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Disaster Research Center

Preliminary Paper
#271

HURRICANE THREAT AND EVACUATION
INTENTIONS: AN ANALYSIS OF RISK
PERCEPTION, PREPAREDNESS, SOCIAL
INFLUENCE, AND RESOURCES

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1998

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Running Head: Hurricane Threat and Evacuation Intentions

This research was partially supported by Grant No 2 MH45069 from the Violence and Traumatic Stress Research Branch of the National Institute of Mental Health, Fran H. Norris, Principal Investigator.

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Abstract

The goal of this study was to test a model in which the decision to evacuate is a function of four processes (risk perception, preparedness, social influence, and economic resources). Participants were interviewed by telephone both while they were under a hurricane warning and after the threat had disappeared (pre-post sample). Because all respondents had been participants in an earlier panel study, pre-threat data were also available. The pre-post sample of 95 panelists was older than the non-respondent sample of 54 panelists who could not be reached by phone during the warning period but was otherwise comparable. The results indicated that higher risk perception and the belief that one is influenced by others are the strongest predictors of intentions to evacuate. Furthermore, risk perception was shown to mediate the influences of many background variables (e.g., experiences, demographics) on evacuation intentions. Post-event comparisons between the pre-post group and a reactivity control group of 66 panelists suggested that the warning period interview did not increase anxiety but may have influenced reactive preparedness.

Hurricane Threat and Evacuation Intentions: An Analysis of Risk Perception, Preparedness, Social Influence, and Resources

>From the viewpoint of the individuals involved in the process, evacuation is a gamble. Either they do not evacuate and risk possible injury or they evacuate and risk worrying about their homes and possibly wasting their time if a hurricane does not hit. Whereas many individuals err on the side of caution, other individuals take the gamble. Evacuation is largely a function of people defining themselves as being in danger and believing that leaving the area in question is beneficial (Fitzpatrick & Mileti, 1991). Successful evacuation requires involvement from both the community (issuing evacuation orders, providing marked exit routes) and the individual (decision making). Although community involvement is important in evacuation, external social influence can only go so far because ultimately the individual is responsible for the decision. Knowing who is at higher risk for not evacuating, and why, could indicate ways of influencing these individuals to make an affirmative evacuation decision and may even suggest early intervention strategies that provide access to the resources necessary to evacuate successfully. The goal of this study was to test a model in which the decision to evacuate is a function of four processes: risk perception, preparedness, social influence, and resources.

Risk Perceptions and Protection Motivation

In an analysis using a combined sample of 777 subjects from Hurricanes Hugo and Andrew, Riad, Norris, and Ruback (1998) examined the reasons people gave for not evacuating. Although both of these storms were Category 4 hurricanes, 33% of those who did not evacuate had believed that the hurricane was not a serious threat, and 25% had been confident in their safety. How bad must conditions be perceived to be before evacuation occurs? Evacuation researchers have examined different aspects of assessing risk, such as perceived severity of the threat, the individual's perceived susceptibility to that threat (Perry et al., 1981; Houts et al. 1984), and family characteristics (Houts et al. 1984, Drabek and Stephenson, 1971).

Many theories focus on individual preventive behavior by using a cost-benefit, decision making perspective (Weinstein, 1988). The health belief model (Becker, 1974; Janz & Becker, 1984), Fishbein

and Ajzen's theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), subjective expected utility theory (Beach, Campbell, & Townes, 1979; Edwards, 1954; Sutton, 1982) and Roger's protection motivation theory (Rogers, 1975) all share this cost-benefit view (Weinstein, 1988).

Perceptions of costs and benefits are important for understanding evacuation. While evacuation decreases certain risks, such as personal injury, it sometimes is perceived as increasing other risks, such as burglary (Riad et al., 1998).

Preparedness

Preparedness in the form of general knowledge and information should facilitate evacuation by enabling more appropriate response behaviors (Faupel et al., 1992). However, whereas some researchers have found high levels of preparedness (Hodler, 1982; Perry & Lindell, 1986) among evacuees, others have not (Bourque et al., 1973; Worth & McLuckie, 1977). What exactly constitutes preparedness has also been debated. At the United Nations conference in Yokohama, the word preparedness was defined in drastically different ways, ranging from action-oriented steps to education (Quarantelli, 1994). A citizen's ability to evacuate on short notice may depend upon two different types of preparedness -- proactive behaviors that have taken place previously in response to a hypothetical threat and reactive behaviors that take place when the threat is immediate (Faupel et al., 1992; Norris, 1997). Although many types of disasters occur too suddenly for reactive behaviors, satellite technology now provides most hurricane victims with a substantial warning period.

Prior disaster experience has been found to be a powerful predictor of preparedness (e.g., Demerath, 1957; Fritz 1961; Hutton, 1976; Moore et al., 1963; Norris, Smith, & Kaniasty, 1998; Perry et al., 1981). The more recent (Perry, 1979), direct (Tierney, 1993), and severe the experience was (Weinstein, 1988) the greater its influence on preparedness. However, Riad et al. (1998) found that prior evacuation behavior significantly predicted future evacuation behavior, whereas prior disaster experience did not. This led the authors to believe there is an "evacuation repertoire" because people who have evacuated before know what to do and how to act. This repertoire is very individualized. Prior evacuation experience may give people a sense of control or a feeling of self-efficacy. Residents may feel

prepared for the storm (e.g., boarded up windows, car filled with gas) but may not feel they have the capability to deal with the evacuation process if they have not done it before.

Social Influence and Norms

Emergency conditions change behavior and norms (Fritz, 1957; Perry, 1979). When a warning is received, people engage in what evacuation researchers have historically called the warning confirmation process. Individuals call others to get their interpretation of the event (Mileti, 1991; Drabek and Boggs, 1968) and observe each other's behavior (Cutter and Barnes, 1982; Carter, Clark and Leik, 1979). Other researchers like Christensen and Ruch (1980) are divided over the influence of social networks in prompting evacuation. Results from their two experiments using taped simulated hurricane bulletins showed that neither actions of an observable friend nor those of a spouse had any effect on the individual's response.

Because evacuation decisions are influenced by societal norms, different population subgroups, with different norms, may have different rates of evacuation (Moore, 1963). Research has backed this notion with race (Perry, 1979; Riad, et al., 1997), age, (Quarantelli, 1985) and gender (Riad et al., 1997).

Access to Resources

Resources are those stable assets, such as health, income, and social support, that can be used to cope with a variety of circumstances. Inadequate economic resources may inhibit evacuation because poor people do not have the means to evacuate (i.e., have no transportation or money). In Riad et al.'s (1997) study, 10% of those who did not evacuate attributed their behavior to inadequate social or economic resources. Individuals who are not well physically may also have trouble evacuating.

One important resource is social embeddedness which provides access to both tangible resources (e.g., a ride or a place to stay) and emotional support (Kaniasty & Norris, 1995). Family constitute an important resource because individuals are most likely to evacuate to the homes of relatives (Drabek & Boggs, 1968). Riad et al. (1997) found that individuals with strong social support were more likely to evacuate following Hurricanes Hugo and Andrew.

