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Family resiliency among hurricane survivors: resource loss, prior traumatic events, and cumulative stress

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FAMILY RESILIENCY AMONG HURRICANE SURVIVORS: RESOURCE LOSS, PRIOR
TRAUMATIC EVENTS, AND CUMULATIVE STRESS

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Science

In

The School of Human Ecology

by
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Sometimes it takes a village to write a thesis. My case was unusual in that the village happened to be one that underwent two catastrophic hurricanes in a very short period of time. Incidentally and ironically, witnessing unprecedented destruction unfold just two weeks after my arrival in Louisiana led to the development of many friendships that made this project possible. There are no words that are able to fully express my gratitude to the many people present in my life that have guided and supported me throughout the time I spent at Louisiana State University.

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ABSTRACT

The purpose of the study was to assess predictors of family resiliency following a disaster and the relationships among them in an exploratory manner. Predictors that were assessed in the study were resource loss, prior traumatic events, cumulative stress and selected demographic characteristics. Using Geographic Information Systems (GIS) by combining Census data with storm damage estimates and purposive sampling, 50 participants affected by Hurricane Katrina from a single suburban community in Southern Louisiana in early spring 2006 were recruited and interviewed. In late spring and summer, data collection was continued in Southwestern Louisiana and 32 rural respondents affected by Hurricane Rita were interviewed. These participants were recruited through rural and farm associations and with the aid of Cooperative Extension Service agents. The typical respondent affected by Hurricane Katrina in the study was a married, employed Caucasian female around 48 years old. The typical respondent affected by Hurricane Rita was a married, employed Caucasian female around 56 years old.

Because there was no existing instrument that measures family resiliency, a multi-dimensional assessment was developed by reviewing existing instruments that measure similar constructs. Resource loss was measured by the Loss of Resource (LOR) inventory (Sattler, 2002). Prior traumatic event and cumulative stress were assessed by an instrument that was modeled after the assessment that was used in the baseline interview that was developed by Harvard Medical School's Hurricane Advisory Group (2006).

Following a frequency and reliability analysis, hypotheses were tested using correlation and regression analysis. For the Hurricane Katrina sample, higher amounts of resource loss and being female significantly predicted less family resiliency. For the Hurricane Rita sample, lower income significantly predicted less family resiliency. Results suggest that resource loss, gender,

and income are important factors to consider when locating families that are more likely to be vulnerable following a disaster.

CHAPTER 1

INTRODUCTION

Disaster research is an interdisciplinary field that brings together engineers, geologists, environmentalists, anthropologists, sociologists, psychologists, family scientists, and many other professionals. The common goal among all involved in disaster studies is to increase sustainability and to decrease vulnerability (J. Pine, Disaster Science Management 7000, October 5, 2005).

In the past 30 years, the occurrence of natural disasters has become more frequent, resulting in greater economic and social losses worldwide (Cutter, 2003). As the population increases in disaster prone areas, more people are in danger of experiencing a disaster (Cutter, 2003). It is assumed that more people will suffer losses from disaster, and in turn more families will be affected by disaster; particularly in Southern Louisiana, the site of the current study.

Social science researchers in the disaster field who are interested in humans typically examine individuals, organizations, or communities (Edwards, 1998). Scientists examining family and individual stress after a disaster might be more likely to explain stress as *response generated*; as a result of governmental and community-level organization with regard to their ability to provide post-disaster assistance (Bolin, 1989). An interest among some family disaster researchers are the feelings of fatigue and frustration associated with trying to meet daily needs with limited and disorganized resources (Edwards, 1998). In the field of disaster research, scientists in the psychological and sociological fields began studying the family as a unit in the 1980s (Bolin, 1989). However, there is a paucity of literature that examines the potential positive outcomes of disaster (Eysenck, 1983, Norris & Murrell, 1988). In the current review, this has been found to be particularly true in reference to families.

The purpose of the current study was to describe the relationships among loss of resources, cumulative stress, prior traumatic event, and demographic characteristics to family resiliency following a disaster.

Hurricane Katrina

Hurricane Katrina was the most destructive and the most expensive natural disaster in U.S. history (Hurricane Katrina Advisory Group, 2006). The area affected by Hurricane Katrina spanned over 90,000 square miles, which is roughly the size of the United Kingdom (U.S. Department of Representatives, 2006). The estimated cost of the storm was 81.2 billion dollars (Knabb, Rhome, & Brown, 2006). Over 500,000 people were evacuated, 1,833 deaths were attributed to the flood and miserable living conditions that occurred after the storm, and 5 million people lived in Katrina's path along the Gulf Coast (Knabb, Rhome, & Brown, 2006).

Hurricane Katrina Damage in St. Tammany Parish, Louisiana

An estimated 4,000 out of 10,300 homes in Slidell, Louisiana sustained serious damage from Hurricane Katrina (St. Tammany Parish Disaster Impact and Needs Assessment, 2006). It is estimated that 400 to 700 of the damaged houses will be complete losses (St. Tammany Parish Disaster Impact and Needs Assessment, 2006). In St. Tammany Parish, the estimated cost in business damage was \$118,366, 000 (St. Tammany Parish Disaster Impact and Needs Assessment, 2006). One thousand, six hundred and sixty-six businesses in the St. Tammany region were destroyed, which is more than one out of every seven businesses in the area. Every school in St. Tammany Parish was either damaged or destroyed (St. Tammany Parish Disaster Impact and Needs Assessment, 2006). Three public schools were destroyed and 49 public schools were damaged. Eight private schools were destroyed and three private schools were damaged. Both universities in St. Tammany were either damaged or destroyed by the Hurricane Katrina storm surge and the estimated costs of repair for the colleges is \$4,119,300 (St.

Tammany Parish Disaster Impact and Needs Assessment, 2006). Twenty-five percent of the staff in local hospitals have yet to return and the number of uninsured hospital patients has tripled (St. Tammany Parish Disaster Impact and Needs Assessment, 2006).

Hurricane Rita

The largest evacuation in U.S. history, which included over 2,000,000 people, preceded the arrival of Hurricane Rita (Knabb, Brown, & Rhome, 2006). Hurricane Rita resulted in 11.3 billion dollars in damages, directly killed 7 people, and indirectly killed 55 people. Floods and a storm surge caused by the hurricane swept away several communities in Southwest Louisiana and damaged many homes and businesses.

Hurricane Rita Damage in Cameron Parish, Louisiana

According to the Cameron Parish Needs Assessment (2006), Cameron Parish was the fifth largest fishing port in the United States prior to Hurricane Rita. Hurricane Rita caused winds, rain, a 20 foot storm surge and flooding that extended 30 miles inland in some places, submerging 200,000 acres of fresh water marshes beneath four feet of saltwater for over two weeks. Two-hundred and fifty commercial fishing boats were destroyed, many of which were either partially or not insured at all. Approximately 60% of the commercial fishing industry was destroyed and an estimated 80% of commercial fisherman in Cameron Parish will relocate to another fishing community.

Hurricane Rita destroyed 3,500 homes in Cameron Parish. In addition, three out of the parish's six schools were destroyed, and the other three schools were damaged. The parish's hospital, health clinic, dental office, pharmacy, and private doctor's office were completely destroyed. Following the hurricane, the only public buildings left standing in the lower portion of Cameron Parish were the Parish Courthouse and the district attorney's office, both which were in

need of extensive repairs. All fire stations, libraries, recreation centers, and other public buildings in lower Cameron Parish were completely destroyed.

Hurricane Rita Damage in Vermilion Parish, Louisiana

According to the Vermilion Parish Needs Assessment (2006), more than 75% of the parish was flooded during two storm surges caused by Hurricane Rita. Damages to rice and sugar cane harvests along with the loss of 9,500 cattle resulted in 50 million dollars lost in agricultural production. Five fire stations were destroyed, several schools were damaged, and over 2,700 homes were severely damaged.

Hypotheses

Given the exploratory nature of the study, five hypotheses were used to describe how various predictors related to family resiliency. The first hypothesis was that there would be a statistical association between loss of resources and family resiliency. The second hypothesis was that there would be a statistical association between cumulative stressors and family resiliency. The third hypothesis was that there would be a statistical association between prior traumatic event and family resiliency. The fourth hypothesis was that there would be a statistical association between each demographic characteristic and family resiliency. The fifth hypothesis was that when demographic characteristics were controlled, loss of resources, cumulative stressors, and prior traumatic events would have significant associations with family resiliency (see Figure 1).

Theoretical Background

Most studies that focus on individuals or families responding to disaster are atheoretical. Findings from atheoretical disaster research on individuals and families were used to guide potential predictors of differences in family resiliency. Prior traumatic events and resource loss were selected as predictors of outcomes in the current study because they were found salient in

the disaster research. No existing model or theory found in the extant literature explains relationships among prior traumatic events, resource loss, and family resiliency in the same model. Furthermore, Burr and Klein (1994) criticized current family stress theories as being inconsistent and found that no previous research had attempted to investigate how different aspects of family life are affected by stress. Family research was also criticized for lacking general principals that are helpful to families or people who help families (Burr & Klein, 1994). The combination of theoretical ideas from the conservation of resources model (Hobfoll, 1988, 1989), cumulative stress (Boss, 2002, McKenry & Price, 2005), and the inoculation hypothesis (Eysenck, 1983) guided the decision to assess loss and prior traumatic events as potential predictors of family resiliency. The lack of a family theory or model that was able to account for the relationships among prior traumatic events, loss, and family resiliency justifies the decision to use ideas from various existing theories and models to potentially develop a helpful model of family resiliency after disasters.

Conservation of Resources

Conservation of resources (Hobfoll, 1988, 1989) is a guiding theory underlying the potential relationship between resource loss and resiliency (Sattler, 2002). The theory suggests that people who have worked to attain a resource become stressed when that resource is lost or irreplaceable (Hobfoll, 1989). A resource, as defined by the theory, is anything that a person values. Resources may include possessions, personal characteristics, family and interpersonal relationships, or financial assets. In the context of a disaster, families may experience loss of these resources, and the stress associated with resource loss may affect family resiliency after the disaster. Thus, in the current study, the association between loss of resources and family resiliency was examined.

Cumulative Stress

Cumulative stress is a theoretical construct that links recent or numerous stressful events to decreases in family resiliency following a disaster. Cumulative stress is characterized by not having enough time to cope between one stressful situation or event and the next (Boss, 2002). Non-normative stressors often precede other stressors such as job loss, death, etc. (McKenry & Price, 2000). The addition of unresolved stressful events is thought to compound the feelings of pressure on a family and potentially lead to adverse outcomes. Stressful events rarely occur in isolation and studying the effects of clustered events may allow researchers to more fully understand how families adapt to and deal with a crisis (Pearlin, 1991). Thus, in the current study, the association between recent stressful events that occurred after the hurricane and family resiliency was examined.

