# Differences in Mental Health Outcomes among Whites, African Americans, and Hispanics Following a Community Disaster

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## Abstract

A number of studies have assessed the association between race and ethnicity and psychological health status following exposure to a stressful event. However, some of these studies indicate racial and ethnic minorities have poorer mental health relative to Whites, while others show no differences or that minorities may actually have better psychological health. One year after the terrorist attacks on the World Trade Center, we collected data on a random sample of city residents ($N = 2368$). The dependent variables were posttraumatic stress disorder (PTSD), PTSD symptom severity, major depression, panic attack, and general physical and mental well–being. We categorized our respondents as Non–Hispanic White, Non–Hispanic African American, Dominican, Puerto Rican, and Other Hispanics. Bivariate results indicated racial/ethnic differences for PTSD symptom severity, depression, general physical and mental health, and panic attack. Using logistic regression and controlling for possible confounding factors, most of these associations were rendered non–significant. That is, we found no post-disaster racial/ethnic differences for PTSD, PTSD symptom severity, or physical health. African Americans and Other Hispanics were less likely to meet criteria for major depression or to be classified as unhealthy on the self–report SF–12 mental health scale compared to Whites. Only for panic attack were African Americans and Puerto Ricans more likely to meet criteria for this outcome. Thus, our study found little support for the hypothesis that Latinos or African Americans consistently suffered from poorer psychological and physical well–being in the aftermath of traumatic events, relative to Whites.

## INTRODUCTION

Over the past 30 years, efforts to understand the social and psychological origins of mental illness have tended to focus on the distribution of stressful events as one mechanism explaining differing rates of psychological and physical problems across gender, racial, ethnic, and social class categories (Aneshensel, Rutter, & Lachenbruch 1991; Breslau, Davis, Andreski, & Peterson 1991; Breslau et al. 1998; Kessler, Mickelson, & Williams 1999; Kessler, Sonnega, Bromet, & Hughes 1995; Turner, Wheaton, & Lloyd 1995). As a consequence, a vast literature has developed linking exposure to negative life and traumatic events to psychological and physical distress (Galea et al. 2002; Plant & Sachs–Ericsson 2004; Turner, Wheaton, & Lloyd 1995). Based on the stress process model (Thoits 1995), these studies have shown that individuals confronted with a disordered or challenging environment respond both physiologically, through alterations in the neuroendocrine and hormone systems (Boscarino 1997), and psychologically, usually through alterations in cognitive functioning (Thoits

1995; Turner, Wheaton, & Lloyd 1995). Serious environmental challenges that result in significant modifications in the person's biological and/or cognitive functioning have been referred to as stressors (Pearlin, Lieberman, Menaghan, & Muller, 1981; Thoits 1995). The consequence of exposure to these stressors can be decreased psychological and physical well–being, often in the form of depression and health problems.

Beginning with the Buffalo Creek disaster (Erikson 1976; Green 1995), a number of studies have focused on exposure to community disasters as a specific type of stressor and investigated factors that can intensify or diminish the effects of such stressful events on individuals (Adams et al. 2002; Bromet, Gluzman, Schwartz, & Goldgaber 2002; Havenaar et al. 1996; Norris et al. 2002). Reviews of disaster studies have concluded that large scale traumatic events significantly increase psychological problems in the short–term and can have long–lasting negative physical and mental health consequences (Brewin, Andrews, & Valentine 2000; Rubonis & Bickman 1991).

The stress process model and empirical studies have also suggested that other aspects of survivors' lives can strengthen or weaken their ability to cope with a community disaster. These factors have fallen into three categories: demographic characteristics such as socioeconomic status or gender; other life events experienced by survivors (e.g., death of a spouse); and social resources (e.g., social support) (Norris et al. 2002; Pearlin, Lieberman, Menaghan, & Mullen 1981; Thoits 1995).

In the present study, we pay particular attention to how race/ethnicity relate to mental and physical disorders within this stress process model. Until recently, most researchers assumed that racial and ethnic minorities would suffer from more psychological and physical problems post-disaster than Whites due to the fact that they experience more stressful events as well as more chronic strains such as living in poverty (Turner & Lloyd 2004). Studies assessing this prediction are, however, inconsistent. Some researchers have found that racial and ethnic minorities, primarily African Americans, suffer from higher rates of psychological disorders compared to Whites (Galea et al. 2002; Warheit, Holzer, & Arey 1975). In contrast, other researchers have discovered few differences between racial and ethnic groups for psychological problems, once background and stress exposure factors have been controlled (Breslau et al. 1998; Galea et al. 2003; Kessler, Sonnega, Bromet, & Hughes, 1995; Monnier, Elhai, Frueh, Sauvageot, & Magruder 2002), or that African Americans may in fact have lower rates of depression relative to other groups (e.g., Kessler et al. 2003). In most of these studies, though, minority participants reported more negative life events compared to their White counterparts (see also Turner, Taylor & Van Gundy 2004).

