

## **ETHNICITY, CULTURE, AND DISASTER RESPONSE: IDENTIFYING AND EXPLAINING ETHNIC DIFFERENCES IN PTSD SIX MONTHS AFTER HURRICANE ANDREW**

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A sample of 404 residents of southern Florida were interviewed in their own homes six months after Hurricane Andrew. The sample was composed of equal numbers of hispanics, non-Hispanic blacks, and Caucasians. Most Latinos ( $n = 97$ ) elected to complete the interview in Spanish; all other interviews were conducted in English. Ethnic groups differed strongly in the prevalence of posttraumatic stress disorder (PTSD). Caucasian disaster victims showed the lowest rate (15%), Spanish-prefering Latinos showed the highest rate (38%), and African-Americans showed a rate (23%) between these two extremes. Additional analyses attempted to explain these symptom differences in terms of *differential exposure* and *differential vulnerability* to trauma. Both explanations had merit but neither completely accounted for observed ethnic differences. Cultural-specific responses to Hurricane Andrew suggest the need to view psychological symptoms in light of the possible adaptive nature of the behaviors due to political, social, economic, and historical perspectives.

When Hurricane Andrew hit southern Florida on August 24, 1992, it left tremendous devastation in its wake (38 dead, approximately \$20 billion in damages). Major disasters, such as Hurricane Andrew, provide a useful context for studying the effects of trauma because within a single shared event, individuals may differ in severity and context of exposure but not in its immediacy. Victims of disasters often show symptoms of anger, depression, generalized distress, and PTSD that dissipate over

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time (Freedy, Saladin, Kilpatrick, Resnick, & Saunders, 1994; Green & Solomon, 1995; Murphy, 1985; Phifer & Norris, 1989; Rubonis & Bickman, 1991; Smith & North, 1993; Smith, North & Spitznagel, 1993; Steinglass & Gerrity, 1990). Whereas rates of PTSD were fairly low following some disasters (Freedy, Addy, Kilpatrick, Resnick, & Garrison, 1997; Norris, 1992; Smith, Robins, Przybeck, Goldring, & Solomon, 1986), they were substantial after others (David et al., 1996; de la Fuente, 1990; Gleser, Green, & Winget, 1981; Madakasira & O'Brien, 1987; North et al., 1999). Disasters that engender bereavement, physical injury, and threat to life most potently increase victims' risk for severe or prolonged distress (Gleser et al., 1981; Thompson, Norris, & Hanacek, 1993).

Because of the ethnic/racial diversity of southern Dade County, Hurricane Andrew also provided an exceptional opportunity to study the differential effects of trauma on diverse ethnic groups. Relatively little is known about the unique and varied psychiatric morbidity of Latinos and non-Hispanic blacks and whites following major trauma (Marsella, Friedman, & Spain, 1996). Yet understanding culturally specific responses to stress may be important for planning and delivering mental health services in disaster-stricken communities, especially those that are culturally or ethnically diverse. Our examination of this issue was divided into two parts, the first *identifying* and the second *explaining* these differences in PTSD six months after Hurricane Andrew.

## IDENTIFYING ETHNIC DIFFERENCES

The impact of disasters on different ethnic groups cannot be examined in isolation from their baseline epidemiology of PTSD. The study of PTSD in minority populations has been growing rapidly (see Allen, 1996; Hough, Canino, Abeug, & Gusman, 1996). Few studies have simultaneously compared African American, Anglos, and Latinos, but the National Co-Morbidity Study ( $N = 5,877$ ; Kessler, Somnaga, Bromet, Hughes, & Nelson, 1995; Kessler et al., in press) is an important exception. Lifetime rates of PTSD (7.8%) did not differ significantly between whites, blacks, and Hispanics. Whereas blacks experienced fewer traumas than whites, they were more likely to develop PTSD once they were exposed. Norris (1992) reported similar findings from an investigation of traumatic events in a sample of 1,000 adult residents of the southeastern U.S., of whom half were black. As in the Kessler et al. study, whites reported more traumatic events, but blacks reported greater levels of stress as a result of trauma in the form of violence and exposure to hazards. In the 1996 Detroit Area Survey (Breslau et al., 1998), blacks were twice (14%) as likely to meet criteria for PTSD as whites (7.3%), although the statistical significance of this difference dropped out when place of

residence (central city vs. other) was controlled. Studies of disaster also indicate that black victims may be at higher risk than white victims for developing PTSD in that specific context (Green et al., 1990).

It is difficult to interpret the National Co-morbidity Study's findings for Hispanics when acculturation may be presumed to vary widely within the group. High rates of PTSD have been found among immigrants from Central America and Mexico (Cervantes, Salgado de Snyder, & Padilla, 1989). Whereas Canino, Bravo, Rubio-Stipec, and Woodbury (1990) found a low rate (4%) among victims of a severe flood in Puerto Rico, higher rates have been found among Latin Americans or Hispanics following disasters in Mexico (32%; de la Fuente, 1990), Chile (19%; Durkin, 1993), Colombia (42%; Lima, Pai, Santacruz, & Lozano 1991) and the U.S. (12%; Hough et al., 1990).

