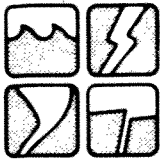


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**THE PSYCHOLOGICAL EFFECTS OF HURRICANE ANDREW ON
ELEMENTARY AND MIDDLE SCHOOL CHILDREN**

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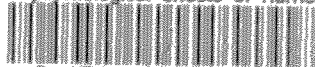
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The Psychological Effects of Hurricane Andrew on
Elementary and Middle School Children:
Report to the Natural Hazards Center

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Running head: Hurricane Andrew

Abstract

The impact of hurricane Andrew on two hundred and twelve elementary and middle school children was examined at six months post disaster. Utilizing two self-report instruments, the predictive utility of several hypothesized mediators of children's reactions to disaster was examined. Results showed higher levels of intrusive symptomology for females and for elementary school children as compared with their middle school counterparts. Additionally, multiple regressions revealed that appraisal and life threat were significant predictors of intrusive symptomology. Findings concerning avoidance symptomology are addressed as well as implications for future studies.

Key Words: Hurricane, child, disaster, posttraumatic stress disorder, trauma, fear

Recent disaster research has purported widely, varying and divergent estimates of a causal link between disaster and psychopathological consequences. Previous studies targeting reactions of children in the post-hurricane environment have suggested that a relationship may exist between the hurricane and resultant disorders including: affective disorders, posttraumatic stress disorder (PTSD), behavioral difficulties, or general emotional distress (Belter & Shannon, 1993; Belter, Dunn, & Jeney, 1991; Dunn, 1991). In addition, certain variables have been postulated as potential mediators of outcome including: (1) the characteristics of the individual (e.g., age, gender, race, trait anxiety, etc.); (2) the emotional experience during the event (e.g., positive versus negative); (3) the severity of physical damage (e.g., property damage, injury to or death of loved one or friend); (4) and level of exposure by the individual to the event (Green, in press; Lonigan, Shannon, Finch, Daugherty, & Taylor, 1991).

When studied independently of a hurricane scenario, tornadoes (Stewart, 1986; Sullivan, Romero, & Hutchison, 1993), flooding (Earls, Smith, Reich, & Jung, 1988; Stewart, 1986; Green, Lindy, Grace, Gleser, Leonard, Korol, & Winget, 1990), fire (Jones & Ribbe 1990; Jones, Ribbe, & Cunningham, in press), and severe storm activity (Dollinger, O'Donnell, & Staley, 1984) have been shown to elicit distressful reactions in their wake. Notwithstanding recent studies, further investigations are necessary to ensure reliable predictions of psychological distress in post-disaster environments (Green, Korol, Grace, Vary, Leonard, Gloser, & Smitson-Cohen, 1991; Green, 1993; McNally, 1993; Norris, 1992; Rubonis, & Bickman, 1991; Solomon & Green, 1992).

While a variety of reactions have been documented within recent years, a more fine grained analysis of reactions to disaster is warranted. In that disasters are not unitary experiences (given the documented range of reactions), the ascertainment of children's unique reactions to stressors is essential for at least

two reasons: (1) to more precisely document consequences of stressors and underlying process, and (2) to develop effective treatment interventions to target problems resulting from such stressors. A specific type of reaction of interest is children's perception of stressors. How threatening or dangerous a child may perceive a particular event may impact their short and longterm reactions. In the coping literature and more recently in the disaster area, it has been found that the "perceived stress" of an event or vulnerability to an event may be a better predictor of distress than the actual stressful event. For example, Keppel-Benson and Ollendick (1993) found among victimized cyclists and pedestrians that the perception of vulnerability predicted greater levels of hyperarousal than did the actual injury. These and other findings highlight the role of individual's perceptions on their functioning across a variety of potentially stressful events.

Children's perceptions or appraisals of stressors have typically been examined with the variable "exposure". While we know that all disasters show some impact of disaster-exposure, regardless of type of exposure, we know less well the impact of specific types of exposure on children's functioning. This is due, in part, to the range and diversity of definitions of exposure used in the literature. For example, Galante & Foa (1986) defined exposure as: number of deaths in fires, while Gleser et al., 1981 defines it as flood impact, life threat and trauma loss. While a general idea of impact of "exposure" has been obtained, a more precise measurement is lacking. That is, the separate and interactive effects of proximity to the event (i.e., living through the hurricane) from the consequences or aftereffects of the event (i.e., loss of home or valued items) have not been clearly ascertained. Similarly, children's reactions separate from loss experienced by significant others during and after the event need to be more precisely articulated. There is a pronounced need to better understand how children experience and conceptualize the disaster itself, that is what they choose to dwell

on, remember, forget, and/or avoid may have important implications for quality of recovery.