Inoculation Hypothesis & Family Stress Models

The inoculation hypothesis (Eysenck, 1983) is the guiding theory that explains the potential relationship between a family's experience with traumatic events in the past and greater family resiliency following a disaster. The inoculation hypothesis (Eysenck, 1983) proposes that repeated exposure to stressors decreases vulnerability over time. The inoculation hypothesis has rarely been studied in the context of natural disasters outside the laboratory (Eysenck, 1983, Norris & Murrell, 1988). Thus, in the current study, the association between stressful events that occurred before the hurricane and family resiliency was examined.

Limitations

The population for the sample in the current study was purposively sampled, is limited to those living in Southern Louisiana, and may not be generalized to other samples. The conclusions may not reflect trends found among survivors of human-made or other types of natural disasters or people affected in other regions.

Assumptions

There are several assumptions that guide the current study:

1. It is assumed that the participant's responses are truthful and represent their actual family situation.
2. It is assumed that the Loss of Resources Inventory, the Prior Event Inventory, and the Family Resiliency Inventory reliably and validly measure the constructs that they are intended to measure.
3. It is assumed that there are no order effects among the loss of resources, prior event, and family resiliency assessments.

Definitions

The following definitions are used throughout the research. The definitions are as follows.

Disaster: a non-normative, stressful event that disrupts social systems, interferes with daily life, puts a wide-spread strain on resources, and requires families to use their coping skills (Bolin, 1985; Edwards, 1999; Tierney, 1989).

Resilience: the process of recovery or bouncing back (Boss, 2002, p. 75).

Resiliency: the outcome of resilience.

Resource: something considered valuable (Norris & Murrell, 1988).

Traumatic Event: phenomena that typically occur outside a person's normal experience (Horowitz, 1976).

Previous experience with disaster: an instance in which someone has either been a victim of disaster or has had past experience living in an area where natural disasters have become a "normalized" threat (Anderson, 1968).

Vulnerable population: a group of people that is more likely to suffer during or after a disaster.

CHAPTER 2

REVIEW OF THE LITERATURE

Justification for Studying Families as a Unit

An individual's response to disaster is influenced by the system in which they belong (Edwards, 1998). Disasters affect the family unit as a whole and symptoms displayed by a family member may lead to secondary traumas for other members of the family (Kilic, Ozguven, & Sayil, 2003). For instance, Green et al., (1991) have suggested that a family's reaction to a stressful event and their adjustment to the event are better predictors of post traumatic stress disorder (PTSD) symptoms in a child than the child's exposure level (Kilic et al., 2003).

Classic disaster studies examined interactions among individuals, families, and the community (Drabek & Key, 1976; Drabek, Key, Erickson, & Crow, 1975). Individuals tended to interact with and rely upon family more than friends or neighbors after a disaster (Drabek et al., 1975). In addition, survivors of a disaster are more likely to interact with their families than are individuals that were not affected (Drabek & Key, 1976). The majority of disaster researchers have focused more intently on outcomes for individuals rather than outcomes for families. In addition, a current review of the literature has found no studies that explain the processes that lead to outcomes for families following disaster.

Predictors of Outcomes Following a Disaster

Although many predictors of outcomes following disaster have been identified in the disaster literature, this literature review focuses on family resiliency, loss of resources, cumulative stress, prior traumatic events, and demographic characteristics because they were the constructs most salient for family resiliency. Demographic characteristics discussed include age, marital status, gender, race and income. The current study examined how loss of resources,

cumulative stress, prior traumatic events, and selected demographic characteristics were associated with the outcome of family resiliency.

Family Resiliency

Burr and Klein (1994) described a “silver lining” aspect of family stress that is often overlooked in disaster literature. Some expressive dimensions of family life such as communication, cohesion, bonding, and family togetherness improve when a family undergoes a stressful situation. If more families and practitioners were aware of the potential benefits of stressful situations for families, then coping may be easier for families (Burr & Klien, 1994). One dimension of successful recovery is resiliency. Resiliency is the idea that a family or an individual has strengths or resources that allow them to overcome a challenging experience and to grow from that experience (Cowen et al., 1996). Resilience is a process (Houser, 1999) in which growth occurs, as opposed to mere survival (Walsh, 1999). Resiliency is different from resilience in that resiliency is an outcome. Family resilience and resiliency can only be understood by studying entire families, not just individuals (Boss, 2002).

Family resiliency is the outcome variable in the current study. Some dimensions of family resiliency that are considered important include economic and social resources, collaborative problem solving, flexibility, clarity, transcendence and spirituality, connectedness, meaning-making, open emotional expression, and positive outlook (Walsh, 2003). Other suggested dimensions of resiliency to consider when assessing a family’s functioning include communication, rules, and types of problem solving (Epstein et al., 2003) in addition to emotional expression of family members, household responsibilities, and caregiving (Edwards, 1998).

In the past, the terms “resilience” and “resiliency” were not commonly used in the extant disaster literature. In some family literature and disaster literature, the terms resilience and

family functioning, family organization, and coping are used interchangeably without an exact, precise, measurable meaning for the global term. Furthermore, there is not yet a pragmatic, measurable definition of family resiliency, making it difficult to understand how resilience leads to the outcomes.

Resources or the lack thereof are typically referred to as protective factors and risk factors, respectively. For the purposes of this literature review, a protective factor is a characteristic that is more likely to be associated with a higher level of family resiliency following a disaster. A risk factor is a characteristic that is more likely to be a barrier to a positive outcome (Boss, 2002). Risk factors and chronic stresses can overlap because factors that fall into both categories are a cost to the family's resources and a strain on the family's equilibrium. For example, having a disability is a risk factor that makes a person more vulnerable during a disaster (Rosenfeld et al., 2005). If the challenges associated with the disability continually result in strain on the person or the person's family over time, the disability is a chronic stressor as well as a risk factor.

In the literature on protective factors and risk factors in the context of disaster experience, the units of study were typically individuals rather than families. Protective factors for individuals include having previous experience with a disaster, economic resources, physical health, and social support (Norris et al., 2002). Risk factors for individuals include being elderly, disabled, middle aged, having more severe exposure during the disaster, secondary stressors such as financial or marital troubles, prior psychiatric problems, or social isolation (Langer, 2004; McCubbin & Patterson, 1983; Norris et al., 2002; Rosenfeld et al., 2005). Combinations of several risk factors are associated with greater vulnerability for individuals (Rosenfeld et al., 2005). There is support for the idea that having strong economic resources including higher

incomes, sufficient insurance, and adequate housing may predict a more complete and faster recovery (Bolin, 1982).

Loss of Resources

The conservation of resources theory predicts that smaller amounts of resource loss are associated with better outcomes and greater amounts of resource loss are associated with negative outcomes (Hobfoll, 1989). The conservation of resources theory (Hobfoll, 1988, 1989) has been tested empirically by using the Loss of Resources index.

A review of the literature showed that specific types of losses are better at predicting certain outcomes. For instance, a meta-analytic review of the disaster literature reported that psychosocial resource loss had a mediating effect of disaster stress on symptomatic mental health outcomes (Norris et al., 2002a). Resources that include self-esteem, perceived control, and social embeddedness, which are categorized as personal characteristics, were assessed in a longitudinal study among participants who survived Hurricane Andrew (Norris & Murrell, 1988). Measures of self esteem and social embeddedness were significant predictors of depression six months following Hurricane Andrew, but they were less predictive of depression 30 months after Hurricane Andrew (Norris & Murrell, 1988). Changes in the amount of personal characteristics were measured and lower scores were associated with more depression (Norris & Murrell, 1988). In a sample consisting of medical professionals two months following Hurricane Hugo, loss of resources were found to be a better predictor of psychological distress than gender, age, race, marital status, and household income (Freeddy, Shaw, Jarrel & Masters, 1992). In addition, resource loss was found to be the most salient factor in determining post-disaster psychological adjustment (Freeddy et al., 1992). Four to seven months following the Sierra Madre earthquake, loss of resources were found to predict psychological distress when other predictors that include perceived life threat during the earthquake, prior traumatic exposure, life events, and

demographic characters were controlled (Freedy, Saladin, Kilpatrick, Resnick, & Saunders, 1994). In a study conducted one month after Hurricane Hugo, Kaiser and Sattler (1996) found resource loss and female gender to be positively associated with psychological distress. Resource loss and depression were also found to be better predictors of psychological distress than a sense of coherency and anxiety (Kaiser & Sattler, 1996). Resource loss, particularly personal characteristic resources, was an important predictor of psychological distress among victims of Hurricane Georges who lived in the U.S. Virgin Islands, Puerto Rico, Dominican Republic, and the United States (Sattler et al., 2002). In a meta-analytic study, extensive loss of property was considered to be a predictor of adverse psychological outcomes such as post traumatic stress and anxiety and other adverse psychological outcomes (Norris et al., 2002a).

Stress and Prior Traumatic Events

Cumulative stress is characterized by not having enough time to cope between one stressful situation or event and the next (Boss, 2002). Although “cumulative stress” per se is not often mentioned in the disaster literature, various types of stress have been discussed and empirically investigated.

Sudden onset of a stressor, rather than gradual onset, is assumed to be a predictor of greater disturbance in a family’s equilibrium (Lipman-Blumen, 1975). Although there are many broad characterizations that describe in the disaster literature (Edwards, 1998), for the purposes of this literature review it is assumed that the stresses associated with a disaster are sudden.

Two types of stresses that families and individuals encounter include chronic stress and normative stress. Normative stresses are events that temporarily put strains on families. Normative stressors do not continue to be stressors over time once they are overcome (Peterson & Mathieson, 2000). Examples of normative stresses include a car breaking down, temporary job loss, or an illness from which a person recovers. However, a chronic stress must be coped with or

adjusted to repeatedly over time for a family to continue functioning (Peterson & Mathieson, 2000). Examples of chronic stressors include psychiatric disorders, disability, and racism. The majority of stressors investigated in the disaster literature are chronic stressors because individuals and families must continue to cope with chronic stress along with the stress of the disaster. The simultaneous coping of normative stressors, chronic stressors, and disaster-related stressors leads to the cumulative effects of stress.

A recent review of the disaster literature reported that chronic stress has not commonly been examined (Norris et al., 2002a). Chronic stress is logically related to family resiliency because cumulative chronic stresses potentially strain interpersonal relationships and increase the risk of family conflicts (Norris et al., 2002a; Norris & Kaniasty, 1996). Chronic stresses that were assessed in disaster studies were often found to mediate the affects of disasters on outcomes (Norris et al., 2002a). Examples of chronic stresses that have been cited in the literature as contributors to vulnerability following a disaster include poverty, unemployment, and a lack of community support (Giel, 1990; WHO, 1992). In addition, cumulative stresses often revolve around family strains and interpersonal relationships (Norris et al., 2002a). When investigators used an index to count the number of disaster-related stresses experienced by a participant, they generally found increases in impairment with increases in numbers of stresses (Briere & Elliott, 2000; Hardin, Weinrich, Hardin, & Garrison, 1994; Norris et al., 2001). Specific stresses that were more likely to predict vulnerability included bereavement, injury to self or family member, life threat, feelings of panic or horror during the disaster, property damage or financial loss, and relocation (Norris et al., 2002a).