Inconsistent findings for a race/ethnicity and mental illness link were also found for comparisons between Latinos and Whites. Early studies of Vietnam combat veterans, for instance, reported that Latinos appear to be particularly vulnerable to PTSD (Escobar et al. 1983; Kulka et al. 1990; Ortega & Rosenheck 2000). In widely cited findings from the National Vietnam Veterans Readjustment Study (NVVRS), 21% of Blacks and 28% of Hispanics met criteria for PTSD, compared to 14% for White/Other veterans. When combat exposure, other negative life–events and traumas, and other predisposing factors (e.g., history of psychological problems, trouble with legal system) were controlled, however, differences in PTSD rates between African Americans and Whites were no longer statistically significant, while differences remained between Hispanics and Whites, with Puerto Rican and Mexican American veterans much more likely to meet criteria for PTSD and experience more severe symptoms (Kulka et al. 1990; Ortega & Rosenheck 2000). In contrast, data from community samples tended to show few racial and ethnic differences in rates of PTSD (Breslau et al. 1998; Kessler et al. 1995). The National Comorbidity Study (NCS), for instance, reported that once other demographic factors were controlled, there was no significant association between

race and PTSD (Kessler et al. 1995). Finally, studies focusing on acculturation revealed that immigrants from Mexico and other Latin American countries suffer from lower rates of mental health problems relative to Whites. The mental health advantage of Latinos disappears, though, as these immigrant groups become more acculturated (Burnam, Hough, Karno, Escobar, & Telles 1987; Marshall and Orlando 2002).

There are several possible reasons for these inconsistencies. First is the manner in which psychological problems were measured. Studies conducted in the late 1960s and the 1970s used symptom counts (e.g., CES–Depression scale) or general measures of psychological distress, whereas recent studies tend to use diagnostic criteria (Plant & Sachs–Ericsson 2004). Use of symptom scales usually result in higher levels of psychopathology for minority participants than for Whites, while use of diagnostic criteria shows lower rates of depression for African Americans and few differences among other racial or ethnic groups (Escobar et al. 1983; Kessler et al. 2003; Plant & Sachs–Ericsson 2004). Second, most studies concentrate on only one or two measures of psychological disorders (e.g., Monnier et al. 2002; Plant and Sachs–Ericsson 2004) rather than a range of outcomes (e.g., Kessler, Mickelson, & Williams 1999). Yet, racial and ethnic differences, as noted above, may exist for some psychological disorders, but not others. Third, most studies treat Latinos as an undifferentiated group, ignoring large differences within this ethnicity. Finally, race and ethnic differences in mental illness are rarely assessed within the context of a specific large–scale trauma. As Norris (1992: p. 409) argues, though, governmental public policies are usually "oriented toward responding to nonnormative events, such as criminal victimization, and collective crises, such as natural disaster."

In this report, we assess the hypothesis that there were significant racial and ethnic differences in psychological and physical health by examining a larger number of outcomes than is typical of past research: PTSD, PTSD symptom severity, depression, panic attack, and general physical and mental well–being. The outcomes reflect both symptom scales (e.g., SF–12) and diagnostic criteria (e.g., PTSD), since past research suggests that type of measure may influence the results of the analyses. In addition, we include a measure of physical well–being (i.e., SF–12) to assess how race and ethnicity relate to this outcome in contrast to the psychological distress measures.

We test this hypothesis using a community survey of individuals who were living in New York City (NYC) during the terrorist attacks on the World Trade Center (WTC). More specifically, our analyses focus on whether or not African Americans, Dominicans, Puerto Ricans, and Other Hispanics were at greater risk of developing psychological and physical health problems following this event when compared to non–Hispanic Whites. We also assess this association taking into account other factors. The stress process model, as described above (Thoits 1995; Turner, Wheaton, & Lloyd 1995), guided our selection of variables and our analyses.

## WORLD TRADE CENTER DISASTER

The terrorist attacks in NYC on September 11, 2001, resulted in one of the largest death tolls of any disaster in the United States (Centers for Disease Control 2002). These attacks resulted in the death of approximately 2,800 persons, with thousands injured and many residents directly witnessing the events. In addition, a large area of lower Manhattan's business district was destroyed, resulting in further social and economic hardships. The scope of the September 11 attacks and their impact on the local community in the weeks that followed suggested that these events might have significant long–term consequences for mental and physical health. Indeed, early post–event research documented a substantial prevalence of psychological symptoms and disorders among residents of NYC, with 7.5% of those living south of 110th Street in Manhattan reporting symptoms related to PTSD and 9.7% having symptoms of depression (Galea et al.

2002). Although Galea and his associates reported race/ethnic differences in this earlier work, later studies found no differences for PTSD (Galea et al. 2003).

According to Norris and her associates (Norris et al. 2002), community disasters that are most likely to trigger severe, lasting, and pervasive psychological problems have the following characteristics: extreme and widespread damage to property, serious and ongoing economic difficulties for the community, high loss of life or threat to life, and caused by human intent. The terrorist attacks in NYC on September 11, 2001, exhibited all of these characteristics. Thus, the WTC attack offered a unique opportunity to examine racial and ethnic differences in well–being associated with a major community–wide disaster.

## DATA AND METHODS

Data for the study come from a random sample of English- or Spanish–speaking adults (18 years old or older) who were living in NYC at the time of the attacks on the WTC and living in New York City at the time of the study. Using random–digit dialing, we conducted a household survey one year after the World Trade Center Disaster (WTCD). When interviewers reached a person at a residential telephone number, they obtained verbal consent and then ascertained the area of residence in NYC, screening out nonresidents and those who were not living in NYC on September 11, 2001. As part of the overall study, we oversampled residents who reported receiving any mental health treatment after the attacks. (The latter respondents were identified by means of screener questions at the start of the survey.) The population was also stratified by the five NYC boroughs and sampled proportionately. If more than one eligible adult lived in the household, interviewers selected one for an interview based on who had the most recent birthday. Interviews occurred between October and December, 2002. Questionnaires were translated into Spanish and then back–translated by bilingual Americans to ensure the linguistic and cultural appropriateness of the items. Trained interviewers using a computer–assisted telephone interviewing system conducted all of the interviews. All interviewers were supervised and monitored by the survey contractor in collaboration with the investigative staff. The Institutional Review Board of The New York Academy of Medicine reviewed and approved the study's protocols.

