

ABSTRACT

DEYOUNG, SARAH ELIZABETH. Disaster Preparedness: Psychosocial Predictors for Hazard Readiness. (Under the direction of Dr. Denis Gray).

Despite information about the probability of potential losses due to natural hazards, preparedness levels for disasters are low in most populations, and this lack of preparedness remains a concern for emergency management practitioners, social scientists, government officials, and other stakeholders that are involved in the hazard cycle. The purpose of the current study is to assess and identify predictors for disaster preparedness in Raleigh, North Carolina. The study includes both qualitative and quantitative measures. Data were collected in May of 2013 through a public service announcement and through community outreach. There were a total of 343 respondents for this research project. Results from correlation analyses showed that preparedness was positively correlated with risk perception, preparedness self-efficacy, hazard experience, media reliance (reliance on information about hazards through technology), and psychological sense of community. A multiple regression was conducted with six key predictors of preparedness, and was found to be a significant model with 37% of variance on the dependent variable. Furthermore, confidence in government was found to have a complex relationship with preparedness due to a suppressor effect of preparedness self-efficacy on confidence in government. Finally, risk perception was also found to mediate the relationship between preparedness self-efficacy and preparedness. Implications for bolstering preparedness are included so that practitioners and policy makers may learn more about reducing vulnerability to natural hazards.

Disaster Preparedness: Psychosocial Predictors for Hazard Readiness

by
Sarah Elizabeth DeYoung

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APPROVED BY:

Dr. Denis O. Gray

Dr. Thomas A. Birkland

Dr. Roger E. Mitchell

Dr. Craig “Kwesi” C. Brookins

DEDICATION

To my daughter, Marina.

BIOGRAPHY

From 2000 to 2009 Sarah spent a great deal of time making lattes, scooping ice cream, and mopping floors as a primary means of earning an income. During that time, she received a bachelor's degree from North Carolina State University in 2005 and a master's degree in experimental psychology (with a concentration in social psychology) from Saint Joseph's University in 2009. Her doctoral degree is in Psychology in the Public Interest (to be conferred in May 2014). Her research interests are community resilience in disaster planning and recovery, public policy studies, program evaluation, and community health interventions for vulnerable populations. The main courses that Sarah has taught as an instructor are social psychology and community psychology. She has volunteer experience working for local as well as international wildlife conservation and animal rescue nonprofit organizations. She is an activist and advocate for breastfeeding normalization, spay and neuter of cats and dogs, and the preservation and protection of sea turtles. Sarah's ultimate goal is to engage in meaningful research that leads to social change and is instrumental for the formation of evidence-based public policy. She also hopes to always be surrounded by good books and good friends.

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INTRODUCTION

Disaster preparedness: psychosocial predictors of readiness for hazard events

On April 16th, 2011 a tornado outbreak from a line of spring storms killed 22 people in the city of Raleigh, North Carolina. “With seven counties devastated and tens of millions of dollars in damage, Gov. Beverly Perdue declared a state of emergency, an order that permits large supply and utility trucks to enter the state and help in the rescue and cleanup”(Berger, 2011, p. 1). Even though weather warnings were issued, the storm system killed 43 people in the Southeastern United States. Many of those killed were living in mobile home communities, and many of the victims were young children. This has caused a burgeoning concern at the city and state level for disaster preparedness.

Disaster preparedness is also becoming more of a focus at the national level. In the fall of 2012, Super Storm Sandy hit the east coast, rendering damage that resulted in a request to Congress for \$82 billion dollars in relief, making it the third most expensive storm in US history (Harkness, 2013). Engaging in preparedness, or actions and plans that increase the capacity to respond to and plan for disasters, is one way that loss (of life and property) can be reduced during hazard events. This emphasis on preparedness is reflected in the following statement by Miskel (2008): “Indeed, another of the lessons from each of the catastrophic disasters of the past is that agencies at all levels need to do more with respect to preparedness” (p. 140). He goes on to say, “Human nature as reinforced by the bureaucratic and political pressures is such, though, that enthusiasm for preparedness always fades between disasters...” (p. 141). Although we do not typically think of communities and neighborhoods as agencies, these are the micro-levels of human systems that are responsible

for the ground-up actions surrounding preparedness. Some neighborhoods and households are better able to withstand hazard events, and these disparate outcomes often depend on the amount of physical and social resources used to bolster preparedness (Norris, 2008; Paton & Johnson, 2001). The current research project is intended to provide an analysis of the existing literature on social, psychological, and technological factors surrounding disaster preparedness and also to collect and analyze data about the way in which residents engage in preparedness for natural hazard events.

The literature review will have two main sections: theoretical and empirical. Furthermore, within these two major sets of literature there are two additional sub-themes; individual (psychological and behavioral) and social factors (such as psychological sense of community and confidence in local government) which interact with preparedness. For the theoretical portion of the literature review I will explore the policy environment of disasters and also provide a description of the major theories and strands of research regarding vulnerability and resilience. The empirical overview will describe studies that relate to key constructs related to individual and social-level psychological constructs related preparedness, and a third section of the empirical review will include the role of communication systems use for warnings and information gathering.

Disaster Policy Overview: History & Evolution

According to most disaster policy researchers, the recent surge in anti-terrorism preparedness exacerbated the preexisting lack of accountability and true mitigation planning. Mitigation planning is defined as “Activities, laws, or policies that attempt to prevent disasters or reduce potential losses from disasters. Mitigation is often between-disaster

activity. Mitigation can be structural (engineered) or nonstructural (behavior changes, zoning laws, land-use restrictions, and the like)” (Sylves, 2008, p. 269). This is similar to, but should not be confused with preparedness, which is defined as “Activities, laws, or policies designed to increase readiness or improve capabilities for disaster response and recovery operations” or “A predisaster activity aimed at helping the public survive and cope with the effects of possible future disasters” (Sylves, p. 271). The main difference between these two concepts is that mitigation is usually engaged at the administrative and official leadership levels, whereas preparedness can be performed at all levels (from citizen to leadership levels). The definition for preparedness includes the phrases “public,” which reflects the functionality of preparedness and an activity that can be carried out at the community and household level.

While the Federal Emergency Management Agency (FEMA) actually lost political power and prestige after September 11th, states, local governments, and citizens began to see FEMA as the key if not sole organization responsible for dealing with hazards and disasters (Birkland, 2006). However, under the Stafford Act (1988) the states and local planners are intended to have the main burden of dealing with disaster mitigation, response, and recovery. In other words, after 9-11 the emphasis changed from bottom-up to top down, which lead to confusion (from the standpoint of residents as well as for key stakeholders in planning) about which actors are supposed to initiate preparedness and all other phases of disaster response and recovery (Birkland, 2006).

In order to understand current best practices as well as challenges outlined by private and public entities regarding disaster preparedness, it is important to understand the general evolution of disaster policy in the United States. The Disaster Relief Act (DRA) of 1974 was

one of the first major laws to allocate funding that would go directly to citizens for basic needs and sought mitigation rather than response and recovery. The DRA was still quite different than modern day disaster management, mainly because there was no central agency designated for dealing with disasters, since this was prior to the creation of the Federal Emergency Management Agency (FEMA), which was later created under the Carter Administration. However, under both the DRA and with the advent of FEMA, states and local governments were seen as the primary planners for hazards- with the federal level acting only with the ability to incentivize (through monetary funding) mitigation efforts. Even considering these major changes to the national structure of emergency management, it was not until 14 years after the creation of FEMA when the Stafford Act of 1988 could be seen as the beginning of “modern-era national disaster management” (Sylves, p. 60). One of the main provisions of the Stafford Act is that individual households are expected to have reasonable preparations in place for disasters, with government response as supplemental. Similarly, local government is expected to respond to disasters with the understanding that state government will supplement responses when local government has been overwhelmed and it needs additional resources, and the same holds true for state relying on federal aid. The Disaster Mitigation Act of 2000 was created to address some of the limitations to the Stafford Act and other Federal Hazard Mitigation Programs, “by creating the first nationwide stand-alone state and local multihazard mitigation planning process, yet it maintained the financial incentives approach” (p. 17, Schwab, 2010).

To reinforce this as a theoretical argument, a poignant essay by Minkler (1999) suggests that there should be a balance between social responsibility for the self as well as for

society to engage in healthy lifestyles and behaviors. This premise can be translated to disaster preparedness as well, since preparedness reduces loss and thereby increasing well-being (at both the individual and community levels), or at minimum increases the likelihood of adaptive patterns in response to stress induced by loss (e.g. Campanella, 2006). Using supporting literature and empirical findings from health psychology on behavior change, Minkler (1999) indicates that there are negative aspects to focusing too much on one or the other (the individual or society level). For example, to focus too much on caring for the self for the sake of society's health might have negative consequences: "Too exclusive an emphasis on social responsibility for health ignores human agency and may, as a consequence, downplay the important role of individuals" (p. 130). Just as an over-emphasis on societal needs might be deleterious to the needs individuals, Minkler also explains how a focus on health that is too individually driven can be dangerous because this can under value the impact of cultural influences on behavior and lead to "blaming victims" that are in poor health.

More importantly, this over-emphasis on the self can lead to a situation that "Lets government off the hook by assigning the blame for premature morbidity and mortality and the like to the individual" (p. 130). Therefore, one must be careful to consider avoiding a possible "diffusion of responsibility" for disaster preparedness. In other words, the government should not rely too much on individual initiatives and individuals should not rely too much on government for preparedness, information diffusion, mitigation, and recovery. Also this means that it is important to assess both individual psychological as well as social and group determinations of preparedness behavior. Therefore, social science can provide a

better understanding of the specific factors that affect preparedness, which would lead to a reduction of losses due to disasters.

In summary, major assumptions of my proposal include: recent historical events such as 9-11 have shifted interest and resources away from natural disaster preparedness; this has had a negative effect on our understanding of the factors that affect preparedness by local communities and the individuals within those communities. A better social science-based understanding of these factors could lead to improved preparedness, resilience and ultimately sustained recovery.

In the following sections I review social science research that may provide a foundation of developing more effective disaster preparedness strategies and policies. However, before one can understand the major findings and themes from the literature, it is important to understand the theoretical ideas and key concepts regarding preparedness.

Theoretical and Conceptual Understanding of Disaster Preparedness

There are a number of theories and conceptual models that are relevant to research about disaster preparedness. Some of these are specific to disaster research, while others are borrowed from other social science research areas such as cognitive and health psychology. The models highlight different variables and categories of variables, such as those pertaining to individuals (such as risk perception and personal experience with disasters), and some are more about group perceptions or and social variables (such as psychological sense of community or confidence in government). The relationships between these variables are complex and may also involve mediators (such as preparedness efficacy) and moderators

(such as the frequency use and type of technologies used for gathering information about warnings).

The main reason why research on disaster preparedness is important is because preparedness can reduce loss of life and property during times of natural hazards and other unexpected hazard events. Also, as outlined in the policy overview on disaster research, according to expectations outlined in the Stafford Act, individuals are expected to take steps to prepare for hazards as a “first-wave” of defense and action during hazard events. Local, state, and federal support should be seen as supplemental for providing assistance. Despite many public awareness campaigns and evidence that preparedness can reduce loss of life and property, preparedness in the general public remains low (Paton & Johnson, 2001).

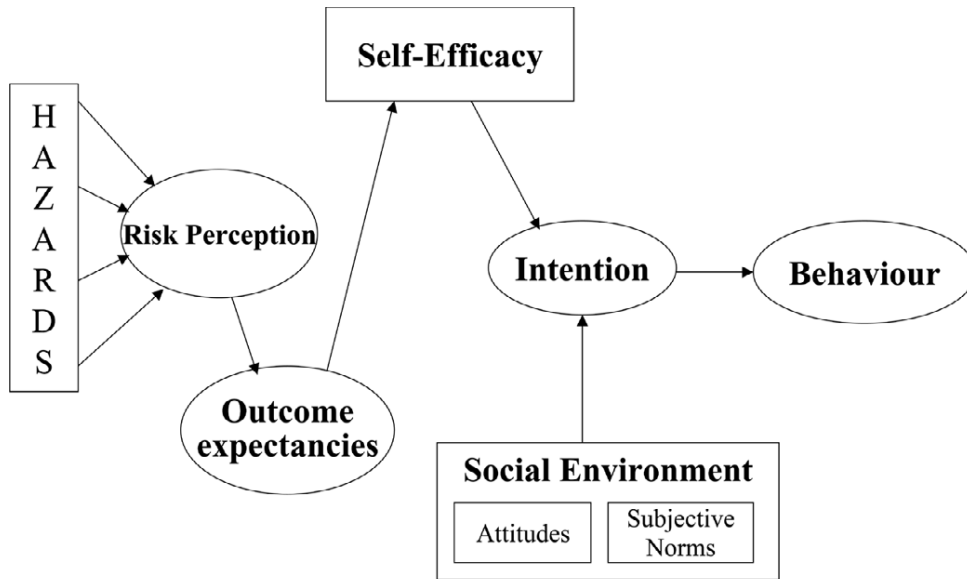
The dependent variable or outcome addressed may vary from one theory or model to another in disaster research. Dependent variables addressed in this literature include: actual preparedness, intentions to prepare, and perceived preparedness. The difference between perceived and actual preparedness is that for perceived, one expressed that she/he thinks they are prepared for a hazard event, and with actual preparedness, one engages in preparedness behavior (such as having food and water storage for 72 hours, having a battery-powered weather radio, and having a family plan for evacuation). Mishra and Saur (2012) succinctly describe preparedness as “self-protective behavior” (p. 1069). Preparedness efficacy is another variable that is included in most models, often as a mediator, and can be defined as the certainty or confidence that one has for the ability to prepare for a hazard (Kievik & Gutteling, 2011).

Relevant Models. Paton and Johnson (2001) have developed a theoretically-driven model of disaster preparedness that attempts to predict preparedness behavior (See Fig. 1.0). Three types of variables are included in the model to predict behavior: type of hazard, individual psychosocial variables and social environmental variables. According to their model, the type of hazard one is dealing with predicts preparedness behaviors. However, these effects are mediated through a series of individual psychosocial variables including; risk perception, outcome expectancies (e.g. preparedness efficacy), and intention.

Efficacy is one portion of the logic model that is proposed. According to this model, the social environment also affects intentions. More specifically, the model suggests that intentions are moderated by the social environment. While the authors do not include specific psychological variables in norms and attitudes, they suggest that individuals who reside in communities with higher sense of community empowerment and stronger social networks would be more likely to sustain their intentions better than individuals without these social environmental supports. Importantly, they also argue that the factors in their model could be affected by two other categories of variables: various public education and/or community development interventions and the physical environment of the individual.

McIvor, Paton and Johnson (2009) propose a similar model, but in this model they have three “layers” of variables: individual, community, and society (See Figure 2.0). The individual level includes positive and negative outcome expectancy, the community level includes community participation and collective efficacy, and the societal layer includes empowerment and general trust. The most important novel part of this model is general trust, since other researchers propose specifically that confidence in government impacts perceived

and actual preparedness. In this model, general trust acts as a mediator between community participation and intentions to prepare. Intentions to prepare is the main outcome variable in this model, as opposed to the path to behavior in the aforementioned model.



