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HURRICANE KATRINA AND THE PERCEPTION OF RISK:
INCORPORATING THE LOCAL CONTEXT

by

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B.A. University of Central Florida, 2007

A thesis submitted in partial fulfillment of the requirements
for the degree of Master of Arts
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in the College of Sciences
at the University of Central Florida
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ABSTRACT

This paper identifies social conditions that shape perceptions of risk to environmental toxins among residents in the Gulf Coasts of Louisiana and Mississippi following Hurricane Katrina. Demographic information from a randomly selected sample of 2,548 residents was used to explore the concept of the "White male effect" as discussed in previous literature, which has found that white males are particularly risk accepting compared to all other race and gender groups. This analysis also evaluated the influence of trust in government and beliefs about environmental justice on perceived exposure and compared responses from residents within and outside the City of New Orleans to determine whether there is evidence of location-specific differences. Hierarchical regression analysis revealed strong support for the combined race and gender effects proposed by previous literature. Additionally, hypotheses regarding the influence of trust in government and belief in environmental *in*justice were supported. Suggestions for future research and policy implications are discussed.

This thesis is dedicated to the late Dr. Brent K Marshall, whose kindness and investment in my future will never be forgotten.

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CHAPTER ONE: INTRODUCTION

Early in the morning on August 29, 2005, category 3 Hurricane Katrina slammed the Louisiana and Mississippi coastlines with sustained winds near 130 miles per hour, eventually devastating an area roughly the size of Great Britain (White House 2006). While the storm resulted in close to \$100 billion dollars in physical damage, the social calamity that unfolded during the approach and aftermath of the storm left behind many unanswered questions about how so much could go wrong. From the evacuation and diaspora of residents to the woefully inadequate disaster response preparation and ongoing disputes about environmental threats, Katrina continues to have a profound effect on the lives of current and former residents of the United States Gulf Coast.

In particular, New Orleans was left with complex problems beyond the physical damage that remained after the storm had migrated inland. Social conditions rapidly deteriorated in the wake of the storm, as stunned residents struggled to find anything that resembled organized relief. Witnessed through media outlets worldwide thousands of residents languished for days before aid arrived. Tens of thousands of people were stranded without basic necessities following one of the Nation's most devastating social and meteorological catastrophes. Even worse, much of this hardship was the direct consequence of failure of multiple levels of government to anticipate and respond to a storm that was known to pose a lethal threat to the Gulf Coast and, more damningly, for which there was adequate warning.

Under an eruption of scathing criticisms, government officials responded with a series of blunders and finger pointing that ultimately prolonged the already abysmally sluggish deployment of emergency personnel and supplies (Congleton 2006). Meanwhile, inside New

Orleans, the destructive force of Hurricane Katrina and its aftermath had leveled communities whose residents possessed little more than a sense of community itself. Deep-rooted social networks, which for generations had supported citizens' existence on appallingly meager means, were dismembered as evacuees became haphazardly scattered about the United States. As the landscape tumbled into the flood that submerged much of the city, a way of life that could survive only in the cultural uniqueness of this city became extinct.

What would become of residents who had nothing left to fall back on? Whose interests would be served in a post-Katrina Crescent City? How could so much have gone wrong? Questions such as these were forming before anyone could pinpoint exactly what had happened. It was obvious, however, that a profound sense of disappointment and anger was developing among those who had been abandoned even before the storm made landfall.

The mere struggle to escape bodily harm had been, for many, a first priority. In order to avoid being trapped inside buildings, thousands in New Orleans were forced to trek through fetid flood water. Upon reflection, survivors have reported fear about what health-related problems could result from taking this plunge (Manuel 2006). As weeks and months passed, a small stream of residents trickled back into the city—some aimed to repair and rebuild, while others visited only to survey what was left before starting anew elsewhere. Over time, those who were able to return began resettling the city and evaluating damage. Homes needed to be demolished, vehicles discarded, and debris cleared. In the process of encouraging these efforts, local officials loosened disposal regulations and have either opened or attempted to open a series of dump sites that have since become controversial (Luther 2007). Concerns have mounted about issues of property value, environmental health and ecological safety (Bullard and Wright 2009).

Compounding general unease about potential sources of contaminants within the city as a whole, Reible et al. (2006: 565) have proposed that those residents least equipped to address contamination could potentially be threatened with the most exposure, warning that “...in the absence of government support for testing and cleanup, the responsibility and cost [of addressing issues of contamination] would fall disproportionately on the poor, effectively meaning that little or no testing would be conducted on individual properties.” Such predictions have not gone unnoticed, as charges have already been made that environmental health risks are being situated in minority neighborhoods (Bullard and Wright 2009). As previous research has identified the ambiguity of health outcomes from toxic exposure directly contributes to collective trauma, stress, and anxiety (Erikson 1976; Edelstein 1988; Brown and Mikkelsen 1990). Given this fact, it is possible that lack of government support for these concerns could re-victimize populations already suffering the burden of residential destruction and financial distress.

Alarm about whether the surrounding environment could be poisonous—or perceived risk—reveals an additional source of anxiety for residents struggling to piece together shattered communities and day-to-day existence. This added burden, along with related concerns about equity in the process of reconstructing New Orleans, compound routine challenges of recovery. The present research explores conditions that affect perceived risk to toxin exposure among Gulf Coast residents, particularly residents of New Orleans, in the post-Katrina landscape. In this thesis, I explore the interaction of demographic characteristics, storm-related experiences, geographic location, and other situational influences to determine how these variables are related to perceived risk of exposure to environmental toxins.

CHAPTER TWO: LITERATURE REVIEW

Characteristics that influence perceived risk to environmental threats have been measured in a variety of ways over the past few decades. Risk perception is influenced by the interplay of a variety of psychological, social, and political factors (Slovic 1999). However, efforts that focus specifically on individual responses to and perceptions of risk ignore the broader context of place and history. More recent research has sought to approach the analysis of risk perceptions with an appreciation for setting and locality of communities (Beamish 2001; Bickerstaff and Walker 2001; Marshall 2004; Marshall et al. 2006). New Orleans presents a cultural and historical backdrop against which to examine how perceptions of environmental risk are shaped. The regional influence in this case helps to illustrate the importance of place and culture for the subjective experience of risk. Additionally, the intervening event of a meteorological and technological catastrophe introduces an element that adds both complexity and clarity to this analysis by uncovering the influence of social conditions relating to disaster response.

Governing bodies within New Orleans have produced a legacy of policies that have been disadvantageous to the city's vulnerable populations and have on occasion increased their vulnerability (Colten 2007; Miller and Rivera 2008). Experiences with government agencies following the immediate impact of the storm and continuing into the recovery process will continue to influence residents' perception of environmental risk. This research intends to build and expand upon insights provided by earlier literature to evaluate factors that influence risk perceptions among New Orleanians and other Gulf Coast residents within the scope of a post-disaster landscape. By locating residents' experiences within their local history, it is my goal to

develop a broader understanding of how troubles and concerns that are place-based color evaluations of environmental threats.

Gender and Risk Perception

It cannot be assumed that social characteristics themselves can predict the manner in which an individual will respond to any situation. However, it is important to examine factors that can influence the opportunities and pressures that one is likely to face and how these life circumstances filter one's outlook. The following section will discuss previous literature that has investigated how race and gender affect risk beliefs and attitudes related to environment and health.

A broadly discussed topic in the literature on the perception of risk is the influence of gender. Research has consistently found that men tend to be more risk accepting than women (Barke, Jenkins-Smith, and Slovic 1992; Kraus, Malmfors, and Slovic 1992; Flynn, Slovic, and Mertz 1994; Board and O'Connor 1997; Davidson and Freudenburg 1996; Finucane, Slovic, Mertz, Flynn, and Satterfield 2000; Marshall 2004; Marshall et al. 2006¹). A variety of reasons have been explored as to why this would be the case. Some researchers (Blocker and Eckberg 1997) have suggested that women's historical exclusion from the field of science and consequent lack of scientific knowledge could be responsible for their greater concern about risks. However, Barke, Jenkins-Smith, and Slovic's (1992) finding that women physical scientists were more apprehensive about the risks of nuclear technologies than were male scientists and Kraus et al.'s

¹ However, for a counter argument, see Greenberg and Schneider 1995.

(1992) discovery of discrepancies in male and female toxicologists' views on the dangers posed by chemicals challenge this explanation.

Krauss (1993) explains women's greater concern for environmental hazards as extending from traditional gender roles. Davidson and Freudenburg's (1996) meta-analysis of research relating to gender differences in risk perception elaborates these observations by explaining that concerns related to health and safety, in relation to local facilities, are responsible for women's greater sensitivity to technologies and environmental pollution. In discussing why this might be the case, they suggest that women's traditional role as care-givers could account for increased risk perception due to heightened concern for the wellbeing of others.

Challenging these findings, Bord and O'Connor (1997) re-evaluated the question of why women are more uniform in their heightened apprehension across a multitude of risk categories by suggesting that women's sensitivity results from the fact that they feel more vulnerable. Across measures, in comparisons concerning evaluation of a specified risk, women consistently reported greater concern than men. The researchers argue that *personal* risk perception, not social status as a woman per se, influences their greater alarm and concern about risks.