Jenkins (1996) examined the prevalence of each PTSD criterion in a sample of Salvadoran refugees. Because Criteria B (Intrusion) and D (Arousal) symptoms were quite common, whereas Criterion C (Avoidance) symptoms were relatively rare, Jenkins concluded that the diagnostic criteria for PTSD, especially Criterion C, may not be fully applicable to Latino victims of trauma. It should be noted that Norris (1992) also observed lower rates of symptoms meeting Criterion C than B or D among both black and white victims of a wide range of traumatic events (see also Green, 1993; North et al., 1999). Nonetheless, Jenkins' observations instruct us to consider each component of PTSD in our research as well as proportions meeting all criteria for PTSD. Marsella et al. (1996) suggested that intrusive thoughts may transcend cultural experiences, whereas avoidance/numbing and hyperarousal may be highly determined by cultural affiliation.

To summarize thus far, the existing evidence is equivocal, sometimes indicating that whites, blacks, and Latinos do not differ in rates of PTSD and sometimes suggesting that they do. To our knowledge, however, no previous study has simultaneously compared European (non-Hispanic white) American, African (non-Hispanic black) American, and Latino (both relatively acculturated and nonacculturated) adults within the context of the same objectively defined event. The present study was thus an important opportunity to explore more closely the manner in which a common traumatic event, Hurricane Andrew, was experienced by ethnically diverse populations.

## EXPLAINING ETHNIC DIFFERENCES

Why might ethnic groups respond differentially? Drawing upon the well-developed literature regarding social class and mental health (Dohrenwend & Dohrenwend, 1969; Kessler, 1982), we examined both

*differential exposure* and *differential vulnerability* to highlight as potential explanations. Differential exposure refers to the possibility that the ethnic groups differed in the extent to which they were exposed to the more traumatic aspects of the hurricane. The poor, the less educated, and ethnic minorities are generally more likely to live in undesirable, at-risk areas and to reside in less safe and more vulnerable homes (Quarantelli, 1994).

In contrast, differential vulnerability implies that ethnic minorities are more affected by stressors, regardless of whether they are similarly or differently exposed. This perspective recognizes that the context within which life events are experienced is critical in understanding reactions to stress. Among the most basic reasons for this is minorities' limited access to economic and social resources that buffer the impact of traumatic events (Kaniasty & Norris, 1995). But recent writings have emphasized that there is more to the concept of ethnicity than simply socioeconomic status (SES). Culture has been defined as the interactive aggregate of common traits that influence the way a human group responds to its environment (Hofstede, 1980). Hence, culture-specific attitudes and beliefs could also influence the relative abilities of ethnic groups to cope with stress and trauma (Allen, 1996; Anderson, 1991; Cervantes & Castro, 1985).

Contemporary theorists often use the concept of acculturation to explain how conflicts in values and behavior lead to tension between autonomous cultures. These conflicts frequently lead to acculturative stress—a state of discomfort that emerges when confronting another's culture (Anderson, 1991). Latino and African American cultures are often described in similar terms, with collectivism the integral common denominator. Collectivism is a sense of oneness with other people; the self is defined as part of a group (Hui & Triandis, 1986). Family ties are extremely important in collectivist cultures, and family obligations are felt keenly. Compared to individualist culture, relationships in collectivist culture are closer within in-groups but more distant outside of those groups. An extreme form of collectivism is familism (Sabogal, Marin, Otero-Sabogal, Marin, & Perez-Stable, 1987; Triandis, 1983). This interconnectedness with family may often be a valuable coping resource but, in some situations, it may offer disadvantages as well. Reluctance to seek help from sources beyond the family could have serious implications in disaster-stricken settings where kin support may be depleted and insufficient to meet all needs (Kaniasty & Norris, 1993). Moreover, familism often brings with it an acute sense of familial obligation that may lead to increased stress and distress (see Mirowsky & Ross, 1984).

A characteristic that has also been associated with Latino culture is fatalism, a predisposition to attribute high causal power to the external environment and minimal causal power to personal forces. In contrast,

instrumentalism reflects an individual's perceptions that his or her actions are effective in controlling, changing, or mastering the environment (Wheaton, 1982). Latinos, especially the less acculturated, as well as some African Americans, have strong beliefs regarding the importance of adapting or submitting to nature or to God (Pepitone & Triandis, 1987). In stress-and-coping research, fatalism ("external control") has almost universally been viewed as a risk factor for poor outcomes (Wheaton, 1982), in part because it inhibits taking action or seeking help when needed.

In summary, our assumption was that these acculturation factors would significantly impact the coping effectiveness of Latinos and African Americans. Therefore, we hypothesized that (1) in the context of disaster they would suffer more adverse consequences, and (2) that severity of exposure, fatalism, familism, and acculturative stress would mediate the ethnicity-distress relationship.

## METHOD

### SAMPLE AND SAMPLING PROCEDURES

In January 1993, our research team visited Dade County (South Miami) and selected the neighborhoods to be included in the study. A publication of *The Miami Herald*, which listed neighborhoods according to the proportion of homes damaged and their property value, was extremely helpful in terms of finding areas with different levels of damage and SES. Predominant race/ethnicity of residents was usually evident when touring the neighborhoods. Data from 1999 census were used to confirm our impressions and finalize our choices. The neighborhoods and areas selected included those known locally as Homestead, Cutler Ridge, Richmond Heights, South Howard, and Saga Bay.