Present Study

In summary, the variables hypothesized to influence individual decision making are risk perception, preparedness, social influence and resources. These variables were examined as predictors of intentions to evacuate among individuals threatened by Hurricane Bertha in 1996. On Wednesday, July 10, 1996, Hurricane Bertha, a category 2 storm was threatening the Eastern Coast. The storm was 300 miles in diameter and its path was unclear. In Georgia, official mandatory evacuation orders were not yet issued but officials recommended that residents of the coastal islands evacuate as a precaution. In South Carolina, a mandatory evacuation order was issued in the evening for South Carolina's barrier islands. Because a northerly turn had been anticipated, a hurricane watch was never issued for Savannah and Charleston. A hurricane warning was issued when it appeared that Bertha would continue on a north-westerly path. A hurricane warning is issued when a hurricane is expected to hit within 24 hours. The hurricane did eventually turn towards the north and made landfall in Wilmington, NC. At the time, Bertha was a category 2 hurricane (105 mph).

On Tuesday July 9, 1996 at 11:30 pm it was decided that this hurricane presented a unique opportunity for study because two of the cities being threatened were the same cities involved in a longitudinal panel study that had been initiated following Hurricane Hugo. Longitudinal data are important for many reasons, including the establishment of reliability of measurement and documentation of changes over time. For this particular study, having a solid data base to work from helped immensely with the time pressures by allowing specific questions regarding evacuation to comprise the bulk of the questionnaire.

This situation also presented a methodological opportunity. Two major weaknesses of evacuation studies are that they are based on self report and employ a retrospective design. When data are collected after a hurricane strikes, time and the fact that the evacuation warnings were true may change residents' memories of why they did not evacuate. Though these weaknesses are pervasive in disaster research, this study overcame them by studying a community before as well as after evacuation warnings were proclaimed. By calling people during the warning period, we were able to ask them about their preparatory

behaviors when the details were still fresh in their minds. One possible issue with prospective designs is that calling before the event may increase awareness of the event and cause individuals to behave differently. Therefore we also incorporated a control group into the design to check for demand characteristics.

Method

Sampling Procedures and Design

Original Panel. A sample of 1,000 adults was drawn, 250 each from four cities that differed in their experience with Hurricane Hugo in 1989. Two of the original cities -- Charlotte, NC and Greenville, SC -- were not included in the present study of Hurricane Bertha. The two included cities -- Charleston, SC and Savannah, GA -- had both been threatened by Hurricane Hugo before the storm actually hit Charleston. Local interviewers used maps marking the boundaries of the areas to solicit interviews. Only one interview per household was allowed. For comparison purposes, a quota (purposive) sampling strategy was used. This strategy provided approximately equal numbers of Blacks and Whites, men and women, and younger (18-39), middle-aged (40-59) and older (60+) persons. The first interviews were conducted in the respondents' homes in the Fall of 1990, the second wave was six months later and the third wave was six months after that. The fourth wave of data was collected in the Fall of 1995. It was from this fourth wave of interviews conducted in Charleston (n = 146) and Savannah (n = 169) that the sample for this study was drawn (see Figure 1).

The Pre-Event Sample. From the fourth wave of interviews, conducted in the Fall of 1995, a manual contained the names, addresses, phone numbers and ID number of those respondents living in Savannah, GA. and Charleston, S.C. The flip of a coin randomly determined the individuals to be called during the hurricane warning. A team of 5 graduate students and 4 undergraduate students were organized to be the interview team. All of the interviewers but one had experience in conducting telephone interviews. Data collection started at 3:00 PM and lasted until 9:30 PM. A total of 165 phone numbers were called, and 95 interviews were conducted for a response rate of 58%.

Post-Event Samples. The post-event samples consist of three groups (see Figure 1). The first

group consisted of all the individuals who were called during the pre-event phase of the study (n = 95). Out of this group a total of 91 individuals were re-interviewed for a response rate of 96%. This group will be referred to as the pre-post group. The sample was 60.4% female and 50.5% black.

The second group called the reactivity control group consists of 95 individuals (n = 41 for Charleston and n = 54 in Savannah). A total of 66 individuals were interviewed (n = 32 for Charleston and n = 34 in Savannah) for a total response rate of 69%. This group had been set aside and was not called in the pre-event phase of the research. A control group is necessary because our phone call about evacuation could possibly be interpreted as a demand characteristic (increasing awareness of the hurricane and therefore causing evacuation). The sample was 68.2% female and 48.5% black.

The third group, the non-respondent group, was made up of 70 individuals (n = 37 in Charleston and n = 33 in Savannah) who were called on the night of the pre-event interviews but were not reached for the interview. Out of this group a total of 54 individuals were reached for a total response rate of 77%. Comparing their responses during the post-event interview to those of the other two groups will allow an estimate of sampling bias to be made. The sample was 61.1% female and 40.7% black.

The same interviewers responsible for the pre-event interviews attempted to call the same respondents back for the post-event interview. There are three large categories of measures, background, pre-event and post-event.

Background Measures

Many important demographic variables were located in the longitudinal data set. Related to evacuation is whether the individual owned or rented his/her home. Also available were measures of race, sex, age, tenure, occupation and education.

Risk Perception. A composite score of psychological distress at Wave 4 ($\alpha = .79$) was measured by taking the mean to 5 items (e.g., how often were your emotions numb, did you quit caring about people, were jumpy or easily startled, unusually forgetful, have trouble sleeping; Thompson, Norris & Hanacek, 1993). The response format ranged from 1 = never to 5 = very often.

Preparedness. At Wave 4, a set of 20 hazard preparedness questions influenced by the Mulilis -

Lippa earthquake preparedness scale (Mulilis et al., 1990) were included by Norris (1997). In a factor analysis, items clustered into Basic Supplies (e.g., radio, batteries, flashlight), Advanced Planning (e.g., household plan for severe storm, professional advice), Hazard Alertness (e.g., attentiveness to weather information), and Perceived Usefulness of Hazard Preparedness (e.g., how useful to have a plan of action). For this analysis a composite score was made by counting affirmative responses to a general hazard preparedness and awareness scale ($\alpha = .72$).

Social Influence. A scale of social embeddedness ($\alpha = .70$) was created by taking the mean of 7 items (number of people you say hello to in a day, how many friends and relatives do you enjoy spending time with and how many times did you get together with them, how many neighbors do you know well enough to visit, how many organizations do you participate in). Resources. The composite score of financial well-being was measured by taking the mean of 4 items ($\alpha = .76$; e.g., problems having clothing, food, meeting monthly bills and money issues were a burden; Norris & Uhl , 1993). The composite score of physical well-being combines 4 items ($\alpha = .84$; e.g., how often did your health prevent you from doing things you wanted to do, have trouble getting around, feel tired and feel physical burden; Norris & Uhl , 1993). The response format for these measures ranged from 1 = never to 5 = very often.

Pre-Event Measures

Evacuation. Subjects were asked, "If a warning is issued, are you going to evacuate?" They responded on a dichotomous scale (yes or no). From the literature and previous work, a list of all of the reasons people had given for not evacuating was compiled. Respondents were read each reason and then asked if it was true or false about them (see Table 1).

Risk Perception. The measure of risk perception was created by taking the mean of affirmative responses to 10 items tapping whether these perceptions would encourage evacuation (current severity/category of the hurricane, national hurricane center increasing the category of the hurricane, an official evacuation order being issued, a governmental mandatory evacuation order being issued, actually feeling the sustained winds on your face, hearing the noise the winds make, family encourages leaving,

believe storm is coming, believe storm will be bad, feel house unsafe; $\alpha = .72$). Respondents answered each question yes or no.