The number of chronic stressors before and after Hurricane Andrew was assessed among Florida survivors six months after the hurricane and 30 months after the hurricane (Norris et al., 1998). Respondents who had more exposure during Hurricane Andrew were more likely to

report a higher number of stressful life events (Norris et al., 1998). More than a third of a sample who survived a series of earthquakes in El Salvador in 2001 reported that they had dealt with prior traumatic events (Sattler, 2002). Experience with prior events and stresses within the past year significantly predicted acute stress disorder following the earthquakes (Sattler, 2002).

Recent post-disaster stresses that have been investigated include the onset of psychiatric conditions such as post-traumatic stress syndrome and the severity of exposure during the disaster that potentially contributes to vulnerability. Some studies reported that women experienced more depression and anxiety following disasters (Shore et al., 1986; Norris et al., 2002). Although the reason for the differences found between men and women is not understood, a potential explanation is that adverse outcomes may be compounded by the stress associated with caregiving and providing emotional support that is usually performed by women (Norris et al., 2002a). This explanation is consistent with the finding that single parents and middle-aged survivors were more likely to experience mental health issues following disaster (Green et al., 1996).

In the disaster literature, the severity of exposure during the disaster is a predictor of a person or a family's vulnerability (Norris et al., 2002). Severe exposure during a disaster may mean that a person was injured, saw another person become injured or killed, or other traumatizing experiences associated with the disaster (Norris et al., 2002; Udwin et al., 2000).

There are contradictory findings among early disaster researchers regarding disasters, severe exposure, and mental illness. Some early research supported the idea that disasters could cause long-term mental illness; particularly among vulnerable populations (Brown et al., 1973). However, contemporary research supports the idea that prior mental problems are associated with vulnerability and that the majority of mental health problems following a disaster are temporary (Norris et al., 2002; Taylor et al., 1976). In a meta-analytic study that included 160

samples and over 60,000 disaster survivors, 121 (77%) of the samples had reported psychiatric problems such as anxiety, post traumatic stress disorder, and depression (Norris, et al., 2002). However, the majority of survivors with psychiatric problems resulting from a disaster recovered within 6 to 16 months following the disaster (Baum & Fleming, 1993). Chronic problems in living, or secondary stressors, were analyzed as mediators between severe disaster exposure and chronic psychological troubles (Norris, et al., 2002). Since prior empirical studies suggest that various stressful events are related to adverse outcomes following disasters, the current study contributed to the body of literature by further examining whether recent stressful events are related to family resiliency.

In addition to investigating recent, cumulative stressors, the current study includes an analysis of how prior traumatic events affect family resiliency. Disasters and trauma are phenomena that typically occur outside a person's normal experience (Horowitz, 1976). A person with previous experience with disaster is defined as someone who has either been a victim of disaster or has had past experience living in an area where natural disasters have become a "normalized" threat (Anderson, 1968). People living within disaster-prone areas are considered as having "previous experience" because they are more familiar with the threat of disaster. The threat of natural disasters is assumed to be less psychologically disturbing for persons living in areas that are not prone to disaster (Anderson, 1968).

A disaster can be traumatic because the experience is outside the realm of normal human experience, making the event hard to process into meaning (Norris & Murrell, 1988). Families or individuals that have successfully adapted to disasters or other traumatic events may perceive their ability to cope with a new disaster better than a family or individual who is experiencing a disaster for the first time (Norris & Murrell, 1988). Similarly, some older individuals perceive the stresses associated with disasters to be less overwhelming than some younger individuals

because many older people have overcome challenges in the past (Bell et al., 1978). In addition, living in an area where disasters occur frequently may normalize the stresses associated with the disaster so that families overcome challenges more easily (Anderson, 1968). There is very little information on how meaning-making or perceptions play a role in a family's recovery. Further investigation of meanings and perceptions may be important because a family's perception might influence the family's ability to cope with barriers to successful recovery.

The inoculation hypothesis was tested by Norris and Murrell (1988) on a sample of adults that were 55 years or older following a flood. When controlling for pre-flood anxiety, a significant interaction between prior disaster experience and severity of exposure was found. The adults who had prior disaster experience were significantly less impaired than the adults without prior experience. Furthermore, when survivors of an earthquake were screened for depression, and pre-disaster depression was controlled, the survivors who had prior experience were less likely to be depressed (Knight et al., 2000). Some studies have also reported that people who live in communities that frequently experience disasters are more likely to be prepared and to evacuate when necessary (Norris, Smith, & Kaniasty, 1999; Riad, Ruback, & Norris, 1999). When differences in impairment between rescue workers and an adult sample of non-rescue workers were assessed, the impairment among rescue workers was significantly less. Furthermore, when multiple samples of rescue workers were assessed in a meta-analytic study, only three (13%) of the rescue workers were considered severely impaired (McCarroll, Fullerton, Ursano, & Hermesen, 1996; Turner, Thompson, & Rosser, 1995; Watts & Wilson, 1999). One explanation for the resilience among rescue workers is that repeated exposure to traumatic events normalized the effects of trauma. Previous success in dealing with a traumatic event may predict better abilities to cope with disaster later in life (Gibbs, 1989) along with a greater capacity for meaning-making and an ability to find social support (Lyons, 1991). Prior exposure to disaster

may be mediated by knowledge and skills related to preparedness that may influence the amount of adverse outcomes following the disaster (Norris et al., 2002a).

The review of the literature did not find any studies that investigate how cumulative stresses or prior traumatic events affect a family's ability to cope with disaster or disaster outcomes. Findings from the current study regarding potential relationships between prior traumatic events and family resiliency are an important contribution to the disaster literature.

Demographic Characteristics

Demographic characteristics are discussed extensively in disaster literature published after 1985; whereas classic disaster literature often included predominately American males in their samples (Drabek, Key, Erickson, & Crowe, 1975; Klatzky, 1972). Previous studies that examined gender were criticized because they did not have enough power to explain differences between genders regarding psychological outcomes (Norris et al., 2002). Among the studies that included balanced proportions of men and women, several found that women reported more psychological disturbances such as depression, whereas men were more likely to suffer from substance abuse and behavioral problems (Norris et al., 2002b; Sattler, Freedy, Anderson, & Kaiser, 1997). Despite findings that support linkages between demographics and outcomes, there is no clear understanding of how demographic characteristics are related to outcomes following a disaster (Gibbs, 1989).

Gender

Females are generally more distressed than males following a disaster, regardless of age, location, and type of disaster (Norris et al., 2002a). However, men are more likely than women to abuse alcohol following disasters (Dooley & Gunn, 1995; Gleser et al., 1981; North, Smith, & Sptiznagel 1994). Female gender was associated with depressive symptoms that included avoidance, intrusion, and arousal six months and thirty months following Hurricane Andrew

(Norris et al., 1988). Some studies found that women and girls were twice as likely as men and boys to develop post traumatic stress disorder following a disaster (De la Fuente, 1990; Green et al., 1990; North et al., 1999).

Race and Ethnicity

Ethnicity or race are studied far less than age and gender in the context of disaster and its psychological outcomes (Norris et al., 2002a). Most American disaster studies compare African-American survivors to Caucasian survivors without examining other ethnic groups (Green, Gleser, Lindy, Grace, & Leonard, 1996). The implications of minority status and poverty often overlap, making it difficult for researchers to distinguish whether a person's minority status or social economic status is more predictive of a certain outcome (Sattler et al., 1997). There is a need for disaster scientists to design studies that distinguish outcomes specifically related to social economic status and ethnicity (Sattler et al., 1997).

Furthermore, despite the fact that the majority of natural disasters occur in developing countries (Toukmanian et al., 2000), most disaster studies examine people in Euro-American countries (Toukmanian et al., 2000; for exceptions see Ibanez, Buck, Khatchikian & Norris, 2004). Some current reviews of disaster literature found an over-representation of Americans among the populations of disaster survivors (Norris et al., 2002b). The lack of appropriate assessments for the analysis of ethnically diverse participants may partially account for the scarcity of research that includes participants from developing countries (Ibanez et al., 2004).

The majority of studies that compare ethnic minorities to the homogenous population found that participants of an ethnic minority reported more distress (Green et al., 1990; La Greca, Silverman, & Wasserstein, 1998; Perilla, Norris, & Lavizzo, 2002). However, a few studies reported that ethnic minorities had less distress following a disaster (Garrison et al., 1995; Shannon, Lonigan, Finch, & Taylor 1994).

Age

The inclusion of families at different ages including young, middle age, and elderly members allows for understanding of phenomena across the lifespan (Allen, Blieszner, & Roberto, 2000). Prior to the 1990's, elderly and middle aged families were rarely studied (Allen, Blieszner, & Roberto, 2000).

Middle-aged survivors of disaster may be more vulnerable to stress than other age groups because they are more likely to be providers for elderly and children (Thompson, Norris & Hanacek, 1993). The increased social responsibilities that are often attributed to people at middle age, including care of children, elderly parents, and other people, may impact their ability to cope in the aftermath of a disaster (Lystad, 1990). The existing body of literature that examined disaster outcomes for elderly survivors reports contradictory findings (Gibbs, 1989; Ticehurst, Webster, Carr, & Lewin, 1996). For instance, scholars describe the elderly as the most vulnerable survivors (Massey, 1997; Klinenberg, 2002) and as the most resilient survivors (Norris & Murrell, 1998; Norris et al., 2002a). Contradictory findings may be attributed to differences in methods employed by the researchers (Norris et al., 2002b; Ticehurst et al., 1996).

Marital Status

Empirical findings regarding marital status are contradictory. Some studies reported that married people were more distressed after a disaster than single people (Brooks & McKinlay, 1992; Gleser et al., 1981; Solomon 2002). Some studies reported that non-married people experienced more distress (Fullerton, Ursano, Tzu-Cheg, & Bhartiya, 1999; Ursano, Fullerton, Kao, & Bhartiya, 1995).

Income

Research supports the idea that income may affect resiliency for families. In a study that included victims of a tornado, victims with lower incomes reported more relationship troubles

within the family than did victims with higher incomes (Bolin & Trainer, 1978). In addition, victims who lived in poverty prior to the disaster are likely to have less resources and to have more difficulty in coping (De Girolamo & McFarlane, 1996). Other studies have found that lower income families generally have more stressful events in their lives than higher income families. For instance, one study that took place in the absence of a disaster found that over half of all very low-income families experience at least one of the following deprivations in the course of a normal year: eviction, utilities disconnected, telephone disconnected, housing with upkeep problems, crowded housing, no refrigerator, no stove, or no telephone (Federman et al., 1996).