Local interviewers, matched for ethnicity, conducted the interviews. Beginning on February 25, 1993, six months after the impact, interviewers were instructed to approach individuals at their homes in the selected areas and to request their participation in the study. Interviewers visited the neighborhoods at different times of day and on different days of the week so that people with different lifestyles and schedules would be considered. Interviews took place in respondents' current homes and lasted approximately one hour. Only one interview was allowed per household. By the end of March, 404 persons had been interviewed. A total of 128 persons who were approached refused to participate, a response rate of 76%. In a quota sampling strategy, a person who refuses is replaced by someone of the same ethnicity, sex, and

age; using this method, refusals do not affect the demographic characteristics of the sample. The strategy ensures that all groups are included in the study in targeted proportions, including those most difficult to find (e.g., middle-aged white men, older Latinas). The resulting sample was balanced across gender (205 female and 199 male subjects), ethnicity (134 Latinos, 135 non-Hispanic blacks and 135 non-Hispanic whites), and age (147 18 to 39 years of age, 124 40 to 59, 130 60 or older, 3 missing). The design was fully crossed so that there were no differences between ethnic groups in sex (51% female) or age ( $M = 48$ ) distributions.

It is recognized that this study is not a probability sample whose findings can be directly applied to a given population. Our goal was neither to estimate precisely the rates of impairment in Dade County, Florida, nor to estimate the rates of impairment among all disaster victims, the latter of which is not a definable population. Instead, our purpose was to identify and to explain differences between groups defined by ethnicity. To increase internal, as opposed to external, validity, we elected to use purposive sampling because this strategy allowed us to equate the sex and age distributions within each ethnic group and to focus on the neighborhoods that experienced the storm's greatest impact.

Interviews were conducted in either English or Spanish, as preferred by the respondent. Language preference is a simple and accurate marker of acculturation (Epstein, Botvin, Dusenbury, & Diaz, 1996). Among Latinos in our study, 97 elected to complete the interview in Spanish and 37 elected to complete the interview in English. Equivalent Spanish and English versions of the measures were obtained initially using the "centering" process recommended by Brislin, Lonner, and Thorndike (1973). A bilingual member of the research team first translated the selected scales into Spanish; another bilingual member translated the scales back into English. Discrepancies or changes in meaning resulting from the translations were resolved by consensus of the team. The instrument was also carefully reviewed by persons of Puerto Rican, Mexican, and Cuban birth so that regional variations in Spanish were taken into account. For the pilot study, bilingual volunteers ( $n = 53$ ) completed a paper-and-pencil version of the interview schedule on two different occasions. In the first session, half of the participants were randomly assigned to complete the English version, the other half to complete the Spanish version. One week later, each participant completed the alternative version. Only scales that demonstrated cross-language stability were retained for the Hurricane Andrew questionnaire.

## MEASURES

*Posttraumatic Stress.* To assess posttraumatic stress, we used the 30-item Revised Civilian Mississippi Scale (RCMS; Norris & Perilla, 1996). The original Mississippi Scale for Combat-Related PTSD (Keane, Caddell, & Taylor, 1988) measures self-reported symptoms of post-traumatic stress in veteran populations. For use in the National Vietnam Veterans Readjustment Survey (NVVRS; Kukla et al., 1990), a civilian form of the scale was developed. Data from 668 civilians who participated in the NVVRS showed that the civilian form of the Mississippi Scale had high internal consistency but limited discriminant validity (Vreven, Gudanowski, King, & King, 1995). Norris and Perilla (1996) revised the Mississippi Scale in a number of ways. They used only 30 items; tapped symptoms that seemed well captured by other items, did not seem relevant to civilian experience, or seemed to be overly general for a measure of PTSD were eliminated. Other changes concerned question formats. Keane et al.'s (1998) civilian form elicits frequency of symptoms "in the past." In this revised version of the Mississippi Scales, the first 18 items "anchor" the symptom to a specific event (e.g., "Since Hurricane Andrew, unexpected noises make me jump"), and the last 12 items do not ("I am able to get emotionally close to others"). All items are scored on the same five-point scale: 1 = *not at all true*, 2 = *slightly true*, 3 = *somewhat true*, 4 = *very true*, and 5 = *extremely true*. This revised scale was internally consistent in the present study ( $\alpha = .89$ ) and stable across language in the pretest ( $r = .98$ ). The RCMS encompasses three conceptually distinct types of symptoms: Criterion B or Intrusion (8 items,  $\alpha = .84$ ), Criterion C or Avoidance (10 items,  $\alpha = .66$ ), and Criterion D or Arousal (7 items,  $\alpha = .74$ ).

For descriptive purposes, we converted this continuous scale to a dichotomous measure of PTSD by first grouping items by symptom (e.g., C1, D2) and counting that symptom as present if any of the relevant items were endorsed as at least "somewhat true" by the respondent. Then, symptoms were grouped by criteria. Item and symptom frequencies for the total sample are shown in the Appendix. These frequencies are similar to those obtained using structured diagnostic instruments (see Green, 1993) in that some symptoms (e.g., disturbed sleep, re-experiencing) are quite common, whereas others (e.g., amnesia) are relatively rare. To meet all criteria for PTSD as defined by the American Psychiatric Association's (1994) *Diagnostic and Statistical Manual of Mental Disorders, fourth edition*, (DSM-IV), the respondent had to show at least one Intrusion symptom (Criterion B), three Avoidance/numbing symptoms (Criterion C), and two Arousal symptoms (Criterion D).

