The Impact of Hurricane Andrew on Deviant Behavior Among a Multi-Racial/Ethnic Sample of Adolescents in Dade County, Florida: A Longitudinal Analysis

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Findings from a longitudinal study are presented on the relationships between the problems and stresses resulting from Hurricane Andrew and posthurricane minor deviant behavior. The sample (N = 4,978) included Hispanic, African-American, and White non-Hispanic middle school students enrolled in Dade County, Florida public schools. Two waves of data were collected prior to the hurricane; a third was obtained approximately 6 months following the storm. Results indicated that females were likely to report higher levels of hurricane-related stress symptoms than males. After controlling for prehurricane levels of minor deviance, family support, and race/ethnicity, hurricane stress symptom level remained a significant predictor of posthurricane minor deviant behavior. The findings lend support to stress theories of social deviance.

KEY WORDS: Hurricane Andrew; deviance; adolescents; longitudinal; psychological distress.

There is a substantial and growing body of literature on the relationships between large scale disasters and their mental health consequences among children and adolescents. Although there are variations in the

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events being studied, as well as sampling and analytic differences, the findings have almost universally indicated that disasters can induce significant and persistent levels of psychological symptomatology among children and adolescents (Belter, Dunn, & Jenny, 1991; Benedek, 1985; Burke, Moccia, Borus, & Burns, 1986; Garrison et al., 1995; Green et al., 1994; Lonigan, Shannon, Taylor, & Finch, 1994). These findings have remained consistent across different cultural groups (Kozlovskaia, Bashina, Gorinova, & Kireeva, 1991; McFarlane, 1987; Zeidner, 1993). Several studies have found that females reported more symptoms associated with emotional reaction to the traumatic events than males (Garrison et al., 1995; Green, Korol, Grace, & Vary, 1991; Shannon, Lonigan, Finch, & Taylor, 1994).

Despite the considerable body of research findings on the relationships between disasters and their mental health consequences for children and adolescents, to date, little research has focused on the relationships between major disaster occurrences and other outcomes, including subsequent social deviance. However, findings from two recent studies suggest the need for further work in this area. Hardin, Carbaugh, Weinrich, and Pesut (1992) reported results from a study of 9th and 10th grade students who had been exposed to Hurricane Hugo 15 months earlier. The students reported both positive and negative responses in coping with stress after the hurricane. Negative responses included hitting or breaking objects, and fighting. A second study which focused primarily on the psychological effects of Hurricane Andrew on school behavior among elementary school children, aged 6 to 11 years, found an increase in school-reported disruptive behaviors measured on two occasions following the hurricane (Shaw et al., 1995). This increase was more significant for girls, for students in less impacted areas of the county, and remained high throughout most of the school year subsequent to the hurricane. Both of these studies, while suggestive of disaster generated antisocial attitudes and behaviors, did not use instruments specifically designed to measure deviant behaviors among young adolescents.

This paper is intended to increase our knowledge of the effects of disaster-related problems and stress symptoms on deviant behavior among adolescents by reporting findings from a three wave longitudinal study which utilized a multi-racial/ethnic sample of adolescents residing in Dade County (Miami), Florida. Two waves of data had been collected prior to Hurricane Andrew; the third was collected approximately 6 months following the storm. The occurrence of the hurricane between the second and third data collection periods provided the research group with an unusual opportunity to explore a number of storm-related phenomena and to do so within the context of a large pre-disaster data base.
Background

Hurricane Andrew, which struck south Florida during the early hours of August 24, 1992, was one of the most devastating disasters in U.S. history. Direct economic losses have been estimated at between 20 and 25 billion dollars; more than 130,000 homes were damaged or destroyed; approximately 160,000 persons were forced to temporary housing; and, an estimated 86,000 persons were left unemployed (Miami Herald, September 24, 1992). The loss of homes and employment were compounded by the perceptions of widespread looting (Miami Herald, September 6, 1992). In addition, family violence, including spouse and child abuse, rose so dramatically immediately after the storm that officials had to appoint additional judges to process the complaints (Miami Herald, September 3, 1992). Damage to the school buildings and an overall disruption in community services including loss of electricity, water, and traffic lights delayed the opening of the public schools. Students and teachers were often reassigned, and absenteeism was very high in the weeks immediately following the storm. Heavy rains, high temperatures and humidity, the lack of electricity and potable water, and over-crowded housing conditions added to the hassles confronting persons as they attempted to deal with the consequences of the storm.