A composite score representing anxiety ($\alpha = .89$) was created by taking the mean of responses to whether the respondents felt nervous, fearful, anxious and stressed. The response format ranged from 1 = not at all to 4 = a great deal. The age and gender of everyone currently living in their household was listed.

Preparedness. To assess the level of reactive preparedness a number of items related to hurricane preparedness were asked. Respondents were told that people do different things in case of emergencies and that the questions referred to right now, today. The respondents answered yes or no. A reactive preparedness measure was created by counting the affirmative responses to whether individuals had done a number of items related to hurricane preparedness (presence of a tarp, chainsaw, protection plan, secured outdoor furniture, moved valuables to a safer place, knew location of shelter, had extra cash, had an evacuation route, had an alternative evacuation route; $\alpha = .72$).

Social Influence. Two types of social influence were measured. The first was reality based, in that it measured the types of social influence actually received or provided. The second type of social influence was hypothetical in that it asked whether types of social influence would affect an evacuation decision if received.

The measure of actual social influence ($\alpha = .76$) was created by taking the mean of the responses tapping this construct (number of neighbors spoken with, number of neighbors preparing their homes, number of neighbors preparing to evacuate, number of people spoken to about an evacuation route, how many friends and family members have called you to urge evacuation, how many friends and family members have offered you a ride or a place to stay, have you made plans for relatives, have you offered anyone a ride or a place to stay). Except for offering a ride or a place to stay, whose response options were yes or no, the questions were answered on a 5-point scale: 1 = none, 2 = one or two, 3 = three to five, 4 = six to nine, or 5 = ten or more.

Openness to social influence ($\alpha = .61$) was assessed by asking whether the following experiences

would encourage them to evacuate: the chance to affiliate with others, seeing neighbors leave, having a friend ask you to evacuate. Respondents answered simply yes or no. The more speculative hypothetical questions were asked before the reality based social influence questions.

Resources. To assess the amount of self-efficacy, four questions ($\alpha = .77$) were adopted from Bandura and rewritten to be specific for the evacuation process (when I make the evacuation plan I am sure it will work, if I run into a problem while evacuating I am sure I can solve it, I think evacuation is too complicated to do and when I start to evacuate I believe I will be able to reach a safe spot). The response options were simply true or false. Applicable questions were reverse-scored.

Post-Event Measures

Risk Perception. Post-event anxiety ($\alpha = .72$) was assessed with the same 4 questions used in the pre-event questionnaire (feel nervous, fearful, anxious, stressed). In addition, respondents were asked, "In the past week how often have you thought about Hurricane Hugo?" and "In the past week how often have you thought about other seriously stressful events that have happened to you?" Both questions were answered on a 4-point scale from 1 = not at all to 4 = a great deal.

Preparedness. To assess any preparatory actions that may have happened after we telephoned respondents, the following questions were asked, "Did you gas up your car, or had you already gassed it up or you did not gas it up"? The answers were scored on a 3 point nominal scale did it, had already done it, and did not do it. The same format was used to assess attainment of water, food, batteries and cash.

Social Influence. To assess amount of social comparison and need for affiliation, respondents were asked if they spent the warning period with anyone other than members of their household. If they answered "yes" then they were asked whether this was for: "Emotional support?", "To compare yourself with others?", "For practical support?", "For informational support?", "Because you were afraid?", and "Because they were afraid?" Respondents answered yes or no.

Results

Description of the Pre-Event Sample

There were 38 males (40%) and 57 females (60%) in the sample. Regarding race, 48% of the sample were Black (n = 46) and 52% were White (n = 49). The sample's mean age in years was 62 (SD = 15.5, range = 27 to 88), and the average years of education were 12.6 (SD = 3.5, range = 5 to 24). The majority of the sample (43.2%) were retired, followed by 33.7% of the sample working full-time. The average amount of time spent in the house during the day was 18 hours. The majority (45%) of the sample (n = 43) were married, although 14% had never married (n = 13), 11% were divorced (n = 10) and 30 % were widowed (n = 29).

The number of people in the household ranged from 1 to 6 (M = 2.5). The number of males in the household ranged from 0 to 3 (M = 1.1) and the number of females ranged from 0 to 4 (M = 1.4). The number of children in the household ranged from 0 to 5 (M = 0.6). The range for male children was 0 to 3 (M = .35) and the range for female children was 0 to 3 (M = .28).

Descriptive Analyses of Evacuation Beliefs and Experiences

Table 1 presents a list of beliefs about evacuation, compiled from earlier work regarding why individuals do not evacuate (Riad et al., 1997). As indicated by the percentages, the majority of this sample believed that they had enough time to leave, that they were in control, and that they had experience with hurricanes. Against the grain of popular disaster lore, only 5 individuals felt they had to stay and care for their pets.

To test whether individuals with different demographic characteristics had different beliefs and experiences regarding the evacuation process a series of chi-square analyses were conducted. Women were more likely to believe the storm was going to be bad, $\chi^2(1, N = 95) = 3.67, p = .05$. Men were more likely to say that they felt their house was safe, $\chi^2(1, N = 95) = 6.88, p < .01$. Men were also more likely to say that they felt in control $\chi^2(1, N = 95) = 4.95, p < .05$. Higher education was related to feeling God is in control, $\chi^2(1, N = 95) = 9.27, p < .05$ as was being Black, $\chi^2(1, N = 95) < 13.70, p < .001$. Whites had more recent evacuation experience, $\chi^2(1, 94) = 15.00, p < .001$. Individuals who had

intentions of evacuating felt less safe in their homes, $\chi^2(1, N = 95) = 10.81, p < .001$, and owned cars, $\chi^2(1, N = 95) = 4.17, p < .05$.

Individuals who had evacuation intentions had family who wanted to leave, $\chi^2(1, N = 82) = 14.72, p < .01$. They also felt that the hurricane would be coming, $\chi^2(1, N = 95) = 5.10, p < .05$, and that it would be bad, $\chi^2(1, N = 95) = 8.39, p < .01$. Individuals who lived in Savannah were more concerned about looting, $\chi^2(1, N = 95) = 3.71, p = .05$, whereas individuals in Charleston said they had more hurricane experience $\chi^2(1, N = 95) = 8.30, p < .01$.

Those who spent the warning period with others ($n = 66$) did so for a variety of reasons. Rank ordered, emotional support was first, followed by: practical support, informational support, because they were afraid, in order to compare self with others and, finally, because the individual was afraid. Blacks were more likely to have spent the warning period with others for emotional support, $\chi^2(1, N = 66) = 4.91, p < .05$.

Multivariate Relations Between Background Variables and the Proximal Measures

Multiple regression was used to determine whether background variables predicted risk perception, reactive preparedness, actual social influence, openness to social influence, efficacy, and anxiety. These measures are those thought to be more proximally related to the evacuation decision and were often substantially related to one another. Risk perception and hypothetical social influence were highly intercorrelated ($r = .64$). Risk perception was also highly correlated with anxiety ($r = .39$). Reactive preparedness was correlated with actual social influence ($r = .53$) and efficacy ($r = .32$). Openness to social influence was moderately correlated with anxiety ($r = .23$). The background variables were selected on the basis of the literature and bivariate relations. They were entered into the equation simultaneously. Table 2 presents the standardized regression coefficients as well as the amount of variance accounted for by the set of background variables in each of the composite variables.