Therefore, the primary goal of this study was to assess, during a single interview, children's reactions during and after hurricane Andrew. This attempt at a fine-grained analysis of children's unique perceptions of this event specifically targeted exposure when it was defined as the child's appraisal of the severity of the hurricane.

A second goal of this study was the assessment of the predictive utility of a theory-based, conceptual working model. Green and her colleagues, in an attempt to predict victims' reactions to a traumatic event, proposed four factors that predict a significant portion of victims' psychological distress (Green, et al., 1991). These four factors include: (1) the characteristics of the stressor (e.g., loss, threat to life, fatalities, and physical disruption); (2) cognitive processing of the traumatic event including general coping strategies used in dealing with the event (e.g., magical thinking, appraisal, conceptual understanding of the cause of the event, and intrusive and avoidance symptomology); (3) individual characteristic of the subject (e.g., demographics); and (4) characteristics of the environment, both pre- and post-disaster (e.g., reactions of the family members, interruption of the routine, peer and school support systems, and general life events) (Korol, et al., 1991). While each of these hypothesized predictors have garnered varying degrees of support within two previous disaster studies (Green, et al., 1991; Korol, 1990; Korol et al., 1991), this model has yet to be tested with hurricanes. Hence, its application to the present event was examined.

Concerning both the primary and secondary goals of this study, it was hypothesized that: (1) children's appraisal of the stressor would contribute significantly to their level of self-reported distress, six months following the event, and (2) that a working model would be useful in predicting levels of distress,

based on the specific sets of objective variables presented.

Methods

Subjects

All subjects were residents of south Dade County, which was struck by Hurricane Andrew. At its peak, the hurricane was rated as a category 5 storm with sustained winds of 150 mph. Hurricane Andrew tracked across southern Florida on its way through the Gulf of Mexico and eventually into Louisiana. Losses would eventually include 23 fatalities directly attributed to the hurricane's action, and an estimated 1.5 million people without electricity, and 200,000 homeless. Reports have estimated the total damage from \$20 to \$30 billion. The close quarters of the residents in South Florida, coupled with a lack of enforcement of existing building codes in construction of homes before the storm, facilitated the extreme damage exacted by Hurricane Andrew (The New York Times, 1992, 1993).

The children and adolescents assessed in this study were recruited through the aid of the Dade County Public School System. Participants were drawn from elementary and middle schools located in low to middle class neighborhoods.

There were 213 children and adolescents examined from six elementary and two middle schools. They ranged in age from 8 to 15 years, with a mean age of 10.7 years. 127 (59.4%) were female, 84 (39.4%) were male, and two (0.9%) did not indicate. There were 82 (38.5%) Caucasians, 71 (33.3%) African-Americans, 31 (14.6%) Hispanics, and 4 (1.9%) Asian-Americans; 25 (11.7%) subjects indicated "other"² as their nationality.

There were 142 (66.7%) elementary children studied ranging from 8 to 11 years of age ($\bar{x} = 9.4$, $SD = 0.76$). This comprised elementary grade level. The remaining 69 (32.4%) students were drawn from middle schools ranging from 12 to 15 years old ($\bar{x} = 13.3$, $SD = 0.74$). This constituted middle school level.

Procedures

A multi-method strategy was used to examine the level of distress and the ensuing adjustment phase. Children and adolescents were targeted and interviewed using a modified version of the Horowitz Impact of Events Scale (HIES; Horowitz, Wilner, & Alvarez, 1979 - Modified by Jones, 1992), and the Hurricane Questionnaire-Child/Adolescent Form (HQ; Jones, & Ribbe, 1993). These questionnaires were group administered by the authors in the subject's schools.

Horowitz Impact of Events Scale (HIES). The HIES is a 15-item self-report questionnaire designed to assess psychological responses to stressful life events. Specifically, the HIES targets PTSD criteria B (intrusion) and C (avoidance) as defined by the DSM-III-R (APA, 1987). The HIES was derived from statements most frequently used by people to describe serious life events (Horowitz et al., 1979). For this study, all of the questions utilized "the hurricane" as the referent. Responses were made in the context of the frequency with which the statements were true for the subject within the past seven days.