Overall, 2368 individuals completed the survey. Approximately, 7% of the interviews (23% for Hispanics respondents) were conducted in Spanish. Using survey industry standards (American Association for Public Opinion Research 2000), the cooperation rate was approximately 63%.[1] A protocol was in place to provide assistance to participants who required mental health counseling. Mean duration of the interviews was 45 minutes. Sampling weights were developed to correct for potential selection bias related to the multiple telephone numbers and persons per household, and for the oversample of treatment–seeking respondents. These weights allowed us to treat the sample as representative of the NYC population.

## DEPENDENT VARIABLES

In our analyses, as noted, we focused on a number of different mental and physical health measures: PTSD, PTSD symptom severity, major depression, psychological and physical well–being, and panic attack. Our PTSD scale was based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM–IV; American Psychiatric Association [APA]

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[1]More specifically, the cooperation rate was composed of (1)completed interviews, (2) screen outs—respondents who were not living in New York City at the time of the interview, were not living in New York City on September 11, or did not speak English or Spanish, (3) quota outs—respondents who were eligible to be interviewed but were of a gender or lived in a borough where the required number of interviews had been completed, and (4) refusals. Thus, the cooperation rate= completed interviews [2369] + screen outs [4985] + quota outs [117]/completed interviews + screen outs + quota outs + refusals [4330]. Our response rate, which is based on completed interviews divided by all eligible phone numbers and refusals, was 37% (completed interviews [2368]/quota outs [117] + refusals [4330] + residential phone but not interviewed by end of data collection [1945]).

1994). This measure was developed for telephone administration and used in previous national surveys (Kilpatrick et al. 1998; Resnick, Kilpatrick, Dansky, Saunders, & Best 1993), as well as in WTCD studies (Boscarino et al. 2004a, 2004b). To meet the PTSD criteria, a respondent had to be exposed to a traumatic event (Criteria A1) and experience intense feelings of fear, helplessness, or horror (Criteria A2). Second, the person had to re–experience the event in one of five ways (Criteria B), avoid stimuli associated with the event in three of seven ways (Criteria C), and had to have increased arousal in two of five ways (Criteria D). Third, the symptoms for Criteria B, C, and D had to last one month or longer (Criteria E). Finally, the symptoms had to have a significant impact on the individual's social life (Criteria F). Our assessment involved 3 sets of experiences, including the WTCD, the most stressful traumatic event experienced "other than the WTCD," and any other traumatic event experienced. To have PTSD, the person had to meet Criteria A through F for one or more of these traumatic events. The Cronbach's alpha for the symptoms used in this scale was 0.90. We reported elsewhere data supporting the validity of this PTSD instrument (Boscarino, Adams, & Figley 2004; Boscarino et al. 2004a; 2004b).

To test for racial/ethnic differences in the severity of PTSD symptoms, we asked respondents who reported a PTSD symptom to indicate whether that particular symptom bothered them "not at all," "just a little," "somewhat," or "a lot" in the past 30 days, which were coded 0, 1, 2, and 3, respectively. (If the respondent did not have the symptom at all, he/she was coded "0" for that particular symptom.) This symptom severity method is similar to the method used for PTSD Symptom Checklist (Blanchard, Jones–Alexander, Buckley, & Forneris 1996). We summed the 17 PTSD symptom severity items and then divided respondents into two groups: no or low symptom severity (score 0−6) and moderate to high severity (score 7 or more). We based this division on an examination of the frequency distribution for this scale and analyses associating the severity cut–point with the BSI–somatization, depression, anxiety, and global severity cases (defined as a standardized T–score of 65+; Derogatis 2001). In particular, the odds ratio for the BSI cases predicting high PTSD symptom severity (i.e., a score of 7+) were 6.2 for somatization, 8.8 for depression, 7.8 for anxiety, and 9.4 for global severity (all $p$'s< .001). These findings indicated that our cut–point reliably differentiated low versus moderate to high PTSD symptom severity and resulted in about a 90th percentile split for our study population (i.e., approximately 10% of the respondents had a score of 7 or higher on this scale).

For a diagnosis of major depression, we used a version of the SCID's major depressive disorder scale from the non–patients version (Spitzer, Williams, & Gibbon 1987), which also has been used in telephone–based population surveys (Acierno et al. 2000; Boscarino, Adams & Figley 2004; Boscarino et al. 2004a, 2004b; Galea et al. 2002; Kilpatrick et al. 2003). Following DSM–IV criteria (APA 1994), respondents met the criteria for depression if they had five or more depression symptoms for at least two weeks. In the current study, Cronbach's alpha for the 10 symptoms used in this scale was 0.87. Data related to the validity of this scale were also previously reported and suggested that this scale can successfully diagnose depression in the general population (Boscarino, Adams & Figley 2004; Boscarino et al. 2004a; 2004b).