Source: Adapted from Bennett and Murphy (1997)

Figure 1 Paton and Johnson (2001) Model of Preparedness

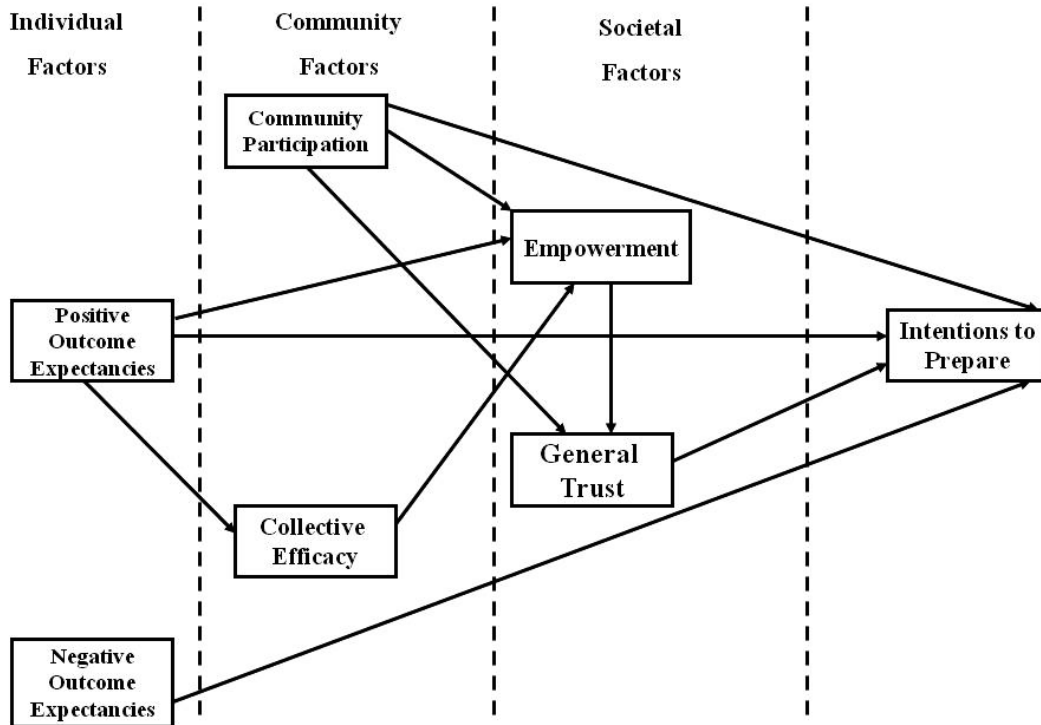


Figure 2 McIvor, Paton and Johnson (2009)

General theories relevant to preparedness. The amalgamation of research on risk perception and social norms suggests that these factors are strong influences on behavior change. In the majority of research on risk perception there is a clear set of guidelines for how people are likely respond to hazards based on: 1) hazard characteristics, 2) personal experience with the hazard, and 3) knowledge and information about the hazard (Mishra & Suar, 2007). Fourth and fifth factors listed by Mayhorn, Yim, & Orrock (2006) also indicate that: 4) warning components and, 5) receiver characteristics, will influence the way in which citizens respond to warning messages. Taken together, these five components are the key variables for predicting behavior in disaster or hazard situations. In general, the riskier a

threat is perceived to be, the more likely a subject is to take action, but only if specific action information is provided to the receiver (Witte, 1992). Similarly, according Wood et al., (2011; as cited in Becker, Paton, Johnson, & Ronan, 2012) if an individual perceives his or her neighbors as taking regular action to mitigate (for example) flooding damage, she or he may be more likely to engage in flood mitigation behaviors (such as building houses with stilts). This is strikingly similar to the Health Belief Model and the Theory of Reasoned Action, or more specifically, theories that predict self-protection in that those models also rely on cognitive predictors. For example, Becker et al., (2012) explain:

A number of models are based on the Theories of Reasoned Action (TRA) and Planned Behaviour (TPB) (Ajzen 1985; Fishbein and Ajzen 1975). These include Protection Motivation Theory (PMT) (Rogers 1983) and Person Relative to Event theory (PrE) (Duval and Mulilis 1999; Mulilis 1996; Mulilis and Duval 1995, 1997, 2003; Mulilis et al. 2000, 2003), both primarily cognitive models that focus on aspects such as likelihood, severity, self-efficacy, outcome expectancy and responsibility for protection. Some studies have explored wider aspects of context, including the influence that social interactions have on preparedness, but have not done so in any detail. (p. 109).

This lack of detail mentioned by Becker and colleagues is one area in which empirical research could close the gap between theory and application for modeling and implementing disaster preparedness.

Theory of vulnerability. Given the wide variety of beliefs as well as contexts that can impact preparedness behaviors, one can see that an intervention for increasing community preparedness and resilience must include careful consideration of the means for communicating risk and hazards. Many researchers have made the connection between vulnerability as a factor in reduction of resilience (e.g. Norris 2008), but they do not

specifically include preparedness as a crucial step for reducing loss in hazard events. Also, researchers have yet to explore the specific relationship between social vulnerability and preparedness behaviors. Vulnerable populations are more likely to sustain losses during hazard events (Cutter, 2003) and therefore it is critical to understand the cognitive and social mechanisms affecting vulnerable groups with regards to preparedness. Resilience is defined as “A process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance” (Norris, 2008 et al., 2008, p. 131), whereas vulnerability, with regards to natural hazards is defined as “the potential for loss” (p. 242, Cutter, Boruff, & Shirley, 2003). Both of these concepts are important when discussing preparedness because preparedness is a part of boosting resilience and reducing vulnerability to hazard events (Paton & Johnson, 2001). Similarly, Keim (2008) explains that “Preparedness, response, and recovery activities all increase resilience” (p. 509), and also he clarifies that susceptibility plays a major role in the reduction of loss of life and property. Susceptibility can be described as “the degree of exposure to dangerous hazards” (p. 509).

Vulnerability has recently become an area of focus in disaster research, partially because during Hurricane Katrina, the loss of life and resources was most severe in the poorest neighborhoods of New Orleans. Seventy-five percent of the displaced people from Hurricane Katrina were low-income African Americans (Birkland, 2006; Cooper & Block, 2006), which caused a sudden national focus on the racial and socio-economic injustices that exacerbate the losses to communities in natural hazard events.

It should be noted that, as Paton and Johnston (2001) suggest, it is not sufficient to rely solely in the typical definitions of vulnerability, since groups vary within the same

“factor”: “(e.g. age, ethnicity) can act to increase or decrease vulnerability depending on its contingent relationship with the environment and hazard characteristics” (p. 272). In other words, we should consider an assessment approach that includes multiple social and psychological factors as having an impact on individual levels preparedness. Conceptually, vulnerability could be viewed at the opposite end of the spectrum of resilience (a significant negative correlation), as was found in a study by Sherrieb, Norris, and Galea (2010).

However, it is important to point out that a community and a household could be vulnerable in some ways (e.g. geographically) and resilient in other aspects (e.g. through social capital).

Another limitation with use of the construct of vulnerability is that it is almost always assessed at the macro-level (state or multistate) and there are very few studies that actually assess vulnerability at a county or city level and fewer at the individual level. This is reflected in a paper by Xiao and Zandt (2012):

Most of the existing research on the economic impacts of natural disasters is limited to studies conducted at highly aggregated units of analysis (Friesema et al., 1979; Wright et al., 1979; Xiao, 2011; Xiao et al., 2011). They use input–output models, social accounting methods or computable general equilibrium models to assess the national and regional impacts of disasters (Kawashima and Kanoh, 1990; Boisvert, 1992; Gordon and Richardson, 1996; Rose and Benavides, 1997). Zhang et al., (2009) call for microanalytical studies to provide guidance for community planners and business owners in developing plans and methods for mitigating impacts and recovering more quickly (p. 2524).

Even though the authors are describing economic recovery from disasters, this emphasis on macro-level unit of analysis is also present in the resilience and vulnerability literature (e.g. Cutter, 2003). The limitations of what has become known as the traditional social vulnerability index (created by Cutter, et al 2003) is also reflected by Khan (2012), while

describing the 11 key variables that resulted from the aforementioned factor analysis variables (including wealth, age, race): “While these factors contribute to vulnerability, many significant factors such as gender, education, disability, social dependence, infrastructure and family structure did not appear in the final output and may not necessarily have the same spatial distribution” (p. 1592).

Summary of theoretical literature. A number of models and theories highlight the types of variables that are likely to affect individual disaster preparedness behavior. These models include: characteristics of the hazard, specifically the type and severity of; characteristics of the individual (e.g. personal and demographic characteristics; experience with hazards, housing type, race, age, and income), individual cognitive and psychological factors (e.g., risk perception, emotions, perceived efficacy; knowledge about hazard) and a variety of social environmental factors that can be assessed through individual perceptions (e.g. public norms and attitudes; social networks, and trust in government); the mode and content of communication about the hazard (e.g., public education efforts). Complicating this proposed framework, specific variables operating within these domains may act as direct effects, moderators or mediators of individual preparedness. Finally, as mentioned in the previous subsection, major dependent variables addressed in much of the disaster preparedness literature can vary considerably and include: actual preparedness, intentions to prepare, and perceived preparedness.

Given the compilation of the past research combined with a set of exploratory research questions, major research goals of the current project are to discover ways in which Raleigh residents (renters, mobile home residents, and home-owners) view their overall risk

level for natural hazards, how they gather information for risks through various forms of technology and communication, what actions they are taking to protect themselves from natural hazards, and whether risk perception or preparedness relates to confidence in local government as well as psychological sense of community.

Research on Disaster Preparedness

Hazard or disaster type. Not only is there a difference between scales of disasters, i.e., a catastrophic event is one that overwhelms all of the planning resources of a city or state, while a disaster is smaller in scale (Sylves, 2008), but hazards can also vary in typology. Man-made hazards include oil-spills, nuclear events, and other technological hazards, whereas natural hazards involve major disruptions in infrastructures that are caused by natural occurrences. Hurricanes, earthquakes, winter storms, tornadoes, and drought are all examples of natural hazards. There are also some natural hazards that can be exacerbated by human activities: droughts and overgrazing of cattle can affect soil and erosion for worsening of flood events, deforestation can contribute to soil conditions that create erosion and fires, and human alteration to beaches and wetlands can reduce natural landscape that would have otherwise served as natural buffers against flooding and wind caused by oceanic storm events (Sylves, 2008). Similarly, man-made and natural hazards can co-occur with political and other events such as war and famine that cause situations known as complex humanitarian crisis events (Shacknove, 1985).

Findings in risk research suggest that technological and man-made disasters (including terrorism) are perceived as riskier (e.g. Gierlach, 2010) than natural hazards. For example, natural hazards such as hurricanes yield a lower compliance for evacuation, and

they produce less distress (Mayhorn, Yim, & Orrock, 2006) than the threat of bombs or chemical spills. There is also an additional level of complexity for public perceptions of the political environment before and after different types of hazard events. Specifically, technological disasters are seen as preventable and that there is a sense of “someone to blame” immediately following the event (Ibitayo, 2000). Also, in a study by Xie et al. (2011) designed to test the role of sensory channels and hazard types (natural or man-made), man-made hazards were perceived as more dangerous and the participants reported a greater emotional response (anger and dread) to those hazards than to natural hazards. Also, within each type of hazard (natural hazards) there are sub-types (landslides versus flooding), and these sub-types cause different psychological and behavioral reactions (such as a decreased sense of control) (Ho, Shaw, Lin, & Chiu, 2008).

As suggested above, since different types of disaster vary in terms of perceived risk, this variable is likely to affect preparedness. However, since my research cannot address the wide range of possible disasters/hazards, I will be focusing specifically on natural hazards (extreme weather events) and disaster type and this variable will not be directly addressed in my research questions other than in supplemental qualitative questions provided to the respondents.

Individual Factors of Preparedness

Personal vulnerability: demographic aspects. As described in the theoretical overview, disaster researchers have developed some standard indices for assessing hazard vulnerability. The Social Vulnerability (SoVI) index is not only a theoretical construct but can provide quantifiable guidelines for predicting likelihood of loss in disasters. The SoVI

can be viewed as a profile for indicators that would put individuals at higher risk than other members of the population, is comprised from census data, and is essentially demographic information. These demographic descriptors can then be divided into two major sub-categories: 1) personal characteristics (such as SES, education level, race, and age) and 2) residential characteristics (geographic location and housing type).

In an exploratory factor analysis of all possible “vulnerability variables”, researchers Cutter, Boruff, and Shirley (2003) found that race was factor number ten on a reduction of over 85 variables that were considered as contributing to the initially proposed Social Vulnerability Index Scale. Personal wealth was number one (a positive correlation of .87) on the scale, followed by age (see Figure 3.0), race, ethnicity, occupation. These findings emphasize the first category for the SoVI; personal/demographic. These demographic trends of vulnerability are evident in disaster recovery studies. For example, women are more likely to be poorer than men and also fare worse during and after disasters (Ikeda, 2009). Also, a study of 935 Katrina evacuees by Spence, Lachlan, and Griffin, (2007) revealed that, “Although 49.1% of the Caucasian respondents had prepared an escape plan ahead of time, only 31.4% of African American respondents and 38.6% of the other non-White respondents reported having a plan in place (pp. 546-547)”. Also, African American residents are more likely to report mistrust of information from government agencies regarding hazard information (West & Orr, 2007). Therefore, hazard information and preparedness campaigns should be designed to meet the specific needs of diverse groups.

Dimensions of Social Vulnerability				
Factor	Name	Percent Variation Explained	Dominant Variable	Correlation
1	Personal wealth	12.4	Per capita income	+0.87
2	Age	11.9	Median age	- 0.90
3	Density of the built environment	11.2	No. commercial establishments/mi ²	+0.98
4	Single-sector economic dependence	8.6	% employed in extractive industries	+0.80
5	Housing stock and tenancy	7.0	% housing units that are mobile homes	- 0.75
6	Race—African American	6.9	% African American	+0.80
7	Ethnicity—Hispanic	4.2	% Hispanic	+0.89
8	Ethnicity—Native American	4.1	% Native American	+0.75
9	Race—Asian	3.9	% Asian	+0.71
10	Occupation	3.2	% employed in service occupations	+0.76
11	Infrastructure dependence	2.9	% employed in transportation, communication, and public utilities	+0.77

Figure 3: Cutter, Brouff, & Shirley (2003)

Demographic: experience with hazards. Another personal characteristic that may affect planning or the consequences of a disaster is experience with hazards. To assess risk perception as well as preparedness as a function of prior disaster experience (history of dealing with natural disaster situations) and disaster education, Mishra and Suar (2007) obtained survey data from 300 participants in two disaster-prone areas in Orissa, India (areas that commonly experienced floods or heat waves). Results revealed that “Significant direct paths of experience and education with preparedness in both flood and heat wave” and also

that “The indirect paths to preparedness through risk perception indicated that people having more experience and education also perceived more risk of flood and heat wave” (p. 152).

Similarly, in a study by Sharma and Patt (2012), past experiences with cyclones lead to higher rates of evacuation. Also, in a qualitative study by Becker, Paton, Johnston, and Ronan (2012), the researchers found experience was important for considerations of preparedness:

Experiential information had a significant impact on the preparedness process. First, it raised awareness and stimulated thought and discussion. It was also essential in helping people understand the consequences of disasters, as experience often provided first-hand information about the types of conditions that could be experienced in a disaster, and what might be needed to overcome any adverse impacts (p. 115).

Demographic: residential. The remaining variables that are considered as key for defining social vulnerability are residential descriptors: density of the built environment, single-sector economic dependence, housing type, and infrastructure dependence (defined by the authors as a combination of county debt to revenue ratio and percentage of workers employed in transportation and communication).

In a theoretical paper, Godschalk (2003) suggests, “Building a disaster resilient city goes beyond changing land use and physical facilities. It must also build the capacity of the multiple involved communities to anticipate and respond to disasters” (p. 140). This is not to underestimate the importance of physical resources, but rather to emphasize that in order to create and maintain these physical resources, the social system must be adaptive and productive. However, as mentioned in the theory section on vulnerability, researchers also know that social vulnerability can also be dramatically affected by the physical structures in

which residents reside. For example, Kusenbach, Simms, and Tobin (2009) found that mobile home residents are also very likely to be uninsured as well uninformed about means for engaging in protective actions against wind and water damage.

The role of physical limitations in increasing vulnerabilities has been evident in catastrophic events such as the Indonesian Tsunami of 2004, in which most of the victims were very young or very old, female, or disabled (Romo-Murphy, James, & Adams, 2011). However, what remains unclear is to what extent these physical characteristics lead directly to loss of life and to what extent the social positioning of these victims contributed to their failure, or rather their inability, to seek shelter. In other words, we should explore the resource gaps in order to gain clearer picture about the relationship between loss of life and resource disparities in communities affected by disasters.

Individual psychosocial. Since preparedness remains low despite catastrophic natural hazard events and broad public awareness campaigns (e.g. Ready.gov, a website created by the United States government designed to bolster overall residential preparedness), it is important to consider the individual psychosocial mechanisms that are involved in turning knowledge into action. As mentioned in the theory section preceding this portion of the review, and according to the literature surrounding the Health Belief Model, behavioral changes can often be affected by changes in beliefs, attitudes, and perceptions of peer groups. Examples of this would be studies which show that mental health outcomes are related to perceived personal efficacy for outcomes of behavior change (Henshaw & Freedman-Doan, 2009). In other words, if people feel that a change in their behavior (such as dieting, reducing smoking, or using a condom) is feasible, possible, and will lead to positive outcomes (such as

weight loss or reduced risk of lung cancer), then they are more likely to engage in self-protective behaviors. Conversely, people who have low levels of efficacy related to their health activities and outcomes are less likely to engage in self-protective behaviors.

Cognitive characteristics. Individual cognitive variables are important because evidence from multiple studies indicate that the cognition plays a role in processing of risks (Cutter, 1984) and how these risks are then translated into not only preparedness intentions, but preparedness behaviors (Mileti & Peek, 2000; Paton, 2003). The variables that influence the decisions and actions made by the receiver include: personal efficacy (McIvor, Paton, & Johnston, 2001) emotions of the receiver (Xie et al., 2011), and level of salience of specific types of environmental situations, such as weather information (Stewart, 2009).

Self-efficacy. As mentioned in the previous section, one variable that disaster researchers propose as helpful for bolstering preparedness is the study of preparedness efficacy (Kievik & Gutteling, 2011; McIvor, Paton, & Johnston, 2001). Efficacy can be viewed as one's perception of believing to have the ability to engage in behaviors that are self-protective. Efficacy has been studied significantly in health research, but the relationship between efficacy and disaster preparedness is still not fully understood. However, as shown by Kievik and Gutteling, (2011) higher levels of flood preparedness efficacy may increase preparedness behaviors.

There are additional caveats to these cognitive variables behavior changes. For example, preparedness can be impacted by risk perception (another individual category variable), and the relationship between risk perception and self-protective behaviors is often mediated by information seeking (Kievik & Gutteling, 2011). Therefore, the more we know

about the specific mechanisms of risk perception and preparedness; the better the chance at developing warning systems and messages that resonate with not only the broad public, but members that are particularly vulnerable to losses due to hazard events.