Gender, race, age, marital status, and income have been considered important predictors of outcomes throughout the disaster literature. Since there are few extant disaster studies that examine resiliency as an outcome, it is believed that the examination of these demographic characteristics in the current study is an important contribution to the disaster literature.

Research Designs Used in Disaster Studies

There are challenges associated with generalizing disaster research findings to other populations outside the research sample. The majority of disaster research focuses on a single event that affects a specific group of participants, which is comparable to a case study (Norris et al., 2002a). Meta-analytic disaster reviews are commonly used to assimilate data from many types of studies in the disaster field.

Cross-sectional interview analysis, a method frequently used to study participants at varying times following a disaster, yields inconsistent findings of morbidity among elderly survivors of disaster (Ticehurst et al., 1996). Cross-sectional interview analysis forces interviewers to use retrospective data that may vary as time passes.

Pre-test and post-test designs are not often found among disaster studies. Notable studies include Drabek, Key, Erickson, and Crow's (1975) study of families before and after tornados in Kansas, and Norris and Murrell's (1988) before and after studies of flood victims in Kentucky. Drabek, Key, Erickson and Crow (1975) conducted the first quasi-experimental design, one that compared pre- and post-test assessments of families affected by disaster with pre- and post-test assessments of a comparison group of non-affected families. Norris and Murrell (1988) were able to study pre-flood symptoms by using a panel study to interview 234 elderly adults before and after a flood. Using a pretest allowed the researchers to have a natural baseline for comparison of pre-flood conditions, which is often lacking in disaster studies (Norris & Murrell, 1988). Although the current study did not employ a pre-test post-test design per se, assessments used in the study including the prior events and the family resiliency were designed to take the families' experiences before the storm into consideration.

Summary

Although there is a rich body of empirical literature that discusses outcomes for individuals following a disaster, there are few studies that focus exclusively on outcomes for families. Furthermore, the majority of disaster studies examine the adverse outcomes that follow disaster such as mental health impairments and maladjustment. The current study is unique in that family resiliency was studied as a potential positive outcome following disaster. The current study will enhance understanding of family resiliency and why some families are able to "bounce back" from experiences with disaster. The current study will contribute to the knowledge of how prior traumatic events and recent cumulative stresses affect families after disasters.

CHAPTER 3

METHODS

The data collected for this study is a part of a larger project, “Families and Disasters,” conducted by Dr. Garrison in collaboration with Dr. Sasser for the Louisiana Agricultural Experimental Station and Louisiana State University. The general purpose of the larger project is to follow families in a longitudinal study to describe patterns of family resilience and resiliency following a disaster. The current study is an exploratory quantitative project.

The data for this study was collected in the first wave of the larger project. Prior to the beginning of the study, approval was granted from the Institutional Review Board. In early 2006, families who had returned to a residential area in Southern Louisiana following Hurricane Katrina were solicited. Geographic Information Systems (GIS) was used to locate an area that had sustained moderate wind damage and or flooding and had adequate social economic status and race variation. Respondents were recruited by door to door contact in the affected neighborhoods. Structured interviews were conducted over a three month period between February and April 2006. Most of the interviews took place in the participant's homes or in their FEMA trailer. A few interviews were conducted at an elementary school in Slidell where several of the participants worked. Some respondents provided names and phone numbers of friends and family members who also qualified for the study.

In the summer of 2006, data collection was continued in rural Southern Louisiana to include families affected by Hurricane Rita. These participants were recruited through rural and farm associations and with the aid of Cooperative Extension Service agents.

Sampling

The sample from Hurricane Katrina comprised 50 respondents living in St. Tammany Parish. Seventeen respondents (34%) were male and 33 (66%) respondents were female. The

sample consisted of 37 (74%) Caucasian respondents, 12 (24%) African American respondents, and one (2%) Latino respondent. The mean age of the respondents was 48.44 years old. Thirty-seven (74%) of the respondents lived in their current home before the storm and 12 (24%) had changed residences since Hurricane Katrina. Data from one (2%) of the respondents regarding residency change since Hurricane Katrina was missing. Twenty-seven (54%) of the respondents owned their homes with a mortgage, 13 (26%) of the respondents owned their homes without a mortgage, 7 (14%) of the respondents rented, and two (4%) of the respondents occupied their home without payment of rent. Data regarding home ownership from one (2%) of the respondents was missing. Forty-seven (94%) of the respondents did not return to their homes immediately following the storm. Twenty-nine (58%) of the respondents were married, six (12%) of the respondents were single or never married, four (8%) of the respondents were cohabitating, six (12%) of the respondents were divorced, four (8%) of the respondents were widowed, and one (2%) of the respondents were separated. Thirty-one (62%) of the respondents reported that they were currently employed. One (2%) of the respondents reported that they earn less than \$5,000. Six (12%) of the respondents reported that they earn between \$5,000 and \$9,999. One (2%) of the respondents reported that they earn between \$10,000 and \$19,999. Thirteen (26%) of the respondents reported that they earn between \$20,000 and \$39,999. Twelve (24%) of the respondents reported that they earn between \$40,000 and \$59,999. Twelve (24%) of the respondents reported that they earn between \$60,999 and \$79,999. Four (8%) of the respondents reported that they earn \$80,000 and above. Data regarding income for one (2%) of the respondents was missing.

The sample from Hurricane Rita included 32 respondents living in Rural Louisiana. Fifteen respondents (46.9%) were male and 17 (53.1%) respondents were female. There were 25 (78.1%) Caucasian respondents, two (6.2%) African American respondents, one (3.1%) Asian

respondent and one (3.1%) Latino respondent. Data regarding race for three (9.4%) of the respondents was missing. The mean age of the respondents was 55.7 years old. Twenty-four (75%) of the respondents lived in their current home before the storm and 8 (25%) of the respondents had changed residences since Hurricane Katrina. Eleven (34.4%) of the respondents owned their homes with a mortgage, 19 (59.4%) of the respondents owned their homes without a mortgage, one (3.1%) of the respondents rented, and one (3.1%) of the respondents occupied their home without payment of rent. Twenty-eight (87.5%) of the respondents did not return to their homes immediately following the storm. Data from one respondent regarding whether or not they returned home immediately after the storm was missing. Nine-teen (59.4%) of the respondents were married, three (12%) of the respondents were single or never married, one (3.1%) of the respondents were cohabitating, two (6.3%) of the respondents were widowed, and 7(22%) of the respondents did not answer. Six-teen (50%) of the respondents reported that they were currently employed. Data regarding employment from two (6.2%) of the respondents was missing. Two (6.3%) of the respondents reported that they earn between \$10,000 and \$19,999. Nine (28.1%) of the respondents reported that they earn between \$20,000 and \$39,999. Seven (21.9%) of the respondents reported that they earn between \$40,000 and \$59,999. Four (12.5%) of the respondents reported that they earn between \$60,000 and \$79,999. One (3.1%) of the respondents reported that they earn between \$80,000 and \$99,999. Six (18.8%) of the respondents reported that they earn \$100,000 or more. Data regarding income for three (9.4%) of the respondents was missing. Thus, the typical respondent affected by Hurricane Katrina in the study was a married, employed Caucasian female around 48 years old. The typical respondent affected by Hurricane Rita was a married, employed Caucasian female around 56 years old.

Variables and Instruments

Loss of Resources

The amount of loss experienced by the respondent's family was measured by the Loss of Resource (LOR) inventory (Sattler, 2002). For each item, the respondent was asked to rate their loss from zero to four. The responses from which the respondent could choose included "No loss", "A little bit of loss", "A moderate amount of loss", "Quite a bit of loss", and "Extreme loss." "No loss" was scored as a zero. "A little bit of loss" was scored as a one. "A moderate amount of loss" was scored as a two. "Quite a bit of loss" was scored as a three. "Extreme loss" was scored as a four. The instrument comprised 44 items. A new variable was computed that summed the item scores. Separate variables for categories of loss indicated in the review of literature were not created because of small sample size and to first establish a relationship between resource loss and family resiliency.

Cumulative Stressors and Prior Traumatic Events

Prior traumatic events were assessed by asking the respondent if they or their family had experienced traumatic experiences such as other disasters, violence, severe family problems, or other extraordinary changes throughout their life. The respondent was also asked whether the events occurred before or after the hurricane. Events that happened after the hurricane were considered recent enough to be cumulative stressors. The prior traumatic event instrument was modeled after the assessment that was used in base-line interview that was developed by Harvard Medical School's Hurricane Advisory Group (2006). The Hurricane Advisory Group is an ongoing longitudinal study that interviewed 2,000 Hurricane Katrina survivors.

A list of potential traumatic events was presented to the respondents during the interview. For each event, the respondent was given a choice of responses regarding their families experiences before and after the storm that included "no", "yes-before" and "yes after". "No"

responses were coded as a zero, “yes-before” responses were coded as a one, and “yes-after” responses were coded as a two. If a respondent said that their family experienced an event before and after the storm, the response was coded as a three. Traumatic events that occurred before the storm were summed to create a variable for prior traumatic events. Events that occurred after the storm were summed to create a variable for cumulative stressors.

Demographic Characteristics

The selected demographic characteristics used had been found to predict outcomes following disasters as previously discussed in the review of literature. Our demographic assessments were reproduced after questions that were asked in the Census Bureau (2000). Demographic characteristics included age, gender, race, marital status and income were reported by the respondents during the interviews. Gender and race were recorded by the interviewer.

We asked the respondents for their own ages as well as the ages of other members of their families. When the respondent was asked about income, total yearly family income prior to the hurricane, including wages and salaries, interest and dividends, and any other money received by all people in the household was specified.

Family Resiliency

Dimensions of family resiliency that are considered important include economic and social resources, collaborative problem solving, flexibility, clarity, transcendence and spirituality, connectedness, meaning-making, open emotional expression, and positive outlook (Walsh, 2003). There is no assessment found in the review of literature that measured family resiliency, so an assessment was developed by modifying questions from other measures that assess similar constructs.

The assessments that were examined to construct a measure of family resiliency include the Family Environmental Scale (FES) (Moos & Moos, 2002), the Massachusetts Self-

Sufficiency Scales and Ladders Management System (Bureau of Neighborhoods, 1999), the Family Hardiness Index (FHI), (McCubbin et al., 2000), the McMaster Family Assessment Device (FAD) (Epstein et al., 1983), and the base-line interview that was used by Harvard Medical School's Hurricane Advisory Group (2006).

The FES is a 90 item questionnaire that measures how a family member perceives the interactions and family structure (Moos & Moos, 2002). The FES conceptualizes family structure with three dimensions that include relationships, personal growth, and system maintenance. The first dimension, relationships, includes three subsets that include cohesion, expressiveness, and conflict. The second dimension, personal growth, includes five subsets that include independence, achievement, orientation, intellectual-cultural orientation, active-recreational orientation, and moral-religious orientation. The third dimension, system maintenance, includes the subsets organization and control. Questions unnecessary to the current study were omitted to create a shorter questionnaire.