For risk perception, hurricane experience had a marginal relationship. Prior evacuation experience was positively related to risk perception. Women, Blacks, and individuals living in Savannah perceived more risk. Individuals who reported psychological distress at Wave 4 perceived more risk.

Anxiety was only predicted by past psychological distress.

Reactive preparedness was predicted by prior evacuation experience and greater preparedness at Wave 4. Younger and Black individuals conducted fewer of the preparatory behaviors. There was a marginal, inverse relation between education and reactive preparedness.

Higher actual social influence was associated with greater preparedness at Wave 4, higher embeddedness in the community, and having more women in the house. Openness to social influence was associated with more evacuation experience and past psychological distress. Respondents who lived in Savannah were also more open to social influence.

Higher efficacy was associated with prior evacuation experience, financial and physical well-being, embeddedness in the community, and more children. However, the fewer women in the household, the more efficacy was reported.

Predictors of Evacuation Intention

Almost half of the sample said they had intentions of evacuating (46%). To determine what demographics were related to intentions to evacuate a series of chi-square analyses were conducted. Chi-square analyses revealed that individuals who had prior hurricane experience were less likely to have evacuation intentions, $\chi^2 (1, N = 95) = 9.44, p < .01$. Those who owned their homes were less likely to have intentions to evacuate, $\chi^2 (1, N = 95) = 8.17, p < .01$. Women were more likely to have evacuation intentions, $\chi^2 (1, N = 95) = 3.73, p < .05$. Individuals who lived in Savannah were more likely to have evacuation intentions, $\chi^2 (1, N = 95) = 7.60, p < .01$. Blacks were more likely to have evacuation intentions than Whites, $\chi^2 (1, N = 95) = 5.50, p < .05$.

For the continuous variables predicting evacuation a MANOVA was conducted. Dependent variables were the proximal influences (efficacy, reactive preparedness, risk perception, actual social influence, openness to social influence, anxiety), the background variables (e.g., financial well-being, physical well-being, Wave 4 preparedness, Wave 4 distress, home ownership, tenure, age, sex, and race) and household composition variables (e.g., number of females and males, children and adults). The independent (grouping) variable was evacuation intentions (yes, no). The multivariate F was significant,

$F(21, 72) = 4.22, p < .001$. Individuals who intended to evacuate were more anxious, had less education, were less embedded in the community, reported psychological distress in the past, perceived more risk, and were more open to social influence than those not intending to evacuate. Reactive preparedness, actual social influence and efficacy were not related to evacuation intentions.

To investigate the importance of whether these relations might differ by city, another MANOVA was conducted on the split sample. The results are presented in Table 3. Individuals who intended to evacuate from Savannah had more anxiety, perceived more risk, were more open to receiving social influence, had more females in the house, were less attached to their home, had lower education levels, and were less embedded in the community than those who did not intend to evacuate. Individuals who intended to evacuate from Charleston also were more anxious, perceived more risk, were more open to social influence, had prior psychological distress, were less educated, and were less embedded in the community than individuals who did not intend to evacuate.

A hierarchical logistic regression model was derived by entering variables that had significant bivariate effects into the equation predicting evacuation intentions. Hierarchical logistic regression was used because of multicollinearity between two of the important variables, risk perception and openness to social influence. Risk perception was entered into the equation first, $\chi^2(1, N = 94) = 40.79, p < .000$. Alone this variable correctly classified 28.5% of the sample over chance. Then embeddedness was entered into the equation, $\chi^2(1, N = 94) = 6.73, p < .001$. This addition improved the model fit by correctly classifying another 1.1% of the sample. Third, openness to social influence was entered, $\chi^2(1, N = 94) = 5.52, p < .05$. The addition of this variable further increased the overall fit of the model by correctly classifying another 3.2% of the sample. Finally, all of the other variables such as anxiety, prior hurricane experience, home ownership, education, race, sex, and city were entered last (see Table 4). None of these variables added to the overall fit of the model, $\chi^2(7, N = 87) = 8.34, n.s.$ Overall the total model correctly classified 32.8% of the sample over chance. Individuals who more perceived risk and were less embedded in the community had evacuation intentions. Openness to social influence was marginally correlated with evacuation intention.

Risk Perception as a Mediator

To test the idea that risk perception mediated the relationship between other variables and evacuation intentions, further analyses were conducted (See Figure 2). According to Baron and Kenny (1986) three conditions must be met to establish mediation. First the independent variable (in this case a set of variables; hurricane experience, evacuation experience, city, past psychological distress, race and sex) must be shown to affect the mediator (risk perception). To test the first condition, a regression equation predicting risk perception was conducted using sex, race, evacuation experience, past psychological distress, city, and hurricane experience as independent variables. This equation was significant, $F(6,88) = 8.24, p < .001$.

The second requirement of mediation is that the mediator (risk perception) must be shown to affect the outcome variable (evacuation intention). This second step was also confirmed because risk perception predicted intentions to evacuate, $\chi^2(1, N = 95) = 42.33, p < .001$. The third requirement is that the effects of the set of independent variables on the outcome variable should (evacuation intention) decrease when the effects of the mediator are taken into account. This was accomplished in two parts. First, the same group of independent variables needed to significantly predict evacuation intention and it did, $\chi^2(1, N = 95) = 31.17, p < .001$. The second goal was to see whether the group of background variables predicted evacuation intentions to evacuate when risk perception was controlled for in the analysis. It did not, $\chi^2(1, N = 87) = 7.78, n.s.$ This meant that risk perception was a psychological mediator of evacuation intentions for those with experience, those living in Savannah, those having past psychological distress, Blacks and women.

Methodological Comparisons

In order to test for the presence of response bias and demand characteristics, validity checks were conducted. To identify these biases, three groups were interviewed one week after the hurricane. The pre-post group was the sample who was interviewed both before and after the hurricane (see Figure 1 for a review). The reactivity control group was the sample that was randomly set aside at the beginning of the study, and no attempt to call them was made. The non-respondent group consisted of those with whom

interviews were attempted but who could not be reached. All validity checks involved examining whether there were differences between these groups on basic demographic characteristics and all post-event measures. Only the significant ones will be mentioned here.

The first comparison involved the reactivity control group and the pre-post group. This comparison tells us whether the individuals we called were significantly different from the individuals we did not call and if our phone call could have influenced evacuation, anxiety levels, or preparedness. The reactivity group scored higher on anxiety ($M = 1.38$) than the pre-post group ($M = 1.20$), $t(155) = -2.32$, $p < .05$. The second comparison involved the reactivity control group and the non-respondent comparison group. This comparison tells us whether the individuals we attempted to contact (e.g. but were not at home) were significantly different from the individuals we did not call. There were no significant differences between these two groups. A third comparison tested differences between the pre-post group and the non-respondent group. This was done in order to determine if there was a response bias, meaning that the individuals we contacted were different in some way than the individuals who were not at home that night. The non-respondent group was marginally more anxious ($M = 1.34$) than the pre-post group ($M = 1.20$), $t(143) = -1.90$, $p < .07$. The pre-post group was older ($M = 61.9$) than the non-respondent group ($M = 52.5$), $t(143) = 3.45$, $p < .001$. A chi-square analysis revealed that the pre-post group had been less likely to spend the warning period with other people, $\chi^2(1, N = 143) = 9.52$, $p < .01$. From this we know that our phone call did not influence affiliation. The pre-post group was, however, more likely to buy batteries than the non-respondent group, $\chi^2(1, N = 143) = 9.19$, $p < .01$. It appears from the consistent anxiety findings that our phone call did not increase anxiety.