Risk perception. As reviewed in the hazard type section of this literature review, the effect of emotions on perceived risk was tested by Xie et al., 2011. Results revealed that “Emotions play a mediating role between hazard types and perceived risks, as well as between pictures and received risk” and that “specific emotions were found to be associated with different types of action tendencies” (p. 450). In other words, stronger emotions elicited higher ratings of the danger of the perceived risk than the presentation of images of risky hazards alone on the perceived risk. Also, loss-based emotions such as fear or dread caused participants to state that they would engage in prevention and mitigation behavior, and agree with statements such as “I would do something to improve the situation” whereas emotions such as anger lead to “aggressive/retaliation” behavior such as agreeing with items on the scale such as “I feel like yelling at the one who is responsible” (p. 460). Regardless of the findings about emotion and perceived risk, this study did not deeply address how participants actually prepare and change their behavior in response to the warnings and the perceptions of risk, since the researchers used an “action tendencies scale” (Boehm & Pfister, 2000, as cited in Xie et al., 2011). Preparedness was not a dependent variable in the Xie et al., study but rather emotional expressions based on message types for hazard presentations. Although helping and prevention emotions were assessed (“I would do something so that potential harmful consequences may be prevented or at least mitigated p. 460”), actual behaviors related to preparedness were not measured.

Finally, related to emotions and risk perception, a meta-review by Bubeck, Botzen, and Aerts (2012) revealed that very few empirical studies have found a significant relationship between risk perception and self-protective behavior for flooding. However, one of the problematic issues with the Bubeck et al., research is that the language and constructs of mitigation and preparedness seem to be used interchangeably, even though these are actually different phases of the hazard cycle (Sylves, 2008). Also, the Bubeck paper implies that the primary means for self-protective behavior is the purchasing of flood insurance, which is different than the definition of “preparedness” in other studies. Still, the findings are important to note: “the supposed positive relation between flood risk perceptions and the adoption of private mitigation measures is hardly observed in cross-sectional studies” (p. 1493). This means that risk perception may not be a significant cognitive mechanism for invoking preparedness behaviors.

Individual emotions. Another individual level variable is that of individual emotions. For example, Mishra and Saur (2012) measured the impact of trait anxiety on preparedness for heat waves and flooding in Orissa, India. The surveys from 300 participants revealed that trait anxiety reduced preparedness for both flooding and heat waves. Highlighting the importance of communication/education processes, disaster education mediated the relationship between anxiety, resources, and disaster preparedness: “... the effect of anxiety in lessening flood preparedness was decreased (partial mediator), and the effect of anxiety inhibiting heat-wave preparedness was practically nullified (full mediator) when the effect of disaster education and resources were controlled” (p. 1079). Resources were defined as income, property, access to education, social ties, recognition in the community, and the

“presence of able members in the family” (p. 1077). What is striking about the resource variable in this study is that it is similar to Norris’ (2008) constructs of social capital as it relates to resilience. Therefore we begin to see an overlap between the role of individual characteristics and perceptions of the social environment when assessing preparedness actions and risk perceptions, as well as an overlap between theory and application regarding resilience and preparedness.

Perceptions of Social/Environmental Context

The way in which a person interacts with and perceives her/his social group is often a major determinant of decision-making and behavioral change (Bandura, 1977 as cited in Kobus, 2003). There are many studies from disaster research that involve assessing the way in which residents view their peers (Kievik & Gutteling, 2011), local government (Basolo et al., 2009), and other social structures; such as their neighborhoods and townships (e.g. Berke et al., 2011). These studies, overall, suggest that residents consider the role of their social surroundings when making decisions about and taking actions regarding preparedness for disasters. It is important to note that variables such as efficacy can act as an individual level variable but *also* as a group level variable (i.e. collective efficacy). For example, Gerber (2007) and other scholars (e.g. Paton 2001; 2003) suggest, individuals typically do not engage in intense or even minor planning and preparedness for natural hazards, unless they feel that people around them have taken steps to prepare for hazard events.

The social environment: building capacities. Researchers have begun to use pre-existing social systems in order to bolster disaster preparedness and education in at-risk communities. In a recent community intervention research project by Berke et al. (2011), a multi-regional

assessment and engagement project sought to increase citizen readiness for disasters through collaborative planning and participatory action research at the neighborhood and town level. The researchers chose six vulnerable towns based on census data (areas of low-income racial diversity) and then piloted the preparedness project in Hertford County, North Carolina. The project was then carried out in the six chosen cities, using participatory action research principles (PAR) to gain access to the community gate-keepers (through semi-structured interviews, focus groups, and surveys of key-informants). The communities were mapped based on social networks and the issues of preparedness were identified by the participants, and then the researchers identified the best places and means for recruiting resident involvement for disaster preparedness planning. Examples of projects carried out by the residents (in partnership with the researchers) were senior education sessions, creation of family preparedness toolkits, and brochures created about household preparedness. Berke and colleagues found that processes of recruitment for disaster planning were far less difficult in communities that had high public participation in church, school, and local government:

In some cases, recruitment of EPD participants was facilitated by strong pre-existing networks of people. Hampton City, VA, for instance initiated an EPD with a lead organization—Hampton City Neighborhood Unit—that had been operating for nearly 20 years. According to the coach of this site, the Neighborhood Unit had “deep networks...lots of contacts, lots of trust, and person-to-person relationships... that could be used to energize people into action. (p. 7).

Therefore, this study provides evidence for one of the main theories outlined by Norris (2008), which is that the existence of strong pre-existing social networks can promote

community resilience and disaster planning. It also offers some evidence for the usefulness of PAR styles of implementing preparedness behaviors.

Confidence in local government. As mentioned in the theoretical overview, the perceptions that an individual has about her/his social and group surroundings can also influence the ways in which they engage in preparedness behaviors. Basolo et al. (2009) explored whether there was a relationship between the expectations of government and actual preparedness behavior. The primary motive for the study was to test the hypothesis that higher confidence in government might actually reduce preparedness behavior. The researchers sampled participants in Los Angeles on earthquake preparedness and participants in New Orleans for hurricane preparedness. Bivariate correlations as well as a multivariate analysis were conducted for this study on each location (Los Angeles and New Orleans respectively). Correlations between perceived and actual preparedness were non-significant. Of all of the independent variables, the only one shown to have an effect on having a family plan (a measure of actual preparedness) was marital status. Additionally, bivariate correlations revealed that citizens that had higher levels of confidence in government were more likely to perceive that they were prepared, whereas actual preparedness was only significantly higher in participants who identified themselves as married. For both locations, confidence in government as well as information sources had a strong, positive effect on level of perceived preparedness. The authors noted that perceptions of self-preparedness were not significantly affected by information exposure and levels of preparedness varied by location. As the authors stated:

Of the preparedness actions analyzed in the study areas, the level of confidence in local government to manage a disaster appears to influence only one behavior, having a family plan, in one study area, the New Orleans region. Specifically, higher levels of confidence in local government are associated with having a family plan; this is opposite to the hypothesized direction (p. 355).

Thus we see that geographical and social context is important when considering disaster preparedness, since only the New Orleans participants were more likely to have a family plan as a function of their level of confidence in government. However, in studies prior to the Basolo et al., study regarding confidence in government, results about the impact of confidence in government on preparedness have been conflicting. In a similar study by Terpstra (2011), Dutch citizens who had higher levels of trust in public planning for flooding were less likely to have flood preparedness intentions. It is important to note that in the Terpstra study, only preparedness intentions were assessed (“To what extent do you intend to do the following in the near future”?) instead of actual preparedness actions (such as storing food, water, having an emergency kit, having a family plan for evacuation, etc.).

Sense of community and place attachment. In addition to increasing household preparedness, some researchers and community leaders argue that another way to build resilience for disasters is through bolstering cohesion and perceptions of community togetherness. Norris et al., (2008) indicate this can be done through building and sustaining a sense of community, place attachment, and citizen participation. A novel and specific way to extend research on sense of place is to assess perceptions of community characteristics in disaster preparedness might be through measuring participants’ Psychological Sense of

Community (McMillan & Chavis, 1976, as cited in Nowell and Boyd, 2010). Psychological Sense of Community can be defined as the sense of connection, belonging, and cohesion one feels within her or his community (Wilkins, 2007). Psychological Sense of Place can be defined as “both the material and social site for the development of social capital, anchoring a sense of self, and a sense of self-in-relation, through memory and the meanings invested in that site through repeated interactions” (Milligan 1998, as cited in Cox and Perry, 2011, p. 396).

While there are no studies that focus specifically on disaster preparedness and psychological sense of community, there are some studies that focus on sense of place and recovery (Chamlee-Wright & Storr, 2009; Dueck & Byron, 2011). Dueck and Byron describe the religious importance of places and spiritual connections that persons have to the land in which they live and the importance of collectiveness in non-Western communities that is often overlooked and under stated in recovery of post-disaster areas. In a study by Chamlee-Wright and Storr (2009), quantitative surveys as well as qualitative data from focus groups revealed that participants often cited New Orleans (post-Katrina) as a unique place that is “unlike any other place”, yet it is unclear how this sense of place attachment affects recovery or willingness to return to areas destroyed. Furthermore, the Chamlee-Wright and Storr study did not include disaster preparedness as a variable of interest.

Even though the post-Katrina studies are useful for exploring sense of place and recovery, most of these studies do not include comparison locations. For example, is there truly something culturally unique about the Ninth Ward area of New Orleans that makes the allure for rebuilding so powerful, or do most community members who have been displaced

from any catastrophic event view their destroyed community with a sense of longing (longing to return, rebuild, and recapture cultural aspects of daily living)?

In one study by Mishra, Mazumdar, and Saur (2010), place attachment was measured as a correlation with residents' level of preparedness. Specifically, the researchers found that: "Regression analysis revealed, families with higher genealogical and economic place attachment were more prepared" (p. 194). In other words, participants who had generational roots in the area and viewed their community as a main source of economic livelihood were more likely to take steps to prepare for major flooding than those who were new residents and did not rely on the area for a means for making an income. There was no significant relationship between religious place attachment and flood preparedness. Also, in a study by King and Kang (2010), disaster preparedness was significantly higher for residents who had a sense of neighborhood belongingness, but only once the danger of a hurricane was imminent. Also, in a qualitative study after a fire disaster in British Columbia, residents expressed distress over changes in the physical and social landscapes that were caused by the fire, thus emphasizing the importance of sense of place during the recovery phase after a disaster (Cox & Perry, 2011). Finally, also in a study after the BP Oil Spill, place attachment was correlated with negative feelings following the disaster (Lee & Blanchard, 2011). Therefore it is unclear the extent to which individuals and households engage in preparedness on a day-to-day basis (or in times of normalcy) and to what extent preparedness is directly or indirectly impacted by perceptions of community cohesion and belongingness, such as psychological sense of community.

In sum, sense of community has been suggested to increase resilience but previous studies fall short of assessing the specific relationship between the construct of sense of community disaster and preparedness. Based on the literature thus far, no empirical studies have explored the specific relationship between psychological sense of community and disaster preparedness. The more crucial shortcoming of these studies is that they focus solely on the role of place, recovery and post-disaster coping, (instead of also assessing the relationship between sense of place and *preparedness* or other pre-disaster activities). It should be noted that the literature thus far falls short of clarifying the relationship between Sense of Place and Sense of Community and therefore warrants further exploration.

Communication and education. In communication research, it has been found that people rely on different types of media and sources for gathering information on a day-to-day basis (Culbertson & Stempel, 1986). It is also important to consider how information and communication plays a role in preparedness actions and behaviors. For example, in the aforementioned qualitative study by Becker, Paton, Johnston, and Ronan (2012):

Interview data revealed that people draw upon multiple types and sources of information in forming beliefs and making decisions about preparedness. Some people may also be motivated to seek further information in order to verify what they have seen or heard. The findings reinforce the fact that no single information format will encourage individuals to prepare and that a variety of resources must be used (p. 115).

Results from the Berke et al., (2011) study showed that participants (in this case residents), when involved in the disaster preparedness planning process, were not only able to provide useful information to city planners and emergency managers (such as updating the accuracy of locations and communicating community norms), but they were also able to

build their own actions disaster preparedness plans with minimal guidance from “coaches” (facilitators) from the research team. This suggests that an active learning approach might be valuable for group interventions regarding hazard planning. Although the capacity-building aspect of this study is critical, it does not provide quantitative evidence of significant increases in “resilience” and preparedness, rather this was a qualitative study that focused on the methods for optimal community building and bolstering interpersonal connections.

It is unclear is whether and to what extent interpersonal connections, once identified, actually do increase residents’ likelihood of engaging in effective disaster preparedness and planning. For example, Nepal, Banerjee, Perry and Scott (2012) found that word of mouth is the preferred method of communication for linguistically isolated populations (such as Spanish or French speaking residents). Therefore emergency management coordinators might be able to adapt warnings, alerts, and evacuation information that is relevant to these groups.

Messages & the Receiver

Another specific component that the previously described models do not include is the aspect of the warning messages, which can be further broken down into: type of information and risk perception. For example, as found in a study by Xie et al. (2011), message type impacts risk perception and intentions to engage in helping or prevention behavior. Additionally, findings from social psychology and communication research suggests that the framing of the warning may trigger the receiver to engage in heuristics (e.g. Tversky and Kahneman, 1973; 1986, as cited in Cohen et al).

In a theoretical paper by Witte (1992) on the cognitive concept of the parallel process model, there is a clear distinction made between messages of threat and messages that are

designed to be fearful. According to Witte, fearful messages are not likely to change behaviors unless a threat is also sensed and a simultaneous solution is offered to reduce the potential threat: "...threat determines the degree or intensity of responses, while efficacy determines the nature of the response" (p. 345). Similarly, Miller, Adame, and Moore (2013) assessed vested interest factors in the decision making during hazard events. Vested interest is similar to the parallel process model:

Vested interest is conceptualised as a function of: (a) the salience of the attitude; (b) the perceived certainty of potential consequences following from behaviours relevant to the attitude; (c) whether or not those consequences are perceived to be immediate as opposed to remote in time; and (d) one's belief in his/her ability to engage in the attitude-relevant behaviour (that is, one's pertinent level of self-efficacy). (p. 6).

Additional variables about warning messages that also impact the way a warning is perceived are: social amplification (e.g. Ibatayo, 2004), instances of bounded rationality (Kahneman, 2003), and again, the framing (Gowda, 1999) of the warning information (as significantly impacting risk perception and also preparedness behaviors). Bounded rationality is mentioned in multiple experimental research as well as theory articles regarding decisions about evacuations in the case of disasters. Bounded rationality can be defined as the process of decision-making in which people are attracted to information that is readily available instead of mentally sifting through a large amount of detailed information (Simon, 1957, as cited in Drabek, 2001).

Technology-mediated communication regarding hazard events. During a tornado outbreak, such as the one that occurred in North Carolina during April of 2011, communication and technology played a crucial role in the way in which people exchange

information regarding the movement and location of the storms. Even though word of mouth is a common form of communication in some communities (Taylor, et al., 2009; Nepal et al., 2012), this spread of information usually begins with a primary technological source (such as television news). Furthermore, people rely heavily on technology such as radio, news, and online sources to seek information about preparedness, sheltering, drills, evacuations, and also response and recovery.

In a study by Xie et al., (2011) that assessed the specific mechanisms of risk perception, (in a secondary experiment) participants were tested to see how a specific media condition could impact overall perceived risk with the type of emotion triggered (by the media channel) as a mediator, as well as the assessment of what kind of behavior followed different levels of perceived risk. Results revealed that, “participants perceived higher risk when watching TV than when reading texts (without pictures) from the website, whereas no difference was found between watching TV and reading texts (with pictures)” (p. 457).

Social media and alert systems. Due to the burgeoning popularity of social media outlets such as Facebook and Twitter, many researchers have begun to assess how people seek and share information in crisis situations through these different forums. For example, in a qualitative study by Bunce, Partridge, and Davis (2012) after the 2011 Queensland flooding in Australia, several main themes of communication were identified: monitoring, which occurred mainly during the hazard event, community (such as sharing of facebook photos of flooded areas), affirmation (e.g. to check on status of well-being of family and friends), and awareness (information about logistics during and after the hazard such as disruptions of transportation). Although this is one of the few qualitative studies on social media regarding

hazard or disaster events, there were several limitations; mainly that the sample was only of four participants. Additionally, the categories identified were rather broad and did not decipher detailed behavioral mechanisms such as to what extent the participants were passively receiving versus actively seeking information about the hazard event via social media.

In another social media study, Palen, Starbird, Veiwig, and Hughes (2010), a content analysis of over 20,000 “tweets” from Twitter revealed that residents near the Red River Valley flooding actively repeated emergency information: “locals are more likely to use the retweet convention to pass on emergency-related information than other types of information during the event” (p. 16). Whether this phenomenon would also occur with Facebook through sharing of status updates related to emergency information such as weather warnings, might be a useful area of exploration.

