HURRICANE MITIGATION DECISION-MAKING:

AN APPLICATION OF THE THEORY OF PLANNED BEHAVIOR

by

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ABSTRACT

This thesis explores how emotions and perceptions of possible mitigation options influences the hurricane mitigation decision making processes of homeowners. It utilizes the theory of planned behavior to guide the design of a test of how homeowners' attitudes, the influence of important persons in their lives, and their perceptions of the characteristics of the mitigation actions impact their intention to complete hurricane mitigation actions. The study also extends the existing literature by exploring how different types of emotional responses towards hurricanes vary in their influence on the household's mitigation decisions. The analysis utilizes data from a survey sent to a random sample of 2500 households in the eastern half of North Carolina. Results suggest that the theory is helpful in explaining the underlying mechanisms of individual homeowners' hazard mitigation decision making. Further, they provide the basis for suggestions on how to best motivate homeowners to complete these actions in the future.

Chapter 1

INTRODUCTION

In the last two decades, federal government expenditures for disasters have significantly increased (Tierney, 2014). In the case of hurricanes, the federal government has repeatedly exceeded its annual budget and allocated additional funds to conduct response and recovery operations (Hoople, 2013). For example, following Hurricanes Katrina, Rita, and Wilma in 2005, the federal government allocated an additional $100 billion beyond the annual budget for the recovery of impacted areas along the Gulf Coast (Hoople, 2013). Nearly a decade later, the federal government supplemented the annual response budget with $48 billion to assist the recovery efforts following Superstorm Sandy in 2012 (Hoople, 2013). While it may seem inevitable that disasters will continue to impact our nation, it is possible to reduce the federal government's disaster response expenditures through an increased use of disaster mitigation. In the United States, the latest cost-benefit analyses show that for every $1 invested in the completion of a mitigation action $6 are saved during disaster response and recovery efforts (Multihazard Mitigation Council, 2017). One possible way to lower the federal government's disaster recovery expenditures is to increase the number of hurricane mitigation actions taken by homeowners. Even though there is great interest within federal and state governments to increase hurricane mitigation in coastal areas, there continues to be a lack of participation by homeowners (Kunreuther, 2006).

A number of studies have explored why mitigation is not more common. They have identified more than fifty distinct factors that influence the willingness of individual homeowners to complete mitigation actions. Factors previously studied include everything from demographic characteristics to risk perception to physical features of the home to prior hazard experiences (Asgary & Willis, 1997; Atreya, Ferreira, & Michel-Kerjan, 2015; Becker, Paton, Johnston, & Ronan, 2013; Botzen & van den Bergh, 2012; Browne & Hoyt, 2000; Ge, Peacock, & Lindell, 2011; Grothmann & Reusswig, 2006; Lindell, Arlikatti, & Prater, 2009; Lindell & Hwang, 2008; Lindell & Whitney, 2000; Peacock, 2003).

Several of these studies, which are elaborated in Chapter 2, have indicated that emotional responses to hazards are an important factor that may influence the willingness of homeowners to complete mitigation actions. The research findings of several studies indicate that a homeowner's emotional responses to hazards can positively increase their willingness to complete mitigation actions or purchase hazard insurance (Botzen & van den Bergh, 2012; Ge et al., 2011; Lindell & Hwang, 2008; Peacock, 2003). However, other studies have failed to find significant evidence that emotion influences a homeowner's mitigation decision making process (Becker, Paton, Johnston, & Ronan, 2012; Becker et al., 2013; Kousky, 2011; Lindell & Whitney, 2000; Petrolia, Landry, & Coble, 2013). Because of these mixed findings, further research is needed to clarify the role of emotion during the mitigation decision making processes of homeowners.

This thesis addresses that need by utilizing the theory of planned behavior to empirically test how emotions experienced by individual homeowners, along with the

influence of others and the perceptions of mitigation actions, affect households' mitigation decisions. Specifically, this study aims to address the following question:

What role do emotions, the influence of others, and perceptions of the characteristics of mitigation actions have on the mitigation decision making processes of individual homeowners?

Utilizing a sample of individual homeowners from the eastern half of North Carolina, the study explores how the three components of the theory of planned behavior impact the hurricane mitigation decision making process. The results and analysis of this data provide both practical and theoretical contributions. The results can be used to provide suggestions on how to better target and encourage homeowners to successfully undertake and complete mitigation actions to strengthen their homes against hurricanes. Additionally, the analysis contributes to knowledge by providing both a detailed outline for how the theory of planned behavior can be applied to future hazard-related studies and a greater insight on the role emotion plays on hurricane mitigation decision making.

The remainder of this introduction explains the theory of planned behavior and gives an overview of how the theory was applied to this study. Chapter 2 discusses the findings of the existing literature that were used to inform this study. Chapters 3 and 4 provide an overview of the methodology and the results of this study, while the remainder of the thesis discusses the findings and conclusions at length.

1.1 Overview of the Theoretical Framework

This section provides a detailed description of the theory of planned behavior and how it was applied for the purposes of this thesis. The goal of this section is to provide enough information that the reader can understand how this theory is

applicable to the mitigation context. This section concludes by stating the hypotheses for the statistical analyses that are described in Chapter 4.

Ajzen & Fishbein have done extensive work on the interaction between an individual's attitude and the completion of a variety of behaviors, including job performance, voter participation, and racial prejudice (Ajzen, 1991; Ajzen, 2011; Ajzen & Fishbein, 1969; Ajzen & Fishbein, 1972; Ajzen & Fishbein, 1973; Ajzen & Fishbein, 1977; Fishbein & Ajzen, 2010). Though the theory of planned behavior has not yet been applied to hazard mitigation behavior, its use in prior work suggests it may provide valuable insights for this context as well. Given the nuances of intention to complete a behavior explained by the theory, this application provides a new way for researchers to understand the underlying complexities of making mitigation decisions.

According to the theory of planned behavior, three variables influence an individual's intention: attitude toward the behavior, subjective norm, and perceived behavioral control. The first is an individual's attitude toward the behavior (Ajzen, 1991). Attitude is defined as an individual's tendency to consistently respond to an object, either positively or negatively (Ajzen & Fishbein, 1973). An individual's attitude is seen to represent their personal understanding of the world and their evaluation of the relevant object (Ajzen & Fishbein, 1972; Ajzen & Fishbein, 1977). This variable measures the degree to which an individual either positively or negatively views the behavior (Ajzen & Fishbein, 1973; Ajzen, 1991). The second variable is subjective norm, which is the perceived social pressure from important persons in their lives to perform the given behavior (Ajzen, 1991). The third variable is perceived behavioral control (Ajzen, 1991). This measures how easy or difficult

individuals perceive performing the actual behavior to be within the context of their lives (Ajzen, 1991). Ultimately, the theory states that there should be a positive relationship between these three variables and an individual's intention to perform the behavior. In the context of the theory of planned behavior, behavior refers to the ability to predict the specific behavioral intentions of an individual in a well-defined situation (Ajzen & Fishbein, 1973). The greater the perceived behavioral control and the more positive an individual's attitude and subjective norm are, the greater the intention should be of that individual to complete the behavior (Ajzen, 1991).

The theory of planned behavior can be best understood through the following diagram developed by Ajzen (1991, p. 182).

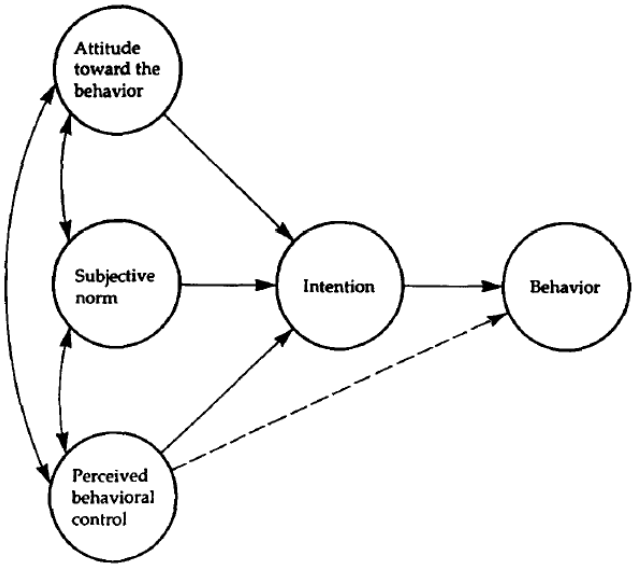


Figure 1 Theory of Planned Behavior Diagram

As shown in Figure 1, attitude, subjective norm, and perceived behavioral control all interact and influence one another. Each of these variables also affects intention, which ultimately influences whether an individual performs a behavior. The

significance and role that each of the three variables play varies based on the particular choice that needs to be made by an individual (Ajzen & Fishbein, 1969; Ajzen, 1991). The perceived behavioral control variable can also directly influence the completion of a behavior. This means that the perceived ease or difficulty of completing that behavior could play a larger role than the other components in determining whether the behavior is completed (Ajzen, 1991).

The theory of planned behavior can be applied to the case of hurricane mitigation decision making. In this case, the behavior is the completion of a hurricane mitigation action. Eight mitigation actions were included in the survey and were used for data analysis: installation of wind resistant shingles, application of special foam adhesive under the roof, installation of hurricane shutters, installation of impact resistant windows, use of hurricane straps to connect the walls and roof, elevation of appliances above flood levels, installation of water resistant siding, and elevation of the home on piles. Given that the behavior is completion of the mitigation action, the intention component is the individual homeowner's intention to complete the specific hurricane mitigation action.

The attitudinal component of the theory is reflected by the emotions an individual feels about the hurricane event itself. This attitudinal component is captured in the survey by asking the participants to rate how much they dread, fear, and worry about hurricanes, to select which emotions best capture their feelings about hurricanes, and to indicate their hurricane risk perception levels (see Appendix A for complete survey). For this case, the relevant subjective norm is if the individual's family members and friends have previously completed mitigation actions. Finally, the perceived behavioral controls for hurricane mitigation decision making can be thought

of as two different dimensions. The first dimension reflects the "costs" of completing hurricane mitigation actions. This dimension includes the cost and effort it takes to install the mitigation action. The second dimension reflects the "benefits" of completing hurricane mitigation actions. These "benefits" include the potential resale value of the action and the action's ability to protect lives and property. A diagram of this broad application of the theory of planned behavior is shown in Figure 2. Please note that due to the nature of the dataset this analysis only covers up to the intention to complete the behavior. As such, the components of the theory included in this analysis are those which fall within the dashed box.

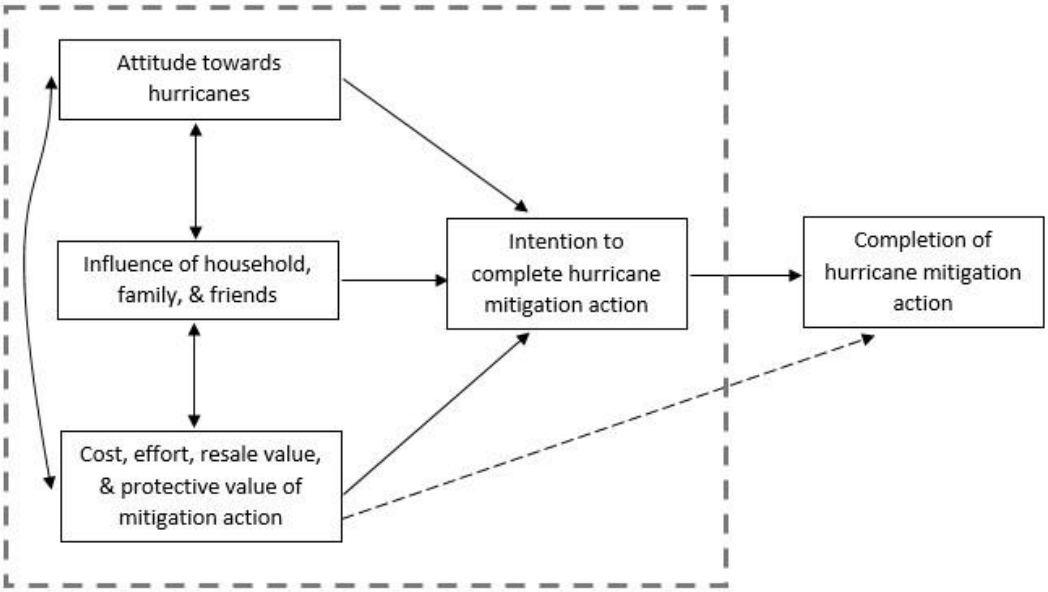


Figure 2 Application of the Theory of Planned Behavior

Based on prior research that utilized the theory of planned behavior, hypotheses can be formulated specific to the hurricane mitigation decision making process. As mentioned previously, it is expected that a positive relationship would be

found between the three components of the theory and an individual's intention to perform the behavior (Ajzen, 1991). Based on this claim by Ajzen (1991), the following four hypotheses are proposed.

Hypothesis 1a: As the degree that an individual homeowner's risk perception, dread, fear, and worry towards hurricanes become greater, the intention of the homeowner to complete the hurricane mitigation action increases.

Hypothesis 1b: If an individual homeowner indicates that thinking about hurricanes evokes a negative emotional response, the intention of the homeowner to complete the hurricane mitigation action increases. On the other hand, if an individual homeowner indicates that thinking about hurricanes evokes either a positive or no emotional response, the intention of the homeowner to complete the hurricane mitigation action decreases.

Hypothesis 2: If the individual homeowner indicates that he/she has been influenced by family or friends who have previously completed mitigation actions, the intention of the homeowner to complete the hurricane mitigation action increases.

Specifically regarding the perceived behavioral control component, a study conducted by Ajzen, Rosenthal, & Brown (2000) found that willingness to pay for a good increases as the perceived overall value of the good increases. Given this finding, the following hypothesis is proposed.

Hypothesis 3: The more favorably the individual homeowner views the characteristics of the mitigation action (cost, effort to install, resale value, and protective value), the intention of the homeowner to complete the hurricane mitigation action increases.

Ajzen & Fishbein's extensive work on the effect an individual's attitude ultimately has on their behavior provides a robust theoretical framework for understanding the willingness of individual homeowners to complete hurricane mitigation actions (Ajzen, 1991; Ajzen, 2011; Ajzen et al., 2000; Ajzen & Fishbein, 1969; Ajzen & Fishbein, 1972; Ajzen & Fishbein, 1973; Ajzen & Fishbein, 1977). Specifically, the theory of planned behavior postulates that attitude, subjective norms, and perceived behavior controls affect both the intention of an individual to complete a behavior and the completion of that behavior (Ajzen, 1991; Ajzen, 2011). In the case of hurricane mitigation, an individual's attitude towards hurricanes, the influence of important people in his/her life, and the individual's perception of the characteristics of the mitigation action itself affect both the intention to complete and the actual completion of the hurricane mitigation action. Chapter 2 provides a discussion of the existing literature relevant to the three components of the theory of planned behavior.

Chapter 2

LITERATURE REVIEW

A literature review of the concepts that influence an individual homeowner's willingness to complete mitigation actions indicates that the effects of attitude, influence of others, and perception of the characteristics of the mitigation action are not fully understood (Atreya et al., 2015; Baumann & Sims, 1978; Botzen & van den Bergh, 2012; Browne & Hoyt, 2000; Ge et al., 2011; Grothmann & Reusswig, 2006; Holt & Laury, 2002; Landry & Jahan-Parvar, 2011; Lindell & Whitney, 2000; Lindell et al., 2009; Peacock, 2003; Petrolia et al., 2013). This chapter begins by providing a brief discussion on hurricane mitigation. The remainder of the chapter includes a discussion of the existing literature organized by each of the three components in the theory of planned behavior. The chapter concludes by addressing several other concepts that the existing literature has identified as influential in the hurricane mitigation decision making process. Though these concepts do not fall within one of the three components identified in the theory of planned behavior, these concepts were included in the analysis as control variables. Prior hurricane experience and socioeconomic status were selected as control variables because they influence individual homeowners' perceptions of hurricanes and the ability of these homeowners to purchase mitigation actions. As such, the inclusion of these two concepts in the analysis was crucial to be able to have a complete understanding of which factors influence the hurricane mitigation decision making process.

2.1 A Discussion on Mitigation

Hurricane mitigation decision making is the process individual homeowners undergo when deciding whether to take protective actions to strengthen their homes

against any future hurricane events (Lindell & Perry, 1992). The importance of studying hazard mitigation decision making is directly related to the increasing annual disaster expenditures of government organizations nationwide. As Kunreuther (2006) noted, there is great interest within government organizations to increase the prevalence of mitigation actions in individual households; however, there is a continual lack of interest and participation from homeowners. By studying the hazard mitigation decision making processes undergone by this sample of homeowners, crucial insights can be gained on how to increase the prevalence of mitigation actions nationwide.

Simply put, a mitigation action is an action taken by an individual to strengthen their property in order to reduce the impacts of future hazard events (Department of Homeland Security, 2017). As recommended by the Federal Emergency Management Agency (FEMA), mitigation actions can be completed to reduce the impacts of flooding and severe winds caused by hurricanes (Federal Emergency Management Agency [FEMA], 2013). For flooding, FEMA recommends several mitigation actions for individual households to complete in order to protect their property, including elevating structures to be above the base flood level, raising utilities above expected flood levels, anchoring manufactured homes, wet flood-proofing basements, using water resistant paints, and installing backflow valves (FEMA, 2013). For severe winds, FEMA suggests that individual households improve the building envelope, install hurricane shutters, retrofit any existing gable end walls, reinforce garage doors, improve roof coverings and structures, and use hurricane clips (FEMA, 2013).

While there are many possible mitigation actions for homeowners to undertake, this thesis focuses only on the eight actions included in the project survey. As mentioned previously, these hurricane mitigation actions are the use of wind resistant shingles, the application of a special foam adhesive under the roof, the use of hurricane shutters, the installation of impact resistant windows, the use of hurricane straps to connect the walls and roof, the elevation of appliances above flood levels, the use of water resistant siding, and the elevation of the home on piles (see Appendix A for the complete survey). These specific actions were selected for inclusion in the survey for several reasons, including their ability to best protect properties against hurricanes, the frequency of these actions being utilized nationwide, and their inclusion in the Insurance Institute for Business & Home Safety FORTIFIED Home Hurricane Program Gold Standards (Malik, Brown, & York, 2013).

2.2 Existing Literature Relevant to Attitude towards Hurricanes

In this application of the theory of planned behavior, the concept of emotion is essential to understanding an individual homeowner's attitude towards a hurricane. In the case of hurricane mitigation decision making, emotion is most appropriately understood through the affect heuristic. When an individual thinks of hurricanes, this thought evokes an affect, meaning that he/she interprets hurricanes either positively or negatively (Slovic, Finucane, Peters, & MacGregor, 2004). Based on that interpretation, the individual then associates a specific emotion with hurricanes (Slovic et al., 2004). Prior research suggests that this affective response may continue to influence the individual's perceptions and decision making processes long in to the future (Mulligan & Scherer, 2012; Slovic et al., 2004). The emotion evoked because of the affective response towards hurricanes is what becomes important in determining

the final decision, or lack thereof, that an individual will make about their intention to complete a mitigation action (Slovic et al., 2004). Therefore, the decision making process is unique for each individual and final decisions can also vary greatly among individuals (Slovic et al., 2004).

During the decision making process, emotion also serves as a "relevance detector" for hurricanes (Frijda, 1986a; Frijda, 1986b). This means that having an emotional response directed towards a hurricane causes the individual's interest to be sparked (Frijda, 1986a). Once an individual experiences an emotion directed towards a phenomenon, the individual realizes from then on that the phenomenon is a relevant part of their lives (Frijda, 1986b; Mulligan & Scherer, 2012). This suggests that the emotional responses that individual homeowners have directed towards hurricanes greatly influence their mitigation decision making processes. Regarding the theory of planned behavior, an individual's affective response and the emotion evoked by that response provide a way to measure an individual's attitude towards hurricanes. Therefore, it is important to understand the emotional responses each individual has towards hurricanes because they can drastically vary and impact the decision making processes among the sample of homeowners.

Limited research has been done which examined the influence of affect on hazard mitigation decision making. However, the existing literature indicates that emotions influence individuals' risk perceptions and motivate them to complete mitigation actions (Siegrist & Gutscher, 2006; Terpstra, 2011). In a study conducted in the Netherlands, participants indicated in a questionnaire whether they had positive, negative, or no emotional responses regarding flood hazards (Terpstra, 2011). All participants resided in either flood-prone coastal or riverfront communities (Terpstra,

2011). The findings showed that having either a positive or negative emotional response towards the flood hazards significantly increased the participants' intentions to take protective actions (Terpstra, 2011). However, research conducted by Siegrist & Gutscher (2008) shows that experiencing emotions towards hurricanes does not necessarily mean an individual will actually complete the mitigation action. In a study conducted in Switzerland following severe flooding in 2005, researchers conducted in-person interviews with both persons residing in flood-prone areas who were impacted by that flooding event and those who were not impacted (Siegrist & Gutscher, 2008). The difference in conclusions between these two studies suggests that living in a flood-prone area and having an emotional response to a flood-related hazard are not enough to persuade individual homeowners to complete mitigation actions. Instead, it appears that emotion is one of several factors that influences the decision making process. As such, it is also important to understand how the other components outlined in the theory of planned behavior impact the hurricane mitigation decision making processes of homeowners.

Additional studies have also explored the influence of hazard intrusiveness on the mitigation decision making process. Hazard intrusiveness is a psychological factor that is based on how frequently and in what ways individuals think about hazards (Ge et al., 2011; Lindell et al., 2009). Like emotion, hazard intrusiveness is a measure of an individual's perception of and affective response to a hazard. Though this is not a variable utilized in this analysis, the results of these existing studies are important nonetheless for understanding how emotion impacts the hurricane mitigation decision making processes. Both Ge et al. (2011) and Lindell et al. (2009) found that hazard intrusiveness had large, positive, significant effects on the mitigation adoption

expectations of the participants. The results from the survey conducted by Ge et al. (2011) on a sample of Florida households indicated that higher hazard intrusiveness increased willingness to utilize hurricane mitigation incentive programs, including mitigation loan programs, flood insurance premium discounts, and property tax reductions. In their survey analyzing seismic hazards, Lindell et al. (2009) found that there was a positive, significant relationship between higher reported hazard intrusiveness and intention to adopt earthquake adjustments.

Other studies have researched the effects of specific emotional responses on the hazard mitigation decision making process. The findings of these studies were instrumental in determining which specific emotions to include in the survey instrument (see Appendix A for the complete survey). In an exploratory study conducted to determine the emotions felt by Dutch flood victims, participants were asked to rate the extent to which they experienced seven positive and seven negative emotions (Zaalberg, Midden, Meijnders, & McCalley, 2009). The results of this study indicated that the flood victims felt a range of emotions; including concern, fear, pleasure, and uncertainty (Zaalberg et al., 2009). Similarly, Terpstra (2011) aimed to determine if it was useful to distinguish between whether participants experienced positive affect, negative affect, or had no affective response to their prior flood hazard experiences. The findings suggested that there were noticeable differences between the effects of positive and negative affect on the participants' intentions to complete mitigation actions (Terpstra, 2011). Participants who experienced negative affect were significantly more likely to intend to complete mitigation actions than those participants who experienced either positive affect or had no affective response (Terpstra, 2011). Ultimately, these studies indicated that it was necessary to include a

range of emotions -- including positive, negative, and lack of – in the survey to best understand the role emotion plays in the hurricane mitigation decision making process.