Race and Risk Perception

Relatively little work has been done with regard to race and environmental risk perception. Early research on differences in attitudes towards the environment was approached with the assumption that Blacks were less concerned about environmental problems than were Whites. For example, Hershey and Hill (1977) suggested that concern about pollution was a

“White thing.” However, later work challenged this idea, particularly on the grounds that concern for the environment and environmental threats were measured in ways that were not salient to Blacks, such as questions that pertained to aesthetics rather than environmental quality (Jones and Carter 1998; Mohai and Bryant 1998).

In support of findings suggesting that non-whites tend to exhibit greater environmental concern than do Whites, a number of national opinion studies have found race, in addition to gender, to play an important role in interpreting risk attitudes. Flynn et al.’s (1994) report on a survey of risk perception yielded significant differences between race/gender categories. After finding that White males in particular were exceptionally risk accepting compared to all other race and gender groups, they coined this pattern the “White male effect.” Upon further investigation, Flynn and colleagues found that a subgroup of White males was responsible for this divergence from the rest of the sample. This group was better educated, had higher household incomes, was more politically conservative, and was “characterized by trust in institutions and authorities and a disinclination toward giving decision-making to citizens in areas of risk management” (Flynn et. al. 1994: 1106). In light of this discovery, the researchers suggested that power and high socioeconomic status contribute to White males’ relative lack of concern for multiple hazards.

Satterfield, Mertz, and Slovic (2004), replicated Flynn et al.’s finding and additionally discovered that nonwhite females also stood out as atypical in the opposite direction. That is, they had particularly high risk ratings when compared to other race and gender groups. The researchers argued that the mere presence of social advantages or disadvantages experienced by certain race/gender groups is not enough to explain their views toward risk and suggested that

risk responses may reflect subjective experiences of vulnerability and environmental injustice. Their findings reflected partial support for this hypothesis, even in the case of White males: those persons with higher scores on vulnerability and environmental injustice scales also scored higher on risk perception scales.

In her case study of White, Black, and Native American environmental activists, Krauss (1993) identified several characteristics that may explain why Black women in particular exhibit greater concern for environmental risks than other groups. She states that “for Black women activists, environmental issues are linked to other social justice issues, such as jobs, housing, and crime” (pg. 257). Furthermore, she notes that Black women tend to view government with mistrust, which causes them to view toxic waste and other issues through a frame colored by experiences with institutionalized racism. These observations support the vulnerability hypothesis put forth by Satterfield et al. (2004). In contrast, Marshall (2004) has suggested that both structural advantage *and* the vulnerability hypothesis are important for explaining why people perceive risks the way they do. Rather than suggesting the importance of one over the other, he has suggested that social advantages may help to produce overall outlooks but that concerns about risks are also driven by perceived personal susceptibility to environmental threats.

The cultural worldview hypothesis has been suggested as an alternative explanation that addresses all race/gender group differences in risk perception. This theory identified sociopolitical belief structures as causing individuals to interpret risks in different ways. Finucane et al. (2000) and Palmer (2003) found White males to identify with a particularly individualistic worldview, whereas other groups aligned more closely with egalitarian views.

Finucane and colleagues (2000) proposed that because White males are highly represented in positions that control and benefit from technologies, the value they place on the benefits thereof may work to lower perceived risk by increasing one's sense of control and efficacy. They conclude that what sets White males apart from women and minorities and makes these opinions possible is their tendency to hold more individualist and anti-egalitarian worldviews than other groups. However, the worldview theory has been criticized as an oversimplification of complex phenomena. Wilkinson (2001: 11) has stated that "(a)ny attempt to mask the complexity of the social experience of risk perception in rigid conceptual abstractions may lead us further away, rather than towards a more intimate understanding of the day-to-day reality in which people recognize and negotiate with 'hazards' as 'risks.'" It is apparent that it is a very difficult task to explain the multifaceted aspects in which race and gender influence the perception of risk.

Perceived Vulnerability and Risk Perception

As previously noted, Satterfield et al. (2004) set out to identify the impact of perceived environmental injustice specifically, and vulnerability more broadly, on the perception of environmental risks. The researchers note that "both subjective experiences of vulnerability and evaluative judgments of (in)justice are central to the perception of risk" (Satterfield et al. 2004:127-8). Marshall (2004) argued that variation along race/gender lines would become more pronounced among residents of a contaminated environment due in part to an increased sense of vulnerability among women and minorities.

Jones and Rainey (2006) investigated linkages between beliefs about environmental justice, environmental health, and race within the context of a locally polluted environment.

They hypothesized that perceived fairness—or unfairness—in exposure to environmental toxins, in addition to beliefs about vulnerability, influenced perceived risk. They found that Blacks were significantly more concerned than Whites about local environmental quality, more likely than Whites to believe that their health was being negatively impacted by environmental contaminants, and that Blacks were more critical than Whites of the local government’s handling of environmental problems. Additionally, they found that public assessments of environmental health were moderately linked to perceptions about environmental justice, supporting Satterfield and colleagues’ argument on a smaller scale of analysis. These researchers, like Marshall (2004), suggest that differences in risk beliefs are more likely to manifest in the presence of a specific environmental threat and add that local social conditions influence how these issues are evaluated.

Recent research on disproportionate environmental burden (Bullard 2000; Mohai and Saha 2007) has suggested that minority communities are more likely to house hazardous waste facilities than are equivalent White communities. In communities where this is the case, local experiences with environmental problems are relevant to evaluating residents’ perception of risk. Environmental injustice in siting of facilities and cleanup of contaminated areas, as experienced by affected residents, are likely to invoke feelings of vulnerability and distrust. These complimentary findings suggest that local experiences of conflicts about the equity of environmental decision-making and perceived discrimination should be taken into consideration when evaluating how a specific community will respond to risk communications.

Marshall, Picou, Formichella, and Nicholls (2006) aimed to further test the assumption that risk perceptions vary by race and gender in surroundings where a clear environmental threat

is present. In agreement with previous literature, this research found Blacks more than Whites, and women more than men, to receive higher scores on measures of risk perception. This study did not provide support for the Black Female hypothesis; however, race and gender differences were largely accounted for by the White male effect. Interestingly, the risk-accepting perceptions of White males were most pronounced on items relating to human health and safety; i.e., industrial pollution and bacterial contamination. Though it is important to examine what influences heightened sensitivity and concern about risks, researchers must also consider what causes some groups to view environmental threats with relative calm.

Trust and Risk Perception

Certainly, whether members of a community feel vulnerable to unequal exposure to harmful environmental conditions lies, at least in part, in their beliefs about the trustworthiness of authorities to safeguard their wellbeing. If residents are given a reason to believe that they cannot trust the information that is being communicated to them from institutional representatives or that their best interests are not being considered, then it follows that they would feel more vulnerable to the unknown effects of potential threats. What factors influence whether the public will develop skeptical or distrustful feelings toward institutions?

Slovic (1999: 698) reiterates the adage that trust is destroyed more easily than it is created. He argues that it is more difficult to be perceived as trustworthy than it is to be perceived with suspicion for the following reasons:

- Trust-destroying events, such as lies, discoveries of errors, or other mismanagement, are more visible or noticeable than trust-building events

- Trust-destroying events carry more weight than trust-building events
- Sources of bad news tend to be more credible than sources of good news
- Distrust, once initiated, tends to reinforce and perpetuate distrust

He asserts that public distrust of technology managers is the result of these basic psychological tendencies and that suspicion is amplified by social and technological changes. Further, he identifies disproportionate media coverage of negative events, the rise of powerful special interest groups, and an adversarial legal system as reinforcing public skepticism.

Freudenburg's (1993) analysis of survey data related to public perception of proposed nuclear waste sites found that, more so than personal qualities, people's beliefs in whether or not risk-producing organizations can be trusted to manage potentially hazardous technologies has the most profound impact on how they perceive risk. He also suggests that the tendency of previous research to deconstruct individual and psychological influences of risk perception belies the more pressing impact of concern about institutional failure. Interpreting this perspective in the context of how marginal social groups evaluate such threats, Clarke and Short (1993: 394) advocate incorporation of the broader social milieu in which perceptions are measured, and point out that the social distribution of trust has implications for perceived fairness. If residents of a community suspect that they are being treated with less care and concern by risk managers and government officials than are other communities, or that care and concern for their plight are lacking, it seems likely that this would have an amplifying effect on anxiety about their potential exposure to health hazards.

In the case of exposure to toxic waste and potential sources of mistrust among low-income communities of color, Lavelle and Coyle's (1992) detailed analysis of Superfund cleanup provides a clear account of unequal protection of socially marginal groups. They found several means by which predominantly minority communities are systematically denied equal resolution of environmental burdens, including preferential enforcement of environmental laws benefiting Whites, delayed initiation of response to addressing pollution in communities of color, and inadequate cleanup in minority areas compared to predominately White communities. Bullard (2000: 106) charges that "government has often cooperated with industry in disenfranchising African-American communities." Citizens' comparative evaluations of the environmental burdens faced by communities of color versus White communities may fuel distrust of government officials.