The Massachusetts Self-Sufficiency Scales and Ladders is a management system that was used by case managers to assess whether or not low-income families were in need of intervention (Bureau of Neighborhoods, 1999). The assessment evaluated families along a continuum that spanned from "thriving" to "in a state of crisis" (Bureau of Neighborhoods, 1999). Some items that were measured included employment, education, health, family development, and child care.

The FHI measures four dimensions of hardiness (McCubbin et al., 2000). The four dimensions of hardiness include control, commitment, challenge, and confidence. The FHI rates items on a Likert scale. To date, the FHI has not been validated nor has its other psychometric properties been established.

The FAD is based on the McMaster Model of Family Function (MMFF). The FAD is a measure of family functioning based on self-report that was used to distinguish healthy families from unhealthy families (Epstein et al., 1983).

The base-line interview that was used by Harvard Medical School's Hurricane Advisory Group (2006) had a portion of their interview that used the responses "better," "worse," or "the same" to answer questions regarding current living situations and their life as a whole. These responses were adopted for the instrument.

For each item on the resiliency instrument, the respondent was given a choice of responses that include "It is better," "It is worse," and "It is the same" since the storm. "It is better" was scored as a 2. "It is the same" was scored with a one. "It is worse" was scored with a zero. Examples of items on the instrument included relationships among family members, family abilities, and characteristics such as family safety. The instrument also included a final item that prompted the respondent to rate their overall family life. A family resiliency variable was computed by summing the scores for each item on the instrument.

Analysis of the Data

Prior to testing the hypotheses, frequencies were computed on the variables to check for normal distribution. A reliability analysis was performed on the assessments for loss, and resiliency. Multicollinearity was assessed by performing correlations among the variables.

The first, second, third, and fourth hypotheses were tested by performing a correlation analysis between each independent variable and family resiliency. Spearman correlations were reported for ordinal-level variables and Pearson's correlations were reported for interval-level variables. The fifth hypothesis was tested by regressing the independent variables on family resiliency. Demographic characteristics were included in the first block of the regression. Cumulative stressors, traumatic events, and loss of resources were entered in the second block.

The effect size, which is defined as the strength of the relationships between independent and dependent variables, was reported (Leech, Barrett, & Morgan, 2005). The effect size is considered important in reporting results because it provides information regarding the magnitude of the association between the independent and dependent variables, whereas the level of significance does not (Leech, Barrett, & Morgan, 2005). It is recommended that effect sizes always be reported for primary results (Wilkinson & The APA Task Force, 1999).

CHAPTER 4

RESULTS

This chapter discusses the results of the data analysis. Results from the data cleaning and inspection process are presented first, psychometric properties of all variables are presented next, and the results from the correlation and regression analysis are presented last.

Data Cleaning and Inspection

Frequencies were computed on the variables to check for normal distribution, primarily skew (Morgan et al., 2007). All variables except cumulative stress were considered normal because skew levels fell between negative and positive one. A square-root transformation was performed on cumulative stress, which improved the skew from 2.592 to 1.597. Log and inverse transformations were not as appropriate to minimize the skew because there were too many zeros in the data set.

Prior to testing the hypotheses, reliability analyses were performed on the assessments for resource loss and family resiliency for the sample that experienced Hurricane Katrina. The loss of resources inventory had a Cronbach's alpha of .894 and the family resiliency assessment had a Cronbach's alpha of .725. The alphas for these assessments were considered reliable because they exceeded .70 (Leech, Barrett, & Morgan, 2005). A reliability analysis was not performed for prior traumatic events and cumulative stress because the items in the assessment are unrelated and not expected to be correlated with one another (Streiner, 2003). Due to data limitations, a reliability analysis was not performed for any of the assessments for the Hurricane Rita sample.

Multicollinearity

Multicollinearity was assessed by performing correlations among the independent variables. All correlations among independent variables were below .50, indicating that there was no evidence of multicollinearity (Leech, Barrett, & Morgan, 2005).

Power Analysis

At a level of .05 with a sample size of 50 or a 32, there is enough power to detect large effects in correlation analyses and regression analyses. A type-two error is the result that no significant association between independent and dependent variables exists despite the presence of a significant association (Cohen, 1988). A type-two error may be committed because medium and small effects may not be detected in either sample.

Psychometric Properties of Variables

Descriptive statistics (means, standard deviations, skew, and kurtosis) of the Hurricane Katrina sample are presented in Table 1 and the Hurricane Rita sample is presented in Table 2.

Descriptive statistics

For the Hurricane Katrina sample, the range of resource loss that was computed by summing the scores from each item in the inventory was between 13 and 104 and the average was 57.4. Thirty-two (64%) families in the Hurricane Katrina sample reported that they had extreme loss of their household appliances. Thirty-one (62%) families reported that they had extreme loss of their furniture. Twenty-eight (56%) families reported that they had extreme loss of their sentimental items. Twenty-five (50%) families reported that they had extreme loss of their home and things need for their children. Twenty-three (46%) families reported that they had extreme loss of their vehicle. Twenty-two (44%) families reported that they had extreme loss of their clothes and their daily routine. For the Hurricane Rita sample, the range of resource loss that was computed by summing the scores from each item in the inventory was between 5 and 81 and the average was 44.65. Twenty-three (72%) of the families from the Hurricane Rita sample reported extreme losses for their home and their furniture. Eight-teen (56%) families reported extreme loss of their appliances. Seventeen (53%) families reported extreme loss of their plants. Sixteen (50%) families reported extreme loss of their sleep and their free time. Table 3 reports

mean losses for each item. The mean amount of loss experienced by each sample does is not much different for most of the items. For both samples, instrumental and physical losses were higher than expressive losses.

Table 1. Descriptive Statistics of Hurricane Katrina Sample

| Variable | Mean | Standard Deviation | Skew | Kurtosis | |
|-------------------------|--------|--------------------|-------|----------|-----|
| Gender ^a | .6600 | -- | -- | -- | |
| Age | 48.44 | 15.493 | .231 | -.658 | |
| Race ^b | .7400 | -- | -- | -- | |
| Income ^c | 4.71 | 1.620 | -.188 | .016 | |
| Marriage ^d | .600 | --- | --- | --- | |
| Resource Loss | 57.420 | 20.533 | .156 | -.323 | |
| Prior Traumatic Events | 1.975 | 2.287 | 1.096 | .266 | |
| Square Root Cum. Stress | .278 | .528 | 1.597 | 1.172 | |
| Family Resiliency | | 20.560 | 6.47 | .576 | 1.7 |

^a 0 = male, 1 = female.

^b 0 = not Caucasian, 1 = Caucasian

^c 1= less than \$5,000, 2 = \$5,000 to \$9,999, 3 = \$10,000 to \$19,999, 4 = \$20,000 to \$39,999, 5 = \$40,000 to \$59,999, 6 = \$60,000 to \$79,999, 7 = \$80,000 to \$99,999, 8 = \$100,000 and above.

^d 0 = not married, 1 = married.

Table 2. Descriptive Statistics of the Hurricane Rita Sample.

| Variable | Mean | Standard Deviation | Skew | Kurtosis | |
|-------------------------|--------|--------------------|-------|----------|-------|
| Gender ^a | .531 | -- | -- | -- | |
| Age | 55.72 | 14.138 | -.741 | .403 | |
| Race ^b | .862 | -- | -- | -- | |
| Income ^c | 5.38 | 1.635 | .547 | -.409 | |
| Marriage ^d | .760 | -- | -- | -- | |
| Resource Loss | 44.656 | 17.986 | -.014 | .125 | |
| Prior Traumatic Events | 1.84 | 1.505 | .767 | .259 | |
| Square Root Cum. Stress | .317 | .589 | 1.635 | -2.119 | |
| Family Resiliency | | 19.54 | 6.31 | .359 | -.409 |

^a 0 = male, 1 = female.

^b 0 = not Caucasian, 1 = Caucasian

^c 1= less than \$5,000, 2 = \$5,000 to \$9,999, 3 = \$10,000 to \$19,999, 4 = \$20,000 to \$39,999, 5 = \$40,000 to \$59,999, 6 = \$60,000 to \$79,999, 7 = \$80,000 to \$99,999, 8 = \$100,000 and above.

^d 0 = not married, 1 = married.

Table 3. Resource Loss: Mean amount of loss per item¹

| Item | Katrina | Rita |
|------------------------------|---------|------|
| Car | 2.08 | .69 |
| Furniture | 3.26 | 3.25 |
| Time enough for sleep | 2.36 | 2.66 |
| Possessions of sentiment | 3.12 | 2.25 |
| Clothing | 2.86 | 2.31 |
| Feeling of value | 1.28 | 1.17 |
| Family stability | 1.0 | .45 |
| Free time | 2.14 | 2.61 |
| Pets | .41 | .66 |
| Plants | 2.41 | 2.34 |
| Intimacy with family members | .86 | .50 |
| Intimacy with friends | 1.41 | .50 |
| Accomplishing life goals | 1.74 | 1.43 |
| Time with love ones | 1.64 | .97 |
| Adequate food | 1.57 | .22 |
| Daily routine | 2.96 | 2.48 |
| Home appliances | 3.24 | 2.88 |
| Home/residence | 3.08 | 3.16 |
| Things needed for children | 2.56 | 2.00 |
| Ability to organize tasks | 1.38 | 1.03 |
| Money for extras | 2.14 | 1.84 |
| Understanding from a boss | 1.15 | .60 |
| Savings or emergency money | 1.66 | 1.10 |

Table 3 Continued

| | | |
|---------------------------------------|------|------|
| Adequate income | 1.20 | 1.13 |
| Chance for training or more education | .71 | .00 |
| Feeling of being independent | 1.44 | 1.13 |
| Companionship with others | 1.30 | .47 |
| Feeling of meaning in your life | 1.00 | .28 |
| Church | 1.18 | .58 |
| Help with tasks around the home | .47 | .70 |
| Loyalty of friends | .32 | .27 |
| Help with childcare | .79 | 1.40 |
| Involvement in organizations or clubs | 1.41 | .52 |
| Health of family member or friends | 1.42 | 1.61 |
| Children's school | 1.56 | 1.38 |
| Other property | .47 | 1.86 |
| Loss of other | 2.44 | 2.40 |

¹ Response set 0 = no loss, 1 = a little bit of loss, 2 = a moderate amount of loss, 3 = quite a bit of loss, 4 = extreme loss.

The range of prior traumatic events for the Hurricane Katrina sample was between zero and nine stressful experiences. The mean was 3.24 and the modes were one and four. The range of cumulative stressors for the Hurricane Katrina sample was between zero and four. The mean was .58 and the mode was zero.

The range of prior traumatic events for the Hurricane Rita sample was between zero and six stressful events. The mean was 1.8 and the mode was one. The range of cumulative stressors for the Hurricane Rita sample was between zero and four. The mean was .43 and the mode was zero. The distribution of families experiencing each number of prior traumatic events and cumulative stresses are in Table 4 and Table 5 respectively.