It should be considered that during some hazard events, such as a catastrophe (which, according to Sylves (2008), is a large scale disaster that incapacitates most of the infrastructure and resources in a given area), main sources of information during and immediately after the hazard event would most likely not be internet-based due to the lack of electricity. For example, data from 984 tsunami survivors in a study by Romo-Murphy, James, and Adams (2011) showed that word of mouth was the most frequently cited source for finding out information during and after the Tsunami of 2004 in Indonesia. However, television and radio broadcasts were seen as useful in provinces that were less affected by the Tsunami and after partial recovery in the areas that had experienced severe flooding, however, “Opinions differed on the most influential media at the time of a disaster.../...One

person noted that television was helpful in broadcasting pictures of lost people. Radio was regarded as an advantage because of its immediacy and interviews” (p. 813). The Romo-Murphy et al. study was a mixed methods study that supplemented interview data with focus group information about perceptions of survival, mitigation, and information diffusion. The authors concluded that the most surprising findings from the focus groups was that disabled participants seemed to have a higher sense of efficacy (although the authors did not specifically call it efficacy): “The focus groups revealed that the disabled, more so than the rest of the sample, has become more convinced that they can do something to help themselves reduce the negative effects of disasters” (p. 812). This finding might be explained by the fact that, as stated in a theoretical paper on technology and disability by Hans and Mohanty (2006), people who are disabled are more likely to rely heavily on technology in their day-to-day lives as a means of “getting around” and engaging in daily tasks.

Communication systems are particularly important for the dissemination of alerts or warnings. Sherman-Morris (2010) assessed the effectiveness of a campus alert warnings system (the “Maroon Alert” system) after a tornado warning was issued near a large Mississippi college campus. Results revealed that participants were somewhat confused about the difference between a warning and a watch, which was similar to the findings of previous studies regarding hazardous weather events, and that participants were unsure of how or where to “shelter in place”, as some of the respondents indicated that there was a lack of designated safe space for events such as tornados. Female students, staff members, and persons who were more proactive about seeking weather information were more likely to take shelter and view the university warning message about the tornado as an indicator of an

imminent threat. Finally, local television was the primary source of information for the time prior to the tornado. A major limitation of this study is that the sole source of data collection (of the surveys) was through a link that was sent out via email. This means that the respondents all had to be people who had somewhat regular access to a computer, and therefore the results are only generalizable to the population of computer-users on campus.

Limitations/gaps in the Current Literature

The majority of the categories of variables in the studies regarding disaster research and natural hazard preparedness can be broken down into two major categories: individual level and social/environmental factors. These variables categories are usually not assessed within the same study. For example, in the Basolo et al., 2009 study, confidence in government (a social perception variable) is measured but risk perception (an individual level category of variable) was not included in the analysis. Similarly, some studies that assessed individual level categories of variables did not include an assessment of social and environmental factors that impact preparedness. For example, sense of place or community was not assessed in the study of hurricane preparedness in mobile home residents (Kusenbach, 2010), but rather risk perception and past experience with hurricanes were measured (individual categories of variables). Some theoretical models propose an integration of both individual and social factors for predictors of preparedness (e.g. Paton and Johnson, 2001), but I found very few empirical studies that assessed both individual as well as social perceptions as predictors for preparedness (an exception would be the study Becker, Paton, Johnston, and Ronan, 2012).

However, even studies that integrated both types of variables (individual and social/group factors) presented some design and method flaws. For example, the aforementioned study by Becker, Paton, Johnston, and Ronan was qualitative in nature. Similarly, the Berke et al., 2011, Nepal et al., 2012, and Fillmore et al., (2011) studies were also qualitative in nature. Although qualitative research is informative (Lindlof & Taylor, 2002), validation of constructs and findings with quantitative data can suggest more definite relationships between variables.

Three other major short-comings of the current literature on preparedness are:

1) Most of the empirical studies focus on assessments of coping, returning to the site of the disaster, or recovery (e.g. Chamlee-Wright & Storr (2009)). The constructs within those studies are not exactly assessing disaster preparedness, but rather coping, and willingness to evacuate or return.

2) With regards to constructs and as mentioned previously, psychological sense of community has not been assessed as a direct predictor of preparedness behaviors. Closely related studies have focused on sense of place (Mishra, Mazumdar, & Saur, 2010) or neighborhood belongingness (Kim & Kang 2009). It should also be noted that preparedness in some previous studies has been defined alternately as flood mitigation, though the primary way in which this was defined was through the action of purchasing personal flood insurance (e.g. Bubeck, Botzen, & Aerts, 2012).

3) Finally, studies that do assess preparedness are usually immediately following a disaster (see Table 1.0 Article Review Spreadsheet) and are retrospective and do not assess the normal preparedness levels in which individuals engage on a day to day basis. It is

urgent to address proactive and prevention aspects of reducing loss of life and property rather than to only address what specific aspects contribute to recovery and coping in the post-disaster phase. This urgency is further driven 1) by the lack of current research on preparedness and sense of community, 2) the community psychology value and mission of initiating social change to prevent impediments to well-being, rather than to engage in ameliorative efforts (Nelson and Prilleltensky, 2005). Please see Table 1.0 for a detailed review of the empirical studies related to hazard research.

Table 1 Review of Key Studies

Authors & Year	Theme(s)	Sample Size	Preparedness Measured?
Basolo et al, 2009	Preparedness	N = 404	Yes
Berke et al, 2010	Planning	6 sites	No
Cox & Perry, 2011	Recovery & Sense of Place	N = 43	No
Cutter et al, 2003	Vulnerability	3,141 counties	No
Eisenman et al, 2009	Latino Preparedness	N = 231	Yes
Fillmore et al, 2011	University & Flooding	N = 12	Yes
Gierlach et al, 2010	Risk perception	N = 360	No
Ibitayo, 2004	Risk Perception	N = 171	No
Kievik & Gutteling, 2011	Efficacy	N = 726	Yes
Kim and Kang, 2009	Risk Perception	N = 186	Yes
Kusenbach et al, 2009	Preparedness	N = 75	Yes
Lee & Blanchard 2011	Sense of Place & Recovery	N = 935	No
Mishra & Suar, 2007	Experience	N = 300	Yes
Sherman-Morris, 2010	Colleges	N = 2921	No
West and Orr 2007	Warnings	N = 785	No
Xie et al 2011	Risk Perception	N = 271	No

Pilot Activities and Research

Meetings with stakeholders. This project focuses on preparedness in the city of Raleigh, North Carolina and areas around Raleigh (including townships such as Cary). This project is conducted with a semi-grounded theory approach (Bernard & Ryan, 2010), since the Emergency Management Coordinator has provided feedback (throughout the course of four meetings during a year's time) to me (the principal investigator) about the "sense-making" for the research hypotheses. I also met with the following individuals for additional assessment of the research plan: the Assistant City Planner, the All Hazards Coordinator for Wake County, the Community Services Director, and the city of Raleigh the Latino Community Services Director.

Qualitative interviews. During the fall of 2012, the principal investigator and two other graduate students interviewed six undergraduate students. Interviews contained open-ended, semi-scripted questions about risk perception, weather salience, health risks, crime risks, sense of belongingness and place, methods for gathering information, and preparedness behaviors. The interviews lasted approximately 30 minutes, were recorded, transcribed, and then coded by three graduate students using an open-coding system. Findings revealed that the interviewees were not overly concerned about weather hazards or disasters unless there is a major news event (e.g. Hurricane Sandy) and that they make decisions on what to do in crisis events based on their peer groups (e.g. Greek Fraternities). This suggests that the interviewees are highly influenced by their peers as well as social media when considering risks, although it is unclear if this same pattern would be evident in residents that are not affiliated with a university or a college setting.

When asked about preparedness and forms of risk that college students might encounter, most of the participants mentioned that they were prepared to face various types of risks (including risks associated with hazardous weather, health, and crime). One participant stated, “I am very prepared, I grew up always being very aware.” Another participant also indicated, “I feel better, probably about weather and health than I do about violence. I just haven’t come one on one with something like that so I don’t really feel as prepared.” However, participants failed to name specifically what types of behaviors or actions they were engaged in that could be categorized as “prepared”, especially with regards to natural hazards.

Pilot Survey of Preparedness.

During the spring of 2013, 12 individuals took the 12 item preparedness scale on a web-based survey. The participants were asked to rate the items on the scale as *relevant* based on their experience with hazards as a resident of Raleigh. The purpose for piloting the preparedness scale was due to adaptation of the scale from its original format as an Earthquake Preparedness Scale (Mulilis-Lippa Earthquake Readiness Scale). Based on the findings, two items were replaced on the scale with items that were perceived as more useful and relevant. The two new items (attending a CPR class and attending an information session on preparedness) are from the FEMA survey on household preparedness (2009).

Research Questions and Hypotheses

Based on the limited literature available on preparedness, the study involved both research hypotheses (when sufficient prior research existed) and research questions (when there is not sufficient evidence to predict a relationship between variables).

Hypotheses

*H*₁: Higher levels of psychological sense of community will be associated with higher levels of preparedness. This prediction is based on the findings that a stronger sense of place, a similar construct, leads to higher levels of preparedness in the Mishra, Mazumdar, and Suar (2010) study.

*H*₂: Higher levels of preparedness self-efficacy will be associated with higher levels of preparedness. This prediction is based on findings that higher levels of self-efficacy were correlated with higher levels of flood preparedness in the Kievik and Gutteling (2011) study.

*H*₃: Higher levels of confidence in local government will be associated with lower preparedness levels. Given that confidence in government had no impact on preparedness in the Basolo et al., (2009) study but showed conflicting results in other studies (e.g. Terpstra, 2011), participants will likely diffuse preparedness planning to city officials.

*H*₄: Experience with prior hazard events will yield higher levels of preparedness than those participants who do not indicate hazard experience. This prediction is due to research by Mishra and Saur (2007).

Exploratory Research Questions (No specific Hypotheses)

- 1) What is the impact of risk perception on preparedness behaviors?

This research question is based on the meta-review by Bubeck, Botzen, and Aerts, (2012) in which the authors identified an overall lack of evidence that risk perception actually impacts preparedness for flooding.

- 2) What is the effect of social vulnerability on preparedness?

Although there is considerable concern expressed in the literature about the impact of disasters on individuals who are judged to be socially vulnerable, there is a lack of empirical research on this issue.

- 3) How does information gathering and the use of technologies impact preparedness behaviors?

While preparedness campaigns often highlight the importance of using technology to be aware of disasters, there is a lack of studies that assess the role of communication and technology on preparedness behavior.

- 4) What is the effect of combined factors (PSOC, Confidence in Government, Self-Efficacy, Media Reliance, and Risk Perception) and other significant demographic predictors on preparedness in a multiple regression? Do they increase the predictive ability of the largest predictor?

Unfortunately, much of the available research has only looked at predictors in simple bivariate fashion. As a consequence, we do not know whether and how much predictive redundancy there is among the hypothesized and tested predictors. Examining this question will allow me to produce the most parsimonious predictive model. Finally, I will test risk

perception as a possible mediator between preparedness (as the outcome variable) and self-efficacy, due to suggestions from research meta-analyses by Bubeck, Botzen, and Aerts (2012), which suggest that the relationship of risk perception to preparedness is not always clear.

METHOD

Design

Participants/Sample

The sample was drawn from residents of the Raleigh and Wake County area of North Carolina. Participants were recruited through web-based survey links as well as through face-to-face survey distribution. There were both English and Spanish versions of the survey available. The main avenues for collecting data were as follows:

- 1) Participants were contacted through the City of Raleigh email list-serve, which is comprised of 3,373 people who have registered for the City of Raleigh notifications (about social, sporting, political, and recreation events).
- 2) The survey was also emailed to leaders of the Raleigh neighborhood associations who are designated as the neighborhood Advisory Council coordinators. They were asked to distribute the survey to their neighborhood email list-serves (N of leaders = 50).
- 3) The link to the survey was also posted at all City of Raleigh Community Recreation Centers (including parks, fitness centers, meeting spaces for residents) through cooperation with Raleigh Parks and Recreation.

- 4) The survey was taken to three Council Advisory Committee (CAC) meetings during the month of May, 2013, which the Raleigh Community Services Director identified to have high number of diverse citizens. The principal investigator and her research assistants handed out the surveys and also obtained time on the meeting agenda to describe the research study.
- 5) The survey was also distributed as a hard copy format (in English and Spanish) to the coordinator of the Raleigh ESL classes.
- 6) The survey was posted at the Wake County Public Health office on Newbern Avenue, and distributed to public health workers at a seminar that was geared towards preventing and identifying human trafficking.
- 7) Flyers advertising the web link and the QRC code for the online survey were distributed and posted on the community boards at three Wake County libraries and the Museum of Natural Sciences.

Requirements for participation in the research study were that respondents must be a current resident of Raleigh or the Wake County area of North Carolina (legal residency is not a consideration) and must be 18 years of age or older. After participants completed the survey they were provided with pamphlet (electronic or hard copy) containing Ready.gov information about preparedness. I, the principal investigator and my research assistants created a brochure that was specific to Raleigh with regards for preparedness (see Appendices).

Survey responses were confidential but not completely anonymous because the researcher will have some data about the geographic location of the respondents based on

demographic items. Also, face-to-face surveys were gathered at the city council meetings (a total of 10 responses were obtained through face-to-face data collection at the CAC's).

Participants were not asked to put their names on any of the forms. Survey data are stored in a locked lab space on the NCSU campus and all electronic files are protected with a password.

Measures & Data Reduction

Data reduction overview. Confirmatory factor analyses (CFA's) were run on the established scales, Preparedness Efficacy, Risk Perception, and Psychological Sense of Community. Items not contributing significantly in the confirmatory factor analyses (by looking at standardized regression weights, using a cutoff of items less than .60) were dropped from the final analyses. A CFA (in addition to an exploratory factor analysis) was also run on the dependent variable of preparedness but all items were retained because there were so few items, and reducing them further or grouping them into subscales further reduced reliabilities (details described below).

Exploratory factor analyses were conducted on the scales developed by the investigator or significantly modified for this study, media reliance, sense of place, and the dependent variable of Preparedness to determine if any underlying structures exist for the measures. Principal component analyses were conducted using a Varimax rotation. The exploratory factor analyses were evaluated with the following criteria: eigenvalue, variance, scree plots, and reliability tests including item deletion summaries.

Dependent variable.

Preparedness. The dependent variable for the current study is disaster preparedness as measured through actual preparedness behaviors such as storing food and water specifically for an emergency event, acquiring a first-aid kit, and having a family evacuation plan. This is driven mainly by the need to increase preparedness at the individual level. As indicated by Miller, Adame, and Moore (2013): “Some 66 per cent of Americans feel they are personally unprepared for a disaster; and when asked why they are not prepared, 26 per cent reported they have not had enough preparation time, whereas 22 per cent claimed they have no idea what to do or how to proceed (Redlener et al., 2006).” (p. 2).

To assess preparedness, a 12 item scale was used, adapted from the Mulilis-Lippa Earthquake Readiness Scale. An adapted version of this scale was also used by Mishra and Saur (2012). This scale is different than assessing intentions to prepare because it contains items that ask about actual actions such as: “I have obtained a working flashlight” and “I have purchased a first aid kit”. In the Mishra and Saur 2012 study, reliability coefficients on their sample were high for preparedness items (Cronbach’s $\alpha = .80$) (p. 1076).

Exploratory factor analyses were conducted on Preparedness to determine if any underlying structures exist for the measures. Principal component analyses were conducted using a Varimax rotation. Two-component solutions were produced, a one-factor and two-factor, which were evaluated with the following criteria: eigenvalue, variance, scree plots, and reliability tests including item deletion summaries. These criteria indicated that a one-component solution was appropriate. (See Figure 4.0 for Scree Plot and Table 2.0 for total variance explained for the 12 items and rotated component matrix with a forced two-factor

loading, respectively). For the current study and sample the reliability is $\alpha = .65$. This approaches the minimum of acceptability for reliability in most measurement scales. A confirmatory factor analysis revealed overall model of preparedness was significant: $\chi^2 (54, N = 343) = 104.913, p = .000$. The chi-square statistic for factor analyses should be non-significant to indicate a goodness of fit. However, this measure is sensitive to sample size in that it may default to significance with a sample larger than 200 due to increased power of the analysis (Kenny, 2014). Therefore the CFI and TLI measures of fit are also reported. For this model ($df=54, N=343$), CFI = .83, TLI = .76. For both of these measures of fit, values close to 1 are considered to be a good fit.