General physical and psychological well–being was assessed using the Short Form–12, version 2 (SF–12–v2). This scale consisted of 12 items scored so that high scores reflect better health (Cronbach's alpha = .87). Following recommended scoring algorithms, the items were converted into standardized T–scores and summed to form two scales (Ware, Kosinski, Turner–Bowker, & Gandek 2002). This algorithm was designed so that both scales would have a mean close to 50 and a standard deviation close to 10. Although both scales contained all twelve items, the physical health measure (SF–12–v2 physical component, range 7 to 71) emphasized items on physical functioning, vitality, and body pain over the past 30 days. The psychological health measure (SF–12–v2 mental component, range 7 to 74) stressed items on emotional problems, feeling depressed, and feeling calm or peaceful over the past 30 days. In our study,

we used the recommended score of less than 35 to define individuals as unhealthy cases for each measure (Ware et al. 2002). This measure has been reported to have excellent validity and reliability (Ware et al. 2002) and has been extensively used in health research (e.g., Burdine, Fleix, Able, Wiltraut, & Musselman 2000; Fleishman & Lawrence 2003; Ware, Kosinski, & Keller 1996).

The panic attack measure was from the Diagnostic Interview Schedule (DIS) scale for panic (Robins et al. 1999), phrased to assess symptoms that occurred during or shortly following the terrorist attacks and adopted directly from DSM–IV (APA 1994). The scale ascertained the presence of panic symptoms in the first few hours after the events of September 11 (no versus yes). Respondents indicating that they had experienced four or more symptoms and that these symptoms reached their peak within 10 minutes after they started met criteria for a panic attack. The scale has content, context, and criterion–related validity (APA 1994). The 14 panic symptoms that comprised this scale had high internal consistency in the current study (Cronbach's alpha = 0.85). This scale also was used in other recent WTCD telephone surveys (Boscarino, Adams & Figley 2004; Boscarino et al. 2004a, 2004b; Galea et al. 2002).

## INDEPENDENT VARIABLES

### Background Characteristics

Consistent with most research (Breslau et al. 1998; Ortega, Rosenbeck, Alegria, & Desai, 2000; Pole et al. 2001), race/ethnicity was self-identified in the following manner. First, the survey interviewer asked the respondent if he/she was of "Spanish or Hispanic origin." For those who answered yes to this question, the interviewer then asked, "Specifically, what country did most of your Spanish or Hispanic family come from?" We next queried the respondent about his/her race, which included White, Black or African American, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaska Native, or "some other race." Using the responses to these three questions, we classified all respondents as follows: non–Hispanic White, non–Hispanic Black or African American, Dominican, Puerto Rican, Other Hispanic, Asian, Native American, Pacific Islander/Alaskan Native, and Other Race/No Race Given. Since one of the study's aims was to compare Latinos with Whites and African Americans, and the number of other racial groups was relatively small, those individuals classified as Asian, Native American, Pacific Islander/Alaskan Native, or Other Race/No Race Given ($n = 188$), were excluded from this study. Thus, our final study sample included the following: 1015 Whites, 606 African Americans, 114 Dominicans, 256 Puerto Ricans, and 189 Other Hispanic respondents ($N = 2180$).

Our analyses included 8 other demographic variables: age, education, gender, marital status, household income, immigration status, language of the interview, and church attendance. Age was coded to the nearest year. Gender and marital status were dummy coded with male and not married the reference categories. To take into account possible acculturation issues (Ortega et al. 2000), we also included immigration status and language of the interview, both of which were dummy coded so that born in the United States and interview conducted in English were the excluded categories. Church attendance was coded into 5 categories (never/rarely, a few times a year, 1−3 times a month, once a week, and more than once a week). We coded income into 7 categories, including under $20,000, $20,000−$29,999, $30,000−$39,999, $40,000−$49,999, $50,000−$74,999, $75,000−$99,999, and $100,000+ (coded 1−7). In this study, individuals without income data were coded to the mean value of this variable. Finally, educational attainment was coded into 5 categories: less than high school graduate, high school graduate, some college, college graduate, and graduate work/graduate degree. In the multivariate analyses, church attendance, income, and educational attainment were treated as interval level measures.

### Stress/Risk and Moderators

Our analyses included 3 stressor variables that could have placed the individual at higher risk for poor psychological and physical well–being and one social resource that could lower such risk. The first stressor was WTCD event exposure, which was composed of 14 possible events (yes; no) that the respondents could have experienced during or after the attacks (e.g., fear of being killed, friend or relative killed, forced to move, lost job as a direct result of the WTCD). The exposure scale was the sum of these events.[2] Due to the skewed distribution, though, we recoded individuals reporting 9 or more events to a score of 8. The negative life event scale (Freedy, Kilpatrick, & Resnick, 1993) was the sum of eight experiences that the respondent could have had in the 12 months before the WTCD (e.g., divorce, death of spouse, problems at work). Based on an examination of the frequency distribution, we dummy-coded respondents into three groups (no life events, one life event, and two or more life events), with no life events the reference category. The third measure focused on 10 lifetime traumatic events (Freedy, Kilpatrick, & Resnick 1993), other than the WTCD (e.g., forced sexual contact, being attacked with a weapon, having a serious accident). The items were summed, with 9 or more traumatic events recoded to 8. The social resource variable was social support (Sherbourne & Stewart, 1991). This measure was the sum of four questions about emotional, informational, and instrumental support (e.g., someone available to help you if you were confined to bed). These items were coded so that high scores indicated high social support (Cronbach's alpha = .83). WTCD exposure, lifetime trauma, and social support were treated as ordinal–level measures in our analyses. These stress/risk and resource measures were used and validated in other WTCD studies in New York City and discussed elsewhere (Boscarino, Adams & Figley 2004;Boscarino et al. 2004a,2004b;Galea et al. 2002;Galea et al. 2003).