In a recent epidemiologic study conducted by the authors, an RCMS value of 59 emerged as the “cutpoint” that was equally accurate for classifying current PTSD cases and noncases as defined by the *Composite International Diagnostic Inventory* (Version 2.1, World Health Organization, 1993), a structured diagnostic instrument for DSM-IV. Only respondents who acknowledged recent (past six months) distress on the CIDI PTSD module were administered the RCMS or included in the analysis ( $n = 120$ ). A RCMS cutpoint of 59 correctly classified 79% of CIDI cases and 77% of CIDI non-cases. A more conservative cutpoint of 70 classified fewer cases correctly (68%) but almost always classified noncases correctly (91%).<sup>1</sup> In the present study, individuals were classified identically by the two methods (one empirical, one conceptual) 87% of the time, which is a reasonable degree of accuracy for a self-report measure.

*Trauma.* For the purposes of this paper, it was important to distinguish between the symptom criteria (B, C, and D) and the stressor criterion (A). With the advent of DSM-IV, the definition of the stressor criterion changed from a relatively objective one, i.e., “an event that is outside the range of usual human experience and that would be markedly distressing to almost everyone” (American Psychiatric Association, 1987, p. 250), to a relatively subjective one, i.e., “actual or threatened death or serious injury . . . or threat of death or injury experienced by a family member . . . The person’s response to the event must involve intense fear, helplessness, or horror.” (American Psychiatric Association, 1994, p. 424). Whereas all participants in this study were exposed to a highly stressful environment and nearly all (88%) experienced *some*, *much*, or *enormous* property loss, as opposed to *none* (0%) or *little* (12%), not everyone was exposed to the more traumatic elements of the disaster. We created an ordinal variable, personal trauma, that classified respondents according to their experiences of threat to life and physical injuries (0 = *neither*, 1 = *either*, 2 = *both*). Life threat was assessed by a single question, “Did you ever feel like your life was in danger during the incident?” Injury was assessed by two questions, one asking whether the respondent had personally been injured, the other asking whether another member of the household had. Because personal trauma is a subjective interpretation of experience, it is not entirely independent of psychological state. However, participants who provided ethnographic interviews relayed an abundance of event descriptions that any reasonable person would find terrifying or horrifying.

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1. More detail on this study and its results may be obtained from the second author, Fran H. Norris.

We also derived a more objective measure, neighborhood trauma. The seven census tracts in which participants lived were rank ordered in terms of the proportions within the areas who reported personal trauma (a trauma score of 1 or 2). These proportions ranged from 65% to 95%. Personal trauma and neighborhood trauma correlated only .17, showing that the latter was relatively independent of personal experience.

*Beliefs.* Three scales were selected to represent culturally-related beliefs. All questions on these measures were answered on a 4-point scale of agreement, ranging from *strongly agree* to *strongly disagree*. Acculturative stress was measured using a 6-item version of Williams and Anderson's (1996) measure ( $\alpha = .82$  in the present study, stability coefficient in the pretest = .99). The scale primarily taps feelings of anxiety that arise when interacting with members of ethnic groups other than one's own and thus can be used with European Americans as well as with Latinos and African Americans. Example items are, "I get nervous going into a room full of people if I am going to be the only \_\_\_\_," and "It is difficult to really trust someone if they're from a different ethnic group." We also included Triandis, McClusker, and Hui's (1990) 2-item measure of family integrity or familism ( $r = .46$ ). These two items are: "Aging parents should live at home with their children," and "Children should live at home with parents until they get married." Though the "scale" is short, Triandis found it to differ strongly across cultural groups. Fatalism was measured using a 6-item version of Rotter's (1966) Internal-External Control Scale ( $\alpha = .60$ , stability coefficient = .90) that was developed by Wheaton (1982) for his classic study comparing the coping efficacy of Mexican Americans and Anglos. Wheaton made an important point that fatalism should not be confused with pessimism; external causation does not automatically imply bad outcomes. Fatalism, however, does imply less coping effort. Example items are, "I have often found that what is going to happen will happen," "Many times we might just as well decide what to do by flipping a coin," and "Many times I feel I have little influence over the things that happen to me."

The final variable included in the study was education, scored in years. This variable was included as a rough measure of socioeconomic status and access to financial resources (see Kessler, 1982). We did not use occupational status because of its lower validity in immigrant groups and in older adults who constitute a significant proportion of our sample.

## RESULTS

*Post-traumatic Stress and PTSD in the Total Sample.* A score of 59 on the RCMS, the sample mean, is the equivalent of endorsing 20 of the 30

symptom items as “somewhat true” or 15 of the 30 symptom items as “very true,” either of which is suggestive of marked levels of posttraumatic stress. In the present sample, 25% were at or above the conservative cutpoint of 70 that is only rarely exceeded by persons who do not have full PTSD. When a dichotomous measure was created conceptually rather than empirically, an almost identical percentage was found to be seriously distressed, i.e., 24%<sup>2</sup> showed the constellation of symptoms consistent with a current diagnosis of PTSD. The rate of 24 to 25% for current PTSD in this sample is three times the national lifetime rate of 8% in the U.S. (Kessler et al., 1995). In interpreting these statistics, it should be kept in mind that they describe only the sample, not the population of Dade County, Florida. Nonetheless, it is apparent that this sample was still experiencing a high degree of distress six months post-event.