The justification of the use of the HIES in this study include: (1) its previous employment in our previous efforts, specifically that of residential and wildfire (Jones, & Ribbe, 1991; Jones, et al., in press); (2) its proven utility in previous studies as an approximation of childhood PTSD in light of traumatic events (Malmquist, 1986; Yule, & Williams, 1990), (3) its good to excellent psychometric properties; (4) its brief administration time in light of time constraints; and (5) the emphasis on self-reported reactions. Since the HIES is comprised of two subscales, that of intrusive and avoidance symptomology, tests of internal consistency yielded an independent Cronbach α coefficient for each scale. The intrusion subscale, $\alpha = .84$, avoidance subscale, $\alpha = .72$, and total scale, $\alpha = .85$, all demonstrated a moderate to good internal consistency.

Hurricane Questionnaire-Child/Adolescent Form (HQ). The child/adolescent version of the HQ consists of 60 questions divided into four sections: (1) demographics, which primarily gathers basic demographic information such as name, age, race, sex, etc.; (2) stressful life events, which includes checklists and descriptions of natural disasters and traumatic events; (3) orientation, which is composed of 13 questions pertaining to hurricane-related events, thoughts, feelings, losses, and other consequences of the hurricane; and (4) coping strategies utilized in the home, the school, and among friends. The HQ assesses the four hypotheses proposed by Green and her colleagues (Green, et al., 1991), namely the characteristics of the stressor, the cognitive processing of the event, individual characteristics of the subjects, and the characteristics of the post-disaster environment.³

Interviews. Administration of the test batteries occurred in the subject's respective home school. The administration took place in a group setting, lasting approximately 45 to 60 minutes. Each group was instructed by either the first author, a graduate student in clinical psychology, or an undergraduate research assistant. Following the assessment, information concerning those who appeared to be having continuing stress related either to the hurricane or the ensuing aftermath was relayed back to the school system.

Results

HIES Responses

Two two-way factorial univariate analyses of variance (ANOVAs) with gender (male versus female) and grade level (elementary versus middle school) as the independent variables and the intrusion and avoidance subscales of the HIES as the dependent variables were carried out. These analyses revealed, for the intrusion subscale, significant effects concerning gender, $F(1, 188) = 6.81, p = .01$, and group, $F(1, 188) = 5.22, p = .02$. However, these were qualified by

the significant interaction, $F(1,188) = 5.65, p = .02$. Inspection of the cell means suggested that female elementary school children exhibited the most intrusive symptomology. (See table 1). Analyses concerning the avoidance subscale did not reveal significant differences⁴.

Insert Table 1 about here

A two-way factorial multivariate analysis of variance (MANOVA) was employed with gender (male versus female) by race (Black, White, and Hispanic) as the independent variables and the intrusion and avoidance subscales of the HIES as dependent variables. There was a significant gender effect, $F(2, 161) = 5.56, p = .005$, and interaction, $F(4, 324) = 2.54, p = .04$, but the race effect was not significant. A series of univariate ANOVAs were performed using the model described above. These analyses revealed a significant gender effect for intrusion on the HIES, $F(1, 167) = 8.25, p = .005$, qualified by a significant sex by race interaction, $F(2, 167) = 3.36, p = .04$. There were no significant effects for race, gender, nor their interaction, nor for the avoidance subscale. (See Table 1)

A two-way factorial MANOVA was performed with grade level (elementary versus middle school children) and race (Black, White, Hispanic) as the independent variables and the two subscales of the HIES as the dependent variables. No significant differences were found for the effects of grade level, race, or their interaction.

It is interesting to note the level of distress among these children. Although the HIES is not an actual diagnostic instrument, Horowitz proposed cutoff scores over the summated scale, both intrusion and avoidance subscales inclusive. Low distress subjects are defined as having a total score of less than nine, moderate distress is denoted by scores between nine and eighteen, and scores over nineteen

denote high distress in victims. For this population, 27 subjects (13.0%) reported low distress, 34 (16.3%) subjects reported moderate distress, and a distinct majority, 147 (70.7%) subjects, received a score of nineteen or higher putting them in the high distress category. Table 1 reports the endorsement and rank order of the individual HIES questions by subscale.