The Case of New Orleans

In order to evaluate how Gulf Coast residents more generally, and New Orleanians specifically, evaluate risks, it is important to consider the historical backdrop of the area. Throughout the development of the city of New Orleans, decisions have been made that contributed to the debacle that unfolded in the days following landfall of Hurricane Katrina. Colten (2007:174) has stated that "(i)nequities and injustices can be built into the physical landscape of cities," and points to years of racial discrimination in the appropriation of where Black residents were allowed to settle as central to the hardships that they later suffered following the storm. The social characteristics that shape the way that people evaluate, cope

with, and respond to threats are complex and interact with each other and the circumstances surrounding the threat itself. With regards to the population of New Orleans, vulnerability to environmental risks more generally, and disaster events, such as Hurricane Katrina cannot be left out of the discussion about their perceptions of environmental risks.

Race in New Orleans

Many of New Orleans's African-American residents lived their day-to-day lives in extreme poverty and racial isolation (Drier 2006). Trapped in low wage jobs and constantly struggling to make ends meet, they faced seemingly insurmountable obstacles to both their personal achievement and their ability to provide a different future for their progeny (Jones-Deweever and Hartmann 2006). More insidious than the readily discernible means through which poverty contributed to disaster vulnerability were the more intimate ways that being born and likely to die in penury precluded individual freedom within these low wage communities in the first place. As stated by Jones-Deweever and Hartmann (2006:87):

For many, being poor meant being trapped in failing school districts, unable to assure a quality education and thus, a way out for their children. It meant being relegated to a place where no one else wants to live, isolated, and disjointed from the rest of society, and having a higher likelihood than others to being exposed to environmental dangers.

Being Black and poor in New Orleans, for many, meant living an existence smothered by lack of opportunity. The results of these conditions can be seen in the generally low academic performance among Black children in the city, who fell well beneath the statewide average (Casserly 2006) for Black student achievement. As stated above, conditions in New Orleans's

low-income minority communities effectively worked to perpetuate hardships across generations.

Drier (2006: 529-30) elaborates that that “New Orleans is not only one of the nation’s poorest cities, but also among the most ghettoized. Among the nation’s 100 largest metropolitan areas, it ranks third in poverty concentration.” However, it is important to note that such deeply entrenched inequalities do not manifest overnight and are rarely traceable to a single causal factor. Years of discrimination in housing and employment combined with policies and practices that, intentionally or not, overwhelmingly advanced the quality of life of Whites at the expense of urban Blacks (Drier 2006; Hartman and Squires 2006). The result was that many African-American communities became choked off from resources needed to grow and provide opportunities for residents. Over time, forced lack of investment and other policies were used to intentionally restrict Blacks’ access to resources enjoyed by Whites. Limited mobility relegated African-Americans to rapidly deteriorating ghettos which they were then blamed for creating due to their lack of personal character (Dreier 2006).

Recent data from the 2000 Census reveals that Blacks within New Orleans were extremely isolated from non-Blacks and lived in neighborhoods that were steeped specifically in *Black* poverty (Drier 2006). Trailing White residents by an average of \$18, 333 in annual income, it is clear that the Crescent City’s most impoverished African-Americans remained leagues away from achieving race or class equality. By the definition used by Massey and Denton (1993), New Orleans’s legacy of institutional racism and White elitism produced a discernible African-American urban underclass. It was no coincidence, then, that this population was

incommensurately devastated when the city's critically flawed levee system was overwhelmed by storm waters.

That is not to say, however, that the disproportionate impact of Katrina on the Black population of New Orleans was a function of their socioeconomic standing. As stated by Gault, and associates (2005: 7), “(w)hile the face of Katrina on television screens following the disaster was largely that of poor African-Americans stranded in the wake of the storm, it is important to recognize that Blackness is not synonymous with poverty.” Though poor Blacks certainly have faced some of the most severe storm-related challenges from onset through recovery, property damage resulting from Katrina has disproportionately affected African-Americans in the city as a whole (Logan 2009). The African-American middle class also escaped the city after their neighborhoods were decimated by flooding. Henkel, Davidio, and Gaertner (2006: 108) elaborate: “as a function of where they lived, when Hurricane Katrina hit, many Black people in New Orleans were already in a position to be disproportionately affected by disaster.”

Long-term neglect of the needs of Blacks in the city became amplified in residents' storm-related experiences. Confusion, disorganization, and, occasionally, reports of blatant racism colored the experiences of survivors who roamed about seeking shelter and assistance in the hours and days that followed Katrina. People flowed by the tens of thousands toward a grossly underprepared Superdome, quickly depleting its modest stockpile of supplies. As crowds continued to pour into the area, they were warned that the facility was at capacity and instructed to seek help elsewhere (Congleton 2006). In another example, a group of mostly African-American survivors, trapped in the city without supplies, reported being intercepted by warning shots fired by armed police when they attempted to cross Crescent City Convention Bridge

(Comfort 2006, Agid 2007; Hirsch and Levert 2009). While varying accounts have been reported about what motivated Gretna's "defenders" to take such action, the incident's effect on those who were denied access was clear: the episode was recounted as a symbol of the venomously pervasive and lethal power of racism (CNN.com; Hirsch and Levert 2009). When an organized response effort finally arrived, rather than rushing in with armfuls of supplies, members of the National Guard searched evacuees "like criminal suspects for guns, illicit drugs, alcohol, contraband, and other items that had been described as 'undesirable'" before sending them to wait for transport out of the city (Tierney, Bevc, and Kuligowski 2006: 71).

Stories about brutal treatment of evacuees and government betrayals circulated widely among survivors, fueling resentment and charges of discrimination. Some accounts were true. For example, state officials had actually kept private donors from entering the city with supplies for fear that such an act would encourage residents to remain in the city (Congleton 2006). Others, however, turned out to be widely circulated rumors, as was the case with reports of dynamiting of 9th Ward levees (Stein and Preuss 2006; Cordasco, Eisenman, Glik, Golden, and Asch 2007; Hirsch and Levert 2009). While some rumors were put to rest, the fact remains that Black residents were given reason to fear that officials were not acting in their best interest, as witnessed by the National Guard's storming of the convention center. The consequences of multiple failures to address the needs of stranded residents surfaced over days and weeks following Katrina: the city's dead was overwhelmingly Black, with African-American deaths tallying nearly twice the rate of White casualties following the storm (Sharkey 2007).

Gender in New Orleans

In addition to race, gender has been identified as a relevant frame for understanding how certain groups respond to risks. Disaster research (Morrow 1997; Enarson 1998) has identified women as being particularly vulnerable to disasters because of their traditional role as caregivers for children, the infirm, and the elderly, their often limited access to education, lack of financial assets, and the threat of physical violence. Jones-Deweever (2008:5) sums up these attributes by stating that women's unique vulnerability to disasters results from:

(1) Decreased economic capacity both before and after disasters; (2) heightened exposure to violence and sexual assault in the aftermath and during the protracted post-disaster recovery phase; (3) decreased mobility and increased resource needs due to care-giving responsibilities; and, (4) policy practices that privilege male-headed households and economic reintegration of men in post-disaster recovery.

These challenges have strong implications for the vulnerability hypothesis in relation to female residents of New Orleans. Like African-Americans more generally, women were disproportionately represented among the survivors stranded in the city following Hurricane Katrina (Seager 2006; Belkhir and Charlemaine 2007). Nonetheless, gender has either been diminished or ignored in public discussion about the causes and consequences of the breakdown of social order resulting from the storm.

Women were particularly economically disadvantaged in New Orleans (Gault, Hartmann, Jones-DeWeever, Werschkul, and Williams 2005) and, as a result, were less able to prepare for Hurricane Katrina's impact. The poverty rate for female-headed households with children under age 18 prior to the storm was striking at 43 percent in New Orleans, compared to the national average of about 34 percent (Census 2000). Compounding the fact that women are less likely to

have access to private transportation or possess a driver's license (Seager 2006), their greater economic vulnerability means that they are both less able to evacuate without assistance and more likely to have trouble providing basic needs to wait out the storm, either by stockpiling supplies or paying for necessities while awaiting return after evacuation.

Seager (2006) has noted that women with children are particularly threatened by the physical consequences of disasters because they, more often than men, are responsible for caring for children, which inevitably slows down their efforts to escape impending danger. Jones-Deweever (2008) documents chilling accounts mothers' efforts to protect and care for their children during and after Katrina. The researcher points to a multitude of alarming experiences that were unique to women: in addition to the challenges of negotiating travel with their progeny in tow, she notes that exceptional trauma can result when children under one's charge are lost in the course of seeking safety. Further, Jones-Deweever documents experiences of women and their children with sexual assault and domestic violence due to the forced choice between unsafe living quarters and homelessness. Given the wealth of challenges related to gendered disaster experiences, it is unsurprising that recent research (Chen, Keith, Airriess, Li, and Leong 2007; Adeola 2009) has found female Katrina survivors to be more predisposed to psychosocial distress than their male counterparts.

Gendered experiences, however, do not exist independently from other social and demographic features. Race, class, and other indicators of social status and marginalization influence life outcomes in coincidence. As articulated by Hill Collins (1990: 229), "each individual derives varying amounts of penalty and privilege from multiple systems of oppression which frame everyone's lives." In order to understand the ways in which these combined factors

shape people's opportunities and experiences, Hill Collins posits that social characteristics interact through a matrix of domination.