## STATISTICAL ANALYSIS

We first present the demographic differences between Whites, African Americans, Dominicans, Puerto Ricans, and Other Hispanics. Next, we present the bivariate cross–tabular results for racial/ethnic group by our six outcome measures, three stress risk measures, and one resource measure. Following those analyses, a series of logistic regressions are estimated to investigate the unique association between race/ethnicity and each health status outcome variable. The logistic analyses proceed in 3 steps to assess how the associations change between race/ethnicity and the dependent measure under investigation as variables are included in the model. In the first model, we estimate the association between race/ethnicity and the dependent variables, without other variables in the equations. Since the purpose of our study was to test the hypothesis that racial and ethnic minorities were more likely to have poor physical and psychological health outcomes relative to Whites and that Latinos, in particular, were more vulnerable to physical and psychological problems, we compare African Americans, Dominicans, Puerto Ricans, and Other Hispanics to Whites for each of the six health outcome measures. In the second model, we include the other demographic characteristics discussed. These analyses reveal the unique association between race/ethnicity and the dependent variables, controlling for background characteristics. In the final model, we add the stress and moderator variables. Thus, the last model provided the strongest test of the proposition that racial and ethnic minority group members had worse physical and mental health outcomes when compared to Whites following the WTCD.[3]

We used the survey estimation (svy) command set in Stata, version 7 (Stata Corporation 2001) to generate our frequency distributions, cross–tabulations, and our logistic regression

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[2]Since there was not an *a priori* method of assessing the severity of any individual exposure event, we decided that a simple summation of events experienced by the respondent was the best way to measure this stressor.

models. This estimation procedure adjusts the data for our sampling design, which included stratification by city borough and case weights, as noted earlier.

## RESULTS

The descriptive statistics by race/ethnicity are presented in Table 1. As shown, there were minor, non–significant differences for gender across the racial/ethnic groups. Significant racial/ethnic differences existed for the other variables, however. More specifically, minority group members tended to be younger, be less educated, be unmarried, have lower household incomes, be born outside of the United States, and attend church more often than Whites (all $p$'s <.01, $\chi^2$ test).

The bivariate results between race/ethnicity and the main independent and dependent variables can be seen in Table 2. As shown, contrary to some expectations (Ortega & Rosenheck 2000), racial and ethnic minorities in our study did not have a greater likelihood of having had PTSD when compared to Whites. On the other hand, minority group members had more severe PTSD symptoms and were more likely to have had a WTCD-related panic attack relative to Whites. In addition, a higher percentage of Dominicans and Puerto Ricans, but a lower percentage of African Americans and Other Hispanics, had major depression, relative to Whites. In terms of the SF12–v2 measures, greater percentages of Dominicans and Puerto Ricans were classified as psychologically unhealthy, compared to Whites, while African Americans and Other Hispanics had slightly lower percentages. African Americans, Dominicans, and Puerto Ricans were generally classified as having poorer physical health than Whites. Examining our stress risk and social resource variables revealed no statistically significant race/ethnic differences for WTCD exposure or lifetime traumatic events. Racial and ethnic minorities were more likely to report negative life events and lower levels of social support than Whites.[4] This latter finding conflicted with studies showing that minority group members have stronger social ties and greater social support relative to Whites (e.g., Plant and Sachs–Ericsoson 2004).

Results from our multivariate logistic regressions (Table 3) indicated that where racial/ethnic differences did exist, they were mainly between Whites and African Americans or in unexpected directions. For PTSD diagnosis and PTSD symptom severity (rows 1 and 2), there were no differences by race/ethnicity, once other demographic factors and stress risk and moderator variables were controlled. Race/ethnic differences continued to be significant for depression (row 3), after controlling other variables. However, African Americans and Other Hispanics were less likely to have had depression relative to Whites. A similar pattern was found for the SF–12–v2 mental health scale (row 4).

For our SF–12–v2 physical health (row 5) and panic attack (row 6) measures, some of the results were mildly supportive of the notion that race/ethnic differences exist. With no controls, both African Americans and Puerto Ricans were more likely to be classified as unhealthy compared to Whites. Introducing other demographic characteristics in the model reduced the

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[3]The main advantage of these multivariate logistic regression analyses is that they allowed us to assess the association between race/ethnicity and the health outcomes, controlling for possible confounding factors. For example, if income is related to both race and mental health, then the apparent bivariate association between race and depression may be spurious due to the common factor (income) being related to both of these variables. By including income in a multivariate model, we are statistically eliminating income differences. If a significant association between race and depression still exists, then we can say that it is not due to their relationship to income. The problem with this analytic technique is the possibility of including too many independent variables so that we over-control for these other factors. By including too many covariates in the logistic regression, we may be committing a type II error and obscuring a "real" association between race/ethnicity and well-being. However, this possibility is reduced by our use of the stress process model as a guide for variable selection. The issue of over-control, though, can never be totally eliminated as a potential problem.

[4]We analyzed the association between race/ethnicity and the stress risk and resource variables using bivariate logistic regression. Results from these analyses are available upon request.

association for African Americans, and eliminated it for Puerto Ricans. Finally, controlling for stress and resource factors rendered the differences between Whites and African Americans not significant. For panic attack just after the WTCD, all of the racial/ethnic groups had a higher likelihood of meeting criteria relative to Whites, without controls. Introducing the other demographic characteristics into the model eliminated the statistically significant differences between Whites, Dominicans, and Other Hispanics. Including the stress and resource factors reduced, but did not eliminate, the greater likelihood of African Americans and Puerto Ricans having experienced a panic attack compared to Whites.