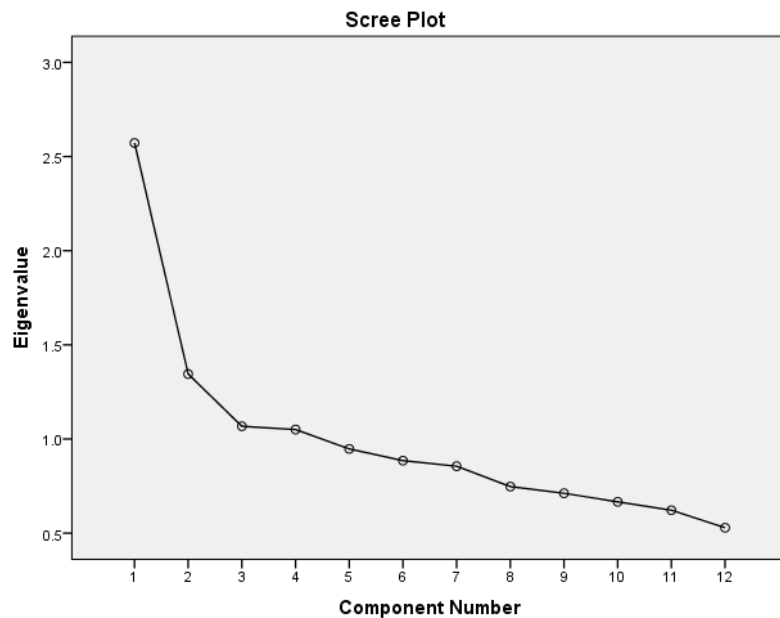


Figure 4: Scree Plot Items for Preparedness

Table 2 Factor Analysis of Preparedness Items: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared			Rotation Sums of Squared		
	Total	Loadings		Total	Loadings		Total	Loadings	
		% of Variance	Cumulative %		% of Variance	Cumulative %		% of Variance	Cumulative %
1	2.572	21.434	21.434	2.572	21.434	21.434	1.870	15.582	15.582
2	1.345	11.210	32.645	1.345	11.210	32.645	1.444	12.036	27.618
3	1.068	8.897	41.541	1.068	8.897	41.541	1.381	11.505	39.123
4	1.050	8.753	50.294	1.050	8.753	50.294	1.341	11.172	50.294
5	.947	7.895	58.190						
6	.885	7.376	65.565						
7	.856	7.129	72.695						
8	.747	6.229	78.924						
9	.712	5.933	84.857						
10	.666	5.553	90.410						
11	.622	5.183	95.593						
12	.529	4.407	100.000						

Extraction Method: Principal Component Analysis.

Predictor Variables

Social vulnerability & demographic information. This is a composite score based on the variables in the factor analysis from the Cutter, Boruff, and Shirley (2003) article.

Specific items include the following questions: “Please estimate your average household income, (less than 25,000, 25,000 to 50,000, 50,000 to 75,000, 75,000 or more), please list your age, gender, housing type (house, mobile home, apartment, other), please indicate your race (African American, Asian American, Latino American, Caucasian, Other), please indicate your ethnicity (Hispanic, non-Hispanic, Native American, other).” Factor analyses

by Cutter and colleagues (2003) revealed that these variables correlated from .77 to .99 with the dominant proposed variables for social vulnerability (see page 18, Figure 3.0 in text).

In the current study, I created a composite score for vulnerability using race, housing type, flood plain residence, income, and elders/children/disabled living in the household. Specifically, a composite score was created for Social Vulnerability by coding participants as gaining a score of 1 point for a yes to the following items: Residing in an area prone to flooding, earning a household income of less than 25,000 per year, having children in the household, having elders in the household, having disabled persons in the household, and being a racial minority. Therefore the maximum score for vulnerability would be 7, and the minimum score will be 0. For the total score, 0 would mean no vulnerability, 1 = very low vulnerability and a score of 2 to 7 would be moderate to high vulnerability.

There were a number of problems with this measure. Specifically, very few respondents were scored in the high vulnerability categories. For the analyses, I used a collapsed scale of 1-3. Specifically, I collapsed scores of moderate (N = 57), average (N = 14), increased (N = 4), and high vulnerability (N = 2) into one category. The new collapsed variable contains 77 people from moderate to high vulnerability. Additionally, the total response rate for the SOVI was 283 (of a total N of 342). In other words, there were 60 subjects that had missing data for one or more of the items that created the SOVI subscale and these were counted as missing data (these cases were not included in the bivariate analysis). However, all variables for the composite score were retained due to the importance of their constructs as suggested by Cutter, and colleagues (2003). For example, there were 43 subjects who did not answer the item about residing in a flood plain area, but most of the

literature surrounding SOVI index suggests that geographic location is among the strongest of predictors for vulnerability to hazards.

Self-Efficacy. To assess self-efficacy for preparedness, I used Kievik and Gutteling's (2011) preparedness self-efficacy scale (7 point, 9 item scale). The scale was translated from Dutch to English by a Dutch-speaking colleague of the principal investigator (see acknowledgements). Items on the scale include statements such as "I feel confident that I can correctly use an emergency kit for the right purpose" and "I feel confident that I can come up with a good emergency plan". Confirmatory factor analyses were run on this measure. The overall model of preparedness self-efficacy was significant: $\chi^2(27, N = 345) = 316.660, p = .000$. The chi-square statistic for factor analyses should be non-significant to indicate a goodness of fit. However, this measure is sensitive to sample size in that it may default to significance with a sample larger than 200 due to increased power of the analysis (Kenny, 2014). Therefore the CFI and TLI measures of fit are also reported. For this model ($df=14, N=352$), CFI = .90, TLI = .83. For both of these measures of fit, values close to 1 are considered to be a good fit (Table 5.0).

Standardized estimates were optimal for preparedness self-efficacy (ranging from $r = .64$ to $.93$) and therefore all items were retained (see Figure 6.00). Reliability in the Kievik and Gutteling study is high for this scale with a Chronbach's $\alpha = 0.96$ (as a Dutch study). For the current study, the reliability is Cronbach's $\alpha = .94$ (as a measure in English).

Risk perception/ threat salience. To assess participant risk perception, the threat salience 7 point, 9 item scale from Miller, Adame, and Moore (2013) was used. Similar to the self-efficacy scale, this was created with the use of tornado preparedness in mind but I

modified it to include flooding and ice storm as well, in order to capture the main possible natural hazards in the city of interest for the sample (Raleigh, North Carolina). Items from this scale include questions such as “How obvious is the threat of tornados/ice storm/hurricane/severe heat event to you?” Ranking 1 as Not Obvious to 7 as Very Obvious. In the Miller, Adame, and Moore research, the reliability for this scale was 0.83, 0.86, and 0.85 (respectively assessing preparedness for tornadoes in study one, tornadoes again in study two, and earthquakes for study three).

For the current study, confirmatory factor analyses were conducted on this measure, and reliability tests including item deletion summaries. The overall model was significant for risk perception: $\chi^2(14, N = 345) = 81.20, p = .000$. As mentioned in the previous section, the chi-square statistic for factor analyses should be non-significant to indicate a goodness of fit. However, this measure is sensitive to sample size in that it may default to significance with a sample larger than 200 due to increased power of the analysis (Kenny, 2014). Therefore the CFI and TLI measures of fit are also reported. For this model ($df=14, N=352$), CFI = .94, TLI = .86. For both of these measures of fit, values close to 1 are considered to be a good fit (Table 6).

One item had a standardized estimate (standardized regression weight) of only $r = .58$ “How aware do you think the public is concerning the issue of tornados/ice storms/hurricane/severe heat event?” and was therefore excluded from the scale for additional analyses. Reliability for risk perception in the current study was Cronbach’s $\alpha = .85$. See Figure 7.0 for the factor model of risk perception.

Psychological sense of community. For measurement of participants' psychological sense of community, the 11-point scale used by Wilkinson (2007) was used. Items on the scale include statements such as, "I think of community planning in (my neighborhood) as a "we" not a "they"" and "I believe my neighbors would help me in an emergency", scored on a Likert scale (1-5, with 1 as strongly disagree to 5 for strongly agree). These items were tested in a confirmatory factor analysis with the lowest loading score item as 0.69 and the highest loading as .95 (see p. 223 of Wilkinson). Confirmatory factor analyses were run on Psychological Sense of Community (see Figure 8.0). For this scale, the overall model was also significant $\chi^2(27, N = 345) = 141.59, p = .000$. The chi-square statistic for factor analyses should be non-significant to indicate a goodness of fit. However, this measure is sensitive to sample size in that it may default to significance with a sample larger than 200 due to increased power of the analysis (Kenny, 2014). Therefore the CFI and TLI measures of fit are also reported. For this model ($df=14, N=352$), CFI = .94, TLI = .91. For both of these measures of fit, values close to 1 are considered to be a good fit (Table 7.0).

The item of "I would work together with others to improve my neighborhood/apartment complex/mobile home community" had a standardized regression estimate of $r = .58$, and was therefore excluded from additional analyses. For the current study, the Cronbach's $\alpha = .93$.

Media reliance/communication & technology scale. To assess the ways in which participants seek information about natural hazards and weather warnings, I created a five item scale containing questions about the frequency of usage and type of communication system used for weather events. The scale is influenced by the aforementioned qualitative

findings from the pilot study conducted prior to the beginning of the quantitative data collection. Items on this questionnaire include questions such as “I use facebook, Twitter, and/or Google Plus to receive and share information regarding weather watches and warnings”. The answer choices are on a 7 point Likert scale with: 1 = Never and 7 = Always. Exploratory factor analyses were conducted on the media reliance scale. Component solutions were produced which were evaluated with the following criteria: eigenvalue, variance, scree plots, and reliability tests including item deletion summaries. These criteria indicated that a one component solution was appropriate. Two items, television and radio, did not contribute to the primary factor and did not produce a defensible subscale together. Because these items appear to have significant face validity they will be assessed individually. See Table 3.0 for details on component loadings for these items. The reliability for the New Media Reliance Scale (with the three remaining items) is $\alpha = .62$

Table 3 Factor Analysis of Media Reliance

	Component		
	1	2	3
I use social networking	.791	-.106	.120
I use an automatic alert	.743	-.034	.054
I use formal sources/ website	.716	.382	-.229
I rely on television.	.049	.150	.961
I listen to radio broadcasts	-.024	.940	.171

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Confidence in local government. To measure confidence in local government for disaster preparedness and planning, I included one item on the questionnaire which states: “On a scale from 1 to 7, with 1 meaning no confidence and 7 meaning total confidence, how confident are you that your local government is prepared to handle a major hurricane (ice storm, or tornado).” This item is based on the methodology and measure from the Basolo et al. (2009) study.

Sense of place. Although I am using psychological sense of community as a predictor in this study, many other researchers have used “sense of place”. To compare sense of place to sense of community as well for comparison to previous studies, I included the following items regarding sense of place: “My neighborhood and town/city provides me with an economic sense of security”, “I view my place of working/living as an extension of myself”, and “The place in which I live has deep spiritual meaning”, “If I had to leave my town/city/neighborhood, I would be emotionally upset”. These are items adapted from the scale used in the study by Mishra, Mazumdar, & Suar (2010). Reliability for the Mishra and colleagues studies ranged from .86 to .92, depending on the dimension of the scale (their scale had three sub-dimensions of religious attachment, economic attachment, and genealogical attachment). For the current study the scale has a Cronbach’s α of .66. These items were scored on a Likert scale (1-5, with 1 as strongly disagree to 5 for strongly agree). Exploratory factor analyses were conducted on sense of place, to determine what, if any underlying structures exist for the measures. Principal component analyses were conducted using a Varimax rotation. For the sense of place scale, only one component with all items was retained and accounted for a total of 50% of the variance for the total scale score. Sense

of place will not be included in the regression, but will be compared as a bivariate correlation with psychological sense of community to explore how well each variable predicts preparedness.

Qualitative Questions. To assess any constructs that may not have been captured in the scales on the survey, I also asked two open-ended questions at the end of the survey which simply stated the following: “What kinds of actions come to mind when you think of preparedness for natural hazards or emergency events?” and “What type of hazard concerns you the most, and why?”.

Analyses Overview

Based on Lenth’s (2006-9) calculation tools, to achieve an adequate power of .80, the sample size should be optimally 250 participants (10% response rate) and no lower than 120 (20 subjects per predictor). Data were screened for missing data and outliers. There was an initial response rate of $N = 469$, but 98 responses were excluded early in the data cleaning phase because they only answered one item (agree to take the survey). An additional 29 responses were excluded because of failure to complete more than 80% of the survey (participants who only answered 15 items or less). After data reduction (factor analyses) I identified two cases that had z -residual scores greater than -3.00 at the multivariate level. These two cases were excluded in order to maintain optimal Skewness and Kurtosis. After data screening and scale reduction, the total N of the sample was 342, and $N = 283$ for the social vulnerability correlation analysis (due to missing data).

To test for the relationship between predictor variables (both hypothesized and exploratory) and the dependent variable of preparedness, bivariate correlations were run.

When conducting the multivariate regressions, a trimming strategy was used. In other words, only variables that were found to be significant at the bivariate level were retained for the multivariate analyses.

The Variance Inflation Factor and Tolerance for the regressions will also be included in the analyses to check for multicollinearity. All analyses will be conducted with an alpha level of $p < \text{or} = .05$ using SPSS statistical software.

RESULTS

Demographic Overview. The average time of residence for the sample (years residing in Raleigh) was 20.34 years. The respondents were mostly White (85%, $N = 281$), residing in a house (86%, $N = 283$). There were 181 females and 134 males (57% and 43%, respectively, $N = 27$ for missing data on gender). Mean age of respondents was 45. For hazard experience, 86% of participants ($N = 289$) indicated “yes” to having some sort of experience dealing with hazards in the past, and 17% ($N = 53$) of participants reported that they lived on or near a flood plain area (listed as an area prone to flooding).

Bivariate Correlations: Hypotheses: My stated hypotheses related to the relationship of psychological sense of community, preparedness self-efficacy, confidence in local government, and experience with prior hazards with the dependent variable preparedness. See Table 8.0 for details of correlations between all variables.

Sense of Community and Preparedness. To compare PSOC ($N = 342$, $M = 32.80$, $SD = 6.93$) with the dependent variable of preparedness ($M = 7.04$, $SD = 2.44$), a bivariate correlation revealed that the correlation between preparedness and PSOC was positive and significant ($r = 0.21$, $p < .01$). This means that subjects with higher scores of sense of

community also had higher scores of preparedness. This confirms the hypothesis for this predictor variable.

Preparedness Self-Efficacy and Preparedness. To compare preparedness self-efficacy ($N = 342, M = 45.46, SD = 11.22$) with preparedness, a bivariate correlation revealed that the correlation between preparedness and preparedness self-efficacy was positive and significant ($r = 0.49, p < .01$). In other words, subjects who had higher scores of preparedness self-efficacy also had higher scores of preparedness. This confirms the hypothesis for this predictor variable.

Confidence in Government and Preparedness. To compare confidence in government ($N = 333, M = 4.40, SD = 1.53$) with preparedness, a bivariate correlation revealed a positive and significant relationship between scores of confidence in government to handle a major hazard event and levels of preparedness ($r = 0.13, p < .01$). This is the opposite of my proposed hypothesis, which was that people with more confidence in government would be less likely to have high levels of preparedness.

Hazard Experience and Preparedness. To compare the relationship of Experience with Hazards ($N = 300, M = 0.877, SD = .39$) with Preparedness, a bivariate correlation revealed a positive and significant relationship ($r = .24, p < .01$). This means that respondents with more hazard experience also had higher scores of preparedness than respondents with lower levels of hazard experience. This confirms the hypothesis on this variable, that people who have experienced hazard events would also display higher levels of preparedness actions.

Bivariate Correlations: Exploratory Variables

Risk Perception and Preparedness. As indicated above, some variables appeared to be plausible predictors but there was insufficient prior research to justify a specific hypothesis. As a consequence the relationship of the following variables was tested by a 2-tail significance test.

To compare risk perception ($N = 342$, $M = 27.76$, $SD = 7.36$) with the dependent variable (preparedness) a bivariate correlation revealed that the correlation between preparedness and risk perception was positive and significant ($r = 0.32$, $p < .01$). This means that respondents who had higher levels of risk perception about hazard events also had higher levels of preparedness.

Social Vulnerability and Preparedness. To test the relationship between social vulnerability (SOVI) and preparedness, I conducted a one-way ANOVA. The overall mean for Social Vulnerability (collapsed scale) was 1.06, $SD = 2.44$ (on a scale of 1-3). In the ANOVA with Preparedness as the dependent variable (DV), there were a total of 87 subjects with a score of 0 vulnerability ($M = 7.06$, $SD = 2.16$), 119 subjects with some/moderate vulnerability ($M = 7.08$, $SD = 2.34$), and, as listed above, 77 subjects with high vulnerability ($M = 7.53$, $SD = 2.86$). There was no overall significant difference of preparedness levels across the three groups of vulnerability, $F(2, 280) = 1.014$, $p = .36$.

Media Reliance/Use of Technologies and Preparedness. To explore the relationship of Media Reliance ($N = 337$, $M = 10.77$, $SD = 4.65$) with preparedness, a bivariate correlation revealed a positive and significant relationship between media reliance and preparedness ($r = 0.33$, $p < .01$). Furthermore, to test the individual items of TV and Radio, there was no

significant correlation between use of TV for hazard information and use of radio for gathering hazard information ($r = .04, p = .522$) and ($r = .08, p = .110$), respectively. Therefore, tv and radio (individual items) were excluded from subsequent regression analyses.

Comparison of Predictive Ability of PSOC and Sense of Place. Although others have used sense of place as a predictor in disaster research, I choose to use PSOC (psychological sense of community). As mentioned above, PSOC was positively and significantly related to preparedness. To also explore the relationship between sense of place and preparedness, a bivariate correlation revealed a positive but non-significant relationship ($r = .07, p = .219$). This suggests PSOC may be a better predictor for preparedness actions than sense of place.

