HIDING IN FLOODPLAIN SIGHT: HOW DOES FLOOD RISK INFORMATION AFFECT FLOOD RISK PERCEPTIONS AND MITIGATION BEHAVIORS?

by

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This thesis was prepared under the direction of the candidate's thesis advisor, Dr. Colin Polsky, Department of Geosciences, and has been approved by all members of the supervisory committee. It was submitted to the faculty of the Charles E. Schmidt College of Science and was accepted in partial fulfillment of the requirements for the degree of Master of Science.

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ABSTRACT

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Florida has 906,465 residential properties facing substantial flood risk, making it imperative to understand how the public may perceive and respond to this risk. Providing people with scientific information may not be enough to impact behavior and decrease losses from flood events. We show participants (n = 20) scientific flood risk graphics and ask behavioral questions to evaluate responses based on the rational actor paradigm (RAP), psychometric paradigm, and cultural theory. We find results consistent with the RAP in 48% of cases, primarily in low risk scenarios. Participants from high income households are more likely to make rational decisions (80%) than those from low income households (~37%). Feelings of dread potentially help explain 40% of deviations from the RAP, while trust in flood experts helps explain 85% of non-RAP cases. Future flood risk communication should incorporate dread and trust in experts into messaging considerations as rationality alone is insufficient.

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CHAPTER I: INTRODUCTION

Problem Statement

How do intuitive, emotional modulating factors influence home-buying and flood risk mitigation behaviors relative to objective, scientific flood risk information? Given the Gulf Coast's current and projected flood risk, this knowledge is imperative to communicating flood risk and increasing community resilience.

Background

The presence of flooding and sea level rise (SLR) is now undeniable as climate change exacerbates ocean thermal expansion, glacial melt, and ice sheet melt from Greenland and Antarctica, challenging the resilience of coastal communities with more frequent flood events and intensifying storms. Flooding is the costliest natural disaster in the United States each year, with billion dollar losses becoming more frequent (Wdowinski et al., 2016). Florida is particularly vulnerable to the increasing impacts of sea level rise for several reasons: large urban populations in low-lying coastal regions, porous limestone geology, susceptibility to hurricane landfalls, saltwater intrusion of freshwater supplies, an increasing population, and severe wealth inequality (Bloetscher et al., 2011).

According to the nonprofit research and technology group First Street Foundation, Florida has 906,465 residential properties facing substantial flood risk, defined as "inundation of 1cm or more to the building in the 100 year return period (1% annual

flood risk)" (First Street Foundation, 2021). These properties are projected to face average expected annual losses of $8,778 in 2021, growing to $15,557 by 2051 due to sea level rise and climate change. Furthermore, 67,069 additional properties are likely to experience flood damage over the next 30 years (First Street Foundation, 2021).

Historically, online home listings have included a plethora of information regarding neighborhoods, schools, and crime but did not address natural hazards when it came to assessing home values. Furthermore, Congress prohibits flood loss history from being required in the negotiation process. This may lead homebuyers to unknowingly put themselves in vulnerable positions moving forward as the rate of sea level rise increases. In August 2020, Realtor.com announced that the online real estate listing website will begin showing flood risk data on all of their properties, including a flood-risk score (1-10 scale) from First Street Foundation's Flood Factor tool (Kearns, 2020). However, studies in behavioral economics suggest that simply providing buyers with this information does not guarantee changes in risk perceptions or behaviors (Treuer et al., 2018). Specifically, other modulating factors such as psychology, emotions, and cultural identity may modulate how objective scientific risk information affects flood risk perceptions and subsequent mitigation behaviors (or lack thereof).

While an aspirational goal is to increase community resilience to flooding and sea level rise, we will define success for this analysis as clearly providing accurate data and information to the participants in an easily digestible fashion, with the understanding that they will make their own decisions regarding risk tolerance and consequent actions. As the rates of change for ice melt in Greenland and Antarctica continue to rise and oceans reach their capacity for storing carbon dioxide, it is imperative to understand how society

may respond to increased flooding in coastal communities. Recent reports indicate that the Intergovernmental Panel on Climate Change (IPCC) estimates may be overly conservative relative to the latest observations, requiring local planners to adjust projections for sea level rise upward and in a non-linear fashion as we move forward (Rignot, 2011).

CHAPTER II: LITERATURE REVIEW

Individual Home Flood Risk

Flood risk from sea level rise as a result of anthropogenic climate change poses a significant threat to coastal communities around the globe. In the U.S., 3.7 million people live on land within 1 meter of high tide and are at high risk of coastal flooding (Wdowinski et al., 2016). It is important to note that the phrase "coastal community" colloquially refers to those positioned on thin strips of land along shorelines where the oceans meet land. However, the impacts of sea level rise, storm surge, groundwater inundation, and tidal flooding are also experienced further inland, especially in Florida. Therefore, I will define "coastal communities" as those within 20 miles of the coast for this study with the understanding that no region is fully protected from the challenges of sea level rise.

The current rate of global sea level rise is currently estimated at 3.4 mm/year with evidence to suggest that the rate may increase non-linearly moving forward (Weeman & Lynch, 2018). Moreover, local sea level rise rates can outpace the global rate due to regional differences in ocean currents and land subsidence. Thus, this relative sea level rise (RSLR) is of most concern to coastal residents (Sweet & Park, 2014). For example, Miami Beach has experienced sea level rise of 9 mm/year since 2006 (Treuer et al., 2018). Figure 1 below shows how that rate is projected to change over time in inches according to scientists with the Southeast Florida Regional Climate Change Compact.

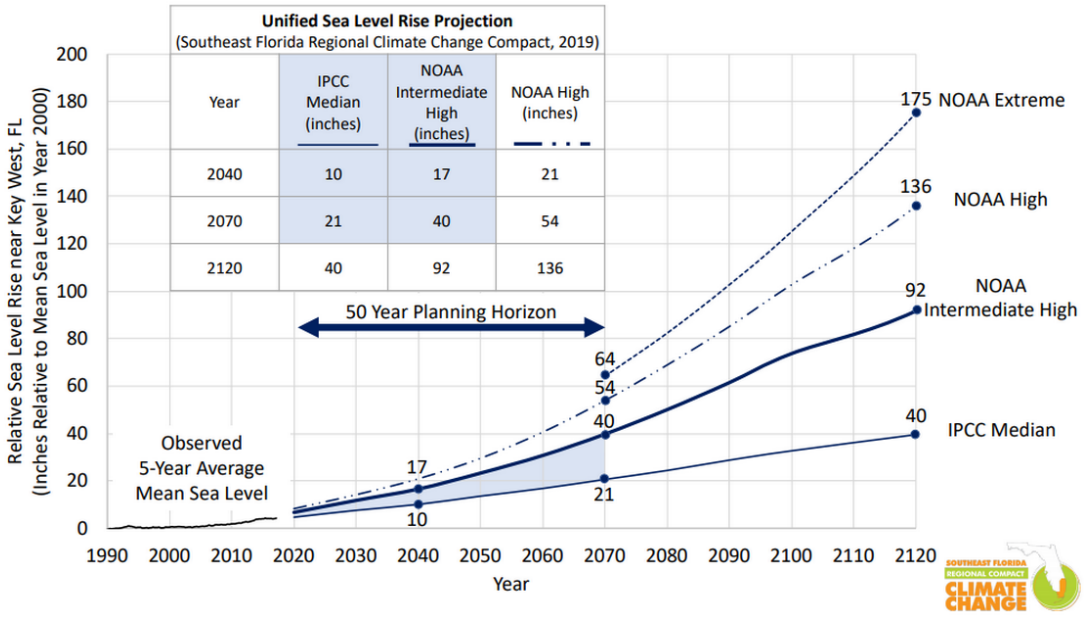


Figure 1 Southeast Florida Regional Climate Change Compact Unified Sea Level Rise Projections, adopted as guidance for planning by Broward, Miami-Dade, Palm Beach, and Monroe Counties (Sea Level Rise Working Group, 2019).

Relative sea level rise has a direct impact on coastal inundation and flooding. According to a study by Sweet and Park (2014), "relative sea level is normally specified with respect to the tidal datum of mean sea level (MSL), whereas coastal inundation and flooding are best described relative to Mean Higher High Water (MHHW)." Effects of RSLR include an increased frequency of coastal flooding from storms, tides, and groundwater inundation which means smaller storms or precipitation events will have the ability to exceed flood level thresholds relative to previous requirements. The authors highlight the idea of a "tipping point" for when the impacts of projected flooding increasingly compromise essential public services and/or coastal ecosystems. Sweet and Park set the tipping point at 30 days per year of exceeded flood level thresholds and found that most locations along the U.S. East Coast will surpass the mark by 2050, with some occurring by 2030 under the IPCC representative concentration pathway (RCP) 8.5 carbon dioxide emissions scenario, including parts of South Florida (Sweet & Park,

2014). While RSLR projections improve upon rates of global SLR, a gap persists when it comes to providing flood risk data at the individual parcel level.

Defining the threshold for when flood impacts will significantly affect essential services to daily life poses a challenge as individual tolerances will vary. Setting the tipping point at 30 days per year from an engineering perspective is a useful initial exercise, however opportunity exists to incorporate more user-generated data into defining the threshold to better assess the pulse of public perceptions. A study conducted using "remarkability" from Twitter observations to define coastal flooding thresholds suggests that several U.S. regions, including Miami-Dade County, experience perceptible flooding at tide heights lower than prevailing flood thresholds (Moore & Obradovich, 2020). The researchers showed that the number of flood-related tweets reacted in anticipated ways to tide height and local flood thresholds, but in outlier counties such as Miami-Dade, the significant increase (+25%) in flood-related tweets occurred at approximately 0.2 meters (of the maximum daily tide height) below the National Oceanic and Atmospheric (NOAA) tide gauge minor flooding threshold. This suggests that the public became aware of the flooding and was motivated enough to tweet about it at lower levels than have been previously defined. This does not necessarily imply that they are willing to take flood mitigation actions, but more so that the level of awareness may be more sensitive than previously expected, which can influence behaviors. A limitation of this study is that the number of active Twitter users in urban regions tends to be more than in rural areas, leading to higher variance estimates in rural areas and less likelihood to be identified as outliers (Moore & Obradovich, 2020). Nevertheless, this study highlights the potential significance of colloquial forms of messaging in flood risk studies

moving forward in order to better evaluate public sentiment and improve upon flood resilience for local communities.

Resilience

In order to improve upon climate and flood resilience for communities, it is important to first understand a clear definition of resilience corresponding to the literature thus far. According to a study by Adger et al. (2005), resilience is defined as "the capacity of linked social-ecological systems to absorb recurrent disturbances such as hurricanes or floods so as to retain essential structures, processes, and feedbacks. Resilience reflects the degree to which a complex adaptive system is capable of self-organization (versus lack of organization or organization forced by external factors) and the degree to which the system can build capacity for learning and adaptation." A key takeaway from this language comes from the phrase "versus lack of organization or organization forced by external factors." It is imperative to highlight the potential magnitude of disruption that could occur within the coming decades due to a major hurricane landfall combined with rising sea levels and slower moving jet stream patterns, as experienced in 2019 with Hurricane Dorian in the Bahamas. This makes preemptive strategic planning even more crucial.

In the past, planners attempted to exert more control over the built environment, taking the perspective that the underlying conditions were relatively stable. Due to the accelerating rate of sea level rise, stakeholders are increasingly being forced to adopt a more malleable mindset in order to prepare for the potential unexpected impacts to come (Adger et al., 2005). The authors are keen to point out that Florida has some advantages relative to less resourceful areas of the world such as Bangladesh in that Florida

emergency management officials can take advantage of early warning systems, strong institutions, and highly skilled personnel with experience in disaster management. These will all be challenged as we move forward with a more dangerous climate. They make sure to point out that mitigation is part of the strategy as well but that we cannot rely on mitigation alone. Government institutions should implement policies that reduce greenhouse gas emissions as quickly and effectively as possible without causing undue hardship on their citizens while simultaneously preparing for worsening impacts. Finally, it is critical that decision-makers can work across interdisciplinary teams to address the issues facing local communities as no sector will be left unscathed. Political, financial, environmental, community, and private institutions must collaborate to preserve civil society, paying close attention to the specific vulnerabilities of each community.

Vulnerability

The term "vulnerability" is often credited with preceding and influencing the term "resilience", making it important to understand as a foundation for resilience efforts. The terms represent differing research themes, but some union between the two exists theoretically. Vulnerability and resilience are mutually based upon the concept of a coupled human-environmental system and suggest the notion that human action and social structures are crucial elements within the overall risk assessment landscape (Adger, 2005). Additionally, both vulnerability and resilience research have parallel objectives in that they seek to detect and assess shocks and stressors endured by social-ecological systems, the responses of such systems, and their adaptive capacities (Adger, 2005). The key distinction between the two is their purpose. Vulnerability strives to detect the attributes that make systems weaker, while resilience attempts to categorize the attributes

that make systems more durable to disruptions (Kim & Marcouiller, 2016). The concepts work collectively to evaluate the subsequent tangible susceptibility of a system, accounting for the capability of resilience to decrease total vulnerability.

Schroter, Polsky and team (2005) developed a useful method for assessing vulnerability risk which includes an eight-step approach to help stakeholders plan and make informed strategic decisions. The framework was designed to be adaptable to different communities, recognizing that each will require the ability to add their unique set of local circumstances to the assessment. Kim & Marcouiller's research (2016) suggests that communities suffering from high unemployment and low income prior to natural disaster events are more vulnerable and require more time to recover (i.e. are less resilient). This may not be a surprise, however there are examples of some low-income neighborhoods faring better than others due to social cohesion and connection to the community that warrant further investigation (Bloetscher, 2016). The 1995 Chicago heat wave illustrates one such example where two communities with similar locations and socio-demographics experienced significantly different outcomes to the event.

Social Vulnerability Index (SoVI)

Previous work aimed to measure vulnerability by developing a Social Vulnerability Index (SoVI), which is a quantitative measure of social vulnerability to environmental hazards. Initially developed in 2003 for U.S. counties, SoVI offers an "empirically based comparative measure that facilitates the geographic examination of relative differences in levels of social vulnerability across states and regions" (Emrich & Cutter, 2011). It is self-described as a first step toward developing resilience plans for stakeholders as it can quickly identify the most vulnerable communities in each region.

This study took a broad look at 13 states in the southern United States, including Florida and Louisiana, to combine the impacts of monetary damages to buildings and crops with social vulnerability impacts affecting more sensitive groups due to socioeconomic and demographic factors. The authors argue that this is necessary in order to leave no excuses for stakeholders failing to prepare to respond to their most vulnerable communities in the wake of future natural disasters and extreme weather events. This was a point of contention following Hurricane Katrina in 2005 as low income African American communities were negatively impacted disproportionately to the rest of the population of New Orleans (Emrich & Cutter, 2011).

Overall, 1,288 counties were included in the study, ranging from Texas to Virginia, commonly referred to as "The South." Implications for race, class, and gender are highlighted in these states dating back to before the U.S. Civil War and Emancipation Proclamation. Often these communities suffer from a lack of resources, funding, and expertise needed to be more resilient as well as being positioned in less desirable locations facing more environmental hazards. Miami-Dade County consistently ranked high on their SoVI index for drought, flood, hurricane, and sea level rise due to its vulnerable location coupled with elevated social vulnerability as Miami-Dade has one of the highest levels of income inequality in the nation (Emrich & Cutter, 2011). An example SoVI index is shown in Figure 2 below.

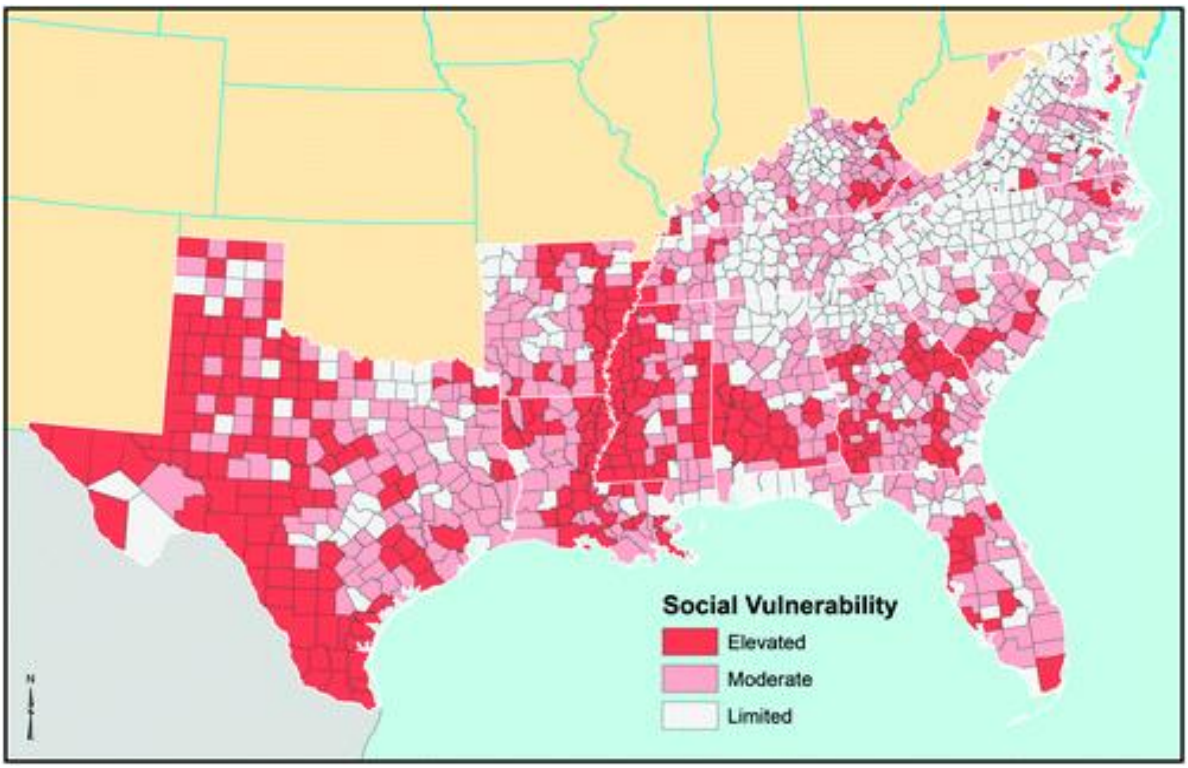


Figure 2 Social vulnerability in the southern United States (Emrich & Cutter, 2011).

Baseline Resilience Index for Communities (BRIC)

Similar to the SoVI index, a Baseline Resilience Index for Communities (BRIC) was developed in order to help policy makers better assess community resilience to environmental hazards and identify areas for improvement. BRIC measures the inherent resilience within communities, not accounting for the practices or policies that aid in adapting to abrupt change or disruptions. Six key factors included in the measurement are: social, environmental, community capital, economic (financial), institutional, and housing/infrastructural (Cutter & Derakhshan, 2020).

According to the research, 2015 BRIC scores ranged from 2.059 to 3.234 with a mean of 2.73. Broward County ranked consistently low in the social, economic, and community capital categories but fared better in the institutional, housing/infrastructural, and environmental categories. The low community capital score reflects the transient

population and lack of place attachment while the high environmental score is indicative of the robust Everglades ecosystem and the services it provides surrounding areas. Enhanced flood risk information has the potential to increase the housing/infrastructural score if it motivates homeowners to undertake mitigation efforts such as elevating homes or lobbying local governments to raise roads. Conversely, it could reduce home values in flood-prone regions, potentially incentivizing those unaware of flood risk to move into those areas. Figure 3 below shows an example of the BRIC for the entire U.S. in 2015.

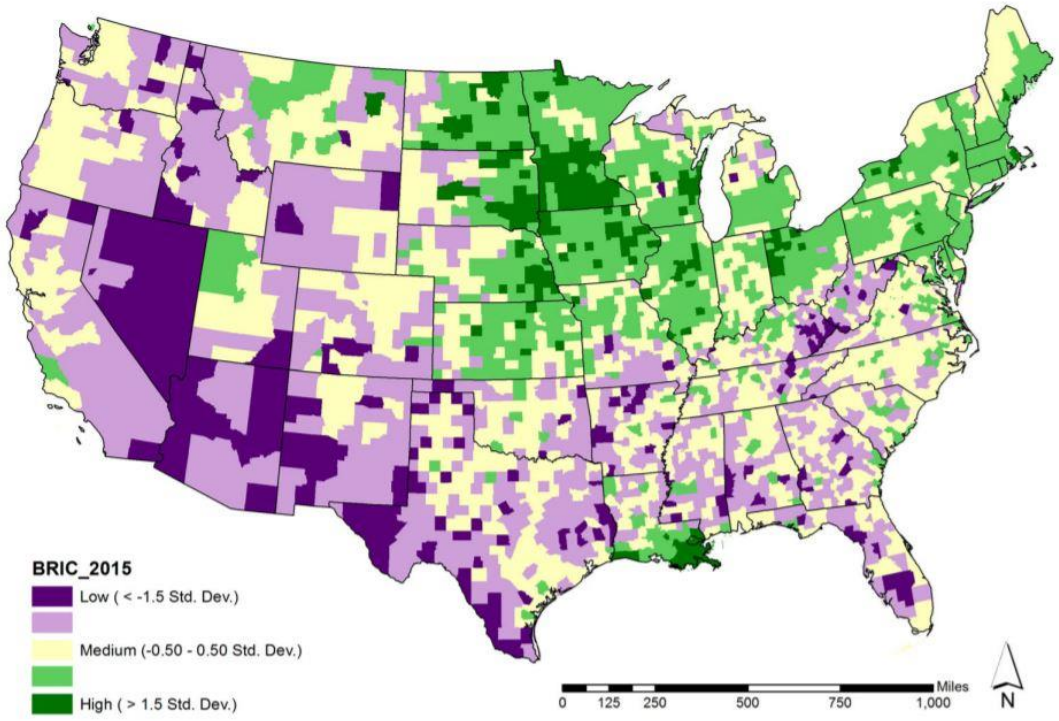


Figure 3 Disaster resilience index for the United States (Cutter & Derakhshan, 2020).