Insert Table 2 about here

HQ and HIES responses

A factor analytic procedure was employed utilizing the HQ responses. Since the HQ yielded primarily dichotomous or ordinally scalable responses, the correlations among the HIES scales and between the HIES and HQ-CA scales were of interest. Table 2 shows all correlations provided at least one HQ correlation with an HIES scale was greater than .25 (there were no correlations of less than .25 with any HIES scale).

Insert Table 3 about here

It is clear that the avoidance subscale of the HIES has a much weaker, though similar relationship with the HQ items than does the intrusion subscale. Additionally, the two subscales of the HIES are substantially related to themselves, both empirically and theoretically.

A matrix of intercorrelations became the basis for the factor analysis. This matrix was submitted to a principal components extraction of roots, followed by inspection of the scree plots of the resulting eigen values. This analysis returned a six-factor solution. This (6 factor) solution was facilitated by standardizing variables with loadings greater than four on each factor. These standardized scores were then averaged for each factor. Finally, these factors were submitted

to Varimax rotation procedures. Table 4 reflects the four factors that generated probabilities less than .05 for their respective β weights. The final two factors did not load into easily definable groups, nor did the loadings produced provide reliable theoretical implications.

Insert Table 4 about here

The next step of the analysis employed a series of stepwise multiple regression utilizing the factors occurring in HQ data and the subscales of the HIES as regressors. The predictor variables were the factor related scores. The regression criteria allowed four to enter into the regression for the intrusion subscale and one for the avoidance subscale. Concerning the avoidance subscale, the use of one predictor did not return significant results. The subscale accounted for less than 10% of the variance. The results of the regression for the intrusion subscale, yielded approximately 25% of the variance was accounted for by four variables, including appraisal, life threat, age/dislocation, and loss/injury. Appraisal accounted for the most variance (13%) of all four variables⁵. Table 6 reflects the results of the regression for the intrusion subscale

Insert Table 5 about here

Discussion

The preliminary findings suggest that appraisal did, in fact, significantly predict levels of distress as hypothesized. In addition, life threat also significantly predicted distress. A weaker finding was that the effects of age/dislocation and loss/injury contributed to virtually no variance, which is consistent with previous reports among children (Green, et al., 1991; Korol, 1990).

While we were unable to fully examine the four predictions of distress as

proposed by Green and her colleagues (Green, et al., 1991) several patterns emerged supporting the utility of this model. More specifically, appraisal of the severity of the event did predict elevated levels of distress. This finding supports earlier efforts (Green, in press; Green, 1993; McNally, 1991; Rubonis, & Bickman, 1991). Unlike previous studies, which have broadly defined appraisal, the benefit of the more fine-grained analysis of this variable enabled us to separate the impact of children's appraisal of the severity of the stressor from general lifestyle disruption (i.e., loss, threat to life, moving, etc.)

The variable of threat to life, where victims of the hurricane appeared to have viewed the event as uncontrollable and themselves as helpless, replicated findings in studies concerning crime related PTSD (Kilpatrick, Saunders, Amick-McMullen, Best, Veronen, & Resnick, 1989), adult survivors of sexual abuse (Powell, Lipovsky, Saunders, Kilpatrick, & Resnick, 1990), the Buffalo Dam flood (Green, et al, 1990), dormitory fire (Jones & Ribbe, 1991), and automobile accident(s) (Keppel-Benson, & Ollendick, 1992).

It was interesting to note that distress was better predicted by the perception of the life threat during previous traumas than the actual number of traumas experienced. This finding might underestimate the nature of the previous traumatic experience and its subsequent threat to life. A sufficiently horrific experience may predispose victims to negative *sequelae* rather than serve as a stress inoculation function.

Also of interest is the lack of prediction of the loss/injury factor. Given the fairly robust findings as reported by Freedy, Shaw, Jarrell, & Masters (1992) and Hobfoll (1992) working primarily with adult samples, this finding requires explanation. It may be the case that the child and the adolescent do not readily conceptualize nor understand "loss", at least shortly after a traumatic event. Many seem to choose to focus on the "positive outcomes" of such events,

possibly as a protective defense mechanism. For example, many children reported benefits of the hurricane as "getting a new house", "getting my house fixed", or "getting new toy/game computer". This lack of predictive utility of the loss variable is supported by Green (Green, et al., 1991) and Korol (Korol, et al., 1991), utilizing both child and adult samples. Future research attention is certainly warranted regarding this variable.