*Post-traumatic Stress and PTSD in the Subsamples.* Table 1 shows the RCMS means for each ethnic group. For the total scale of posttraumatic stress, the omnibus *F* test was statistically significant in the ANOVA, as were two of the three planned contrasts: Minority group members were more distressed than whites,  $t(400) = 3.04, p < .01, ES = .38$ ,<sup>3</sup> and Spanish-prefering Latinos were more distressed than English-prefering Latinos,  $t(400) = 2.44, p < .02, ES = .46$ . Whether scored by using the conceptual algorithm or by using the cutpoint of 70, rates of PTSD varied strongly across groups. Spanish-prefering Latinos showed the highest rate (38% using the conceptual algorithm, 35% using the empirical algorithm), followed by African Americans (23%, 29%), followed by English-prefering Latinos (19%, 16%) and non-Hispanic whites (15%, 16%).<sup>4</sup>

Table 1 also provides data regarding the three subscales of the RCMS. Differences in intrusive symptoms were quite strong, with minority

2. A more conservative criterion for scoring PTSD is to require all symptoms to be *very or extremely true* rather than *somewhat, very, or extremely true*. By this more stringent criterion, 9.2% of the sample met all criteria.

3. Effect sizes (ES) were calculated as the difference between two means divided by the pooled standard deviation, as described by Lipsey (1998). By this method, they represent the number of standard deviations the two groups differ. On the basis of their review of 300 meta-analyses, Lipsey and Wilson (1993) found an effect size of .24 to be at the 20th percentile, an effect size of .44 to be at the median, and an effect size of .68 to be at the 80th percentile. These criteria for labeling effects as “small,” “medium,” and “large” are fairly similar to those (.20, .50, .80, respectively) recommended by Cohen (1988).

4. Rates of severe PTSD were also significantly different between groups,  $\chi^2(N = 404, 3) = 12.29, p < .01$ . Presented in ascending order, these rates were 2.7% among English-prefering Latinos, 4.4% among non-Hispanic whites, 10.4% among non-Hispanic blacks, and 16.5% among Spanish-prefering Latinos.

TABLE 1. Differences Between Ethnic Groups in Continuous and Dichotomous Outcome Measures

	Latino		Non-Hispanic		Total Sample	F or $\chi^2$
	Spanish	English	Black	White		
<b>Post-Traumatic Stress and PTSD</b>						
Mean	64.8	56.6	60.3	54.6	59.1	6.85***
SD	21.4	14.2	16.4	16.2	17.9	
% All symptom criteria	38.1	18.9	23.0	14.8	23.5	17.10***
<b>Intrusion and Criterion B</b>						
Mean	20.9	15.6	16.1	14.4	16.7	18.25***
SD	7.9	5.0	6.7	6.3	7.2	
% Criterion B	88.7	78.4	74.1	58.5	72.8	28.14***
<b>Avoidance and Criterion C</b>						
Mean	19.1	16.8	18.9	16.7	18.0	5.46***
SD	6.8	4.8	5.5	5.1	5.7	
% Criterion C	40.2	18.9	24.4	17.8	25.5	15.57**
<b>Arousal and Criterion D</b>						
Mean	17.3	17.3	18.9	17.5	17.9	1.74
SD	6.8	5.0	5.8	6.2	6.1	
% Criterion D	67.0	67.6	80.7	63.0	70.3	11.62**

Note. For tests of differences in percentages meeting criteria, contingency analysis ( $\chi^2$ ) was used. For tests of differences in means, analysis of variance (F) was used.

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

group members more distressed than Caucasians,  $t(400) = 4.15, p < .001$ ,  $ES = .47$ , Latinos more distressed than African Americans,  $t(400) = 2.44, p < .02$ ,  $ES = .46$ , and Spanish-preferring Latinos more distressed than English-preferring Latinos,  $t(400) = 4.05, p < .001$ ,  $ES = .74$ . The same pattern of pronounced differences held when Intrusion was scored in terms of percentages showing at least one Criterion B symptom. Whites were the least likely to meet this criterion (58%), and Spanish-preferring Latinos were most likely (89%). With regard to Avoidance symptoms, minority group members were again more distressed than whites,  $t(400) = 2.54, p < .01$ ,  $ES = .35$ , and Spanish preferring Latinos were again more distressed than English-preferring Latinos,  $t(400) = 2.13, p < .04$ ,  $ES = .41$ . Ethnic differences in percentages showing three separate symptoms of Avoidance (Criterion C) were consistent with the pattern of mean differences. whites were least likely to reach criterion (18%), and Spanish-preferring Latinos were most likely (40%). Arousal symptoms showed a somewhat different pattern. The omnibus F test was not significant in this one case. Overall, minority group members did not differ from

whites in their levels of Arousal symptoms,  $t(400) = 0.42$ ,  $ES = .09$ , but within the minority population, African-Americans showed higher Arousal levels than Latinos,  $t(400) = -1.99$ ,  $p < .05$ ,  $ES = .26$ . This effect was especially pronounced when Arousal was scored according to whether the individual met the criterion of showing two separate Arousal symptoms (Criterion D). African Americans were more likely to reach this criterion (81%) than any other ethnic group (63% to 68%).