The existing literature has also covered the effects of a couple of specific emotions on hazard risk perception and mitigation decision making at length. These emotions are dread and worry. Dread is an emotion in which an individual feels an event is catastrophic, personally threatening, and difficult to prevent (Slovic, Fischhoff, & Lichtenstein, 1980). In a study asking participants to rate their perceived benefit and risk for several new technologies, perceived risk was found to be significantly, positively correlated to feelings of dread (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 2000). This means that the newer, more dreaded technologies tended to result in higher perceived levels of risk than those technologies which participants reported to dread less (Fischhoff et al., 2000). In a study assessing the risk level of ninety different hazards, Slovic et al. (1980) found that hazards which were viewed as risky, uncontrollable, and of catastrophic potential were positively, significantly correlated with feelings of dread toward that hazard. Additionally, findings from another study on technological risks indicated that the more an individual dreads a hazard, the more they want actions and regulations to be taken in order to reduce the risk (Slovic, 2000). This suggests that dreading a hurricane may influence a homeowner to complete mitigation actions. Terpstra (2011) also found that higher reported levels of dread increased individuals' intentions to complete mitigation actions. Based on these findings, it is likely that feelings of dread directed towards hurricanes may positively influence the intention of individual homeowners to complete hurricane mitigation actions.

In the existing literature, worry is an emotion regarding the overall level of concern an individual feels towards a hazard (Asgary & Willis, 1997; Ge et al., 2011). A sample of individual homeowners residing in Florida were asked to rate their level of worry that a future hurricane may impact their community (Ge et al., 2011). The findings of this study indicated that as worry increased, the installation of hurricane shutters significantly increased as well (Ge et al., 2011). Asgary & Willis (1997) asked a sample of households located in seismic-prone regions of Iran to indicate their level of worry about the threats of earthquakes to their lives. However, the findings of Asgary & Willis (1997) did not show any support between the level of worry directed towards earthquakes and the adoption of hazard mitigation actions. The difference in significance between these two studies' findings could be due to a number of things. It is possible that the profound difference in economic status between the sample of households in Florida and the sample of households in Iran could explain the difference between willingness of these households to complete mitigation actions. It is also possible that households are more willing to mitigate to protect against hurricane hazards than against earthquake hazards. A difference in the gender composition between these samples may also explain the difference in willingness to complete mitigation actions. Unfortunately, neither Asgary & Willis (1997) nor Ge et al. (2011) provide the exact gender composition of their sample respondents. A major finding from the research conducted by Turner, Nigg, & Paz (1986) was that men are much less likely to say they worry about earthquakes than do women. This suggests that the male participants in the studies conducted by Asgary & Willis (1997) and Ge et al. (2011) may have underreported their levels of worry about the hazards. Additionally, the difference in cultures between men in Florida and men in Iran may

mean that men in Iran may be even less likely to report feelings of worry. The difference in these existing findings suggest that further research is necessary to truly understand the effect of worry on hazard mitigation decision making.

The current state of the existing literature suggests that emotion is an important factor in understanding the hurricane mitigation decision making processes of individual homeowners. It appears that individual homeowners follow the affect heuristic and assign a positive and/or negative emotion towards hurricanes (Frijda, 1986a; Frijda, 1986b; Mulligan & Scherer, 2012; Slovic et al., 2004). The existing literature has briefly covered the effects of different emotions on the hazard mitigation decision making process (Ge et al., 2011; Lindell et al., 2009; Siegrist & Gutscher, 2006; Terpstra, 2011; Zaalberg et al., 2009). However, more research is needed to truly determine if the emotions a person feels towards hurricanes are a crucial component in understanding if they will ultimately complete mitigation actions. A better understanding of the specific emotions that individual homeowners experience is essential to capturing their attitude directed towards hurricanes.

Besides emotion, the concept of risk perception also influences individual homeowners' attitudes towards hurricanes. The risk perception of individual homeowners can be explained through the use of the psychometric paradigm. This paradigm explains how individuals cognitively understand and interpret the risk associated with hazard events (Slovic, Fischhoff, & Lichtenstein, 1986). The paradigm states that individuals evaluate risk based on their current and desired risk levels of a hazard, their personal views of the hazard, such as their knowledge and their level of dread, and their perceived likelihood of death from the hazard (Slovic et al., 1986). For the purposes of this research then, an individual's risk perception towards

hurricanes can be explained by the individual's current and desired risk levels of a hurricane, their personal views of hurricanes, including their personal hurricane knowledge and level of dread towards these hazard events, and their perceived likelihood of death from a hurricane. From this description of risk perception, it is evident that how an individual homeowner perceives their risk of hurricanes will greatly influence their overall attitude towards hurricanes. As such, the inclusion of risk perception in this study was imperative in order to fully understand the attitude component as outlined in the theory of planned behavior.

In the case of natural hazards, the possible outcomes are vast and difficult for decision makers to accurately estimate (Slovic, Kunreuther, & White, 1974). Extensive research has shown that persons residing in hazard-prone areas fail to perceive their risk of that hazard within a probabilistic framework (Kates, 1962; Slovic et al., 1974; Slovic et al., 1976). The results of a study conducted on flood plain residents indicated that the risk perception of residents changed significantly from when they first moved to the flood plain to the present day (Kates, 1962). This study also showed that even after experiencing a flood, the residents' willingness to adopt protective actions remained low (Kates, 1962). Similarly, Slovic et al. (1976) speculated that persons fail to perceive risk within a probabilistic framework due to repeated uneventful experiences with the hazard. In the case of homeowners in coastal North Carolina, it is likely that repeated hurricane seasons without problems, or even repeated near misses, influence the risk perception and hurricane mitigation decision making processes of these homeowners. In terms of the theory of planned behavior, this existing literature suggests that an individual's attitude towards hurricanes is greatly influenced by their hurricane risk perception.

It is not just natural hazards that individuals fail to perceive risk within a probabilistic framework. Studies on technological hazards also provide evidence of individuals failing to perceive risk within a probabilistic framework. In a study assessing seat belt usage and car accident probabilities, results indicate that individuals are only capable of worrying about and subsequently taking efforts to protect themselves against a small number of risks (Slovic, Fischhoff, & Lichtenstein, 2000). Those results also indicated that events with near zero probabilities are more frequently ignored by individuals (Slovic et al., 2000). Again, these results imply that coastal homeowners may be more likely to ignore the risks associated with hurricanes since they are low probability events. Based on the theory of planned behavior, it is hypothesized that having a negative attitude towards hurricanes influences an individual's intention to complete a hurricane mitigation action. However, the results of Slovic et al. (2000) suggest that if coastal homeowners are not worrying about hurricanes; then, it is unlikely they will have formed any attitudes towards hurricanes necessary to influence their intention to complete a mitigation action.

Previous empirical studies on hazard risk perception provide additional proof that how homeowners perceive the risk and probability of hazards impacts their intention to complete mitigation actions. In a study assessing seismic hazard risk perception of residents of New Zealand, participants were asked to state how likely it was that an earthquake would occur (Becker et al., 2013). The study found that if a resident believed there was a high probability of the occurrence of an earthquake then they indicated greater levels of willingness to complete earthquake preparedness actions (Becker et al., 2013). On the other hand, the results of this study also indicated that if a resident believed there was a low probability of the occurrence of an

earthquake then their willingness to complete earthquake preparedness actions was significantly lower (Becker et al., 2013). A study conducted in the Netherlands by Botzen & van den Bergh (2012) also found that the lower a resident believed their probability of flood risk to be, the lower their willingness to pay for flood insurance was.

Other studies have analyzed the influence of risk perception on hazard mitigation decisions (Asgary & Willis, 1997; Becker et al., 2013; Ge et al., 2011; Lindell & Hwang, 2008; Lindell & Whitney, 2000; Lindell et al., 2009; Peacock, 2003). Several studies have found a positive correlation between an individual's risk perception and their adoption of mitigation actions (Asgary & Willis, 1997; Becker et al., 2013; Lindell & Hwang, 2008; Lindell et al., 2009). Specifically regarding the perceived risk of hurricanes, Ge et al. (2011) & Peacock (2003) found that higher risk perception significantly increased the prevalence of envelope and shutter coverage among single-family homeowners in Florida. However, a study conducted on a sample of California residents regarding their seismic risk perception returned mixed results (Lindell & Whitney, 2000). The researchers found a negative, but insignificant, correlation between risk perception and adoption of mitigation actions; however, they also found a positive correlation between risk perception and the intention to adopt mitigation actions (Lindell & Whitney, 2000).

The current state of the existing literature suggests that additional research is needed to clarify the influence of risk perception of uncertain, high risk hazards, such as hurricanes, on the hazard mitigation decision making process. Currently, the existing literature fails to show clear directional support on the impact of risk perception on decision making during times of risk and uncertainty (Asgary & Willis,

1997; Becker et al., 2013; Ge et al., 2011; Lindell & Hwang, 2008; Lindell & Whitney, 2000; Lindell et al., 2009; Peacock, 2003). By including risk perception in this study, a better understanding of this concept's influence on an individual's attitude towards hurricanes and ultimately, their intention to complete mitigation actions can be gained.

2.3 Existing Literature Relevant to Influence of Others

In the theory of planned behavior, the second factor that influences intention to complete a mitigation action is known as the subjective norm, which is the perceived social pressure from important people in the respondent's life to perform the behavior (Ajzen, 1991). In the existing literature pertaining to hazard mitigation decision making, a couple of studies have explored the effects of the influence of others (Peacock, 2003; Zaalberg et al., 2009). In both studies, the influence of others was measured as the impact of the previous mitigation behavior of the respondent's family, friends, and neighbors on the individual homeowner participating in the study. The data used for this analysis also measured the influence of others in this manner.

Peacock (2003) studied the impact of informal social influences on the envelope and shutter coverage in a sample of coastal Florida homeowners. In this study, informal social influences were measured as a variable indicating whether the majority of the respondent's neighbors' properties had storm shutters (Peacock, 2003). The findings of this study indicated that informal social influences had a positive, significant relationship with the adoption of envelope and shutter coverage (Peacock, 2003).

Zaalberg et al. (2009) interviewed flood-prone residents of the Netherlands to explore the impact of the residents' existing social support on their preparedness

actions. Respondents were given a list of nine different persons and agencies and were asked to indicate from whom they had received social support during their previous flooding experiences (Zaalberg et al., 2009). These categories included the support of family, friends, and neighbors. The results of this study indicated that the presence of social support during a prior flooding experience had a negative impact on the intention of these respondents to take preventive actions (Zaalberg et al., 2009).

The difference between the findings of these two studies could be attributed to the stark difference in how these questions were asked. While Peacock (2003) asked respondents to indicate if other individuals they knew had taken mitigation actions, Zaalberg et al. (2009) asked respondents to indicate who provided them with support during their previous flooding experiences. Additionally, the types of actions of others used in these studies are quite different and measure two very different types of social behavior. Peacock's (2003) study asked respondents to indicate the social influence of another household's behavior, whereas Zaalberg et al.'s (2009) study asked respondents to indicate if they had been the recipient of any altruistic behavior during their disaster experience. The difference here is that the social behavior in Peacock's (2003) study serves as a positive "role model" example for mitigation and the social behavior in Zaalberg et al.'s (2009) study negates the need for a respondent to take additional mitigation actions since others previously provided adequate assistance during a disaster. Regardless, these findings suggest that including the influences of others in analysis is necessary in order to completely understand the hurricane mitigation decision processes of individual homeowners. A benefit to this application of the theory of planned behavior is that a gap in the existing literature regarding the influence of others during hazard mitigation decision making can hopefully be filled.

2.4 Existing Literature Relevant to Characteristics of the Mitigation Actions

In the theory of planned behavior, perceived behavioral controls also influence intention to complete a behavior. Perceived behavioral controls measure how easy or difficult individuals perceive performing the actual behavior to be within the context of their lives (Ajzen, 1991). The perceived behavioral controls for this study focus on the perceptions that the individual homeowners have about the characteristics of the eight mitigation actions. Specifically, the characteristics covered in the survey were the cost of the mitigation action, the effort it takes to install the action, the potential resale value of the action, and the action's ability to protect both lives and property. It is important to study individual homeowners' perceptions of the characteristics of mitigation actions because the theory of planned behavior argues that an individual's attitude towards that behavior, or the mitigation action itself, has more predictive potential than an individual's attitude towards the hazard itself (Ajzen, 1991; Ajzen & Fishbein, 1973; Lindell et al., 2009). However, individuals' attitudes towards the mitigation actions themselves have not been studied extensively in the existing literature.

Weinstein & Nicolich (1993) conducted the first research on this topic. Their model showed that there is a positive correlation between an individual's perception of the effectiveness of the mitigation action to provide protection from the hazard and the actual adoption of the action (Weinstein & Nicolich, 1993). In a study examining the prevalence of seismic hazard mitigation actions in over 1200 Los Angeles County and Bay area households, the perception of the cost of the mitigation action was found to play a significant role in the hazard mitigation decision making processes (Russell, Goltz, & Bourque, 1995). These researchers found that more expensive mitigation actions were far less likely to be adopted by participants (Russell et al., 1995). Two

studies examined respondents' perceptions of the cost of the action and the perceived efficacy of the action to protect persons and property from seismic hazards (Lindell & Prater, 2002; Lindell & Whitney, 2000). Unlike Russell et al. (1995), these two studies did not find the cost of the mitigation action to be significantly correlated with either intention to complete the action or actual adoption (Lindell & Prater, 2002; Lindell & Whitney, 2000). However, the findings from both Lindell & Whitney (2000) and Lindell & Prater (2002) showed that perceived efficacy to protect lives and property were positively, significantly correlated with both the participants' intentions to complete the action and the actual adoption of the action.

This thesis research aims to provide a greater understanding of the influence of the individual homeowner's perception of the characteristics of mitigation actions on the hazard mitigation decision making processes. By including the perceptions about the cost of the mitigation action, the effort it takes to install the action, the potential resale value of the action, and the action's ability to protect lives and property as measures in this analysis, hopefully a greater understanding of the potential impediments to purchasing these mitigation actions can be gained and ultimately overcome to increase the prevalence of these actions in coastal households nationwide.

2.5 Existing Literature Relevant to Control Variables

My review of the existing literature indicated that two additional concepts were important to include in order to capture the entireties of the hurricane mitigation decision making experiences and processes undergone by individual homeowners. These concepts are prior hurricane experience and a household's socioeconomic status. Though these concepts fall outside of the components included in the theory of planned behavior, the existing literature indicates that these concepts influence both

the way individuals think about hurricanes and their ability to afford mitigation actions. Because of this, these concepts were included as control variables during analysis.

Previous research studies on hazard mitigation have frequently included prior hazard experience as a variable (Atreya et al., 2015; Baumann & Sims, 1978; Becker et al., 2013; Botzen & van den Bergh, 2012; Browne & Hoyt, 2000; Grothmann & Reusswig, 2006; Lindell & Hwang, 2008; Lindell et al., 2009; Peacock, 2003; Petrolia et al., 2013). Each of these studies examined the influence of prior hazard experience on willingness to pay for both mitigation actions and hazard insurance.

Several studies found that prior hazard experience was positively, significantly correlated with intention to complete mitigation actions (Grothmann & Reusswig, 2006; Lindell & Hwang, 2008; Lindell et al., 2009; Peacock, 2003). Of these studies, three focused specifically on flood hazards (Grothmann & Reusswig, 2006; Lindell & Hwang, 2008; Peacock, 2003). These findings indicate the importance of the inclusion of prior hurricane experience as a control variable for this thesis research.

The existing literature has also explored the influence of prior hazard experience on demand for hazard insurance. These findings can also be used to better understand the influence of prior experience on intention to complete mitigation actions. Currently, there are mixed results on the influence of prior flood experience on the demand for hazard insurance. Browne and Hoyt (2000) estimated a demand model from flood insurance data, which indicated that prior flood experience significantly increased the purchase of flood insurance. In numerous studies of southern, coastal floodplain residents, prior flood experience was found to be positively correlated with flood insurance demand (Atreya et al., 2015; Baumann &

Sims, 1978; Petrolia et al., 2013). Though most studies found prior experience to have a positive effect on the demand for hazard insurance, one study does suggest that prior flood experience may lower the demand for flood insurance. In a study conducted with floodplain residents in the Netherlands, Botzen & van den Bergh (2012) found that prior flood experiences resulted in lower (though non-significant) willingness to pay for hazard insurance. However, this difference may be attributed to the high prevalence of community-level mitigation actions employed in the Netherlands. Regardless, these findings about the demand for hazard insurance suggest that prior hazard experience is an important element of the mitigation decision making process.

The second concept included as a control variable during analysis was a household's socioeconomic status. Prior studies found income to be positively correlated with completion of mitigation actions (Grothmann & Reuswigg, 2006; Peacock, 2003). In a study of residents residing in flood-prone urban Germany, Grothmann & Reuswigg (2006) found that higher incomes were correlated with the purchase of flood protection devices. Similarly, Peacock (2003) found that higher incomes were positively correlated with the prevalence of envelope and shutter coverage among Florida participants. Income was also found to positively influence the demand for hazard insurance (Botzen & van den Bergh, 2012; Browne & Hoyt, 2000; Landry & Jahan-Parvar, 2011; Petrolia et al., 2013). Several of these studies created flood demand models for the coastal regions of the United States, which showed that income was positively correlated with demand for flood insurance (Browne & Hoyt, 2000; Landry & Jahan-Parvar, 2011; Petrolia et al., 2013). Botzen & van den Bergh (2012) found income of the residents of flood-prone regions of the Netherlands to be positively correlated with willingness to pay for flood insurance.

These significant findings indicate that socioeconomic status is an important concept when considering hurricane mitigation decision making processes.

Figure 3 again depicts the theory of planned behavior as seen previously in Chapter 1. However, this figure also includes the relevant concepts for each of the theory's components that is utilized in the analyses discussed at length in the following chapters.

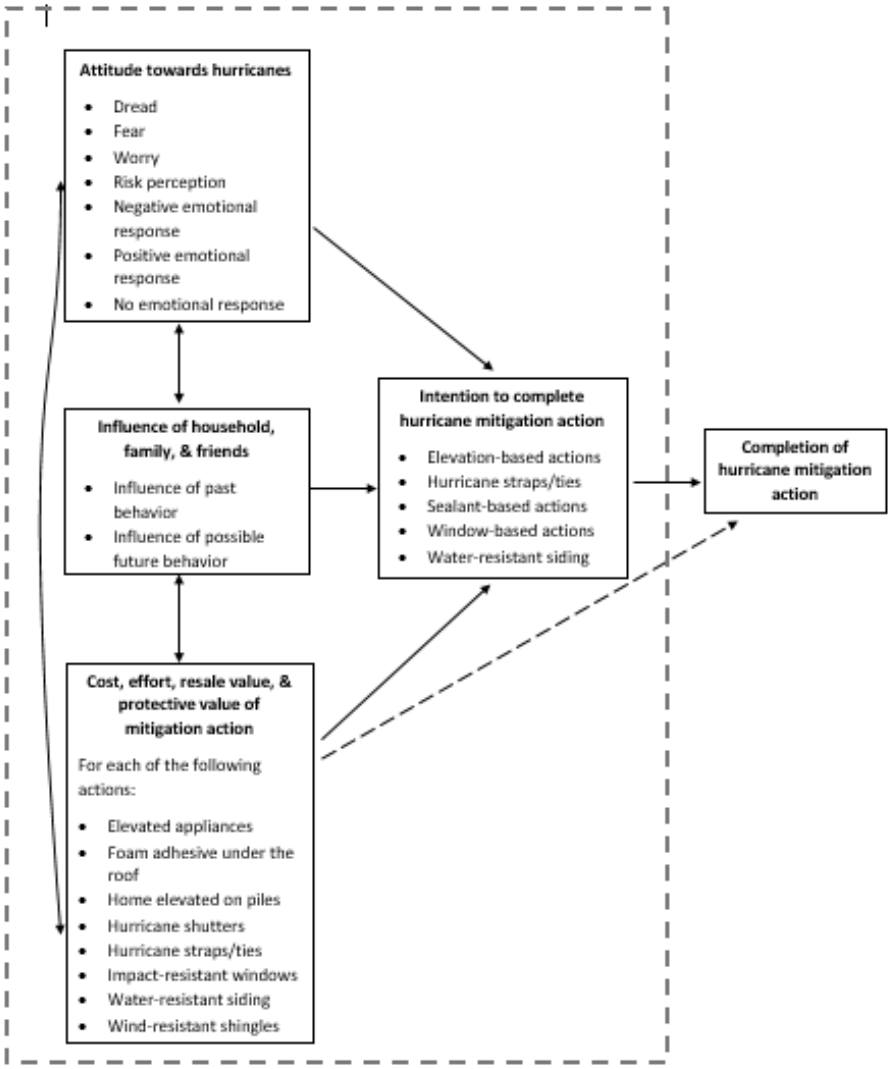


Figure 3 Theory of Planned Behavior Diagram with Measures

Chapter 3

METHODOLOGY

The survey data used for this thesis was collected as a part of an interdisciplinary National Science Foundation funded project. This project, titled "An Interdisciplinary Approach to Modeling Multiple Stakeholder Decision-making to Reduce Regional Natural Disaster Risk," aims to develop a framework incorporating five models which represent the hurricane mitigation action behaviors and decisions of homeowners, insurers, and the government. Through the use of relevant sociological, economic, and engineering concepts, these five models aim to realistically represent the following: (1) government regulation and incentive decisions, (2) insurer pricing and risk transfer decisions, (3) insurer competition, (4) individual homeowner purchase and retrofit decisions, and (5) a regional loss and retrofit simulation model (Wang, Davidson, Trainor, Nozick, & Kruse, 2017; Xu, Nozick, Kruse, Davidson, & Trainor, 2017; Jasour, Davidson, Trainor, Kruse, & Nozick, R&R). The data used to inform these models was obtained through a mailed survey. Mailed surveys are a useful tool for accurately representing participants' complex decisions and judgments because they allow respondents to share the nuances of these processes in an efficient manner (Slovic, Fischhoff, & Lichtenstein, 2000). As such, a mailed survey was an appropriate instrument to collect data about individual homeowners' hurricane mitigation decision making processes.

The mailed paper survey was distributed from the University of Delaware's Disaster Research Center to 2500 randomly selected households. This sample was purchased from Genesys, a branch of the Marketing Systems Group, which utilizes the United States Postal Service's address database system to select random addresses for

research purposes (Marketing Systems Group, 2017). This sample consisted of only single-family households located in the eastern half of the state of North Carolina. In order to be eligible to participate in the survey, respondents had to be at least 18 years old, own and live in the property the survey was mailed to, and contribute to the household's property insurance and home improvement decision making process.

3.1 Survey Distribution Procedures

The survey was distributed following the Dillman (2007) procedures. Dillman (2007) recommends the following five elements in order to achieve high survey response rates: respondent-friendly surveys, four contacts through first-class mail, stamped return envelopes, personalization of correspondence, and prepaid financial incentives (p. 150-153). The project team spent a great deal of time and effort to ensure that the survey was easy to understand and was as brief as possible in order to produce respondent-friendly surveys. Additionally, our survey involved four contacts through first-class mail. An initial contact postcard was mailed out in late January 2017 indicating that the household's participation in a scientific research study was being requested. One week after the postcards were sent, the first wave of surveys was mailed out with a one dollar bill incentive and a stamped return envelope. Two weeks later, a second wave of surveys was mailed out and a final, third wave was sent out two weeks after that. In an effort to ensure personalization, the survey began with a personalized note from two of the project's principal investigators.