Decision Making Under Uncertainty

Psychology plays an important role in how people perceive natural hazard risk and ultimately how they make decisions under uncertainty, including concepts such as the rational actor paradigm (RAP), prospect theory, bounded rationality, and the psychometric paradigm along with political identity, cultural theory, and socio-economic

demographics. Early literature on the rational actor paradigm suggested that people are mostly rational, economic actors that make decisions like well-informed computers in order to maximize the expected utility of outcomes (Simon, 1955; Starr, 1969). However, Herbert Simon observed that "the cognitive limitations of the decision-maker force him to construct a simplified model of the world to deal with it (1955)." This phrase describes the concept of *satisficing*, where a decision-maker attempts to achieve some satisfactory, but not necessarily maximal, degree of accomplishment (Slovic et al., 1974).

If the rational actor paradigm were true for flood risk, individuals would be making decisions to reduce damages, rather than exacerbating losses and expanding development in vulnerable locations. For example, the Gulf Coast regions of Florida and Louisiana currently face approximately $8.7 billion in annualized expected economic damages in today's environment, with a projected 61% increase over the next 30 years in the U.S. due to climate change (First Street Foundation, 2021). Often, scientific risk communication strategies are built, even if implicitly, on the so-called information deficit model, which begins with the idea that the at-risk population are deficient in their knowledge of science and risk and that providing more or better information will lead to more "rational" perceptions and behaviors (O'Sullivan et al., 2012). Given the significant current and projected flood risk in the region, it is crucial to understand those "non-rational" factors that prevent citizens from fully internalizing the threats and becoming motivated to take preemptive action.

A key finding from previous research is that relative to the RAP, "people have difficulty making good decisions about prospective, uncertain outcomes that lie in the distant future. They typically err by putting too much weight on that which is immediate

and concrete over that which is temporally distant and vague (Slovic et al., 1974).” This mindset makes it difficult to incur financial or lifestyle sacrifices in the short-term to address long-term problems such as sea level rise, flood risk, and climate change, even if the long-term benefits outweigh the short-term costs. Interestingly, younger generations (ages 18-38) tend to show the most concern for future climate change impacts and are more willing to take political action according to a Yale climate change communication study (Ballew et al., 2020).

Prospect theory was introduced to explain observed contradictions in human behavior as a critique to the *rational actor paradigm* (RAP) (Tversky & Kahneman, 1981). Under the RAP, one would expect a near 50% to 50% split in responses to the choice experiments below, given that the expected utilities of each outcome are the same (200 people saved in both Programs A & B, i.e., 400 people die;. 400 deaths in both Programs C & D, i.e., 200 people are saved):

> **Problem 1: Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:**
>
> If Program A is adopted, 200 people will be saved. (72%)
>
> If Program B is adopted, there is a 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved. (28%)
>
> Which of the two programs would you favor?
>
> **A second group of respondents was given the cover story of problem 1 with a different formulation of the alternative programs, as follows:**
>
> If Program C is adopted 400 people will die. (22%)
>
> If Program D is adopted there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die. (78%)

Which of the two programs would you favor?

However, prospect theory demonstrated that most people (72%) preferred the sure thing in the first choice experiment while in the second experiment, most (78%) preferred to take the risk. The authors highlighted the importance of a reference point and framing in decision making as the subjective fear of a loss proved more powerful than the hope of a gain, which was missing from the *rational actor paradigm* (Tversky & Kahneman, 1981). They observed this reversal of preferences in many other experiments conducted with university faculty, students, and physicians alike, concluding that three cognitive features are at the core of *prospect theory* and are shared amongst several instinctive processes of perception, judgment, and emotion: (1) Evaluation is relative to a neutral reference point (outcomes are expressed as gains or losses), (2) Diminishing sensitivity (subjective value of a gain from $10 to $20 is greater than value from $110 to $120), and (3) Loss aversion (displeasure of losses is greater than the pleasure of gains).

The literature on bounded rationality suggests "limitations of the decision maker's perceptual and cognitive capabilities" (Slovic et al., 1974) that may explain the need for people to simplify and constrain decisions made under uncertainty. There are widespread data demonstrating that natural hazard risks are often miscalculated, citing the difficulty floodplain residents have with interpreting probabilistic information. A 1962 study by Robert William Kates and colleagues revealed that while technical experts never fully ignored the likelihood of a flood recurring in a previously flooded location, 84 out of 216 floodplain residents stated they did not expect to be flooded again in the future, naming reasons such as cyclical phenomena, the law of averages, and denial of determinability (Kates, 1962). These observations bring to question if presenting probabilistic scientific

information typically designed for experts is the optimal way to communicate flood risk to the general public, or if more colloquial forms of communication that appeal to emotions such as expert videos or images with less probabilistic information (or none) are more effective. It is important to note that although bounded rationality offers a critique of the rational actor paradigm, it is often branded as a softer version of the RAP rather than a significant alternative explanation.

Building on this work, winner of the Nobel Prize in Economics Daniel Kahneman described the splitting of cognitive processing into System 1 and System 2 thinking that became well-known in the field of behavioral economics to differentiate between the easier, quicker, intuitive judgments (System 1) and the slower, more analytical, reasoning (System 2) that most humans often instinctively avoid because of the added required effort. Yet ironically, System 2 is precisely the notion at the center of the RAP. Kahneman concluded that most decisions are made intuitively and "that the rules that govern intuition are generally similar to the rules of perception" (Kahneman, 2003). The challenge to the *rational actor paradigm* came by explaining time constraints (not having the time to research all of the available information), information constraints (never being able to fully process all of the available information), and systematic biases (disproportionate weighting in support of or against ideas based on prejudice) (Kahneman, 2003). This nuance asserts that the RAP is sufficient for many of life's quick, day-to-day decisions. Indeed, it is an evolutionary advantage in many cases to be able to make quick decisions based on intuition and experience. However, the RAP becomes less sufficient when evaluating longer term problems, such as climate change and flood risk that require more concentrated thought and effort.

Decision making that accounts for long-term trends has become progressively vital as the rates of sea level rise, intense flooding events, and severe storms increase. Inquiry into the psychology of decision-making stresses that "decisions determine outcomes for individuals, businesses, governments, and societies, and knowing more about how to improve those outcomes would benefit all of these individuals, collectives, and institutions (Milkman et al., 2009)." In our modern, fast-paced world, individuals are often faced with an overabundance of information, time constraints, and options that can all lead to less than optimal decisions. It is important to be aware of these influences on bias in order to improve decision making in the face of growing uncertainty.

As shown by these previous concepts, public risk perceptions and subsequent behaviors depend upon several factors outside of the rational actor paradigm. Studies in Geography, Sociology, Anthropology, and Psychology reveal that how one perceives and responds to risks often depends to a large degree on cultural identities, ideological beliefs, and emotional responses (Slovic, 1987). The *psychometric paradigm* set out to quantify some of these theorized risk perceptions across various hazards such as nuclear energy and automobiles, where respondents indicate how risky they perceive these hazards to be as well as how much they would like to see them regulated. A key difference between expert risk analysis and that of the lay audience is that experts tend to associate risk to the number of deaths per year whereas the lay audience tends to combine annual deaths with other factors such as feelings of dread, threat to future generations, catastrophic potential, and controllability. The lay audience can analyze risk as a function of annualized deaths when instructed to, but without specific instruction more intuitive measures tend to dominate the process (Slovic, 1987).

A total of 81 hazards across 18 risk characteristics were analyzed with *dread risk* emerging as the main factor and *unknown risk* the secondary factor. Dread risk is defined by "perceived lack of control, dread, catastrophic potential, fatal consequences, and the inequitable distribution of risks and benefits" with nuclear weapons and nuclear power scoring the highest (Slovic, 1987). Unknown risk is characterized as "unobservable, unknown, new, and delayed in their manifestation of harm" with chemical technologies scoring the highest for this factor (Slovic, 1987). Slovic concluded that dread risk is the most important determinant in how risky the public perceives a hazard and how strongly they would like to see it regulated. In some cases, public risk perception is not really about actual risk at all, but more about the psychological, cultural, and ideological factors at play.

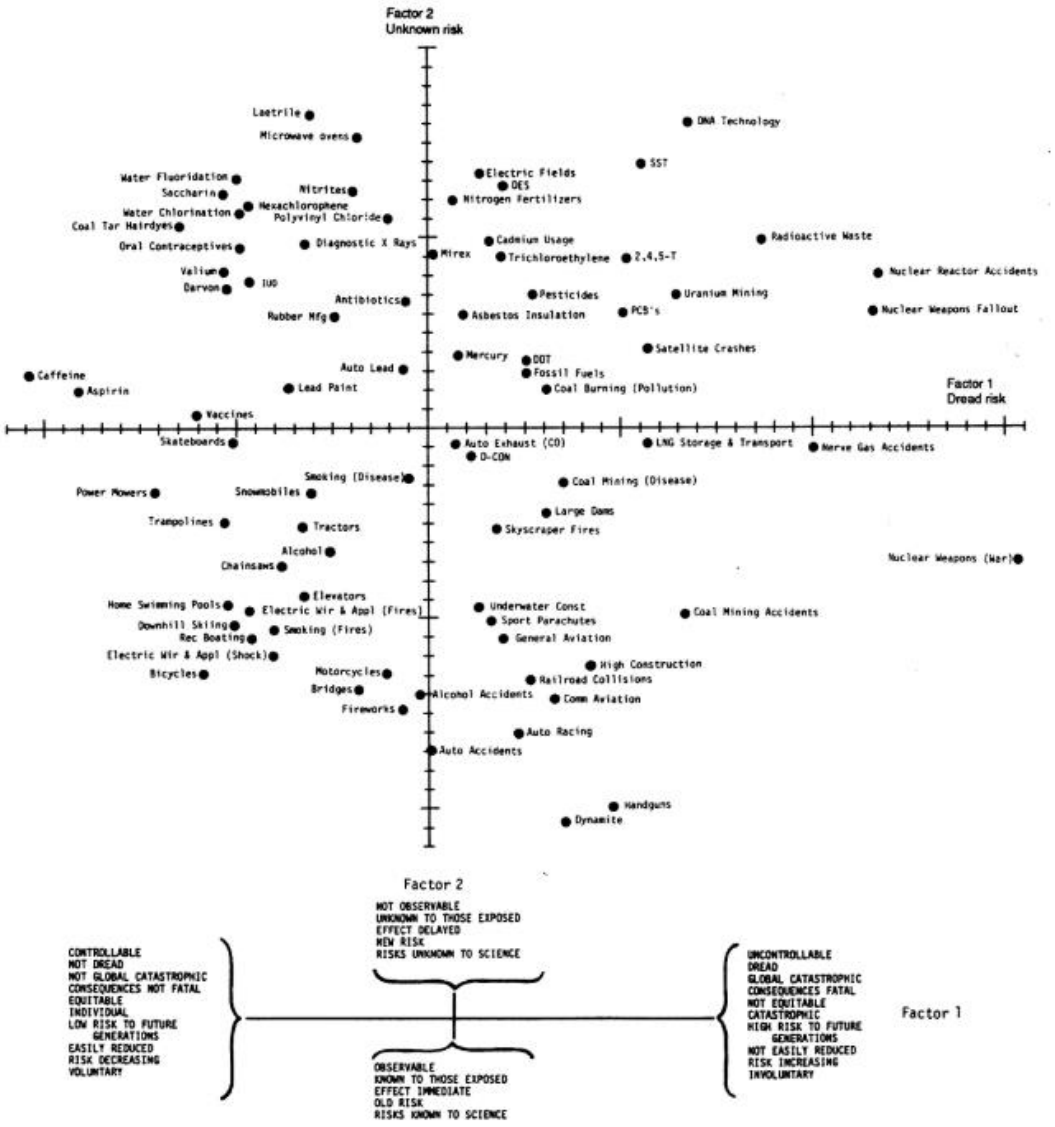


Figure 4 Location of 81 hazards on factors 1 and 2 derived from the relationships among 18 risk characteristics. Each factor is made up of a combination of characteristics. (Slovic, 1987).

Analyzing risk perceptions and behaviors in the context of flooding is a relatively recent field that applies some of the previous concepts discussed. Previous literature suggests that people rarely take actions that partially reduce risk but are more likely to value actions that reduce risk to zero. Botzen and colleagues conducted a study in the Netherlands titled *Individual preferences for reducing flood risk to near zero through elevation* and found that most homeowners (52%) were willing to make an investment of

€10,000 to elevate a new home to a level with virtually zero flood risk (Botzen et al., 2013). The authors calculated the average monthly willingness to pay (WTP) for insurance as €21 based on a choice model experiment, which contrasted with an average monthly WTP of €67 if the costs of elevating the home were financed over a 30-year mortgage, identifying a safety premium of approximately €45 per month. This indicates that survey respondents were more likely to act if they perceived they could eliminate risk (elevate home), versus simply reducing it by some probability (purchase flood insurance). In behavioral economics, this is referred to as the *certainty effect*, by which "individuals place a considerable value on reducing small probability risk to a probability of zero" (Botzen et al., 2013). The Gulf Coast region of the U.S. faces unique challenges reducing risk to zero, but this work provides insights into potential motivating factors for flood risk mitigation behaviors.

While reducing risk to near-zero has psychological implications for decision-making, the reality is that very few (if any) coastal communities will be able to accomplish this at scale. A question that arises from this realization is, what are individual's propensities for relocating from high risk areas? Research by Rey-Valette and team (2019) suggests that governmental preventative relocation is met with strong opposition from citizens, citing a resistance index from survey results that indicate optimistic bias and place attachment as key factors. Socio-geographical factors that limit one's mobility are also a concern, such as populations over the age of 55 and low-income households. Those most likely to relocate include high income earners and those with the least amount of place attachment to their neighborhoods (Rey-Valette et al., 2019).

These findings are pertinent to South Florida as the region has one of the highest levels of income inequality in the nation (Emrich & Cutter, 2011).

Emotional Response to Flood Risk

When analyzing how communities may adapt to sea level rise and flood risk, it is imperative to acquire an understanding of how decision makers perceive risks to anticipate how they may respond. A 2011 study on adaptation behavior in the Florida Keys noted that "the stronger one's perception that climate change poses a substantial risk and the stronger their emotional reactions to the risk, the greater is their willingness-to-pay for mitigation" (Mozumbder et al., 2011). However, different factors elicit diverse emotional responses from different people such as personal experience, values, morals, and worldviews. While public opinion polls are important to persuade elected officials, this 2011 study focuses on the perceptions of local decision makers who are most directly able to shape policy.

An online survey was administered to gauge sentiment on various climate change-related issues, including loss of coral reefs, sea-level rise, more frequent flooding, and property loss. Over 91% of respondents agreed that "climate change is real, and impacts are being felt today." However, much more variation was experienced regarding the impacts being unavoidable (near 50%/50% split) and officials being able to find mitigation solutions (61% agreed) (Mozumbder et al., 2011). These areas of disagreement are crucial when deciding how much investment to make in the region. If there is a significant and growing sentiment that certain areas will have to be abandoned, funding for repairs and future infrastructure may become severely limited and residents may be forced to make increasingly difficult decisions.

Perhaps most surprisingly, only 5% of Florida Keys' experts and decision makers acknowledged that they had plans in place for climate change adaptation (Mozumbder et al., 2011). The RAP suggests that a much greater percentage of decision makers would have plans in place to mitigate projected damages to the area. This leaves a significant gap between the hard, physical reality of climate change, the stakeholder's perceptions, and the degree of preparedness that had taken place up to the time of this study. Local officials will require additional support from academia, private institutions, government, non-profit organizations, and various other sources to provide the vital information and funding required to navigate future uncertainty. A key takeaway is that more collaboration across agencies is necessary to receive the essential support. Local officials cited a need for more involvement in state and federal initiatives along with additional training to manage the increasing rate of environmental change. This 2011 study focused on climate change risk perceptions and mitigation behaviors of local experts, whereas our study will focus on flood risk perceptions and behaviors of the general public.

Moreover, the importance of risk personalization and emotions in responding to natural hazard warnings has been relatively well researched. Most previous work has looked at how positive, and negative emotions impact the public's crisis responses (Liu, 2017). Recently, some researchers have begun to look at specific emotions closer, such as defining risk personalization as "fear for self & others" rather than concern over material possessions of financial loss (Claeys et al. 2013). For example, "fear for self and others" has been shown to be a positive predictor of how the public responds to governmental crisis communication (Liu, 2017). Practical information such as hazard maps showed some effect on risk perceptions and behaviors (RAP-like), but was unable to paint the full

picture on their own. While the importance of risk personalization in whether people respond to warnings as directed is fairly well understood, the specific emotions triggered by the message personalization require further analysis. The researchers called for a need to understand how emotions elicited by emergency messages influence planned behaviors (Liu et al., 2017).

Few studies combine the objective or rational decision-making process (e.g., RAP) with the more intuitive, emotional process (e.g., psychometric paradigm) under the context of flooding to analyze results. In one such study, two Dutch coastal regions were surveyed to assess flood risk perceptions and flood preparedness under the context of a *cognitive route* and an *affective route,* where the cognitive route is most similar to the RAP and the affective route is most similar to the psychometric paradigm (Terpstra, 2011). The cognitive route suggested that an increase in trust in flood experts decreased flood risk perceptions (measured by indices of *perceived dread, perceived flood likelihood, and perceived flood consequences)* and preparedness amongst the public as their levels of dread were reduced. Since they believed that the flood defenses engineered by the experts were sufficient, they were cognitively freed from excessive concern. Conversely, elevated levels of dread triggered by the negative emotions *fear* and *powerlessness* following a previously experienced storm increased flood risk perceptions and subsequent flood preparedness intentions or flood mitigation behaviors (Terpstra, 2011). This is consistent with the *negative affect heuristic* coined by Paul Slovic and colleagues in 2007 which described positive and negative feelings associated with objects or events in people's minds, whereby people tag these objects or events a certain

way in order to quickly draw on them later for decision making from an "affect pool" (Slovic et al., 2007).

In addition, emotions play a pivotal role in how people interpret their flood experiences. A 2008 study found that 20-35% of flood victims questioned cited emotions of *fear*, *uncertainty*, and *insecurity* as the worst results of their experiences, while non-victims rarely cited any of these emotions as the worst expected consequences of future flooding (Siegrist & Gutscher, 2008). According to the authors, these past negative emotions were key drivers of motivating flood victims to take significantly more mitigation action on future flooding relative to those who had not experienced these events and emotions. In one experiment, presenting emotional images in the form of pictures of flooded houses was sufficient to increase flood risk perceptions even though subjects did not experience the event themselves (Terpstra, 2011). This suggests that the emotional state of participants can substantially impact flood risk perceptions and mitigation behaviors. Unfortunately, few studies have looked at how specific emotions such as dread can influence flood risk perceptions and mitigation behaviors relative to more objective or rational messages, such as those often constructed by governmental authorities or researchers.

Flood Risk Information Framing

Given the current and future concerns over sea level rise in the region, the main goal of this study is to assess how presenting probabilistic, scientific information to communicate flood risk to the general public compares with more emotional or intuitive factors such as dread. A 2015 study that analyzed the impacts of political cues and practical information on climate change decisions found that immersing the participant in

practical information “overrode political identity cues” (Wong-Parodi & Fischhoff, 2015). In the study, they manipulate the participants’ frame of reference by having them focus on risks due to “elevation, global warming, or both, or mentioning neither”, using Climate Central’s Risk Finder tool as the interactive, objective, scientific frame. They have participants assume they are making a hypothetical decision on purchasing a home in a flood prone, coastal region of Savannah, Georgia using the Zillow® real estate website after showing them these various risk portrayals.