*Joint Effects of Exposure and Ethnicity on PTSD.* The differential exposure explanation presumes, first, that there are individual differences in exposure to trauma and, second, that severity of exposure is related to severity of symptoms. Both of these assumptions were met. In the total sample, 19.3% ( $n = 78$ ) were classified as low personal trauma (they reported neither threat to life nor injury), 46.8% ( $n = 189$ ) moderate personal trauma (either life threat or injury), and 33.9% ( $n = 137$ ) high personal trauma (both life threat and injury). RCMS means were 47.6, 57.0, and 68.7 at low, moderate, and high trauma, respectively. The difference between these means was highly significant,  $F(2, 401) = 44.82$ ,  $p < .001$ , and linear in character,  $t = 9.13$ ,  $p < .001$ ,  $ES = 1.17$ . Percentages showing the constellation of symptoms consistent with a diagnosis of PTSD also varied strongly across trauma levels,  $\chi^2(N = 404, 2) = 25.12$ ,  $p < .001$ . Rates of PTSD were 9% in the low personal trauma group, 20% in the moderate personal trauma group, and 37% in the high personal trauma group, a fourfold increase.

Neighborhood trauma correlated with RCMS scores modestly before,  $r = .15$ ,  $p < .002$ , but only weakly after,  $r = .09$ ,  $p = .07$ , personal trauma was controlled. Mean RCMS scores for two groups representing below ( $n = 225$ ) and above ( $n = 179$ ) median levels of neighborhood trauma were 57.1 and 61.7, respectively,  $t(401) = 2.60$ ,  $p < .01$ ,  $ES = .26$ . Rates of PTSD were 19% in less affected neighborhoods and 29% in more affected neighborhoods,  $\chi^2(N = 404, 1) = 5.45$ ,  $p < .02$ .

Given these effects, differences in severity of exposure seemed a particularly likely explanation for the differences in outcomes. Ethnic differences in personal trauma did, in fact, show a pattern similar to that observed regarding ethnic differences in psychological outcomes. The effect was highly significant,  $\chi^2(N = 404, 6) = 30.84$ ,  $p < .001$ . Spanish-preferred Latinos were underrepresented in the low exposure group ( $z = -2.0$ ) and overrepresented in the high exposure group ( $z = 2.6$ ), whereas Caucasians were overrepresented in the low exposure group ( $z = 3.3$ ) and underrepresented in the high exposure group ( $z = -1.9$ ). The ethnic groups also differed in neighborhood trauma,  $F(3, 400) = 43.50$ ,  $p < .001$ . Relative to Caucasians, minority group members were disproportionately likely to reside in highly affected neighborhoods,  $t(400) = 9.88$ ,  $p < .001$ ,  $ES = 1.03$ . The mean difference in exposure between African Ameri-

cans and Latinos was statistically significant but small in magnitude,  $t(400) = 2.23, p < .01, ES = .19$ . The contrast between Spanish- and English-preferring Latinos did not reach significance,  $t(400) = -1.64, ES = .28$ .

Did these differences in severity of exposure explain the differences in rates of PTSD? To provide a preliminary answer to this question, differences in RCMS means and PTSD rates were tested controlling for level of trauma. Because of the low  $n$  in the English-preferring Latino group, they were omitted from these analyses. A pattern showing differences in RCMS means and PTSD percentages between trauma groups but similarity between ethnic groups at any given trauma level would most strongly support the differential exposure hypothesis. The ethnic groups did not differ from one another when personal trauma was low,  $F(2,70) = 0.86, p = .43, \chi^2(N = 73,2) = 0.01, p = .99$ , or moderate,  $F(2,168) = 1.14, p = .32, \chi^2(N = 171,2) = 3.89, p = .14$ , but they did differ from one another when personal trauma was high,  $F(2,120) = 2.79, p = .06, \chi^2(N = 123,2) = 6.87, p < .03$ . Given high exposure, scale means were 73, 70, and 63, and PTSD rates were 50%, 38%, and 21% for Spanish-preferring Latinos, non-Hispanic blacks, and Caucasians, respectively. The synergistic effect between ethnicity and trauma is clearly evident in Figure 1.

This synergistic effect was less striking but still present when neighborhood trauma was substituted for the personal trauma measure. The difference between ethnic groups in RCMS scores was significant among respondents living in neighborhoods below the median on this measure,  $F(2,196) = 3.60, p < .03$ , as well as above median,  $F(2,165) = 6.37, p < .002$ , with minorities higher. However, as found for personal trauma, percentages showing the constellation of symptoms consistent with a diagnosis of PTSD did not differ between ethnic groups in the less affected neighborhoods,  $\chi^2(N = 199,2) = 1.94, p = .38$ , but did differ between ethnic groups in the more affected neighborhoods,  $\chi^2(N = 168,2) = 20.52, p < .001$ . Given high neighborhood trauma, PTSD rates were 59% for Latinos, 23% for African Americans, and 8% for Caucasians. Overall, these data are more consistent with the differential vulnerability hypothesis than with the differential exposure hypothesis, but both hypotheses—exposure and vulnerability—seemed worthy of more in-depth examination.

*Mediating Roles of Trauma and Beliefs in Explaining Ethnic Differences.*

Our final analyses were undertaken to test whether between-group differences in severity of exposure, education, and psychocultural attitudinal variables explain or account for observed ethnic differences in PTSD after Hurricane Andrew. In path analytic terms, this statement implies that all effects of ethnicity on posttraumatic stress symptoms should be indirect when exposure, education, and beliefs are controlled.