In keeping with Dillman's (1991) procedures for self-administered mail surveys, we aimed to minimize sampling, noncoverage, nonresponse, and measurement errors. Sampling error occurs when certain members of the population are excluded from participation in the survey (Dillman, 1991). In an effort to correct

for sampling error, a large sample was utilized that is representative of the residents of the eastern half of North Carolina. To avoid noncoverage error, all members of the population residing in the eastern half of North Carolina needed to have the opportunity to be included in our survey's sample (Dillman, 1991). Unfortunately, our survey does exclude certain members of the population, including persons who are renters. However, the choice to utilize a sample of 2500 residents is a direct representation of the desire to take every effort to avoid exclusion. Nonresponse error occurs when members of the sample choose not to complete the survey questions (Dillman, 1991). Of the surveys returned to the DRC, only 6% were partially completed so nonresponse error is not a concern. In order to combat nonresponse error, the surveys mailed in the first wave each included a one dollar bill as a monetary incentive for the homeowners' participation. Response rates to mailed surveys continue to decline (Fulton, 2016; Robb, Gatting, & Wardle, 2017; Tourangeau & Plewes, 2013). The one dollar bill was included because recent research has determined that the inclusion of a small monetary incentive increases response rates (Robb et al., 2017). Finally, measurement error is a problem that arises when participants are unable to accurately answer the survey questions (Dillman, 1991). Each question in our survey was meticulously edited and rephrased to ensure that the questions would be as clear and concise as possible for participants. Additionally, a small pretest was conducted and some survey items were rephrased based on the feedback of the pretest participants.

The American Association for Public Opinion Research (AAPOR) calculator was used to determine the relevant response rates for the survey (American Association for Public Opinion Research, 2017). Based on the AAPOR calculator, the

response rate ranges from a minimum of 10% to a maximum of 69%. The calculated cooperation rate is 90%. The calculated refusal rate ranges from a minimum of 1% to a maximum of 7%. Finally, the calculated contact rate ranges from a minimum of 17% to a maximum of 84%.

3.2 Variables Used from the Survey

In total, one dependent variable, eleven independent variables, and two control variables were utilized for this thesis analysis. The following subsections describe how these variables were captured in the survey.

3.2.1 Dependent Variable

The dependent variable for this study is intention to complete hurricane mitigation actions. The survey asked respondents to indicate their intention to complete each of the eight hurricane mitigation actions included in the survey. The question stated, “For this question, we would like you to imagine that you moved to a new home that did not have any of the following features. With that assumption, tell us if you would add each feature within five years.” The response set for each of the hurricane mitigation actions was “Yes”, “No”, and “Not Sure”. Specifically, the eight actions included in the survey are wind resistant shingles, the application of special foam adhesive under the roof, hurricane shutters, impact resistant windows, the use of hurricane straps to connect the walls and roof, the elevation of appliances above flood levels, water resistant siding, and the elevation of the home on piles.

3.2.2 Independent Variables

For the purposes of this thesis analysis, eleven independent variables from the overall study were utilized. Each of these independent variables fall within the three

components from the theory of planned behavior shown to influence an individual's intention to complete a mitigation action.

3.2.2.1 Attitudinal Component Independent Variables

There are five independent variables that fall under the theory's attitudinal component. The first of these independent variables is emotion. For emotion, the survey asked, "Which of the following emotions do you feel when you think about hurricanes? (Select all that apply.)". The response set was "Angry", "Anxious", "Calm", "Capable", "Exhilarated", "Indifferent", "Repulsed", "Resigned", "Scared", and "Other:". Dread, fear, and worry were also independent variables for this factor. For these variables, the survey asked, "To what degree do you experience each of the following emotions when it comes to hurricanes? (Select one box for each emotion.)". The response set for each was a five-point Likert scale ranging from "Not at all" to "An extreme amount." The final independent variable for this component is risk perception. For this variable, the survey asked three questions regarding the likely damage, disruption, and injury a hurricane could cause. The question stated, "If a hurricane affects North Carolina, how likely is it to cause…a. Significant damage to your home?; b. Significant disruption to your life?; c. An injury or the death of someone close to you?." The response set was a five-point Likert scale ranging from "Very unlikely" to "Very likely".

3.2.2.2 Subjective Norm Component Independent Variables

One independent variable falls under the theory's subject norm component. This independent variable is the influence of family and friends. The survey asked respondents to indicate "Yes" or "No" if in the past they had ever had the experience

of “Family or friends strengthened their homes.” They were then also asked, “Did having this experience make you consider buying more insurance or strengthening your home to protect it from hurricanes?” The response set was “Yes”, “No”, and “N/A”.

3.2.2.3 Perceptions of the Characteristics Component Independent Variables

The final independent variables involved the respondent’s perceptions of the characteristics of the eight mitigation actions; cost, effort, resale value, and protective value. The question for cost asks respondents to indicate “Yes” or “No” to the statement, “The cost of this feature is too high.” The question for effort asks respondents to indicate “Yes” or “No” for each of the eight mitigation actions to the statement, “This feature requires too much effort to install.” The question for resale value for the eight mitigation actions asks respondents to indicate “Yes” or “No” to the statement, “This feature would add value if I sell my home.” Finally, the questions for protective value asks respondents to indicate “Yes” or “No” to two statements: “This feature would protect lives” and “This feature would protect my property.”

3.2.3 Control Variables

Finally, the analysis utilized two control variables from the survey. The first control variable was prior hurricane experience. The question in the survey capturing that was “The following is a list of hurricanes that have affected North Carolina over the last 20 years. For each hurricane that occurred while you lived here, please indicate if you personally had each experience during that event.” The response set was “Yes” or “No” to the eleven hurricanes. The second control variable is socio-economic status. This variable was captured from three questions in the survey. The

first question inquired about annual household income: “Please mark the income range that best describes your annual household income from all sources. This is before taxes and other deductions.” The response set was “$0 - $14,999”, “$15,000 - $34,999”, “$35,000 - $49,999”, “$50,000 - $74,999”, “$75,000 - $99,999”, $100,000 - $149,999”, “$150,000 - $249,999”, and “$250,000+”. The second question inquired about net worth: “Which of the following categories best captures your net worth? By net worth, we mean the total value of cash, checking, savings, investments, and property of your household minus any loans.” The response set was “$0 - $49,999”, “$50,000 - $99,999”, “$100,000 - $149,999”, “$150,000 - $199,999”, “$200,000 - $299,999”, “$300,000 - $399,999”, “$400,000 - $499,999”, and “$500,000+”. The third and final question inquired about the household’s total outstanding debt: “What is your best estimate of how much you owe on any mortgages, home equity loans, home equity lines of credit, or other second mortgages? Total outstanding debt: $___.”

3.3 Data Analysis Methodology

My approach to data analysis followed the steps recommended by Sahu (2013b). The software utilized for data analysis was IBM SPSS Statistics 24 (IBM Analytics, 2018). Once data collection and entry were completed, Sahu (2013b) calls for the raw data to be scrutinized and edited. Through this process, errors in data entry were fixed and the accuracy of the data was assured (Sahu, 2013b). Next, basic descriptive statistics and tests of the assumptions of the specific statistical tests utilized during this analysis were completed. The descriptive statistics for the raw data are discussed at greater length in the next chapter and can be found in their entireties in Appendix B. These processes indicated which variables needed to be reclassified from their existing categories in to new categories that were more appropriate for this data

analysis (Sahu, 2013b.) The reclassified variables will be explained below in the same order as the previous sections: dependent variables, then independent variables organized by component, and finally control variables.

3.3.1 Reclassified Dependent Variables

From the raw data, there are 8 measures: (1) ADDSHINGLES, (2) ADDFOAM, (3) ADDSHUTTERS, (4) ADDWINDOWS, (5) ADDSTRAPS, (6) ADDAPPLIANCES, (7) ADDSIDING, and (8) ADDPILES. For each of these measures, respondents had the option to respond either “Yes”, “No”, or “Not Sure”; however, for the sake of this analysis the “Not Sure” responses were excluded due to the lack of directionality associated with that response. A second reclassification was also necessary for these variables. Several of the mitigation actions included in the survey serve similar purposes; thus, it is unlikely that homeowners would complete both of those actions. For instance, if a homeowner chose to elevate their home on piles, it would be redundant to also elevate their appliances. Additionally, a homeowner would likely only take one action to protect their windows or improve their sealant on their home. The Insurance Institute for Business & Home Safety FORTIFIED Home Hurricane Program Gold Standards were used as a reference for these reclassifications (Malik et al., 2013). For the purposes of analysis, a dummy dependent variable, ADDANY, was also created which represented whether a homeowner would be willing to complete any of the eight mitigation actions. The following table depicts the six reclassified dependent variables that were utilized for data analysis. The descriptive statistics for these variables can also be found in Appendix B.

Table 1 Reclassified Dependent Variables

Raw Variable/s	Recoding Process	Reclassified Variable
ADDAPPLIANCES, ADDPILES	Exclusion of "Not sure" responses; Recoded to reflect 0 = Yes to at least one elevation protective measure; 1 = No to both	ELEVATION
ADDWINDOWS, ADDSHUTTERS	Exclusion of "Not sure" responses; Recoded to reflect 0 = Yes to at least one windows protective measure; 1 = No to both	WINDOWS
ADDSHINGLES, ADDFOAM	Exclusion of "Not sure" responses; Recoded to reflect 0 = Yes to at least one sealant protective measure; 1 = No to both	SEALANT
ADDSIDING	Exclusion of "Not sure" responses; 0 = Yes; 1 = No	SIDING
ADDSTRAPS	Exclusion of "Not sure" responses; 0 = Yes; 1 = No	STRAPS
ADDAPPLIANCES, ADDFOAM, ADDPILES, ADDSHINGLES, ADDSHUTTERS, ADDSIDING, ADDSTRAPS, ADDWINDOWS	Exclusion of "Not sure" responses; Recoded to reflect 0 = Yes to at least one protective measure; 1 = No to all protective measures	ADDANY

3.3.2 Reclassified Independent Variables – Attitudinal Component

As mentioned in section 3.2.2.1, there are 16 measures from the raw data relevant to the attitudinal component. Of these, 13 measures were reclassified for the purposes of data analysis while the other three were utilized in their original form. As discussed in Chapter 2, an aim of this analysis was to fill a gap in the existing literature and try to better understand how different types of emotions impact the mitigation decisions made by individual homeowners. Three types of emotional responses were prevalent in the existing literature: negative, positive, and a lack of emotional response. Measures from the raw data aligned with each of these types of emotional response and they were recoded to become the reclassified variables, NEGATIVEEMOTION, POSITIVEEMOTION, and NOEMOTION. Table 2 on the next page depicts the measures used to inform each of the new variables.

Risk perception has also been shown to impact the mitigation decision making processes of individual homeowners (Asgary & Willis, 1997; Becker et al., 2013; Ge et al., 2011; Lindell & Hwang, 2008; Lindell & Whitney, 2000; Lindell et al., 2009; Peacock, 2003). The three risk perception measures from the raw data are LIKELYDISRUPT, LIKELYDAMAGE, and LIKELYINJURY. However, for the purposes of this analysis it was best to only have one measure of risk perception. Thus, those three measures were recoded to create a single variable, RISKPER, representative of the total range of hurricane risk perception of the respondent. The descriptive statistics for these four new measures can be found in Appendix B.

Table 2 Attitudinal Component Reclassified Variables

Raw Variable/s	Recoding Process	Reclassified Variable
EMOTIONAnger, EMOTIONAnxious, EMOTIONRepulsed, EMOTIONScared	0 = If respondent indicated they felt angry, anxious, repulsed, or scared about hurricanes, they had a negative emotional response; 1 = No negative emotional response	NEGATIVEEMOTION
EMOTIONCalm, EMOTIONCapable, EMOTIONExhilarated	0 = If respondent indicated they felt calm, capable, or exhilarated about hurricanes, they had a positive emotional response; 1 = No positive emotional response	POSITIVEEMOTION
EMOTIONIndifferent, EMOTIONResigned	0 = If respondent indicated they felt indifferent or resigned about hurricanes, they had no emotional response; 1 = Respondent had an emotional response	NOEMOTION

3.3.3 Reclassified Independent Variables – Subjective Norm Component

The four measures from the raw data representative of this component were FAMSTRGHA, FAMSTRGHB, FAMSTRGTHFUTUREA, and FAMSTRGTHFUTUREB. Together, the 'A' and 'B' raw measures represent whether a respondent knows anyone who has recently strengthened their home against hurricanes. For analysis purposes, it was necessary to combine these raw measures in to two reclassified variables: INFLUENCEPAST and INFLUENCEFUTURE. Table 3 depicts how these measures were reclassified, and Appendix B shows the descriptive statistics for the new variables.

Table 3 Subjective Norm Component Reclassified Variables

Raw Variable/s	Recoding Process	Reclassified Variable
FAMSTRGTHA, FAMSTRGTHB	Excluded respondents who did not know anyone who previously strengthened their home; 0 = Yes, respondent knows someone who strengthened their home; 1 = No respondent does not	INFLUENCEPAST
FAMSTRGTHFUTUREA, FAMSTRGTHFUTUREB	Excluded respondents who did not anticipate anyone they knew would strengthen their home; 0 = Yes, respondent thinks someone they know might strengthen their home; 1 = No respondent does not	INFLUENCEFUTURE

3.3.4 Reclassified Independent Variables – Perceptions of the Characteristics Component

Section 3.2.2.3 details how the raw data captures the perceptions of five different characteristics of each of the eight mitigation actions. For the sake of multivariate analyses, five new variables were created which represent the respondent's overall perceptions of each of the five different characteristics. These new variables are dummy variables, where 0 = Yes, a respondent had an overall positive perception of the characteristic or 1 = No, the respondent had a negative overall perception of the characteristic. The five new variables are: COSTDUMMY, EFFORTDUMMY, VALUEDUMMY, LIVESDUMMY, and PROPERTYDUMMY. The descriptive statistics for these new variables can be found in Appendix B.

3.3.5 Reclassified Control Variables

Several measures from the raw data were used to create new control variables for the purposes of analysis. The raw data captured if respondents had personally experienced any of the eleven hurricanes to impact North Carolina in the last twenty years. This raw data is very similar to a popular concept in the existing literature known as prior experience. For the purposes of analysis, a respondent's prior experience was best represented by recoding their eleven individual hurricane experiences to one dummy variable, PRIOREXPERIENCE, where 0 = Yes, a respondent's life has been disrupted by a hurricane or 1 = No, a respondent's life has not been disrupted by a hurricane. It is worth noting that the most recent hurricane to have impacted North Carolina at the time of data collection was Hurricane Matthew in 2016. The descriptive statistics for PRIOREXPERIENCE can be found in Appendix B.

The measures, INCOME, NETWORTH, and LOANDEBT, were used to create a new variable that estimates the respondent's socioeconomic status. Prior research has often only assessed the effect of income on mitigation decision making (Botzen & van den Bergh, 2012; Browne & Hoyt, 2000; Grothmann & Reusswigg, 2006; Landry & Jahan-Parvar, 2011; Peacock, 2003; Petrolia et al., 2013). The choice to incorporate socioeconomic status in to this analysis is an effort to determine if the entireness of a person's economic reality does impact their mitigation decision making processes. The variable used in analysis, SES, was calculated by adding INCOME to NETWORTH and then subtracting LOANDEBT. Given that the raw data for INCOME and NETWORTH were collected in ranges in the survey, these calculations resulted in lower and upper estimates of the SES for each respondent. The calculated SES values were then assigned to one of the following categories: 0 = "In Debt", 1 =

"$1 - $150,000", 2 = "$150,001 - $300,000", 3 = $300,001 - $500,000", and 4 = "> $500,000". The descriptive statistics for SES can be found in Appendix B.

3.4 Bivariate Data Analysis

After the necessary variables were reclassified, bivariate data analysis was used to determine the individual relationships present between each of the independent variables and the intention to complete each of the mitigation actions. The statistical tests used for these purposes included the following: Cramer's V test, Kruskal-Wallis test, Mann-Whitney U test, Pearson's chi-square, and Phi test. The results of the bivariate analyses are discussed at greater length in Chapter 4. The complete results can be found in Appendix C.

3.5 Multivariate Data Analysis

Following the completion of the bivariate data analysis, the next step was to employ the multivariate analysis technique, which allowed for more than two variables to be analyzed at a time. Given the nature of the dependent variables, it was appropriate to utilize the binary logistic regression approach. However, this approach was unable to be performed due to a limited number of responses for the variables. The minimum threshold to perform this technique was not met for any of the six binary dependent variables previously mentioned. Instead, the raw data for the eight mitigation actions was again reclassified. This time an interval variable, OVERALLINTENTION, was created to represent a respondent's overall willingness to add the five types of mitigation actions. The scale for OVERALLINTENTION was 0 to 5, where 0 represents the respondent did not indicate they would add any mitigation actions and 5 represents the respondent indicated they would all five types

of mitigation actions. The frequencies for this variable can be seen in Table 4. As can be seen in the table, the mode is zero and the median is one intended completed mitigation actions. The mean is 1.49 actions, with a standard deviation of 1.575 actions.

Table 4 Overall Intention Dependent Variable Descriptive Statistics

Intended total mitigation actions	Frequency	Percent	Cumulative Percent
0	86	42.6	42.6
1	27	13.4	55.9
2	26	12.9	68.8
3	39	19.3	88.1
4	15	7.4	95.5
5	9	4.5	100.0
Total *(32 missing)*	202	100.0	

The creation of the overall intention variable meant that it was possible to utilize linear regression as a multivariate analysis approach. In a regression analysis, the dependent variable is the function of one or more independent variables and any error existent in the dataset (Sahu, 2013a). By utilizing this technique, it was possible to create a multiple regression equation to model which independent variables significantly influence the willingness to complete mitigation actions (Sahu, 2013a). Specifically, a stepwise regression technique was utilized. With this technique, the contribution of each independent variable is assessed at every step of the regression (Lindeman, Merenda, & Gold, 1980b). This technique allows for the most efficient equation to be determined by ultimately selecting a smaller subset of the total possible

independent variables (Lindeman et al., 1980b). The results of the statistical tests and the multivariate analyses will be presented in Chapter 4.

Chapter 4

RESULTS & DISCUSSION

This chapter presents the findings of the statistical analyses conducted using the collected survey data. This section begins by presenting the descriptive statistics for all independent, dependent, and control variables utilized during analysis. Section 4.3 presents and discusses the findings of the bivariate analyses. Finally, the chapter concludes with a presentation of the results of the multivariate analyses, including the tests of assumptions and an overall model of the variables which impact the intention of individual homeowners to complete mitigation actions.

4.1 Description of Sample Respondents

Respondents were asked to complete several questions to indicate demographic characteristics. It is important to note that not all respondents completed all questions. Table 5 provides a comparison of the demographic characteristics of the sample (n = 234), the subset of the sample used to create model (n = 45), and the U.S. Census statistics for the state of North Carolina. The U.S. Census statistics were obtained from the 2016 American Community Survey (United States Census Bureau, 2016).

The age of respondents ranged from 26 to 96 years old. Notably, the median age of the sample and sub-sample is far older than that of the population of the state of North Carolina. Though the racial and ethnic representation varied from that of the population, respondents in the sample and sub-sample did still capture the diversity present in the overall population. The gender breakdown of the sample and sub-sample was very comparable to that of the population. The sample had a greater total percentage of high school graduates. Finally, the percentage of respondents in the sample residing in single family homes was comparable to that of the population.

Table 5 Sample Demographic Characteristics

Median Age		
North Carolina Census	*Sample*	*Sub-Sample*
38.3	61	54
% White		
North Carolina Census	*Sample*	*Sub-Sample*
69.2%	80.8%	86.7%
% Black		
North Carolina Census	*Sample*	*Sub-Sample*
21.5%	10.3%	8.9%
% Hispanic		
North Carolina Census	*Sample*	*Sub-Sample*
8.9%	2.7%	0%
Gender		
North Carolina Census	*Sample*	*Sub-Sample*
48.6% Male, 51.4% Female	48.2% Male, 51.8% Female	48.9% Male, 51.1% Female
Educational Attainment: % High School Graduates		
North Carolina Census	*Sample*	*Sub-Sample*
86.3%	98.7%	100%
% Residing in Single-family homes		
North Carolina Census	*Sample*	*Sub-Sample*
87.9%	88.3%	91.1%

4.2 Descriptive Statistics

These analyses incorporated 63 total measures, representing one dependent variable, 49 independent variables, and two control variables. The measures of central tendency for these measures will be presented and discussed in this section in the following order: dependent variable first, independent variables in order of the hypotheses, and control variables last. Please refer to Appendix B for tables depicting the complete descriptive statistics.

Seven measures were used to represent the dependent variable in bivariate and multivariate analyses. Five of these measures represented a homeowner's intention to complete each of these mitigation actions individually: ELEVATION, SEALANT, SIDING, STRAPS, and WINDOWS. Another measure, ADDANY, represents the homeowner's intention to complete any mitigation action. Finally, the measure, OVERALLINTENTION, is an interval measure representing the total number of mitigation actions the homeowner intends to complete. The relevant measures of central tendency can be seen in Table 5 on the next page.

Table 6 Dependent Variables – Measures of Central Tendency

	Elevation	Sealant	Siding	Straps	Windows	Add Any	Overall Intention
Mode	No	No	No	No	Yes	Yes	0
Median	n/a	n/a	n/a	n/a	n/a	n/a	1
Mean	n/a	n/a	n/a	n/a	n/a	n/a	1.49

It is worth noting that most respondents indicated they would have intentions to complete at least one mitigation action. However, the mode for the different

measures of the individual mitigation actions were no intention, except for the WINDOWS measure. Considered together, these measures suggest that most respondents would only complete at most one mitigation action, if any. This is further supported by the measures of central tendency for the OVERALLINTENTION measure, where the mode is zero intended actions and the median and mode are both one intended action.

For Hypothesis 1a, four measures were used: dread, fear, worry, and risk perception. The relevant measures of central tendency for these measures can be found in Table 6 below.

Table 7 Hypothesis 1a Independent Variables – Measures of Central Tendency

	Dread	Fear	Worry	Risk Perception
Mode	A little	A little	A little	3
Median	A little	A little	A little	5
Mean	n/a	n/a	n/a	4.78

The measures of central tendency in Table 6 show that respondents had very similar feelings of dread, fear, and worry directed towards hurricanes. In fact, respondents only dreaded, feared, and worried about hurricanes a little. With regards to risk perception, the measures of central tendency ranged from 3 to 5 out of a possible score of 12. These scores suggest that respondents have low overall risk perception with regards to how likely it is hurricanes may impact their lives in the future. These measures of central tendency for risk perception align with the findings of the existing literature. Given that extensive research has shown persons residing in hazard-prone areas underestimate their risk, it is not surprising that these respondents

have a low hurricane risk perception (Kates, 1962; Slovic et al., 1974; Slovic et al., 1976).

The analyses for Hypothesis 1b utilized three measures. In the survey, one question asked respondents to select any from a series of nine emotions they felt about hurricanes. From the nine possible emotions, four reflected a negative emotional response, three reflected a positive emotional response, and two reflected the lack of an emotional response. The complete descriptive statistics for these measures can be found in Appendix B. Of the 232 respondents who completed the question, 66.4% experienced some type of an emotional response. 56.4% of the 232 respondents had a negative emotional response directed towards hurricanes, while 36.6% had a positive emotional response. For the purposes of this study, it is important to note that the respondents did have a variety of types of emotional responses towards hurricanes. It is also important to note that respondents could have selected anywhere from zero to nine emotions. However, the greatest number of emotions selected by any respondent was four. This suggests two things: that respondents can distinguish between their emotions and that they are not overwhelmed emotionally by the thought of a potential hurricane impacting their homes. Considering the work of Frijda (1986a; 1986b), the low levels of reported emotional responses suggests that these homeowners may not be having adequate emotional responses to serve as hurricane "relevance detectors" to spark the interest of these homeowners to complete mitigation actions.