How does this apply to the residents of New Orleans? Several researchers have argued that Black women in particular were the hardest hit by Hurricane Katrina due to a multitude of factors that restricted their mobility and resources (Ransby 2006; Belkhir and Charlemaine 2007; but also see Hartmann et al. 2005). A comparison of disparities in quality of life between Black and White women in New Orleans provides support for this argument. For example, in spite of the fact that three Historically Black Universities were located inside the city, the rate at which African-American women attained college degrees was only slightly above the national average for Black women. They trailed far behind White women, whose degree attainment far surpassed even the national average (Jones-Deweever and Hartmann 2006). In a city that offered more educational support for Black women than any other area in the region, it is remarkable that the local effect could be so modest. Though far from being a cure-all, education presents a way out of poverty, a means by which to command better access to resources. The consequences of low educational attainment are especially pronounced for African-American women, as evidenced by their exceptional vulnerability to poverty (Jones-Deweever and Hartmann 2006).

However, as noted by Ransby (2006), Black women's increased storm-related burdens do not so easily conform to expected outcomes. In some instances, they have responded with an unexpected resiliency, working to rebuild support systems and fight for equality in the rebuilding of the city. Previous cautions by Hill Collins prove useful in locating Black women's response to adversity:

African-American women have been victimized by race, gender, and class oppression. But portraying Black women solely as passive, unfortunate recipients of racial and sexual

abuse stifles notions that Black women can actively work to change our circumstances and bring about changes in our lives. Similarly, presenting African-American women solely as heroic figures who easily engage in resisting oppression on all fronts minimizes the very real costs of oppression and can foster the perception that Black women need no help because we can ‘take it.’ (P.237)

Interestingly, Sharkey’s (2007) research on deaths resulting from Hurricane Katrina provides findings that illustrate this point. Although Black people overall were disproportionately represented among the deceased, elderly *men* died in the greatest proportions. In exploring why men, often viewed as enjoying greater opportunity and more resources than women, would be more likely to die as a result of a disaster, he theorizes that males suffer from more social isolation than do females. Thus, though men may have more monetary resources than do women, they also have a smaller social support network. Social resources may ultimately be more important when, as with the case of the elderly, physical disability increases the need for reliance on others. Findings such as these illustrate that further exploration is needed to understand how demographic characteristics such as gender interact in creating vulnerability and influencing how limitations are interpreted.

Wrestling with Nature: The Struggle to Develop New Orleans

From its founding, the landscape of New Orleans has been characterized by man’s struggle to dominate nature. Only a year after being established, plans were being crafted to build levees in order to make the city’s less than ideal terrain more suitable to sustain a port and, eventually, a bustling trade hub. Financial interests, which had driven settlers to endure treacherous environmental conditions, were a key motivation in both the establishment and

alteration of the site (Colten 2005; Miller and Rivera 2008). The location of the city along the Mississippi River served as an ideal meeting point between merchants peddling goods produced further north and those bringing goods from overseas. As economic opportunities flourished, the population expanded outward (Congleton 2006).

As development spread further outward, new strategies were needed to contain occasional upheavals of nature. A series of canals and levees were carved into the terrain to allow further growth, and over time flood risks were reduced (Miller and Rivera 2009). Development of the area continued, slowly encroaching upon wetlands. Over time, progressive erosion of marsh areas began to erase the buffer zone that had initially served to protect the city by absorbing flooding and storm surges (Colten 2005). Eventually, the U.S. Congress placed responsibility for maintenance and modification of the region's flood management system under the Army Corp of Engineers, which has been engaged in a cyclical battle with the river system ever since (Congleton 2006). As New Orleans became better able to support population growth through new technology, people settled further into danger zones characterized by freshly drained land that began to sink as it settled. The vulnerability of this new terrain was exacerbated by man-made alterations to the Mississippi River that were, consistent with previous land-use decisions, intended to expand the region's financial interests (Congleton 2006).

Local Politics and the Seeds of Distrust

Social and topographical conditions that ultimately made Hurricane Katrina a catastrophe did not develop overnight. While physical alteration of the landscape was an important

component of the city's geographical vulnerability, the social dimensions of the disaster were also produced over the city's development. A brief examination of the history of New Orleans reveals that a complex series of economic, political, and societal practices combined to produce the social conditions that were exposed so dramatically in 2005.

From the city's founding, race relations have been strained. New Orleans's initial colonizers, the British, maintained hard and fast rules about White superiority over Blacks and did not support racial mixing, while under Spanish and French rule, these distinctions became more malleable within lower classes. Though elite Whites continued to uphold values of racial purity, there was space for mulattoes in a classist hierarchy (Miller and Rivera 2007). After the city came under American rule, however, these distinctions again disappeared. People of African descent were stripped of opportunities for advancement and once more came to be regarded as insurmountably inferior to Whites. In the years to come, Blacks were increasingly relegated to social marginality with the introduction of Jim Crow laws (Colten 2005; Miller and Rivera 2008).

The enforcement of Jim Crow in New Orleans and throughout the South began a process of racial segregation that lingers even today (Colten 2002). In addition to removing Blacks from White residential areas, Black settlements were, in some cases, intentionally pushed onto low quality lands that were prone to flooding and consequent public health hazards brought about by fetid conditions (Colten 2007). It is important to recognize how these practices have contributed to vulnerability that endangered so many lives once Hurricane Katrina threatened the city: Gieryn (2000: 474) has stated that "places reflect and reinforce hierarchy by extending or denying life-chances to groups located in salutary or detrimental spots." In the development of

New Orleans, this translates into a series of policies and practices that in effect pushed environmental burdens into minority communities in an effort to preserve elite interests (Colten 2007). Sanyika (2009: 94) has elaborated this point:

Uptown New Orleans, The French Quarter, and the central business district survived the drowning and are intact and functioning, whereas the lower parts of the city in downtown New Orleans (Lower Ninth, the East, and Gentilly) remain significantly unpopulated and dysfunctional. This distinction between downtown or wet neighborhoods and uptown or dry neighborhoods serves as a metaphor for racial and class dynamics in the city: Downtown is primarily black, and uptown is significantly white.

Further, concerns have been voiced that majority African-American areas of New Orleans are still not being afforded the level of flood protection as White areas, and that this may lead again to disinvestment and redlining (Bullard and Wright 2009).

New Challenges, Old Concerns: Exposure to Environmental Toxins

New Orleans is no stranger to confrontation relating to environmental health hazards. The Agriculture Street landfill community, a mostly Black residential area in the city, has had been embroiled for 15 years in an effort to be relocated after discovering that the community had been located on a toxic waste dump (Bullard and Wright 2009). Building upon the region's history of contested charges of contamination, Hurricane Katrina has added to an already lengthy list of local environmental health concerns. Flood waters stagnated in the city for weeks after the storm. Exacerbating the problem of flooding, which may have spread throughout the city heavy metals and other compounds that would have otherwise remained at or near the original site of contamination, there were nearly 400 reported incidents of hazardous materials being discharged into flood waters (National Oceanic and Atmospheric Association 2005). Ten major oil spills resulting from the storm resulted in the release of over eight million gallons of oil across the state of Louisiana (Davis and Farrell 2006). Finally, additional release of toxins has resulted from inappropriate disposal of residential materials ruined by Katrina (Luther 2007). These combined releases of materials into soil and water have produced mixtures of compounds about which very little is known. "Toxins such as benzene, lead, formaldehyde, hydrocarbons, dioxins, and other chemicals also leached into the soil and homes of survivors. These hazardous toxins will invariably pose long-term contamination risks to the local ecology as well as health risks to returning residents" (Picou and Marshall 2007:7).

For those residents who were trapped and thus forced to wade through the water that blanketed New Orleans, exposure to its contents was and is a serious concern (Frickel and

Vincent 2005). The mere observation that one has been immersed in flood waters widely described as a “toxic gumbo” (Frickel 2006) is enough to cause grave concern regarding the effects of environmental contaminants on physical health.

Perhaps even more alarming than the presence of unfathomable combinations of toxic chemicals, however, are charges that information about these substances is being withheld in some cases and intentionally altered in others (Frickel 2006). Allen’s (2007) preliminary review of post-Katrina conflicts in New Orleans indicates that several charges of environmental racism have already resulted from decisions about waste-disposal practices that residents say are unsafe. She identifies discrepancies between soil samples collected by residents and official assurances from the EPA that toxins are not a problem and that the city houses no environmental health threats. Frickel and Vincent (2007) charge regulatory agencies with being invested in placating the public in order to attract investors, potentially at the expense of residents’ health. These suspicions again reflect a concern that, rather than striving to create a sound and holistic body of research to determine the extent of contamination and potential results of exposure, government agencies are pursuing agendas that betray the broader public good to pursue the interests of the economic elite. Some residents’ suspicion that officials are involved with falsifying and/or fabricating information, while extending from legitimate fears about scientific unknowns, may also reflect a response to institutional recreancy.

Conclusion

Risk perception is influenced by the interplay of a variety of psychological, social, and political factors (Slovic 1999). Research has demonstrated concern about risks to be more

pronounced in women than in men and among minorities more than Whites. However, gender and race alone do not explain these patterns. Rather, these characteristics may be better understood as indicators of social position and perceived vulnerability (Satterfield et al. 2004). In these terms, having social status and power may reduce fear while lacking the security offered by these features may cause one to be more concerned about environmental threats. This hypothesis is supported by reports that subjective evaluations of discrimination and beliefs about environmental justice influence risk concern (Satterfield 2004; Jones and Rainey 2006).