The use of the HIES allowed the approximation of PTSD symptomology as defined by the DSM-III-R. Given that most of the significant findings in this study were employing the intrusion subscale while excluding effects concerning the avoidance subscale, brings an interesting question to light. All constructs that comprise PTSD (intrusive, avoidance, and arousal) have been demonstrated to be valid (March, 1990; McNally, 1993) and form a cohesive disorder across different traumatic events including war veterans, rape (Foa, & Riggs, 1993), flood (Earls, et al., 1988). However, one question raised by our data is why would there be a distinct lack of avoidance symptomology in this sample?

An explanation for the lack of avoidance in this study concerns the characteristics of the post-disaster environment. All subjects were, and quite assuredly still immersed in an environment where reminders of the event were rampant and pervasive. All subjects were met, on their way to school, by piles of debris the size of single-family dwellings dotted along the side of the road. Subjects had to contend with the daily sight of wrecked shopping malls, wind tossed debris, and abandoned homes.

It is conceivable that attempts to avoid reminders of the hurricane were ultimately impossible in this environment. The outcome from these continuous reminders is unknowable in the context of this study. The chronic presentation of reminding stimuli may be conceptualized as a continuous or chronic stressor. The tendency for blame to be shifted from the hurricane's wrath to government

ineptitude may cloud the issue as to where the causal link is drawn.

Based on Terr's clinical experience (Terr, 1989), she has proposed the possible existence of two types of PTSD. Type I is said to result from a single-impact traumatic event characterized by classical reexperiencing phenomena. Type II is postulated as an evolution of PTSD resulting from either series of traumatic events or exposure to a prolonged stressor. This evolving, Type II PTSD is characterized by denial, dissociation, and numbing of affect. Typically, Type II resembles Borderline Personality Disorder (BPD). Famularo, Kinscherff, and Fenton (1991) documented the rates of PTSD in children clinically diagnosed with BPD. They found that 36.8% of children diagnosed with BPD also met the criteria for PTSD, suggesting that PTSD and BPD could warrant a comorbid diagnosis in light of a continuous stressor, or that PTSD could be confused with indicators of BPD. Herman & van der Kolk (1987) postulated that in a "complicated posttraumatic syndrome", a child, who is unprotected and isolated, could potentially incorporate the posttraumatic stress responses as maladaptive personality structures. Given the blurring of the distinction of the type of stressor that the current sample suffers from, that of an acute stressor or from a chronic stressor, it is possible that these children are experiencing a Type II-like disorder. Unfortunately, we were not able to objectively assess this dynamic. The need to study the delineation between acute and chronic stressors is apparent.

Findings suggest that although no particular age group is at risk for elevated symptomology, as reported by the HIES female, elementary school children are at risk for elevated levels of distress as compared to middle school children. One possible explanation for the lack of more robust differences for age could reside in the fact that a rather restricted range of children were examined (8 to 15 years).

Our findings concerning race demonstrate a possibility that this variable could play a mediating role in expressed symptomology. Lonigan, et al. (1992)

found a prevalence among African-American subjects in expressed anxiety and PTSD symptomology. Our findings reverse this claim, with Caucasians most susceptible to distress as compared to African-Americans. Further research is needed to ascertain the relationship of race and expressed distress.

A pervasive problem among disaster literature is the lack of standardized measurement instruments precluding precise comparisons between studies (see both Green, in press, and McNally, 1991 for a review).

Notwithstanding several major shortcomings including: (1) the use of only one outcome measure; (2) self-report measurement introducing the possibility of over and underreporting of distress; (3) use of an opened instrument with younger children (4) lack of pre-morbid assessment of the victims; (5) lack of assessment and interviewing of the parents and teachers; and (6) a sample-selection bias, some preliminary findings are suggestive. The stressor should be determined by the individual perception of the event, not by edict nor accord. One must look at the context in which a potential stressor is embedded, never ignoring the interactive role of the environment, family, or friends. There must be special consideration for children given their differing levels of cognitive ability.