The impacts of the storm were extensive and they persisted over a long period of time. Approximately 8 months after the hurricane a survey of 14,937 households was conducted in Dade County, revealing that only about five percent of the most badly damaged homes had been fully repaired (Miami Herald, April 18, 1993). A Newsweek article published at about the same time reported that children and adolescents in Miami were still showing signs of psychological trauma and that school counselors and psychologists had noted more students with falling grades and disruptive classroom behavior since the storm (Newsweek, April 5, 1993).

In short, the demands occasioned by the hurricane were disturbing, pervasive, and persistent and as such the postdisaster environment provided an excellent opportunity to explore a number of empirical issues of interest to social epidemiologists, disaster researchers, policy makers, and service providers.

Theoretical Assumptions and Hypotheses

At a general level, the disaster component of the third data collection period was guided by theoretical assumptions derived largely from the disaster, stress, and deviance literature. Stated most simply, it was assumed
that there would be significant relationships between the problems and stresses associated with Hurricane Andrew and a variety of subsequent outcomes including social deviance. Specifically, the research was guided by a stress model proposed by Wirheit (1979; 1985; 1988). The full details of the model are too extensive to outline here but, in brief, it conceptualizes large scale natural disasters as producing a variety of stressful life events similar to those reported by Holmes and Rahe (1967) and Paykel, Prusoff, and Uhlenhuth (1971). Stressful life events associated with large scale disasters would logically include occurrences such as death and/or injury to family members and/or friends; damage to one's home and/or loss of personal property; economic losses including the loss of employment or temporary lay-offs; separation from other family members and friends; and, prolonged residential dislocation. In addition to these events, disasters are conceptualized as creating a large number of daily hassles associated with the postdisaster environment and the restoration of one's daily routine. These include the disruptions or loss of community based services such as electricity, water, sewage treatment, telephones, and transportation facilities. The theoretical model includes postulates which suggest that these stressful life events and hassles singly, and together, place a variety of demands on individuals who, in turn, respond to them by relying on their personal, familial, interpersonal, economic, social, and cultural resources. Individuals are hypothesized to be at increased risk for a state of stress when the demands occasioned by the disaster exceed the response capabilities of the affected individuals, especially when the demand-response set involves high priority situations and/or when the imbalance persists over time. The manifestations of a state of stress are perceived as including a wide range of psychological and physiological symptoms and social dysfunctions. In sum, the central components of the model include the presence of disaster induced stressful life events and hassles, the magnitude and duration of the demands placed on individuals, the presence/absence of relevant coping resources, and a variety of adaptive and nonadaptive outcomes. It is important to emphasize that the model does not view the relationships between disaster events and their personal consequences in a simple linear fashion but rather it includes a number of intervening variables and the possibility of differential outcomes.

The theoretical framework outlined above, the literature on disasters and on deviance, and the results of analyses based on the first two waves of data led the research group to hypothesize the following relationships as they designed the third wave questionnaire: (1) there will be a positive and significant relationship between the number of hurricane-generated problems and the levels of hurricane-related stress symptoms experienced by those in the sample; (2) there will be a positive and significant relation-
ship between the number of hurricane-generated problems experienced by those in the sample and the level of posthurricane minor deviance; (3) there will be a positive and significant relationship between the level of hurricane-related stress symptoms experienced by those in the sample and the level of posthurricane minor deviance; (4) adolescents with higher levels of pre-hurricane family support will experience significantly lower levels of hurricane-related stress symptoms than those with low levels of family support; (5) adolescents with higher levels of hurricane-related stress symptoms will report significantly lower levels of perceived family support after the hurricane; and (6) adolescents with higher levels of posthurricane family support will have lower levels of posthurricane minor deviance than those with lower levels of family support. These hypotheses are analyzed within the context of controls for gender, race/ethnicity, socioeconomic status (SES), and levels of pre-hurricane minor deviance.