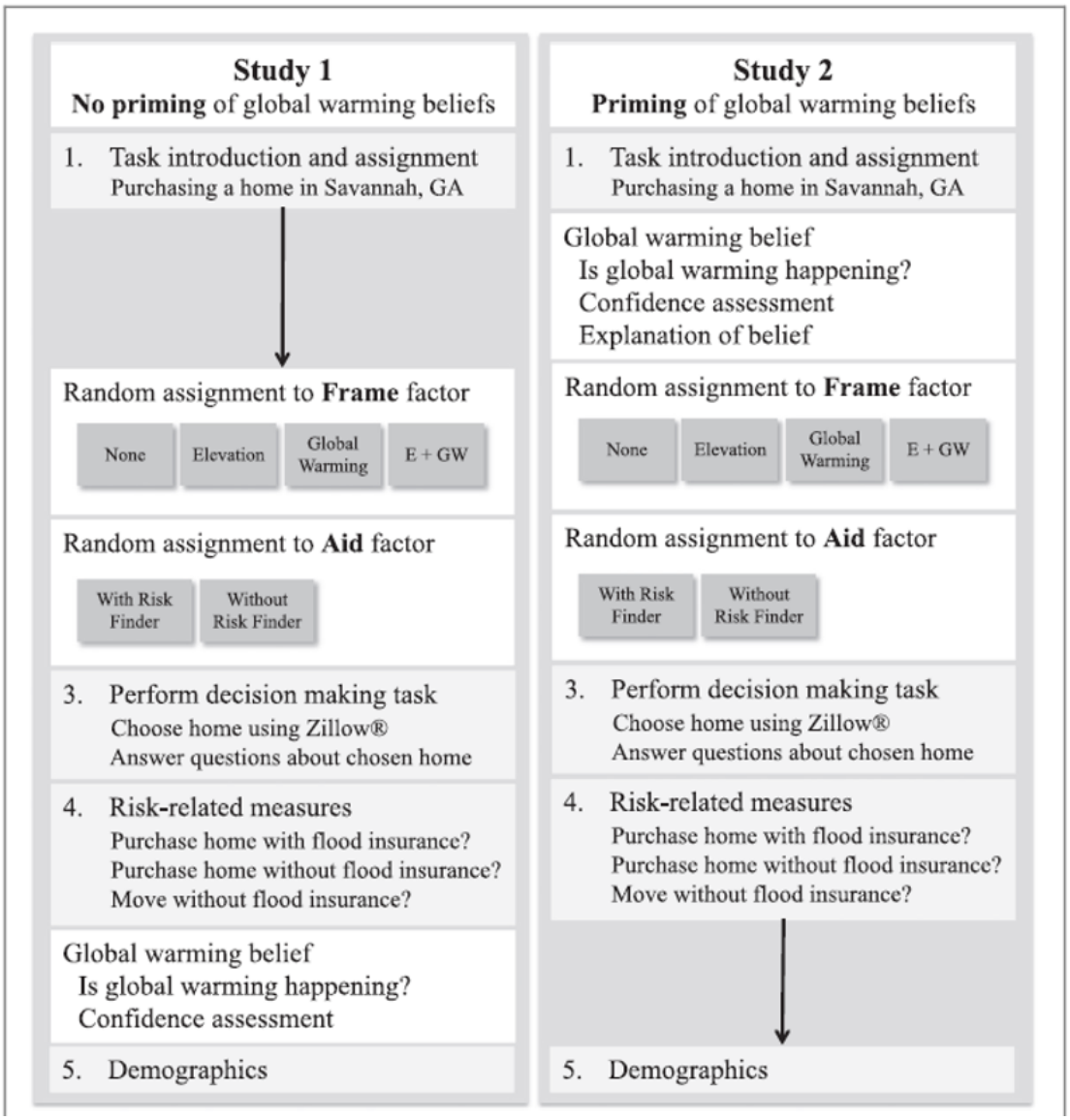


Figure 5 Flow Chart illustrating study design (priming, frame factor, and aid factor) in choice experiment (Wong-Parodi & Fischhoff, 2015).

The study successfully compared using the Climate Central Risk Finder tool (practical information) to analyze flood risk versus using an elevation map (practical information) juxtaposed with a Zillow® map. However, apparently the study does not apply the psychometric paradigm or other emotional factors that may modulate decision making and behavior. As discussed earlier, it is difficult for a layperson to correctly

interpret probabilistic information while making decisions under uncertainty (Slovic et al., 1974).

This presents a gap in the literature that does not account for emotional or intuitive modulating factors related specifically to flood risk perceptions and mitigation behaviors for our study area. The purpose of this experiment is to fill a portion of that gap related to three main objectives: (1) Assess how people perceive flood risk, (2) examine how flood risk information and emotions, specifically dread, affect individual flood risk perceptions and behaviors, and (3) discuss the implications for public and private resilience initiatives.

CHAPTER III: METHODS

Study Area

The Florida & Louisiana Gulf Coast region is adjacent to the Gulf of Mexico and its counties jointly make up approximately 25 million people. The 102 counties listed in Table 1 below will serve as the study area for this research as Gulf Coast Counties.

State	County / Parish Name	Population Estimate (2019)
Florida	Miami-Dade County	2,716,940
Florida	Broward County	1,952,778
Florida	Palm Beach County	1,496,770
Florida	Hillsborough County	1,471,968
Florida	Orange County	1,393,452
Florida	Pinellas County	974,996
Florida	Duval County	957,755
Florida	Lee County	770,577
Florida	Polk County	724,777
Florida	Brevard County	601,942
Florida	Pasco County	553,947
Florida	Volusia County	553,284
Florida	Seminole County	471,826
Louisiana	East Baton Rouge Parish	440,059
Florida	Sarasota County	433,742
Louisiana	Jefferson Parish	432,493
Florida	Manatee County	403,253
Louisiana	Orleans Parish	390,144
Florida	Collier County	384,902
Florida	Osceola County	375,751
Florida	Lake County	367,118
Florida	Marion County	365,579
Florida	St. Lucie County	328,297
Florida	Escambia County	318,316
Florida	Leon County	293,582
Florida	Alachua County	269,043

Florida	St. Johns County	264,672
Louisiana	St. Tammany Parish	260,419
Louisiana	Lafayette Parish	244,390
Florida	Clay County	219,252
Florida	Okaloosa County	210,738
Louisiana	Calcasieu Parish	203,436
Florida	Hernando County	193,920
Florida	Charlotte County	188,910
Florida	Santa Rosa County	184,313
Florida	Bay County	174,705
Florida	Martin County	161,000
Florida	Indian River County	159,923
Florida	Citrus County	149,657
Louisiana	Livingston Parish	140,789
Louisiana	Tangipahoa Parish	134,758
Florida	Sumter County	132,420
Louisiana	Ascension Parish	126,604
Florida	Flagler County	115,081
Louisiana	Terrebonne Parish	110,461
Florida	Highlands County	106,221
Louisiana	Lafourche Parish	97,614
Florida	Nassau County	88,625
Louisiana	St. Landry Parish	82,124
Florida	Putnam County	74,521
Florida	Monroe County	74,228
Florida	Walton County	74,071
Florida	Columbia County	71,686
Louisiana	Iberia Parish	69,830
Louisiana	Acadia Parish	62,045
Louisiana	Vermilion Parish	59,511
Louisiana	St. Martin Parish	53,431
Louisiana	St. Charles Parish	53,100
Louisiana	St. Mary Parish	49,348
Louisiana	St. Bernard Parish	47,244
Florida	Jackson County	46,414
Louisiana	Washington Parish	46,194
Florida	Gadsden County	45,660
Florida	Suwannee County	44,417
Louisiana	St. John the Baptist Parish	42,837
Florida	Okeechobee County	42,168
Florida	Hendry County	42,022
Florida	Levy County	41,503
Florida	DeSoto County	38,001

Louisiana	Beauregard Parish	37,497
Florida	Wakulla County	33,739
Louisiana	Evangeline Parish	33,395
Louisiana	Iberville Parish	32,511
Louisiana	Jefferson Davis Parish	31,368
Florida	Baker County	29,210
Florida	Bradford County	28,201
Florida	Hardee County	26,937
Louisiana	West Baton Rouge Parish	26,465
Louisiana	Allen Parish	25,627
Florida	Washington County	25,473
Louisiana	Plaquemines Parish	23,197
Louisiana	Assumption Parish	21,891
Louisiana	Pointe Coupee Parish	21,730
Florida	Taylor County	21,569
Louisiana	St. James Parish	21,096
Florida	Holmes County	19,617
Louisiana	East Feliciana Parish	19,135
Florida	Gilchrist County	18,582
Florida	Madison County	18,493
Florida	Dixie County	16,826
Louisiana	West Feliciana Parish	15,568
Florida	Union County	15,237
Florida	Hamilton County	14,428
Florida	Jefferson County	14,246
Florida	Calhoun County	14,105
Florida	Glades County	13,811
Florida	Gulf County	13,639
Florida	Franklin County	12,125
Louisiana	St. Helena Parish	10,132
Florida	Lafayette County	8,422
Florida	Liberty County	8,354
Louisiana	Cameron Parish	6,973

Table 1 Table of populations for Florida & Louisiana Gulf Coast counties. Source: Data.census.gov from the 2019 American Community Survey.

Florida's climate ranges from humid subtropical regions to purely tropical. This study focuses more on the tropical areas of Florida in the South. The state has a dry season and a wet season, with the wet season taking place from May through October and experiencing the highest amounts of rainfall. In addition, Florida is also well known for

its hurricanes that occur from June to November. Compounding on the wet season and hurricane season is “King Tide” season, a colloquial term for perigean spring tides. These tides are most noticeable in the Fall due to the warmer waters and seasonal winds that drive water levels higher than normal (Kottek, 2006).

The region is particularly vulnerable to the increasing impacts of sea level rise for several reasons: large urban populations in low-lying coastal regions, a porous limestone geology, susceptibility to hurricane landfalls, an increasing and aging population, severe wealth inequality, and saltwater intrusion of freshwater supplies (Bloetscher et al., 2011). Some floods occur due to intense precipitation events such as tropical storms or hurricanes that generate more rainwater than the built environment can soak up. Others are a result of water seeping up from below the permeable limestone geology. The main variables that contribute to the severity of floods are the amount of recent rainfall received, the current saturation levels of the ground, the intensity of winds and their tidal influence, the sea level, and how effective the city’s water management system is to handle these stressors (City of Fort Lauderdale, 2020).

The three major causes of floods are the spilling over of bodies of water, shoreline tidal surges, and precipitation, with riverine flooding over banks and into neighboring land being the most common. Still, a typical rainy season can generate flooding as the region’s sub-tropical climate raises the likelihood of flooding relative to other coastal regions. Urbanization of the built environment plays a significant role as well. Contrasted with suburban and rural locations, most cities face a larger flood risk. Miles and miles of pavement, roads, and parking lots have modified the normal path of water. Before modern day Florida was developed, water management happened naturally by way of the

Everglades, mangrove habitats, and waterway flow to the ocean. Commencing in the late 1800s, the construction of canals enabled intense land development that unwittingly harmed the natural system's capacity to manage water in the area successfully (City of Fort Lauderdale, 2020).

These factors are exacerbated due to sea level rise as the native land cannot take up as much water as it used to. As ocean water pushes up from underneath, it pushes against fresh water already in the ground, causing the fresh water to rise and challenging the existing stormwater management system. During downpours, stormwater does not have as many locations to run out of harm's way as it did in the past (City of Fort Lauderdale, 2020).

In addition, the Louisiana portion of the Gulf Coast consists primarily of bays, lagoons, and inlets. The coast is crossed by numerous rivers, the largest being the Mississippi River. Most of the land along the Gulf Coast is comprised of marshland, which has been quickly vanishing due to erosion, sea level rise, and extreme storms such as Hurricane Katrina in 2005 (Fikes, 2014). The eastern part of the Gulf Coast that extends down through Florida is also scattered with numerous bays and inlets.

The Louisiana Gulf Coast climate is humid subtropical. Most of the year features warm to hot temperatures while the winter months experience moments of cool weather, which may become more frequent due to arctic amplification (Francis, 2012). Like Florida, the region is also exposed to hurricanes, floods and severe thunderstorms. Most of the Gulf Coast has a summer wet season, with July or August typically being the rainiest months due to the mixture of regular thunderstorms caused by persistent heat and humidity, and tropical weather systems.

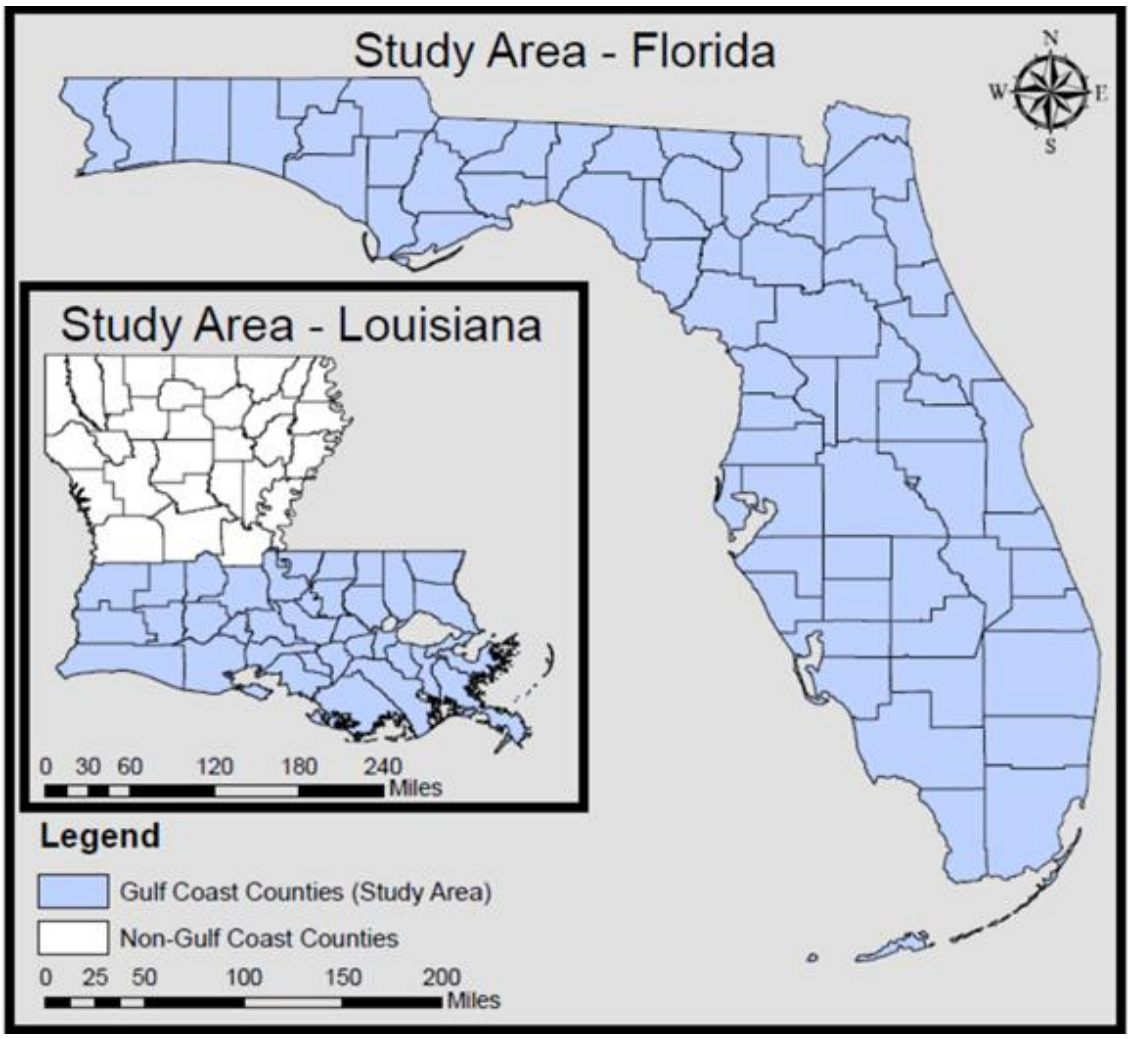


Figure 6 Map of Florida and Louisiana Gulf counties. Sources: ESRI, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, MPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordinance Survey, ESRI Japan, METI, ESRI Chia (Hong Kong), OpenStreetMap contributors, and the GIS User Community.

Primary Data

This study is part of the collective work of several research facilities across the contiguous United States as part of the National Academy of Sciences Gulf Research Program research project, "*Why Location Matters: How Smarter Decision-Making by Renters and Homebuyers Will Increase Coastal Resilience.*" FAU's Center for Environmental Studies (CES) engaged a third-party firm (GreatBlue) to recruit participants for the screening and collection of surveys and focus groups. These surveys

and focus groups (intended n = 24; actual n = 20) were collected online in an examination of the flood risk perceptions and mitigation behaviors of current homeowners and will be used to inform a larger (n = ~1,000) survey later in the year.

This project included two similar, sequential components involving human subjects. The first component included surveying (67 close-ended questions) home owners across the Gulf Coast of Florida and Louisiana regarding flood risk perception, flood risk mitigation behavior, cultural identity, social cohesion, scientific literacy, political identity, relevant homeowner information, and demographic information. The surveys took place between 5/28/2021 and 6/3/2021.

Questions were based on various previous studies throughout the literature (Slovic, 1987; Botzen et al., 2013; Siegrist & Gutscher, 2008; Cutter et al., 2020; Emrich et al., 2011; Wong-Parodi & Fischhoff, 2015) in a collaborative effort with myself focusing more on the emotional modulating factors (psychometric paradigm) and Glen focusing more on cultural theory. There is significant overlap with the other categories. The survey was designed with the following seven key themes in mind:

1. **Flood Risk Literacy**: questions intended to measure the level of prior flood-related knowledge that the participant had. These questions were designed to have a mix of academic and practical questions about flooding.
2. **Flood Risk Numeracy:** questions intended to measure the level of comprehension, specifically numeracy, that participants had towards the flood risk information graphics. These questions focused on the understanding of objective flood risk information shown in the flood risk information graphics.

3. **Flood Risk Mitigation Behaviors:** questions intended to measure the willingness of participants to take mitigatory actions given their respective flood risk information graphics. These questions focus both on mitigation behaviors regarding purchases (e.g., flood insurance), as well as more labor intensive actions (e.g., elevating your home).
4. **Home-Buying Behaviors:** questions intended to measure the willingness of respondents to purchase the hypothetical home represented in their respective flood risk information graphics.
5. **Flood Risk Perceptions:** questions intended to measure the perceptions that respondents have, both within the examples of the flood risk information graphics, as well as outside of the graphics. These questions focus on the dread or fear that flooding evokes, the perceptions that respondents have regarding their trust in flood experts, and their perceptions of the riskiness of the flood risk information graphics.
6. **Cultural Identity:** questions intended to group participants based on their worldviews into one of four categories in which certain characteristics define the categories. These questions focus on how respondents feel that society and the government should function, both within and outside of the flood context.
7. **Socio-economic Demographics:** questions intended to characterize participants by asking about age, gender, household income, and other similar demographic questions.

The second human subjects' component included three different focus groups containing approximately eight participants each who had completed the initial survey,

utilizing semi-structured questions with the same topics as the first component. As noted above, focus group subjects were asked to participate in voluntary, moderated focus groups in which they discussed topics related to their flood risk perceptions and preferences for flood risk mitigation behaviors. Focus groups were moderated by advisor Dr. Colin Polsky, myself, and colleague Glen Ogelsby. There was no deception in focus group discussions. Participants were compensated $75 for their participation and received this payment upon completing both the survey and the focus group in the form of an e-gift card. Participation was voluntary and consent was obtained prior to involvement. The three separate focus groups took place on 6/1/2021, 6/2/2021, and 6/3/2021.

Focus groups were audio recorded and then transcribed into Microsoft Word documents. Neither recordings nor transcripts contained any information allowing identification of individual participants and the groups were conducted on an online platform through Zoom. These locations were easily accessible to respondents through GreatBlue's secure online platform but were not observed by non-participants. Full details of the focus group prompt can be found in Appendix D.
The data collection process occurred over one month and was conducted in a two-staged approach that allowed for the application of both qualitative and quantitative study. The 20 participants were randomly assigned to one of three groups and received a different level of flood risk information graphics (500-year floodplain, 100-year floodplain, and 25-year floodplain) based on their group. The flood risk information graphics included two visuals for each of the three flood risk levels representing variation in both what information is presented, and at what risk level. The two types of risk information shown to survey participants are the cumulative risk as a percentage for the floodplain over a 30-

year time horizon, and the average annualized loss for a hypothetical property in the given floodplain for the same timeframe. Levels of risk vary between survey participants and focus groups, with approximately a third of participants in each of the three groups receiving one of the following: 500-year floodplain group was shown graphics with a 6% cumulative chance of flooding and $4,000 cost of flooding over 30 years; 100-year floodplain group was shown graphics with a 26% cumulative chance of flooding and $20,000 cost of flooding over 30 years; and the 25-year floodplain group was shown graphics with a 71% cumulative chance of flooding and $75,000 cost of flooding over 30 years.

Initial surveys were administered at the start of the data collection process to gain quantitative data and to better understand general flood risk perceptions and mitigation behaviors. Data collected from these surveys were used to inform focus group questions with the same subjects that were then used to probe deeper into relevant flood risk perception and mitigation behavior questions already asked in the survey. The use of these focus groups provided further insight and additional qualitative data for analysis. A few examples of the survey questions are shown below. Questions 13 through 16, 18 through 28, and 30 through 36 vary by the level of risk graphics shown for each of the three surveys. The questions are the same, but the answer choices change based upon the numbers shown in the risk graphics. For the full 25-year floodplain survey, refer to Appendix A.