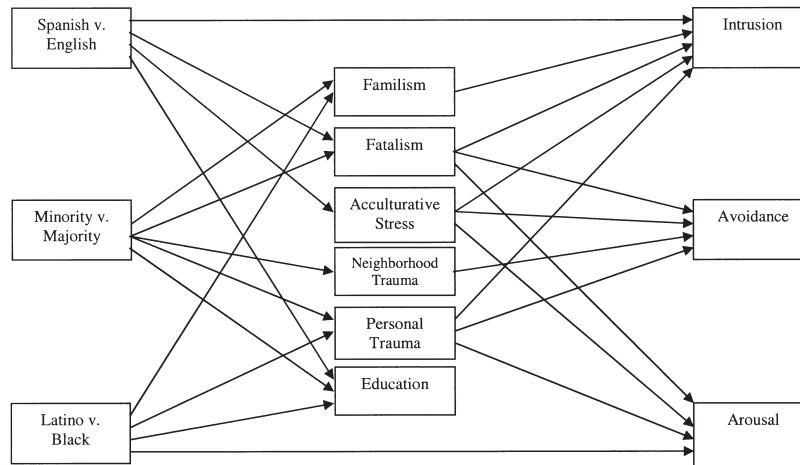


FIGURE 1. Percentages meeting study criteria for PTSD by personal trauma and ethnicity.

We tested our hypothesized model by using the Linear Structural Relations Program (LISREL 8; Joreskog & Sorbom, 1993) as the statistical technique. Intrusion, avoidance, and arousal were the dependent (endogenous) variables. The error variances or residuals of the equations predicting these outcomes were free to correlate. The mediators were two aspects of exposure (personal trauma and neighborhood trauma), three culturally relevant beliefs (fatalism, acculturative stress, and familism), and education. The error variances or residuals from the equations for these six mediators were also free to correlate. The independent (exogenous) variable was ethnicity. Ethnicity was scored in terms of three orthogonal contrast codes (see Bakeman, 1992) that are consistent with the planned contrasts employed in the ANOVAs described previously. Minority versus Majority contrasted Caucasian respondents (-3) to African Americans (+1), English-preferred Latinos (+1) and Spanish-preferred Latinos (+1). Latino versus black contrasted African Americans (-2) to English-preferred (+1) and Spanish-preferred (+1) Latinos; whites were coded to the mean of the contrast (0). Finally, Spanish versus English contrasted English-preferred (-1) and Spanish-preferred (+1) Latinos to each other; in this case, both blacks and whites were coded to the mean (0).

As outlined by Baron and Kenny (1986), three conditions must be met to establish mediation. First, the independent variable (in this case, ethnicity) must be shown to affect the mediators (in this case, exposure, ed-

ucation, and beliefs). Consistent with this criterion, ethnicity was related to each hypothesized mediator. Together, the three contrast codes explained 11% of the variance in personal trauma. Significant effects emerged for the Minority versus Majority code,  $\beta = .31, z = 6.00$ , and the Latino versus black contrast code,  $\beta = .12, z = 2.32$ , indicating that Latinos were most traumatized and non-Hispanic whites the least. ( $z$  critical value at  $p < .05$  is 1.96.) Spanish- and English- preferring Latinos did not differ from one another,  $\beta = .01, z = 0.17$ . Ethnicity explained 39% of the variance in neighborhood trauma. The Minority versus Majority contrast code had a very strong effect,  $\beta = .61, z = 14.30$ , indicating that the minority groups included in the study tended to live in more highly traumatized neighborhoods than did non-Hispanic whites. There was a trend toward African Americans living in more highly traumatized communities than did Latinos,  $\beta = -.09, z = -1.92$ . Again, Spanish- and English-preferring Latinos did not differ from one another,  $\beta = .03, z = 0.71$ .

Consistent with our hypothesized model, ethnicity also influenced respondents' beliefs. The three contrast codes explained 10% of the variance in fatalism, and effects reached significance for both the Minority versus Majority contrast code,  $\beta = .26, z = 4.98$ , and the Spanish versus English contrast code,  $\beta = .12, z = 2.07$ . Thus minority group members were, on average, more fatalistic than majority group members and, within that group, Spanish-preferring Latinos were particularly fatalistic.

Ethnicity explained only 3.4% of acculturative stress, but it should be remembered that the construct as measured here can apply to any individual who experiences interpersonal tension when interacting with members of ethnic groups other than his or her own. The effect of the Minority versus Majority code approached significance,  $\beta = .10, z = 1.79, p < .10$ , indicating that, on average, minority group members experienced or acknowledged this discomfort more than majority group members. Spanish-preferring Latinos were again highest,  $\beta = .12, z = 2.14$ .

In contrast, the effect of ethnicity on familism was quite strong,  $R^2 = .35$ . Minority group members were much more familistic than majority group members,  $\beta = .48, z = 10.99$ , and Latinos were more familistic than African-Americans,  $\beta = .29, z = 6.26$ . Spanish- and English-preferring Latinos did not differ significantly from one another,  $\beta = .07, z = 1.36$ .

As expected, ethnicity also explained a sizable portion of the variance in education,  $R^2 = .23$ . The effects of the Minority versus Majority contrast code,  $\beta = -.30, z = -6.36$ , the Latino versus black contrast code,  $\beta = -.26, z = -5.24$ , and the Spanish versus English contrast code,  $\beta = -.13, z = -2.43$ , reflected a rank-ordering wherein white respondents averaged the most education, and Spanish-preferring Latinos the least.