Geographic location and social histories are also important factors that shape risk perceptions. In the case of New Orleans, a long legacy of racial discrimination and government corruption has contributed to vulnerability and distrust among Blacks. The city is located in a region infamous for its petrochemical plants. The intervening events of Hurricane Katrina and subsequent breakdown of social order strained residents' ability to trust the government and produced new concerns about the presence of environmental pollutants. How might an event such as this influence fear of exposure to chemicals? How do such concerns differ in stressed versus non-stressed environments? The forthcoming analysis will address these questions by questioning the role of trust in government, beliefs about environmental justice, living in New Orleans, race, gender, and education, and other demographic variables in forming attitudes toward environmental risk.

CHAPTER THREE: DATA AND METHODS

Instrument

Data were collected as part of a broader survey of Hurricane Katrina survivors funded by grants from the Rockefeller Foundation and the Bill and Melinda Gates Foundation provided through the Social Science Research Council. A survey instrument of 123 items using a variety of measures and scale was extensively reviewed, pre-tested, and revised where appropriate. The present research is a secondary data analysis of these data. Independent variables from the instrument included in this analysis are: *current New Orleans resident*, *beliefs about environmental justice*, *trust in local government*, *gender*, *race*, and a *gender/race* interaction variable. Control variables include *age*, *years of education*, *divorced/separated*, *unemployed*, *number of children living in respondent's home*, and *being rescued during the storm*. The dependent variable in this study is *perceived exposure to toxins*.

Sample

The target population included all adult (over 18) residents of two counties in Mississippi (Hancock and Harrison) and five parishes in Louisiana (Jefferson, Orleans, Plaquemines, St. Bernard, and St. Tammany). For Mississippi, an appropriate sampling frame of 30,000 geographically targeted RDD telephone numbers was purchased from ASDE Survey Sampler. Experience with the Mississippi sample suggested that this sample was significantly larger than needed. For Louisiana, an appropriate sampling frame of 15,000 geographically targeted RDD

telephone numbers was purchased from ASDE Survey Sampler. Within each household, participation of adult respondents was randomized using “most recent birthday” criteria.

Data Collection

The interviews were conducted by the USA Polling Group.² A total of 810 interviews were completed in Mississippi between April 16 and May 28, 2008, and a total of 1,738 interviews were completed in Louisiana between June 2 and August 27, 2008, yielding a grand total of 2,548 completed interviews. Interviews took an average of 17.25 minutes to complete.

Methods

In this analysis, responses from subjects in Orleans Parish were compared with those from all other parishes and counties in Louisiana and Mississippi included in the survey. This was done in order to determine whether experiences of storm victims differ based upon location within the impact zone, due to the previously mentioned “toxic gumbo” that covered New Orleans in the days following Hurricane Katrina. In addition, responses were compared by race and gender to evaluate patterns identified in previous literature. Relationships were first tested using a series of T-tests and ANOVAs, and then included into a series of four multiple regression models, one for each race/gender group under analysis.

² USA Polling Group is a multi-disciplinary survey research center located on the University of South Alabama’s main campus in Mobile, Alabama. Over its nine-year history, the Polling Group has conducted over 550 surveys using a state-of-the-art computer-assisted telephone interview system.

Operationalization of Variables

Independent Variables

Living in New Orleans

Previous research has reached conflicting conclusions on the influence of living in a polluted environment. While Marshall (2004), Jones and Rainey (2006), and Marshall et al. (2006) have discussed significant dissimilarities in perceived environmental risk between demographic groups in a locally polluted environment., Greenberg and Schneider (1995) concluded just the opposite—that such differences would be reduced when there was an immediate environmental health threat. In addition to unsolved questions relating to environmental quality, status of living in New Orleans has implications for perceived vulnerability due to negative storm-related experiences. In order to substantiate this assumption, the variables *current New Orleans resident* and *rescued during the storm* have been included in the analysis as dummy variables (living in New Orleans =1, rescued during the storm=1). Most respondents who were rescued in the course of Hurricane Katrina lived in Orleans Parish.

Environmental Justice

Beliefs about environmental justice were measured with the following three statements: “Minority communities lack the political clout to stop hazardous facilities from being located near them;” “I think hazardous facilities are more common in minority communities;” and “For economic reasons, minority communities are forced to accept more industrial pollution than non-minority communities.” Each statement was originally measured using a five point Likert scale with categories ranging from strongly disagree to strongly agree, where higher scores indicated stronger agreement. In order to establish whether or not the questions were compatible, they were validated by a factor analysis and the calculation of Chronbach’s alpha ($=.81$) prior to being combined into a fifteen-point scale measuring beliefs about environmental justice. In this scale, a score of one indicates total disagreement that environmental injustice exists based upon race, and a score of 15 indicates total agreement that minority communities suffer from environmental *in*justice. This scale is used to indirectly measure beliefs about the “equity of risk distributions in public life” (Satterfield et al. 2004), or the fairness with which environmental burdens are allocated across communities. Results for race and gender groups are presented in Table 3.

Trust in Government

The public’s faith in government cannot be overlooked because the risk perception literature (Freudenberg 1993; Slovic 1999) has suggested a link between institutional trust and concern about environmental hazards. Freudenburg (1993) has noted that while much of the sociological work on risk perception focuses on individual characteristics of the perceiver, the

concept of institutional recreancy is a frequently overlooked explanatory variable. When institutions fail to carry out the duties with which they are entrusted, it follows that affected populations will exhibit greater concern that the public interest will be ignored or overlooked again in future situations.

The botched government response to Katrina, particularly in the case of New Orleans, presented survivors with a tremendous breach of trust (Miller and Rivera 2008; Hirsch and Levert 2009). Furthermore, conflicts related to the recovery process continue to raise questions about government officials' willingness to act in good faith toward all residents (Bullard and Wright 2009). Residents who have been either directly or indirectly affected by government failures are unlikely to isolate these experiences from ongoing issues that require competence and evenhandedness on behalf of elected officials. This variable has been calculated by combining three questions that asked about trust in local, state, and federal government (Cronbach's $\alpha=.80$). In their original format, these questions asked respondents to rate their trust in the aforementioned levels of government using a five-point scale including the following response categories: "A great deal of trust," "A good deal of trust," "Some trust," "Very little trust," and "No trust at all." Results are presented in Table 3.

Race and Gender

Race and *gender* are the primary independent variables considered in this study. Due to an insufficient number of respondents representing other racial categories, this paper will only compare differences between White and Black subjects. As previous literature (Flynn et al. 1994; Finucane et al. 2000; Palmer 2003; Marshall 2004) has found race and gender to have an

interactive effect, the gender variable has been further reduced into the following four race/gender groups: White male, White female, Black male, and Black female.

Dependent Variable

Toxin Risk Perception

To measure perceived exposure to environmental toxins, respondents were asked, on a five point Likert scale with responses ranging from strongly disagree to strongly agree, to what extent they agreed with the statements, “I fear that dangerous chemicals are present in my neighborhood” and “I fear that I was exposed to dangerous chemicals as a result of Hurricane Katrina.” Responses were validated using factor analysis and Cronbach’s alpha (.75) to verify agreement between items and then combined to create a ten-point scale measuring fear of exposure to environmental toxins, where higher scores indicate heightened fear of exposure to toxins.

Control Variables

Age, number of children in home, unemployed, and divorced/separated are included in order to account for effects of vulnerability.

Age

The variable *age* is included as a continuous variable with respondents ranging in age from 18 to 94 years old. Sharkey (2007) identified elderly residents of New Orleans as the

largest demographic group represented in casualties from Hurricane Katrina, consistent with previous disaster-related studies, which have also found seniors to be among the most vulnerable populations (Morrow 1999; Klinenberg 2002). Because of physical fragility and typically greater mobility problems frequently experienced by the elderly, age is expected to be positively correlated with perceived risk.

Children in Home

Presence of children is considered as a vulnerability variable for survey respondents because children represent an increased need for parents' concern for health and safety. As children are especially sensitive to environmental toxins (Lanphear, Vorhee, and Bellinger 2005), parents are expected to be more concerned about pollution than people who don't have children.

Employment Status

The variable *unemployed* is included as a dummy variable (employed respondents=0, unemployed=1) in this analysis. Being unemployed is expected to predict heightened perceived risk because of the limitations to access to health care and other resources that financial burdens create.

Marital status

Preliminary tests with this sample suggested that being estranged from a partner, more so than being coupled or single, made the strongest effect on perceived risk. This category has been included in my analysis as an indirect measure of social isolation.

Education

The variable *education* was recoded as a continuous variable based upon an estimated number of years required for each of eight response categories including less than high school education (10 years), high school diploma (12 years), some college (13 years), associate's degree (14 years), bachelor's degree (16 years), master's degree (18 years), doctoral degree or professional degree (22 years). Because respondents were not asked about their income, this variable is used as a surrogate measure of socioeconomic status. Prior research has found education to negatively influence perceived risk (Flynn et al. 1994; Finucane et al. 2000), whereas other studies have not found the variable to have any influence (Marshall 2004; Marshall et al. 2006). This variable has been included in the regression model as a measure of cultural capital that contributes to an expected reduction in perceived risk.