In order to validate our above analyses, we also assessed models using ordinary least–squares regression incorporating interval level measures for PTSD symptom count, PTSD symptom severity, depression symptom count, the SF–12–v2 mental health scale, the SF–12–v2 physical health scale, and panic symptom count as dependent variables. The results of these investigations were essentially the same as those reported for the logistic regression models and are available upon request.

## DISCUSSION

Consistent with other community studies (e.g., Breslau et al. 1998; Kessler et al 1995), we did not find greater rates of PTSD among Latinos when compared to other racial/ethnic groups. In addition, the analyses revealed that African American and Other Hispanics were less likely to have had major depression and to be classified as unhealthy on the SF–12–v2 mental health measure. The latter findings were consistent with other community studies (Aneshensel, Rutter, & Lachenbruch 1991; Kessler et al. 2003). Even for physical health, we did not find support for racial/ethnic differences, once all factors were included in the analyses. Only for panic attack were African Americans and Puerto Ricans more likely to have met criteria for this disorder compared to Whites. In this study, therefore, there was little support for the notion that Latinos or African Americans suffer from worse mental health than Whites following a traumatic event, once demographics, stressors, and stress moderators are taken into account. There was also no support that Latinos experience PTSD symptoms more intensely than Whites or African Americans, once other factors were taken into account.

Our race/ethnicity findings are seemingly at odds with studies of PTSD among combat veterans (e.g., Kulka et al. 1990; Ortega & Rosenheck 2000). In their review of the empirical literature examining this association, however, Frueh, Brady, & Arellano (1998) contend that the results of past studies are anything but clear. They conclude that both the limited amount of research and the inconsistent empirical data pertaining to race and PTSD prevented any definitive conclusions about the role of race/ethnicity in understanding differences in PTSD rates (Frueh et al. 1998; Monnier et al. 2002). Our results do support other analyses of community samples and the finding of no racial and ethnic differences in PTSD (e.g., Kessler et al. 1995).

Kessler and colleagues (1995) speculate that differences in diagnostic criteria, assessment procedures, or sample characteristics might underlie these differing rates of PTSD. Many of the early studies on Vietnam Veterans (e.g., Escobar et al. 1983) use criteria from the Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition (DSM–III; American Psychiatric Association 1980), whereas later studies use criteria for DSM–III–R or DSM–IV (e.g., Breslau et al. 1991, 1998). Most studies employing the later criteria find fewer racial/ethnic differences. In a study of White and African American veterans presenting themselves at a Veterans Affairs Medical Center outpatient clinic for PTSD, Monnier and her associates (2002) report few race/ ethnic differences for PTSD, depression, anxiety, dissociation, paranoia, or schizophrenia. It is also possible that race/ethnic differences for PTSD and other psychological problems are related to specific types of occupations or social contexts. Pole and colleagues (2001), for instance, found that Hispanic police officers from an urban law enforcement agency reported

more PTSD symptoms than their White or African American counterparts. These issues may also explain different findings for depression and point to the necessity of conducting further research to assess the specific reasons for these conflicting findings.

The most interesting ethnic difference in our study was for the panic attack measure. Both African Americans and Puerto Ricans were about twice as likely to meet criteria as White respondents. Ortega and Rosenheck (2000) suggested that the higher PTSD rate for Puerto Ricans in their study was possibly due to the greater expressiveness of this group compared to Whites. Norris, Perilla, and Murphy (2001) in their study of Whites in Florida and Mexicans in Mexico subjected to similarly devastating hurricanes argue that Hispanics in general more readily acknowledge symptoms than other race/ethnic groups because culturally it is not seen as a personal failing or shortcoming. These speculations offer possible reasons for Puerto Ricans' elevated chances of experiencing a panic attack in the wake of the WTCD.

Norris and her associates (Norris, Perilla, & Murphy 2001; Norris et al. 2002) also offer several explanations for why African Americans are more vulnerable to panic attacks. First, African Americans may experience or perceive more severe events. In our study, however, African Americans reported about as many WTCD related experiences as Whites and their PTSD symptom severity was not significantly higher. Second, African Americans typically do not have the economic and social resources to buffer the impact of traumatic events, which was certainly the case for our sample. Finally, African Americans, and minority groups more generally, are subjected to discrimination and marginalization which may exacerbate the effects of community–wide disasters like the WTCD. Based on our study results, the explanation for African American vulnerability to panic attacks appears to be structural (e.g., income, education, discrimination) in nature, rather than cultural (e.g., greater expressiveness). Future research should assess both cultural and structural sources of increased vulnerability to psychological problems in more detail for different racial/ethnic groups.

There are both limitations and strengths to our study that should be noted. By omitting individuals without telephones, those who did not speak either English or Spanish, and those too disabled to undertake a telephone survey, we may have missed more highly vulnerable individuals and a variety of other ethnic groups. Given that the sample matched the 2000 Census for NYC, elimination of households without a telephone did not appear to introduce overall demographic bias. We are limited, though, in generalizing about the association between race/ethnicity and psychological problems beyond White, African American, and Latino groups. To date, little research has focused on how the WTC attacks affected the physical or mental health of immigrant communities or the wide variety of ethnic groups living in NYC. Severe trauma exposures, however, such as the WTCD, may not have had a more deleterious effect on individuals within such groups, since many are likely to be integrated into their cultural environments, with potentially strong social support networks. There may also be cultural differences in the social desirability in reporting psychiatric symptoms that could affect the ethnicity–PTSD relationship (Norris, Perilla, & Murphy 2001), which we do not have the data to explore. In one of the few studies on Asian immigrants working near the WTC at the time of the terrorist attacks, Thiel de Bocanegra and Brickman (2004) report that about 23 percent of their Chinese immigrant sample scored between moderately and severely depressed and 21 percent met study criteria for PTSD.