Multiple Regression

Before proceeding with regression analyses, assumptions of normality and homoscedasticity were assessed. The Variance Inflation Factor and Tolerance for the correlations were found to comply with the assumption of multicollinearity. Scatterplot values for the regression were consistently spread out which is indicative of normality and homoscedasticity. Only variables that were significant at the bivariate level were included in the regression analyses (sense of place and SOVI were not included due to lack of significance at the bivariate level). The predictors for the model are as follows: psychological sense of community, hazard experience, risk perception, confidence in government, preparedness self-efficacy, and media reliance.

Table 4 Multiple Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	-.779	.710		-1.096	.274		
PSOC	.039	.019	.103	2.093	.037	.892	1.120
Risk Perception	.072	.017	.212	4.314	.000	.892	1.121
Media Reliance	.097	.026	.183	3.748	.000	.896	1.116
Efficacy	.087	.011	.403	7.824	.000	.809	1.237
Con Govt.	-.172	.081	-.108	-2.123	.035	.835	1.197
Hazard Exp.	.786	.361	.105	2.178	.030	.930	1.075

a. Dependent Variable: Prep DV

The model summary for disaster preparedness was significant with the six predictors: $R^2 = .369$, $R^2_{adj} = .356$, $F(6,294) = 28.660$, $p < .001$. In other words, the model accounted for 37% of variance in the dependent variable of preparedness. All variables contributed significantly to the model. Efficacy contributed the most to the model ($\beta = .40$), which means that preparedness self-efficacy can be viewed as a fairly reliable predictor (with this sample) for engaging in preparedness actions. Risk perception contributed the second highest amount of variance to the model with a $\beta = .21$, followed by media reliance, confidence in government, hazard experience, and psychological sense of community (in order of magnitude of weight).

It should be noted that confidence in government had a negative regression coefficient in the regression model, but was positive and significant at the bivariate level. I checked for coding and analytical errors and found that there were no errors. However, I found that the variable of confidence in government remained positive in alternative regression models that did *not* include the predictor of self-efficacy. When self-efficacy was added to the model, confidence in government became negative in beta weight. Also, when conducting a regression with preparedness as the dependent variable and just these two variables (self-efficacy and confidence in government), the beta weight for confidence in government was also negative. This meets the qualifications of a statistical phenomenon known as net suppression. Suppression is an instance in which “a situation in which the magnitude of the relationship between an independent variable and a dependent variable becomes larger when a third variable is included” (MacKinnon, Krull, & Lockwood, 2000, p. 3). Net suppression specifically, is “the situation in which one predictor receives a beta weight in excess of its validity coefficient and the other receives a negative beta weight called ‘net’ suppression” (p. 20-21, Smith, Ager, & Williams (1992). Please see Table 4.0 for regression output details. This finding was unanticipated and perhaps warrants additional research on the relationship between confidence in government to handle a disaster and preparedness self-efficacy in hazard research.

An important aspect of the multivariate finding is that the overall regression model with combined predictors is much better at displaying variance for preparedness than each variable alone at the bivariate level. The highest correlation at the bivariate level was $r =$

0.49, ($R^2 = 24\%$). Since the overall model was $R^2 = 37\%$, this means that one can understand preparedness more accurately by looking at variables at the multivariate level.

Mediation Analysis

Due to past research on risk perception as a possible mediator between other predictors and preparedness as an outcome variable (e.g. Kievik & Gutteling, 2011), I felt it was theoretically important to test if risk perception acts a mediator between self- efficacy and preparedness. The Kievik and Gutteling (2011) study tested mediation of information seeking on intentions to take protective actions with efficacy as a predictor, and information seeking as a mediator on intentions to take actions with risk perception as a predictor. They found information seeking to be a partial mediator in both cases, yet risk perception was not tested as a mediator. Also, many researchers cite the lack of extensive empirical evidence that risk perception actually influences preparedness directly or indirectly (Bubeck, Botzen, & Aerts, 2012).

For the mediation with preparedness dependent variable, risk perception as a possible Mediator, and Preparedness Efficacy as a Predictor, I used the approach outlined by Baron and Kenny (1986): 1) tested to see if all variables are related significantly to one another, 2) conducted a regression with efficacy as the predictor and preparedness as the DV, 3) conducted another regression in which risk perception is the DV with and efficacy as a predictor, 4) conducted another regression with both predictors of efficacy and risk perception as predictors in the model with Preparedness as the DV, 5) and finally running a Sobel Test to check for mediation significance.

All three variables were significantly related to one another ($p < .05$) which indicate that a mediational analysis was appropriate to conduct. The first regression analysis, with preparedness as dependent variable and preparedness efficacy as the predictor, yielded a significant relation ($\beta = 0.49, p < .01$). A second regression analysis, with the mediator (risk perception) as the dependent variable and efficacy beliefs as the predictor, showed that efficacy influenced risk perception significantly ($\beta = 0.16, p < .01$). The regression analysis with self-efficacy and risk perception as predictors on preparedness as the outcome variable revealed that the previously found relationship between efficacy and preparedness remained significant ($\beta = 0.45, p < .01$), however, the mediator also showed a significant but reduced relation ($\beta = 0.25, p < .01$) with preparedness, which indicates partial mediation of risk perception (Fig. 5.0). A Sobel test (Baron & Kenny, 1986) confirmed that risk perception mediates the relation self-efficacy and preparedness ($Z = 2.528, p < 0.01$). This means that part of the effect of causing respondents to engage in preparedness is through the level of risk perception, when self-efficacy acts as a predictor variable.



Figure 5 *Mediation of Risk Perception*

Qualitative Findings. As described in the measures, there were two questions at the end of the survey that were designed to explore and capture any thoughts, feelings, or ideas about preparedness that were not included in the preceding literature review or survey scales. The two questions were: “When you think of disaster or emergency preparedness, what kinds of actions come to mind?” and “What kind/type of disaster(s) concern(s) you the most and why (tornado, hurricane, flooding from severe thunderstorms, ice/snow storms, extreme heat or other)?” Responses were coded based on initial themes and then re-coded based on emergent subthemes.

Coding themes for Question One, “What kinds of actions come to mind”, were: Evacuation, Shelter & Protection, Storage of Supplies & Food, Medical & Injury, Panic & Paranoia, Tracking the Storm, Communication with Others (Family and Friends and Helping Others), issues related to Pets, and Other. Initially the responses were aggregated into one code but then were later separated as two distinct forms of communication. Inter-rater reliability was calculated using a random sample of 20 participants and a code-book shared with a colleague of the principal investigator. A calculation was created using the number of times a code is assigned by each rater divided by the total number of ratings across the sample. Inter-reliability was found to be approximately 95%.

For the Q1 open-ended, 244 respondents of 342 answered the question (Actions that Come to Mind When You Think about Preparedness) (93 participants did not respond to this item). It should be noted that Tracking the Storm and Checking on Family Members were the two main sub-themes of Communication. For example, some participants reported “Ensuring

my family is safe”, whereas others reported that the main action that comes to mind is “Tracking storm, preparing property, planning for water, safe shelter or evacuate, food availability.”

Many responses for Q1 were assigned more than one code per sentence or comment. For example, one respondent indicated, “Depends on the event and when it might happen and duration of event. Check food and water supply, fuel for car, batteries, other emergency supplies. Stay aware by radio, TV, Internet.” This lengthy comment from the respondent was coded to list evacuation because of mentioning “fuel for car”, preparedness items (food and supplies) because of “check food and water”, communications for tracking storm because of “Stay aware” as a part of the response.

The largest percent of responses were coded to relate to storing food and water. An astounding 68% of respondents ($N = 167$) mentioned stocking and storing supplies. An example of a list/response from a participant for this category includes the following: “Food, water, tarp, duct tape, flashlight, batteries, radio, and first-aid kit.” This category was followed by $N = 66$ (27%) of respondents indicated that they think of evacuating, an N of 49 subjects listed medical as a concern (20% of the total responses), 45 subjects mentioned checking on others (18%), and 24 subjects mentioned tracking the storm through news and other communication updates. The frequency for which respondents listed pets and pet readiness as a concern was 6.5% ($N = 16$).

A total of 67 responses were coded as “Other” due to the response as belonging to an ambiguous or non-existent category. These responses included: power outages, recovery, clean-up, "hunkering-down", police, fire, terrorism, insurance, FEMA, Katrina, economics,

security, property damage, protecting property, cutting trees, having a plan, surviving, personal belongings, job experience as an emergency management coordinator, tree removal, general readiness, and buying a gun.

For the second open-ended question, “What kind of disasters most concern you”, a total of 181 of the 342 respondents answered this question. As with the first open-ended question, many subjects indicated that they were concerned with more than one kind of hazard event. In other words, it was possible that someone listed both tornados and hurricanes as most concerning. Of the kinds of hazards that concerns residents most, 147 (81%) respondents indicated that tornados were most concerning, and many reported that their sudden and unpredictable nature was most concerning. A total of 51% ($N = 92$) of people who responded to this item indicated that they were concerned most about hurricanes. A total of 82 respondents (45%) indicated that they were most concerned with “Other” types of hazards which included failure in political leadership, cyber-attacks, nuclear events, chemical spills, and fires. Finally, a total of 67 (37%) of respondents listed snow or ice storms as a concern.

DISCUSSION

Overview of findings. Bivariate correlations confirmed all hypotheses, with the exception of social vulnerability and confidence in government. Social vulnerability (which was showed no significant relationship to preparedness and was not a hypothesized variable) as a variable had some psychometric problems due to lack of heterogeneity, while confidence in government showed significance but in the opposite of the hypothesized direction (the

hypothesized direction was negative but the results showed a positive correlation at the bivariate level).

The overall regression model for preparedness actions as a dependent variable was significant with six key predictors: media reliance, hazard experience, psychological sense of community, confidence in local government, risk perception, and preparedness self-efficacy. In the regression model, all of the predictors were positive predictors except for confidence in government. As described in the results, this is likely due to the effect of self-efficacy acting as a suppressor variable on confidence in government. Also as mentioned in the results, efficacy contributed the most to the model ($\beta = .40$), which means that preparedness self-efficacy can be viewed as a fairly reliable predictor (with this sample) for engaging in preparedness actions. Risk perception contributed the second highest amount of variance to the model with a $\beta = .21$, followed by media reliance, confidence in government, hazard experience, and psychological sense of community (respectively).

Qualitative results showed that participants thought of storing supplies such as food and water, as the first thing that comes to mind when they think about disaster preparedness. In response to what kind of hazards are most concerning, most participants indicated that tornados were most concerning, and that the sudden and unpredictable nature of tornadoes is what made them most concerning. It should be noted that the data collection period for this research study was during the month of May, therefore tornados may have been more salient to participants because severe weather is more common in North Carolina during the late spring and early summer months.

Study limitations. This study had some limitations that related to both measurement issues (scale development and reliability) and external validity (lack of generalizability to a diverse population). These limitations were present despite concerted efforts to develop adequate scales (piloting and data reduction) and engender diverse responses during data collection. There were also some limitations related to scope and specification of hazard type and consideration of geographical context.

The most severe limitation of this current study was that the sample, although robust in size, was predominantly white, middle to high income, and residing in a house. Not only does this reduce the external validity of the study, but one of the main research questions for this study was the role of social vulnerability in preparedness. Without high heterogeneity (racial and economic) of the sample, the SOVI (social vulnerability) composite score was affected. Most scores showed low vulnerability, and therefore I collapsed the original composite scale. However, even after collapsing the composite scores of vulnerability ratings, there was still no significant relationship between social vulnerability and preparedness.

It should be noted that aggressive tactics were used for reaching vulnerable residents: I posted flyers about the study at low-income neighborhood grocery stores, I advertised the study (in Spanish) at three different tiendas (grocery stores) in various locations in Raleigh, I distributed information about our study to the director of ESL courses for the City of Raleigh, and I contacted the Women and Infant Children Supplemental Nutrition program coordinator for Wake County (I was denied access to WIC participants for study recruitment). Since the main way in which data was gathered was through the MyRaleigh Subscription as a Public

Service Announcement, most of the respondents either had internet access or own a computer. There were ten hard copies obtained from going to three different Citizens Advisory Council meetings (CAC's), but most people attending the meetings wanted to ask questions about disasters (and how to be prepared) rather than complete a survey. Main topics at the CAC meetings were neighborhood-centric issues such as pedestrian safety, construction of new parks and developments, littering, and community events (museum or park events). Even though disaster preparedness might seem important to neighborhood leaders, there simply was not a lot of time on the agenda to go over the importance of disaster preparedness, even though some individuals expressed interest in learning more about our research project (in which case we distributed the preparedness brochure).

Another major limitation of this study was the dependent measure of Preparedness. I used an adapted version of the Mullis-Lippa Earthquake readiness scale, which appears to be the standard measure used for assessing preparedness (e.g. Mishra and Saur 2012). This scale was reduced (one item dropped, about storing bags for toilet/waste collection) after piloting and then the scale was tested for factor reduction using both exploratory and confirmatory factor analyses. However, most of the predictor measures, such as preparedness self-efficacy, had good psychometric properties. Specifically, preparedness self-efficacy was $\alpha = .94$.

It is important to note that the preparedness self-efficacy scale that was used in this current study was translated from Dutch and had not been tested in English. The confirmatory factor analysis revealed that the overall model was significant and that all items (as standardized beta weights) contributed significantly to the variable of preparedness self-efficacy. This is encouraging because the implications are that this scale could be used in

additional studies that include English-speaking participants. More importantly, a scale that can be used in a variety of cultural and national settings can be interpreted as having high construct validity. More flooding research that originated in Holland is being translated to mitigation research done in areas such as the Mississippi Delta and Gulf Coast of the US (e.g. Texas A&M University Hazard Center researchers¹) and this scale now has been validated as useful in an English-speaking population.

As noted in the results, respondents with higher scores of media reliance (such as online social networking and automatic text alerts), and had significantly higher levels of Preparedness. The scale I created for media reliance was a novel scale, and also had fair reliability ($\alpha = .62$), with only three items left on the final scale of technology items used for gathering information about hazards (use of social media, use of text messages, and use of formal sources such as the National Oceanic and Atmospheric Administration webpage).

With regards to geographic vulnerability, our study had several limitations. Schwab (2010) indicates that “No systematic research evaluating Disaster Mitigation Act outcomes has been undertaken nationwide” but also describes how “more than 400 local hazard mitigation plans approved by FEMA.../...provides initial insight into the character of local responses during the first round of plan preparation under DMA (Boswell et al. 2008)” p. 18. These characteristics include some “best practices,” such as “use of the best available data on hazards from federal and state sources” as well as some shortcomings such as “local hazard mitigation plans had little linkage to other state or local plans” (p. 19). These positive and negative aspects of the characteristics from the mitigation plans are relevant for the underlying themes and findings for the current study on household preparedness.

Hypotheses and Research Questions. The first hypothesis was that psychological sense of community would be positively correlated with preparedness. This was found to be true at the bivariate level and within the regression model. In other words, participants who feel a greater sense of connectedness, belonging, and sense of social responsibility in what they perceive to be their “community” have higher levels of preparedness for hazard events. Other studies that focus on sense of place (Mishra, Mazumdar, & Suar, 2010) found a positive relationship between certain aspects of sense of place and levels of preparedness, but prior to the current study there was a lack of empirical evidence that psychological sense of community was related to disaster preparedness. One could conclude that psychological sense of community is a better predictor of preparedness than sense of place. This new information may be particularly useful for practitioners (i.e. emergency managers) because preparedness campaigns can be “channeled” through community and neighborhood connectedness and community associations. Based on my findings, we could infer that if the sense of community is well-established in a given neighborhood or municipality, preparedness programs are more likely to be successful.

The second hypothesis was that higher levels of preparedness self-efficacy would be positively related to preparedness. Similar to findings from Kievik and Gutteling (2011), this study confirms that there was a positive and significant relationship between preparedness self-efficacy and preparedness. This is important not only because it expands upon initial research related to self-efficacy and disaster preparedness, but because this lends to the broader emphasis in health science and social science research that self-efficacy is often a

critical part of the cognitive mechanism for fomenting and sustaining behavioral change (Henshaw & Freedman-Doan, 2009).

The third hypothesis was that confidence in local government to handle a hazard event would be significantly but negatively associated with preparedness. This hypothesis, in retrospect might have been better stated as a research question due to the mixed findings related to the effect of confidence in government on preparedness (Basolo et al., 2009; Terpstra, 2011). In some cases, confidence in government has shown to be related to higher levels of preparedness but in other studies the reverse effect was found, possibly due to a “diffusion of responsibility” effect. In the current study, the relationship between confidence in government and preparedness was significant and positive at the bivariate level, but significant and negative in the regression model. As described in the results, this was likely due to a suppressing effect by preparedness self-efficacy. In other words, participants who had higher scores of preparedness self-efficacy were also had lower scores on confidence in government. This might be the effect of respondents who embrace a highly independent and self-sufficient lifestyle, that also feel strongly that local government should or could have a limited role in assisting with preparedness and response. Additionally, this suppressor affect could also be reflective of conflicting findings in the general population with regards to the relationship between preparedness and confidence in government in that these two variables are not simply related to one another, but through complex mechanisms of outside variables. For example, in the Basolo et al., study, participants *perceived* that they were more prepared if they had high levels of confidence in government, but that their *actual* preparedness measures were not significantly related to confidence in government.