Two measures were used in the analyses for Hypothesis 2. While both variables reflect the influence of family and friends, one reflects their prior behavior and the other reflects their potential future behavior. Unlike the other measures, the values for N for these two measures are not 234 because not all respondents knew

individuals whom had completed protective actions. The descriptive statistics for these two measures are shown below in Table 7. Of the respondents to whom this measure was applicable, most indicated that the behavior of their family or friends either did or potentially could make them consider installing mitigation actions. These responses are consistent with a study conducted by Peacock (2003) where the mitigation behavior of neighbors influenced homeowners' envelope and shutter coverage.

Table 8 Hypothesis 2 Independent Variables – Descriptive Statistics

Measure Name	N	Missing	Yes (#|%)		No (#|%)	
Influence – Prior Behavior	33	201	19	58%	14	42%
Influence – Future Behavior	67	167	35	52%	32	48%

The analyses for Hypothesis 3 utilized 45 measures. For each of the eight mitigation actions included in the survey, five measures were used to determine the respondent's perceptions of the characteristics of that action. Table 8 depicts the descriptive statistics for the perceptions of the characteristics of the wind resistant shingles. As shown in the table, respondents generally had favorable views of the effort it takes to install the shingles, their potential resale value, and the ability of the action to protect property.

Table 9 Descriptive Statistics for Wind-Resistant Shingles

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Shingles Cost	197	37	91	46%	106	54%
Shingles Effort	190	44	116	61%	74	39%
Shingles Value	202	32	133	66%	69	34%
Shingles Lives	196	38	73	37%	123	63%
Shingles Property	205	29	160	78%	45	22%

Similar to the perceptions for wind resistant shingles, respondents also had generally favorable views of the special foam adhesive's potential resale value and ability to protect property. The following table depicts the descriptive statistics for the perceptions of the characteristics of the special foam adhesive under the roof.

Table 10 Descriptive Statistics for Special Foam Adhesive

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Foam Cost	186	48	75	40%	111	60%
Foam Effort	179	55	76	42%	103	58%
Foam Value	187	47	96	51%	91	49%
Foam Lives	190	44	68	36%	122	64%
Foam Property	194	40	139	72%	55	28%

The data shows that respondents had positive perceptions of the protective value of the ability of hurricane shutters to protect both lives and property. Table 10 shows the descriptive statistics for the perceptions of characteristics of hurricane shutters.

Table 11 Descriptive Statistics for Hurricane Shutters

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Shutters Cost	195	39	73	37%	122	63%
Shutters Effort	187	47	98	52%	89	48%
Shutters Value	193	41	100	52%	93	48%
Shutters Lives	197	37	137	69%	60	31%
Shutters Property	200	34	153	76%	47	24%

With regards to the perceptions of impact resistant windows, most respondents indicated that they had positive views of the potential resale value of the action and the ability of the action to protect lives and property. Table 11 displays the descriptive statistics for the perceptions of the characteristics for impact resistant windows.

Table 12 Descriptive Statistics for Impact Resistant Windows

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Windows Cost	198	36	64	32%	134	68%
Windows Effort	188	46	86	46%	102	54%
Windows Value	192	42	135	70%	57	30%
Windows Lives	200	34	172	86%	28	14%
Windows Property	201	33	177	88%	24	12%

Most respondents had positive perceptions of the characteristics of hurricane straps/ties, except for the perceived potential resale value. One hundred eight respondents (56%) indicated that they had a negative perception of this characteristic. The descriptive statistics for the other characteristics are shown below in Table 12.

Table 13 Descriptive Statistics for Hurricane Straps/Ties

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Straps Cost	194	40	111	57%	83	43%
Straps Effort	188	46	105	56%	83	44%
Straps Value	192	42	84	44%	108	56%
Straps Lives	191	43	124	65%	67	35%
Straps Property	193	41	130	67%	63	33%

For the elevated appliances action, most respondents had negative perceptions for all five of the characteristics. The complete descriptive statistics can be seen in Table 13.

Table 14 Descriptive Statistics for Elevated Appliances

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Appliances Cost	189	45	93	49%	96	51%
Appliances Effort	180	54	94	52%	86	48%
Appliances Value	187	47	48	26%	139	74%
Appliances Lives	190	44	53	28%	137	72%
Appliances Property	191	43	91	48%	100	52%

For the water resistant siding action, the majority of respondents had positive perceptions for only one characteristic: the ability of the siding to protect property. Table 14 depicts the complete descriptive statistics for all five of the perceptions of the characteristics for this action.

Table 15 Descriptive Statistics for Water Resistant Siding

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Siding Cost	189	45	79	42%	110	58%
Siding Effort	179	55	83	46%	96	54%
Siding Value	183	51	100	55%	83	45%
Siding Lives	191	43	68	36%	123	64%
Siding Property	191	43	131	69%	60	31%

As was the case with the perceptions of the characteristics of elevated appliances, many of the respondents had negative perceptions of the characteristics of the home elevated on piles action. The descriptive statistics can be found in Table 15.

Table 16 Descriptive Statistics for Home Elevated on Piles

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Piles Cost	194	40	50	26%	144	74%
Piles Effort	186	48	39	21%	147	79%
Piles Value	187	47	52	28%	135	72%
Piles Lives	191	43	89	47%	102	53%
Piles Property	196	38	94	48%	102	52%

Upon comparison, the descriptive statistics representing the perceptions of the characteristics of the mitigation actions show several patterns. With regards to cost, most respondents have a negative perception of the total cost it takes to complete seven of the eight mitigation actions. Respondents only had a positive perception of the cost it takes to install hurricane straps/ties. These responses are similar to the

findings of Russell et al. (1995) whom claimed perception of cost was found to play a significant role in the hazard mitigation decision making processes. On the other hand, the majority of respondents have a positive perception of the abilities of six of the eight actions to protect property. These responses were expected based on the results of the existing literature that suggest positive perceptions of the effectiveness of the mitigation action play a significant role in the mitigation decision making process (Weinstein & Nicolich, 1993). Respondents only had a negative perception of the ability of the elevation-based mitigation actions (elevated appliances and home elevated on piles) to protect property. The other three characteristics, effort to install, resale value, and ability to protect lives, were split relatively evenly between positive and negative perceptions.

Five final measures were used in the analyses for Hypothesis 3, which represented a respondent's overall perceptions of the five different characteristics. Table 16 shows the descriptive statistics for these measures. Respondents had positive perceptions regarding the cost, effort to install, and ability to protect property of the mitigation actions. Most respondents had negative perceptions about the ability of mitigation actions to protect lives. Finally, respondents were evenly split between positive and negative perceptions about the potential added resale value.

Table 17 Descriptive Statistics for Perception Dummy Variables

Measure Name	N	Missing	Positive Perception (#|%)		Negative Perception (#|%)	
Cost Dummy	209	25	126	60%	83	40%
Effort Dummy	201	33	106	53%	95	47%
Value Dummy	203	31	101	50%	102	50%
Lives Dummy	205	29	97	47%	108	53%
Property Dummy	206	28	147	71%	59	29%

Two different measures were used as control variables in this analysis: prior hurricane experience and socioeconomic status. The descriptive statistics for prior hurricane experience can be seen in Table 17. As shown in the table, 75% of respondents have previously experienced a hurricane.

Table 18 Descriptive Statistics for Prior Experience

	Frequency	Percent	Cumulative Percent
Yes	163	74.8	74.8
No	55	25.2	100.0
Total *(16 missing)*	218	100.0	

Table 18 depicts the descriptive statistics for the socioeconomic status measure. The median socioeconomic status of respondents falls within the range of $150,001 - $300,000. The mode socioeconomic status of respondents falls within the range of $1 - $150,000.

Table 19 Descriptive Statistics for Socioeconomic Status

	Frequency	Percent	Cumulative Percent
In Debt	19	10.9	10.9
$1 - $150,000	52	29.7	40.6
$150,001 - $300,000	31	17.7	58.3
$300,001 - $500,000	36	20.6	78.9
$500,000+	37	21.1	100.0
Total *(59 missing)*	175	100.0	

4.3 Bivariate Analyses

As mentioned in Section 3.4, five bivariate statistical tests were used. The specific tests utilized were determined based on the nominal and ordinal nature of the data. Like the descriptive statistics section, the results of the bivariate analyses will be presented by hypotheses. This section only discusses the results that are significant at the .05 level. For the complete results, refer to Appendix C.

For Hypothesis 1a, bivariate analysis tested for any existing relationships between intention to complete mitigation actions and the levels of risk perception, dread, fear, and worry respondents felt directed towards hurricanes. The only significant relationship was between elevation and fear. The results of the Pearson's Chi-Square tests showed the presence of a significant relationship between fear and the intention to adopt the elevation-related mitigation actions. This relationship was significant at the .05 level: X^2 (4, N = 176) = 9.686, p = .046. Furthermore, a Kruskal-Wallis test showed that there was a statistically significant difference in intention to adopt the elevation-related mitigation actions between the different levels of fear, $X^2(4) = 9.631$, p = .047, with a mean rank fear score of 99.50 for Not at All, 83.97 for Very little, 88.50 for A little, 89.35 for A moderate amount, and 70.17 for An extreme amount. These significant results suggest that how greatly a homeowner fears hurricanes can impact their willingness to elevate either their appliances or their home on piles. These results also support the state of the existing literature which suggests that homeowners who experienced negative affect directed towards hazards were significantly more likely to intend to complete mitigation actions (Terpstra, 2011).

For Hypothesis 1b, the following statistical tests were used to test for relationships between the different types of emotional responses and the intention to complete mitigation actions: Mann-Whitney U test, Pearson's Chi-Square test, and Phi

test. First, the results of these statistical tests were used to determine the presence of a relationship between having a negative emotional response directed towards hurricanes and the intention to complete mitigation actions. None of these results were significant at the .05 level. Next, these tests were also applied to determine if there was a relationship between having a positive emotional response directed towards hurricanes and the intention to complete mitigation actions. The results of these tests were also not significant. However, significant results were found between having a lack of an emotional response directed towards hurricanes and the intention to complete elevation-related mitigation actions. The results of the three tests showed the presence of a significant relationship at the .05 level: X^2 (1, N = 179) = 6.264, p = .012; U = 2979, p = .013; Φ = .187, p = .012. While the results of this test do suggest that having a lack of an emotional response directed towards hurricanes is associated with the intention to complete elevation-related mitigation actions, the test does not indicate the strength or direction of the association. Unfortunately, these limited significant results do little to clarify the mixed findings in the existing literature on the role emotional plays in the mitigation decision making process (Asgary & Willis, 1997; Ge et al., 2011; Lindell et al.,2009; Mulligan & Scherer, 2012; Terpstra, 2011; Zaalberg et al., 2009). Instead, this lack of significance provides support to the assertion by Siegrist & Gutscher (2008) that having an emotional response to hurricanes does not mean an individual will actually complete the mitigation action.

For Hypothesis 2, the following tests were utilized: Mann-Whitney U test, Pearson's Chi-Square test, and Phi test. The results of these tests indicate that both the respondent's family or friends' prior mitigation behavior and their potential future mitigation behavior influence the respondent's intention to complete mitigation

actions. Three of the dependent variables had significant relationships with prior mitigation behavior. This suggests the prior mitigation behavior of others influences the intention to adopt water-resistant siding, windows-based, and sealant-based mitigation actions (see Table 19 below for results). This significant relationship between the prior mitigation behavior of others and the respondent's intention to complete mitigation actions adds support to the findings of the existing literature (Peacock, 2003; Zaalberg et al., 2009).

Table 20 Bivariate Analysis Results for Prior Mitigation Behavior

Action	*U*	Sig.	X^2	d.f.	Sig.	Φ	Sig.
Water-Resistant Siding	33	.001	11.342	1	.001	.648	.001
Windows-Based	69	.032	4.739	1	.029	.397	.029
Sealant-Based	49	.005	8.023	1	.005	.535	.005

The results of the statistical tests for potential future behavior are similar to the results for prior behavior. Both intention to adopt water-resistant siding and windows-based mitigation actions had statistically significant relationships with the potential future mitigation behavior of the homeowners' family and friends (see Table 20 below for results). These significant results suggest that the influence of others is an important factor in understanding the mitigation decision making processes of homeowners.

Table 21 Bivariate Analysis Results for Potential Future Mitigation Behavior

Action	*U*	Sig.	X^2	d.f.	Sig.	Φ	Sig.
Water-Resistant Siding	187	.027	4.996	1	.025	.326	.025
Windows-Based	246	.009	6.984	1	.008	.356	.008

The analyses for Hypothesis 3 showed many significant results. Notably, only five of the forty measures used had insignificant results. Like the other bivariate

analyses, the Mann-Whitney U test, Pearson's Chi-Square test, and Phi were used to determine the relationships between the respondents' perceptions of the characteristics of the mitigation actions and the intention to adopt the five different types of mitigation actions. The significant results can be seen on the following page in Table 21.

There are several things worth noting about the results shown in Table 21. First, the results indicate that for any type of mitigation action its added resale value and its ability to protect both lives and property matters. For all eight of the actions, these bivariate analyses were significant which suggests that a homeowner's intention to adopt a mitigation action is greatly influenced by their perception of these three characteristics. The significant relationships between intention and the perceived protective ability of the actions supports the work of Weinstein & Nicolich (1993) which first found perceived effectiveness of an action to be correlated with actual adoption of the action. Second, while cost and effort were not significant for all eight actions, they were still statistically significant indicators of intention to adopt five actions. This also suggests that the overall cost and the effort it takes to install these actions impacts the homeowner's mitigation decision making process as well. The significant relationships for cost provide clarity for the mixed results of the existing literature. The significant relationships and negative Phi test results support the findings of Russell et al. (1995) whom found more expensive mitigation actions were significantly less likely to be adopted by homeowners. Third, the variation in direction of the Phi test results suggests that there are both positive and negative associations present in the data set (Lindeman, Merenda, & Gold, 1980a). However, the small values of the Phi coefficients suggest these are weak associations. Finally, the

significant results for all but five measures indicate the importance that perceptions of the characteristics of these mitigation actions plays in the decision making process.

Table 22 Perception of Characteristics of Mitigation Actions Bivariate Results

Action: Characteristic	*U*	Sig.	X^2	d.f.	Sig.	*Φ*	Sig.
Elevate appliances: Effort	2571	.014	6.036	1	.014	-.198	.014
Elevate appliances: Resale value	1740.5	.000	22.636	1	.000	.379	.000
Elevate appliances: Protect lives	1612.5	.000	30.766	1	.000	.437	.000
Elevate appliances: Protect property	2729	.001	11.011	1	.001	.260	.001
Elevate on piles: Cost	2125	.020	5.445	1	.020	-.184	.020
Elevate on piles: Effort	1462.5	.000	14.753	1	.000	-.307	.000
Elevate on piles: Resale value	1822.5	.000	19.589	1	.000	.351	.000
Elevate on piles: Protect lives	2765	.027	4.932	1	.026	.176	.026
Elevate on piles: Protect property	2960	.018	5.603	1	.018	.185	.018
Foam adhesive: Cost	2012.5	.005	7.945	1	.005	-.232	.005
Foam adhesive: Effort	1973	.013	6.250	1	.012	-.208	.012
Foam adhesive: Resale value	2186.5	.009	6.907	1	.009	.215	.009
Foam adhesive: Protect lives	1555.5	.000	20.451	1	.000	.369	.000
Foam adhesive: Protect property	1723.5	.001	12.109	1	.001	.282	.001
Hurricane shutters: Cost	2681	.021	5.352	1	.021	-.180	.021
Hurricane shutters: Effort	2556.5	.009	6.775	1	.009	-.205	.009
Hurricane shutters: Resale value	2304	.000	14.242	1	.000	.296	.000
Hurricane shutters: Protect lives	1984.5	.000	14.789	1	.000	.298	.000
Hurricane shutters: Protect property	2040.5	.010	6.657	1	.010	.200	.010
Hurricane straps: Cost	1958.5	.000	13.925	1	.000	-.305	.000
Hurricane straps: Effort	2152.5	.002	9.605	1	.002	-.252	.002
Hurricane straps: Resale value	2060	.001	11.192	1	.001	.273	.001
Hurricane straps: Protect lives	1743	.000	19.728	1	.000	.363	.000
Hurricane straps: Protect property	1831	.000	13.184	1	.000	.295	.000
Impact-resistant windows: Cost	2457.5	.011	6.511	1	.011	-.199	.011
Impact-resistant windows: Effort	2593.5	.014	6.040	1	.014	-.194	.014
Impact-resistant windows: Resale value	1653.5	.000	20.529	1	.000	.357	.000
Impact-resistant windows: Protect lives	922.5	.000	17.608	1	.000	.325	.000
Impact-resistant windows: Protect property	951.5	.001	10.334	1	.001	.250	.001
Water-resistant siding: Resale value	1638	.000	18.888	1	.000	.363	.000
Water-resistant siding: Protect lives	1571	.000	20.226	1	.000	.368	.000
Water-resistant siding: Protect property	1790	.000	12.678	1	.000	.291	.000
Wind-resistant shingles: Resale value	2172	.000	7.370	1	.007	.217	.007
Wind-resistant shingles: Protect lives	1780	.000	14.089	1	.000	.304	.000
Wind-resistant shingles: Protect property	1391.5	.000	16.165	1	.000	.321	.000

Finally, bivariate analysis was used to determine the relationship between the control variables and the intention to adopt each of the five mitigation action types. To

determine the relationship between prior experience and intention, the following tests were used: Mann-Whitney U test, Pearson's Chi-Square test, and Phi test. The results of the tests between prior experience and intention were not significant. This means that there is no statistical evidence suggesting the presence of a relationship between a respondent's prior hurricane experience and their intention to complete hurricane mitigation actions. Unfortunately, this lack of significant results does not help to clarify the divide in the existing literature as to whether prior hazard experience increases or decreases intention to complete and completion of mitigation actions (Atreya et al., 2015; Baumann & Sims, 1978; Botzen & van den Bergh, 2012; Petrolia et al., 2013).

To determine the relationship between socioeconomic status and intention, the following tests were used: Kruskal-Wallis test, Pearson's Chi-Square test, and Cramer's V test. The results of the tests between socioeconomic status and intention were also not significant and did not show support for a relationship between a household's socioeconomic status and intention to complete a mitigation action. This finding is contrary to the existing literature which has found measures of socioeconomic status to be positive indicators of intention to complete and actual completion of mitigation actions (Botzen & van den Bergh, 2012; Browne & Hoyt, 2000; Grothmann & Reuswigg, 2006; Landry & Jahan-Parvar, 2011; Peacock, 2003; Petrolia et al., 2013).

Section 4.4 discusses the multivariate analyses used to explore the relationships between the independent variables and the intention to mitigate.

4.4 Multivariate Analysis

To test for further support of the four hypotheses, a linear regression was run to determine the relationships between the independent and control variables and the intention to complete mitigation actions. A stepwise regression technique was used to create the model that will be explained in greater detail below. Ultimately, the model explains a significant proportion of the variance in intention to adopt mitigation actions and has a number of significant coefficients representative of the results of the previously discussed bivariate analyses. This final model incorporates six independent variables (risk perception, negative emotional response, a lack of an emotional response, potential future behavior, perception of ability to protect lives, and perception of ability to protect property) and one control variable (SES).

This model was also tested to ensure it met the five assumptions of linear regression. The first assumption states that the relationship between the independent and dependent variables must be linear (Lindeman et al., 1980b). As shown in Figure 4 below, the relationship approximates a straight line and thus this assumption is met.

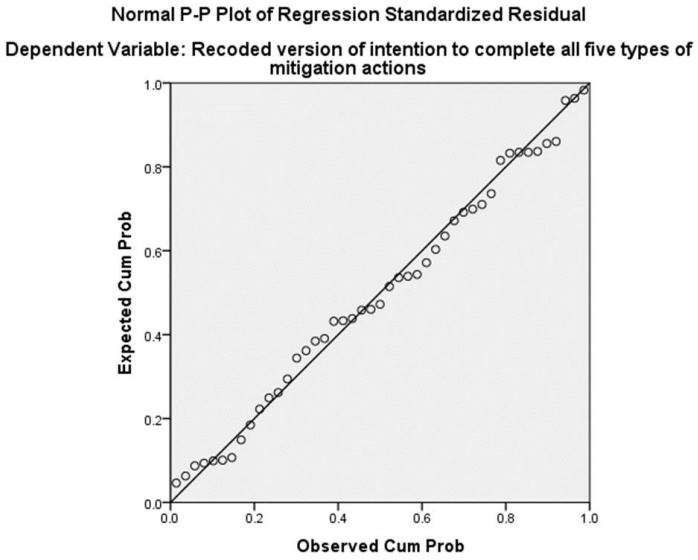


Figure 4 Test of Linear Regression Assumption #1

The second assumption of linear regression is that there is little to no multicollinearity in the data (Lindeman et al., 1980b). To check for multicollinearity, the Variance Inflation Factor (VIF) is used. Multicollinearity is present when VIF values exceed 10. As shown in Table 22, none of the VIF values came close to 10 so the second assumption was also met by this model.

Table 23 Test of Linear Regression Assumption #2

Variable	VIF
Lives Dummy	1.229
Future Influence of Others	1.542
SES	1.081
Risk Perception	1.178
No Emotional Response	1.258
Property Dummy	1.408
Negative Emotional Response	1.284

The third assumption of linear regression is that there is little or no autocorrelation in the data (Lindeman et al., 1980). To test for autocorrelation, the Durbin-Watson test is used. If there is no autocorrelation in the data, the Durbin-Watson statistic should be between 1.5 and 2.5. The Durbin-Watson statistic for this model is 2.260, which indicates there is no autocorrelation in this dataset. As such, the third assumption of linear regression was met by the model.

The fourth and final assumption of linear regression is that of homoscedasticity, which is tested by plotting the residuals (Lindeman et al., 1980). As

shown in Figure 5, the scatterplot of this model's residuals is random. Therefore, the fourth assumption of linear regression was also met.

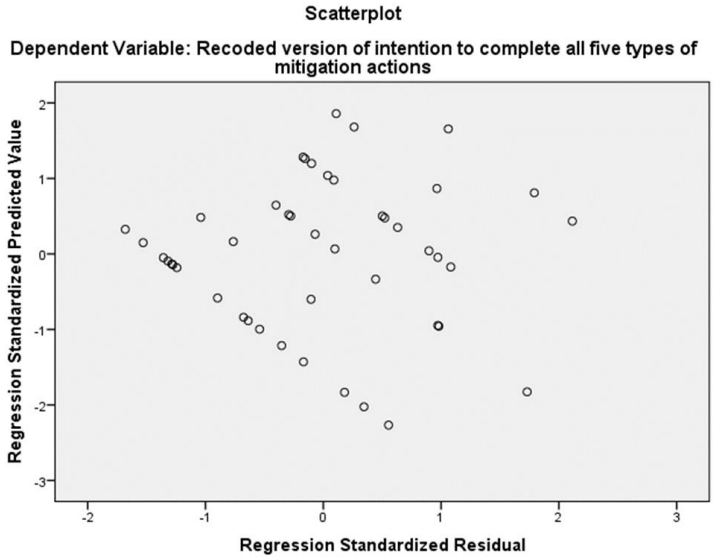


Figure 5 Test of Linear Regression Assumption #4

This model was calculated utilizing a subset of the sample (n = 45). It must be acknowledged that a limitation of this model is the amount of missing data points within the data set which limited the responses able to be included in the model. Though this model is sufficient for the purposes of completion of a thesis, further analyses with this data must address the missing data.