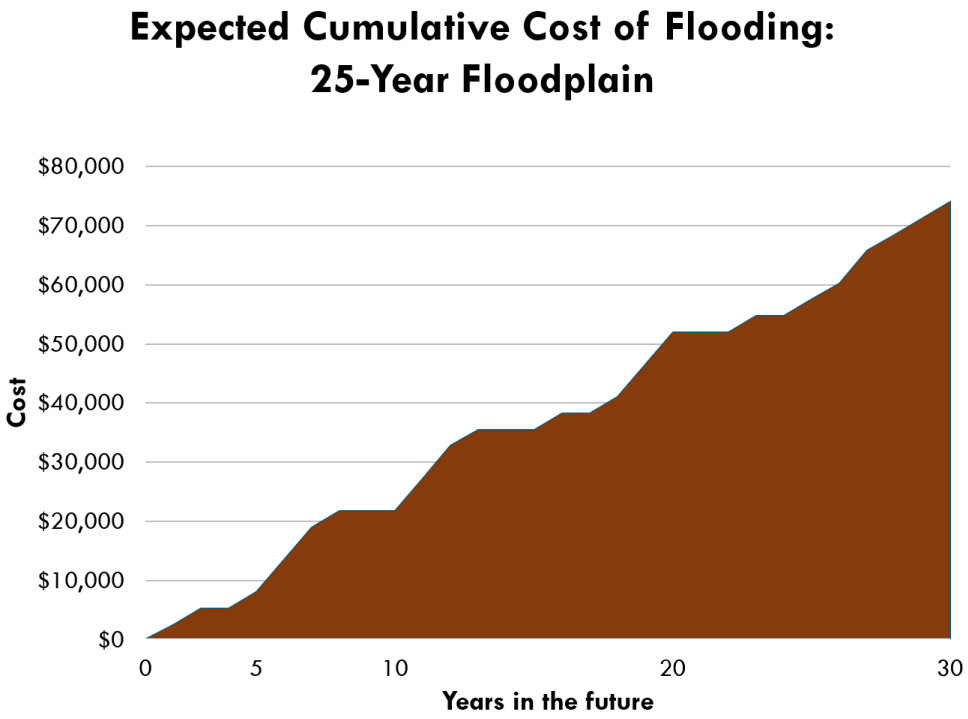


Figure 7 High risk (25-year floodplain) average annualized loss chart of flood risk information illustrating the hypothetical cost of a home in the 25-year floodplain.

How strongly do you agree or disagree with the following statements?

	Strongly Agree	Agree	Disagree	Strongly Disagree
Q37. It is up to me how serious the consequences of flooding will impact me.	○	○	○	○
Q38. Flooding causes feelings of dread in me, on the level of a gut reaction.	○	○	○	○
Q39. Flood news reports make me scared.	○	○	○	○
Q40. Flooding has me concerned for the future of my community, my family, and/or my daily life.	○	○	○	○
Q41. Flooding has me concerned for substantial damage to my house, possessions, and/or public infrastructure.	○	○	○	○
Q42. Flooding will become more and more dangerous over time.	○	○	○	○
Q43. The experts know enough about flooding to protect us.	○	○	○	○

Figure 8 Sample Survey Questions.

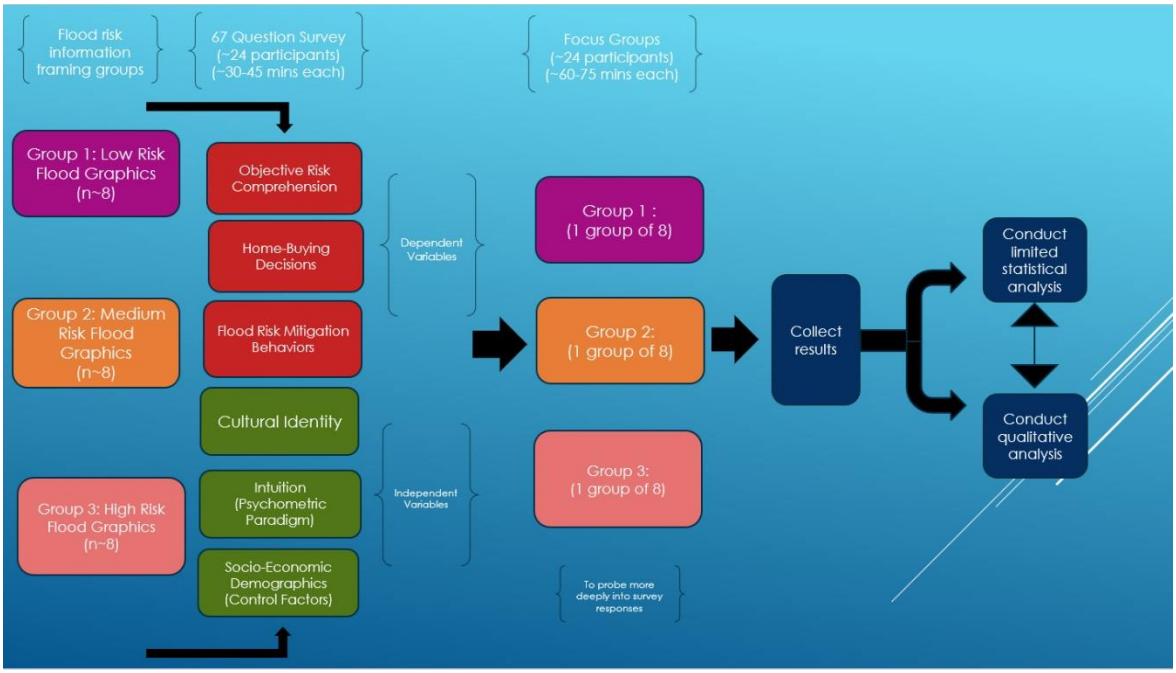


Figure 9 Flow Chart illustrating how secondary data will be used and primary data will be collected to analyze the impacts on flood risk perceptions and flood risk mitigation behaviors.

CHAPTER IV: ANALYSIS

Three main objectives of this research are to: (1) Assess how people perceive flood risk, (2) examine how flood risk information and emotions, specifically dread, affect individual flood risk perceptions and behaviors, and (3) discuss the implications for public and private resilience initiatives.

Quantitative and qualitative analysis of the collected data were conducted in order to identify patterns and draw conclusions from the survey responses and focus groups. These findings were carefully identified, studied and summarized. In addition to descriptive statistics, cross tabulations between select pairs of variables, and their associated Chi-Square tests of significance, we utilized Cronbach's Alpha to interpret the survey responses. It is important to note that this small sample size of n = 20 participants is not representative of the entire study area and is intended to help inform a later study of approximately n = ~1,000 participants. We do not claim statistical significance in these results, but rather are searching for suggestive patterns. Insights gained from this research will help shape and improve the survey and focus group instruments for the large sample study. Data were put through rigorous deductive and inductive quality control measures by myself and colleague Glen Oglesby, including evaluating the theory behind each formula, spot checking a minimum of 3 calculation outputs per approximately 20 different variables, recording any inconsistencies, and meeting to compare notes before making updates to the Word document protocol, Excel document, and SPSS files. For more detail on these documents, refer to Appendices E & F.

Cronbach's Alpha

Cronbach's Alpha was established by Lee Cronbach in 1951 to offer a measure of the internal consistency of a test or scale, stated as a number between 0 and 1. Internal consistency refers to the extent to which all the items in a test measure the same concept and are connected to the items' inter-relatedness within the test. Internal consistency is used to assess reliability before a test is fully administered. The level of a Cronbach's Alpha coefficient that is acceptable or unacceptable is arbitrary. Moreover, reliability estimates reveal the amount of measurement error in a test. In short, this explanation of reliability is the "correlation of the test with itself" (Tavakol & Dennick, 2011).

The evidence of reliability for this test is divided into three groups: (1) content – the test needs to measure the underlying construct, (2) criterion – the test must correlate with another accepted and established test of the same underlying construct, (3) consequence – the size of the correlation coefficient must result in at least .90 for large stakes testing and at least .60 for low stakes testing (Field, 2018). For this research, indices created will be required to return values of at least .80 for the size of their correlation coefficients to be considered valid. However, the level of a Cronbach's Alpha coefficient that is acceptable or unacceptable is arbitrary.

$$\alpha = \frac{N\bar{c}}{\bar{v} + (N-1)\bar{c}}$$

Equation 1 Cronbach's Alpha formula (Field, 2018).

Chi-Square Statistic

The Chi-Square statistic is a frequently used test to measure the relationships between categorical variables, such as the Likert scale questions found in our flood risk survey. Specifically, the Chi-Square test shows whether a relationship exists between two variables by comparing expected patterns one would find if the variables were independent of each other to the observed pattern of responses in each of the cells within the cross tabulation being generated. When running a Chi-Square test, the null hypothesis is that there is no relationship between a set of categorical variables, i.e., that they are independent of each other. However, if the Chi-Square test results are statistically significant, the null hypothesis is rejected suggesting an association between the two categorical variables (Field, 2018).

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Equation 2 Chi Square Formula (Field, 2018).

Where χ denotes the Chi-square test statistics, O_i is the observed value, and E_i is the expected value of the variable of interest. In order to interpret Chi-square tests, we first have to ask the question what deviations, if any, from random exist (where random has a statistical meaning of "no relationship between the *n* specified variables")? Then, we identify which cell or cells appear to cause the table to be unbalanced. In order to attempt to explain any imbalance, we have to justify or rationalize what a particular cell

implies for what is going on with an individual's perceptions and behaviors, drawing from the prior peer-reviewed literature (Field, 2018).

To illustrate using a straightforward example, consider a classroom of 100 students where the researcher hypothesizes that political party affiliation affects what kind of pizza the students like. There are 30 Republicans and 70 Democrats in the class, with 40 liking pepperoni and 60 liking broccoli. In this case, if there were an effect of political party affiliation on pizza preference, then we would assume to see significant deviations away from the expected count shown in Table 2 below. For example, 30% of the 40 people who prefer Pepperoni are Republican (.30 X 40 = 12) and 70% of the 40 people who prefer Pepperoni are Democrat (.70 X 40 = 28) with the same distribution for the 60 who like Broccoli (.30 X 60 = 18) and (.70 X 60 = 42), leading to a p-value of equal to or less than 0.05 for the Pearson Chi-Square test. If political party affiliation were unassociated with pizza preference, then we would expect the observed counts to be close to the expected counts in table below, leading to a p-value of greater than 0.05.

	Republican	**Democrat**
Pepperoni	12	28
Broccoli	18	42

Table 2 Expected Count Sample 2x2.

In this hypothetical example below, we randomized the distribution of the 40 Pepperoni and 60 Broccoli preferences in Microsoft Excel and exported into SPSS to find that the Chi-Square score returned a p-value of .008 which is less than 0.05 so we can

reject the null hypothesis and conclude that there is a significant correlation between pizza preference and political party.

CHAPTER V: RESULTS

Data were analyzed using the SPSS (originally Statistical Package for the Social Sciences) predictive analytics software package (SPSS, 2009). Chi-square tests, independent samples t-tests and one-way analysis of variance (ANOVA) were used, with the critical significance value (p-value) set at 0.05.

The survey results were exported into Microsoft Excel and coded using the Cronbach Alpha scores to create a set of eight indices: (1) Flood Risk Literacy, (2) Flood Risk Comprehension, (3) Flood Risk Mitigation Behaviors, (4) Flood Risk Graphic Perceptions, (5) Dread Risk, (6) Trust in Experts, (7) Home-Buying Behaviors, and (8) Social Solidarity. Flood Risk Literacy and Flood Risk Comprehension were generated using a cumulative index where participants who answered five or more questions correctly out of six total questions received a "Pass" score while participants who answered less than five questions correctly received a "Fail" score. All other indices were created using an averaged score of survey questions within the index. Full details on the indices and protocols utilized can be found in the Appendix E.

Socio-Economic Demographics

Following both inductive and deductive quality assurance measures, the original sample size of 24 survey participants was reduced to 20 valid responses. All participants were screened with questions of age, political affiliation, race, income, and location with the intent to ensure a reasonably equal distribution of these demographic characteristics across the small sample size. The sample population was comprised of 35% Republicans,

15% Independent or No Party Affiliation, and 50% Democrats. Along political ideologies, 25% identified as Liberal, 35% Conservative, and 40% Moderate. 75% of the sample identified as female with the remaining 25% identifying as male. Age groups varied with 30% falling between 18-34 years of age, 25% between 35-49, 30% between 50-64, and 15% being over the age of 65. 75% of the sample fell below an annual household income of $75,000, with the remaining 25% having annual household incomes greater than $75,000. The sample racial and ethnic backgrounds skewed heavily White (70%) with 5% identifying as Asian, 5% Black or African American, 10% Hispanic, Latino, or Spanish origin, and 10% both Hispanic, Latino, or Spanish origin and White. Regarding education level, much of the sample had some college or an associate degree at 50%, 15% were high school graduates, 20% had a bachelor's degree, 10% had a master's degree, and 5% had both a college education and vocation school. Table 3 below shows a summary of these statistic. A full breakdown of the demographic characteristics can be found in Appendix F.

Variable	Mean	Min.	Max.	Std. Deviation
Political Party (Strongly Republican = 1)	3.2	1	5	1.399
Ideological Views (Strongly Liberal = 1)	3.2	1	5	1.196
Homeownership (Owned w/ mortgage = 1, Owned w/o mortgage = 2, Rented = 3)	1.4	1	3	0.598
Gender (Male = 1)	1.75	1	2	0.444
Age (18-34 = 1, 35-49 = 2, 50-64 = 3, 65+ = 4)	2.3	1	4	1.081
Household Income ($15,000 to $24,999 = 2, $25,000 to $49,999 = 3, $50,000 to $74,999 = 4, $75,000 to $99,999 = 5, $100,000 to $199,999 = 6, $200,000 or more = 7)	4	2	7	1.257
Education Level (High school graduate = 2, Some college = 3, Bachelor's degree = 4, Master's degree = 5, Doctoral degree = 6, Military or vocational = 7, Other = 8)	3.5	2	8	1.357

Table 3 Summary Statistics (n = 20).

Democrats scored the highest on the Comprehension Index, with 9 out of 10 passing contrasted with 4 out of 7 Republicans. Regarding mitigation behavior, 5 out of 8 Conservatives scored high compared to 0 out of 5 for Liberals. Participants in the 18-34 age group featured a perfect 6 out of 6 pass rate for Comprehension while the 65 and over age group had the most difficulty with 2 out of 3 failing. Regarding income levels, 9 out of 15 respondents with household incomes under $75,000 per year scored high for home-buying behavior with the remaining 6 scoring low. For those with household incomes of $75,000 or greater, 4 out of 5 scored high on the home-buying index.

Cronbach's Alpha

Running the Cronbach's Alpha test for internal consistency in SPSS with all of our indices returned the results shown in Table 4 below. Most major indices returned scores above 0.80 with the exception of Literacy, Comprehension, and Social Solidarity. Although the Literacy and Comprehension indices returned low values, we are confident

that the questions accurately represent the concepts of flood risk literacy or awareness and flood risk comprehension or graphic understanding. One possible explanation for the low Literacy index score is the varying nature of the questions, as some are “true or false”, some are “select all that apply”, and others “choose one”. This contrasts with most other indices that feature mainly Likert scale questions with the same answer choices flowing in the same direction. There was very little internal consistency in how our 20 respondents answered each of the six flood literacy questions. Given this finding, we will focus on Comprehension when assessing the RAP.

Index	Cronbach's Alpha
Literacy Index	-0.013
Comprehension Index	0.407
Mitigation Index	0.848
Graphic Perception Index	0.853
Dread Index	0.806
Trust in Experts Index	0.801
Trust in Institutions Index	0.883
Home Buying Index	0.908
Social Solidarity	0.684

Table 4 Cronbach's Alpha scores for indices.

Univariate Frequencies

First, we will look at some basic univariate frequencies to lay the foundation for our core concepts: Literacy, Comprehension, Home Buying Behavior, and Mitigation Behavior. The rational actor paradigm would expect most people to score highly on both the Literacy and Comprehension questions if humans made decisions like well-informed computers (Simon, 1955). However, we expect participants to struggle with the Literacy questions as they are not all common knowledge concepts to the general public and

anticipate most to correctly answer the Comprehension questions as they are more straight forward and contain the answers within the graphics themselves, meaning it primarily measures one's ability to comprehend the numbers shown (i.e., Numeracy). It is important to note that the threshold of answering 5 or more questions correctly has significant implications for whether scores are bucketed into the "Fail" or "Pass" category. Choosing 4 or more out of 6 correct answers as the threshold for example may tell a different story.

Among 20 participants, 85% failed to answer at least 5 out of the 6 Literacy questions correctly. This contrasts sharply with the Comprehension index where 75% of participants correctly answered 5 or more of the questions.

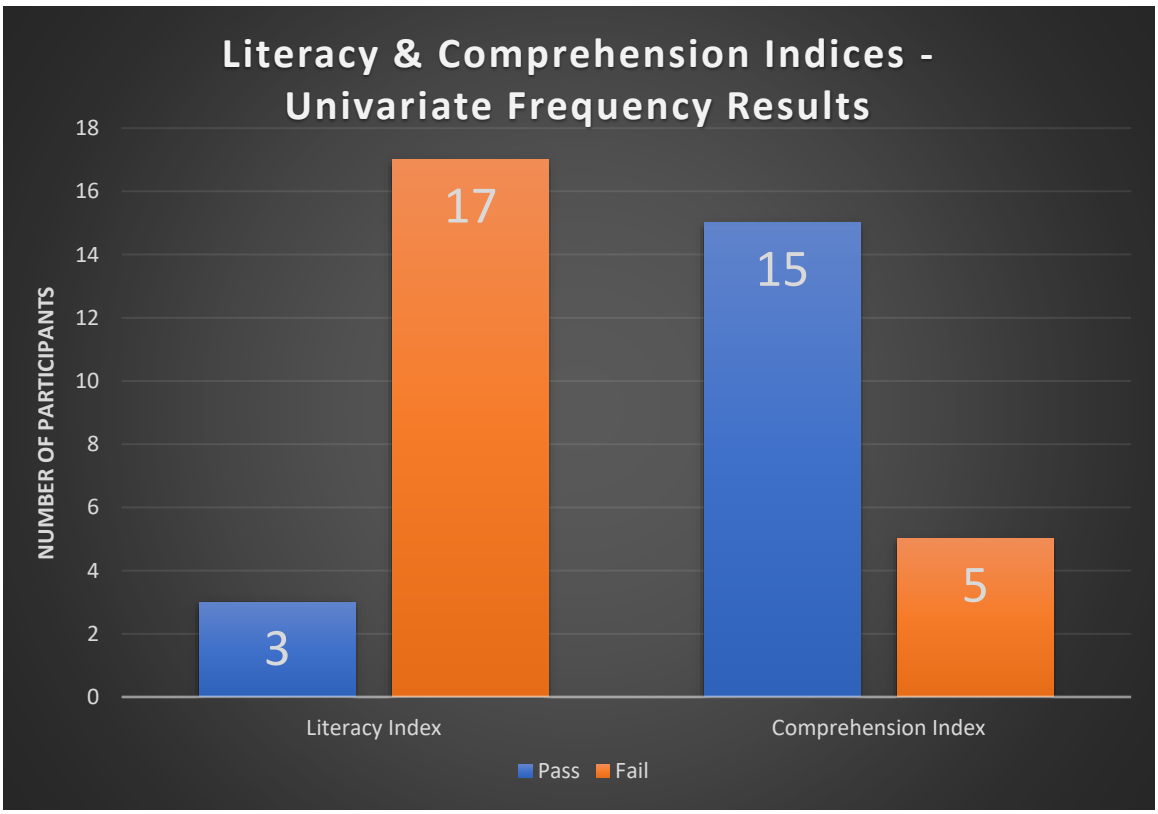


Figure 10 Literacy & Comprehension Indices Frequencies.

Regardless of the floodplain shown, 12 out of 20 participants (Q16. Home Buying after Cumulative Risk graphic) and 13 out of 20 participants (Q28. Home Buying after AAL Risk graphic) either agreed or strongly agreed to that they would buy a home located in the type of floodplain shown. This resulted in 13 out of 20 participants scoring "High" on the Home-Buying index shown below. We found a relatively even split in the Mitigation Behavior index with 11 returning as "Low" and 9 as "High".