Hypotheses

H₁: Responses will vary by race such that Blacks are significantly more concerned about exposure to environmental toxins than are Whites. Previous research has found significant differences between attitudes toward the environment more generally and environmental risk in particular among non-Whites versus Whites, with minorities being more concerned (Jones and Carter 1998; Mohai and Bryant 1998; Finucane et al. 2000; Marshall 2004; Satterfield et al. 2004; Jones and Rainey 2006; Marshall et al. 2006). In order to test this hypothesis, initially these relationships were evaluated by independent samples T-tests. Next, having found support for the hypothesis, race was incorporated independently into each regression model in addition to an interaction variable on a race/gender group (i.e., White male, Black female, etc.) to determine their combined effects.

H₂: Responses will vary by gender such that women tend to be more risk averse than men in their race group. As noted above, previous research has produced relatively consistent findings that women express greater concern about risk than men (Barke, Jenkins-Smith, and Slovic 1992; Kraus et al. 1992; Flynn, Slovic, and Mertz 1994; Board and O'Connor 1997; Davidson and Freudenburg 1996; Marshall et al. 2006;). However, some studies (Finucane, Slovic, Mertz, Flynn, and Satterfield 2000; Marshall 2004) have also suggested that race has an intervening effect—hence gender comparisons will be made within groups rather than simplifying differences across all men and women. To determine the individual influence of gender, the mean perceived toxin exposure scale for men and women was compared, like race,

first using an independent samples T-test on a dichotomous variable, then incorporated into the regression model for each race/gender group.

H₃: White males will have the lowest risk concern overall and Black females will have the highest concern. This hypothesis is used to measure the “White male” and “Black female” effects explored by previous research (Flynn et al. 1994, Marshall 2004, Satterfield et al. 2004, Marshall et al. 2006). These concepts were measured first with a one-way ANOVA to establish the presence of significant differences between the race/gender groups. Next, I created a linear regression model in order to identify, if any, the interactive effects of race and gender while, as mentioned in hypotheses one and two, taking the individual contributions of these characteristics into consideration. This method helped to clarify whether there is actually an independent interactive contribution of race and gender together, or whether their individual effects entirely account for differences between groups.

H₄: Living in Orleans Parish will increase perceived toxin exposure. This variable has been included in the linear regression model through use of a dummy variable (all other parishes and counties=0, New Orleans =1). First, the presence of an overall effect of location was established by comparing mean differences between the average score of respondents in Orleans Parish (5.86) versus the combined mean score of all other parishes and counties (5.17) using an independent samples T-test. Next, in light of a significant finding that New Orleanians were more concerned than others, the dummy variable was added to the regression model to further clarify whether living in the city per se increased overall risk perception. Recent literature (Elliott and Pais 2006; Adeola 2009) has produced conflicting findings about whether or not the Katrina-related experiences of New Orleans residents are in fact unique and different from those of storm

survivors in other areas. Further analysis of this population is aimed at adding to this growing body of research.

H₅: Stratification in exposure concern along race and gender lines will be more pronounced in Orleans Parish than in the rest of the sample. Some studies (Bush et al. 2001; Bickerstaff and Walker 2001; Marshall 2004) have suggested that expressed concern about exposure to environmental hazards is in part influenced by perceived presence of locally based ecological threat. Furthermore, some researchers have also found that effects based on socio-demographic factors manifest differently in a locally polluted versus a locally unpolluted environment, and these studies have produced incongruous results. This hypothesis addresses the influence of social marginality by analyzing race and gender differences in stressed versus non-stressed environments.

H₆: Respondents who perceive unfairness in the locating of hazardous waste facilities will score higher on the toxin exposure scale than those who perceive no discrimination in this process. Satterfield et al. (2004) found evidence, on a national scale, that perceived discrimination and vulnerability partly explained race- and gender-based differences in risk perception because socially marginalized groups tend to experience less control over their lives. Furthermore, the researchers suggested that risk beliefs tied into attitudes about environmental justice, which were also found to affect perceived risk. Jones and Rainey's (2006) case study of a contaminated community found that perceived racial bias in addressing local environmental problems increased fear about exposure to toxins and consequent health problems. The environmental justice scale used in this analysis is used as a proxy for perceived discrimination, which Satterfield et al. (2004) related to perceived vulnerability.

These hypotheses are aimed at testing the assumption, as illustrated in Figure 1, that ascriptive and achieved characteristics interact with one another to amplify or attenuate risk perception. For example, while being White is expected to attenuate fear of toxin exposure, living in a locally contaminated environment, belief in environmental *injustice*, and low trust in government are expected to be positively related.

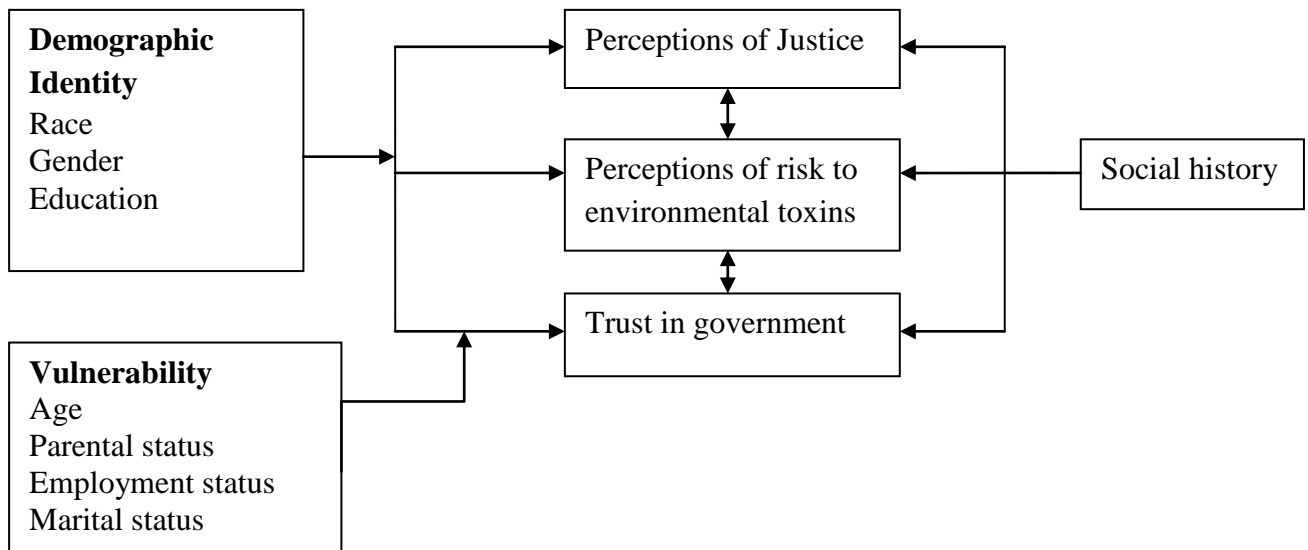


Figure 1: Stations of Risk Perception Amplification and Attenuation

CHAPTER FOUR: RESULTS

Descriptive Statistics

Descriptive information for each of the four race/gender groups for the sample as a whole is presented in Table 1 along with comparable data from the U.S. Census. Overall, differences between sample data and pre-Katrina population estimates were quite modest. However, of what differences there are, the variables *age*, *percent Black*, *education*, and *percent unemployed* reveal that the post-disaster population has been altered. Across counties, the population is now significantly older, less likely to be employed, contains fewer Black residents, and is represented by a higher level of educational attainment than reported by prior census data. This sample was selected not from the population of 2000, but from the population that actually remains in this locale post-Katrina. Therefore, comparison to population estimates prior to Katrina serves only as a heuristic device to illustrate how the social landscape has changed—who is left, which populations have not returned.

Preliminary Tests

Hypothesis 1 predicted that Blacks would be significantly more concerned about exposure to environmental toxins than would Whites. As expected, the mean score on the risk perception scale was significantly higher for Blacks than for Whites. Additionally, differences in perceived risk varied by gender within each racial category, with women scoring higher than

men on perceived risk within both race categories. Also as predicted, White males overall had the lowest mean scores on this scale while the Black female group averaged highest.

The results of a one-way ANOVA test revealed that differences between each group were significant at the $p < .001$ level except for that between Black males and Black females, which was not significant. Thus, while this preliminary test provided support for the first part of hypothesis three, the second half, which pertained to Black females, was not supported. While Black women as a group scored highest on perceived risk, the lack of significant difference from Black men contradicts the presence of a Black female effect. Thus, it appears that White males are the only group that differs significantly from all other race and gender groups.

A simple T-test reveals that, on the whole, residents in New Orleans are slightly more concerned about toxin exposure than are residents from other parishes (mean perceived risk score of 5.86 versus 5.17, $p < .001$). However, compared to counties and parishes elsewhere, significant differences within race/gender groups inside Orleans Parish are less pronounced (see Table 4). While variation in perceived risk between Black and White respondents is still present, the differences between sexes of the same race disappear in these groups. Thus, in the case of New Orleans, it appears that race is more important than gender. Accordingly, this analysis fails to accept hypothesis five.