Table 4. Number of Families that Experienced Prior Traumatic Events.

| Number of prior traumatic events | Number of families from Hurricane Katrina | Number of families from Hurricane Rita |
|--|--|---|
| 0 | 2(4%) | 6(19%) |
| 1 | 10 (20%) | 10 (31%) |
| 2 | 9(18%) | 6(19%) |
| 3 | 8(16%) | 5(16%) |
| 4 | 10(20%) | 4(13%) |
| 5 | 4(8%) | 0(0%) |
| 6 | 3(6%) | 1(3%) |
| 7 | 1(2%) | 0(0%) |
| 8 | 2(4%) | 0(0%) |
| 9 | 1(2%) | 0(0%) |

Table 5. Number of Families that Experienced Cumulative Stresses.

| Number of cumulative stresses | Number of families from Hurricane Katrina | Number of families from Hurricane Rita |
|-------------------------------|---|--|
| 0 | 31(62%) | 24(75%) |
| 1 | 12(24%) | 5(17%) |
| 2 | 5(10%) | 1(3%) |
| 3 | 1(2%) | 1(3%) |
| 4 | 1(2%) | 1(3%) |

The majority of families in both samples experienced between zero and four traumatic events before the storm. The majority of families in both samples experienced one or zero cumulative stresses after the storm.

Prior to Hurricane Katrina, 32 (64%) families had experienced another disaster. One family experienced other natural disasters both before and after Hurricane Katrina. Thirteen (26%) families had been involved in a serious accident before Hurricane Katrina. Three (6%) families had been involved in serious accidents only after Hurricane Katrina. Two (4%) families had been involved in a serious accident both before and after Hurricane Katrina. Prior to Hurricane Katrina, 10 (20%) families had a member that was attacked with a weapon. Ten (20%) families had a member that was attacked without a weapon before Hurricane Katrina. One family (2%) had a member that was attacked before and after Hurricane Katrina without a weapon. Four families (8%) had a member who had been forced or threatened into some type of unwanted sexual contact before Hurricane Katrina. Eight (16%) families had a member that was seriously injured before Hurricane Katrina. Two (4%) families had a member that was seriously injured before and after the storm. One (2%) family had a member that was injured after the storm. Six

(12%) families had a member that had been in a situation in which they had seriously feared for their life before Hurricane Katrina. Twenty-two (44%) families had a member that had seen someone seriously injured or violently killed prior to Hurricane Katrina. One (2%) family had a member that had seen someone seriously injured or violently killed after Hurricane Katrina and one (2%) family experienced this event both before and after Hurricane Katrina. Fourteen (28%) families experienced the death of a family member before Hurricane Katrina, three (6%) families experienced the death of a family member after Hurricane Katrina, and five (10%) families experienced the death of family members both before and after Hurricane Katrina. Eight (16%) families experienced family problems before Hurricane Katrina, one (2%) family experienced problems after Hurricane Katrina, and two (4%) families experienced problems before and after Hurricane Katrina. Eight-teen (36%) families experienced an extraordinary stressful event before Hurricane Katrina. Three (6%) families experienced an extraordinary stressful event after Hurricane Katrina and three (6%) families experienced an extraordinary stressful event before and after Hurricane Katrina.

Twenty-one (66%) families had experienced another natural disaster prior to Hurricane Rita. Nine (28%) families had a member that was involved in an accident before Hurricane Rita. One (3%) family had a member that was involved in an accident both before and after Hurricane Rita. Two (6%) families had a member that was attacked with a weapon before Hurricane Rita and one (3%) family had a member that was attacked after Hurricane Rita. One (3%) family had a member that was attacked without a weapon after Hurricane Katrina. Six (19%) families had a member that was seriously injured before Hurricane Rita. One (3%) family had a member that feared for their life before the storm and one (3%) family had a member that feared for their life before and after Hurricane Rita. Six (19%) families had a member that saw someone violently injured or killed before the storm, two (6%) after the storm, and two (6%) before and after the

storm. Seven (22%) families had experienced a death in the family before Hurricane Rita and three (9%) after Hurricane Rita. Two (6%) families experienced an extraordinary stressful event before the storm and two (6%) families experienced an extraordinary event after Hurricane Rita. One (3%) family experienced an extraordinary stressful event both before and after Hurricane Rita.

The range in scores for family resilience in the Hurricane Katrina sample was between 4 and 40 and the average score was 20.56. Table 6 depicts percentages of families that reported better, worse, or same for each item.

Table 6. Family Resiliency by Item for Hurricane Katrina.

| Item | Better | Worse | Same |
|--|-----------------|-------|------|
| Financial situation | 24 ^a | 36 | 40 |
| Safety | 16 | 20 | 32 |
| Decision making | 28 | 20 | 32 |
| Physical health | 0 | 40 | 60 |
| Mental health | 8 | 34 | 58 |
| Ability to solve practical or daily problems | 18 | 22 | 30 |
| Ability to perform household responsibilities | 6 | 32 | 62 |
| Ability to set priorities | 2 | 34 | 64 |
| Ability to respect each other | 46 | 4 | 48 |
| Ability to be supportive | 58 | 6 | 34 |
| Ability to resolve conflicts | 38 | 10 | 52 |
| Ability to communicate | 52 | 10 | 38 |
| Relationship between spouses (if applicable) | 38 | 6 | 26 |
| Relationship(s) between Parent and child(ren) | 42 | 2 | 40 |
| Relationship between your Family and extended family | 28 | 18 | 54 |
| Relationship between your family and your neighbors | 38 | 12 | 50 |
| Overall, my family's life since the hurricane is | 20 | 28 | 50 |

^a percentage

The range in scores for family resilience in the Hurricane Rita sample was between seven and 32 and the average score was 19.5. Table 7 depicts percentages of families that reported better, worse, or same for each item.

Table 7. Family Resiliency by Item for Hurricane Rita.

| Item | Better | Worse | Same |
|--|-----------------|-------|------|
| Financial situation | 10 ^a | 48 | 42 |
| Safety | 10 | 7 | 84 |
| Decision making | 23 | 10 | 67 |
| Physical health | 10 | 13 | 74 |
| Mental health | 7 | 7 | 87 |
| Ability to solve practical or daily problems | 21 | 7 | 72 |
| Ability to perform household responsibilities | 10 | 20 | 70 |
| Ability to set priorities | 7 | 24 | 69 |
| Ability to respect each other | 28 | 0 | 72 |
| Ability to be supportive | 24 | 3 | 72 |
| Ability to resolve conflicts | 31 | 7 | 62 |
| Ability to communicate | 33 | 7 | 60 |
| Relationship between spouses (if applicable) | 27 | 7 | 60 |
| Relationship(s) between Parent and child(ren) | 25 | 3 | 66 |
| Relationship between your Family and extended family | 25 | 7 | 61 |
| Relationship between your family and your neighbors | 27 | 3 | 70 |
| Overall, my family's life since the hurricane is | 26 | 10 | 65 |

^a percentage

One difference in the responses for family resiliency between the samples was that the “it is worse” and “it is better” responses were more frequent in the Hurricane Katrina sample than in the Hurricane Rita sample. The percentage of “the same” responses for each item in the Hurricane Rita sample are generally higher than those in the Hurricane Katrina sample. One similarity between the samples was that “the same” was the most frequent response for the majority of the items. The items that had the most improvement after the storm were generally

expressive elements of family resiliency, whereas the items that were more likely to become “worse” were the instrumental elements of family resiliency. In general, relationships were more likely to improve whereas physical and mental health were more likely to stay the same or become worse.

Correlation Analysis

For the Hurricane Katrina sample, the one-tailed test indicated the association between gender and family resiliency were significant at the .01 alpha level. Women were more likely to report lower family resiliency than men. The correlation was $-.346$, which is slightly higher than a medium effect size (Cohen, 1988). The relationship between resource loss and family resiliency was significant at the .05 alpha level in the one-tailed correlation analysis. The correlation was $-.269$, which is slightly smaller than a medium effect size (Cohen, 1988).

For the Hurricane Rita sample, the one-tailed test indicated the association between income and family resiliency was significant at the .05 alpha level. The correlation was $.309$, which is slightly lower than a medium effect size (Cohen, 1988). Families with higher incomes were more likely to report more family resiliency than families with lower incomes. Correlations between all variables for Katrina and Rita are in Table 8 and Table 9 and correlations with family resiliency are in Table 10.

In the correlation matrix, several associations among the independent variables were significant. Prior traumatic events and gender were negatively correlated at the .001 alpha level for the Hurricane Katrina sample and at the .05 alpha level for the Hurricane Rita sample. The effect size of the association between gender and prior traumatic events for the Hurricane Katrina sample was $-.437$, which is greater than a medium effect and smaller than a large effect (Cohen, 1988). The effect size of the association between gender and prior traumatic events for the Hurricane Rita sample was $-.348$, which is a medium effect size (Cohen, 1988). Men were more

likely to report that their family had experienced stressful events prior to the hurricane in both the Hurricane Katrina and Hurricane Rita samples. In the Hurricane Rita sample, the association between cumulative stress and gender was significant at the .01 alpha level. The effect size of the association between cumulative stress and gender was $-.479$, which is almost a large effect (Cohen, 1988). In the Hurricane Rita sample, men were more likely than men to report that their family had experienced stressful events after the hurricane. No significant association between gender and cumulative stress was found in the Hurricane Katrina sample. In the Hurricane Katrina sample, the association between cumulative stress and prior traumatic events was significant at the .01 alpha level. The effect size was $.343$, which is a medium effect size (Cohen, 1988). In the Hurricane Katrina Sample, families that had experienced stressful events before the hurricane were more likely to experience stressful events after the hurricane. No significant association between prior traumatic events and cumulative stress were found in the Hurricane Rita sample. In the Hurricane Katrina sample, associations between cumulative stress and resource loss and between gender and resource loss were significant at the .05 alpha level. The size of the effect between resource loss and cumulative stress was $.270$ and the size of the effect between resource loss and gender was $.250$. The effect sizes for the associations between resource loss and cumulative stress and between resource loss and gender are between a small and medium effect size (Cohen, 1988). In the Hurricane Katrina sample, families that experienced stressful events after the hurricane were more likely to report more resource loss. In the Hurricane Katrina sample, women were more likely than men to report that their families had more resource loss. Associations between resource loss and cumulative stress and between resource loss and gender were not found to be significant in the Hurricane Rita sample.