Footnotes

¹This research was funded by a grant awarded to the first author from the ~~National~~ ^{NATURAL} Hazards Center at the University of Colorado in Boulder. Portions of this manuscript were presented at the 101st Annual American Psychological Association convention, August, 1993, in Toronto, Canada. Thanks to Bonnie Green and Richard McNally for their assistance in reviewing and suggesting revisions on the Hurricane Questionnaire. Also, special thanks to our research team without whom we could have never entered all of the data, much less complete this report. All correspondence should be sent to Russell T. Jones, Virginia Tech Department of Psychology, Stress and Coping Lab, 4102 Derring Hall, Blacksburg, Va 24061-0436.

²Many subjects that endorsed "other" as a particular ethnic group noted that a mixture of ethnic groups (e.g., Black-Hispanic, Caucasian-Latino, etc.) was not an option on the ethnic section. Due to an inability to classify "other" (e.g. was the subject Native-American or identifying with two ethnic groups such as a African-Latino), this category was omitted from analyses immediately addressing race.

³Due to project limitations, cognitive processes of the event were not examined in the present investigation.

⁴The parameter for significance for all results required $p < .05$. Otherwise, results were reported as insignificant.

⁵At the time of the writing of this manuscript, parental reactions, loss, and injury were not completely entered into the regression due to length of time needed to reduce questions of a free-response format included in the HQ.

References

- American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders (3rd ed., rev.). Washington, DC:
- Belter, R. W., & Shannon, M. P. (1993). Impact of natural disasters on children and families. In Saylor, C. F. (Ed.), Children and Disasters pp. 85-103. Plenum Press: New York, New York.
- Belter, R. W., Dunn, S. E., Jeney, P. (1991). The Psychological impact of hurricane Hugo on children: A needs assessment. Advances in Behaviour Research and Therapy, 13, 155-161.
- Dollinger, S. O'Donnell, J., & Staley, A. (1984). Lightning strike disaster: Effects on children's fears and worries. Journal of Consulting and Clinical Psychology, 52, 1028-1038
- Earls, F., Smith, E., Reich, W., & Jung K. G. (1988). Investigating psychopathological consequence of disaster in children: A pilot study incorporating a structured diagnostic interview. Journal of the American Academy of Child and Adolescent Psychiatry, 9, 36-46.
- Famularo, R., Kinscherff, R., & Fenton, T. (1991). Posttraumatic stress disorder among children clinically diagnosed as borderline personality disorder. The Journal of Nervous and Mental Disease, 179, 428-431
- Foa, E. B., & Riggs, D. S. (1993). Posttraumatic stress disorder and rape. In Oldham, J. M., Riba, M. B., & Tasman, A. (eds.), Review of Psychiatry, Volume 12, (pp. 273-303). Washington DC: American Psychiatric Press.
- Freedly, J. R., Shaw, D. L., Jarrell, M. P., Masters C. (1992). Towards an understanding of the psychological impact of natural disasters: An application of the Conservation of Resources Model. Journal of Traumatic Stress, 5, 441-.

- Galante, R., & Foa, D. (1986). An epidemiological study of psychic trauma and treatment effectiveness for children after a natural disaster. Journal of the American Academy of Child Psychiatry, 25, 346-356.
- Gleser, G., Green, B., & Winget, C. (1981). Prolonged Psychosocial Effects of Disaster. Academic Press, Inc., New York, New York.
- Green, B. L. (in press). Mental health and disaster: Research review. Report to the National Institute of Mental Health.
- Green, B. L. (1993). Disasters and posttraumatic stress disorder. In J. R. T. Davidson & E. B. Foa (Eds.), Posttraumatic Stress Disorder: DSM-IV and Beyond (pp. 75-97). Washington, DC: American Psychiatric Press.
- Green, B., Korol, M., Grace, M., Vary, M., Leonard, A., Gleser, G., & Smitson Cohen, S. (1991). Children and disaster: Age, gender, and parental effects on PTSD symptoms. Journal of the American Academy of Child Psychiatry, 30, 945-951.
- Green, B., Lindy, J. Grace, M., Vary, M., Leonard, A., Gleser, G., & Winget C. (1990). Buffalo Creek survivors in the second decade: Stability of stress symptoms. American Journal of Orthopsychiatry, 60, 43-54
- Herman J., & van der Kolk, B. A. (1987). Traumatic antecedents of borderline personality disorder. In van der Kolk, B. A. (ed.), Psychological Trauma. Washington DC: American Psychiatric Association
- Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of events scale: A measure of subjective stress. Psychosomatic Medicine, 41, 209-218.
- Jones, R. T., Ribbe, D. P., & Cunningham, P. B. (in press). Child and adolescent victims of fire: Psychosocial consequences. Journal of Traumatic Stress.