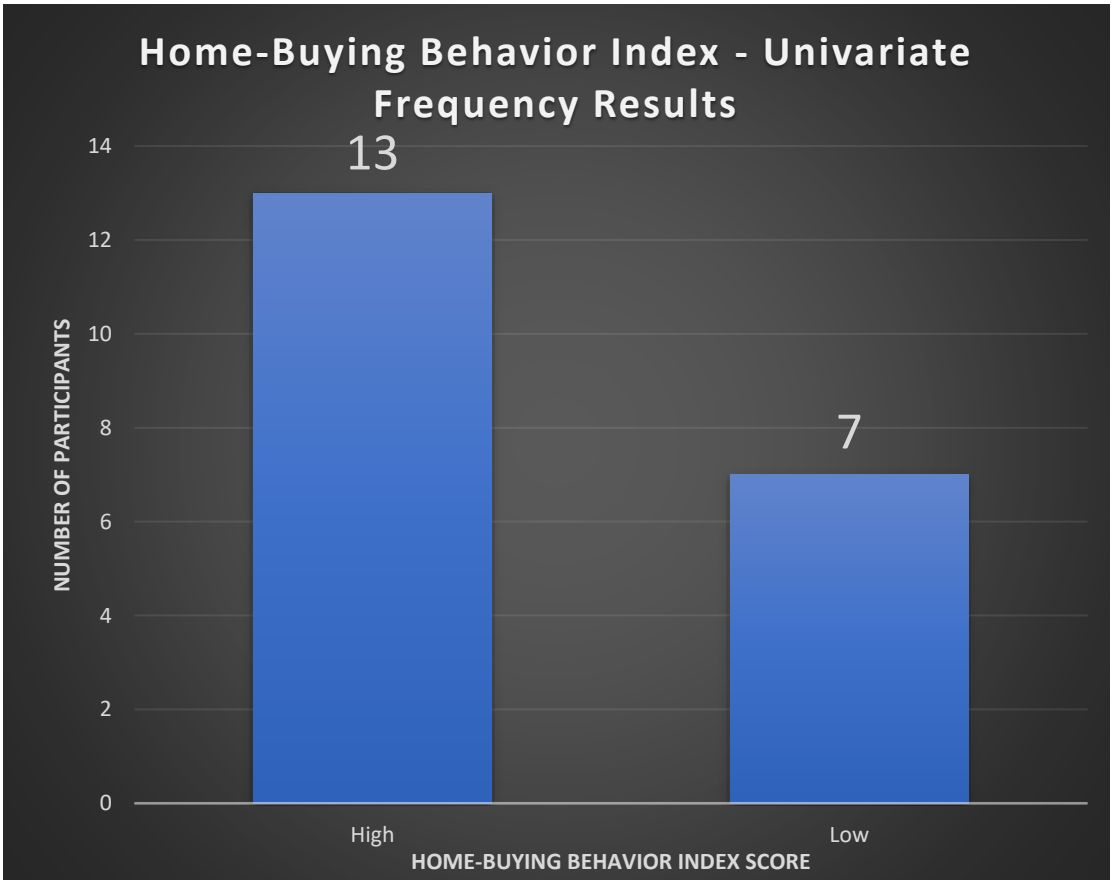


Figure 11 Home-Buying Behavior Index Univariate Frequencies.

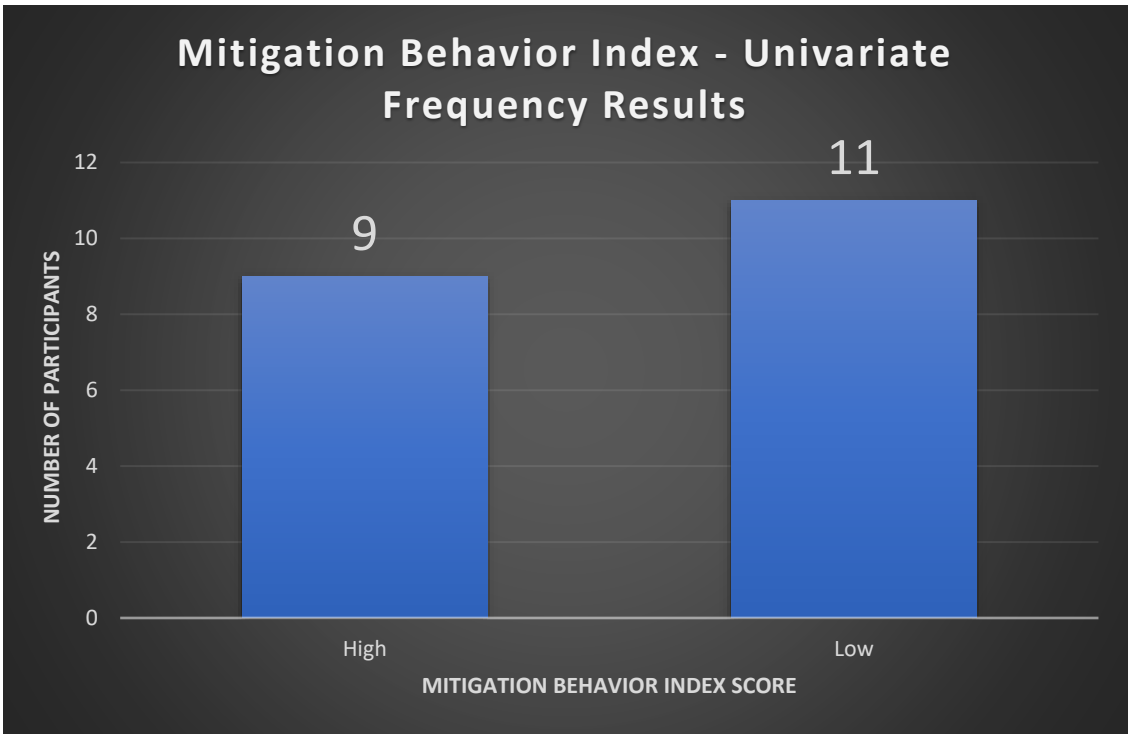


Figure 12 Mitigation Behavior Index Univariate Frequencies.

Most participants exhibited elevated levels of dread with 15 out of 20 scoring high on the Dread Risk Index.

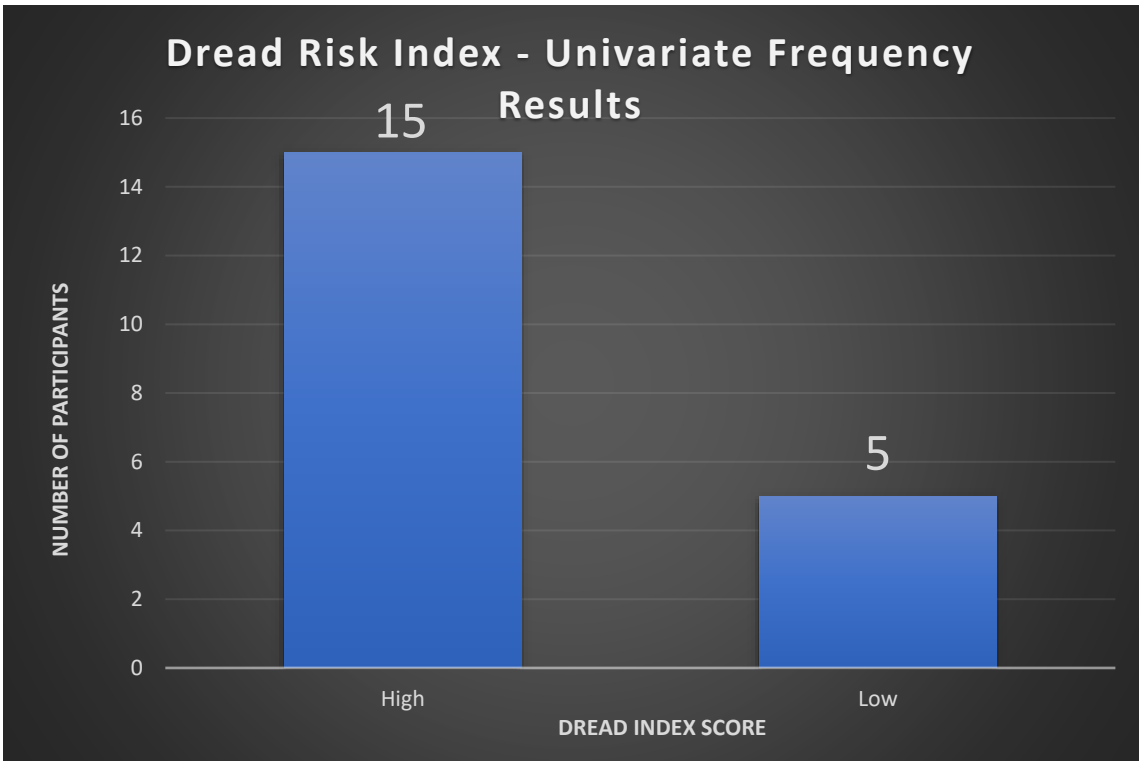


Figure 13 Dread Risk Index Univariate Frequencies.

Bivariate Frequencies

Prior to adding the psychometric paradigm, specifically *Dread* and *Trust in Experts* results to the multivariate analysis, we will set up the expectations of the rational actor paradigm. The Flood Risk Literacy and Flood Risk Comprehension (sometimes referred to as "Numeracy" for lay audience in focus groups) indices will serve as the initial tests for participants either having or lacking complete information regarding flood risk. The RAP anticipates that the majority of participants would pass both the Literacy and Comprehension tests and be more likely to mitigate flood risk, but less likely to purchase a home in high risk scenarios (100-year & 25-year floodplains). As previously discussed, participants had little difficulty answering questions measuring comprehension (75% pass rate), however their ability to recall prior knowledge of flooding and/or flood

risk was less apparent (15% pass rate). This demonstrates the first contradiction of the RAP observed in the survey results.

The second contradiction comes when comparing what a “rational” person *could* do, and what they *should* do versus what respondents decided in the survey. This is demonstrated using the previously mentioned Flood Risk Literacy and Flood Risk Comprehension indices, in addition to indices that operationalize what respondents could do (Risk Mitigation Behavior) and what they should do (Home-Buying Behavior). Based on the assumptions of the RAP, these cross-tabulated indices would be expected to show certain clustering of people based on the level of risk and questions being asked such as the following example in Figure 14.

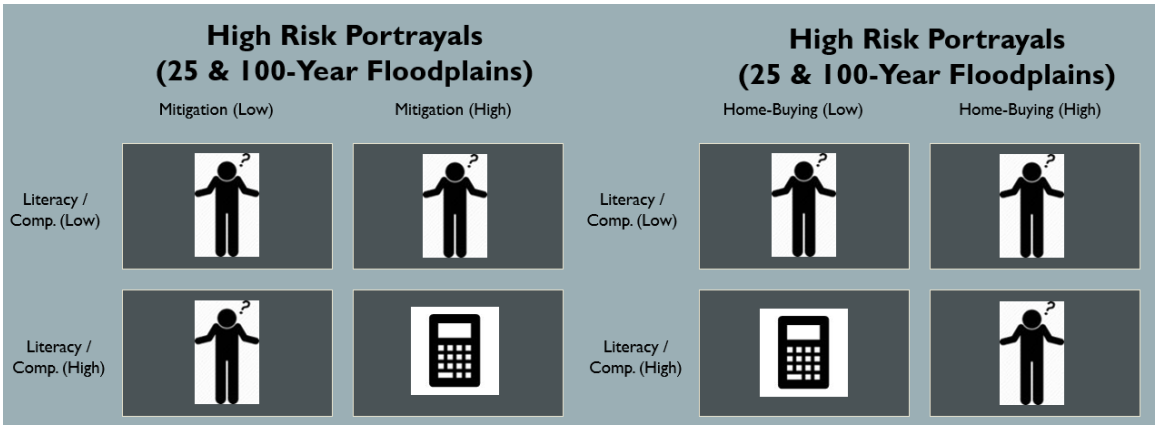


Figure 14 Matrices illustrating how a "rational" actor is expected to respond. Calculator icon indicates expected RAP response. Shrugging man indicates a non-RAP response.

The survey results tell a different story about the “rationality” of the participants. Looking at the 10% of participants that both passed the literacy test and were shown graphics of either the 100-year or 25-year floodplains, only 1 participant fell into the “rational” quadrant of high literacy and high mitigation behavior. Looking at home-buying behaviors, no participants made the “rational” decision, as most were willing to purchase the hypothetical high-risk homes. Switching from literacy to comprehension in

both scenarios demonstrates a different type of inconsistency with the RAP. Both mitigation behaviors and home-buying behaviors had participants that were considered "rational" (6 mitigation and 5 home-buying), however there were almost as many respondents who had high comprehension that made "irrational" decisions (4 mitigation and 5 home-buying). A full illustration of the high-risk cross-tabulations can be seen below in Figure 15.

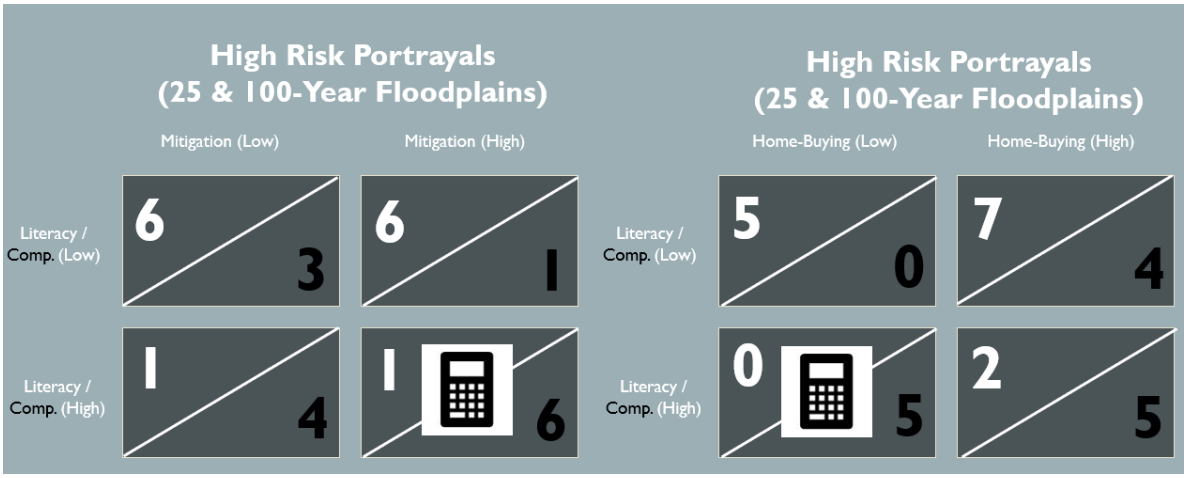


Figure 15 Illustrative cross-tabulation of results showing how participants that were shown high-risk graphics responded in literacy, comprehension, mitigation behaviors, and home-buying behaviors. Literacy frequencies in white & comprehension frequencies in black.

This does not necessarily imply that the RAP is completely unsupported, but rather that there are other factors that influence decision-making under uncertainty for the "rational actor." Analyzing the data in the 500-year floodplain (low-risk graphic), participants who understood the graphics shown were more willing to purchase the home and less willing to mitigate on balance. Of the 6 participants that were shown the 500-year floodplain risk graphic, 5 passed the comprehension test, and 4 of those 5 answered both home-buying and mitigation behavior questions "rationally." A common observation across all flood plain graphics is that most participants were willing to buy the home, suggesting that flood risk had an insignificant impact on their decision.

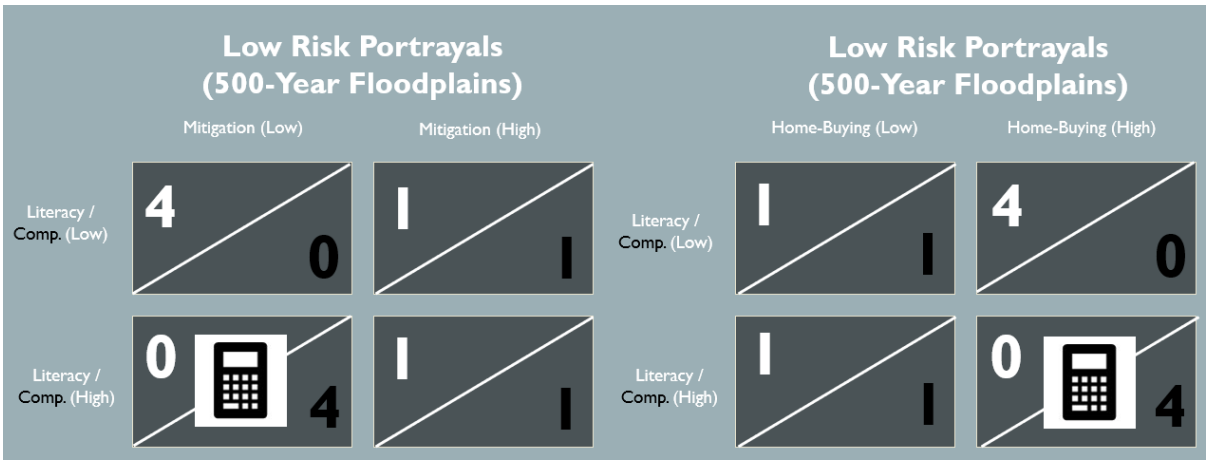


Figure 16 Illustrative cross-tabulation of results showing how participants that were shown low-risk graphics responded in literacy, comprehension, mitigation behaviors, and home-buying behaviors. Literacy frequencies in white & comprehension frequencies in black.

Adding a layer of complexity to these results, we will next focus on how psychometrics, specifically *Dread* and *Trust in Experts* interact with the RAP. First, we found a few interesting correlations between dread and basic socio-economic factors, such as gender and age. While only 5 men participated in the study, 4 out of 5 scored high on the dread risk index contrasted with 11 out of 15 females. Regarding age, all 6 respondents in the 18-34 age category scored high on the dread index while all 3 respondents in the 65 and over age category scored low. Complete results for the dread index by age are shown below in Figure 17.

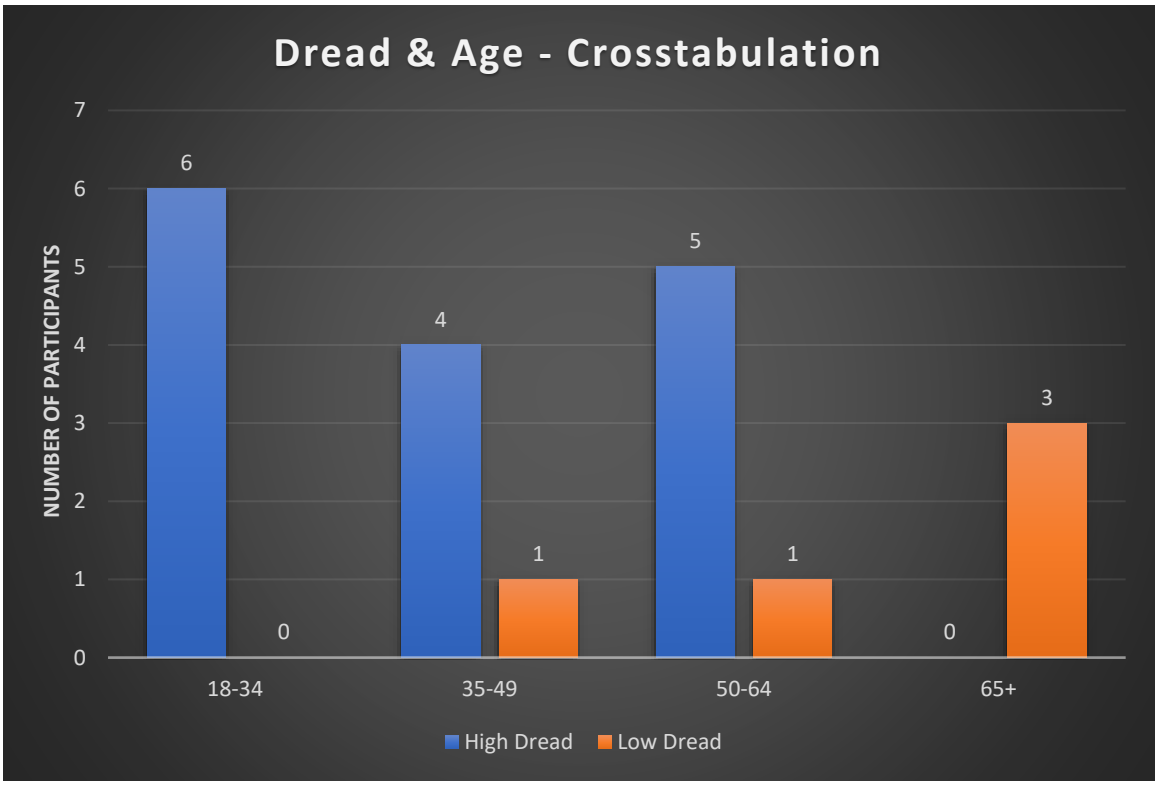


Figure 17 Bar chart showing Dread Index frequency results by age.

Comparing the dread risk index with mitigation behavior and home-buying behavior, the RAP expects to find high dread correlating with high mitigation behavior and low home-buying behavior for high risk graphics (25-year & 100-year floodplains) and low dread correlating with low mitigation behavior and high home-buying behavior for low risk graphics (500-year floodplain). We found moderate clustering for high dread and high mitigation behavior (6 out of 14 participants) in the high risk graphics groups but little significant results between dread and home-buying behavior.

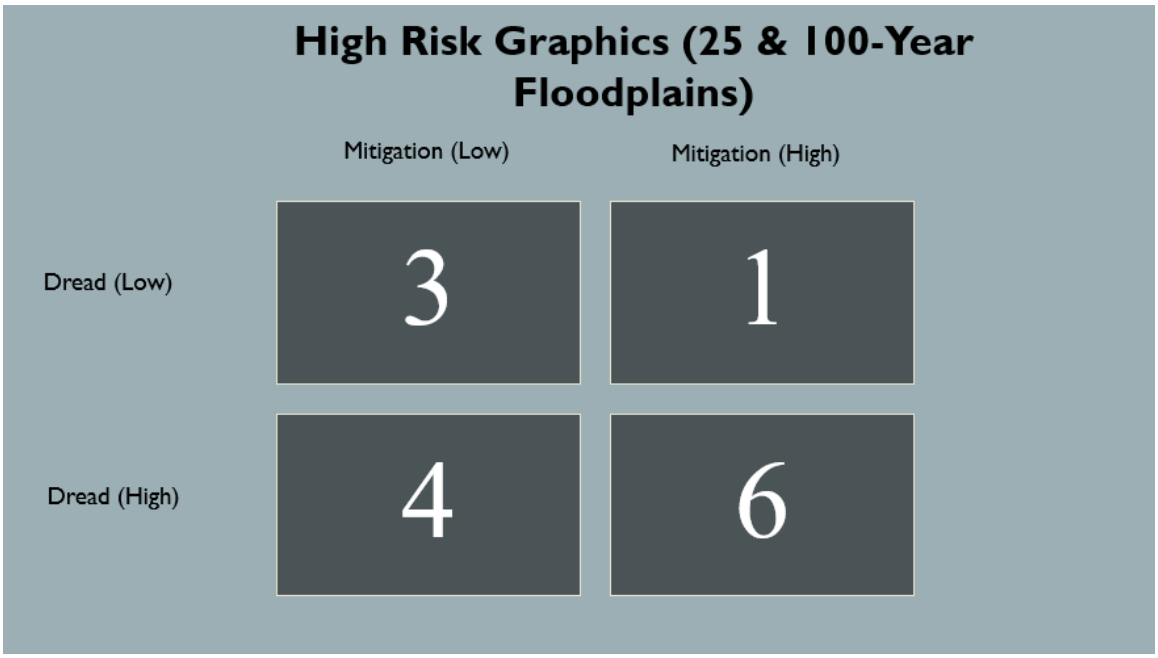


Figure 18 Illustrative cross tabulation results for dread risk & mitigation behavior indices in high risk scenarios.