Our conclusions are also limited by the cross–sectional nature of the data. We do not have any pre–disaster data. However, this limitation should have little bearing on the present study. Having information on pre–disaster mental health status, depression, for example, and including it in our analyses would most likely not alter the conclusion about the general lack of an association between race/ethnicity and mental health. Finally, all of our measures of mental and physical well–being are self–report. Although there has been significant progress

in assessing individual mental health with standardized instruments administered by lay interviewers (Adams et al. 2002; Breslau et al. 1998; Kessler et al. 1994), there continue to be discrepancies between lay and clinician–based assessments of community samples.

These limitations should not overshadow the strengths of the study, which include the use of a large random sample representative of NYC, the assessment of physical and mental well–being using standard scales and measurements, the focus on a specific event which meets criteria for community–wide disaster, and the use of a specific model to guide variable selection. A conclusion of our analyses is that racial and ethnic heritage seems to have little association with PTSD or other psychological disorders following the WTCD, but a strong association with emotional reactions to trauma (i.e., panic attack). It is possible that race and ethnicity may be related to the consequences of trauma, but that such effects may take longer to manifest themselves. Thus, continuing investigation of the race and ethnic effects on psychological health seems highly warranted.

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**Table 1**

Descriptive Statistics for the World Trade Center Disaster Study by Race/Ethnicity ($N = 2180$)[†]

| | % White | % African American | % Dominican | % Puerto Rican | % Other Latino | $\chi^2$ (p–value)[*] |
|---|---|---|---|---|---|---|
| Gender | | | | | | 10.2 (.221) |
| Male | 48.4 | 42 | 45.7 | 40.1 | 48.7 | |
| Female | 51.6 | 58 | 54.3 | 59.9 | 51.3 | |
| Age | | | | | | 90.7 (<.001) |
| 18–29 | 18 | 29.7 | 47.8 | 31.4 | 39.5 | |
| 30+ | 82 | 70.3 | 52.2 | 68.6 | 60.5 | |
| Education | | | | | | 277.5 (<.001) |
| Less Than College Graduate | 42.1 | 73.7 | 79.5 | 83.7 | 74.9 | |
| College Graduate | 57.9 | 26.3 | 20.5 | 16.3 | 25.1 | |
| Marital Status | | | | | | 66.5 (<.001) |
| Not Married | 45.5 | 64.1 | 62 | 62.5 | 48.7 | |
| Married | 54.5 | 35.9 | 38 | 37.5 | 51.3 | |
| Yearly Household Income | | | | | | 161.4 (<.001) |
| Less than $30,000 | 17.1 | 39.2 | 53.5 | 40.8 | 42.2 | |
| $30,000+ | 82.9 | 60.8 | 46.5 | 59.2 | 57.8 | |
| Immigrant Status | | | | | | 362.3 (<.001) |
| Born in U.S. | 83.2 | 62.4 | 34.4 | 72 | 25.8 | |
| Born outside U.S. | 16.8 | 37.6 | 65.7 | 28 | 74.2 | |
| Church Attendance | | | | | | 29.6 (.003) |
| Less Than Once a Week | 71.4 | 62.7 | 54.3 | 62.4 | 58.6 | |
| Once a Week or More | 28.6 | 37.3 | 45.7 | 37.6 | 41.4 | |
| (n =) | (1015) | (606) | (114) | (256) | (189) | |

[*] All differences by race/ethnicity were significant (p <.005), except for gender.

[†] All percentages are weighted; n's are unweighted.

**Table 2**

Association between Key Study Variables and Race/Ethnicity ($N = 2180$)[†]

| | % White | % African American | % Dominican | % Puerto Rican | % Other Latino | $\chi^2$ (p–value) |
|---|---|---|---|---|---|---|
| **PTSD Past Year** | | | | | | |
| No | 96 | 94.5 | 94.7 | 91.6 | 95 | 7.7 (.212) |
| Yes | 4 | 5.5 | 5.3 | 8.4 | 5 | |
| **PTSD Symptom Severity** | | | | | | |
| None/Some | 92.2 | 89.5 | 82.6 | 81.6 | 88.4 | 29.7 (<.001) |
| High | 7.8 | 10.5 | 17.4 | 18.4 | 11.6 | |
| **Depression Past Year** | | | | | | |
| No | 87.1 | 89.1 | 81.9 | 84.9 | 93.6 | 14.9 (.019) |
| Yes | 12.9 | 10.9 | 18.1 | 15.1 | 6.4 | |
| **SF–12–v2 Mental Health** | | | | | | |
| Healthy | 94.5 | 95.3 | 84.4 | 87.4 | 96.7 | 41.4 (<.001) |
| Not Healthy | 5.5 | 4.7 | 15.6 | 12.6 | 3.3 | |
| **SF–12–v2 Physical Health** | | | | | | |
| Healthy | 95 | 89.9 | 91.6 | 89.5 | 97.6 | 26.9 (.001) |
| Not Healthy | 5 | 10.1 | 8.4 | 10.5 | 2.4 | |
| **Panic Attack–WTCD** | | | | | | |
| No | 94.5 | 86.6 | 83.4 | 83.2 | 86.6 | 47.9 (<.001) |
| Yes | 5.5 | 13.4 | 16.6 | 16.8 | 13.4 | |
| **WTCD Event Exposure** | | | | | | |
| Low/Moderate | 93 | 93.7 | 88.1 | 91.1 | 92.4 | 6.1 (.376) |
| High | 7 | 6.3 | 11.9 | 8.9 | 7.6 | |
| **Negative Life Events** | | | | | | |
| Low/Moderate | 86.9 | 80.1 | 79.1 | 78 | 78.2 | 22.4 (.007) |
| High | 13.1 | 19.9 | 20.9 | 22 | 21.8 | |
| **Pre–9/11 Lifetime Trauma** | | | | | | |
| Low/Moderate | 84 | 79.8 | 80.4 | 82.9 | 87.8 | 9.5 (.204) |
| High | 16 | 20.2 | 19.6 | 17.1 | 12.2 | |
| **Social Support** | | | | | | |
| Low/Moderate | 54.8 | 68.3 | 75.8 | 63.4 | 68.7 | 46.0 (<.001) |
| High | 45.2 | 31.7 | 24.2 | 36.6 | 31.3 | |