Discussion

In this final section, results of the study are summarized, the limitations and strengths of the study are described, and the implications for future investigations are discussed. This study was undertaken to identify the differences between respondents who intended to evacuate and those who did not under ambiguous threatening circumstances. The variables of particular interest were risk perception, preparedness, social influence, and resources.

Clearly, perceiving risk was very important in deciding whether to evacuate or not. Other storm characteristics such as believing it was going to be bad and that it was coming also had an effect on evacuation intentions. These findings are consistent with the models of evacuation decision-making that have placed great emphasis on risk perception.

Risk perception was a psychological mediator for important background variables (e.g., race, sex, past psychological distress, hurricane experience, evacuation experience, and city). Although independently these variables predicted evacuation intention, they do not once risk perception was controlled for. Being Black, female, having past distress, being experienced, and living in Savannah affected how much risk these individuals felt and this link was what predicted evacuation intention.

There are other variables that may affect the adults' perception of risk. Historically, studies have shown that family variables have been very important components of evacuation (Houts et al, 1984; Drabek & Stephenson, 1971). This was because families tended to evacuate as a unit (Perry, 1979). Consistent with past research, individuals who had intentions to evacuate had family who wanted to leave.

Another household variable that could affect perceptions of risk was having children in the house. Past research has found that households with young children were more likely to evacuate (e.g., Houts et al, 1984). In this study, the influence of children in the household was assessed in two ways. First, those who had children in the household (35.8%) were compared to those who did not have children in the household (64.2%). Secondly, the evacuation intentions of individuals who had young children (e.g., under six and 12) were examined. Neither the number of total children in the household nor the number of young children in the household were related to evacuation intentions.

Although having children was not related to evacuation intention, having male children was related to perceiving more risk. The more male children in the household, the more risk was perceived. Zajonc's (1976) research with birth order showed that there was a longer lag time between babies being born when the first child was a male. The hypothesized reason for this was that parents preferred male children, therefore waited longer after having a male child than a female child. Cross-cultural research

also shows that male children are preferred in India (Nath & Land, 1994) and in China (Arnold & Zhaxiang, 1986). If this male child preference is true, then respondents may have been more concerned with protecting male children.

This study took into account that individuals may sometimes experience conflicting motivations in that although they perceive risk, it may be for their territory rather than for themselves. This notion of territoriality was important on the bivariate level with owners being less likely to leave, and being more concerned about looting. There was also a city difference with individuals who lived in Savannah being more attached to and proud of their homes. These individuals were less likely to have evacuation intentions.

The second variable hypothesized to be related to evacuation intentions was preparedness. Younger, White, and married individuals were more prepared. This may be a resource issue in that younger individuals have more energy to prepare, and married couples have more help. Blacks were less well off financially than Whites. However, financial well-being itself was not related to preparedness.

Individuals who were prepared at Wave 4 (1995) were prepared at Wave 5 (before Bertha). The Wave 4 measure was concerned with general hazard preparedness. The Wave 5 measure was concerned with reactive preparedness. This research is consistent with the finding that higher levels of general preparedness should enable more appropriate response behaviors (Faupel et al., 1992). This finding is very important because it pulls the field one step beyond where it was given the context of the study (e.g., actual threat of natural disaster).

Prior evacuation experience was once again more important than hurricane experience. Those who had prior evacuation experience (52.6%) perceived more risk, were more prepared, had higher levels of efficacy, and were more likely to say that others would influence their decision to evacuate. Hurricane experience was only marginally related to risk perception. Those who had evacuation experience were more likely to have evacuation intentions. However, those who had hurricane experience were less likely to have evacuation intentions.

It has been suggested that individuals who have prior evacuation experience have an evacuation

repertoire because they know what to do and how to act (Riad et al., 1997). This study takes the repertoire finding further because it includes 2 additional steps, efficacy and risk perception. Now it can be said that individuals who have evacuated before know what to do, how to act, feel as though they can accomplish the action, and perceive enough risk to intend to evacuate to begin with.

The other important variable that predicted evacuation intentions in the logistic regression model was social embeddedness. Individuals who had evacuation intentions appeared to be less embedded in the community. As mentioned before, some individuals may be more attached to place. It is possible that individuals who are more embedded in the community find it more difficult to leave.

There were two types of social influence measured, actual and hypothetical. Actual social influence is a combination of social comparison processes (e.g., see neighbors preparing homes, see neighbors preparing to evacuate) and specific disaster related support (e.g., received phone calls, talked to individuals about evacuation routes). Hypothetical social influence measured an openness to being influenced by others to make an evacuation decision.

Younger individuals received more actual social influence (e.g., spoke with more people, saw more individuals engaging in preparatory behaviors). The more females in the household the more actual social influence. Vaux (1988) has argued that feminine sex-role characteristics (e.g., expressing warmth and compassion; see Bem, 1974) facilitates the providing and receiving of support and therefore enhances the development and maintenance of supportive relations. These types of relations may become more apparent under stressful situations like a hurricane threat. There is some indication that women prepare their families and communities for disasters more than men (Fothergill, 1996).

Openness to social influence was related to having evacuation experience and having past psychological distress. These individuals may have made a positive decision to evacuate if only they had been influenced. Blacks were more open to social influence. In other words, Blacks said that they would be influenced to evacuate if they were called, if they saw their neighbors leave, and if a friend asked them to leave. There were, however, no ethnic differences regarding actual social influence. This may be representative of cultural differences between White and Black families. Staples (1979) stated that the

Black kinship network is more extensive and cohesive than kinship bonds among the Whites and a larger proportion of Black families take relatives into their household. From this, it logically follows that Blacks would be more open to others suggesting that they evacuate; however, they may not have had the resources to provide actual support.

Gender differences appear to be quite consistent in the literature with women being more likely to evacuate (Riad et al., 1997) and have evacuation intentions. As men and women view the world differently, it follows that they will also perceive risks differently (Cutter, 1992). Women are more likely to perceive a disaster event or threat as serious or risky (Cutter, 1992; Howe, 1990; Leik et al., 1982; Flynn et al., 1994, Fothergill, 1996). Gender was also one of the variables mediated by risk perception. Women perceived more risk and felt less safe in their homes than the men. Women are more likely to receive risk communication, due to their social networks, and to respond with protective actions, such as evacuation (Fothergill, 1996).

Altogether resources were not important predictors of evacuation intentions. This is consistent with past research as well (Riad et al., 1997). It appears as though individuals will find a way to leave if they perceive enough risk. Socioeconomic status, as indicated by a financial well-being scale, was not a significant predictor of evacuation intention. Physical stress that could hinder evacuation was not related to intentions either. Efficacy was unrelated to evacuation intentions as well. Social support questions specific to evacuation were not distinguishable in factor analyses from the other social influence items.