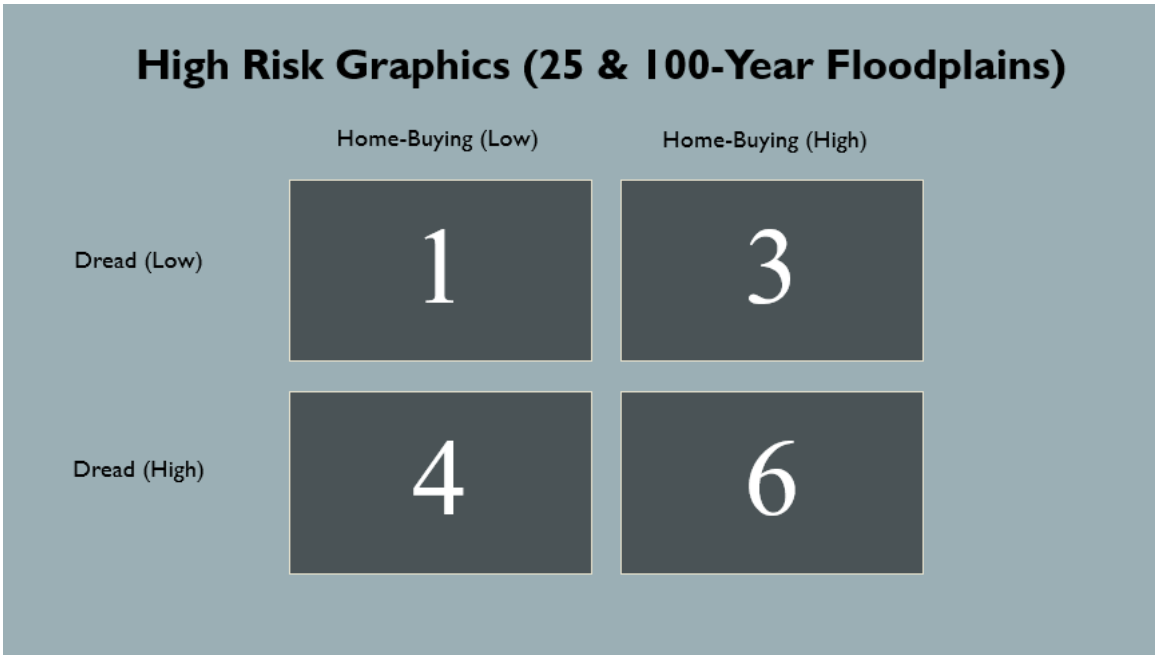


Figure 19 Illustrative cross tabulation results for dread risk & home-buying behavior indices in high risk scenarios.

An interesting finding when analyzing the dread index across all three floodplains is that the level of dread increased as the risk graphic shown became less risky. Expectations were for dread to increase as the risk graphics showed more objective risk. This observation is shown in Figure 20 below. Of important note is that the average age of participants for each group declined as the risk graphics shown became less risky.

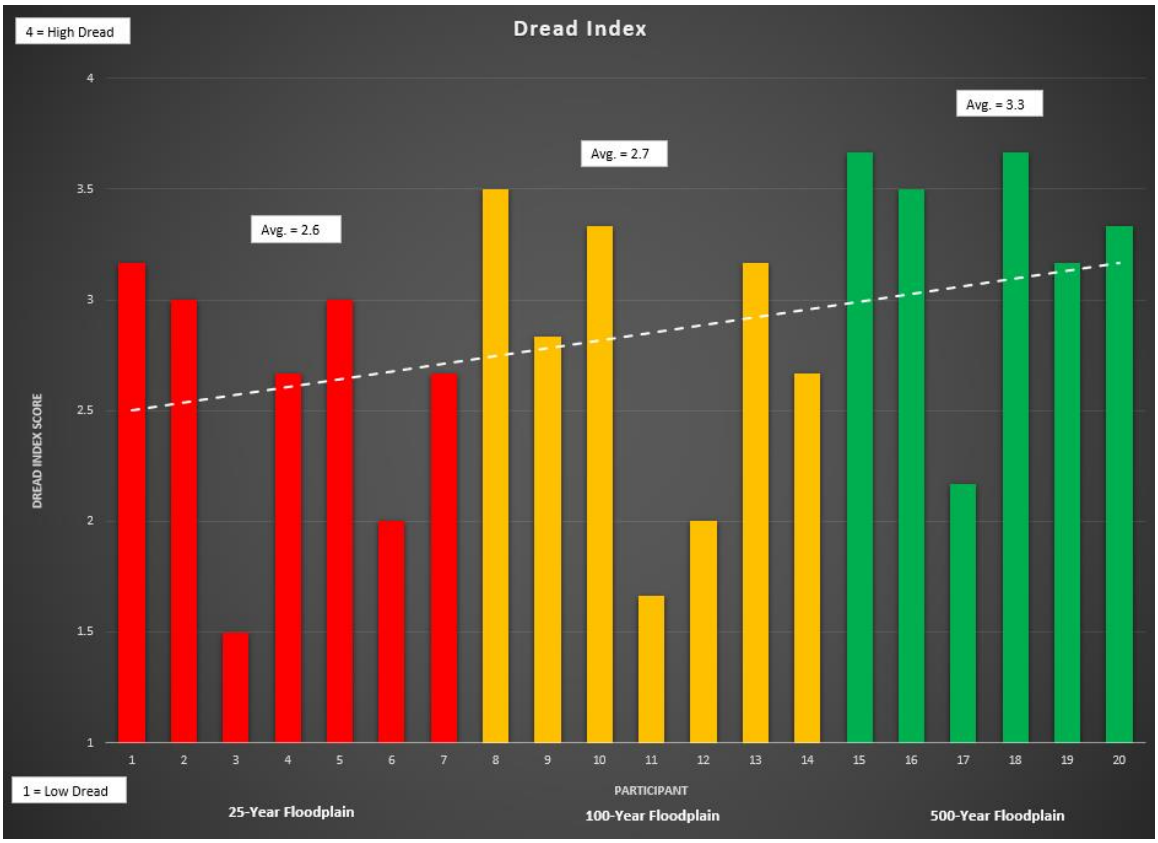


Figure 20 Dread index scores by floodplain graphics group.

Analyzing the set of 6 questions that comprise the dread index individually reveals subtle but potentially important differences with questions 38 and 42 receiving the highest distribution of "agree" or "strongly agree" responses and question 37 receiving the most conflicting results.

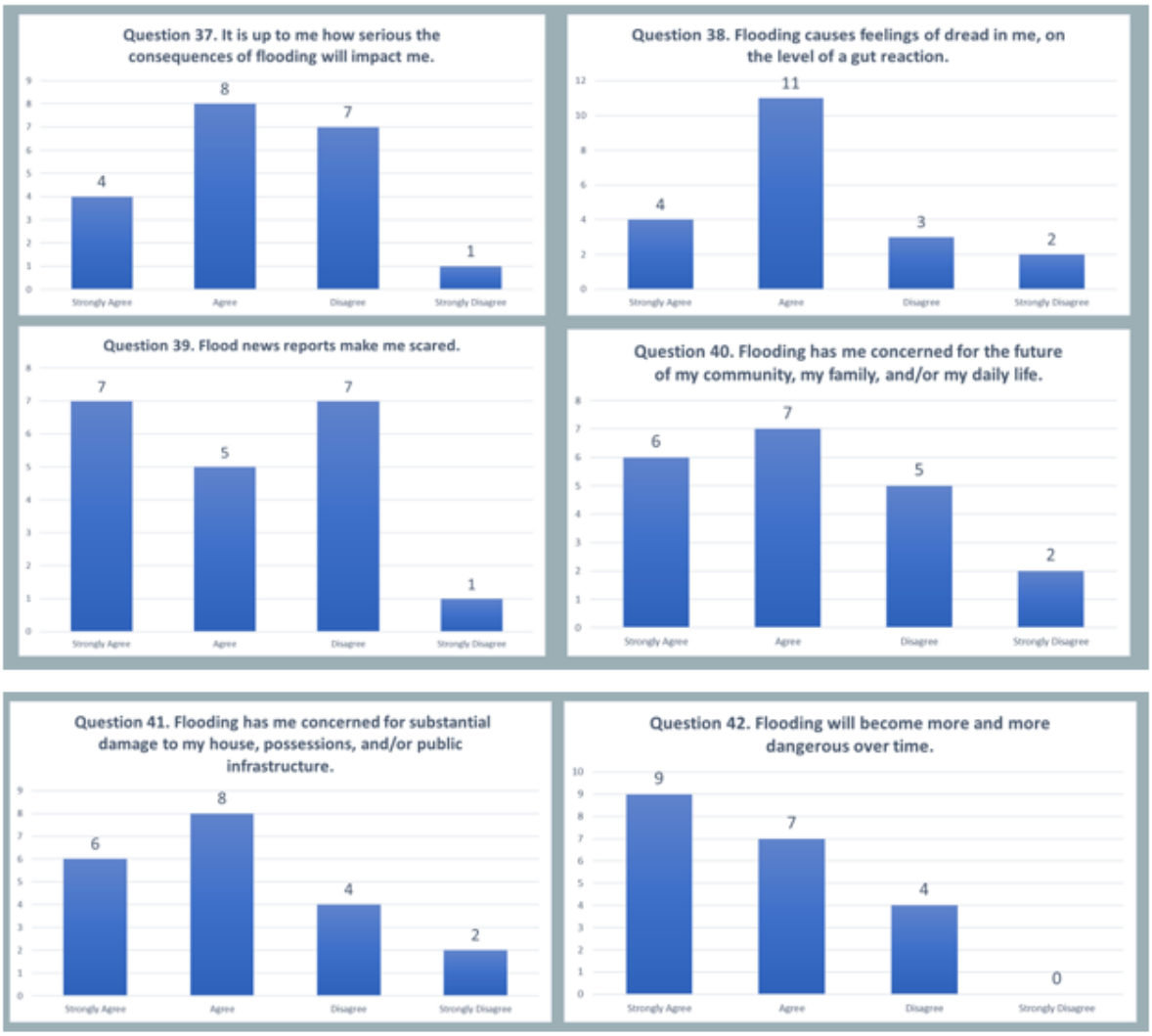


Figure 21 Survey response frequencies for 6 questions that comprise the Dread Index (n = 20).

We also analyzed results by income with a focus on low-to-moderate income which we previously defined as less than $75,000 per year household income. When analyzing Dread by Home-Buying and income, we find noteworthy clustering for those with both high Dread and high Home-Buying in the High Income category (4 out of 5). Conversely, the low income participants were more balanced between high and low Home-Buying with high Dread (6 out of 15 high Dread & High Home-Buying. 5 out of 15 high Dread & low Home-Buying).

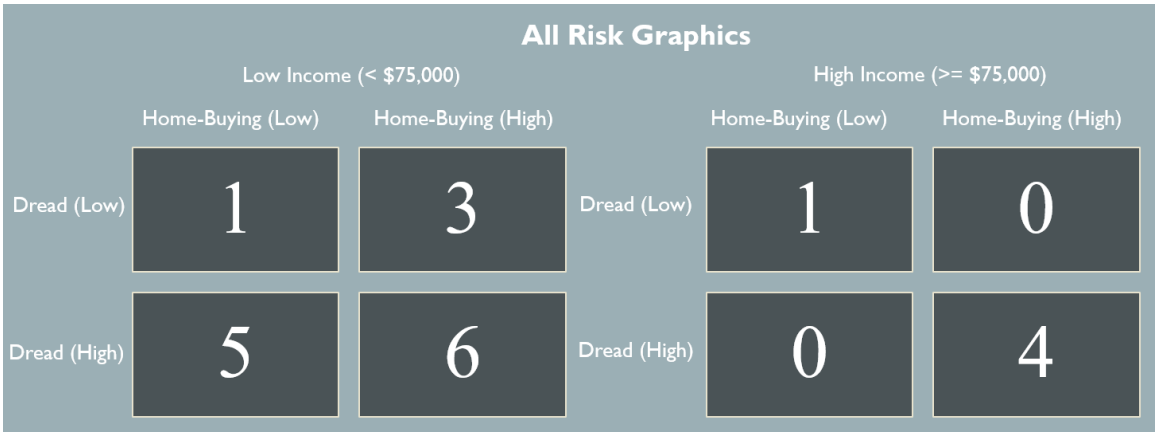


Figure 22 Illustrative cross tabulations for Dread & Home-Buying by Income in all risk scenarios.

We also explored lowering the threshold for Low Income to below $50,000 per year to see how the results were influenced and found an even more noteworthy split shown in below.

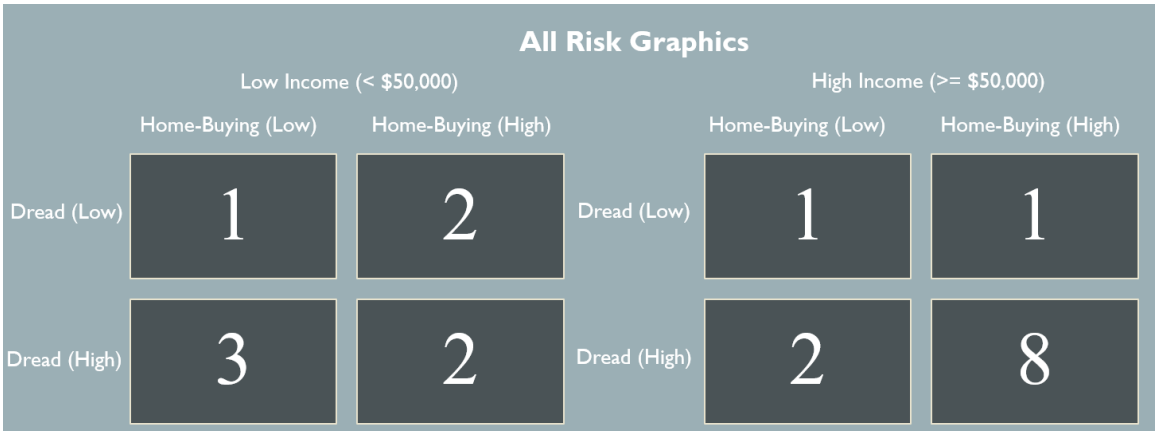


Figure 23 Illustrative cross tabulations for Dread & Home-Buying by Income ($50K Low Income) in all risk scenarios.

The Trust in Experts and Trust in Institutions indices showed mostly RAP-like behavior when cross tabulated with home-buying, resulting in 9 out of 14 participants scoring high for trust in experts and home-buying across the high risk graphics groups. Similarly, although not as strongly correlated, 6 out 14 participants who scored high for trust in institutions also scored high for home-buying.

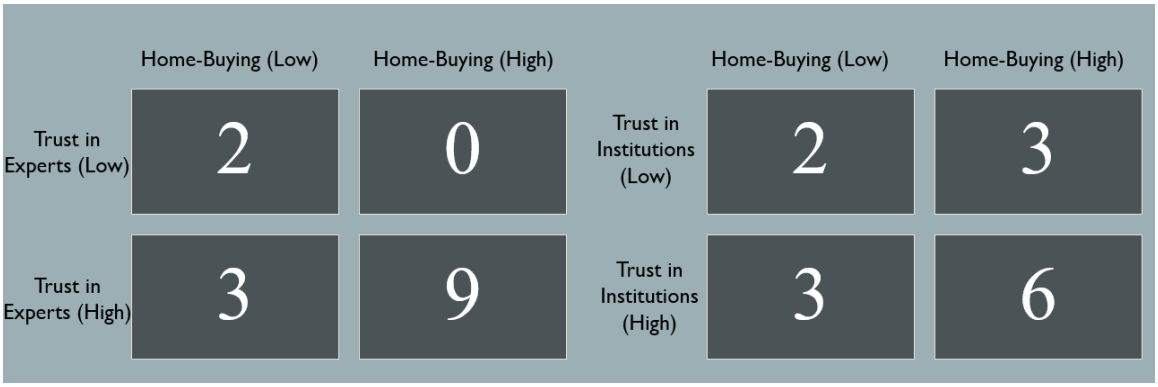


Figure 24 Illustrative cross tabulations for Trust in Experts & Trust in Institutions indices in high risk graphic scenarios.

Focus Group Results

Each focus group was organized through GreatBlue over the Zoom platform and lasted around 90 minutes. Participants were given a few minutes at the beginning of each focus group to prepare their audio and video before being asked for consent to participate. Introductions were led by Dr. Colin Polsky. Participants were then walked through specific survey questions with the purpose of gaining further insight into the content of the questions, their wording, and the participants' reactions. Participants were shown a collection of the survey questions to recall, along with frequencies from the survey results, and the flood risk information graphics relevant to each group. Lastly, questions were asked regarding the content and flow of the survey, as well as whether participants had any general comments about the study overall.

As anticipated, each group tended to have one or two participants that dominated the conversation, a few others that moderately contributed, and a couple that barely spoke or not at all. Some common themes across all three groups include a lack of awareness about moderate and high cost flood mitigation options, difficulty interpreting probabilistic information, emotional reactions to the flood risk graphics, lack of trust or frustration with government efforts to curb flooding, lack of political division amongst those who had previously experienced flooding, feelings of dread amongst those who had experienced severe flooding in the past, the desire to elaborate more on cultural identity questions, applying most scenarios to their lived experiences rather than a proposed hypothetical scenario, financial concerns for those who couldn't afford most mitigation options, lack of flood risk or flood insurance consideration while shopping for a home, and a need for an independent third party source to help the public better understand

flood risk. Many participants mentioned that the Flood Awareness and Flood Comprehension questions were easy to understand and straightforward, however survey results found significantly higher "Pass" rates with the Comprehension index (75%) compared to the Awareness index (15%).

Regarding flood risk mitigation options, one elderly gentleman from New Orleans in the 500-year floodplain group stated, "You can clean storm drains out but not much else you can do…You can only put so many sandbags out." An elderly woman in the same group cited, "The only way you can lower your own flood risk is to not live in a floodplain." These responses suggest that the participants were largely unaware mitigation options such as flood bladders, rain gardens, special fencing, and home elevation or they considered them ineffective or not worth the cost. The response from the elderly woman supports the *certainty effect*, by which "individuals place a considerable value on reducing small probability risk to a probability of zero" (Botzen et al., 2013).

One of the most consistent views in the 25-year floodplain group was the idea that any probabilistic or uncertain outcome had a "50/50 chance" of occurring. One elderly woman commented, "I took it as a 50/50 chance every year. You could flood two or three times in a row and then not again for a few years." Another middle aged woman stated, "You have a 50/50 chance if you're going to flood or not no matter the flood zone." Yet a third person, a different middle aged woman claimed, "I say 50/50 chance because I've lived in Florida since 1998 in two different houses. The one that wasn't in a flood zone experienced a little (almost) flooding. The home I'm in now is in a flood zone and has never experienced flooding." These three statements suggest that this group had difficulty

assessing probabilistic outcomes, even when provided with the objective scientific information in the survey, and support the findings of the Robert William Kates study (1962).

Several instances of emotional reactions to either the flood risk information graphics, specific questions, or the overall survey experience were recorded across all three focus groups. In the 500-year floodplain group, one young woman described how the "graphics were intuitive but the line graph with larger surface area was more effective in being dramatic and showing severity (than the bar chart with probabilities)." This refers to the average annualized loss graphic depicting the cost of flooding over a 30 year period. Although this group was shown the low risk graphic, this woman still felt like the graph was showing something relatively serious. This could suggest that cost of flooding is more impactful than probability of flooding, but that is difficult to determine in this case. Another speculation is that the numbers on the graphics are less impactful than the overall image itself. People tend to look quickly at the graphic and process a certain emotion or feeling on what it implies (System 1) rather than spend extra time to think through what the numbers are trying to convey (System 2) (Kahneman, 2003).