Method

Sample

The data used in this study were part of a longitudinal research project which focused on developmental issues in a Hispanic, African-American and White non-Hispanic sample (N = 4,978) of middle school students in the Dade County (greater Miami) Florida public schools. The original study was designed to explore the relationships among a wide range of personal, social, and psychosocial factors and social deviance, including substance use and other non-normative behaviors.

The original research plan concentrated primarily on boys because data obtained from a number of sources indicated very low prevalence rates of illicit drug use among Hispanic girls in Dade County (National Center for Health Statistics, 1985; National Institute on Drug Abuse, 1987; Page, McCoy, Sweeney, and Rio, 1985). Detailed power analyses based on the most reliable prevalence rates available indicated that, even with the inclusion of all middle school girls in the county, the power to find a significant difference, if it existed, between Hispanic and non-Hispanic girls was less than .6. Nevertheless, data were obtained on a small subsample of girls and, given the emphasis of this particular study, they are included in these analyses.

Three waves of data were collected. The first (T-1) took place in the fall of 1990 when students were in the sixth or the seventh grade. The second (T-2) was collected in the fall of 1991. Hurricane Andrew which occurred on August 24, 1992 delayed the final wave (T-3) of data collection
to the spring of 1993. All 48 of Dade County's public middle schools participated in the study and, as students progressed from middle school to high school, all 25 high schools cooperated with the research group during the T-3 data collection.

Prior to the T-1 data collection, informed consent forms, printed in both English and Spanish, were mailed to the parents or guardians of all potential respondents. Only those students returning affirmative responses were included in the study. Informed consent was also secured from the students themselves at the time of the questionnaire administration. Overall, usable data were secured from 72% of all eligible students during the T-1 data collection period. The total T-1 sample consisted of 6,760 boys and 626 girls. The T-2 sample included 6,089 boys and 549 girls, 90% and 87% of the T-1 sample, respectively. The T-3 sample consisted of 5,370 boys and 554 girls. The increase in the sample of girls at T-3 was the result of an improvement in the tracking methods.

After careful review and detailed analyses, it was decided to focus the analyses on data obtained at waves T-2 and T-3. The underlying notion guiding this decision was that the time proximity between these two periods would provide a better test of the guiding hypotheses than a timeframe which encompassed the longer time span associated with the T-1 and T-3 data collection period. Matching data were obtained on 4,488 boys and 490 girls for the T-2 and T-3 periods.

Representativeness/Attrition of the Sample

The Dade County school system provided the research group with information on all students in the eligible population of middle school students. Six variables, including race, ethnicity, age, reading level, year in school, native/foreign born, and number of parents in the household, were analyzed to determine if there were statistically significant differences between students in and not in the T-1 sample. Overall, the results indicated that students in the sample and students in the entire eligible population were not significantly different.

In addition to determining the representativeness of the sample, attrition analyses were conducted to determine if there were significant differences between those remaining in the study and those dropping out over time. The results of these tests indicated that the two groups were essentially equivalent on the variables of interest and, therefore, it was not necessary to assign weights to correct for differences between drop-outs and participants.
Questionnaire Construction and Administration

The construction and testing of the student questionnaire, which took approximately 18 months to complete, involved the use of four focus groups and two pilot studies. The normal difficulties associated with questionnaire construction were compounded by the fact that the school population included many foreign-born students with poor reading skills and limited knowledge of English. These language and reading level difficulties were addressed through concerted efforts to develop items which could be understood by the students and to word the items in language consistent with their grade levels. After the English version of the questionnaire was developed, it was translated, back-translated, and re-translated into the Spanish forms most likely to be understood by the heterogeneous Hispanic groups included in the sample. A number of different administration procedures were developed to facilitate the gathering of information from those with special language/reading difficulties.