- Jones, R. T., & Ribbe, D. P. (1993). The child and adolescent hurricane questionnaire. Unpublished manuscript, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Jones, R. T., & Ribbe, D. P. (1991). Child, adolescent, and adult victims of residential fire. Behavior Modification, 139, 560-580.
- Keppel-Benson, J., & Ollendick, T. H. (1993). Posttraumatic stress disorder in children and adolescents. In C. F. Saylor (Ed.), Children and Disasters. New York : Plenum Press.
- Kilpatrick, D. G., Saunders, B. E., Amick-McMullen, A., Best, C. L., Veronen, L. J., & Resnick, H. S. (1989). Victim and crime factors associated with the development of crime-related posttraumatic stress disorder. Behaviour Therapy, 20, 199-214.
- Korol, M. (1990). Children's psychological responses to nuclear waste disaster in Fernald, Ohio. Doctoral dissertation, University of Cincinnati
- Korol, M., Green, B. L., Grace, K. L., (1991). Developmental analysis of the psychosocial impact of disaster on children: A review. Journal of Clinical and Child Psychology, in press.
- Lonigan, C. J., Shannon, M. P., Finch, A. J., Daugherty, T. K., & Taylor, C. M. (1991). Children's reactions to a natural disaster: Symptom severity and degree of exposure. Advances in Behaviour Research and Therapy, 13, 135-154.
- March, J. S., (1990). The nosology of posttraumatic stress disorder. Journal of Anxiety Disorders, 4, 61-82.
- Malmquist, C. P., (1986). Children who witness parental murder: Posttraumatic aspects. Journal of the American Academy of Child Psychiatry, 25, 320-325.
- New York Times References (1992, 1993).

- McNally, R. J. (1993). Stressors that produce posttraumatic stress disorder in children. In J. R. T. Davidson & E. B. Foa (Eds.), Posttraumatic Stress Disorder: DSM-IV and Beyond (pp. 57-74). Washington, DC: American Psychiatric Press.
- McNally, R. J. (1992). Assessment of posttraumatic stress disorder in children. Psychological Assessment, 3, 531-537.
- McNally, R. J., (1991). Assessment of posttraumatic stress disorder in children. Psychological Assessment, 3, 531-537.
- Norris, F. H. (1992). Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. Journal of Consulting and Clinical Psychology, 60, 409-418.
- Powell, M., Lipovsky, J., Saunders, B., Kilpatrick D., & Resnick, H. (1990, November). Paper presented at the 25th annual meeting of the association for the Advancement of Behavior Therapy, San Francisco, CA.
- Rubonis, A. V., & Bickman, L. (1991). Psychological impairment in the wake of disaster: The disaster-psychopathology relationship. Psychological Bulletin, 109, 384-399.
- Solomon, S. D., & Green, B. L. (1992). Mental health effects of natural and human-made disasters. PTSD Research Quarterly, 3, 1-3.
- Stewart, M. (1986). A study of the needs, coping styles and use of medical services of tornado victims. Canadian Journal of Public Health, 77, 173-179.
- Sullivan, M. A., Romero, R., & Hutchison, K. (1993). Children's long-term reactions to a tornado. Paper presented at the American Psychological Association Conference, August, 1993, Toronto, Canada.

- Terr, L. (1989). A proposal for DSM-IV category, Post-Traumatic Stress. Paper prepared for the *DSM-IV* Workgroup on Post-Traumatic Stress Disorder.
- Yule, W., & Williams, R. M. (1990). Posttraumatic stress reactions in children. Journal of Traumatic Stress, 3, 279-295.