The fourth hypothesis for the current study was that experience with hazards would be positively associated with preparedness. Similar to findings from Mishra and Saur (2007), the results showed that respondents who indicated “yes” to having experience dealing with hazards in the past also has significantly higher scores on preparedness. This finding is counter to the stereotype of the southerner or coastal residence that refuses to evacuate or prepare for a hurricane because they have “been through it all before” and can handle a hazard event. Although evacuation may not be considered a part of preparedness, qualitative results from my study show that many respondents think of evacuation as a part of preparedness. These findings (the relationship of hazard experience with preparedness) also shows that experience with disasters and hazard events may be more cautious and diligent in dealing with hazards. People with more hazard experience may be more salient of weather patterns, check the local news, and engage in preparedness actions because they either 1) benefitted from preparedness actions during a past hazard event or 2) were not prepared in a previous hazard event and do not wish to relive the consequences of their lack of preparation. This study did not include an assessment of specification of the type of experience with regards to past losses or hazard type for experience, which might be valuable items to include in future research.

In addition to the main hypotheses, there were also several research questions. The first research question was “What is the impact of risk perception on preparedness?” The current study results show that respondents who had higher scores of risk perception were also significantly more prepared. This was true at the correlational level and in the regression model. Also, the role of risk perception as a mediator was confirmed with a

mediation analyses, with preparedness self-efficacy as a predictor. This adds to the literature on risk perception and preparedness, which is useful because meta-reviews by Bubeck, Botzen, and Aerts, (2012) cited a lack of empirical evidence that risk perception has an impact on actual preparedness for flooding. It should be noted that our preparedness scale was not exclusive to flooding preparedness as in many of the other studies on risk perception, and therefore it may be feasible to suggest that risk perception mediates preparedness (with preparedness efficacy as a predictor) in an “all hazards” scenario. This also has important implications for practitioners because preparedness campaigns that align well with perception of risk (i.e. using “fear appeals”) for persuasion may actually be useful, as long as self-efficacy is considered in the campaign materials (informing people that they *can* engage in preparedness).

The second exploratory research question was “What is the effect of social vulnerability on preparedness?” There was no significant effect of social vulnerability on preparedness in the current study. This finding is likely in part caused by the lack of diversity in the sample. As described previously, the sample was mostly white, middle to high income, residing in houses (not apartments or mobile homes). Also as described previously, this distribution of the sample was despite rather vigorous efforts to recruit respondents from vulnerable neighborhoods. For example, in the early phases of data collection and outreach I was scheduled to collect data at a mobile home park as a part of a community health fair through the Wake County Department of Health and Human Services, but the funding for the community health fair was suspended for unknown reasons and therefore I was unable to reach the this population. It would have been important and useful to collect data in

conjunction with the health fair because the residents would likely have been more trusting and responsive to my presence as a researcher because the health workers had already gained trust and legitimacy with the community.

For the third exploratory research question, I was interested in assessing the relationship between reliance on media and technology with preparedness actions. No readily available scales existed for this purpose, so I created the media reliance scale which included items that were designed to measure respondents' frequency of using various means of technology for gathering information about hazard events. This is similar to "information seeking" in the Kiviek and Gutteling (2011) study but is fundamentally different because in their study they presented respondents with pre-specified website that they could click on to gather more information while participating in the study when reading about a hypothetical hazard event (in the form of flooding), whereas my scale was designed to assess overall frequency (day to day) of gathering hazard information. Results showed a positive relationship between media reliance and preparedness. This shows that engaging with websites, using text alert systems, and using social media, are all associated with higher levels of preparedness. Although this is not entirely surprising, it is important information for emergency management practitioners because it identifies useful channels for delivering information about preparedness. Since TV and Radio were dropped from the scale in the factor analysis and were also not related to preparedness as individual items, it is feasible to suggest that preparedness campaigns would be best disseminated through social media (i.e. a facebook page for local news and weather), text message alert systems (a modern form of reverse 911 in which residents in a hazard zone are all sent text warnings), and through

formal web resources (government sponsored webpages). However, since preparedness scores were lower for respondents who did *not* have higher scores on media reliance, practitioners might want to evaluate the implication that users of “conventional” forms of technology and communication and media may be more vulnerable to hazard events because they are not as prepared. In other words, text and internet preparedness campaigns and alerts may bolster preparedness since the current findings show that this positive relationship exists. Complex mechanisms of information diffusion might be best assessed in future studies and should include evaluations about the aforementioned complexities of media reliance.

The fourth exploratory research question was related to assessing the predictability of preparedness by combining all of the key predictor variables. The predictors for the model, psychological sense of community, hazard experience, risk perception, preparedness self-efficacy, and media reliance all positively contributed to the model for a combined variance in the dependent variable of 37%. This means that 37% of change in behavior (increased preparedness) was caused by these variables. Again, the strongest regression coefficient for the model was preparedness self-efficacy ($\beta = .40$), followed by risk perception ($\beta = .21$), then media reliance ($\beta = .18$), and then the remaining variables of PSOC, confidence in government, and hazard experience, were comparable to one another (.10, -.12, and .10, respectively) in terms of beta weights. The considerable strength of risk perception and self-efficacy show that these two items are relatively good predictors for preparedness, especially in a multiple regression. Even though the bivariate correlation of preparedness self-efficacy with preparedness was stronger than all of the other bivariate correlations ($r = 0.49$), one

could still make a more accurate inference about the effect of self-efficacy from the multiple regression due to the consideration of multiple causes of variance on the dependent variable.

Again, confidence in government had a negative regression coefficient upon being entered into the model, whereas it previously displayed a positive effect at the bivariate level (with preparedness). Once again, this is likely due to net suppression. In other words, the sum variance of the two squared variables is greater than the variance of the regression/multivariate effect and therefore self-efficacy and confidence in government are more useful in the context of the one another than by assessing the predictor/dependent variable correlation separately. The suppression effect was unanticipated and possibly warrants further exploration in future research. The finding that psychological sense of community, hazard experience, risk perception, preparedness self-efficacy, and media reliance all positively contributed as significant predictors to the model confirm all of the hypotheses but also support the novel exploration of how all of these predictors affect preparedness in the presence of all of the respective predictors. Preparedness self-efficacy had the most influence on the model, ($\beta = .40$ and $p < .01$), followed by risk perception, ($\beta = .21$ and $p < .01$). Again, both of these predictors were high in reliability, and therefore the conclusions and implications from these two measures can be accepted without as many reservations that arose due to lower reliability in some of the other measures (specifically, the dependent variable of preparedness and the predictor variable of media reliance). However, it should be noted again that the overall model was much more useful for assessing in what psychosocial conditions might preparedness be greatest. The standardized coefficients and

the Pearson correlations for each significant relationship did not approach the variance strength of the overall model (37%).

Future research. There are many areas of research that can be expanded upon, given the measurement problems but also considering some of the promising findings from the current study. The major limitations could be corrected or improved upon, namely there should be additional development and testing of the two scales that had low reliability: preparedness and media reliance. Also, the external validity of future studies related to preparedness could be improved by garnering a much more diverse sample (economically, racially, and perhaps even geographically). For example, I did not use spatial flood mapping data in to guide the data collection locations. The use of flood zone mapping to guide data collection could have provided some more useful information about the level of preparedness.

Most important but also related to vulnerability, future research should include means in which more vulnerable populations can be accessed through identification of community gatekeepers, neighborhood canvassing, and other tactics. As cited in Nepal, Banerjee, Perry, and Scott, (2012) and West and Orr (2007), Spanish speaking populations, African American residents, and other diverse groups have ways of communicating hazard information (sharing and receiving) that is often different than information gathering techniques used in the general population. Therefore, it would have been useful (and also morally important) to be able to make interpretations about these diverse groups with regards to the predictor variables as well as the dependent variable of preparedness. Also, from a methodological point of view, the diverse sample would allow for analyses to be conducted on the variable of social

vulnerability to assess its relationship with other predictor variables as well as with criterion or outcome measures.

Also, a better scale of preparedness should be developed for future research. As described in the literature and method section, many researchers use preparedness intentions or intentions to prepare, and therefore I chose to use actual preparedness because this arguably a better assessment of how residents would be equipped to handle an actual hazard event. The scale used in the current study was adapted from an earthquake readiness measure, although it had undergone some adaptations for some studies for flood and tornado preparedness, the reliability findings from the current study suggest that there is a need for an all hazards preparedness scale. As some researchers have also indicated, the conceptualization of hazard phases can be very complex and should also be specified in the future (Neal, 1997). Specifically, the current study was designed to assess preparedness during a non-hazard period, in other words, normal day-to-day life. However, as Neal (1997) indicates, preparedness for many practitioners and even residents may be more accurately conceptualized and assessed in days immediately before a major hazard event. Also, results from the qualitative questions may provide some beginning foundations for a new or improved preparedness scale. For example, many respondents mentioned items that were not included in the preparedness scale: evacuation readiness (fuel for cars), getting pets ready for the hazard event, checking on family members and friends before the event, getting cash, and securing property (for potential wind damage). Given this broader list of preparedness, the new scale might be more reliable with the inclusion of these types of activities.

Finally, even though one of the major suggestions as a result of the current study is to

develop a more accurate all-hazards or multi-hazard preparedness scale, it may be useful to know more about the nature of participants' previous experience with hazards. For example, for the current study it was clear that hazard experience was positively related to preparedness, but there was no assessment of whether this was dependent upon different hazard types. In other words, if a person has experience an ice storm or blizzard event, are they more likely to be prepared for winter weather in the future or will their overall levels of preparedness increase for various types of hazards? Hazard researchers agree that there are some types of hazards that are under-studied, such as ice and blizzard events (e.g. Neal, 1982), and should be more carefully studied in the future. This was also evident in the qualitative responses from the current study, since 67% of participants expressed ice and winter weather as a concern. I speculate that this affect would be related to geographic locations, since some areas of the United States may be better equipped in dealing with certain natural hazard events that are more "centric" to their regional weather patterns.

Another important potential area for future research would be to identify specific cognitive mechanisms (such as risk perception, self-efficacy, fatalism, or emotions) that further explain or predict preparedness, and in which contexts (hazard type, temporal factors, geography), with which populations of people. For example, does social vulnerability mediate the effects of preparedness for any of these contextual factors, and if so, which factors and what is the magnitude of the effect? These proposed models would likely look like an intricate path analyses and would also require a larger and more diverse sample. Finally, since the current study was able to identify risk perception as a mediator on preparedness (with preparedness self-efficacy as the predictor variable), this mediating

relationship could be assessed again with the development of a more rigorous preparedness measure, as well as by testing alternative predictor variables, such as information seeking that was used in the Kievik & Gutteling, (2011) study, so that these complex relationships could be supported or clarified.

Implications for Policy. As described previous sections of the current study, most legislation related to disasters pertains to mitigation and recovery. The Disaster Mitigation Act and preceding legislation have been useful for reducing property damage and overall losses due to natural hazards such as flooding caused by hurricanes. For example, as cited in Schwab (2010), “The loss-prevention function has been illustrated through the Multi-Hazard Mitigation Council study of FEMA mitigation projects, which showed that for every dollar invested in mitigation, four dollars of disaster loss were avoided (Rose et al. 2007) p. 16.”

Despite these figures and the positive proactive nature of the legislation, there are areas for improvement. For example, preparedness is not addressed in federal disaster policy, other than within language that implies that preparedness activities are conceptually similar to mitigation. Preparedness is defined as just as one phase of the hazard cycle, and also seems to be more critical to the roles of practitioners than policy-makers. However, policy makers can benefit from collaborating with practitioners in bolstering preparedness because, as results from the current study suggest, preparedness can be predicted to a certain extent by knowing more about the social and demographic characteristics of a given city. A concrete example of this would be confidence in government as related to preparedness levels, which may be part driven not only by perceptions of local leaders but also of national legislation regarding disaster preparedness, response, and recovery.

Also, despite several national campaigns to improve preparedness, these efforts have likely been overshadowed by lingering national attention on issues related to domestic terrorism and international security. The states and local municipalities in particular are vulnerable to complexities of issue attention and scarcity of preparedness funding. For example, a lay person might notice that the ready.gov webpage is well developed in terms of design, information, and usability. However, there seems to be a lot of variation at the local levels for the development of webpages that are intended to be the “context specific” portals of information for residents. Perhaps this is an example of an issue that can also be addressed by practitioners, such as emergency management officials, in coordination with local government leaders, city planning officials, and community organizations.

Implications for Practice. Implications for practitioners, as described briefly in previous sections, relates to the findings that risk perception, preparedness self-efficacy, hazard experience, and use of media reliance in the form of modern technology (specifically internet and text alerts) all were positively associated with levels of preparedness. This is useful because practitioners, specifically planners, emergency management coordinators, first responders, public health workers, and community leaders could all benefit from designing preparedness campaigns that “tap into” residents’ risk perception (possibly through reminders of potential consequences such as loss of property), sense of preparedness efficacy (i.e. “you can do it”), hazard experience (“remember what happened last time”), and broad dissemination of preparedness information through mixed media channels.

With regards to challenges in data collection for the current project, specifically access to vulnerable populations, practitioners would benefit from acknowledging the

difficulty in commitment to building rapport, access to community gatekeepers, and building incentives for resident participation in hazard planning. These types of activities likely require funding support in order to effectively implement preparedness assessment and outreach in the most vulnerable communities. One way to achieve preparedness outreach in a way that is both sustainable and cost-effective might be to use pre-existing networks, community centers, and local structures. This is similar to suggestions for disaster resilience (Norris, et al., 2008), but could also be applied to preparedness efforts. Similar to efforts by Berke and colleagues (2011), investment and sustained involvement in community hazard planning and preparedness would be more likely to occur if the activities lead by practitioners are participatory, inclusive, flexible, and context specific.

Conclusions

Although predicting and assessing preparedness for hazards is a complex from a political, social, and cultural perspective, the findings of the current study suggest that social perceptions and embeddedness (psychological sense of community and confidence in government), cognitive factors (risk perception and preparedness self-efficacy), as well as other factors (hazard experience and media reliance) all positively relate to the current study's measure for preparedness. Despite some limitations with measurement (scales) and external validity (homogeneity of the respondents), this study provides some support for previous research on preparedness predictors and also potentially serves as a catalyst for forming new research questions as well.

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APPENDICES

Appendix A

Self-efficacy (Kievik & Gutteling, 2011)

Please rate each item regarding your level of confidence.

I feel confident that I....

1. Can seek information that will be useful regarding flooding or hazard preparedness:

Not Confident 1 2 3 4 5 6 7 Highly Confident

2. Can put together a complete emergency kit:

Not Confident 1 2 3 4 5 6 7 Highly Confident

3. Can correctly use an emergency kit for the right purpose:

Not Confident 1 2 3 4 5 6 7 Highly Confident

4. Can come up with a good emergency plan:

Not Confident 1 2 3 4 5 6 7 Highly Confident

5. Can prepare myself adequately for a disaster:

Not Confident 1 2 3 4 5 6 7 Highly Confident

6. Can protect myself against the possible consequences:

Not Confident 1 2 3 4 5 6 7 Highly Confident

7. Can respond adequately when a disaster occurs:

Not Confident 1 2 3 4 5 6 7 Highly Confident

8. Can evacuate in case of a disaster:

Not Confident 1 2 3 4 5 6 7 Highly Confident

9. Can help others if need be:

Not Confident 1 2 3 4 5 6 7 Highly Confident

Appendix B

Threat Salience/Risk Perception (Miller, Adame, and Moore, 2013)

Salience is defined as your awareness of the presence or prominence of a potentially threatening event. Please answer the following questions regarding how salient of an event tornados/ice storm/hurricane/severe heat event are for you.

1. How often do you think about potential tornado strikes/ice storm/hurricane/severe heat event?

Not Often 1 2 3 4 5 6 7 Very Often

2. How concerned are you about potential tornado strikes/ice storm/hurricane/severe heat event?

Not Concerned 1 2 3 4 5 6 7 Very Concerned

3. How prominent of an issue do tornadoes/ice storm/hurricane/severe heat event represent?

Not Prominent 1 2 3 4 5 6 7 Very Prominent

4. How obvious is the threat of tornados/ice storm/hurricane/severe heat event to you?

Not Obvious 1 2 3 4 5 6 7 Very Obvious

5. How often do you think about the threat of tornadoes/ice storm/hurricane/severe heat event?

Not Often 1 2 3 4 5 6 7 Very Often

6. How aware do you think the public is concerning the issue of tornados/ice storm/hurricane/severe heat event?

Not Aware 1 2 3 4 5 6 7 Very Aware

7. How often do you think about preparing for the possibility of a tornado strike/ice storm/hurricane/severe heat event?

Not Often 1 2 3 4 5 6 7 Very Often

8. How much do you care about tornadoes/ice storm/hurricane/severe heat event?

Not Much 1 2 3 4 5 6 7 Very Much

Appendix C

Preparedness Scale

1. I have obtained a working flashlight. (yes/no)
2. I have purchased a first aid kit. (yes/no)
3. I have taken a CPR training course in the past two years. (yes/no)
4. I have attended a meeting on how to better prepare for a disaster in the past two years.
(yes/no)
5. I have access to an alternative cooking source.
(e.g., gas barbecue) (yes/no)
6. I have a supply of essential medicines for illness and allergies. (yes/no)
7. I have obtained a supply of canned food that could be used in an emergency. (yes/no)
8. I have obtained a working battery radio. (yes/no)
9. I have stored water for survival. (yes/no)
10. I have considered the risk of a major earthquake/flood/ice storm when deciding to live in the house that I do now. (yes/no)
11. I have obtained a working fire extinguisher. (yes/no)
12. I have arranged a place to meet with family or friends after a tornado/hurricane/major ice storm. (yes/no)

Appendix D

Psychological Sense of Community Scale (abridged, from Wilkinson, 2007).