Regression Model

Next, a hierarchical multiple regression model was calculated in order to further explore the influence of the test and control variables. In step one dummy variables for White females, Black males, and Black females were regressed on perceived exposure to environmental toxins.

White males were excluded as the reference group. In step two, measures of trust in government and beliefs about environmental justice were added to these variables. In step three, control variables were added. Overall, this model does provide evidence of a White male effect. Results are presented in Table 5. Race and gender effects were statistically significant and accounted for 8 percent of the variance in perceived exposure, such that all other groups—White female ($\beta=.094$, $p<.001$), Black male ($\beta=.115$, $p<.001$), and Black female ($\beta=.153$, $p<.001$)—were more likely than White males to exhibit concern about environmental toxins. Next, the attitudinal measures for faith in institutions were both statistically significant such that low trust in government ($\beta=.186$, $p<.001$) and Belief that environmental *injustice* occurs in minority communities ($\beta=.227$, $p<.001$) predicted a noticeable increase in perceived risk to toxin exposure. Including these variables resulted in a 17.1% increase in the R^2 value. Finally, age, employment status, having children in the home, and living in New Orleans were not statistically significant predictors of toxin exposure perceptions. However, higher education ($\beta=1.116$, $p<.001$) and being divorced or separated ($\beta=.061$, $p<.05$) were significant indicators of increased perceived risk. Overall, the control model added 1.7% to total the R^2 at 19.0%.

CHAPTER FIVE: DISCUSSION

Summary of Empirical Results

The results of this analysis support the findings of previous literature regarding the White male effect. Overall, broad social trust and relationships with institutions were significant predictors of risk perception. Measures of vulnerability—namely older age, caring for children in the home, and being unemployed—were not reliable predictors of environmental risk perceptions. Finally, differences in perceived risk among those living in a stressed versus non-stressed environment were not found.

Hypothesis Evaluation

Hypothesis one was concerned with the racial distribution of concern about environmental toxins. As predicted, Blacks were significantly more likely than Whites to believe that they had been exposed to dangerous chemicals as a result of the storm and that there were toxins in their neighborhoods. Similarly, hypothesis two predicted that women would be more concerned about toxic exposure than would men. The findings support this prediction. On the whole, women in each race group score higher on the risk perception scale than men.

In addition, risk perception scores seem to be driven by a White male effect wherein White men are significantly less concerned about toxic exposure than White women, Black men, and Black women.

The variable *living in New Orleans*, discussed by hypothesis four, was not fully supported. While respondents from this city overall were slightly more concerned about exposure to environmental toxins, this variable did not remain significant with further scrutiny. Immediacy of the threat may contribute to the modest variation between residents within and outside the city. While reports immediately after Hurricane Katrina sensationalized the dangers posed by flood waters, many of the most proximate threats, such as risk of severe skin infections and illness from bacteria, did not manifest. It could be that recognition of these claims as false alarms has precluded concerns about chemical hazards.

In contradiction to hypothesis five, this analysis found *less* variation along race and gender lines within the city. Rather than increasing differences between groups, it appears that perceptions of toxic exposure are broader in post-Katrina New Orleans. This finding stands in contradiction to propositions made by previous literature studies (Bush et al. 2001; Bickerstaff and Walker 2001; Marshall 2004) that stratification is increased in stressed environments. Perhaps it is the case that in a catastrophe of this magnitude, in which toxins were arguably released across locations due to flooding, exposure concern becomes more generalized.

Finally, there was strong support for hypothesis six: a negative attitude toward fairness in the siting of hazardous waste facilities, or environmental *injustice*, consistently predicted high scores on the toxic exposure beliefs scale. The theme of faith in institutions was further supported by measures of trust in government, which also steadily predicted risk perception across all groups. Considering these two variables in tandem, it appears that lacking faith in institutions overall increases reported concern about exposure to environmental toxins.

Implications for Conceptual Model

The findings present interesting implications for the conceptual model used therein. Some variables demonstrate that further exploration of certain topics is needed, while other variables have fallen short of the effects implied by previous research. For instance, Status as being unemployed was not significant in this analysis; however, an examination of Table 2 may explain why this was the case. Within each county examined, the percent of unemployed is significantly higher than previous Census estimates. In a post-disaster setting where record levels of physical destruction have removed employment opportunities, such high levels of unemployment may take on a different meaning than in other areas not affected by disaster. It is possible that stigma related to unemployment is simply not present in affected areas, and thus is not applicable as a measure of vulnerability.

On the other hand, the modest increased toxic exposure perceived by those divorced or separated may reflect the disruption of any support networks connected to health care benefits or financial assets. Perhaps social isolation is a theme only touched upon that may be more influential than vulnerability per se.

Education was one of the stronger predictors of perceived exposure, suggesting that measures of status may need further exploration. Individuals with more cultural capital tend to enjoy greater mobility and greater financial resources. Residing in a place of one's choosing would infer that a person would be less inclined to be fearful that threats to personal health and safety are present, and that he or she would be better equipped to identify and pursue channels of

legal recourse in the event that objectionable practices, such as inappropriate waste disposal, are observed.

Trust in government and environmental justice beliefs –and faith in institutions is more broadly—are useful than social status and power in explaining subjective environmental risk. In a region where experiences with government corruption and ineptitude have intertwined with the immediate danger of a life –threatening disaster, this relationship is especially salient. This point is illustrated by Blacks’ overall greater distrust of government and greater belief in environmental *injustice*

This model makes a notable contribution to what is known about the perception of risk and “White male effect” (Flynn et al. 1994), accounting for one fifth of the variation in toxic exposure perception. However, while the combined variables in this analysis do add to the discussion about what drives the combined race and gender effects presented here and in prior literature, they do not completely account for them. The following section will provide a critique of this model and suggestions to strengthen it for use in future research.

CHAPTER SIX: CONCLUSION

Limitations

Nothing extraordinary threatens the valid measure of concepts in this study that is not inherent in all multiple item survey research involving a one shot case study following an extraordinary event. However, the Sociological craft is always subject to self reflection, scrutiny, and improvement. In that spirit, I present a critical appraisal of possible threats to the validity and reliability of this study (Campbell and Stanley's 1963).

Statistical Regression

Because this research was conducted nearly three years after Hurricane Katrina, the potential exists that some concerns have dissipated and that other effects have not yet had time to develop. Residents in this area have transitioned from initial shock of exposure to a major disaster into day-to-day existence in recovering post-disaster communities. This transition may reveal differences in how such residents evaluate environmental dangers. For example, Katrina survivors in New Orleans who were exposed to flood waters in the days following the storm may have initially been concerned about becoming ill, whereas this fear of immediate threat would not be an issue years after the exposure. However, as time has progressed, and more questions have been raised about the soundness of official statements concerning environmental health within the city, fears about environmental toxins may have begun to take on new meaning. Concern about long-term exposure to environmental toxins may manifest in years to come as a

chronic stressor. Given the ambiguity of knowledge about cumulative, prolonged exposure to environmental toxins and the many unanswered questions about to what extent and at what concentrations toxins may be present, it is a fair assumption that opinions on these topics have not fully developed.

Selection of Subjects

Because this sample was comprised entirely of people whose lives have been altered as a result of a major catastrophic event, it may not be generalizable to those living in areas that have not undergone such trauma. Residents of post-disaster environments may be fundamentally different from residents of non-stressed environments. Thus, while this research provides valuable insights into the concerns of residents living in areas affected by disaster, caution must be taken in attempts to generalize these patterns in areas untouched by community-wide catastrophe of this scope.

Maturation

During the three year period between the landfall of Hurricane Katrina and data collection, public and private discourse have been consumed with appraising damage and trying to negotiate life in a post-catastrophe environment. Data provided by respondents must be understood as having been filtered through discussions in media, among congregations, through community organizations, and within public and private forums. These influences and other have

shaped residents' outlook in a way that may be unique to such a period in post-disaster communities and valuable to the recovery process. Undoubtedly, these interactions have influenced the perceptions reported on in this study.

Conceptualization of Variables

Because this analysis has been constructed from a secondary data set, measures have been constructed from available questions. As such, the concept of vulnerability may not have been fully captured. Surrogate measures included in this analysis have been tested by previous research as control variables. However, they have not been validated as indicators of vulnerability per se. More sound conclusions could be drawn from measures that are specifically intended to measure the influence of perceived vulnerability and discrimination on risk perception. Similarly, using education and employment status as surrogate measures for overall socioeconomic status may also omit relevant information. These measures do not completely explain the extent to which financial assets and social capital alter how individuals evaluate environmental health risks.

Next, while evaluating trust in government and beliefs about justice may be a starting point for evaluating generalized faith in institutions, it is also incomplete. The concept of recreancy, for example, cannot be fully understood by asking whether or not the government can be trusted. Breaches of trust take place through institutional neglect in both private and public sectors and on multiple levels of government. Negative experiences with disaster management alone, therefore, may not necessarily predict the extent to which people feel threatened by

environmental contamination. Responsibility for monitoring and addressing pollution is not easily attributed to a generalized concept of “government.” Therefore, improvements may be made on the model to expand measures of this concept.

Suggestions for Future Research

The research presented in this paper demonstrates that risk perception is not a concept that can be understood by examining demographic characteristics alone. Issues of status, power, history, and trust must all be taken into consideration in order to determine why individuals and groups respond to information about environmental risk in certain ways.