Table 1: Cell Means for MANOVA and ANOVA analyses involving Intrusion and Avoidance Subscales of the HIES

Level of Analysis Avoidance	Intrusion			
	Mean	Std.	Mean	Std.
Gender by Grade Level				
Male/Elementary	10.9	8.0	14.7	8.3
Male/Middle School	11.0	9.9	15.1	10.8
Female/Elementary	18.3	10.0	17.9	9.4
Female/Middle School	11.3	8.9	13.8	10.0
Gender by Race				
Male/Afro-American	12.1	8.8	14.7	8.8
Male/Caucasian	10.8	8.5	15.9	9.3
Male/Hispanic	9.9	9.4	15.0	10.2
Female/Afro-American	12.4	9.1	15.2	8.8
Female/Caucasian	19.4	10.3	16.7	9.1
Female/Hispanic	15.2	9.5	15.9	11.2
Grade Level by Race				
Elementary/Afro-American	13.4	8.8	16.6	8.3
Elementary/Caucasian	17.0	10.8	16.6	9.2
Elementary/Hispanic	15.8	9.2	18.0	8.0
Middle School/Afro-American	9.8	8.9	11.6	8.9
Middle School/Caucasian	12.4	9.8	15.9	9.1
Middle School/Hispanic	12.6	9.7	14.9	11.4

Table 2

Reported Frequency (%) and Rank Order of HIES Responses by Subscale

Subscale Rank Order	Frequency Response (%)	
<u>Intrusion</u>		
I thought about it when I didn't mean to	70.0	5
I had trouble falling asleep or staying asleep because of pictures or thoughts about it that came into my mind	54.0	11
I had strong feelings about it	73.2	3
I had dreams about it	49.3	14
I kept seeing it over and over in my mind	54.0	11
Other things kept making me think about it	67.7	7
Any reminder brought back feelings about it	76.5	1
<u>Avoidance</u>		
I stopped letting myself get upset when I thought about it or was reminded about it	68.1	6
I tried not to remember	73.7	2
I stayed away from reminders of it	50.7	13
I felt as if it hadn't happened or it was make believe	45.5	15
I tried not to talk about it	61.5	9
I was aware that I still had a lot of feelings about it, but I didn't deal with them	65.7	8
I tried not to think about it	70.4	4
I don't have feelings about it anymore	55.4	10

Table 3

Correlations between the HIES subscales and HQ items exceeding $r = .25$

	Intrusion	Avoidance	Total
Intrusion	-	.60	.90
Avoidance	.60	-	.89
Life in danger from "other traumatic event"	.35	.16	.28
Life in danger from "other natural disaster"	.28	.11	.23
How bad did the hurricane make you feel?	.33	.26	.33
Did you get help to deal with the hurricane?	.33	.23	.31
How afraid were you during the hurricane?	.32	.28	.34
How much of a problem was the hurricane?	.25	.15	.22

NOTE. *Ns* for these correlations vary from 210 to 256 due to sporadic omission of responses.

Table 4

Factor loadings and theoretical implications of certain HQ items

Question	
Loading	
<hr/>	
Factor 1 - Appraisal (Cronbach α = .68)	
1. Was your life in danger?	.44
2. How bad did you think hurricane Andrew was?	.41
3. How afraid were you during the hurricane?	.68
4. How much of a problem was hurricane Andrew?	.77
5. How bad did it make you feel?	.81
Factor 2 - Life Threat / Helplessness / Uncontrollability (Cronbach α = .55)	
1. Did you think you could do anything to stop the hurricane from hurting you?	.60
2. Was anyone you were close to hurt during the hurricane?	.53
3. Did you have to move after the hurricane?	.46
4. Was your life in danger due to a previous natural disaster?	.46
5. Was your life in danger due to previous traumatic experience?	.46
Factor 3 - Dislocation / Age (Cronbach α = .56)	
1. Did you have to change schools?	.64
2. Did any of your friends move away?	.55
3. Did any of your neighbors move away?	.48
4. Age	-.74
Factor 4 - Loss / Injury (Cronbach α = .56)	
1. Did the hurricane damage something valuable/important to you?	.61
2. When you knew there was a hurricane, were you afraid anyone close to you would get hurt?	.67
3. Did (either of) your parent(s) lose their job(s)?	.57
4. Have you gotten help to deal with the hurricane?	.47

Table 5

Multiple Regression Results: Factors Predicting Intrusion Scores Six Months After Hurricane Andrew (N = 213)

P	Partial R ²	Coefficients
Intercept <.0001	-	14.01
Appraisal <.0001	.127	4.53
Life Threat <.0008	.059	2.81
Age / Dislocation <.0009	.035	-3.00
Loss / Injury <.0005	.025	3.64

Total variance accounted for (R²) = .25