The questionnaires were administered in school settings by trained members of the project staff. Privacy was emphasized in seating arrangements and students were encouraged to use the large envelope which contained their questionnaire to cover their answers.

Measures

Race/ethnicity was determined by the student’s self-report and verified by the records of the school system. For purposes of this paper, the sample included three racial/ethnic groups: Hispanics, African Americans, and White non-Hispanics. Students from other racial and ethnic groups were deleted from the analyses due to their small numbers in this sample. Dummy coding was used to create a dichotomous variable for each racial/ethnic group. White non-Hispanic was the reference category in the analyses. The gender variable was scored 0 for boys and 1 for girls.

A measure of socioeconomic status (SES) was created by combining standardized scores for parents’ level of education and household density. This measure was validated by correlating it with collateral information on household income provided by a subsample of parents of students in the study. A substantial correlation between the student-based scores and the parent information indicated that the SES measure was reasonably valid. However, because some Hispanics prefer to live in extended family groups, although they have the economic means to do otherwise, the measure may exaggerate the number of low SES individuals in the study. Therefore, the findings related to SES in this analysis must be interpreted with caution.
A five item hurricane problems index was developed for inclusion in the T-3 protocol. The questions in the index were designed to determine the kind and number of disaster-related problems experienced by students and their families following the hurricane. These included home and school dislocations, injury to self or family members, and the loss of jobs by parents due to the storm. The response choices were yes or no. The reliability of this index was .91.

The T-3 instrument also included 15 Likert-type questions designed to measure the stress symptoms of students in the sample. The items were broadly based on the stress, psychiatric epidemiologic, and disaster literature (Bolin, 1985; 1988; Dohrenwend & Dohrenwend, 1981; Holmes & Masuda, 1974; Holmes & Rahe, 1967; Kessler, Price, & Wortman, 1985; Langner, 1962; Lazarus & Launier, 1978; Macmillan, 1957; Paykel, Prusoff, & Uhlenhuth, 1971; Pearlin, Lieberman, Menaghan, & Mullen, 1981; Pearlin & Schooler, 1978; Warheit, 1986; 1988). The questions elicited information on the feelings and behaviors of students immediately following the hurricane. More specifically they were intended to tap feelings of anxiety, worry, nervousness, irritability, aggressiveness, sadness, and loss; and, overall, encompassed some of the dimensions of "demoralization" as described by Frank (1974). The list of items was prefaced by the phrase: "Following the hurricane, how often did each of the following things happen to you?" Items included, "I had trouble sleeping," "I was very sad, moody, and depressed," and "I felt upset and restless more than usual." The response choices ranged from never to always with higher scores indicating higher levels of hurricane stress symptoms. The items were used to create a hurricane stress symptoms scale based on principal components analysis with varimax rotations. The resulting scale was tested for internal consistency utilizing the procedures developed by Cronbach (1951). The alpha coefficient, .88, indicated a high level of internal consistency. This stress symptom measure has also been found to be positively associated with indicators of mental health problems after the hurricane such as depression and suicidal ideation (Warheit, Zimmerman, Khoury, Vega, & Gil, 1996).

Pre- and posthurricane measures of family affectual support were included to assess the familial coping resources available to the student before and after the storm. These measures consisted of a seven-item scale developed by Olson and his colleagues (Olson, 1986; 1989). The scale items were preceded by the phrase: "How much do you agree with each of the following statements about your immediate family (the people you live with)." Examples of these items included, "family members respect one another," "we really do trust and confide in each other," and "we can express our feelings with our family." The possible range of scores was from 1 to
4 with higher values indicating more family support. The Cronbach's alpha coefficient for this scale at T-2 was .90; at T-3 it was .91.

The dependent variable in the analysis was posthurricane (T-3) minor deviance. Minor deviance was measured by a seven item scale developed and tested extensively by Kaplan and colleagues (Kaplan, Johnson, & Bailey, 1986). The measure includes items which ask about behaviors in the previous month such as "got angry and broke things," "started a fist fight," and "took things from someone else's desk or locker when you weren't supposed to." The response choices were yes or no with higher scores indicating higher levels of minor deviant behaviors. The items were tested for internal consistency using Cronbach's (1951) procedures. The alpha coefficient was .72. A prehurricane (T-2) measure of minor deviance, identical to the one used at T-3, was also used in the analysis as a control variable. It was found to have an alpha coefficient of .71.