Returning to the elderly man from New Orleans, his final comments shed some light on a few interesting points. He stated that, "This whole thing has dredged up some bad memories for me. I would love to do this again in the future. I have a lot of experience with flooding. We've been chased out of town so many times by hurricanes. You never know when it's going to be your turn again and it causes high anxiety. You don't know who to believe but when it's your turn, RUN!" This man self-identified as a conservative Republican but was sure to point out that hurricanes and flooding do not

care about your political leanings. He exhibited both high dread and low trust in experts but was very open to sharing his thoughts, feelings, and experiences with the group. Another elderly gentleman from the west coast of Florida stated, “I wanted the chances of flooding to be low. I was being more emotional than intellectual by wishing the chances would be lower in the future.” This suggests that he may have been surprised at how high the risk of flooding would be over the next 30 years and had an emotional reaction that caused him some sense of dread or fear, leading to him wishing for a different reality than what he saw on the flood risk graphics. Interestingly, he was aware of his initial reaction and was able to process through it to communicate it to the group. Full details and notes of the focus group can be found in Appendix I.

CHAPTER VI: DISCUSSION

The rational actor paradigm has shown to be a useful, yet incomplete explanation for why people perceive and mitigate flood risk in certain ways. In this study, we analyzed its impact and considered potential alternative explanations such as the psychometric paradigm. We found the RAP useful in helping to explain behavior in some scenarios, but not all. For example, participants shown the low risk graphics (500-year floodplain) were more likely to exhibit "rational" behavior than those shown higher risk graphics (100-year and 25-year floodplains). A key driver of these results may be that most people said they were willing to purchase the hypothetical home regardless of risk level shown. This highlights a concept observed in the focus groups that flood risk is not typically a main concern when people are considering purchasing a home. Other factors tend to dominate the thought process such as features of the physical home, location, and safety of the neighborhood.

Another potential explanation is the difficulty people have with interpreting probabilistic information. While most passed the survey Comprehension test (15 out of 20), the focus groups revealed difficulties with understanding flood risk probabilities. It is important to note that the Comprehension questions primarily measured participants' numeracy, or their ability to read the numbers on the graphs, not necessarily their ability to interpret what those numbers mean for their flood risk. For example, one of the most consistent views in the 25-year floodplain group was the idea that any probabilistic or uncertain outcome had a "50/50 chance" of occurring. One elderly woman commented, "I

took it as a 50/50 chance every year. You could flood two or three times in a row and then not again for a few years." Another middle aged woman stated, "You have a 50/50 chance if you're going to flood or not no matter the flood zone." Statements like these suggest that this group had difficulty assessing probabilistic outcomes, even when provided with the objective scientific information in the survey, and support the findings of the Robert William Kates study (1962). A speculative explanation is that "50/50" is a generic phrase used for any uncertainty. Participants likely do not really mean a 50%/50% chance of flooding, rather they mean that it is not certain to happen every year but that it is possible. These participants may think that nobody really knows the true odds and it can happen anytime. This has significant implications for resilience efforts and communicating increasing flood risk over time as it appears that both a 5% and 95% chance of flooding over 30 years could be interpreted as a 50%/50% chance.

The efficacy of the RAP becomes less apparent when attempting to apply it to the higher risk graphics (100-year and 25-year floodplains). These scenarios showed mixed results with little to no substantial clustering of responses consistent with the RAP when analyzing the Literacy, Comprehension, Mitigation Behavior, and Home-Buying Behavior indices. However, we did find noteworthy clustering for the Trust in Experts and Trust in Institutions indices, with 9 out of 14 respondents scoring high for Trust in Experts and Home-Buying and 6 out of 14 scoring high for Trust in Institutions and Home-Buying. Additionally, none of the participants who scored low for Trust in Experts exhibited high Home-Buying behavior. This offers an alternative explanation to the RAP in that even with elevated risk levels, respondents tended to be more willing to purchase a home in a floodplain if they trust the engineering experts and flood managers to protect it.

Prior literature suggests an opposite effect for Trust in Experts on Mitigation Behavior, as higher trust leads to less mitigation behavior because people tend to substitute the expert actions for their own individual action (Terpstra, 2011). We found little evidence for this with 9 out of the 16 respondents who scored high for Trust in Experts also scoring low for Mitigation Behavior, contrasted with 7 out of 16 scoring high for Mitigation Behavior.

Dread related to flood risk proved to be a strong emotional consideration for most participants (15 out of 20 scored high), even if subsequent Mitigation and Home-Buying behaviors did not strongly adhere to expectations. Question 38, which asks about dread in the most direct way out of the 6 questions in the index (i.e., flooding causes feelings of dread in me, on the level of a gut reaction) had a similar distribution with 15 out of 20 respondents either agreeing or strongly agreeing. Contrary to expectations, we found elevated levels of dread as the risk graphics shown became less risky. One possible psychological explanation is that the numbers on the graphics are less impactful than the overall image itself. People tend to look quickly at the graphic and process a certain emotion or feeling based on what it implies (System 1) rather than spend extra time to think through what the numbers are trying to convey (System 2) (Kahneman, 2003). Some may quickly look at the title “500-year floodplain” and process that to be worse than the 25-year floodplain. This is supported by the young woman in the 500-year floodplain focus group who stated, “the line graph with the larger surface area was more effective in being dramatic and showing severity.” However, analyzing the data using socio-economic information suggests an alternative explanation. The 500-year floodplain group featured the youngest average age and we found noteworthy polarization between

dread and age, with the 18-34 age group exhibiting the highest dread and the 65 and over age group exhibiting the lowest. These results matched expectations as we anticipated finding higher dread scores among younger respondents (Ballew et al., 2020).

We also found a tendency for high income earners ($75,000 annual household income or greater) with high dread to also exhibit high home-buying behavior (4 out of 4), whereas those with annual household incomes below $75,000 and high dread were more evenly split (5 scored low for home-buying and 6 scored high). This brings up potential discrepancies for how much risk one is willing to take on based upon their income levels as the high income earners still felt the fear of flood risk but decided they would purchase the home anyway. A young woman from Louisiana in the 100-year floodplain focus group was particularly concerned about the costs of mitigation and stated, “If people don’t have the money to invest in flood mitigation they can’t do it.” While the results for home-buying behavior crossed with income suggest some influence, we found little differences for mitigation behavior based on income levels.

CHAPTER VII: CONCLUSION

As the presence of flooding becomes increasingly apparent and challenges the resilience of coastal communities with more frequent flood events and intensifying storms, it is important to understand how the public may perceive and respond to these risks. Traditionally, home listings have included an abundance of information regarding neighborhoods, schools, and crime but do not address flood risk, potentially leading homebuyers to unknowingly be putting themselves in vulnerable positions. The industry is slowing changing as groups like First Street Foundation partner with online real estate companies to disclose flood risk, but a gap in awareness remains. Even so, previous studies suggest that simply providing people with objective scientific information may not be enough to significantly impact behavior and decrease the amount of loss suffered from flood events (Treuer et al., 2018).

This mixed methods study evaluated how scientific flood risk information graphics affected participants' flood risk perceptions, mitigation behaviors, and home-buying behaviors under the context of the rational actor paradigm in order to compare it to other modulating factors such as those found within the psychometric paradigm and cultural theory. We administered an online survey and subsequent focus groups to a small sample size of n = 20 participants to quantitatively and qualitatively assess their responses to 67 questions, with the intention of using these results to refine the instruments for a future large sample size study of n = ~1,000 participants.

When analyzing results, it is important to note that there is an absence of objectively defined thresholds from prior literature regarding the rational actor paradigm and psychometrics. In one landmark study, results of 72% / 28% deviated enough from the expected 50% / 50% to characterize the findings as irrational (Tversky & Kahneman, 1981). In the case of dread, explanatory ability in the range of 20 – 40% was sufficient to classify dread as the most influential factor relative to others (Slovic, 1987). This makes it difficult to definitively say one factor worked while another did not. We kept this in mind while attempting to draw conclusions based on our small sample.

Overall, the rational actor paradigm did not perform as well as traditional proponents would have expected. We found results consistent with the RAP in only 19 out of 40 cases combined for mitigation and home-buying behaviors (~48%). In low risk scenarios, 8 out of 12 cases were rational (4 out of 6 for both Mitigation & Home-Buying). In high risk scenarios, 11 out of 28 cases were rational (6 out of 14 for Mitigation & 5 out of 14 for Home-Buying). This leaves a significant proportion of cases (~52%) seeking further explanation. For example, even though a high level of cases (~67%) showed low mitigation behavior with high comprehension in low risk scenarios, survey responses also show ~36% of cases that have high home-buying behavior with high comprehension in high risk scenarios. This overarching finding suggests that (recognizing our small sample size) objective, scientific information is modestly useful in communicating risk to the public, but requires significant additional support if we are to effectively engage with the great majority of homeowners.

In seeking to explain the non-rational responses, we first look to socioeconomic status, which we examine using the income variable. Using a cutoff of $75,000 per year

to classify participants as high or low income, high income households appear more likely (80%) than low income (~37%) to make rational decisions.

Recalling the landmark Slovic (1987) study on the psychometric paradigm, many people behaved irrationally. Dread was determined to be the most influential factor in how people perceived risk and how they would like to see it mitigated. In our study, we found high dread scores for most participants (75%), with 8 out of 20 deviations from RAP appearing to be explained by dread (~40%). This is consistent with the findings of Fischhoff et al. (1978), suggesting that dread is a useful explanatory factor, although not an overwhelming silver bullet. When crediting dread with explanatory influence, we only look at non-rational cases that may be explained by dread, which merits further study. In high risk scenarios, 7 out of 14 cases were rational regarding mitigation, with 6 out of those 7 having high dread. Of the 7 non-rational cases, 3 may help to be explained by dread. Here it is important to point out that we give credit to the RAP for 6 cases where high dread correlates to rational behavior. Regarding home-buying in low risk scenarios, 4 out of 6 cases were rational, with all 4 having high dread. In high risk scenarios, 5 out of 14 responses were rational regarding home-buying, with 4 out of those 5 having high dread. Of the 9 non-rational cases, 3 can help to be explained by dread.

In over a third of cases (~36%), we observed apparently contradictory results such as participants scoring high for both dread and willingness to purchase a home in high risk scenarios (~43%) but scoring low for mitigation behavior under the same conditions (~29%), highlighting the complexity of decision making under uncertainty. Interestingly, the same 6 respondents who scored high for dread and home-buying within high risk

scenarios also scored high for trust in experts, but a total of 9 respondents scored high for trust in this category, suggesting that dread may not be as relevant as trust in experts.

Trust in flood experts appears to help explain our results as a high score overrode rationality, particularly in high risk scenarios. Overall, 16 out of 20 participants scored high for trust in experts. A total of 17 out of 20 deviations from RAP can help to be explained by trust in flood experts (~85%). In high risk scenarios, 7 out of 14 responses were rational regarding mitigation, with 6 out of those 7 having high trust in experts. Here, trust in flood experts appears to explain the non-rational responses with high trust in experts correlating to low mitigation behavior for 6 out of 7 responses (Terpstra, 2011). Regarding home-buying in high risk scenarios, a minority (5 out of 14) of the sample is rational. Again, trust in flood experts appears to explain the non-rational responses, as all 9 out of 9 cases had high trust in experts and high home-buying even with the high risk. Overall, trust in flood experts appears to override rationality.

Income level appears to help further explain these results as those from households earning over $75,000 per year were more likely to have high trust in experts with low mitigation (3 out of 5) and high trust in flood experts with high home-buying (3 out of 5). Another possible explanation is that higher income levels lead to a higher willingness to purchase a home regardless of dread level as 4 out of 5 high income earners with high dread also had high home-buying. Interestingly, income appears to have the opposite effect for mitigation behaviors with higher income leading to lower mitigation. Overall, the level of risk shown in the floodplain graphics had little impact on results, though focus group responses indicate that the AAL graphics showing damages in terms of dollars were perceived as more severe than the cumulative risk graphics

showing flood probability as a percentage over 30 years, drawing on the difficulty many have with probabilistic thinking (Slovic et al., 1974).

Future flood risk communication should incorporate dread and trust in experts into messaging considerations as rationality alone is insufficient. Additional studies into flood risk perceptions and behaviors would benefit from a larger sample size to expand the scope of this project and be able to find statistical significance within survey responses. Reevaluating the questions that make up the Literacy and Comprehension indices is recommended in order to improve upon their Cronbach's Alpha scores, particularly Literacy. While the questions were carefully selected and scrutinized, the formats were variable in nature which makes achieving a high Cronbach's Alpha difficult. While somewhat expected, the high failure rate (17 out of 20 failed) warrants further investigation. A preliminary exploration of Principle Component Analysis (PCA) in SPSS suggests that there may be three different concepts (multi-dimensional) being measured by the Literacy index, which would be better served by breaking out the 6 questions into 3 different groups of questions. Additionally, questions where focus group participants expressed consistent confusion could be evaluated for rewording or removal, such as question 37 in the Dread index, "It is up to me how serious the consequences of flooding will impact me". The focus group prompt would benefit from more emphasis that the risk scenarios shown in the survey are hypothetical scenarios designed to have participants respond as if they lived in a floodplain like the one shown or were considering purchasing a home in the floodplain shown, as most applied the questions to their own previous experiences by default.

Applying the concept of three different flood risk scenarios using scientific graphics could be expanded upon in future studies by introducing new stimuli such as videos or tweets from local experts, interactive maps from groups such as First Street Foundation, and/or varying messages from different personas that may better align with a participant's identity in order to measure how the type of scientific communication utilized impacts responses under the settings of the rational actor paradigm, psychometric paradigm, and cultural theory.

APPENDICES

Appendix A: Full Survey – 25 Year Floodplain Version

NAS-Gulf T4 Prototype Stimulus Survey - 25-Year Floodplain

Start of Block: Intro

Thank you for participating in our research study! Flooding is the costliest natural disaster in the United States. This survey studies perceptions of, and responses to, flood risk hazards, which include tidal flooding, heavy precipitation flooding, and storm surge. The goals are to: (1) examine how flood risk information, emotions, and cultural identity affect individual flood risk perceptions and mitigation behaviors, and (2) discuss the implications for public and private community resilience initiatives. We define flooding as a temporary overflow of water onto land that is normally dry. Floods present a variety of challenges. Some floods make driving or playing in your yard difficult. Other floods damage homes and personal belongings such as cars. In severe cases floods can even lead to injury or death. The survey presents some quick multiple choice questions that should require only about 25 minutes to complete.

The survey is structured as follows: I. Flood Awareness
II. Flood Risk
III. Flood Cost
IV. Opinions About Flooding & Flood Management
V. Our Way of Life
VI. Demographics

Thank you again for your participation in our research study!

*This project involves several research institutions as part of the National Academy of Sciences Gulf Research Program.

End of Block: Intro

Start of Block: Consent Form

TITLE: How do flood risk information and cultural identity affect flood risk perceptions and flood risk mitigation behaviors? Investigator(s): Dr. Colin Polsky, Ryan Amato, Glen Oglesby Thank you for your interest in participating in our research study. This project is part of the collective work of several research facilities across the contiguous United States as part of the National Academy of Sciences Gulf Research Program research project. This survey asks for information about perceptions of, and responses to, flood risk hazards, which include tidal flooding, heavy precipitation flooding and storm surge. The goals are to: (1) assess how homeowners perceive flood risk, (2) determine how flood risk information and cultural identity affect individual flood risk perceptions and mitigation behaviors, and (3) discuss the implications for community resilience. The survey takes most people about 20-30 minutes to complete. Your participation in this study is your choice. You may skip any questions that make you feel uncomfortable and you are free to withdraw from the study at any time. All answers to this survey are strictly confidential. Your name will not appear anywhere in the data that we keep—your survey responses will be identified by number only. All data will be accessible only to the project team, including any downloaded from the third-party firm's encrypted cloud platform, such as digital copies of surveys, and will be stored in electronic form on the project leader's (Dr. Colin Polsky) or co-leader's (Professor William O'Dell) password protected computers and restricted network drive or university-restricted research computing cloud. Any printed data will be secured in a locked file cabinet to which only the PI and research coordinators have access. Data with no identifying information may be shared with other researchers or used for future research. To protect your confidentiality and privacy, we will remove any information that could identify you before these files are shared. The subject matter of this study includes common and innocuous topics related to flood risk perceptions and flood risk mitigation behaviors. Participation in this study presents minimal risks to you, no more than one would expect in everyday life. These topics have been the subject of numerous recent newspaper articles, radio programs and public meetings in the study areas, and are very familiar to residents. No deception or discomfort is involved. We foresee no substantive risks associated with participation. By taking a few minutes of your time, you will be adding greatly to our understanding of mitigating flood risk and potentially enhancing local management flood mitigation efforts and communication. You may not initially benefit from this study, but your participation may be useful to your community's overall understanding of flood risk mitigation. Results from this study have the potential to transform understanding about which flood mitigation efforts make areas more resilient, which could potentially enhance local management efforts. We cannot speak to all homeowners or prospective homeowner's in the Gulf Coast region, so your answers will represent the opinions of many other residents in your area. Participants who complete both the survey and the focus group will be compensated with a $75 e-gift card. The compensation is provided only to those participants who complete both the survey and participate in the entirety of the focus group. Withdrawal from the study prior to completion of the survey and completion of the focus group will result in forfeiting compensation. The compensation will be sent within 24-48 hours upon completion of the focus group to the participant's email address by the research marketing vendor. This study has been approved by the Florida Atlantic University Institutional Review Board. If you have questions about the study, you should email the principal investigator, Dr. Colin Polsky (cpolsky@fau.edu). If you have questions or concerns about your rights as a research

participant, contact the Florida Atlantic University Division of Research, Research Integrity Office at (561) 297-1383 or send an email to researchintegrity@fau.edu. To continue with the survey, you are confirming that you are at least 18 years old, you currently reside within a county near the Gulf of Mexico, and you freely consent to participate.

- ○ I consent
- ○ I do not consent

End of Block: Consent Form

Start of Block: Section 1: Flood Awareness (Q1 - Q12)

Section 1: Flood Awareness

Q1. True or false? Adding impervious surfaces like streets or sidewalks makes a neighborhood more prone to flooding.

- ○ True
- ○ False
- ○ Unsure

Q2. At what depth will flood water begin to float most vehicles?

- ○ About 1 inch
- ○ About 6 inches
- ○ About 1-2 feet
- ○ More than 2 feet
- ○ Unsure

Q3. True or false? An area with sand-like soil is more likely to flood than an area with clay-like soil.

- ○ True
- ○ False
- ○ Unsure

Q4. **Select all of the following that are true.** I can help reduce the flood risk of my community and my home by:

- [ ] Removing debris from storm drains
- [ ] Planting a rain garden
- [ ] Paving over my front yard with concrete
- [ ] None of the above
- [ ] Unsure

Q5. Of the choices below, what is the biggest cause of coastal flooding?

- ○ Storm surge
- ○ Clogged gutters
- ○ Algal blooms
- ○ Plumbing issues
- ○ Unsure

Q6. True or False? Flood impacts can be limited by installing special fencing to block the water from entering the home.

- ○ True
- ○ False
- ○ Unsure

Q7. When did you last experience a flood?

- ○ This past year
- ○ 1 to 2 years ago
- ○ 3 to 5 years ago
- ○ 6 to 10 years ago
- ○ More than 10 years ago
- ○ I have never experienced a flood

Q8. Have you ever experienced the following as a result of flooding? (**Select all that apply**)

- [ ] Temporarily evacuated during an event (e.g., stayed at a shelter, hotel, or with a friend)
- [ ] Been displaced for a short period of time (1-2 weeks)
- [ ] Been displaced for a longer period of time (longer than 2 weeks)
- [ ] Lost your home and rebuilt it
- [ ] Lost your home and relocated
- [ ] I have never experienced a flood

X→

Q9. When you imagine a flood, what would be the worst thing for you?

- ○ Casualties, deaths
- ○ Fear, shock, uncertainty
- ○ Evacuation
- ○ Material loss (house, landscape, possessions, etc.)
- ○ Effort for cleaning up
- ○ Flooding does not concern me

How strongly do you agree or disagree with the following statements?

	Strongly Agree	Agree	Disagree	Strongly Disagree
Q10. I already seek information about being prepared for flooding.	○	○	○	○
Q11. I intend to be better prepared for future flooding.	○	○	○	○

Next, we would like to know more about your home buying decisions.

Q12. Please rank the following home purchasing / renting factors in order of how important they would be if you were in the market to purchase / rent a home today.

Rank order your top five with 1 being the most important and 5 being the least.