Four of the variables included in the model were significant predictors of intention to complete mitigation actions. Risk perception significantly predicted intention, $\beta = .260$, $t(37) = 2.743$, $p = .009$. The direction of this coefficient suggests that there is a positive relationship between risk perception and intention, which supports the prediction outlined in Hypothesis 1a. The lack of an emotional response also significantly predicted intention, $\beta = -1.203$, $t(37) = -2.591$, $p = .014$. The

direction of this coefficient suggests the presence of a negative relationship, which supports the prediction made in Hypothesis 1b. It was predicted that the lack of an emotional response would decrease intention to complete mitigation actions and this prediction is clearly supported by the results of the regression. The perceived ability of the mitigation actions to protect lives was also a significant predictor of intention: β = -.903, $t(37) = -2.11$, $p = .042$. The direction of this coefficient suggests that the more favorably the respondent views an action's ability to protect lives, the less likely they will be to intend to complete mitigation actions. This is contrary to the prediction made in Hypothesis 3. Similarly, the perceived ability to protect property was also a significant negative predictor of intention: $\beta = -1.095$, $t(37) = -2.129$, $p = .040$. The direction of this coefficient is also contrary to the prediction made in Hypothesis 3. These results suggest that while the perceived ability to protect lives and property clearly impact the mitigation decision making process – the impact is not necessarily a positive influence on intention to complete mitigation actions.

Based on these significant coefficients, the following model is supported:

Intention = 2.274 + .260(*Risk Perception)* - 1.203(*Lack of an Emotional Response*) - .903(*Ability to Protect Lives*) – 1.095(*Ability to Protect Property*).

This model also explained a significant proportion of variance in intention to complete mitigation actions, $R^2 = .469$, $F(7, 37) = 4.674$, $p = .001$. The complete statistical results of this model can be found in Appendix C.

Chapter 5

CONCLUSION

Using a North Carolina case, this study aimed to address the following research question:

What role do emotions, the influence of others, and perceptions of the characteristics of mitigation actions have on the mitigation decision making processes of individual homeowners?

This concluding chapter will address my answer to this question through a presentation of the findings, a discussion on the limitations impacting this work, suggestions for future research, and implications of this work. Ultimately, the results suggest that alone one of these components does not solely influence the mitigation decision making process of individual homeowners. However, considering the combined influence of these three components is crucial in trying to understand this complex process.

5.1 Findings

This section presents the findings in order of the hypotheses and then comments on the overall model. The section concludes with Table 23 briefly depicting a summary of the findings. Hypothesis 1a stated that increasing levels of dread, fear, worry, and risk perception will increase the homeowner's intention to complete the hurricane mitigation actions. The descriptive statistics and measures of central tendency for these variables showed that respondents had low levels of dread, fear, worry, and risk perception towards hurricanes. From the bivariate analyses, fear was shown to have a significant relationship with intention to complete the two elevation-based mitigation actions. The multivariate analyses suggest that risk perception has a

positive effect on intention to complete any mitigation actions. These results suggest that there is partial support for Hypothesis 1a. Fear and risk perception have been shown to have a statistically significant influence on intention; however, dread and worry have not. Ultimately, it is clear that fear and risk perception – when present - do increase intention and they are two important factors in understanding the mitigation decision making processes of homeowners. A real concern arising from this dataset is that these emotions may not frequently occur in coastal homeowners. If these emotions are not present, then they are unable to play an influential part in this decision making process.

Hypothesis 1b had two parts. First, it was hypothesized that if an individual homeowner had a negative emotional response towards hurricanes, then intention would increase. Second, it was hypothesized that if an individual homeowner had either a positive or no emotional response towards hurricanes, then intention would decrease. As was shown by the descriptive statistics, approximately two-thirds of respondents had an emotional response towards hurricanes. Additionally, the majority of respondents felt some sort of negative emotion; though some respondents also felt either a positive or a lack of an emotional response about hurricanes. However, the bivariate and multivariate analyses did not return statistically significant results for either negative or positive emotional responses. The bivariate analysis between a lack of an emotional response and elevation-based mitigation actions was significant and suggests the presence of a relationship between these two variables. The presence of a relationship between a lack of emotional response and intention was further supported by the negative, significant coefficient in the model. This result provides partial support for Hypothesis 1b by supporting the prediction that a lack of an emotional

response would have a negative effect on intention to complete mitigation actions. This result also supports the findings of Siegrist & Gutscher (2008) who suggested the presence of an emotional response is not enough to persuade residents of flood-prone areas to mitigate. While the majority of respondents did have an emotional response towards hurricanes, the only significant result involved a lack of an emotional response. As suggested in my findings about Hypothesis 1a and by Siegrist & Gutscher (2008), it is clear emotion is an important factor in understanding the mitigation decision making processes of individual homeowners. However, the results of this work also prove that emotion is not the only relevant predictor.

Hypothesis 2 involved the subjective norm component of the theory of planned behavior, which predicts the influence of others on intention. It was hypothesized that knowing others who had completed or possibly would complete mitigation actions would increase the intention of homeowners to do the same. The descriptive statistics indicated that most respondents would consider the completion of mitigation actions if they had family or friends who had previously or would in the future complete these actions. The bivariate analyses produced several significant relationships. Prior behavior of others was significantly related to the intention to complete water-resistant siding, windows-based, and sealant-based actions. Potential future behavior of others was significantly related to the intention to complete water-resistant siding and windows-based actions. While neither of these measures had a significant coefficient in the overall model, potential future behavior was the most significant predictor of the overall R-square value during the stepwise regression process. As such, this suggests that the influence of others is an important factor in understanding the overall variance of the model and of an individual's intention to mitigate. However, given these results,

Hypothesis 2 cannot be supported. This means that further research is necessary to determine the role the influence of others plays in the mitigation decision making process. Unfortunately, this study cannot provide additional clarity on the mixed results of the existing literature. Peacock (2003) suggested the influence of others has a positive effect on envelope and shutter coverage, whereas Zaalberg et al. (2009) suggested the influence of others has a negative effect on preparedness. While these results do indicate the influence of others is related to intention to complete mitigation actions, no firm stance can be taken regarding the direction of this relationship.

Hypothesis 3 involved the perceptions of the characteristics of the mitigation actions. It was predicted that the more favorably a respondent perceived the characteristics of an action that their intention to complete the action would increase. The descriptive statistics for these measures indicated the following: (a) respondents had overall positive perceptions of the cost, effort, and ability of the mitigation actions to protect property; (b) respondents had an overall negative perception of the ability of these actions to protect lives; and (c) respondents were equally split between negative and positive perceptions for the resale value of these actions. The bivariate analyses for these measures showed great significance. These analyses showed the presence of significant relationships between three perceptions of the characteristics (resale value, ability to protect lives, and ability to protect property) and the intention to complete all of the different types of mitigation actions. Cost and effort were also shown to have some significance, supporting the findings of Russell et al. (1995). The results of the multivariate analysis show that the ability to protect both lives and property are negative predictors of intention. These results are contrary to the findings of both Lindell & Whitney (2000) and Lindell & Prater (2002), both of whom found perceived

efficacy to be positive predictors. Likewise, this finding is contrary to Hypothesis 3, which predicted positive relationships between the perceptions of the characteristics and intention to mitigate. Regardless, these significant findings indicate that the perceptions are crucial to understanding the decision making processes of individual homeowners; they just might not be positive predictors as hypothesized. Ultimately and as suggested by Lindell et al. (2009), the perceptions homeowners have regarding mitigation actions should be considered both in research and by relevant stakeholders.

As mentioned already in this section, the model found four variables to be significant predictors of intention to mitigate. Risk perception was found to be a positive predictor, whereas lack of an emotional response, ability to protect lives, and ability to protect property were negative predictors. The other three variables included in the overall model are also worthy of discussion. The variable, negative emotion, had a negative, though insignificant, coefficient. However, this contrasts with the prediction of Hypothesis 1b, which predicted negative emotion would have a positive effect on intention. This finding also contradicts the existing literature, which suggested that a negative emotional response increases the completion of either mitigation or preparedness actions (Terpstra, 2011; Zaalberg et al., 2009). Again, the assertion by Siegrist & Gutscher (2008) that emotion is only a part of the picture when it comes to mitigation decision making seems to hold true. More work is necessary to be able to say with any certainty what the effect of emotion is on these processes. Socioeconomic status was found to be a negative, though insignificant, predictor of intention to mitigate. Though this contradicts some findings from the existing literature which suggest income has a positive effect on willingness to mitigate, this finding provides some evidence that respondents with financial security may be less

willing to mitigate (Grothmann & Reusswigg, 2006; Peacock, 2003). The reason for this may be that those homeowners have the financial means to repair their properties in the event of hurricane damage and would rather not spend the money to complete mitigation actions. The last variable included in the model was potential future influence of others. This variable was found to be a positive, but insignificant, predictor of intention. The direction of this coefficient provides additional support for Hypothesis 2, which suggested influence of others has a positive effect on intention. This also supports the findings of the existing literature, where influence of others was proven to be positively related to envelope and shutter coverage and completion of preparedness actions (Peacock, 2003; Zaalberg et al., 2009).

The following table shows a summary of the findings for each of the four hypotheses.

Table 24 Summary of Findings

Hypothesis	Results
1a: Positive relationships between intention & i) risk perception, ii) dread, iii) fear, iv) worry	*Partial support*: Positive relationships between i) intention & risk perception and iii) intention & fear
1b: i) Negative emotional response, intention increases; ii) Positive or iii) no emotional response, intention decreases	*Partial support*: iii) No emotional response, intention decreases
2: Influence of others, intention increases	*Not supported*: No significant relationships
3: Positive relationship between more favorable views of the characteristics of the mitigation actions & intention	*Not supported*: Significant results contrary to prediction show a negative relationship between favorable views of protective value & intention

5.2 Limitations

There are several limitations of this study that are worth mentioning. The first limitation is that hazard intrusiveness was not a measure included in the survey. Both Ge et al. (2011) and Lindell et al. (2009) found hazard intrusiveness to have large, positive effects on the mitigation adoption expectations of their participants. The inclusion of this concept in the survey could have helped shed additional light on the role emotion plays in the decision making process. It also could have provided some insight on how the frequency of emotional response directed towards a hurricane influences intention, which is also currently missing from this analysis.

Ajzen's (1991) theory of planned behavior includes a completion of behavior component. The second limitation of this thesis is the failure to incorporate the completion component. Due to the nature of the dataset, it was not possible to include completion in this analysis because respondents were not asked to provide information about the mitigation actions they may have previously completed. While this is a limitation of this work, it should be noted that understanding intention and the factors which influence it provides invaluable information that can be used to address concerns regarding the completion of hurricane mitigation actions in coastal regions of the United States.

The third limitation of this work is that the dependent variable utilized in the linear regression assumes that homeowners would be willing to adopt more than one mitigation action for their property. Unfortunately, the survey does not explicitly ask respondents to indicate their views on the use of multiple mitigation actions simultaneously. For the sake of analysis, it was necessary to assume that respondents

would be willing to utilize multiple mitigation actions simultaneously. However, if that assumption is not true, the results of this analysis could look very different.

5.3 Future Research

Based on the existing literature and the findings and limitations of this study, future research is still needed to determine what role emotion, the influence of others, and the perceptions of the characteristics of the mitigation actions play in this decision making process. Below I offer three suggestions which I believe highlight the most important work still to be done on this topic.

This study, like many others, collected data from a random sample. As a result, most respondents had not undertaken mitigation actions on their homes. While there is clearly much to be learned from surveying a representative, random sample of the population, when it comes to a topic with such uncertainty and such financial impact as hurricane mitigation it would also be useful to target the homeowners who have actually undergone this decision making process and completed an action. Given the success of the mitigation program in Alabama, my first suggestion for future research is to utilize purposive sampling to target Alabama homeowners who have completed mitigation actions. Another benefit of only including homeowners who have previously mitigated is that you can say with certainty which factors lead to actual completion, and not just intention or expectations to complete.

The second suggestion I have for future research regards the measures included in a future survey or interview guide. The measures should include the following:

- Open-ended questions allowing respondents to truly describe the emotions they do (or do not) feel towards hurricanes
- Measures of hazard intrusiveness

- Measures inquiring about actual completion, not just intention to complete
- Greater detail on how homeowners may have been influenced by others (i.e., what actions did the others complete; did the others consider mitigating, then ultimately decide not to, and that influenced your decision)
- Definitive ranking of reasons/factors that impact their decision making process (i.e.: What is the single most important factor impeding your household from adding a mitigation action?)

The third suggestion I have for future research stems from several comments left on the returned surveys. A number of respondents who still live in a floodplain, but further inland from the Atlantic Ocean, indicated that hurricanes were not a huge concern for them. The same questionnaire could be utilized again; however, this time it could be sent to only a random sample of households located in the counties immediately along the coast of North Carolina. The results of the two surveys could be compared to see if there really is a difference between a homeowner's willingness to mitigate based on their proximity to the coast. Is the real issue in unwillingness to mitigate, not a matter of emotion or perception of the actions, but instead based on a lack of proximity to the ocean, the perceived source of the threat of a hurricane?

5.4 Implications

I was born and raised in a beach town in the mid-Atlantic. When I first started working as a graduate assistant on this project, I had to Google search every single one of the hurricane mitigation actions mentioned in the existing literature. With every search, I became more and more alarmed to realize that I had never heard mention of

anyone in my hometown adding these features to their homes. Some casual inquiry about why my family and family friends had not completed any of these actions led to some interesting discussions about cost concerns, repeated near-miss hurricane experiences, and laughter about wanting to save money to host future infamous hurricane parties. Many initial reactions were, "But why would we do that?"

With that statement, an interest in the factors underlying hurricane mitigation decision making was born. As my literature review progressed, I realized just how concerning the low prevalence of hurricane mitigation actions nationwide truly is. As mentioned in the introduction, cost-benefit analyses show that for every $1 invested in the completion of a mitigation action $6 are saved during disaster response and recovery efforts in the United States (Multihazard Mitigation Council, 2017). "But why would we do that?" rang out again in my head. Why would you spend your limited financial resources on costly mitigation actions when a hurricane might not even impact your home? This thesis was truly an effort to provide some insight on that question.

There are a number of implications for both policymakers and researchers that arise from the findings of this thesis. For policymakers, the largest implication is that the underlying complexities of homeowners must be understood in order to offer the most effective mitigation programs in the future. Programs that are not grounded in the realities of a homeowner's perceptions about these actions will not succeed and thus will not offer the government maximum financial relief during future disasters. Another implication for policymakers is that this study indicates how little coastal area homeowners are thinking about their hurricane risk and their mitigation options. That must change for any significant difference in the prevalence of mitigation actions

nationwide to occur. One suggestion is to increase the number of year-round internet, television, and radio commercials discussing hurricanes, preparedness, and mitigation in coastal areas. A final implication for policymakers is that the characteristics of mitigation actions and how homeowners view them are crucial factors in understanding why homeowners mitigate. Factors, such as cost, installation effort, added resale value, and ability of the action to protect lives and property, need to be included in the discussion on future mitigation grant programs.

For researchers, one thing is clear – many questions still remain when it comes to mitigation decision making. One implication from this thesis is the applicability of the theory of planned behavior for framing future studies on this topic. To the best of my knowledge, this thesis was the first application of the theory of planned behavior to hazard mitigation decision making. The significance of my findings suggest that the theory of planned behavior provides a concise framework for understanding the complexities of mitigation decision making. A second implication for researchers is that the timing of data collection can really impact findings. This survey was distributed to coastal North Carolina in the winter of 2017 following years of no major hurricanes making landfall in the United States. The responses to the survey items may have been very different if this survey were to have been distributed following the very active 2017 hurricane season. When considering findings of studies, context is crucial. It could very well be the case that this recent hurricane season has caused more homeowners in coastal North Carolina to actively consider their mitigation options.

5.5 Concluding Thoughts

This study aimed to answer the following question:

What role do emotions, the influence of others, and perceptions of the characteristics of mitigation actions have on the mitigation decision making processes of individual homeowners?

While I do not think I can definitively answer that question, I do think I can confidently say that emotions, the influence of others, and the perceptions of the characteristics of mitigation actions are all important factors in the mitigation decision making processes of individual homeowners. I think the most important contribution that this thesis makes is proving that many factors are important in their level of influence on an individual homeowner's intention to complete a mitigation action. This thesis also shows how well-suited the theory of planned behavior is as a framework for interpreting this nuanced decision making process.

Ultimately, I hope the findings of this thesis enlighten homeowners, policymakers, and researchers about the importance of better understand the mitigation decision making process. Going forward, it is imperative that policy programs and research studies incorporate the perceptions of coastal homeowners from the outset. Recognizing the impact that emotion, the influence of others, and the perceptions of the characteristics of the actions have on the mitigation decision making process is necessary to ensure an increased prevalence of mitigation actions nationwide.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Ajzen, I. (2011). The theory of planned behavior: Reactions and reflections. *Psychology & Health, 26*(9), 1113-1127.

Ajzen, I., & Fishbein, M. (1969). The prediction of behavioral intentions in a choice situation. *Journal of Experimental Social Psychology, 5*(4), 400-416.

Ajzen, I., & Fishbein, M. (1972). Attitudes and normative beliefs as factors influencing behavioral intentions. *Journal of Personality and Social Psychology, 21*(1), 1-9.

Ajzen, I., & Fishbein, M. (1973). Attitudinal and normative variables as predictors of specific behaviors. *Journal of Personality and Social Psychology, 27*(1), 41-57.

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin, 84*(5), 888-918.

Ajzen, I., Rosenthal, L. H., & Brown, T. C. (2000). Effects of perceived fairness on willingness to pay. *Journal of Applied Social Psychology, 30*(12), 2439-2450.

American Association for Public Opinion Research. (2017). *AAPOR Response Rate Calculator*. Oakbrook Terrace, IL: American Association for Public Opinion Research.

Asgary, A., & Willis, K. G. (1997). Household behavior in response to earthquake risk An assessment of alternative theories. *Disasters, 21*(4), 354-365.

Atreya, A., Ferreira, S., & Michel-Kerjan, E. (2015). What drives households to buy flood insurance? New evidence from Georgia. *Ecological Economics, 117*, 153-161.

Baumann, D. D., & Sims, J. H. (1978). Flood insurance: Some determinants of adoption. *Economic Geography, 54*(3), 189-196.

Becker, J. S., Paton, D., Johnston, D. M., & Ronan, K. R. (2012). A model of household preparedness for earthquakes: How individuals make meaning of earthquake information and how this influences preparedness. *Natural Hazards, 64*(1), 107-137.

Becker, J. S., Paton, D., Johnston, D. M., & Ronan, K. R. (2013). Salient beliefs about earthquake hazards and household preparedness. *Risk Analysis, 33*(9), 1710-1727.

Botzen, W. J. W., & van den Bergh, J. C. J. M. (2012). Risk attitudes to low-probability climate change risks: WTP to pay for flood insurance. *Journal of Economic Behavior & Organization, 82*(1), 151-166.

Browne, M. J., & Hoyt, R. E. (2000). The demand for flood insurance: Empirical evidence. *Journal of Risk and Uncertainty, 20*(3), 291-306.

Department of Homeland Security. (2017, March 1). *What is Mitigation?*. Retrieved from https://www.fema.gov/what-mitigation

Dillman, D. A. (1991). The design and administration of mail surveys. *Annual Review of Sociology, 17*, 225-249.

Dillman, D. A. (2007). Survey implementation. In *Mail and Internet Surveys: The Tailored Design Method* (2nd ed.) (149-193). Hoboken, NJ: John Wiley & Sons, Inc.

Federal Emergency Management Agency. (2013). *Mitigation ideas: A resource for reducing risk to natural hazards.* Washington, DC: Department of Homeland Security.

Fishbein, M., & Ajzen, I. (2010). Defining and predicting behavior. In Predicting and Changing Behavior (29-73). New York: Taylor & Francis Group, LLC.

Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (2000). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. In R. E. Löfstedt (Ed.), *The Perception of Risk* (80-103). New York: Earthscan.

Frijda, N. H. (1986a). Emotional experience. In *The emotions* (1st ed.) (176-259). New York: Cambridge University Press.

Frijda, N. H. (1968b). Regulation. In The emotions (1st ed.) (401-450). New York: Cambridge University Press.

Fulton, B.R. (2016). Implementing response enhancing strategies and conducting nonresponse analyses. *Sociological Methods & Research*, 1-37.

Ge, Y., Peacock, W. G., & Lindell, M. K. (2011). Florida households' expected responses to hurricane hazard mitigation incentives. *Risk Analysis, 31*(10), 1676-1691.

Grothmann, T., & Reusswig, F. (2006). People at risk of flooding: Why some residents take precautionary action while others do not. *Natural Hazards, 38*(1), 101-120.

Holt, C. A., & Laury, S. K. (2002). Risk aversion and incentive effects. *The American Economic Review, 92*(5), 1644-1655.

Hoople, D. (2013, September 23). The budgetary impact of the federal government's response to disasters. [Weblog]. Retrieved from https://www.cbo.gov/publication/44601

IBM Analytics. (2018). IBM SPSS Software. Retrieved from https://www.ibm.com/analytics/data-science/predictive-analytics/spss-statistical-software

Jasour, Z., Davidson, R. A., Trainor, J. E., Kruse, J., & Nozick, L. K. (R&R). Homeowner decisions to retrofit to reduce hurricane-induced wind and flood damage. Journal of Infrastructure Systems.

Kates, R. W. (1962). The perception and adoption of alternative flood damage reduction measures. In *Hazard and Choice Perception in Flood Plain Management* (104-134). Chicago, IL: The University of Chicago.

Kousky, C. (2011). Understanding the demand for flood insurance. *Natural Hazards, 12*(2), 96-110.

Kunreuther, H. (2006). Disaster mitigation and insurance: Learning from Katrina. *Annals of the American Academy of Political and Social Science, 604*, 208-227.

Landry, C. E., & Jahan-Parvar, M. R. (2011). Flood insurance coverage in the coastal zone. *The Journal of Risk and Insurance, 78*(2), 361-388.

Lindell, M. K., & Hwang, S. N. (2008). Households' perceived personal risk and responses in a multihazard environment. *Risk Analysis, 28*(2), 539-556.

Lindell, M. K., & Perry, R. W. (1992). Models of warning response processes. In A. L. Wilson & S. M. Nix (Eds.), *Behavioral Foundations of Community Emergency Planning* (115-145). Hemisphere Publishing Corporation: Philadelphia.

Lindell, M. K., & Prater, C. S. (2002). Risk area residents' perceptions and adoption of seismic hazard adjustments. *Journal of Applied Social Psychology, 32*(11), 2377-2392.

Lindell, M. K., & Whitney, D. J. (2000). Correlates of household seismic hazard adjustment adoption. *Risk Analysis, 20*(1), 13-25.

Lindell, M. K., Arlikatti, S., & Prater, C. S. (2009). Why people do what they do to protect against earthquake risk: Perceptions of hazard adjustment attributes. *Risk Analysis, 29*(8), 1072-1088.

Lindeman, R. H., Merenda, P. F., & Gold, R. Z. (1980a). Further methods of bivariate correlation. In *Introduction to Bivariate and Multivariate Analysis* (63-92). Glenview, IL: Scott, Foresman and Company.

Lindeman, R. H., Merenda, P. F., & Gold, R. Z. (1980b). Multiple regression and correlation. In *Introduction to Bivariate and Multivariate Analysis* (93-145). Glenview, IL: Scott, Foresman and Company.

Malik, F., Brown, R., & York, W. (2013). *IBHS FORTIFIED Home Hurricane; Bronze, Silver and Gold: An incremental, holistic approach to reducing residential property losses in hurricane-prone areas.* Tampa, FL: Insurance Institute for Business & Home Safety.

Marketing Systems Group. (2017). *Gensys Address Based Sample (ABS).* Retrieved from http://www.m-s-g.com/web/genesys/Address-based-samples.aspx

Mulligan, K., & Scherer, K. R. (2012). Toward a working definition of emotion. *Emotion Review, 4*(4), 345-347.

Multihazard Mitigation Council. (2017). *Natural Hazard Mitigation Saves: 2017 Interim Report.* Washington, D.C.: National Institute of Building Sciences.