Table 8. Correlation Matrix of all Variables (1-tailed) Hurricane Katrina Sample.

| Variable | 1† | 2 | 3† | 4 | 5† | 6 | 7 | 8 | 9 |
|----------------------------|----------|-------|-------|--------|-------|--------|-------|--------|---|
| 1. Gender† | - | | | | | | | | |
| 2. Age | -.281* | - | | | | | | | |
| 3. Race † | -.137 | .074 | - | | | | | | |
| 4. Income | -.166 | -.186 | .148 | - | | | | | |
| 5. Marital Status † | .017 | .023 | .074 | .407** | - | | | | |
| 6. Prior Traumatic Event | -.437*** | .113 | .086 | -.240* | -.186 | - | | | |
| 7. Sqrt. Cumulative Stress | -.059 | -.073 | -.113 | -.218 | -.077 | .343** | - | | |
| 8. Resource Loss | .250* | -.051 | -.149 | -.026 | -.158 | .157 | .270* | - | |
| 9. Family Resiliency | -.292* | .042 | .041 | .155 | -.040 | -.026 | .016 | -.269* | - |

† Spearman's correlation
 * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 9. Correlation Matrix of all Variables (1-tailed) Hurricane Rita Sample.

| Variable | 1† | 2 | 3† | 4 | 5† | 6 | 7 | 8 | 9 |
|----------------------------|---------|-------|--------|-------|-------|-------|-------|------|---|
| 1. Gender† | - | | | | | | | | |
| 2. Age | .121 | - | | | | | | | |
| 3. Race † | .042 | .197 | - | | | | | | |
| 4. Income | -.098 | -.105 | -.344* | - | | | | | |
| 5. Martial Status † | .257 | .065 | .116 | .179 | - | | | | |
| 6. Prior Traumatic Event | -.348* | -.193 | .068 | .059 | .167 | - | | | |
| 7. Sqrt. Cumulative Stress | -.479** | -.160 | .046 | .024 | -.099 | .226 | - | | |
| 8. Resource Loss | .078 | -.254 | -.114 | .090 | .130 | -.107 | -.082 | - | |
| 9. Family Resiliency | .036 | -.142 | .114 | .309* | .163 | .130 | .024 | .156 | - |

† Spearman's correlation
 * $p < .05$. ** $p < .01$.

Table 10. Correlations of Independent Variables with Family Resiliency (one tailed).

| Variable | Correlation | |
|------------------------|----------------|-------------|
| | <u>Katrina</u> | <u>Rita</u> |
| Gender | .292** | .036 |
| Age | -.051 | -.142 |
| Race | -.051 | .114 |
| Income | -.026 | .309* |
| Marital Status | -.040 | .163 |
| Prior Traumatic Event | .038 | .130 |
| Sqrt Cumulative Stress | .069 | .024 |
| Resource Loss | -.269* | .156 |

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

In the Hurricane Katrina sample, prior traumatic events were negatively associated with income at the .05 alpha level. The effect size of the association between prior traumatic events and income for the Hurricane Katrina sample was -.240, which is greater than a small effect and smaller than a medium effect (Cohen, 1988). Families with higher incomes were more likely to report fewer prior traumatic events than families with lower incomes. No significant correlation between income and prior traumatic events was found in the Hurricane Rita sample.

Regression Analysis

For the Hurricane Katrina sample, in the first step, one of the demographic characteristics, gender, significantly influenced family resiliency at the .05 alpha. In the second

step, prior traumatic events, resource loss, and cumulative stress did not significantly predict family resiliency when demographic characteristics were controlled. The results from the regression analysis for the Hurricane Katrina sample are showed in Table 11.

For the Hurricane Rita sample, in the first step, one of the demographic characteristics, income, significantly influenced family resiliency at the .05 alpha. In the second step, prior traumatic events, resource loss, and cumulative stress did not significantly predict family resiliency. The results from the regression analysis for the Hurricane Rita sample are showed in Table 12.

Table 11. Predictor Variables of Family Resiliency (Hurricane Katrina).

| Step | Variable | β | SEB | t |
|------|-------------------------------|---------|-------|--------|
| 1 | Constant | 22.837 | 5.379 | 4.245 |
| | Age | -.008 | .064 | -.120 |
| | Gender | -4.692* | 2.056 | -2.282 |
| | Race | -1.509 | 2.125 | -.710 |
| | Income | .507 | .671 | .756 |
| | Marital Status | -.115 | 2.118 | -.054 |
| 2 | Constant | 25.698 | 6.851 | 3.751 |
| | Prior Traumatic Event | -.085 | .580 | -.147 |
| | Square-root Cumulative Stress | 1.578 | 1.644 | .960 |
| | Resource Loss | -.080 | .053 | -1.496 |

Note. $R^2 = .141$ (step 1) $R^2 = .203$ (step 2)
 $\Delta R^2 = -.062$ (not significant)
 $F_{stat} = 1.407$ (step 1) $F_{stat} = 1.279$ (step 2)
 $\Delta F_{stat} = .128$ (not significant)

* $p < .05$.

Table 12. Predictor Variables of Family Resiliency (Hurricane Rita).

| Step | Variable | β | SEB | t |
|------|-------------------------------|---------|--------|-------|
| 1 | Constant | 8.540 | 8.305 | 1.028 |
| | Age | .003 | .088 | .039 |
| | Gender | .773 | 2.564 | .302 |
| | Race | 1.929 | 3.909 | .494 |
| | Income | 1.687* | .804 | 2.097 |
| | Marital Status | -.541 | 3.088 | -.175 |
| 2 | Constant | 15.996 | 12.354 | 1.295 |
| | Prior Traumatic Event | -.510 | 1.163 | -.439 |
| | Square-root Cumulative Stress | -2.765 | 2.960 | -.934 |
| | Resource Loss | -.065 | .083 | -.785 |

Note. $R^2 = .220$ (step 1) $R^2 = .277$ (step 2)
 $\Delta R^2 = -.057$ (not significant)
Fstat = .961 (step 1) Fstat = .672 (step 2)
 $\Delta Fstat = .289$ (not significant)

CHAPTER 5

DISCUSSION

The purpose of this study was to examine the relationship between demographic characteristics, prior traumatic events, cumulative stress, resource loss, and family resiliency. The study was exploratory in nature with the aim of understanding how several independent variables relate to family resiliency, a construct that was infrequently examined in disaster research.

Findings

In the current study, being female was significantly associated with two negative outcomes for the Hurricane Katrina sample. Females were significantly more likely to report that their family experienced more resource loss and less family resiliency. These findings are consistent with the results of other studies that compare men and women in the field of disaster science. For instance, women were found to report more depression after disasters (Norris et al., 2002a), more likely to develop post-traumatic stress disorder after disasters (De la Fuente, 1990; Green et al., 1999; North et al., 1999), and more likely to display depressive symptoms after disasters than men (Norris & Murrell, 1988).

In the field of stress research, some studies have found that women were more likely to focus on their emotions and on other people, whereas men were more likely to withdraw from their emotions and to face challenges alone (Burr & Klein, 1994; Levenson & Gottman, 1983, 1985). The general tendency to dwell on other people and on emotional circumstances may explain why women in the current study were likely to report more resource loss and less family resiliency. Also, if women in the current study were more depressed than men, which was the norm in some of the previously mentioned studies, then being depressed may have influenced their assessments of their family's experiences. Depression was not assessed in the current study,

so it is not known whether being depressed actually influenced the differences found between men and women.

In the current study, men were likely to report more stressful events before the hurricane for both samples and after the hurricane for the Hurricane Rita sample than women. This may be attributed to the likelihood that more men had served time in the military, been in more car accidents, and been involved in more physical violence than women. In addition, women may have experienced more sexual assault than they reported.

Experience with prior traumatic events was significantly associated with lower income and cumulative stress in the Hurricane Katrina sample. Families with low income had more stressful experiences before the hurricane than did families with high incomes. Lower income families were more likely to report lower family resiliency in the Hurricane Rita sample. These associations are consistent with results from other studies that explore the challenges of poverty and low income. For instance, one study involving families that were not involved in a disaster situation found that lower-income families had more challenges and stressful events than higher income families over the course of an average year (Federman et al., 1996). A meta-analytic study found that in general, lower income families struggle more after disasters (Norris et al., 2002a). The increased difficulties that lower income families experience after a disaster may partially be explained by the ongoing stressful events that they experienced before the disaster.

One explanation for the association between prior traumatic events and cumulative stresses and for the association between cumulative stress and resource loss in the Hurricane Katrina sample is that some of the prior traumatic events were actually cumulative. The families may have first experienced the stress just prior to the hurricane and may have been still dealing with the stress after the storm. The prior traumatic events may have been inducing “loss spirals” described several disaster research projects in which certain losses increase the likelihood that

other losses and stressful events will follow (Hobfoll, 1988; Freedy et al., 1992; Norris et al., 1999).

In the current study, families that experienced more stresses after the storm were more likely to report higher resource loss in the Hurricane Katrina sample. Resource loss was significantly associated with less family resiliency. In the disaster literature, it has been found that survivors are more likely to experience stressful events in the months following the disaster (Hutchins & Norris, 1989; Murphy, 1985). In addition, it has been found that experiencing stresses after a disaster has a higher association with poor outcomes than the initial disaster experience (Freedy et al., 1994). Other disaster studies have also found significant correlations between resource loss and decreased mental health (Freedy et al., 1992; Freedy et al., 1997; Norris and Kaniasty, 1996).

Results of Hypothesis Testing

Hypothesis one stated that there would be a statistically significant association between resource loss and family resiliency. When hypothesis one was tested, a slightly smaller than medium sized, negative effect for the relationship between resource loss and family resiliency was found in the Hurricane Katrina sample. This suggests that higher resource loss is associated with lower family resiliency. The second and third hypotheses predicted that there would be a statistically significant association between cumulative stress and family resiliency and prior traumatic events and family resiliency. Hypothesis two, and three were not supported.

Hypothesis four stated that there would be a statistically significant association between demographic characteristics and family resiliency. When hypothesis four was tested, a medium effect size for the relationship between gender and family resiliency was found in the Hurricane Katrina sample and a medium sized effect between income and family resiliency was found in the Hurricane Rita sample. This suggests that gender and income may be salient variables for

predicting family resiliency. Cumulative stress, prior traumatic events, race, age, and marital status were not found to be predictive of family resiliency.

Hypothesis five stated that when demographic characteristics were controlled, cumulative stress, prior traumatic events, and resource loss would still significantly predict family resiliency. Hypothesis five was also not supported. Small and medium associations among the independent and dependent variables may exist despite the results of this project because the sample size was not large enough to provide enough power to avoid committing a type two error.

The findings of the current study regarding family resiliency are not particularly comparable to other studies because, as noted in the review of the literature, there is no previous measure of family resiliency. Furthermore, there are few studies that examine families as a unit in the context of disaster. However, in a study conducted by Burr and Klein (1994) that investigated how families respond to various stressful events, it was proposed that different aspects of the family system would respond to stress in different ways. The Burr and Klein (1994) study found that approximately one-third of the time, a family's ability to communicate and their family cohesion improved when responding to stress. Tables 9 and 10 showed how the majority of families responded to various dimensions of family resiliency. Dimensions that involve relationships and communication are labeled expressive dimensions of family resiliency. Dimensions that collectively involve the family's ability to "get through the day" are labeled instrumental dimensions of family resiliency.