A complete list of the individual scale and index items, response choices, and scoring procedures can be obtained from the senior author.

**Analyses**

The data analyses were conducted separately for boys and girls due to their very different sample sizes and to investigate whether the effects of the hurricane on adolescents varied by gender. The analytic procedures included the calculation of zero-order correlation coefficients among the variables in the study and the testing of a path model of the effects of hurricane stress symptoms and problems on posthurricane minor deviance. Path analysis is a useful statistical technique for examining longitudinal data because it allows temporal ordering of the variables. In addition, the path coefficients can be interpreted like standardized regression coefficients. As a result, statistical tests for differences in beta coefficients can be utilized to determine the significance of differences between the corresponding path coefficients in the boys' and the girls' path models.

The path models were estimated with LISREL 7 procedures utilizing a correlation matrix (Jöreskog & Sörbom, 1989). Rather than estimating each equation separately, as with traditional path analysis, LISREL considers the model as a system of equations and estimates the structural coefficients simultaneously. The resulting path coefficients provide the means by which the direct, indirect, and total effects of the variables on one another can be calculated.

The structural components of the model can be tested for goodness of fit using a chi-square statistic. A non-significant chi-square indicates that the model fits the data well. However, since the chi-square statistic is af-
fected by large sample sizes, additional goodness-of-fit indices are also calculated (Jöreskog & Sörbom, 1989).

Results

Table 1 provides information on the social and demographic characteristics of the sample by gender group. Approximately two thirds of the boys were of Hispanic heritage; the remaining one third was evenly divided between African-American and White non-Hispanic students. Inasmuch as the larger research project from which the data for this paper were drawn focused primarily on boys, they were disproportionally represented in the sample. A smaller subsample of girls was drawn from four schools in Dade County. Almost one half the sample of girls was Hispanic with the remainder evenly divided between African-American and White non-Hispanic students.

Forty five percent of the boys' sample were in the lowest SES group; 40% were in the middle group, and 15% were in the upper SES group. In the girls' sample 42% were in the lowest SES group, 32% in the middle group, and 26% in the upper SES group.

A matrix of zero-order correlations, as well as the means and standard deviations for the variables used in the analysis, are presented in Table 2. Values in the upper triangle of the matrix are the correlations for girls; values in the lower triangle are the correlations for boys. Means and standard deviations for each of the variables in the model are included below the correlation matrix.

Table 1. Sociodemographic Characteristics of the Study Samplea

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<th>Variables</th>
<th>Boys</th>
<th>Girls</th>
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<td>n</td>
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<td>Race/ethnic group</td>
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<td>African-American</td>
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<td>Upper SES</td>
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aTotal N's of each variable may differ due to missing data.
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<td>—.01</td>
<td>—.03*</td>
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Male sample (n = 3829)

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Female sample (n = 430)

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*Values in the upper triangle of the matrix are the correlations for girls; values in the lower triangle are the correlations for boys.

*p < .05; **p < .01; ***p < .001.
For both boys and girls, the variable most highly correlated with posthurricane minor deviance was prehurricane deviance. The substantial correlation, .49, suggests that these behaviors remained relatively stable over time. Hurricane stress symptoms were more highly correlated with posthurricane minor deviance for girls (.29) than for boys (.16). Hurricane problems were also significantly correlated with postdisaster deviance for both gender groups, but the relationship was of lesser magnitude. Pre- and posthurricane family support were highly significant correlates of posthurricane minor deviance for both boys and girls. Racial/ethnic group variables and SES were not significantly related to posthurricane minor deviance for boys, but they were for girls.