National Research Council of the National Academies. (2013). The growing problem of nonresponse. In R. Tourangeau & T. J. Plewes (Eds.), *Nonresponse in Social Science Surveys: A Research Agenda* (7-39). Washington, D.C.: The National Academies Press.

Peacock, W. G. (2003). Hurricane mitigation status and factors influencing mitigation status among Florida's single-family homeowners. *Natural Hazards Review, 3*(4), 149-158.

Petrolia, D. R., Landry, C. E., & Coble, K. H. (2013). Risk preferences, risk perceptions, and flood insurance. *Land Economics, 89*(2), 227-245.

Robb, K. A., Gatting, L., & Wardle, J. (2017). What impact do questionnaire length and monetary incentives on mailed health psychology survey response? *British Journal of Health Psychology, 22*(4), 671-685.

Russell, L. A., Goltz, J. D., & Bourque, L. B. (1995). Preparedness and hazard mitigation actions before and after two earthquakes. *Environment and Behavior, 27*(6), 744-770.

Sahu, P. K. (2013a). Multivariate Analysis. In *Research Methodology: A Guide for Researchers in Agricultural Science, Social Science and Other Related Fields* (325-388). New Delhi: Springer.

Sahu, P. K. (2013b). Processing and analysis of data. In *Research Methodology: A Guide for Researchers in Agricultural Science, Social Science and Other Related Fields* (75-130). New Delhi: Springer.

Shreve, C. M., & Kelman, I. (2014). Does mitigation save? Reviewing cost-benefit analyses of disaster risk reduction. *International Journal of Disaster Risk Reduction, 10*(A), 213-235.

Siegrist, M., & Gutscher, H. (2006). Flooding risk: A comparison of lay people's perceptions and expert's assessments in Switzerland. *Risk Analysis, 26*(4), 971-979.

Siegrist, M., & Gutscher, H. (2008). Natural hazards and motivation for mitigation behavior: People cannot predict the affect evoked by a severe flood. *Risk Analysis, 28*(3), 771-778.

Slovic, P. (2000). Perception of risk. In R. E. Löfstedt (Ed.), *The Perception of Risk* (220-231). New York: Earthscan.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis, 24*(2), 311-322.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1976). Cognitive processes and societal risk taking. In R. E. Löfstedt (Ed.), *The Perception of Risk* (32-50). New York: Earthscan.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1980). Facts and fears: Understanding perceived risk. In R. E. Löfstedt (Ed.), *The Perception of Risk* (137-153). New York: Earthscan.

Slovic, P., Fischhoff, B., & Lictenstein, S. (1986). The psychometric study of risk perception. In V. T. Covello, J. Menkes, & J. Mumpower (Eds.), *Risk Evaluation and Management* (3-24). New York: Springer.

Slovic, P., Fischhoff, B., & Lictenstein, S. (2000). Accident probabilities and seat belt usage: A psychological perspective. In R. E. Löfstedt (Ed.), T*he Perception of Risk* (73-79). New York: Earthscan.

Slovic, P., Kunreuther, H., & White, G. F. (1974). Decision processes, rationality and adjustment to natural hazards. In R. E. Lofstedt (Ed.), *The Perception of Risk* (1-31). New York: Earthscan.

Terpstra, T. (2011). Emotions, trust, and perceived risk: Affective and cognitive routes to flood preparedness behavior. *Risk Analysis, 31*(10), 1658-1675.

Tierney, K. (2014). Communities and societies at risk. In K. H. Roberts & I. I. Mitroff (Eds.), *The Social Roots of Risk* (125-159). Stanford, CA: Stanford University Press.

Tourangeau, R., & Plewes, T. J. (2013). Nonresponse in Social Science Surveys: A Research Agenda. Washington, D.C.: The National Academies Press.

Turner, R. H., Nigg, J. M., & Paz, D. H. (1986). Are the people really concerned? In *Waiting for Disaster: Earthquake Watch in California*. Berkeley, CA: University of California Press.

United States Census Bureau. (2016). *QuickFacts North Carolina* [Data file]. Retrieved from https://www.census.gov/quickfacts/NC

Wang, D., Davidson, R. A., Trainor, J. E., Nozick, L. K., & Kruse, J. (2017). Homeowner purchase of insurance for hurricane-induced wind and flood damage. *Natural Hazards, 88*(1), 221-245.

Weinstein, N. D., & Nicolich, M. (1993). Correct and incorrect interpretations of correlations between risk perceptions and risk behaviors. *Health Psychology, 12*(3), 235-245.

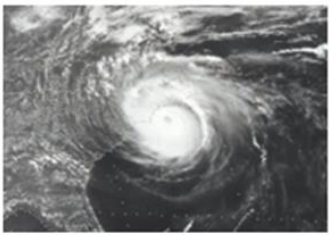
Xu, K., Nozick, L., Kruse, J. B., Davidson, R., & Trainor, J. (2017). Affordability of natural catastrophe insurance: Game theoretic analysis and geospatially explicit case study. In J. Kruse, J. Crompyoets, & F. Pearlman (Eds.), *GEOValue: The Socioeconomic Value of Geospatial Information* (267-282). Baton Rouge, FL: Taylor & Francis Group, LLC.

Zaalberg, R., Midden, C., Meijnders, A., & McCalley, T. (2009). Prevention, adaptation, and threat denial: Flooding experiences in the Netherlands. *Risk Analysis, 29*(12), 1759-1778.

Appendix A

SURVEY INSTRUMENT

NORTH CAROLINA HURRICANE MITIGATION SURVEY



Hello from Joe and Jamie. We are part of a team of professors conducting a study, funded by the National Science Foundation, to better understand how homeowners like you make decisions about hurricanes. We could use your help. Your thoughts and ideas are important to us, and we hope you will agree to take a few minutes to answer these questions. As a token of our appreciation, we have included a dollar in the envelope with this survey.

It should take about 20 minutes of your time and any information you provide will be treated confidentially. The time you spend answering these questions will benefit emergency planning professionals, researchers, and homeowners like you. Please take the time to complete the survey and return it using the enclosed postage paid envelope.

This research study has been reviewed and approved by the Institutional Review Board for Human Subjects Research at the University of Delaware. If you have any questions about your rights as a participant, you can contact them directly at the following number: (302) 831-2137. You can also contact us directly using the information below. Thank you for helping.

Dr. Joseph E. Trainor
jtrainor@udel.edu
302-831-6618

Dr. Jamie Kruse
krusej@ecu.edu
252-328-5718

1. Are you at least 18 years old?
   ☐ Yes ☐ No

2. Do you own and live at the address that this survey was mailed to?
   ☐ Yes, I own this property and it is my primary residence.
   ☐ Yes, I own this property and it is my second or vacation home.
   ☐ No, I own this property but I mostly rent it out to other people.
   ☐ No, I do not own this property.
   ☐ Other: _____

3. Are you involved in making decisions related to property insurance and home repairs or improvements for this home?
   ☐ Yes, I make these kinds of decisions alone.
   ☐ Yes, I make these kinds of decisions but someone else also provides input.
   ☐ Yes, I give input to the person or people who makes these kinds of decisions.
   ☐ Yes, I have an equal say in these kinds of decisions together with another person or group of people in my home.
   ☐ No, I am not the person who makes these kinds of decisions and they are unavailable for this survey. (See note in italics below.)

4. If you said in Question 3 that you make these decisions with someone else, which of the following best describes the other person or people that also make these decisions? (Select all that apply.)
   ☐ Spouse or partner
   ☐ Roommate
   ☐ Child
   ☐ Homeowner Association
   ☐ Other:_____
   ☐ Boyfriend or girlfriend
   ☐ Parent
   ☐ Brother and/or sister
   ☐ Not applicable

If you answered NO to any of the first three questions, unfortunately, you are not eligible to participate in our survey. Please ask someone who can answer yes to these questions. If no one in your household is willing or able to participate, please put this book in the prepaid envelope and place it in the mail. Feel free to keep the dollar anyway.

1

Unique ID#

5. Before you received this survey, how often would you say **you thought about** each of the following:

   a. The risk of a hurricane damaging your home?
   - ☐ Once a week
   - ☐ Once a month
   - ☐ Once a year
   - ☐ Once every 5 years
   - ☐ Once every 10 years or longer
   - ☐ Never

   b. Options to strengthen your home against a hurricane?
   - ☐ Once a week
   - ☐ Once a month
   - ☐ Once a year
   - ☐ Once every 5 years
   - ☐ Once every 10 years or longer
   - ☐ Never

   c. Insurance options to reduce the cost if a hurricane affected your home?
   - ☐ Once a week
   - ☐ Once a month
   - ☐ Once a year
   - ☐ Once every 5 years
   - ☐ Once every 10 years or longer
   - ☐ Never

6. On average, how often would you say hurricanes affect North Carolina?
   - ☐ Once a year or more
   - ☐ Once every 2-4 years or less
   - ☐ Once every 5-9 years
   - ☐ Once every 10-14 years
   - ☐ Once every 15-19 years
   - ☐ Once every 20 years or longer

7. If a hurricane affects North Carolina, how likely is it to cause…

   a. Significant damage to your home?
   ☐ Very unlikely ☐ Unlikely ☐ Not sure ☐ Likely ☐ Very likely

   b. Significant disruption to your life?
   ☐ Very unlikely ☐ Unlikely ☐ Not sure ☐ Likely ☐ Very likely

   c. An injury or the death of someone close to you?
   ☐ Very unlikely ☐ Unlikely ☐ Not sure ☐ Likely ☐ Very likely

8. If we said there is a 50% chance that your home will experience $5,000 or more in damage from a hurricane in the next 5 years, what would be your response?
   - ☐ That seems about right.
   - ☐ The chance is higher than 50% (more likely).
   - ☐ The chance is lower than 50% (less likely).
   - ☐ I don't know.

9. Which of the following emotions do you feel when you think about hurricanes? (Select all that apply.)

☐ Angry ☐ Anxious ☐ Calm
☐ Capable ☐ Exhilarated ☐ Indifferent
☐ Repulsed ☐ Resigned ☐ Scared
☐ Other: _____

10. To what degree do you experience each of the following emotions when it comes to hurricanes? (Select one box for each emotion.)

	Not at all	Very little	A little	A moderate amount	An extreme amount
Dread	☐	☐	☐	☐	☐
Fear	☐	☐	☐	☐	☐
Worry	☐	☐	☐	☐	☐

11. About what year did you start living in the eastern half of North Carolina? _____

12. About what year did you start living in your current home? _____

13. About what year was your current home built? _____

14. About how many more years do you expect to own your current home? _____

15. Do you believe that…
    a. Hurricane damage is unavoidable?
    ☐Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

    b. Your actions matter in determining how much a hurricane will damage your home?
    ☐Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

16. To what extent do you think each is responsible for reducing the potential effects of hurricanes in your community?

	Not at all	A little	To a moderate extent	To a great extent
Individual homeowners	☐	☐	☐	☐
Government	☐	☐	☐	☐

17. The following is a list of hurricanes that have affected North Carolina over the last 20 years. For each hurricane that occurred while you lived here, please indicate if you personally had each experience during that event.

	My community was disrupted by this event.		My life was disrupted by this event.		My home was damaged by this event.		A friend or relative was injured or lost their lives in this event.	
	Yes	No	Yes	No	Yes	No	Yes	No
Matthew (2016)	☐	☐	☐	☐	☐	☐	☐	☐
Arthur (2014)	☐	☐	☐	☐	☐	☐	☐	☐
Sandy (2012)	☐	☐	☐	☐	☐	☐	☐	☐
Irene (2011)	☐	☐	☐	☐	☐	☐	☐	☐
Ernesto (2006)	☐	☐	☐	☐	☐	☐	☐	☐
Isabel (2003)	☐	☐	☐	☐	☐	☐	☐	☐
Floyd (1999)	☐	☐	☐	☐	☐	☐	☐	☐
Dennis (1999)	☐	☐	☐	☐	☐	☐	☐	☐
Bonnie (1998)	☐	☐	☐	☐	☐	☐	☐	☐
Fran (1996)	☐	☐	☐	☐	☐	☐	☐	☐
Bertha (1996)	☐	☐	☐	☐	☐	☐	☐	☐

18. Below is a list of experiences that you may have had **in the past.** For each experience, please answer the two questions about its effect on you.

Experience	Have you ever had this experience?		Did having this experience make you **consider** buying more insurance or strengthening your home to protect it from hurricanes?		
	Yes	No	Yes	No	N/A
Purchased a home	☐	☐	☐	☐	☐
Renovated your home or reroofed	☐	☐	☐	☐	☐
Your insurance premium changed	☐	☐	☐	☐	☐
Learned about a program to help pay for strengthening your home	☐	☐	☐	☐	☐
Experienced a hurricane	☐	☐	☐	☐	☐
Heard about a major hurricane somewhere else	☐	☐	☐	☐	☐
A child or elderly dependent joined your household	☐	☐	☐	☐	☐
Your marital status changed	☐	☐	☐	☐	☐
Family or friends strengthened their homes	☐	☐	☐	☐	☐
Someone explained options to protect your home	☐	☐	☐	☐	☐
Other:_____	☐	☐	☐	☐	☐

19. Below is the same list of experiences. For each experience, please answer the two questions about its possible effect on you.

Experience	Is it possible you will have this experience in the next 5 years?		If you do have this experience, do you think it will make you **consider** buying insurance or strengthening your home to protect it from hurricanes?		
	Yes	No	Yes	No	N/A
Purchase a home	☐	☐	☐	☐	☐
Renovate your home or reroof	☐	☐	☐	☐	☐
Your insurance premium changes	☐	☐	☐	☐	☐
Learn about a program to help pay for strengthening your home	☐	☐	☐	☐	☐
Experience a hurricane	☐	☐	☐	☐	☐
Hear about a major hurricane somewhere else	☐	☐	☐	☐	☐
A child or elderly dependent joins your household	☐	☐	☐	☐	☐
Your marital status changes	☐	☐	☐	☐	☐
Family or friends strengthen their homes	☐	☐	☐	☐	☐
Someone explains options to protect your home	☐	☐	☐	☐	☐
Other:_____	☐	☐	☐	☐	☐

20. This table includes a list of features that could reduce the chance of damage to your home in the event of a hurricane. Please tell us if you think the following statements are true for each feature.

	The cost of this feature is too high.		This feature requires too much effort to install.		I understand how this feature works.		This feature would add value if I sell my home.	
	Yes	No	Yes	No	Yes	No	Yes	No
Wind resistant shingles	☐	☐	☐	☐	☐	☐	☐	☐
Special foam adhesive under the roof	☐	☐	☐	☐	☐	☐	☐	☐
Hurricane shutters	☐	☐	☐	☐	☐	☐	☐	☐
Impact resistant windows	☐	☐	☐	☐	☐	☐	☐	☐
Hurricane straps/ties	☐	☐	☐	☐	☐	☐	☐	☐
Elevated appliances	☐	☐	☐	☐	☐	☐	☐	☐
Water resistant siding	☐	☐	☐	☐	☐	☐	☐	☐
Home elevated on piles	☐	☐	☐	☐	☐	☐	☐	☐

21. Please do the same for these statements.

	This feature would protect lives.		This feature would protect my property.		Adding this feature would make my home less attractive.	
	Yes	No	Yes	No	Yes	No
Wind resistant shingles	☐	☐	☐	☐	☐	☐
Special foam adhesive under the roof	☐	☐	☐	☐	☐	☐
Hurricane shutters	☐	☐	☐	☐	☐	☐
Impact resistant windows	☐	☐	☐	☐	☐	☐
Hurricane straps/ties	☐	☐	☐	☐	☐	☐
Elevated appliances	☐	☐	☐	☐	☐	☐
Water resistant siding	☐	☐	☐	☐	☐	☐
Home elevated on piles	☐	☐	☐	☐	☐	☐

22. Please mark the box that best describes if your current home has each feature. (Select one per row.)

	My home does not have this feature ***or*** I don't know if it does.	My home has this feature and...		
		it was ***not*** important to me when I bought the home.	it was ***important*** to me ***when I bought*** the home.	I ***added*** it ***after I bought*** the home.
Wind resistant shingles	☐	☐	☐	☐
Special foam adhesive under the roof	☐	☐	☐	☐
Hurricane shutters	☐	☐	☐	☐
Impact resistant windows	☐	☐	☐	☐
Hurricane straps/ties	☐	☐	☐	☐
Elevated appliances	☐	☐	☐	☐
Water resistant siding	☐	☐	☐	☐
Home elevated on piles	☐	☐	☐	☐

23. If you said in Question 22 that you added a home protection feature to your home after you moved in…

a. Was the availability of a grant program part of what motivated you to add that feature?
   - ☐ There was no grant available.
   - ☐ A grant was available, but I did not use it.
   - ☐ A grant was available and I used it.
     i. What feature(s) did you use the grant for?
     _____
   - ☐ I am not sure if a grant was available or not.

b. If a grant was available…
   i. How much did the grant program pay you? _____
   ii. What was the total cost of the feature? _____

24. Several types of insurance policies are offered in this region. For each type listed below, please answer the two questions.

	Is this type of insurance policy offered where you live?			Do you currently have this type of policy?		
	Yes	No	Don't know	Yes	No	Don't know
Standard homeowners policy that **includes** wind coverage	☐	☐	☐	☐	☐	☐
Standard homeowners policy that **excludes** wind coverage	☐	☐	☐	☐	☐	☐
Special wind policy	☐	☐	☐	☐	☐	☐
Flood insurance through the National Flood Insurance Program (NFIP)	☐	☐	☐	☐	☐	☐

25. For this question, we would like you to **imagine that you moved to a new home that did not have any of the following features**. With that assumption, tell us if you would add each feature within five years.

	I think I would add this feature within five years.		
	Yes	No	Not sure
Wind resistant shingles	☐	☐	☐
Special foam adhesive under the roof	☐	☐	☐
Hurricane shutters	☐	☐	☐
Impact resistant windows	☐	☐	☐
Hurricane straps/ties	☐	☐	☐
Elevated appliances	☐	☐	☐
Water resistant siding	☐	☐	☐
Home elevated on piles	☐	☐	☐

26. Imagine again that you moved to a new home without any of these features **and** now you could receive a grant from the government to strengthen your home. The grant would not need to be repaid. Would you take each action below within five years given the grant terms listed?

a. Strengthen your roof with high wind shingles **or** special adhesive foam.

The government would pay…	I would do the action.	
	Yes	No
50% of the cost, with a maximum grant of $2,500.	☐	☐
100% of the cost, with a maximum grant of $2,500.	☐	☐
50% of the cost, with a maximum grant of $5,000.	☐	☐
100% of the cost, with a maximum grant of $5,000.	☐	☐
50% of the cost, with a maximum grant of $10,000.	☐	☐
100% of the cost, with a maximum grant of $10,000.	☐	☐

b. Protect the openings in your home by installing impact resistant windows **or** hurricane shutters, and reinforcing garage doors.

The government would pay…	I would do the action.	
	Yes	No
50% of the cost, with a maximum grant of $2,500.	☐	☐
100% of the cost, with a maximum grant of $2,500.	☐	☐
50% of the cost, with a maximum grant of $5,000.	☐	☐
100% of the cost, with a maximum grant of $5,000.	☐	☐
50% of the cost, with a maximum grant of $10,000.	☐	☐
100% of the cost, with a maximum grant of $10,000.	☐	☐

c. Install hurricane straps to strengthen the roof-wall connection.

The government would pay…	I would do the action.	
	Yes	No
50% of the cost, with a maximum grant of $2,500.	☐	☐
100% of the cost, with a maximum grant of $2,500.	☐	☐
50% of the cost, with a maximum grant of $5,000.	☐	☐
100% of the cost, with a maximum grant of $5,000.	☐	☐
50% of the cost, with a maximum grant of $10,000.	☐	☐
100% of the cost, with a maximum grant of $10,000.	☐	☐

d. Protect against flood damage by elevating outlets and appliances above flood level, **or** installing water resistant insulation and siding.

The government would pay…	I would do the action.	
	Yes	No
50% of the cost, with a maximum grant of $2,500.	☐	☐
100% of the cost, with a maximum grant of $2,500.	☐	☐
50% of the cost, with a maximum grant of $5,000.	☐	☐
100% of the cost, with a maximum grant of $5,000.	☐	☐
50% of the cost, with a maximum grant of $10,000.	☐	☐
100% of the cost, with a maximum grant of $10,000.	☐	☐

e. Elevate the home above historical flood levels.

The government would pay…	I would do the action.	
	Yes	No
50% of the cost, with a maximum grant of $2,500.	☐	☐
100% of the cost, with a maximum grant of $2,500.	☐	☐
50% of the cost, with a maximum grant of $5,000.	☐	☐
100% of the cost, with a maximum grant of $5,000.	☐	☐
50% of the cost, with a maximum grant of $10,000.	☐	☐
100% of the cost, with a maximum grant of $10,000.	☐	☐

27. Property acquisition (buyout) programs pay residents to move away from dangerous areas so that no one will suffer damage or injury in that home during future events. Has the government ever made an offer to buy your home?
☐ I have never been offered a buyout.
☐ I have been offered a buyout and I took it.
☐ I have been offered a buyout, but I did not take it.

28. If you have ever had a property acquisition (buyout) offer…
a. What percentage of your home's market value were you offered?_____

b. Was this offer made...
☐ During normal times
☐ Just after a major disaster event

29. If you were given the opportunity today, would you sell your home to the government through a property acquisition (buyout) program?
☐ Never
☐ Possibly, if the circumstances were right

30. The table below shows some made up options a government property acquisition (buyout) program could offer. For each option below, if the government made you an offer to purchase your home at the value listed, would you take it?

The government would pay you…	I would accept the buyout.	
	Yes	No
75% of market value for your home.	☐	☐
90% of market value for your home.	☐	☐
100% of market value for your home.	☐	☐
110% of market value for your home.	☐	☐
125% of market value for your home.	☐	☐

31. Now imagine a hurricane has seriously damaged your home and you have not started repairing it yet. In that situation, if the government made you an offer to purchase your home at the value listed below would you take it?

The government would pay you…	I would accept the buyout.	
	Yes	No
75% of market value for your home.	☐	☐
90% of market value for your home.	☐	☐
100% of market value for your home.	☐	☐
110% of market value for your home.	☐	☐
125% of market value for your home.	☐	☐

In this last section, we would like to ask a few questions about you and the members of your household. You may refuse to answer any question, but know that your choice does affect the quality of the study.

32. What year were you born?_____

33. How many people live in your household who…
    a. are under the age of 18? _____
    b. are age 18-64? _____
    c. are over the age of 64? _____
    d. have a disability or medical condition that may impact your ability to respond to a hurricane? _____

34. What is the highest level of education you have completed?
    ☐ Less than high school graduate
    ☐ High school graduate
    ☐ 2 year college degree (A.A./A.S.)
    ☐ 4 year college degree (B.A./B.S.)
    ☐ Graduate degree (Master's or Ph.D.)
    ☐ Professional degree (D.D.M., J.D., M.D., etc.)

35. Which of the following best describes your marital status?
    ☐ Married ☐ Single/Never married
    ☐ Widowed ☐ Separated
    ☐ Divorced

36. Which category best describes your race?
    ☐ Caucasian/White ☐ African American/Black
    ☐ Asian ☐ American Indian
    ☐ Pacific Islander ☐ Multi-racial

37. Do you consider yourself to be of Hispanic origin?
    ☐ Yes ☐ No ☐ Not sure

38. Which of the following best captures your gender?
    ☐ Male ☐ Female ☐ Other: _____

39. Which of the following best describes your current employment status?

- ☐ Employed full-time
- ☐ Employed part-time
- ☐ Unemployed
- ☐ Homemaker
- ☐ Student
- ☐ Retired
- ☐ Unable to work

40. Which of the following best describes your home?

- ☐ Single family home, duplex, or townhouse
- ☐ Manufactured home or trailer
- ☐ Apartment or condominium
- ☐ Some other kind of structure
- ☐ I don't know

41. What is your best estimate of your home's current market value?
Market value: $_____

42. What is your best estimate of how much you owe on any mortgages, home equity loans, home equity lines of credit, or other second mortgages?
Total outstanding debt: $_____

43. Please mark the income range that best describes your annual household income from all sources. This is before taxes and other deductions.