Before closing, a few strengths and weaknesses of the study should be noted. The major weaknesses of the study are that it was based on self report and that a wide range of age groups were not represented. It is important to remember that this was the fifth wave of interviews with these individuals. The original sample in 1990 was selected so that a third of the individuals were over 60.

A possible issue also is that evacuation intention was measured, not evacuation per se. In the theory of reasoned action (Fishbein & Ajzen, 1977) and the addition to it of the theory of planned behavior (Ajzen, 1989), the individual's intention to perform the behavior is a central factor. Intentions are assumed to capture the motivational factors that impact on a behavior; they are indications of how

hard people are willing to try and of how much effort they are planning to exert in order to perform the behavior. The theory of planned behavior postulates three conceptually independent determinants of intentions. The first is the attitude toward the behavior (positive or negative). The second is a social factor that is the perceived social pressure to perform or not perform the behavior. The third and final antecedent of intention is the degree of perceived control which is influenced by such factors as prior experience and other resources.

Intention, in turn, is viewed as one immediate antecedent of actual behavior (Ajzen & Fishbein, 1980). In this case the driving motivation is risk perception. This study showed that risk perception is a psychological mediator of intentions to evacuate controlling for social norm pressures and resources.

The main strength of this study was the prospective design using a large longitudinal data base. One of the advantages of using a longitudinal sample was that the prior psychological distress measure was truly prior and, therefore some causality can be inferred. Most studies of evacuation use a retrospective design and we do not believe that evacuation intentions under true threat conditions have ever been studied.

One problem with this approach was that asking evacuation questions before the event may cause heightened awareness of the four processes discussed so far. The inclusion of the non-respondent and reactivity control groups addressed this issue. It is important to note for both ethical and measurement issues that our phone call did not increase anxiety.

Another concern is that Bertha did not hit. However, Turner, Nigg, and Paz (1986) have stated that a disaster need not occur for there to be social consequences. Their research showed increased levels of preparedness for and awareness of an earthquake threat in California. Another possible criticism was that studying evacuation intention was not the same as studying evacuation. It may be that the lack of significant resource variables predicting evacuation intentions may be proof of this missing link in that resources may become important for turning the intention into an action. On the other hand, as already mentioned, the theory of planned behavior states that intentions are the best predictors of behavior.

Another possible criticism is that exactly how the individuals were warned about the impending

disaster was not assessed. It may be that how individuals were warned was not central to whether these individuals perceived risk. This is especially the case with hurricanes when satellite images are readily available. As has already been mentioned, the sample was aware of the threat. However, warning may be more important with flash floods, tornados and other types of more immediate disasters.

Regarding generalizability there were differences between the cities of Savannah and Charleston. Individuals in Savannah were more concerned about looting and were more open to social influence. The political problems in Savannah may have led to strong city differences. Another reason there was a city difference could be that individuals in Charleston had prior experience with Hugo. This may explain why individuals in Charleston who intended to evacuate had experienced past psychological distress. A final reason for why Savannah perceived more risk than Charleston was that they were closer to the hurricane during data collection.

In summary, this study adds to the scientific body of literature in numerous ways. First the design of the study was such that many issues regarding evacuation in the literature could be assessed under threat conditions. Having comparison groups adds to the validity of the findings. Secondly, showing that risk perception is a psychological mediator could lead to specific intervention ideas. Knowing who takes these events less seriously gives emergency managers a way to target that population for possible help with decision making or preparedness. Third, regarding social influence, in some cases, a single phone call from a friend could encourage evacuation. Fourth, there was a relationship between general preparedness and reactive preparedness. Increasing general preparedness of the community would lead to better preparedness under threat conditions.

In conclusion, risk perception, social influence and preparedness are important indicators of intentions to evacuate. Resources were not important in predicting evacuation intentions. Usually reasons including resources are examined after an event has occurred. Individuals who really should have evacuated are asked why they did not. Using low resources (e.g., no car, no place to go) as excuses may reduce the cognitive dissonance felt by the individuals in some of these cases.

References

- Aguirre, B. E. (1991). Evacuation in Cancun during Hurricane Gilbert. International Journal of Mass Emergencies and Disasters, 9(1), 31-45.
- Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting behavior. Englewood Cliffs, NJ: Prentice-Hall.
- Altman, I. (1975). Environment and social behavior: Privacy, personal space, territory and crowding. Monterey, CA: Brooks/Cole.
- Arnold, F. and Zhaoxiang, L. (1986). Sex preference, fertility, and family planning in China. Population and Development Review, 12, 221-246.
- Baker, E. J. (1979). Predicting response to hurricane warnings: A reanalysis of data from four studies. Mass Emergencies, 4, 9-24.
- Baker, E. J. (1991). Hurricane evacuation behavior. International Journal of Mass Emergencies and Disasters, 9(2), 287-310.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191-215.
- Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. Journal of Personality and Social Psychology, 35, 125-139.
- Beach, L., Campbell, F., & Townes, B. (1988). Subjected expected utility and the prediction of birth planning decision. Organizational Behavior and Human Performance, 24, 18-28.
- Bolin, R. (1989). Natural disasters. In R. Gist and B. Lubin (Eds). Psychosocial aspects of disaster. New York: John Wiley & Sons (pp 3-28).
- Bourque, L., Reeder, L., Cherlin, A., Rave, B., & Walton, D. (1973). The unpredictable disaster in a metropolis: Public response to Los Angeles earthquake of February, 1971. Los Angeles, CA: Survey Research Center, University of California, Los Angeles.
- Bromet, E., Schulberg, H.C., Dunn, L., & Gondek, P. (1980). Three Mile Island Mental health findings. Rockville, MD: National Institute of Mental Health.

Burger, J., & Palmer, M. (1992). Changes in and generalization of unrealistic optimism following experiences with stressful events: Reactions to the 1989 California Earthquake. Personality and Social Psychology Bulletin, 18, 39-43.

Brown, B. (1987). Territoriality. In D. Stokols & I. Altman (Eds.), Handbook of environmental psychology. New York: Wiley (pp. 505-532).

Carter, T., Clark, J., & Leik, R. (1979). Organizational and household response to hurricane warnings in the local community. NHWS Report Series, Department of Sociology, University of Minnesota, Minneapolis.

Cohen, S., & Hoberman, H.M. (1983). Positive events and social support as buffers of life change stress. Journal of Applied Social Psychology, 13, 99-125.

Cottrell, N., & Epley, S. (1977). Affiliation, social comparison and socially mediated stress reduction. In J. M. Suls & R. L. Miller (Eds.), Social comparison processes: Theoretical and empirical perspectives (pp.43-68). Washington, D. C.: Hemisphere.

Christenson, L., & Ruch, C. (1980). The effect of social influence on response to hurricane warnings. Disasters, 4, 205-210.

Cutter, S. (1994). Environmental risks and hazards. Englewood Cliffs, NJ: Prentice-Hall.

Cutter, S., & Barnes, K. (1982). Evacuation behavior and Three Mile Island. Disasters, 6, 116-124.