Scored on a scale of 1-5 (1 being strongly disagree, 5 being strongly agree).

1. Living in my neighborhood/apartment complex/mobile home community gives me a sense of community.
2. A feeling of fellowship runs deep between me and others in my neighborhood/apartment complex/mobile home community.
3. I feel loyal to the people in my neighborhood/apartment complex/mobile home community
4. I like to think of myself as similar to the people who live in my neighborhood/apartment complex/mobile home community.
5. I regularly stop and talk with people in my neighborhood/apartment complex/mobile home community.
6. I agree with most people in my neighborhood/apartment complex/mobile home community about what is important in life.
7. If I needed advice about something I could go to someone in my neighborhood/apartment complex/mobile home community.
8. My friendships and associations with others in my neighborhood/apartment complex/mobile home community mean a lot.
9. I think of community planning in my neighborhood/apartment complex/mobile home community as a “we” not a “they”.
10. I believe my neighbors would help me in an emergency.
11. I would work together with others on something to improve my neighborhood/apartment complex/mobile home community.

Appendix E

Use of Communication Systems & Technologies Scale (Media Reliance)

1. I use social networking such as Facebook, Twitter, and/or Google Plus to receive and share information related to weather events (snow, extreme heat, wind, rain).

Not Often 1 2 3 4 5 6 7 Very Often

2. I use an automatic alert system that sends text messages to my cell phone.

Not Often 1 2 3 4 5 6 7 Very Often

3. I use formal sources of information such as the website of the National Oceanic and Atmospheric Administration for tracking potentially hazardous weather events.

Not Often 1 2 3 4 5 6 7 Very Often

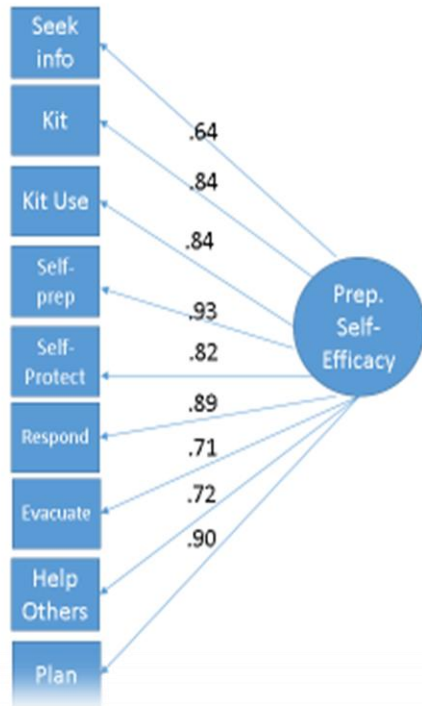


Figure 6 *Confirmatory Factor Analysis of Preparedness Self-efficacy*

Table 5 Confirmatory Factor Analysis Model Fit for Self-efficacy

CMIN			
Model	NPAR	CMIN	CMIN/DF
Default model	27	316.66	11.728
Saturated model	54	0	
Independence model	9	2865.367	63.675

Baseline Comparisons

Model	NFI	RFI	CFI
	Delta1	rho1	
Default model	0.889	0.816	0.897
Saturated model	1		1
Independence model	0	0	0

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	0.6	0.534	0.538
Saturated model	0	0	0
Independence model	1	0	0

NCP

Model	NCP	LO 90	HI 90
Default model	289.66	236.06	350.715
Saturated model	0	0	0
Independence model	2820.367	2648.558	2999.488

(Table 5
Continued)

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	0.921	0.842	0.686	1.02
Saturated model	0	0	0	0
Independence model	8.33	8.199	7.699	8.719

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.177	0.159	0.194	0
Independence model	0.427	0.414	0.44	0

AIC

Model	AIC	BCC	BIC	CAIC
Default model	370.66	372.277		
Saturated model	108	111.234		
Independence model	2883.367	2883.906		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	1.078	0.922	1.255	1.082
Saturated model	0.314	0.314	0.314	0.323
Independence model	8.382	7.882	8.903	8.383

HOELTER

Model	HOELTER	HOELTER
Model	0.05	0.01
Default model	44	52
Independence model	8	9

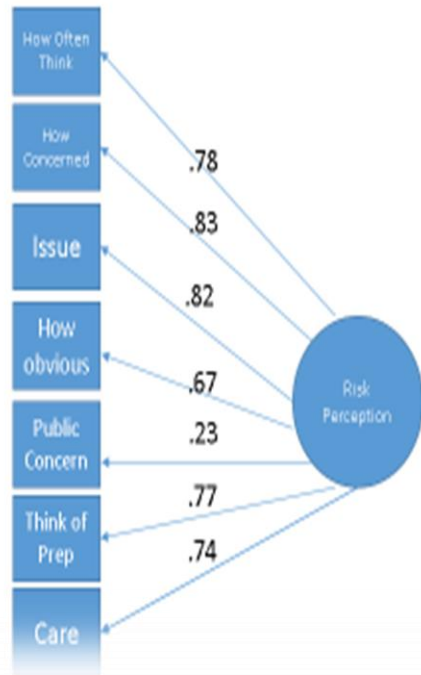


Figure 7 Confirmatory Factor Analysis Model of Risk Perception

Table 6 Confirmatory Factor Analysis Model Fit of Risk Perception

CMIN			
Model	NPAR	CMIN	CMIN/DF
Default model	21	81.2	5.8
Saturated model	35	0	
Independence model	7	1187.659	42.416

Baseline Comparisons			
Model	NFI Delta1	RFI rho1	CFI
Default model	0.932	0.863	0.942
Saturated model	1		1
Independence model	0	0	0

Parsimony-Adjusted Measures			
Model	PRATIO	PNFI	PCFI
Default model	0.5	0.466	0.471
Saturated model	0	0	0
Independence model	1	0	0

NCP			
Model	NCP	LO 90	HI 90
Default model	67.2	42.527	99.383
Saturated model	0	0	0
Independence model	1159.659	1050.614	1276.094

(Table 6.0
continued)

FMIN

Model	FMIN	F0	LO 90
Default model	0.236	0.195	0.124
Saturated model	0	0	0
Independence model	3.452	3.371	3.054

RMSEA

Model	RMSEA	LO 90	HI 90
Default model	0.118	0.094	0.144
Independence model	0.347	0.33	0.364

AIC

Model	AIC	BCC	BIC
Default model	123.2	124.2	
Saturated model	70	71.667	
Independence model	1201.659	1201.993	

ECVI

Model	ECVI	LO 90	HI 90
Default model	0.358	0.286	0.452
Saturated model	0.203	0.203	0.203
Independence model	3.493	3.176	3.832

HOELTER

Model	HOELTER	HOELTER
	0.05	0.01
Default model	101	124
Independence model	12	14

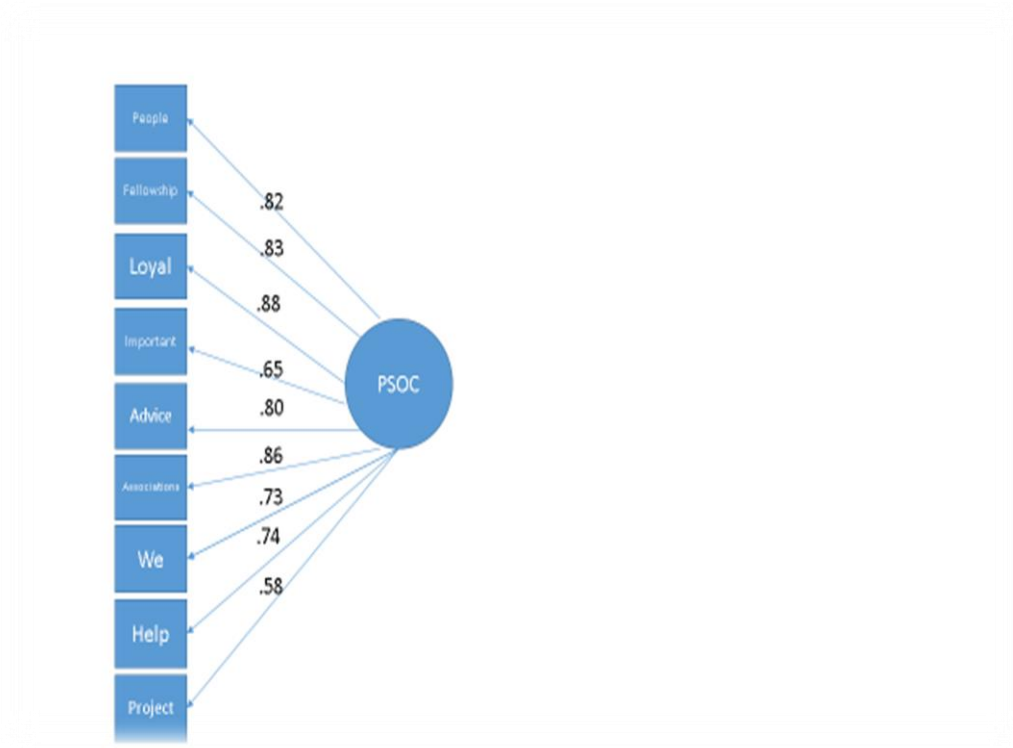


Figure 8 *Confirmatory Factor Analysis Model of Psychological Sense of Community*

Table 7 Confirmatory Factor Analysis Model Fit for Psychological Sense of Community

CMIN			
Model	NPAR	CMIN	CMIN/D F
Default model	27	146.596	5.429
Saturated model	54	0	
Independence model	9	2230.738	49.572
Baseline Comparisons			
Model	NFI Delta1	RFI rho1	CFI
Default model	0.934	0.89	0.945
Saturated model	1		1
Independence model	0	0	0
Parsimony-Adjusted Measures			
Model	PRATIO	PNFI	PCFI
Default model	0.6	0.561	0.567
Saturated model	0	0	0
Independence model	1	0	0
NCP			
Model	NCP	LO 90	HI 90
Default model	119.596	85.335	161.376
Saturated model	0	0	0
Independence model	2185.738	2034.77	2344.051

Table 7.0
(continued)
FMIN

Model	FMIN	F0	LO 90
Default model	0.426	0.348	0.248
Saturated model	0	0	0
Independence model	6.485	6.354	5.915

RMSEA

Model	RMSEA	LO 90	HI 90
Default model	0.113	0.096	0.132
Independence model	0.376	0.363	0.389

AIC

Model	AIC	BCC	BIC
Default model	200.596	202.212	
Saturated model	108	111.234	
Independence model	2248.738	2249.277	

ECVI

Model	ECVI	LO 90	HI 90
Default model	0.583	0.484	0.705
Saturated model	0.314	0.314	0.314
Independence model	6.537	6.098	6.997

Table 8 Correlation Matrix

		1	2	3	4	5	6	7
Efficacy	<i>r</i>	1	.169**	.159**	.250**	.250**	.489**	.306**
	Sig.		0.002	0.004	0	0	0	0
	N	342	331	334	337	326	342	330
PSOC	<i>r</i>	.169**	1	.164**	0.052	0.087	.213**	.277**
	Sig.	0.002		0.003	0.347	0.122	0	0
	N	331	331	323	326	315	331	319
Risk Perception	<i>r</i>	.159**	.164**	1	.213**	.124*	.319**	.188**
	Sig.	0.004	0.003		0	0.027	0	0.001
	N	334	323	334	330	318	334	322
Media Reliance	<i>r</i>	.250**	0.052	.213**	1	.114*	.329**	0.105
	Sig.	0	0.347	0		0.041	0	0.057
	N	337	326	330	337	323	337	327
Hazard Experience	<i>r</i>	.250**	0.087	.124*	.114*	1	.238**	.130*
	Sig.	0	0.122	0.027	0.041		0	0.02
	N	326	315	318	323	326	326	322
Preparedness	<i>r</i>	.489**	.213**	.319**	.329**	.238**	1	.131*
	Sig.	0	0	0	0	0		0.017
	N	342	331	334	337	326	342	330
Confidence Govt	<i>r</i>	.306**	.277**	.188**	0.105	.130*	.131*	1
	Sig.	0	0	0.001	0.057	0.02	0.017	
	N	330	319	322	327	322	330	330

** . Correlation is significant at the 0.01 level

*. Correlation is significant at the 0.05 level.

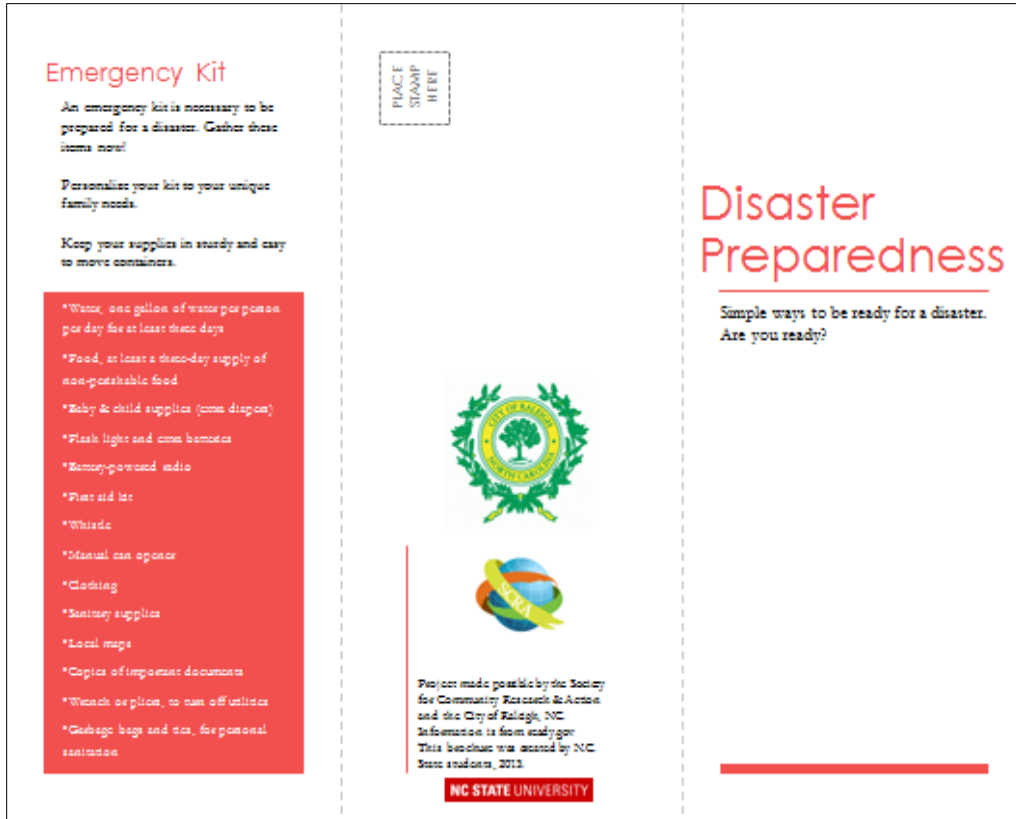


Figure 9 Outreach Materials (Brochure Side One)



First Aid Kit

Your first aid kit is an essential part of an emergency kit.

- Latex gloves
- Sterile dressings
- Cleansing agent and antibiotic ointments
- Burn ointment
- Adhesive bandages
- Eye wash solution
- Thermometer
- Aspirin
- Anti-diarrhea medication
- Antacid
- Band-aids
- Scissors
- Petroleum jelly
- Penicillin medication

• Also, consider taking a CPR class to be prepared for emergencies.

Have a Plan

- Planning ahead will help you have the best possible response to a disaster.
- Create a plan for communicating with family and friends.
- Have a designated meeting location for your family.
- Watch T.V., listen to the radio, or check online for updates.

How to Shelter-In-Place

- Choose an interior room or an area with as few windows and doors as possible.
- Bring your family and pets inside.
- Lock the doors and close the windows.
- Take emergency kit.
- Turn off any forced air systems.

If you are in a mobile home or car during a tornado, it is safer to be outside in a ditch with your hands covering your head!



Be Pet Prepared



Many evacuation shelters now offer a place for pets during emergency events.

- Have current ID tags on a security flasher collar or microchips.
- Have current photos of your pet.
- Have a secure pet carrier or leash.
- Spray and groom your pet. Pet overpopulation can increase the number of animal casualties in a disaster.
- If you need to evacuate and are faced with leaving your pet behind, call your vet to ask about boarding options until you can return.

Animal Survival Kit

- Food
- Bottled water
- Medications
- Veterinary records
- Cat/litter pan
- Food dishes

Figure 10 Outreach Materials (Brochure Side Two)