- ☐ $0 - $14,999
- ☐ $15,000 - $34,999
- ☐ $35,000 - $49,999
- ☐ $50,000 - $74,999
- ☐ $75,000 - $99,999
- ☐ $100,000 - $149,999
- ☐ $150,000 - $249,999
- ☐ $250,000 +

44. Which of the following categories best captures your net worth? By net worth, we mean the total value of cash, checking, savings, investments, and property of your household minus any loans.

- ☐ $0 - $49,999
- ☐ $50,000 - $99,999
- ☐ $100,000 - $149,999
- ☐ $150,000 - $199,999
- ☐ $200,000 - $299,999
- ☐ $300,000 - $399,999
- ☐ $400,000 - $499,999
- ☐ $500,000 +

Thank you for taking the time to complete this survey. Please place this booklet inside the enclosed postage paid envelope and place it in the mail as soon as you can.

Appendix B

DESCRIPTIVE STATISTICS

Descriptive Statistics for Raw Variables
Dependent Variables

ADDSHINGLES: Wind-resistant shingles – I think I would add this feature within five years.			
	Frequency	Percent	Cumulative Percent
Yes	67	28.6	30.7
No	91	38.9	72.5
Not sure	60	25.6	100.0
Total (*16 missing*)	218	100.0	

ADDFOAM: Special foam adhesive under the roof – I think I would add this feature within five years.			
	Frequency	Percent	Cumulative Percent
Yes	38	17.7	17.7
No	112	52.1	69.8
Not sure	65	30.2	100.0
Total (*19 missing*)	215	100.0	

ADDSHUTTERS: Hurricane shutters – I think I would add this feature within five years.

	Frequency	Percent	Cumulative Percent
Yes	50	23.0	23.0
No	113	52.1	75.1
Not sure	54	24.9	100.0
Total (*17 missing*)	217	100.0	

ADDWINDOWS: Impact-resistant windows – I think I would add this feature within five years.

	Frequency	Percent	Cumulative Percent
Yes	88	40.4	40.4
No	87	39.9	80.3
Not sure	43	19.7	100.0
Total (*16 missing*)	218	100.0	

ADDSTRAPS: Hurricane straps/ties – I think I would add this feature within five years.

	Frequency	Percent	Cumulative Percent
Yes	46	21.4	21.4
No	120	55.8	77.2
Not sure	49	22.8	100.0
Total (*19 missing*)	215	100.0	

ADDAPPLIANCES: Elevated appliances – I think I would add this feature within five years.

	Frequency	Percent	Cumulative Percent
Yes	17	7.9	7.9
No	153	71.2	79.1
Not sure	45	20.9	100.0
Total (*19 missing*)	215	100.0	

ADDSIDING: Water-resistant siding – I think I would add this feature within five years.

	Frequency	Percent	Cumulative Percent
Yes	63	29.0	29.0
No	103	47.5	76.5
Not sure	51	23.5	100.0
Total (*17 missing*)	217	100.0	

ADDPILES: Home elevated on piles – I think I would add this feature within five years.

	Frequency	Percent	Cumulative Percent
Yes	14	6.5	6.5
No	157	72.4	78.8
Not sure	46	21.2	100.0
Total (*17 missing*)	217	100.0	

Independent Variables

Attitudinal Component Independent Variables

EMOTIONAnger: Which of the following emotions do you feel when you think about hurricanes?			
	Frequency	Percent	Cumulative Percent
Yes	5	2.2	2.2
No	227	97.8	100.0
Total (2 *missing*)	232	100.0	

EMOTIONAnxious: Which of the following emotions do you feel when you think about hurricanes?			
	Frequency	Percent	Cumulative Percent
Yes	117	50.4	50.4
No	115	49.6	100.0
Total (2 *missing*)	232	100.0	

EMOTIONCalm: Which of the following emotions do you feel when you think about hurricanes?			
	Frequency	Percent	Cumulative Percent
Yes	47	20.3	20.3
No	185	79.7	100.0
Total (2 *missing*)	232	100.0	

EMOTIONCapable: Which of the following emotions do you feel when you think about hurricanes?

	Frequency	Percent	Cumulative Percent
Yes	50	21.6	21.6
No	182	78.4	100.0
Total (2 *missing*)	232	100.0	

EMOTIONExhilarated: Which of the following emotions do you feel when you think about hurricanes?

	Frequency	Percent	Cumulative Percent
Yes	10	4.3	4.3
No	222	95.7	100.0
Total (2 *missing*)	232	100.0	

EMOTIONIndifferent: Which of the following emotions do you feel when you think about hurricanes?

	Frequency	Percent	Cumulative Percent
Yes	40	17.2	17.2
No	192	82.8	100.0
Total (2 *missing*)	232	100.0	

EMOTIONRepulsed: Which of the following emotions do you feel when you think about hurricanes?

	Frequency	Percent	Cumulative Percent
Yes	0	0.0	0.0
No	232	100.0	100.0
Total (2 *missing*)	232	100.0	

EMOTIONResigned: Which of the following emotions do you feel when you think about hurricanes?

	Frequency	Percent	Cumulative Percent
Yes	47	20.3	20.3
No	185	79.7	100.0
Total (2 *missing*)	232	100.0	

EMOTIONScared: Which of the following emotions do you feel when you think about hurricanes?

	Frequency	Percent	Cumulative Percent
Yes	55	23.7	23.7
No	177	76.3	100.0
Total (2 *missing*)	232	100.0	

DREAD: To what degree do you experience each of the following emotions when it comes to hurricanes?

	Frequency	Percent	Cumulative Percent
Not at all	53	24.0	24.0
Very little	50	22.6	46.6
A little (*Median & Mode*)	56	25.3	71.9
A moderate amount	45	20.4	92.3
An extreme amount	17	7.7	100.0
Total (13 *missing*)	221	100.0	

FEAR: To what degree do you experience each of the following emotions when it comes to hurricanes?

	Frequency	Percent	Cumulative Percent
Not at all	41	18.3	18.3
Very little	60	26.8	45.1
A little (*Median & Mode*)	68	30.4	75.4
A moderate amount	41	18.3	93.8
An extreme amount	14	6.3	100.0
Total (10 *missing*)	224	100.0	

WORRY: To what degree do you experience each of the following emotions when it comes to hurricanes?

	Frequency	Percent	Cumulative Percent
Not at all	20	8.8	8.8
Very little	49	21.5	30.3
A little (*Median & Mode*)	88	38.6	68.9
A moderate amount	53	23.2	92.1
An extreme amount	18	7.9	100.0
Total (6 *missing*)	228	100.0	

LIKELYDAMAGE: If a hurricane affects North Carolina, how likely is it to cause significant damage to your home?

	Frequency	Percent	Cumulative Percent
Very unlikely	10	4.3	4.3
Unlikely (*Median & Mode*)	108	46.4	50.6
Not sure	69	29.6	80.3
Likely	38	16.3	96.6
Very likely	8	3.4	100.0
Total (1 *missing*)	233	100.0	

LIKELYDISRUPT: If a hurricane affects North Carolina, how likely is it to cause significant disruption to your life?

	Frequency	Percent	Cumulative Percent
Very unlikely	10	4.3	4.3
Unlikely (*Mode*)	91	39.2	43.5
Not sure (*Median*)	50	21.6	65.1
Likely	66	28.4	93.5
Very likely	15	6.5	100.0
Total (2 *missing*)	232	100.0	

LIKELYINJURY: If a hurricane affects North Carolina, how likely is it to cause an injury or the death of someone close to you?

	Frequency	Percent	Cumulative Percent
Very unlikely	54	23.2	23.2
Unlikely (*Median & Mode*)	111	47.6	70.8
Not sure	50	21.5	92.3
Likely	14	6.0	98.3
Very likely	4	1.7	100.0
Total (1 *missing*)	233	100.0	

Subjective Norm Component Independent Variables

FAMSTRGTHA: Family or friends strengthened their homes – Have you ever had this experience?			
	Frequency	Percent	Cumulative Percent
Yes	42	18.7	18.7
No	183	81.3	100.0
Total (9 *missing*)	225	100.0	

FAMSTRGTHB: Family or friends strengthened their homes – Did having this experience make you consider buying more insurance or strengthening your home to protect it from hurricanes?			
	Frequency	Percent	Cumulative Percent
Yes	20	10.0	10.0
No	105	52.2	62.2
N/A	76	37.8	100.0
Total (33 *missing*)	201	100.0	

Perceptions of the Characteristics Component Independent Variables

SHINGLESCOST: Wind-resistant shingles – The cost of this feature is too high.			
	Frequency	Percent	Cumulative Percent
Yes	106	53.8	53.8
No	91	46.2	100.0
Total (37 *missing*)	197	100.0	

SHINGLESEFFORT: Wind-resistant shingles – The feature requires too much effort to install.

	Frequency	Percent	Cumulative Percent
Yes	74	38.9	38.9
No	116	61.1	100.0
Total (44 *missing*)	190	100.0	

SHINGLESVALUE: Wind-resistant shingles – The feature would add value if I sell my home.

	Frequency	Percent	Cumulative Percent
Yes	133	65.8	65.8
No	69	34.2	100.0
Total (32 *missing*)	202	100.0	

SHINGLESLIVES: Wind-resistant shingles – This feature would protect lives.

	Frequency	Percent	Cumulative Percent
Yes	73	37.2	37.2
No	123	62.8	100.0
Total (38 *missing*)	196	100.0	

SHINGLESPROPERTY: Wind-resistant shingles – This feature would protect my property.

	Frequency	Percent	Cumulative Percent
Yes	160	78.0	78.0
No	45	22.0	100.0
Total (29 *missing*)	205	100.0	

FOAMCOST: Special foam adhesive under the roof – The cost of this feature is too high.			
	Frequency	Percent	Cumulative Percent
Yes	111	59.7	59.7
No	75	40.3	100.0
Total (48 *missing*)	186	100.0	

FOAMEFFORT: Special foam adhesive under the roof – The feature requires too much effort to install.			
	Frequency	Percent	Cumulative Percent
Yes	103	57.5	57.5
No	76	42.5	100.0
Total (55 *missing*)	179	100.0	

FOAMVALUE: Special foam adhesive under the roof – The feature would add value if I sell my home.			
	Frequency	Percent	Cumulative Percent
Yes	96	51.3	51.3
No	91	48.7	100.0
Total (47 *missing*)	187	100.0	

FOAMLIVES: Special foam adhesive under the roof – This feature would protect lives.

	Frequency	Percent	Cumulative Percent
Yes	68	35.8	35.8
No	122	64.2	100.0
Total (44 *missing*)	190	100.0	

FOAMPROPERTY: Special foam adhesive under the roof – This feature would protect my property.

	Frequency	Percent	Cumulative Percent
Yes	139	71.6	71.6
No	55	28.4	100.0
Total (40 *missing*)	194	100.0	

SHUTTERSCOST: Hurricane shutters – The cost of this feature is too high.

	Frequency	Percent	Cumulative Percent
Yes	122	62.6	62.6
No	73	37.4	100.0
Total (39 *missing*)	195	100.0	

SHUTTERSEFFORT: Hurricane shutters – The feature requires too much effort to install.			
	Frequency	Percent	Cumulative Percent
Yes	89	47.6	47.6
No	98	52.4	100.0
Total (47 *missing*)	187	100.0	

SHUTTERSVALUE: Hurricane shutters – The feature would add value if I sell my home.			
	Frequency	Percent	Cumulative Percent
Yes	100	51.8	51.8
No	93	48.2	100.0
Total (41 *missing*)	193	100.0	

SHUTTERSLIVES: Hurricane shutters – This feature would protect lives.			
	Frequency	Percent	Cumulative Percent
Yes	137	69.5	69.5
No	60	30.5	100.0
Total (37 *missing*)	197	100.0	

SHUTTERSPROPERTY: Hurricane shutters – This feature would protect my property.			
	Frequency	Percent	Cumulative Percent
Yes	153	76.5	76.5
No	47	23.5	100.0
Total (34 *missing*)	200	100.0	

WINDOWSCOST: Impact-resistant windows – The cost of this feature is too high.

	Frequency	Percent	Cumulative Percent
Yes	134	67.7	67.7
No	64	32.3	100.0
Total (36 *missing*)	198	100.0	

WINDOWSEFFORT: Impact-resistant windows – The feature requires too much effort to install.

	Frequency	Percent	Cumulative Percent
Yes	102	54.3	54.3
No	86	45.7	100.0
Total (46 *missing*)	188	100.0	

WINDOWSVALUE: Impact-resistant windows – The feature would add value if I sell my home.

	Frequency	Percent	Cumulative Percent
Yes	135	70.3	70.3
No	57	29.7	100.0
Total (42 *missing*)	192	100.0	

WINDOWSLIVES: Impact-resistant windows – This feature would protect lives.

	Frequency	Percent	Cumulative Percent
Yes	172	86.0	86.0
No	28	14.0	100.0
Total (34 *missing*)	200	100.0	

WINDOWSPROPERTY: Impact-resistant windows – This feature would protect my property.

	Frequency	Percent	Cumulative Percent
Yes	177	88.1	88.1
No	24	11.9	100.0
Total (33 *missing*)	201	100.0	

STRAPSCOST: Hurricane straps/ties – The cost of this feature is too high.

	Frequency	Percent	Cumulative Percent
Yes	83	42.8	42.8
No	111	57.2	100.0
Total (40 *missing*)	194	100.0	

STRAPSEFFORT: Hurricane straps/ties – The feature requires too much effort to install.

	Frequency	Percent	Cumulative Percent
Yes	83	44.1	44.1
No	105	55.9	100.0
Total (46 *missing*)	188	100.0	

STRAPSVALUE: Hurricane straps/ties – The feature would add value if I sell my home.

	Frequency	Percent	Cumulative Percent
Yes	84	43.8	43.8
No	108	56.3	100.0
Total (42 *missing*)	192	100.0	

STRAPSLIVES: Hurricane straps/ties – This feature would protect lives.			
	Frequency	Percent	Cumulative Percent
Yes	124	64.9	64.9
No	67	35.1	100.0
Total (43 *missing*)	191	100.0	

STRAPSPROPERTY: Hurricane straps/ties – This feature would protect my property.			
	Frequency	Percent	Cumulative Percent
Yes	130	67.4	67.4
No	63	32.6	100.0
Total (41 *missing*)	193	100.0	

APPLIANCESCOST: Elevated appliances – The cost of this feature is too high.			
	Frequency	Percent	Cumulative Percent
Yes	96	50.8	50.8
No	93	49.2	100.0
Total (45 *missing*)	189	50.8	

APPLIANCESEFFORT: Elevated appliances – The feature requires too much effort to install.			
	Frequency	Percent	Cumulative Percent
Yes	86	47.8	47.8
No	94	52.2	100.0
Total (54 *missing*)	180	100.0	

APPLIANCESVALUE: Elevated appliances – The feature would add value if I sell my home.			
	Frequency	Percent	Cumulative Percent
Yes	48	25.7	25.7
No	139	74.3	100.0
Total (47 *missing*)	187	100.0	

APPLIANCESLIVES: Elevated appliances – This feature would protect lives.			
	Frequency	Percent	Cumulative Percent
Yes	53	27.9	27.9
No	137	72.1	100.0
Total (44 *missing*)	190	100.0	

APPLIANCESPROPERTY: Elevated appliances – This feature would protect my property.			
	Frequency	Percent	Cumulative Percent
Yes	91	47.6	47.6
No	100	52.4	100.0
Total (43 *missing*)	191	100.0	

SIDINGCOST: Water-resistant siding – The cost of this feature is too high.			
	Frequency	Percent	Cumulative Percent
Yes	110	58.2	58.2
No	79	41.8	100.0
Total (45 *missing*)	189	100.0	

SIDINGEFFORT: Water-resistant siding – This feature requires too much effort to install.

	Frequency	Percent	Cumulative Percent
Yes	96	53.6	53.6
No	83	46.4	100.0
Total (55 *missing*)	179	100.0	

SIDINGSVALUE: Water-resistant siding – The feature would add value if I sell my home.

	Frequency	Percent	Cumulative Percent
Yes	100	54.6	54.6
No	83	45.4	100.0
Total (51 *missing*)	183	100.0	

SIDINGLIVES: Water-resistant siding – This feature would protect lives.

	Frequency	Percent	Cumulative Percent
Yes	68	35.6	35.6
No	123	64.4	100.0
Total (43 *missing*)	191	100.0	

SIDINGPROPERTY: Water-resistant siding – This feature would protect my property.

	Frequency	Percent	Cumulative Percent
Yes	131	68.6	68.6
No	60	31.4	100.0
Total (43 *missing*)	191	100.0	

PILESCOST: Home elevated on piles – The cost of this feature is too high.

	Frequency	Percent	Cumulative Percent
Yes	144	74.2	74.2
No	50	25.8	100.0
Total (40 *missing*)	194	100.0	

PILESEFFORT: Home elevated on piles – The feature requires too much effort to install.

	Frequency	Percent	Cumulative Percent
Yes	147	79.0	79.0
No	39	21.0	100.0
Total (48 *missing*)	186	100.0	

PILESVALUE: Home elevated on piles – The feature would add value if I sell my home.

	Frequency	Percent	Cumulative Percent
Yes	52	27.8	27.8
No	135	72.2	100.0
Total (47 *missing*)	187	100.0	

PILESLIVES: Home elevated on piles – This feature would protect lives.

	Frequency	Percent	Cumulative Percent
Yes	89	46.6	46.6
No	102	53.4	100.0
Total (43 *missing*)	191	100.0	

PILESPROPERTY: Home elevated on piles – This feature would protect my property.			
	Frequency	Percent	Cumulative Percent
Yes	94	48.0	48.0
No	102	52.0	100.0
Total (38 *missing*)	196	100.0	

Control Variables

MATTHEWLIFE: Matthew (2016) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	78	37.9	37.9
No	128	62.1	100.0
Total (28 *missing*)	206	100.0	

ARTHURLIFE: Arthur (2014) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	16	9.1	9.1
No	159	90.9	100.0
Total (59 *missing*)	175	100.0	

SANDYLIFE: Sandy (2012) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	19	11.2	11.2
No	151	88.8	100.0
Total (64 *missing*)	170	100.0	

IRENELIFE: Irene (2011) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	36	22.1	22.1
No	127	77.9	100.0
Total (71 *missing*)	163	100.0	

ERNESTOLIFE: Ernesto (2006) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	11	7.1	7.1
No	143	92.9	100.0
Total (80 *missing*)	154	100.0	

ISABELLIFE: Isabel (2003) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	20	14.2	14.2
No	121	85.8	100.0
Total (93 *missing*)	141	100.0	

FLOYDLIFE: Floyd (1999) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	85	55.9	55.9
No	67	44.1	100.0
Total (82 *missing*)	152	100.0	

DENNISLIFE: Dennis (1999) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	30	21.9	21.9
No	107	78.1	100.0
Total (97 *missing*)	137	100.0	

BONNIELIFE: Bonnie (1998) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	20	15.5	15.5
No	109	84.5	100.0
Total (105 *missing*)	129	100.0	

FRANLIFE: Fran (1996) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	100	68.5	68.5
No	46	31.5	100.0
Total (88 *missing*)	146	100.0	

BERTHALIFE: Bertha (1996) – My life was disrupted by this event.			
	Frequency	Percent	Cumulative Percent
Yes	33	25.8	28.5
No	95	74.2	100.0
Total (106 *missing*)	128	100.0	

INCOME: Please mark the income range that best describes your annual household income from all sources. This is before taxes and other deductions.			
	Frequency	Percent	Cumulative Percent
$0 - $14,999	10	5.1	5.1
$15,000 - $34,999	25	12.7	17.8
$35,000 - $49,999	28	14.2	32.0
$50,000 - $74,999	33	16.8	48.7
$75,000 - $99,999 *(Median)*	24	12.2	60.9
$100,000 - $149,999 *(Mode)*	40	20.3	81.2
$150,000 - $249,999	25	12.7	93.9
$250,000 +	12	6.1	100.0
Total (37 *missing*)	197	100.0	

NETWORTH: Which of the following categories best captures your net worth? By net worth, we mean the total value of cash, checking, savings, investments, and property of your household minus any loans.