Dabbs, J. M., & Leventhal, H. (1966). Effects of varying the recommendations in a fear-arousing communication. Journal of Personality and Social Psychology, 4, 525-531.

Deaux, K., Dane, F.C., & Wrightsman, L.S. (1993). Social psychology in the 90's. Pacific Grove, CA: Brooks/Cole Publishing Company.

Demerath, N. (1957). Some general propositions: An interpretive summary. Human Organization, 16, 28-29.

Drabek, T. E., & Boggs, K. S. (1968). Families in disaster: Reactions and relatives. Journal of Marriage and the Family, 30(3), 443-451.

- Drabeck, T. E., & Stephenson, J. S. (1971). When disaster strikes. Journal of Applied Social Psychology, 1(2), 187-203.
- Edwards, W. (1954). The theory of decision making. Psychological Bulletin, 51, 380-417.
- Faupel, C.E., Kelley, S.P., & Petee, T. (1992). The impact of disaster education on household preparedness for Hurricane Hugo. International Journal of Mass Emergencies and Disasters, 10, 5-24.
- Festinger, L. (1954). A theory of social comparison processes. Human Relations, 7, 117-140.
- Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.
- Fischhoff, B. (1990). Psychology and public policy: Tool or toolmaker? American Psychologist, 45, 647-653.
- Fitzpatrick, C., & Mileti, D. (1991). Motivating public evacuation. Mass Emergencies and Disasters, 9, 137-152.
- Flynn, C. B. (1979). Three Mile Island telephone survey, preliminary report on procedures and findings. Washington, D.C.: U.S. Nuclear Regulatory Commission.
- Flynn, C.B., & Chalmers, J.A. (1979). The social and economic effects of the accident at Three Mile Island: Findings to date. Washington, D.C.: U.S. Nuclear Regulatory Commission.
- Fothergill, A. (1996). Gender, risk, and disaster. International Journal of Mass Emergencies and Disasters, 14, 33-56.
- Fritz, C. (1961). Disaster. In Robert Menton and Robert Nisbet (Eds.), Contemporary Social Problems. New York: Harcourt.
- Fritz, C.B., & Williams, H.B. (1957). The human being in disasters: A research perspective. The Annals of the American Academy of Political and Social Science, 309, 42-51.
- Greenberg, M. S., & Ruback, R.B. (1994). After the crime: Victim decision making. New York: Plenum Press.
- Haas, J., & Trainer, P. (1974). Effectiveness of Tsunami warning systems in selected coastal towns in Alaska. Rome: Proceedings of the Fifth World Conference on Earthquake engineering.

- Hobfoll, S. (1988). The ecology of stress. New York: Hemisphere.
- Hodler, T. (1982). Residents' preparedness and response to the Kalamazoo tornado. Disasters, 6, 44-49.
- Houts, P. S., Lindell, M. K., Hu, T. W., Cleary, P. D., Tokuhata, G., & Flynn, C. (1984). The protective action decision model applied to evacuation during the three mile island crisis. International Journal of Mass Emergencies and Disasters, 2(1), 27-39.
- Hutton, J. (1976). The differential distribution of death in disaster: A test of theoretical propositions. Mass Emergencies, 1, 261-266.
- Janis, I. (1967). Effects of fear arousal on attitude change: Recent developments in theory and experimental research. In L. Berkowitz (Ed.), Advances in Experimental Social Psychology, Vol. 3. New York: Academic Press, 1967.
- Janis, I. L., & Mann, L. (1977). Decision making: A psychological analysis of conflict, choice, and commitment. New York: The Free Press.
- Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. Psychological Review, 80, 237-251.
- Kaniasty, K., & Norris, F.H. (1995). In search of altruistic community: Patterns of social support mobilization following Hurricane Hugo. American Journal of Community Psychology, 23, 447-477.
- Kulik, J., Mahler, I. & Earnest, A. (1994). Social comparison and affiliation under threat: Going beyond the affiliate-choice paradigm. Journal of Personality and Social Psychology, 66, 301-309.
- Kurland, N. (1995). Ethical intentions and the theories of reasoned action and planned behavior. Journal of Applied Social Psychology, 25, 297-313.
- Maddox, J., & Rogers, R. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. Journal of Experimental Social Psychology, 19, 469-479.
- Moore, H., Bates, F., Layman, M., & Parenton, V. (1963). Before the wind: A study of response to Hurricane Carla. National Academy of Sciences/ National Research Council on Disasters, Study #19. Washington, D.C.: National Academy of Sciences.

Mulilis, J., Duval, S., & Lippa, R. (1990). The effects of a large destructive local earthquake on earthquake preparedness as assessed by an earthquake preparedness scale. Natural Hazards, 3, 357-371.

Nath, D and Land, K. (1994). Sex preference and third birth intervals in a traditional indian society. Journal of Biosocial Science, 26, 377-388.

Norris, F.H. (1997). The frequency and structure of precautionary behavior in the domains of hazard preparedness, crime prevention, vehicular safety, and health maintenance. Health Psychology, 16, 566-575

Perry, R. W. (1979). Evacuation decision-making in natural disasters. Mass Emergencies, 4, 25-38.

Perry, R. W. (1985). Comprehensive emergency management: Evacuating threatened populations. Greenwich, Connecticut: Jan Press Inc.

Perry, R. W., & Lindell, M. K. (1991). The effects of ethnicity on evacuation decision-making. International Journal of Mass Emergencies and Disasters, 9(1) 47-68.

Perry, R.W., Lindell, M.K., & Greene, M.R. (1981). Evacuation planning in emergency management. Lexington, MA.: D.C. Health.

Quarantelli, E. L. (1985). Social support systems: Some behavioral patterns in the context of mass evacuation activities. In B. J. Sowder (Ed.) Disasters and Mental Health: Selected Contemporary Perspectives. National Institute of Mental Health, Rockville, Maryland (pp 122-136).

Quarantelli, E. L. (1984). Evacuation behavior and problems: Findings and implications from the research literature. Federal Emergency Management Agency, Washington, D. C.

Quarantelli, E. L. (1994). Preparedness and disasters: A very complex relationship, Paper #209. Disaster Research Center, University of Delaware.

Raats, M., Shepard, R., & Sparks, P. (1995). Including moral dimensions of choice within the structure of the theory of planned behavior. Journal of Applied Social Psychology, 25, 484-494.

Riad, J.K., Norris, F., & Ruback, R. B. (1997). Predicting evacuation from two major disasters. Submitted to Journal of Applied Social Psychology.