The second criterion for establishing mediation is that the potential mediators must be shown to affect the outcome variables. In the equation for intrusion, significant effects emerged for personal trauma,  $\beta = .43, z = 9.57$ , but not for neighborhood trauma,  $\beta = -.04, z = -0.88$ . All three of the belief measures had significant effects: for fatalism,  $\beta = .14, z = 3.11$ ; for acculturative stress,  $\beta = .11, z = 2.55$ ; and for familism,  $\beta = .18, z = 4.15$ . Education did not make an independent contribution,  $\beta = -.06, z = -1.33$ .

In the equation for avoidance, significant effects emerged for both personal trauma,  $\beta = .26, z = 5.52$ , and neighborhood trauma,  $\beta = .11, z = 2.21$ . Among the belief measures, there were effects of fatalism,  $\beta = .22, z = 4.77$ , and acculturative stress,  $\beta = .19, z = 3.93$ , but not familism,  $\beta = -.02, z = -0.34$ . Education again failed to make a significant contribution,  $\beta = .02, z = 0.34$ .

In the equation for arousal, the significant predictors were personal trauma,  $\beta = .29, z = 5.80$ , fatalism,  $\beta = .17, z = 3.58$ , acculturative stress,  $\beta = .13, z = 2.55$ , familism,  $\beta = -.11, z = -2.32$ , and education,  $\beta = .12, z = 2.30$ . These significant, but relatively small, effects of familism and education were in the opposite direction from predictions, with lower familism and higher education being associated with greater arousal with these other variables controlled.

The third criterion for establishing mediation is that the effect of the predictor variable (ethnicity) on the outcome variable must decrease in strength when the mediators are taken into account. Given the previous tests showing that ethnicity was significantly related to the outcome variables (Table 1), the strictest interpretation of this criterion is that the model in which all effects of ethnicity are indirect would fit the data adequately. This model, however, did not fit the data well,  $\beta (N = 386,9) = 54.58, p < .001, RMSEA = 0.12, AGFI = .80, NFI = 0.96, CFI = .96, Critical N = 145$ . Two residuals were significant ( $z > 1.96$ ), indicating that the model explained neither the relation between intrusion and the Spanish versus English contrast code ( $z = 3.56$ ) nor the relation between arousal and the Latino versus black contrast code ( $z = -2.51$ ). Adding paths from the Spanish versus English code to intrusion and from the Latino versus black code to arousal greatly improved the fit of the model,  $\beta (N = 386,7) = 18.71, p < .009, RMSEA = 0.066, AGFI = .91, NFI = .99, CFI = .99, Critical N = 376; \beta \Delta (N = 386,2) = 35.87, p < .001$ . The findings showed that Spanish-prefering Latinos had higher intrusion,  $\beta = .18, z = 5.07$ , and African Americans had higher arousal,  $\beta = -.13, z = -3.22$ , than explained by the mediators. Other effects remained comparable except that the small effects of familism and education on arousal dropped to nonsignificant levels.

Although no residuals in this model were significant, to ensure that there were no other significant direct effects of ethnicity, we tested a

TABLE 2. Direct, Indirect, and Total Effects of Ethnicity Contrast Codes in the Structural Equation Models

Dependent Variable Effect	Minority versus Majority		Latino versus Black		Spanish versus English	
	Coef.	Z	Coef.	Z	Coef	Z
<b>Intrusion</b>						
Direct	.00	0.00	.00	0.00	.18	5.07***
Indirect	.21	5.30***	.09	2.90**	.04	1.49
through trauma	.09	.05	.00			
through beliefs	.11	.03	.04			
through education	.01	.01	.00			
Total	.21	5.30***	.09	2.90**	.22	5.12***
<b>Avoidance</b>						
Direct	.00	0.00	.00	0.00	.00	0.00
Indirect	.21	5.18***	-.00	-0.02	.05	2.01*
through trauma	.15	.02	.01			
through beliefs	.07	-.02	.05			
through education	-.01	.00	.00			
Total	.21	5.18***	-.00	-0.02	.05	2.01*
<b>Arousal</b>						
Direct	.00	0.00	-.13	-3.22***	.00	0.00
Indirect	.10	2.44*	-.02	-0.59	.02	0.92
through trauma	.11	.03	.00			
through beliefs	.02	-.03	.03			
through education	-.02	-.02	-.01			
Total	.10	2.44*	-.15	-3.36***	.02	0.92

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ ,  $n = 386$ .

just-identified model,  $\beta (N = 386,0) = 0$ , in which all the contrast codes were allowed to affect all the outcomes directly as well as indirectly. Except for those direct effects previously mentioned, all direct effects of the ethnicity contrast codes were very small and not statistically significant.

Table 2 presents the direct, indirect, and total effects of each contrast code in the revised model. The indirect effects have been decomposed into three parts: effects through exposure, effects through beliefs, and effects through education. All significant effects of the minority versus majority code were indirect. The adverse outcomes of minority group members were explained, to a great extent, by their higher levels of trauma. For intrusion, the indirect effects through trauma and through beliefs were similar in magnitude; but for avoidance and arousal, the indirect effects through trauma were considerably greater than the indirect effects through beliefs. The other two ethnicity codes contrasted subgroups of the minority population. The two significant effects of the

