	Frequency	Percent	Cumulative Percent
$0 - $49,999	33	17.3	17.3
$50,000 - $99,999	22	11.5	28.8
$100,000 - $149,999	14	7.3	36.1
$150,000 - $199,999	12	6.3	42.4
$200,000 - $299,999 *(Median)*	22	11.5	53.9
$300,000 - $399,999	18	9.4	63.4
$400,000 - $499,999	12	6.3	69.6
$500,000 + *(Mode)*	58	30.4	100.0
Total (43 *missing*)	191	100.0	

LOANDEBT: What is your best estimate of how much you owe on any mortgages, home equity loans, home equity lines of credit, or other second mortgages? *(N = 190)*

Minimum	$0
Maximum	$700,000
Median	$74,000.00
Mean	$103,540.99
Standard Deviation	$116,114.93
Skewness	$1.72
Kurtosis	$4.72

Descriptive Statistics for Reclassified Variables
Dependent Variables

ELEVATION: Recoded version of ADDAPPLIANCES and ADDPILES			
	Frequency	Percent	Cumulative Percent
Yes	23	12.8	12.8
No	157	87.2	100.0
Total (54 *missing*)	180	100.0	

WINDOWS: Recoded version of ADDWINDOWS and ADDSHUTTERS			
	Frequency	Percent	Cumulative Percent
Yes	94	51.1	51.1
No	90	48.9	100.0
Total (50 *missing*)	184	100.0	

SEALANT: Recoded version of ADDSHINGLES and ADDFOAM			
	Frequency	Percent	Cumulative Percent
Yes	75	43.9	43.9
No	96	56.1	100.0
Total (63 *missing*)	171	100.0	

SIDING: Recoded version of ADDSIDING

	Frequency	Percent	Cumulative Percent
Yes	63	38.0	38.0
No	103	62.0	100.0
Total (68 *missing*)	166	100.0	

STRAPS: Recoded version of ADDSTRAPS

	Frequency	Percent	Cumulative Percent
Yes	46	27.7	27.7
No	120	72.3	100.0
Total (68 *missing*)	166	100.0	

ADDANY: Reclassified variable which represents intention to add at least one action

	Frequency	Percent	Cumulative Percent
Yes	114	56.7	56.7
No	87	43.3	100.0
Total (33 *missing*)	201	100.0	

OVERALLINTENTION: Reclassified variable which represents intention to add all of the actions			
	Frequency	Percent	Cumulative Percent
0 (*Mode*)	86	42.6	42.6
1 (*Median; Mean = 1.49*)	27	13.4	55.9
2	26	12.9	68.8
3	39	19.3	88.1
4	15	7.4	95.5
5	9	4.5	100.0
Total (32 *missing*)	202	100.0	

Independent Variables

Attitudinal Component Independent Variables

NEGATIVEEMOTION: Recoded version of EMOTIONAnger, EMOTIONAnxious, EMOTIONRepusled, EMOTIONScared			
	Frequency	Percent	Cumulative Percent
Respondent felt a negative emotion	130	56.0	56.0
Respondent did not feel a negative emotion	102	44.0	100.0
Total (2 *missing*)	232	100.0	

POSITIVEEMOTION: Recoded version of EMOTIONCalm, EMOTIONCapable, EMOTIONExhilarated

	Frequency	Percent	Cumulative Percent
Respondent felt a positive emotion	85	36.6	36.6
Respondent did not feel a positive emotion	147	63.4	100.0
Total (2 *missing*)	232	100.0	

NOEMOTION: Recoded version of EMOTIONIndifferent, EMOTIONResigned

	Frequency	Percent	Cumulative Percent
Respondent had an emotional response	154	66.4	66.4
Respondent did not have an emotional response	78	33.6	100.0
Total (2 *missing*)	232	100.0	

RISKPER: Recoded version of LIKELYDAMAGE, LIKELYDISRUPT, LIKELYINJURY			
	Frequency	Percent	Cumulative Percent
0	4	1.7	1.7
1	6	2.6	4.3
2	28	12.1	16.4
3 (*Mode*)	53	22.8	39.2
4 (*Mean = 4.78*)	23	9.9	49.1
5 (*Median*)	29	12.5	61.6
6	34	14.7	76.3
7	23	9.9	86.2
8	17	7.3	93.5
9	8	3.4	97.0
10	2	0.9	97.8
11	3	1.3	99.1
12	2	0.9	100.0
Total (2 *missing*)	232	100.0	

Subjective Norm Component Independent Variables

INFLUENCEPAST: Recoded version of FAMSTRGHA, FAMSTRGHB – Individual knows someone who has strengthened their home and yes/no it will make them consider mitigation.			
	Frequency	Percent	Cumulative Percent
Yes	19	57.6	57.6
No	14	42.4	100.0
Total (201 *missing*)	33	100.0	

INFLUENCEFUTURE: Recoded version of FAMSTRGHFUTUREA, FAMSTRGHFUTUREB – Individual may know someone who will strengthen their home and yes/no it may make them consider mitigation.			
	Frequency	Percent	Cumulative Percent
Yes	35	52.2	52.2
No	32	47.8	100.0
Total (167 *missing*)	67	100.0	

Perceptions of the Characteristics Component Independent Variables

COSTDUMMY: Recoded version of SHINGLESCOST, FOAMCOST, WINDOWSCOST, APPLIANCESCOST, SIDINGCOST, PILESCOST, STRAPSCOST, SHUTTERSCOST			
	Frequency	Percent	Cumulative Percent
Yes	126	60.3	60.3
No	83	39.7	100.0
Total (25 *missing*)	209	100.0	

EFFORTDUMMY: Recoded version of SHINGLESEFFORT, FOAMEFFORT, WINDOWSEFFORT, APPLIANCESEFFORT, SIDINGEFFORT, PILESEFFORT, STRAPSEFFORT, SHUTTERSEFFORT

	Frequency	Percent	Cumulative Percent
Yes	106	52.7	52.7
No	95	47.3	100.0
Total (33 *missing*)	201	100.0	

VALUEDUMMY: Recoded version of SHINGLESVALUE, FOAMVALUE, WINDOWSVALUE, APPLIANCESVALUE, SIDINGVALUE, PILESVALUE, STRAPSVALUE, SHUTTERSVALUE

	Frequency	Percent	Cumulative Percent
Yes	101	49.8	49.8
No	102	50.2	100.0
Total (31 *missing*)	203	100.0	

LIVESDUMMY: Recoded version of SHINGLESLIVES, FOAMLIVES, WINDOWSLIVES, APPLIANCESLIVES, SIDINGLIVES, PILESLIVES, STRAPSLIVES, SHUTTERSLIVES

	Frequency	Percent	Cumulative Percent
Yes	97	47.3	47.3
No	108	52.7	100.0
Total (29 *missing*)	205	100.0	

PROPERTYDUMMY: Recoded version of SHINGLESPROPERTY, FOAMPROPERTY, WINDOWSPROPERTY, APPLIANCESPROPERTY, SIDINGPROPERTY, PILESPROPERTY, STRAPSPROPERTY, SHUTTERSPROPERTY			
	Frequency	Percent	Cumulative Percent
Yes	147	71.4	71.4
No	59	28.6	100.0
Total (28 *missing*)	206	100.0	

Control Variables

PRIOREXPERIENCE: Recoded version of MATTHEWLIFE, ARTHURLIFE, SANDYLIFE, IRENELIFE, ERNESTOLIFE, ISABELLIFE, FLOYDLIFE, DENNISLIFE, BONNIELIFE, FRANLIFE, BERTHALIFE			
	Frequency	Percent	Cumulative Percent
Yes	163	74.8	74.8
No	55	25.2	100.0
Total *(16 missing)*	218	100.0	

SES: Recoded version of INCOME + NETWORTH – LOANDEBT			
	Frequency	Percent	Cumulative Percent
In Debt	19	10.9	10.9
$1 - $150,000 (*Mode*)	52	29.7	40.6
$150,001 - $300,000 (*Median*)	31	17.7	58.3
$300,001 - $500,000	36	20.6	78.9
$500,000 +	37	21.1	100.0
Total *(59 missing)*	175	100.0	

Appendix C

COMPLETE RESULTS OF BIVARIATE AND MULTIVARIATE ANALYSES

Results of the Bivariate Analyses

I. Dependent Variable: Elevation

Independent Variable	Cramer's V	Kruskal-Wallis	Mann-Whitney U	Pearson's Chi Square	Phi
DREAD	$V = .115$, $p = .685$	$X^2 = 2.261$, $p = .688$, d.f. = 4		$X^2 = 2.274$, $p = .685$, d.f. = 4	
FEAR	$V = .235$, $p = .046$	$X^2 = 9.631$, $p = .047$, d.f. = 4		$X^2 = 9.686$, $p = .046$, d.f. = 4	
WORRY	$V = .136$, $p = .517$	$X^2 = 3.233$, $p = .520$, d.f. = 4		$X^2 = 3.252$, $p = .517$, d.f. = 4	
NEGATIVE EMOTION			$U = 3745.5$, $p = .234$	$X^2 = 1.425$, $p = .233$, d.f. = 1	$\phi = -.089$, $p = .233$
POSITIVE EMOTION			$U = 3661.0$, $p = .562$	$X^2 = .338$, $p = .561$, d.f. = 1	$\phi = -.043$, $p = .561$
NO EMOTION			$U = 2979.0$, $p = .013$	$X^2 = 6.264$, $p = .012$, d.f. = 1	$\phi = .187$, $p = .012$
RISKPER	$V = .266$, $p = .242$	$X^2 = 12.613$, $p = .246$, d.f. = 10		$X^2 = 12.684$, $p = .242$, d.f. = 10	
INFLUENCE PAST			$U = 84.0$, $p = .411$	$X^2 = .700$, $p = .403$, d.f. = 1	$\phi = .158$, $p = .403$
INFLUENCE FUTURE			$U = 267.0$, $p = .103$	$X^2 = 2.706$, $p = .100$, d.f. = 1	$\phi = .230$, $p = .100$
APPLIANCE COST			$U = 2879.0$, $p = .157$	$X^2 = 2.019$, $p = .155$, d.f. = 1	$\phi = -.113$, $p = .155$
APPLIANCE EFFORT			$U = 2571.0$, $p = .014$	$X^2 = 6.036$, $p = .014$, d.f. = 1	$\phi = -.198$, $p = .014$
APPLIANCE VALUE			$U = 1740.5$, $p < .001$	$X^2 = 22.636$, $p < .001$, d.f. = 1	$\phi = .379$, $p < .001$
APPLIANCE LIVES			$U = 1612.5$, $p < .001$	$X^2 = 30.766$, $p < .001$, d.f. = 1	$\phi = .437$, $p < .001$
APPLIANCE PROPERTY			$U = 2729.0$, $p = .001$	$X^2 = 11.011$, $p = .001$, d.f. = 1	$\phi = .260$, $p = .001$
PILES COST			$U = 2125.0$, $p = .020$	$X^2 = 5.445$, $p = .020$, d.f. = 1	$\phi = -.184$, $p = .020$
PILES EFFORT			$U = 1462.5$, $p < .001$	$X^2 = 14.753$, $p < .001$, d.f. = 1	$\phi = -.307$, $p < .001$
PILES VALUE			$U = 1822.5$, $p < .001$	$X^2 = 19.589$, $p < .001$, d.f. = 1	$\phi = .351$, $p < .001$
PILES LIVES			$U = 2765.0$, $p = .027$	$X^2 = 4.932$, $p = .026$, d.f. = 1	$\phi = .176$, $p = .026$
PILES PROPERTY			$U = 2960.0$, $p = .018$	$X^2 = 5.603$, $p = .018$, d.f. = 1	$\phi = .185$, $p = .018$
PRIOR EXPERIENCE	$V = .034$, $p = .657$		$U = 2717.5$, $p = .658$	$X^2 = .197$, $p = .657$, d.f. = 1	
SES	$V = .179$, $p = .351$	$X^2 = 4.397$, $p = .355$, d.f. = 4		$X^2 = 4.429$, $p = .351$, d.f. = 4	

II. Dependent Variable: WINDOWS

Independent Variable	Cramer's V	Kruskal-Wallis	Mann-Whitney U	Pearson's Chi Square	Phi
DREAD	$V = .072$, $p = .925$	$X^2 = .895$, $p = .925$, d.f. = 4		$X^2 = .900$, $p = .925$, d.f. = 4	
FEAR	$V = .140$, $p = .484$	$X^2 = 3.438$, $p = .487$, d.f. = 4		$X^2 = 3.457$, $p = .484$, d.f. = 4	
WORRY	$V = .140$, $p = .473$	$X^2 = 3.520$, $p = .476$, d.f. = 4		$X^2 = 3.529$, $p = .473$, d.f. = 4	
NEGATIVE EMOTION			$U = 4095.5$, $p = .807$	$X^2 = .06$, $p = .807$, d.f. = 1	$\phi = .018$, $p = .807$
POSITIVE EMOTION			$U = 3892.5$, $p = .893$	$X^2 = .018$, $p = .893$, d.f. = 1	$\phi = .010$, $p = .893$
NO EMOTION			$U = 3690.5$, $p = .917$	$X^2 = .011$, $p = .917$, d.f. = 1	$\phi = .008$, $p = .917$
RISKPER	$V = .242$, $p = .556$	$X^2 = 10.627$, $p = .561$, d.f. = 12		$X^2 = 10.685$, $p = .556$, d.f. = 12	
INFLUENCE PAST			$U = 69.0$, $p = .032$	$X^2 = 4.739$, $p = .029$, d.f. = 1	$\phi = .397$, $p = .029$
INFLUENCE FUTURE			$U = 246.0$, $p = .009$	$X^2 = 6.984$, $p = .008$, d.f. = 1	$\phi = .356$, $p = .008$
WINDOWS COST			$U = 2457.5$, $p = .011$	$X^2 = 6.511$, $p = .011$, d.f. = 1	$\phi = -.199$, $p = .011$
WINDOWS EFFORT			$U = 2593.5$, $p = .014$	$X^2 = 6.040$, $p = .014$, d.f. = 1	$\phi = -.194$, $p = .014$
WINDOWS VALUE			$U = 1653.5$, $p < .001$	$X^2 = 20.529$, $p < .001$, d.f. = 1	$\phi = .357$, $p < .001$
WINDOWS LIVES			$U = 922.5$, $p < .001$	$X^2 = 17.608$, $p < .001$, d.f. = 1	$\phi = .325$, $p < .001$
WINDOWS PROPERTY			$U = 951.5$, $p = .001$	$X^2 = 10.334$, $p = .001$, d.f. = 1	$\phi = .250$, $p = .001$
SHUTTERS COST			$U = 2681.0$, $p = .021$	$X^2 = 5.352$, $p = .021$, d.f. = 1	$\phi = -.180$, $p = .021$
SHUTTERS EFFORT			$U = 2556.5$, $p = .009$	$X^2 = 6.775$, $p = .009$, d.f. = 1	$\phi = -.205$, $p = .009$
SHUTTERS VALUE			$U = 2304.0$, $p < .001$	$X^2 = 14.242$, $p < .001$, d.f. = 1	$\phi = .296$, $p < .001$
SHUTTERS LIVES			$U = 1984.5$, $p < .001$	$X^2 = 14.789$, $p < .001$, d.f. = 1	$\phi = .298$, $p < .001$
SHUTTERS PROPERTY			$U = 2040.5$, $p = .010$	$X^2 = 6.657$, $p = .010$, d.f. = 1	$\phi = .200$, $p = .010$
PRIOR EXPERIENCE	$V = .023$, $p = .760$		$U = 2719.5$, $p = .761$	$X^2 = .093$, $p = .760$, d.f. = 1	
SES	$V = .174$, $p = .365$	$X^2 = 4.284$, $p = .369$, d.f. = 4		$X^2 = 4.314$, $p = .365$, d.f. = 4	

III. Dependent Variable: SEALANT

Independent Variable	Cramer's V	Kruskal-Wallis	Mann-Whitney U	Pearson's Chi Square	Phi
DREAD	$V = .124$, $p = .649$	$X^2 = 2.463$, $p = .651$, d.f. = 4		$X^2 = 2.478$, $p = .649$, d.f. = 4	
FEAR	$V = .143$, $p = .503$	$X^2 = 3.318$, $p = .506$, d.f. = 4		$X^2 = 3.338$, $p = .503$, d.f. = 4	
WORRY	$V = .211$, $p = .114$	$X^2 = 7.394$, $p = .116$, d.f. = 4		$X^2 = 7.439$, $p = .116$, d.f. = 4	
NEGATIVE EMOTION			$U = 3493.0$, $p = .750$	$X^2 = .102$, $p = .749$, d.f. = 1	$\phi = .024$, $p = .749$
POSITIVE EMOTION			$U = 3353.0$, $p = .948$	$X^2 = .004$, $p = .947$, d.f. = 1	$\phi = -.005$, $p = .947$
NO EMOTION			$U = 3117.0$, $p = .953$	$X^2 = .003$, $p = .953$, d.f. = 1	$\phi = -.004$, $p = .953$
RISKPER	$V = .259$, $p = .493$	$X^2 = 11.359$, $p = .498$, d.f. = 12		$X^2 = 11.426$, $p = .493$, d.f. = 12	
INFLUENCE PAST			$U = 49.0$, $p = .005$	$X^2 = 8.023$, $p = .005$, d.f. = 1	$\phi = .535$, $p = .005$
INFLUENCE FUTURE			$U = 269.0$, $p = .212$	$X^2 = 1.587$, $p = .208$, d.f. = 1	$\phi = .176$, $p = .208$
SHINGLES COST			$U = 2380.0$, $p = .072$	$X^2 = 3.268$, $p = .071$, d.f. = 1	$\phi = -.148$, $p = .071$
SHINGLES EFFORT			$U = 2331.0$, $p = .068$	$X^2 = 3.349$, $p = .067$, d.f. = 1	$\phi = -.149$, $p = .067$
SHINGLES VALUE			$U = 2172.0$, $p = .007$	$X^2 = 7.370$, $p = .007$, d.f. = 1	$\phi = .217$, $p = .007$
SHINGLES LIVES			$U = 1780.0$, $p < .001$	$X^2 = 14.089$, $p < .001$, d.f. = 1	$\phi = .304$, $p < .001$
SHINGLES PROPERTY			$U = 1391.5$, $p < .001$	$X^2 = 16.165$, $p < .001$, d.f. = 1	$\phi = .321$, $p < .001$
FOAM COST			$U = 2012.5$, $p = .005$	$X^2 = 7.945$, $p = .005$, d.f. = 1	$\phi = -.232$, $p = .005$
FOAM EFFORT			$U = 1973.0$, $p = .013$	$X^2 = 6.250$, $p = .012$, d.f. = 1	$\phi = -.208$, $p = .012$
FOAM VALUE			$U = 2186.5$, $p = .009$	$X^2 = 6.907$, $p = .009$, d.f. = 1	$\phi = .215$, $p = .009$
FOAM LIVES			$U = 1555.5$, $p < .001$	$X^2 = 20.451$, $p = < .001$, d.f. = 1	$\phi = .369$, $p < .001$
FOAM PROPERTY			$U = 1723.5$, $p = .001$	$X^2 = 12.109$, $p = .001$, d.f. = 1	$\phi = .282$, $p = .001$
PRIOR EXPERIENCE	$V = .060$, $p = .452$		$U = 2274.5$, $p = .453$	$X^2 = .567$, $p = .452$, d.f. = 1	
SES	$V = .138$, $p = .646$	$X^2 = 2.475$, $p = .649$, d.f. = 4		$X^2 = 2.494$, $p = .646$, d.f. = 4	

IV. Dependent Variable: STRAPS

Independent Variable	Cramer's V	Kruskal-Wallis	Mann-Whitney U	Pearson's Chi Square	Phi
DREAD	$V = .138$, $p = .546$	$X^2 = 3.051$, $p = .549$, d.f. = 4		$X^2 = 3.070$, $p = .546$, d.f. = 4	
FEAR	$V = .112$, $p = .728$	$X^2 = 2.028$, $p = .731$, d.f. = 4		$X^2 = 2.041$, $p = .728$, d.f. = 4	
WORRY	$V = .200$, $p = .154$	$X^2 = 6.631$, $p = .157$, d.f. = 4		$X^2 = 6.671$, $p = .154$, d.f. = 4	
NEGATIVE EMOTION			$U = 3315.0$, $p = .778$	$X^2 = .080$, $p = .777$, d.f. = 1	$\phi = .022$, $p = .777$
POSITIVE EMOTION			$U = 3134.0$, $p = .798$	$X^2 = .066$, $p = .798$, d.f. = 1	$\phi = -.020$, $p = .798$
NO EMOTION			$U = 2970.0$, $p = .807$	$X^2 = .060$, $p = .806$, d.f. = 1	$\phi = -.019$, $p = .806$
RISKPER	$V = .267$, $p = .300$	$X^2 = 11.714$, $p = .305$, d.f. = 10		$X^2 = 11.786$, $p = .300$, d.f. = 10	
INFLUENCE PAST			$U = 74.5$, $p = .353$	$X^2 = .898$, $p = .343$, d.f. = 1	$\phi = .182$, $p = .343$
INFLUENCE FUTURE			$U = 208.5$, $p = .208$	$X^2 = 1.625$, $p = .202$, d.f. = 1	$\phi = .190$, $p = .202$
STRAPS COST			$U = 1958.5$, $p < .001$	$X^2 = 13.925$, $p < .001$, d.f. = 1	$\phi = -.305$, $p < .001$
STRAPS EFFORT			$U = 2152.5$, $p = .002$	$X^2 = 9.605$, $p = .002$, d.f. = 1	$\phi = -.252$, $p = .002$
STRAPS VALUE			$U = 2060.0$, $p = .001$	$X^2 = 11.192$, $p = .001$, d.f. = 1	$\phi = .273$, $p = .001$
STRAPS LIVES			$U = 1743.0$, $p < .001$	$X^2 = 19.728$, $p < .001$, d.f. = 1	$\phi = .363$, $p < .001$
STRAPS PROPERTY			$U = 1831.0$, $p < .001$	$X^2 = 13.184$, $p < .001$, d.f. = 1	$\phi = .295$, $p < .001$
PRIOR EXPERIENCE	$V = .036$, $p = .656$		$U = 2141.5$, $p = .657$	$X^2 = .198$, $p = .656$, d.f. = 1	
SES	$V = .103$, $p = .850$	$X^2 = 1.356$, $p = .852$, d.f. = 4		$X^2 = 1.366$, $p = .850$, d.f. = 4	

V. Dependent Variable: SIDING

Independent Variable	Cramer's V	Kruskal-Wallis	Mann-Whitney U	Pearson's Chi Square	Phi
DREAD	$V = .086$, $p = .885$	$X^2 = 1.152$, $p = .886$, d.f. = 4		$X^2 = 1.159$, $p = .885$, d.f. = 4	
FEAR	$V = .208$, $p = .139$	$X^2 = 6.898$, $p = .141$, d.f. = 4		$X^2 = 6.941$, $p = .139$, d.f. = 4	
WORRY	$V = .173$, $p = .298$	$X^2 = 4.869$, $p = .301$, d.f. = 4		$X^2 = 4.899$, $p = .298$, d.f. = 4	
NEGATIVE EMOTION			$U = 3375.0$, $p = .944$	$X^2 = .005$, $p = .944$, d.f. = 1	$\phi = .005$, $p = .944$
POSITIVE EMOTION			$U = 3148.0$, $p = .923$	$X^2 = .009$, $p = .923$, d.f. = 1	$\phi = .008$, $p = .923$
NO EMOTION			$U = 2701.0$, $p = .268$	$X^2 = 1.233$, $p = .267$, d.f. = 1	$\phi = .086$, $p = .267$
RISKPER	$V = .259$, $p = .435$	$X^2 = 11.029$, $p = .441$, d.f. = 11		$X^2 = 11.097$, $p = .435$, d.f. = 11	
INFLUENCE PAST			$U = 33.0$, $p = .001$	$X^2 = 11.342$, $p = .001$, d.f. = 1	$\phi = .648$, $p = .001$
INFLUENCE FUTURE			$U = 187.0$, $p = .027$	$X^2 = 4.996$, $p = .052$, d.f. = 1	$\phi = .326$, $p = .025$
SIDING COST			$U = 2435.0$, $p = .493$	$X^2 = .472$, $p = .492$, d.f. = 1	$\phi = -.057$, $p = .492$
SIDING EFFORT			$U = 2248.0$, $p = .122$	$X^2 = 92.405$, $p = .121$, d.f. = 1	$\phi = -.129$, $p = .121$
SIDING VALUE			$U = 1638.0$, $p < .001$	$X^2 = 18.888$, $p < .001$, d.f. = 1	$\phi = .363$, $p < .001$
SIDING LIVES			$U = 1571.5$, $p < .001$	$X^2 = 20.226$, $p < .001$, d.f. = 1	$\phi = .368$, $p < .001$
SIDING PROPERTY			$U = 1790.0$, $p < .001$	$X^2 = 12.678$, $p < .001$, d.f. = 1	$\phi = .291$, $p < .001$
PRIOR EXPERIENCE	$V = .114$, $p = .154$		$U = 2094.0$, $p = .155$	$X^2 = 2.036$, $p = .154$, d.f. = 1	
SES	$V = .215$, $p = .209$	$X^2 = 5.831$, $p = .212$, d.f. = 4		$X^2 = 5.877$, $p = .209$, d.f. = 4	

Results of the Multivariate Analysis

I. Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.685	.469	.369	1.285

II. Analysis of Variance Results

	Sum of Squares	d.f.	Mean Square	F	Significance
Regression	54.061	7	7.723	4.674	.001
Residual	61.139	37	1.652		
Total	115.200	44			

III. Residuals Statistics

	Minimum	Maximum	Mean	Standard Deviation	N
Predicted Value	-.71	3.86	1.80	1.108	45
Residual	-2.161	2.718	.000	1.179	45
Std. Predicted Value	-2.267	1.858	.000	1.000	45
Std. Residual	-1.681	2.115	.000	.917	45

IV. Coefficients and Collinearity Statistics

	Unstandardized B	Standard Error	t	Significance	Tolerance	VIF
(Constant)	2.274	.714	3.185	.003		
PROTECT LIVES	-.903	.427	-2.111	.042	.814	1.229
INFLUENCE FUTURE	.364	.477	.762	.451	.649	1.542
SES	-.232	.159	-1.458	.153	.925	1.081
RISKPER	.260	.095	2.743	.009	.849	1.178
NO EMOTION	-1.203	.464	-2.591	.014	.795	1.258
PROTECT PROPERTY	-1.095	.514	-2.129	.040	.710	1.408
NEGATIVE EMOTION	-.715	.435	-1.643	.109	.779	1.284