilpatrick DG, Resnick HS, Saunders BE, Best CL (1989). *The National Women's Study PTSD Module*. Charleston: Crime Victims Research and Treatment Center, Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina
- Koopman C, Classen C, Spiegel D (1994). Predictors of post-traumatic stress symptoms among survivors of the Oakland/Berkeley, Calif, fire-storm. *Am J Psychiatry* 151:888-894
- Lipovsky JA (1991). Post-traumatic stress disorder in children. *Fam Community Health* 14:42-51
- Maida CA, Gordon NS, Steinberg A, Gordon G (1989). Psychosocial impact of disasters: victims of the Baldwin Hills fire. *J Traumatic Stress* 2:37-48
- McFarlane AC (1988). Recent life events and psychiatric disorder in children: the interaction with preceding extreme adversity. *J Child Psychol Psychiatry* 29:677-690
- McFarlane AC, Policansky SK, Irwin C (1987). A longitudinal study of the psychological morbidity in children due to a natural disaster. *Psychol Med* 17:727-738
- McLeer SV, Deblinger E, Henry D, Orvaschel H (1992). Sexually abused children at high risk for post-traumatic stress disorder. *J Am Acad Child Adolesc Psychiatry* 31:875-879
- Milgram RM, Milgram NA (1976). The effect of the Yom Kippur war on anxiety level in Israeli children. *J Psychol* 94:107-113
- Nader K, Pynoos R, Fairbanks L, Frederick C (1990). Children's PTSD reactions one year after a sniper attack at their school. *Am J Psychiatry* 147:1526-1530
- Neal AM, Turner SM (1991). Anxiety disorders research with African Americans: current status. *Psychol Bull* 109:400-410
- Newman CJ (1976). Children of disaster: clinical observations at Buffalo Creek. *Am J Psychiatry* 133:306-312
- Norris FH (1992). Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. *J Consult Clin Psychol* 60:809-818
- Pynoos RS, Nader K (1988). Children who witness the sexual assaults of their mothers. *J Am Acad Child Adolesc Psychiatry* 27:567-572
- Resnick HS, Kilpatrick DG, Dansky BS, Saunders BE, Best CL (1993). Prevalence of civilian trauma and post-traumatic stress disorder in a representative national sample of women. *J Consult Clin Psychol* 61:984-991
- Saunders BE, Arata CM, Kilpatrick DG (1990). Development of a crime-related post-traumatic stress disorder scale for women within the Symptom Checklist-90-Revised. *J Traumatic Stress* 3:439-448
- Schwarz ED, Kowalski JM (1991). Post-traumatic stress disorder after a school shooting: effects of symptom threshold selection and diagnosis by DSM-III, DSM-III-R, or proposed DSM-IV. *Am J Psychiatry* 148:592-597
- Solomon SD (1989). Research issues in assessing disaster's effects. In: *Psychosocial Aspects of Disaster*. Gist R, Lubin B, eds. New York: John Wiley, pp 308-340
- Solomon SD, Canino G (1990). The appropriateness of DSM-III-R criteria for post-traumatic stress disorder. *Compr Psychiatry* 31:227-237
- Steinglass P, Gernity E (1990). Natural disasters and post-traumatic stress disorder: short-term vs long-term recovery in two disaster-affected communities. *J Appl Soc Psychol* 20:1746-1765
- Terr LC (1991). Childhood trauma: an outline and overview. *Am J Psychiatry* 148:10-20
- Titchener JL, Kemp FT (1976). Family and character change at Buffalo Creek. *Am J Psychiatry* 133:295-299
- Weeks MF, Kulka RA, Lesser JT, Whitmore RW (1983). Personal versus telephone surveys for collecting household health data at the local level. *Am J Public Health* 73:1389-1394

REFERENCES

- Breslau N, Davis G, Andreski P et al. (1991). Traumatic events and post-traumatic stress disorder in an urban population of young adults. *Arch Gen Psychiatry* 48:216-222
- Burke JD, Bonus JF, Burns BJ et al. (1982). Changes in children's behavior after a natural disaster. *Am J Psychiatry* 139:1010-1014
- Dohrenwend BP, Dohrenwend BS, Warheit GJ et al. (1981). Stress in the community: a report to the President's Commission on the accident at Three Mile Island. *Ann NY Acad Sci* 365:159-174
- Dollinger SJ, O'Donnell JP, Sraley AA (1984). Lightning-strike disaster: effects on children's fears and worries. *J Consult Clin Psychol* 52:1028-1038
- Earls F, Smith E, Reich W et al. (1988). Investigating psychopathological consequences of a disaster in children: a pilot study incorporating a structured diagnostic interview. *J Am Acad Child Adolesc Psychiatry* 27:90-95
- Fitzpatrick KM, Boldizar JP (1993). The prevalence and consequences of exposure to violence among African-American youth. *J Am Acad Child Adolesc Psychiatry* 32:424-430
- Freedly JR, Resnick HS, Kilpatrick DG (1992a). Conceptual framework for evaluating disaster impact: implications for clinical intervention. In: *Responding to Disaster: A Guide for Mental Health Professionals*. Austin LS, ed. Washington, DC: American Psychiatric Press, pp 3-23
- Freedly JR, Shaw DL, Jarrell MP, Masters CR (1992b). Towards an understanding of the psychological impact of natural disasters: an application of the Conservation Resources Stress Model. *J Traumatic Stress* 5:441-453
- Galante R, Foa D (1986). An epidemiological study of psychic trauma and treatment effectiveness for children after a natural disaster. *J Am Acad Child Psychiatry* 25:357-363
- Garrison CZ, Weinrich MW, Hardin SB, Weinrich S, Wang L (1993). Post-traumatic stress disorder in adolescents after a hurricane. *Am J Epidemiol* 138:522-530
- Gleser GC, Green BL, Winget C (1981). *Prolonged Psychosocial Effects of Disaster: A Study of Buffalo Creek*. New York: Academic Press
- Gornjian AK, Najarian LM, Pynoos RS et al. (1994). Post-traumatic stress disorder in elderly and younger adults after the 1988 earthquake in Armenia. *Am J Psychiatry* 151:895-901

Record Number: A17482687

This information is not a tool for self-diagnosis or a substitute for professional care.



[Copyright](#) and [Terms of use](#)