| | % White | % African American | % Dominican | % Puerto Rican | % Other Latino | $\chi^2$ (p–value) |
|---|---|---|---|---|---|---|
| (n =) | (1015) | (606) | (114) | (256) | (189) | |

WTCD = World Trade Center Disaster.

[†] All percentages are weighted; *n*'s are unweighted.

**Table 3**

Logistic Regression Odds Ratios (OR) and 95% Confidence Limits (CL) for Psychological and Physical Health Outcome among Ethnic Group Compared to Whites following the World Trade Center Disaster ($N = 2092$ to $2180$)

| Dependent Variables | African American OR (95% CL) | Dominican OR (95% CL) | Puerto Rican OR (95% CL) | Other Hispanic OR (95% CL) |
|---|---|---|---|---|
| **PTSD** | | | | |
| No other variables controlled | 1.37 (0.80−2.33) | 1.34 (0.52−3.45) | 2.17 (1.18−3.98)[*] | 1.26 (0.59−2.69) |
| Demographics[†] | 1.10 (0.64−1.91) | 0.94 (0.28−3.08) | 1.47 (0.73−2.96) | 1.09 (0.46−2.57) |
| +Stress and Resource[‡] | 0.90 (0.50−1.64) | 0.64 (0.20−2.05) | 1.02 (0.48−2.15) | 0.79 (0.27−2.32) |
| **PTSD Symptom Severity** | | | | |
| No other variables controlled | 1.37 (0.93−2.02) | 2.48 (1.32−4.65)[**] | 2.65 (1.65−4.26)[***] | 1.54 (0.83−2.87) |
| Demographics | 0.96 (0.61−1.49) | 1.20 (0.51−2.82) | 1.60 (0.95−2.68) | 0.88 (0.45−1.72) |
| +Stress and Resource | 0.82 (0.51−1.33) | 0.90 (0.39−2.05) | 1.29 (0.71−2.36) | 0.68 (0.34−1.36) |
| **Depression** | | | | |
| No other variables controlled | 0.83 (0.58−1.19) | 1.49 (0.85−2.64) | 1.21 (0.76−1.92) | 0.46 (0.27−0.80)[**] |
| Demographics | 0.66 (0.44−0.97)[*] | 1.16 (0.61−2.24) | 0.91 (0.55−1.52) | 0.42 (0.20−0.88)[*] |
| +Stress and Resource | 0.54 (0.35−0.82)[**] | 0.84 (0.38−1.87) | 0.65 (0.37−1.16) | 0.29 (0.12−0.65)[**] |
| **SF−12 Mental Health** | | | | |
| No other variables controlled | 0.84 (0.50−1.42) | 3.16 (1.71−5.81)[***] | 2.47 (1.46−4.18)[***] | 0.59 (0.31−1.12) |
| Demographics | 0.46 (0.26−0.79)[**] | 1.56 (0.69−3.55) | 1.39 (0.79−2.46) | 0.36 (0.15−0.83)[*] |
| +Stress and Resource | 0.39 (0.22−0.69)[***] | 1.23 (0.55−2.76) | 1.15 (0.62−2.12) | 0.27 (0.11−0.69)[**] |
| **SF−12 Physical Health** | | | | |
| No other variables controlled | 2.14 (1.35−3.40)[***] | 1.76 (0.78−3.96) | 2.25 (1.20−4.20)[*] | 0.47 (0.19−1.13) |
| Demographics | 1.78 (1.04−3.04)[*] | 1.78 (0.54−5.83) | 1.79 (0.85−3.79) | 0.52 (0.18−1.56) |
| +Stress and Resource | 1.74 (1.00−3.04) | 1.72 (0.45−6.59) | 1.66 (0.75−3.65) | 0.53 (0.17−1.71) |
| **Panic Attack−WTCD** | | | | |
| No other variables controlled | 2.66 (1.78−3.97)[***] | 3.41 (1.74−6.69)[***] | 3.47 (2.16−5.58)[***] | 2.65 (1.52−4.65)[***] |
| Demographics | 1.87 (1.16−3.02)[**] | 1.45 (0.53−3.95) | 2.15 (1.27−3.63)[**] | 1.24 (0.62−2.50) |
| +Stress and Resource | 1.89 (1.15−3.10)[*] | 1.23 (0.45−3.31) | 1.80 (1.04−3.11)[*] | 1.06 (0.50−2.22) |

WTCD = World Trade Center Disaster.

[†] Demographic controls: Age, income, gender, education, marital status, immigrant status, language of interview, and church attendance.

[‡] Stress and resource controls: Exposure to WTCD, negative life events, traumatic events, and social support.

[*] $p < .05$

[**] $p < .01$

[***] $p < .001$.