- Rofe, Y. (1984). Stress and affiliation: A utility theory. Psychological Review, 91, 235-250.
- Rogers, R. (1975). A protection motivation theory of fear appeals and attitude change. The Journal of Psychology, 91, 93-114.
- Rossi, P., Wright, J., & Weber-Burdin, E. (1982). Natural hazards and public choice: The state and local politics of hazard mitigation. New York: Academic Press.
- Ruback, R. B., & Innes, C. A. (1988). The relevance and irrelevance of psychological research: The example of prison crowding. American Psychologist, 43, 683-693.
- Russell, D., & Cutrona, C. E. (1984). The Social Provisions Scale: A qualitative measure of facets of social support. Manuscript in preparation.
- Schacter, S. (1959). The psychology of affiliation. Stanford, Stanford University Press.
- Schneider, S. (1995). Flirting with disaster: Public management in crisis situations. New York: M.E. Sharpe.
- Stallings, R. A. (1984). Evacuation behavior at three mile island. International Journal of Mass Emergencies and Disasters, 2(1), 11-26.
- Sutton, S. (1982). fear arousing communications: A critical examination of theory and research. In J. R. Eiser (Ed.), Social psychology and behavioral medicine (pp. 303-338). New York: Wiley.
- Taylor, R. (1989). Human territorial functioning: An empirical, evolutionary perspective on individual and small group territorial cognitions, behaviors, and consequences. New York: Cambridge University Press.
- Thompson, M., Norris, F. H., & Hanacek, B. (1993). Age differences in the psychological consequences of Hurricane Hugo. Psychology and Aging, 8, 606-616.
- Tierney, K. (1993). Disaster preparedness and response: Research findings and guidance from the social science literature, Paper #193. Disaster Research Center, University of Delaware.
- Turner, R., Nigg, J. & Heller Paz, D. (1986). Waiting for disaster: Earthquake watch in California. University of California Press. Berkeley, CA.
- Waterstone, M. (1978). Hazard mitigation behavior of urban flood plain residents. Natural

hazards Research Working Paper #35. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Waugh, W. (1990). Hurricanes. In W. Waugh & R. Hy (Eds.), Programs and policies dealing with major hazards and disasters. New York: Greenwood Press (pp. 61-80).

Waugh, W. (1993). Co-ordination or control: Organizational design and the emergency management function. Disaster Prevention and Management, 2, 17-31.

Weinstein, N. (1988). The precaution adoption process. Health Psychology, 7, 355-386.

Weinstein, N. (1989). Effects of personal experience on self-protective behavior. Psychological Bulletin, 105, 31-50.

Weinstein, N. (1993). Four competing theories of health-protective behavior. Health Psychology, 12, 324-333.

Windham, G.O., Ellen, I.P., Ross, P.J., & Spencer, B. G. (1977). Reactions to storm threat during Hurricane Eloise. Report #51. State College, Mississippi: Social Science Research Center, Mississippi State University.

Worth, M., & McLuckie, B. (1977). Get to high ground! The warning process in Colorado floods June, 1965. Disaster Research Center Historical and Comparative Disasters Series. Columbus, OH: Disaster Research Center, Ohio State University.

Zanjonc, R. (1976). Family configuration and intelligence. Science, 192, 227-236.

Table 1

Beliefs and Experiences Related to Evacuation Decision Making

| Beliefs and Experiences | n | % |
|--|----|------|
| You have enough time to leave . | 93 | 97.9 |
| Believe your survival is under your control. | 84 | 88.4 |
| Experience with hurricanes. | 79 | 83.2 |
| Believe whether you survive is God's will. | 79 | 83.2 |
| Believe your house is structurally safe. | 78 | 82.1 |
| You have a place to go. | 74 | 77.9 |
| Believe the hurricane is a serious threat. | 72 | 75.8 |
| You have a car. | 66 | 69.5 |
| Your family is together in one place. | 61 | 64.2 |
| Believe the hurricane will be bad. | 61 | 64.2 |
| Believe the hurricane is coming. | 53 | 55.8 |
| Experience with evacuation. | 50 | 52.6 |
| Have to protect your home from the storm. | 43 | 45.3 |
| Have to protect your home from looters. | 42 | 44.2 |
| Your family wants to leave. | 30 | 30.6 |
| You want to leave. | 27 | 28.4 |
| You have to stay to care for your pet. | 5 | 5.3 |
| You are too sick to leave. | 3 | 3.2 |

Table 2
 Standardized Regression Coefficients for Composite Measures.

| | Risk Perception | Reactive Preparedness | Actual Social Influence | Openness to Social Influence | Efficacy | Anxiety |
|-----------------------------|-----------------|-----------------------|-------------------------|------------------------------|----------|---------|
| Hurricane Experience | -.20 | ---- | ---- | ---- | ---- | ---- |
| Evacuation Experience | .29** | .30*** | ---- | .30** | .35*** | ---- |
| Wave 4 Preparedness | ---- | .37*** | .30** | ---- | ---- | ---- |
| Financial Well-being | ---- | ---- | ---- | ---- | .23* | ---- |
| Physical Well-being | ---- | ---- | ---- | ---- | .28** | ---- |
| Embeddedness | ---- | ---- | .22* | ---- | .18 | ---- |
| Past psychological distress | .37*** | ---- | ---- | .28** | ---- | .39** |
| Age | ---- | -.30** | ---- | ---- | ---- | ---- |
| Sex | .20* | ---- | ---- | ---- | ---- | ---- |
| Race | .22* | -.29** | ---- | .39*** | ---- | ---- |
| Education | ---- | -.20 | ---- | ---- | ---- | ---- |
| # of Females | ---- | ---- | .35** | ---- | -.33** | ---- |
| # of Children | ---- | ---- | ---- | ---- | .26 | ---- |
| City | -.27** | ---- | ---- | -.31** | ---- | ---- |
| Multiple R | .65 | .70 | .59 | .57 | .61 | .46 |
| Adjusted R ² | .33 | .40 | .23 | .21 | .26 | .07 |

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Means for Individuals Who Intended to Evacuate and Those Who Did Not, with Corresponding Values of F, Separated by City

| | <u>Savannah</u> | | | <u>Charleston</u> | | |
|------------------------------|----------------------|----------------------------|-------------------|----------------------|----------------------------|----------|
| | Intended to Evacuate | Did not Intend to evacuate | <u>F</u> | Intended to Evacuate | Did not Intend to Evacuate | <u>F</u> |
| Anxiety ^{2.37} | 1.75 | 5.12* | 2.30 | 1.92 | 2.28 | |
| Attachment to Home | 3.98 | 4.62 | 6.80** | 4.03 | 4.11 | .07 |
| Education | 10.57 | 12.00 | 2.92 ^a | 12.31 | 14.60 | 4.75* |
| Risk Perception | .77 | .48 | 27.08*** | .68 | .43 | 17.83*** |
| Openness to Social Influence | .81 | .49 | 12.61*** | .83 | .43 | 15.44*** |
| Past psychological distress | 1.28 | .85 | 3.12 ^a | 1.59 | 1.06 | 4.27* |
| Embeddedness | 17.50 | 20.00 | 5.19* | 18.62 | 20.42 | 2.29 |
| Number of Females | 1.54 | 1.06 | 4.72* | 1.31 | 1.57 | 1.18 |

^a $p < .10$ * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4
Predicting Evacuation Intention: Hierarchical Logistic Regression Results

| Predictors of Evacuation | Regression Results | |
|-------------------------------|--------------------|------|
| | B | SE B |
| Risk perception | 4.14* | 1.85 |
| Embeddedness | -.21* | .09 |
| Hypothetical social Influence | 2.03 ^a | 1.16 |
| Prior hurricane experience | -1.39 | 1.08 |
| Owner | .68 | .79 |
| City (Charleston) | -.48 | .73 |
| Black | .30 | .38 |
| Male sex | .42 | .67 |
| Anxiety | .32 | .46 |
| Education | -.09 | .12 |
| Prior distress | .01 | .45 |

^a $p < .08$ * $p < .05$ ** $p < .01$ *** $p < .001$