A t test contrasting the mean scores on the hurricane stress symptoms scale by gender group indicated that girls were significantly more likely than boys to report symptoms of hurricane stress, t(545.3, N = 4716) = 5.28, p < .001. A repeated measures analysis of variance comparing means on pre- and posthurricane deviance scores revealed significantly higher levels of deviance after the hurricane for both boys, F(1, 4301) = 62.79, p < .001, and girls, F(1, 477) = 21.72, p < .001. However, girls had lower mean scores than boys on both the pre- and posthurricane minor deviance measures.

Path analysis of the variables in the model was conducted in order to explicate the relationships among the control, predictor, and mediating variables and posthurricane minor deviance. Separate path analyses were conducted for boys and girls to determine whether the contributions of the variables in the model to posthurricane minor deviance differed by gender. The results of these analyses are shown in Figures 1 and 2. In estimating the path models, race/ethnicity, and SES were utilized as exogenous control variables, hurricane-related problems and hurricane stress symptoms were utilized as the primary predictor variables, pre- and posthurricane family support were included as mediating variables, and prehurricane deviance was included to control for the adolescents's level of deviant behavior prior to the storm.

Following traditional conventions, only paths with coefficients at statistically significant levels were retained in the final model. Due to the large difference in the sample sizes for the boys and girls, the level at which a path coefficient was considered significant was p < .001 for the boys' sample and p < .05 for the girls' sample. Indirect effects, consisting of the sum of the products of alternate path coefficients, were added to the direct effects to produce the total effects of the variables in the model on posthurricane minor deviance.

The structural components of the model were tested for goodness of fit using LISREL 7 assessment measures (Jöreskog and Sörbom, 1989).
Hurricane Andrew and Deviant Behavior

Both models were fully recursive since all paths in each model led in one direction. Although the chi-square for the boys' model failed to achieve nonsignificance, $\chi^2 (22, N = 3,829) = 109.29, p = .000$, this was most likely due to the very large sample size. However, the goodness of fit (GOF) index, .994, and the adjusted goodness of fit (AGOF) index, .987, indicated a good fit of the model to the data. For each index a value between .9 and 1.0 indicates an acceptable fit. The goodness-of-fit indices for the girls' model also reflected a good fit of the model to the data, $\chi^2 (20, N = 430) = 23.37, p = .27; \text{GOF} = .988; \text{AGOF} = .974$.

The path analyses indicated that hurricane problems had a substantial direct effect on hurricane stress symptoms for both boys (.34) and girls (.39). These findings support the first hypothesis which postulated a positive and significant relationship between the number of hurricane-generated problems and the levels of hurricane-related stress symptoms experienced by those in the sample.

Figure 1. Path model estimating the effects of hurricane Andrew on minor deviant behavior among male adolescents. ***, $p < .001$. 
Figure 2. Path model estimating the effects of hurricane Andrew on minor deviant behavior among female adolescents.
The second hypothesis, which postulated that there would be positive relationships between hurricane problem scores and posthurricane deviance, was only weakly supported for both boys and girls, and, for both gender groups, they had only indirect effects. For boys, the path from hurricane problems through hurricane stress symptoms resulted in a small indirect effect (.04) on posthurricane minor deviance. For girls, hurricane problems had two indirect paths to posthurricane minor deviance. One led through hurricane stress symptoms (.07) and the other from hurricane problems through hurricane stress symptoms and through posthurricane family support (.01). The total indirect effect (.08) of hurricane problems on posthurricane minor deviance for girls, while significant, was relatively weak.

The third hypothesis, which postulated a positive and significant relationship between levels of hurricane stress symptoms and posthurricane minor deviance, was weakly supported for boys and moderately supported for girls. Stress symptom scores had a significant direct effect (.11) on posthurricane minor deviance for boys. The effect for girls was stronger. Stress symptom scores had a direct effect of .19 on posthurricane minor deviance as well as an indirect effect through posthurricane family support (.02) for a total effect of .21. A test for significant differences in the beta coefficients (direct path coefficients) between boys and girls was also calculated. It indicated that hurricane stress was a significantly stronger predictor of posthurricane minor deviance for girls than for boys.