Variation in perceived risk along race and gender lines needs be investigated further within locally polluted environments to see if they differ from unpolluted environments. As humans encroach further into previously uninhabited lands, technological failures and human-driven environmental hazards will continue to intersect with hurricanes and other meteorological events. More research is needed to determine how these intersections between human-caused and natural disasters influence public beliefs about risk.

While potential explanations for risk sensitivity among African-American women and men within a post-Katrina environment have been proposed in this analysis, much has been left unsaid about what influences Whites to interpret risks differently than Blacks while sharing a common geographic and social space. By strengthening measures used to evaluate these factors, future research can focus on explaining why phenomena such as the White male effect manifest,

and how people come to hold attitudes towards issues such as justice and abuse of power that influence their faith in institutions.

In addition, these objective measures of status and power would be complimented by in-depth examination of actual exposure risk. A critique of risk perception research lies in its tendency to treat perceptions as abstract constructs rather than potentially accurate appraisals of existing dangers. Ideally, future research might move beyond this by evaluating the actual distribution of environmental dangers in Gulf Coast communities. In actuality, however, this feat is likely beyond the ability of any single research effort. Issues of contamination are complex and effects are difficult to identify under normal circumstances. The post-Katrina landscape of city-wide blankets of sediment, traces of chemicals, and other contamination-related unknowns further muddies exploration of these issues. However, as data collection in the area continues and more information is gathered by citizens, academics, and regulatory bodies, long-term research efforts will be better equipped to evaluate the perception of risk in conjunction with data about actual risk.

It is precisely because issues such as these cannot be explained or addressed immediately that longitudinal research is needed in the area. Concerns about toxics, justice, and other stressors will continue to affect Gulf Coast residents over time. As people migrate to and from the region, it will be important to address how changes in the physical and social landscape affect residents over the long term.

Policy Implications

This research is relevant to communities recovering from Hurricane Katrina and to risk managers in general, as its findings provide insights that can inform risk communications. Further work is needed in the Gulf Coast to address the problems of inequity that underlie issues of vulnerability and trust in institutions. In order for damaged trust in government organizations to be mended, particularly among socially disadvantaged populations, efforts must be made to publicly acknowledge concerns about fairness in cleanup, in recovery efforts, and, eventually, during business-as-usual.

Concerns relating to environmental justice and overall environmental health must be investigated by autonomous regulatory bodies in a process that is transparent if residents are to trust that their interests are being served. In order to accomplish this, efforts must be made to involve and empower residents who are invested in the long-term success of these communities in the recovery process. This means providing residents with equal representation in decision-making bodies that have the authority to address both environmental burdens and inequalities that led to the social disaster of Katrina in the first place. Practices such as these will lead to a more equitable and more ecologically sound future across the Gulf Coast region.

APPENDIX :TABLES

Table 1: Descriptive Statistics for Selected Variables by Race/Gender Groups

	White Males	White Females	Black Males	Black Females
Age (mean years)	55.4	55.9	58.4	57.6
Education				
< H.S.	3.23%	3.87%	10.96	8.7%
H.S. diploma/ GED	15.78%	22.06%	24.56%	24.4%
Some college, no degree	21.99%	26.06%	25.0%	24.4%
Associate's degree	7.58%	6.34%	16.4%	5.24%
Bachelor's degree	28.45%	25.12%	8.39%	
Master's degree	9.81%	10.92%	3.95%	
Doctoral degree	3.98%	2.35%	2.19%	1.05%
Professional degree	5.22%	1.17%	2.19%	0%
% Unemployed	29.81%	43.9%	32.46%	40.56%
Children in home (% yes)	36.02%	31.34%	47.81%	45.45%
% divorced or separated	9.07%	14.32%	18.42%	18.53%
Number rescued during storm	2	6	14	16
N	780	815	200	260

Table 2: Descriptive Information for Sample and Population

	Jefferson Parish		Orleans Parish		Plaquemines Parish		St. Bernard Parish		St. Tammany Parish		Hancock County		Harrison County	
	Data	Census	Data	Census	Data	Census	Data	Census	Data	Census	Data	Census	Data	Census
Median Age	56.0	38.8	57.0	38.2	54.0	36.0	54.0	36.6	55.0	36.9	63.0	38.5	58.0	33.9
% Male	48.5	48.0	48.6	46.6	49.1	50.3	38.5	48.3	46.1	49	45	49.6	48	49.8
% Female	51.5	52.0	51.4	53.4	50.9	49.7	61.5	51.7	53.9	51	55	50.4	52	50.2
% White	62.5	66.7	44.1	31.9	83.0	70.3	76.9	88.3	79.4	85.4	86.2	90.2	74.8	73.1
% Black	19.1	26.6	40.3	64.1	11.3	27.5	7.7	7.6	6.7	11.7	1.9	6.8	12.7	21.1
% divorced/ separated	14.8	13.2	13.9	14.2	7.5	7.1	11.0	12.8	6.7	11.4	8.8	12.8	11.1	16.0
% unemployed	31.1	4.7	20.0	7.9	34.0	3.7	34.1	3.4	32.3	2.9	47.5	3.4	36.8	3.6
Education														
% > High school	5.7	18.9	4.9	19.5	4.3	23.4	12.8	26.9	2.8	12.8	7.7	26.9	6.1	19.7
% HS diploma	23.6	32.3	13.9	28.2	19.1	34.8	51.3	37.9	20.4	27.7	18.3	37.9	22.9	28.4
% Some college	27.4	21.2	24.6	20.1	34.0	26.1	15.4	21.7	23.6	23.6	23.9	21.7	28.6	25.9
% Associate's degree	6.2	4.8	5.4	3.3	12.8	4.1	2.6	4.5	7.6	5.7	6.3	4.5	8.6	7.6
% Bachelor's degree	24.6	15.2	27.4	16.9	19.1	7.0	14.1	6.3	33.2	20.5	24.6	6.3	21.1	11.8
% Grad/professional degree	12.5	7.6	23.9	12.0	10.6	4.6	3.8	2.6	12.4	9.6	19.0	2.6	12.9	6.6

*Source: United States Census American Fact Finder

Table 3: Perceived Toxin Exposure, Beliefs about Environmental Justice, and Trust in Government by Race/Gender Groups

	White Males	White Females	Black Males	Black Females
Risk perception scale	4.76	5.28	6.38	6.47
<i>N</i>	740	779	166	233
Environmental Justice Scale mean	8.59	8.98	10.68	10.77
<i>N</i>	627	605	149	209
Trust in Government Scale Mean	9.92	10.01	11.32	11.39
<i>N</i>	780	815	200	260

One-way ANOVA for risk perception scale resulted in significant differences between: White males & White females^{***}; White males & Black males^{***}; White males & Black females^{***}; White females and Black males^{***}; White females & Black females^{***}

One-way ANOVA for the Environmental Justice Beliefs Scale resulted in significant differences between: White males & Black Males^{***}; White Males and Black Females^{***}; White females & Black males^{***}; White females and Black females^{***}

One-way ANOVA for the Trust in Government Scale resulted in significant differences between: White males & Black Males^{***}; White Males and Black Females^{***}; White females & Black males^{***}; White females and Black females^{***}

* p<.05; ** p <.01; *** p<.001

Table 4: Mean perceived Risk score by race/gender groups and residence within and outside Orleans Parish

	White Males	White Females	Black Males	Black Females
All other counties/parishes	4.72	5.28	6.05	6.23
<i>N</i>	129	121	90	127
Orleans Parish	4.93	5.27	6.66	6.67
<i>N</i>	611	658	76	106

One-way ANOVA for risk the perception scale outside Orleans Parish resulted in significant differences between: White males & White females^{***}; White males & Black males^{***}; White males & Black females^{***}; White females and Black males^{*}; White females & Black females^{***}

One-way ANOVA for the perception scale within Orleans Parish resulted in significant differences between: White males & Black Males^{***}; White Males and Black Females^{***}; White females & Black males^{***}; White females and Black females^{***}

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

Table 5: Toxin Exposure Risk Perception Hierarchically Regressed on Race/Gender Groups, Attitude Measures, and Control Variables

Independent Variables	Race Gender Model	Attitude Measures	Control Variables
	Model (step one)	Model (step two)	Model (step three)
White female	.559 (.122) ***	.501 (.110) ***	.432 (.094) ***
Black male	1.621 (.207) ***	1.089(.139) ***	.901 (.115) ***
Black female	1.718 (.258) ***	1.170 (.176) ***	1.015 (.153) ***
Trust in government	—	.147 (.189) ***	.145 (.186) ***
Environmental justice beliefs	—	.163 (.216) ***	.171 (.227) ***
Age	—	—	-.002 (-.015)
Unemployed	—	—	-.030 (-.006)
Number of children present in home	—	—	.019 (.014)
Current New Orleans resident	—	—	-.006 (-.001)
Education	—	—	-.093 (-.116) ***
Divorced/separated	—	—	.390 (.061) *
Constant	4.825	1.945	3.361
R ²	.080	.174	.190
N	1,451	1,451	1,451

Note: items in main cell entries are unstandardized regression coefficients, while those in parenthesis are beta coefficients.

* significant at p<.05; ** significant at p <.01; *** significant at p<.001

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