Table 13 showed the most frequent response to questions on the family resiliency inventory for each sample. In Table 13, for both Katrina and Rita samples, there was either no change or improvement in expressive dimensions of family resiliency. All instrumental dimensions of family resiliency were rated as "the same" except financial situation for the Rita sample. Table 14 showed the most frequent response to questions on the family resiliency

inventory when “the same” responses were ignored. In Table 14, all instrumental dimensions of family resiliency were rated as “worse” and all expressive dimensions were rated as “better” for the Hurricane Katrina sample when “the same” responses were ignored. For the Hurricane Rita sample, all expressive dimensions of family resiliency were rated as “better” and instrumental dimensions were mixed. For both samples, it is interesting to note that physical health became worse and that the relationship aspects of family resiliency became better.

Table 13. Family Resiliency.

| | Type | Katrina | Rita |
|--|--------------|---------|-------|
| Financial situation | Instrumental | Same | Worse |
| Safety | Instrumental | Same | Same |
| Decision making | Instrumental | Same | Same |
| Physical health | Instrumental | Same | Same |
| Mental health | Instrumental | Same | Same |
| Ability to solve practical or daily problems | Instrumental | Same | Same |
| Ability to perform household responsibilities | Instrumental | Same | Same |
| Ability to set priorities | Instrumental | Same | Same |
| Ability to respect each other | Expressive | Same | Same |
| Ability to be supportive | Expressive | Better | Same |
| Ability to resolve conflicts | Expressive | Same | Same |
| Ability to communicate | Expressive | Better | Same |
| Relationship between spouses (if applicable) | Expressive | Better | Same |
| Relationship(s) between Parent and child(ren) | Expressive | Better | Same |
| Relationship between your Family and extended family | Expressive | Same | Same |
| Relationship between your family and your neighbors | Expressive | Same | Same |
| Overall, my family’s life since the hurricane is | | Same | Same |

Table 14. Family Resiliency.

| Sample | Type | Katrina | Rita |
|--|--------------|---------|---------|
| Financial situation | Instrumental | Worse | Worse |
| Safety | Instrumental | Worse | Better |
| Decision making | Instrumental | Worse | Better |
| Physical health | Instrumental | Worse | Worse |
| Mental health | Instrumental | Worse | Neither |
| Ability to solve practical or daily problems | Instrumental | Worse | Better |
| Ability to perform household responsibilities | Instrumental | Worse | Worse |
| Ability to set priorities | Instrumental | Worse | Better |
| Ability to respect each other | Expressive | Better | Better |
| Ability to be supportive | Expressive | Better | Better |
| Ability to resolve conflicts | Expressive | Better | Better |
| Ability to communicate | Expressive | Better | Better |
| Relationship between spouses (if applicable) | Expressive | Better | Better |
| Relationship(s) between Parent and child(ren) | Expressive | Better | Better |
| Relationship between your Family and extended family | Expressive | Better | Better |
| Relationship between your family and your neighbors | Expressive | Better | Better |
| Overall, my family's life since the hurricane is | | Worse | Better |

The findings of the current study must be considered with the understanding that several limitations existed. First, participants in the study were not randomly selected. A non-probability, convenience sample affects the generalization of the findings. The majority of participants in the study were able to return to their homes. Since the participants were home, they probably had more options and resources than other people who were not able to return. The people who did not return may have been a more appropriate sample for understanding how loss and stress affect the family because they probably experienced more loss and greater stress. Second, although the respondents were asked to provide a collective response that reflected the perceptions of their

entire family, it must be acknowledged that the individual's experiences may have taken precedence over the entire family's collective experiences.

Third, low correlation and beta values in the correlation analysis and in the regression analysis may indicate that some of the variables in the study are not relevant to family resiliency or that the measure created to assess family resiliency was not accurate. Fourth, all stressful events that occurred before the hurricane were coded as prior traumatic events. The measure may not be accurate because events that happened right before the storm were considered prior traumatic events, when they may actually have been cumulative stressors. Fifth, the sample was not large enough to detect small and medium effect sizes at an alpha of .05.

Theoretical Contribution

Theoretical ideas described in the literature review that guided the hypotheses for the current study included conservation of resources (Hobfoll, 1988), the cumulative stress construct (Boss, 2002), and the inoculation hypothesis (Eysenck, 1983). The conservation of resources model and the cumulative stress construct were supported by the findings in the current study because higher resource loss and cumulative stress were associated with lower family resiliency.

It is unclear whether the inoculation hypothesis was supported by the findings of the current study. At a first glance of the significant correlations, it appears to not be supported because prior traumatic events were not significantly associated with family resiliency or with resource loss. However, the men in both samples experienced more stressful events through their lifetime than women and they reported less resource loss and less family resiliency. It is possible that the men's prior experiences made them feel less vulnerable to resource loss and to decreases in dimensions of family resiliency. Furthermore, the lack of association between prior traumatic events and family resiliency and resource loss may be attributed to the way that prior traumatic events were measured in this study or to a type-II error.

Recommendation for Future Research

This study is a starting point for understanding family resiliency in disaster research. The findings reveal little about what predicts levels of family resiliency. Family resiliency can be better explained in the future with repeated studies, larger and more random samples, and maybe better and more accurate measures of resiliency and stress. This study is a part of a longitudinal project that will study how family resiliency changes over time. As explained in the review of literature, longitudinal studies are not often conducted in the field of disaster science. A combination of longitudinal studies and qualitative methods are recommended to understand family resiliency in depth and to guide constructs that may be better predictors in subsequent studies.

To study how loss and stress affect a family, a purposive sample should consist of some people who lost the most and underwent the most changes in the shortest amount of time. In the context of Hurricane Katrina and Rita, the people who were the most stressed and experienced the most loss were probably the ones who were forced to leave their homes, to live in a different city, to be separated from other family members, to get new jobs, to put their children in new schools, and be unable to return to their home, family, and friends. Unfortunately for understanding families and disasters, the families who lose the most after a disaster are probably the busiest, hardest to find, and most inconvenient for scheduling interviews and completing studies.

Implications for Practice

One of the most notable practical implications for this study is deciding what is important when making decisions that affect families after a disaster. An ability to describe the characteristics that are more likely to predict a family's resiliency would mean that disaster researchers knew which families were the most vulnerable. By studying and understanding

predictors of family resiliency, disaster planners and recovery workers may be enabled to provide better resources to families. They may be better prepared to know what families need at different time periods within the recovery process, which families are in the most need, and maybe less money would be wasted on resources that are not helpful. In addition, a better understanding of family resiliency could be used to set better priorities when making decisions about disaster recovery. For instance, decision makers could use family research to determine which families to help the fastest, who needs FEMA trailers, or when to take away FEMA trailers, or who needs home repair or help with insurance coverage. Disaster research on families could be used by lobbyists to give disaster recovery workers reasons to improve the process.

Classic studies found that individuals were more likely to rely upon their families than their friends for social support in disaster situations (Drabek et al., 1975). More recent studies found that disasters often leave social support networks broken and that the institutionalized support networks alone are not adequate for helping individuals manage their vulnerabilities (Bates & Perlanda, 1994; Myers, 1989). One particular vulnerability that may be impacted by the quality of familial and social relationships is physical health (Klinenberg, 2002).

Given the predicted increase in the frequency of natural disasters and an increased amount of people susceptible to the impacts (Cutter, 2003), the continuation of investigating the impact of disaster on the family is essential. It is sometimes said that families are the cornerstone of a society. In the event of a disaster, the resources that keep families strong are often less readily available or diminished, rendering families vulnerable in a time of chaos (Bates & Pelanda, 1994). When families are vulnerable, communities can become vulnerable. Therefore, the commitment to policies and decisions that result in sustainable communities are directly linked to protecting the wellbeing of families.

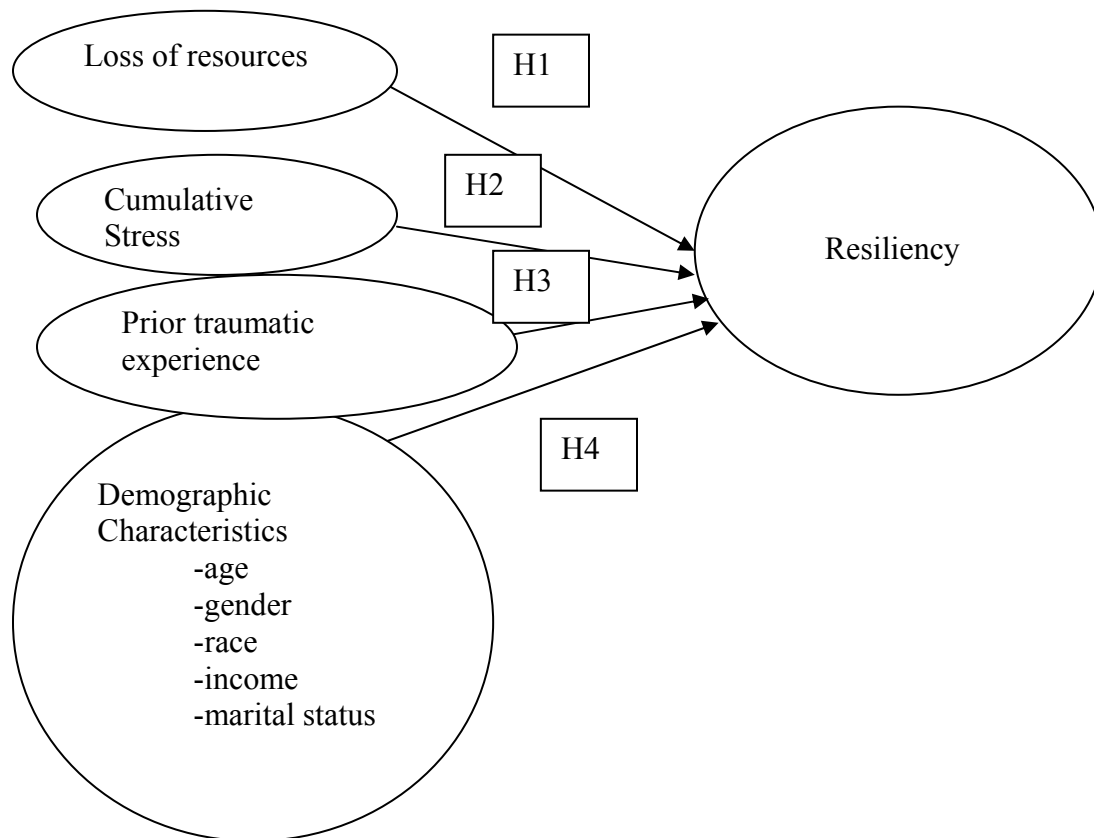


Figure 1. Empirical Model

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