The fourth hypothesis postulated that those with higher levels of perceived prehurricane family support would experience significantly lower levels of hurricane stress symptoms than those with lower levels of support. This hypothesis was confirmed for the girls but not for the boys. There were no significant direct or indirect effects of prehurricane family support on hurricane-related stress symptoms for boys while for girls there was a significant direct negative effect (-.12).

The fifth hypothesis stated that those with higher levels of hurricane stress symptoms would report significantly lower levels of perceived posthurricane family support than those with lower levels of stress symptoms. This hypothesis was partially supported. Hurricane stress symptoms had no direct or indirect effects on perceived posthurricane family support for boys. However, for girls, there was a relatively weak direct effect (-.10), indicating that girls with higher levels of stress symptoms perceived lower levels of family support after the hurricane.

The sixth hypothesis postulated that those with higher levels of perceived posthurricane family support would have significantly lower levels of posthurricane minor deviance than those with lower levels of support. This hypothesis was confirmed for both boys and the girls. Posthurricane
family support had a direct negative effect, \(-.24\) for boys and \(-.23\) for girls, on posthurricane minor deviance. In addition, it should be noted that prehurricane family support had substantial indirect effects on posthurricane minor deviance for both gender groups. The products of a number of alternate paths were summed yielding a total indirect effect of \(-.29\) for boys and \(-.32\) for girls.

Among the control variables, prehurricane levels of minor deviance had the strongest direct effect on posthurricane minor deviance for both gender groups. The effect was \(.41\) for boys and \(.38\) for girls. There were no significant paths from SES to any of the variables in the path model for boys or girls and, in keeping with conventions, this variable was deleted from the path analyses. In addition, the racial/ethnic group variables were not significantly related to any of the variables in the path model for boys and, therefore, they were also removed from the analyses. However, significant paths from Hispanic (.15) and African American (.24) to prehurricane minor deviance were found for girls. This finding indicated that girls in these two racial/ethnic groups were more likely to be involved in prehurricane minor deviant behavior than girls in the White non-Hispanic reference group. In addition, an indirect path from each of these racial/ethnic groups to posthurricane minor deviance also suggests that Hispanic and African-American girls were more likely to be involved in minor deviance after the hurricane than their White non-Hispanic counterparts.

The \(R^2\) value for the variables included in the path models as predictors of posthurricane minor deviance was similar for both gender groups. It was \(.31\) for boys and \(.34\) for girls.

Discussion

The research reported in this paper was designed primarily to determine the relationships between the problems and stress symptoms generated by Hurricane Andrew, family support, and posthurricane deviance among a multi-racial/ethnic sample of young adolescents. A longitudinal data set provided a context for the testing of several hypotheses derived from the stress and disaster literature. As hypothesized, there were strong positive relationships between the number of hurricane problems experienced and posthurricane stress levels among both boys and girls in all three racial/ethnic groups. This finding, while not new, does confirm the widely held view that stressors occasioned by disaster events have the potential to produce psychological stress symptoms among adolescents. On the other hand, the hypothesis regarding the relationships between problem levels and posthurricane deviance was not strongly supported. Only indirect re-
relationships were found between hurricane problems and posthurricane deviance, and for both gender groups these relationships were associated with stress symptom levels. In short, social structural factors related to personal losses such as damage to one's home became predictors of posthurricane deviance only when they were linked to psychosocial stress levels. This finding underscores Bolin's observation (1985) that community-wide disasters have the potential to produce negative psychological and social outcomes, even for those who do not experience economic losses and personal dislocations.

As hypothesized, hurricane-related stress symptoms were directly linked to posthurricane minor deviance for both gender groups. The authors recognize that caution must be used in interpreting these results, inasmuch as the relationships for boys were weak and for girls were only moderate. Nonetheless, these findings are important since hurricane stress remained a significant predictor of posthurricane deviant behavior even after the influence of prehurricane deviance and the other variables were taken into account. These findings demonstrate that the manifestations of posthurricane stresses may include a variety of nonnormative, deviant behaviors among adolescents as well as the more frequently documented psychological problems. And, although we are not making any claim for their reliability or validity, numerous anecdotal accounts offered by teachers in Dade County following the hurricane are consistent with the findings from our empirical data. Universally, teachers indicated to the research group that following the storm students displayed a wide range of attitudes and behaviors not seen before the hurricane. Many of the behaviors and attitudes they reported are often associated with stress-related outcomes, e.g., inability to concentrate, distractibility, agitation, short attention spans, and increased levels of aggressive and disruptive behaviors.

A significant gender difference in psychological symptomatology was found in this study with girls reporting higher levels of hurricane-related stress symptoms than boys. This result concurs with the findings of other investigators who have stated that females of all ages are more likely than males to report symptoms of anxiety and stress in postdisaster environments (Garrison et al., 1995; Green et al., 1991; Green et al., 1994; Shannon et al., 1994).

The relationships between family support, both pre- and posthurricane, and hurricane-related stress symptoms differed by gender. Perceived family support prior to the hurricane was found to mediate the experience of stress symptoms for girls but not for boys. Girls who perceived higher levels of prehurricane family support had lower hurricane-related stress symptom scores. In addition, girls with higher levels of hurricane-related stress symptoms reported lower levels of posthurricane family support. Among boys,
posthurricane family support was not linked to any of the hurricane-related variables in the model. These findings suggest that young adolescent girls may be more likely than boys to use family responses as a reference point for their own emotional reactions. A number of researchers have noted the importance of considering parental reactions (Handford et al., 1986; McFarlane, 1987), as well as an irritable or depressed family atmosphere (Green et al., 1991), when studying the stress responses of adolescents.

The findings on family support and posthurricane minor deviance were as hypothesized. Both boys and girls with higher levels of posthurricane family support had lower levels of posthurricane minor deviance. Prehurricane family support was also linked to posthurricane deviance, albeit indirectly, such that boys and girls with higher levels of family support prior to the hurricane reported lower levels of posthurricane minor deviance. Together, these results highlight the importance of considering family support factors in understanding social deviance among early adolescents.

Among the control variables, it was found that SES was not significantly related to any of the variables in the path model for either boys or girls. One possible explanation of this finding is that the impacts of the hurricane were so pervasive and geographically extensive that their adverse affects were randomly distributed throughout the community. Although the race/ethnicity variables were not related to the hurricane variables in the path model for boys or girls, they were predictors of prehurricane deviance and, indirectly, of posthurricane deviance among girls. That is, Hispanic and African-American girls in the sample were more likely to engage in minor deviant behavior than their White non-Hispanic counterparts, both before and after the hurricane.

The findings show considerable support for the model that guided the research, particularly for girls. For both gender groups, hurricane problems were related to stress symptoms which, in turn, were significantly related to post-hurricane deviance. And, for girls, family support served as a buffer against hurricane stress symptoms. However, viewed from a more global perspective, these findings indicate that, while significant, the problems and stresses associated with Hurricane Andrew were less powerful predictors of poststorm deviance than prehurricane deviant behavior.

A major strength of this study is that it is based on data collected both before and after the hurricane. However, several limitations of the study must also be acknowledged. While the measure of hurricane-related stress symptoms was based on the stress, psychiatric epidemiologic, and disaster literature, it was not a standardized measure and, as a consequence, direct comparisons with other studies are not possible. The use of self-report as the sole measure of minor deviant behavior was another limitation of the study. However, the complexities of obtaining collateral information...
on the deviant behavior of adolescents made the securing of these data all
but impossible, and, furthermore, the validity of such information can be
questioned as well. Moreover, other studies have found that adolescents
report these behaviors candidly, perhaps because they are among the most
prevalent kinds of social deviance (Kaplan et al., 1986; Kaplan & Johnson,

Lystad (1984), Benedek (1985), McFarlane (1987) and others have
called for the careful and long-term monitoring of the mental health and
social well-being of children and adolescents following their exposure to
disaster-related experiences. The results of our research suggest that those
planning and providing support services to adolescents in postdisaster en-
vironments should also be cognizant of the fact that disaster-related stresses
have the potential to produce a variety of other nonadaptive responses in-
cluding social deviance.

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