_____ Location (Distance to work, shopping, restaurants, entertainment, etc.)
_____ Neighborhood (Low crime rates, quality of public schools, etc.)
_____ Risk level (Flood, hurricane, wind, etc.)
_____ Size (Number of bedrooms, bathrooms, square footage, etc.)
_____ Amenities (Garage, premium interior, pool, etc.)
_____ Other (please specify)

End of Block: Section 1: Flood Awareness (Q1 - Q12)

Start of Block: Cumulative Risk Stimuli Intro

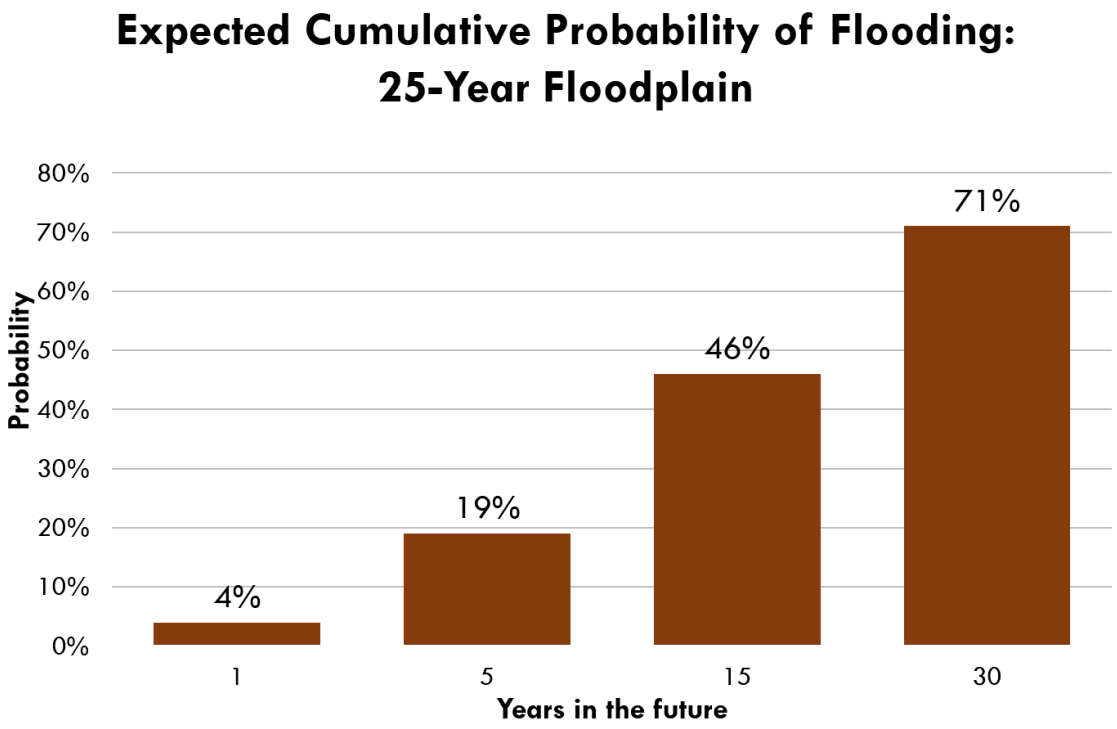
Section 2: Flood Risk

Now we will ask you about flood risks for a hypothetical home. We will start by looking at the home's **chance** of flooding over the next 30 years.

Recall that we define flooding as a temporary overflow of water onto land that is normally dry. Some floods make driving or playing in your yard difficult. Other floods damage homes and personal belongings such as cars. In severe cases floods can even lead to injury or death.

End of Block: Cumulative Risk Stimuli Intro

Start of Block: Cumulative Risk Stimuli (Q13)

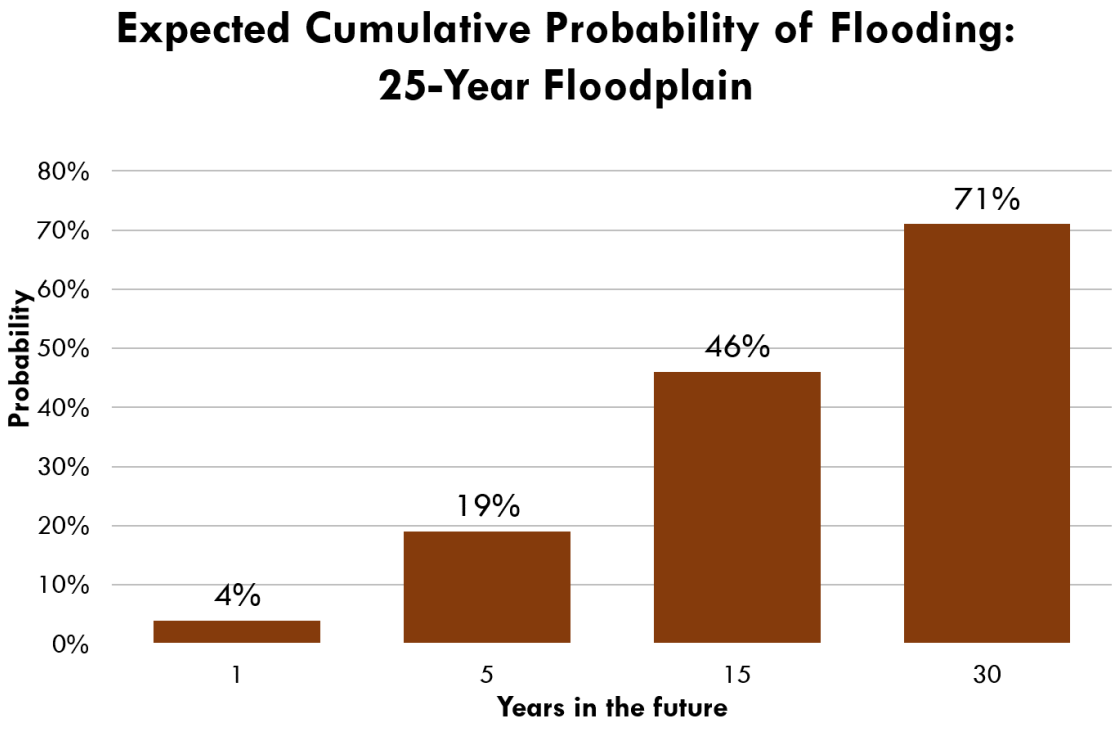


Q13. Assuming your home is in this floodplain, what is the chance of the home flooding over the next 15 years?

- ○ 71%
- ○ 46%
- ○ 19%
- ○ 4%
- ○ Unsure

End of Block: Cumulative Risk Stimuli (Q13)

Start of Block: Cumulative Risk Stimuli (Q14)

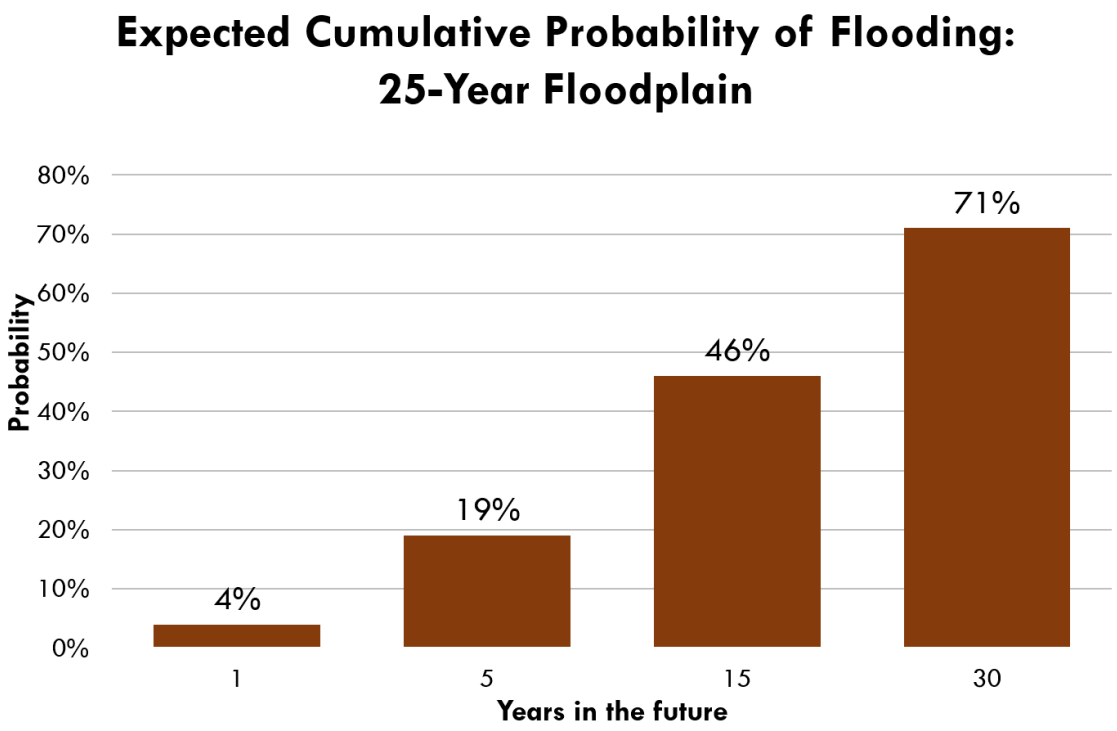


Q14. Assuming your home is in this floodplain, what is the chance of the home flooding next year?

- ○ 71%
- ○ 46%
- ○ 19%
- ○ 4%
- ○ Unsure

End of Block: Cumulative Risk Stimuli (Q14)

Start of Block: Cumulative Risk Stimuli (Q15)

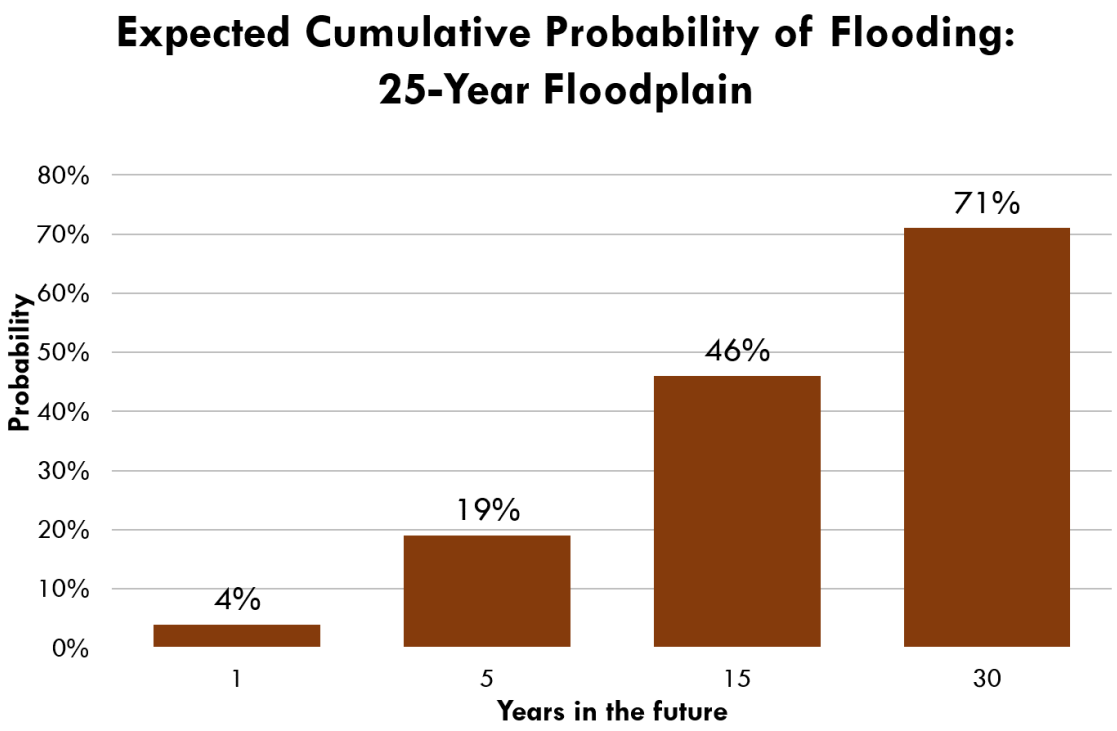


Q15. What does this graphic show about the chance of flooding?

- This home's cumulative chance of flooding increases over time.
- This home's cumulative chance of flooding does not change over time.
- This home's cumulative chance of flooding decreases over time.
- Unsure

End of Block: Cumulative Risk Stimuli (Q15)

Start of Block: Cumulative Risk Stimuli (Q16)



Q16. Assuming that this home meets all of your other needs and preferences (cost, size, etc.), how strongly do you agree or disagree with the following statement?: I would buy a home located in the kind of floodplain represented in the chart above.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

End of Block: Cumulative Risk Stimuli (Q16)

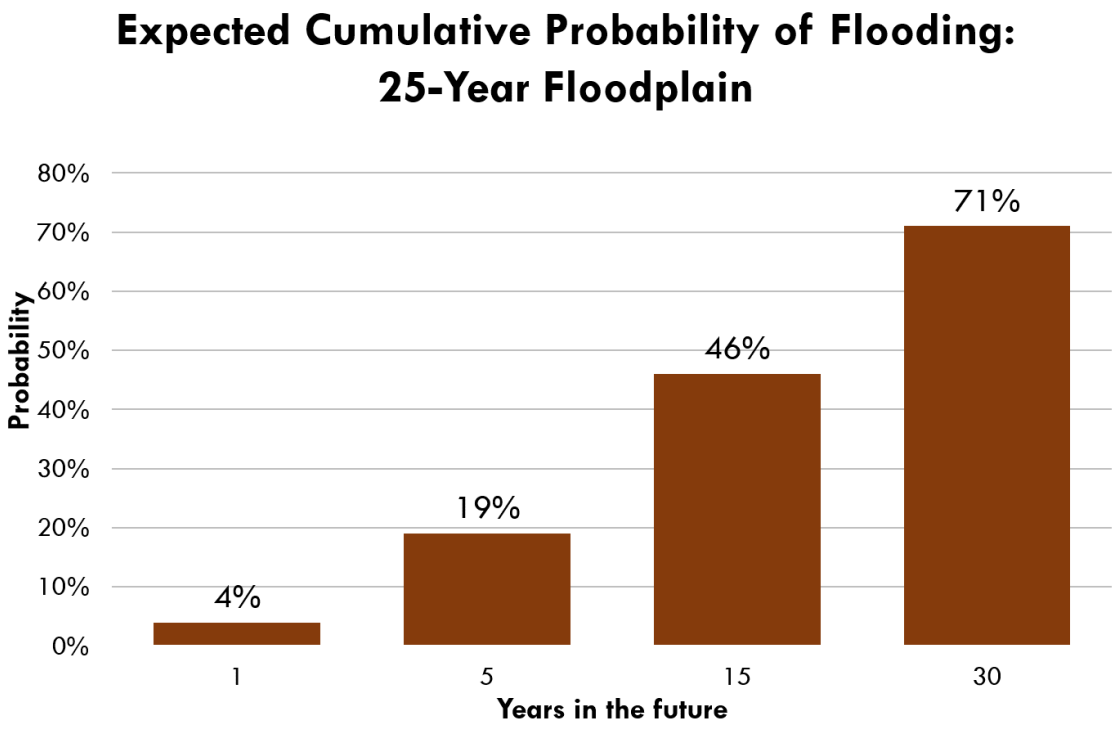
Start of Block: Cumulative Risk Stimuli (Q17)

Q17. From 1% to 100%, what cumulative chance of flooding over 30 years (the typical lifetime of a mortgage) would be too high for you to purchase a home?

- ○ Specify your percentage below. Type your answer as a number (For example, use 63 for 63%) _____
- ○ The chance of flooding does not matter in my decision

End of Block: Cumulative Risk Stimuli (Q17)

Start of Block: Cumulative Risk Stimuli (Q18)



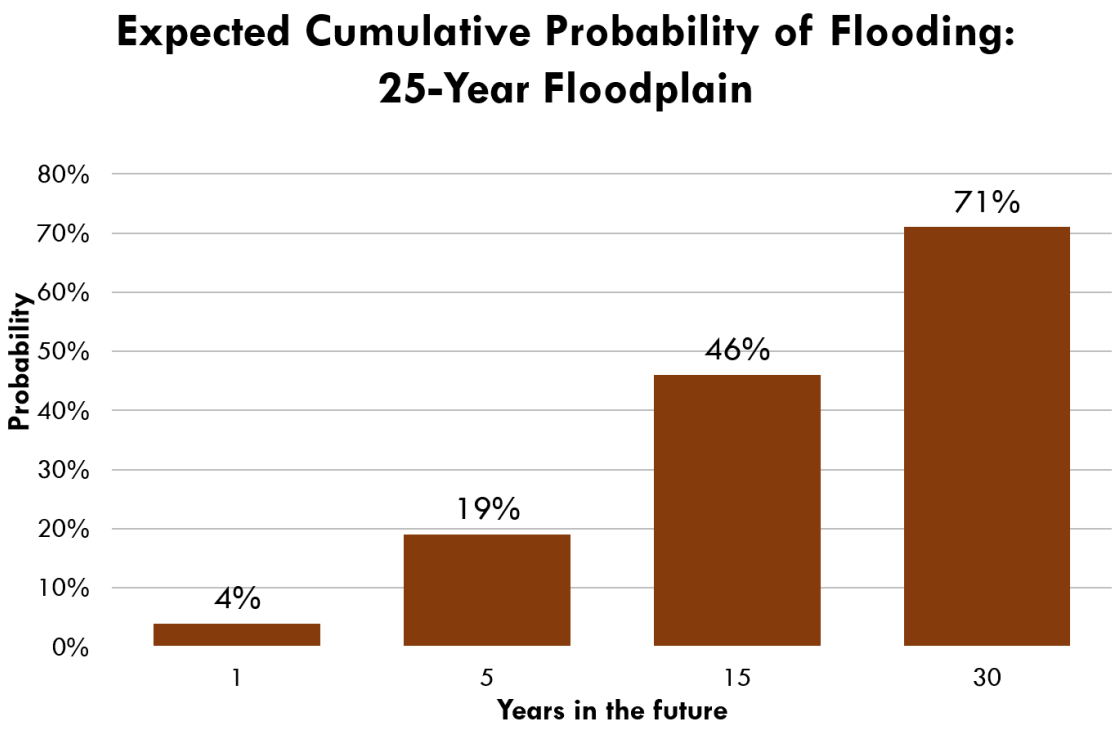
Assume you currently own a home located in the kind of floodplain represented in the chart above. Please answer as if this home was your own.

Q18. Looking at this graphic, how much do you think that flooding will impact you personally?

- ○ Not at all
- ○ Only a little
- ○ A moderate amount
- ○ A great deal

End of Block: Cumulative Risk Stimuli (Q18)

Start of Block: Cumulative Risk Stimuli (Q19-Q23)

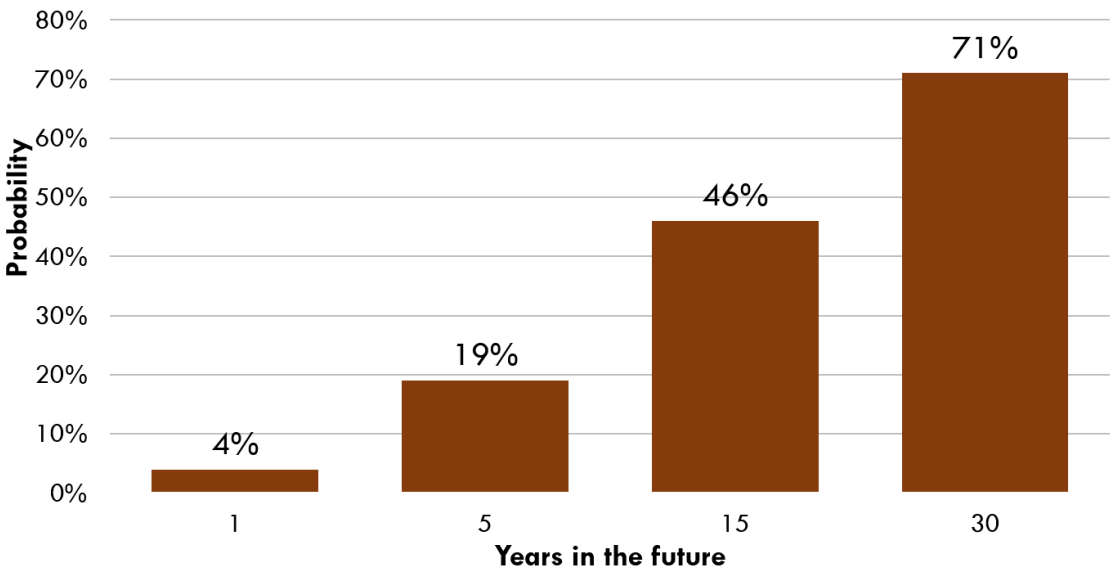


Assume you currently own a home located in the kind of floodplain represented in the chart above. Please answer as if this home was your own. How likely are you to do the following?

	Not at all	Only a little	A moderate amount	A great deal
Q19. Pay to elevate your home to reduce flood damages.	○	○	○	○
Q20. Sell and move out if flood insurance was not available for this home.	○	○	○	○
Q21. Purchase flood insurance even if it becomes less affordable over time.	○	○	○	○
Q22. Install sandbags every time a flood advisory is issued for this home.	○	○	○	○
Q23. Pay to maintain and upgrade a seawall for this home.	○	○	○	○

End of Block: Cumulative Risk Stimuli (Q19-Q23)

Start of Block: Cumulative Risk Stimuli (Q24)



Assume you currently own a home located in the kind of floodplain represented in the chart above. Please answer as if this home was your own.

Q24. Consider the following scenarios over the life of a 30-year mortgage for this home. Which of the following are you most likely to do to reduce your own flood risk? (choose one)

- ○ Do nothing; spend $0 and accept the expected impacts from the 71% chance of flooding
- ○ Invest in low-cost flood mitigation; spend $500 on sandbags, a rain garden, and/or inflatable bladders to slightly reduce the expected impacts from the 71% chance of flooding
- ○ Invest in medium-cost flood mitigation; spend $5,000 on a flood wall around my home to moderately reduce the expected impacts from the 71% chance of flooding
- ○ Invest in high-cost flood mitigation; spend $20,000 on elevating my home to greatly reduce the expected impacts from the 71% chance of flooding

End of Block: Cumulative Risk Stimuli (Q24)

Start of Block: AAL Risk Stimuli Into

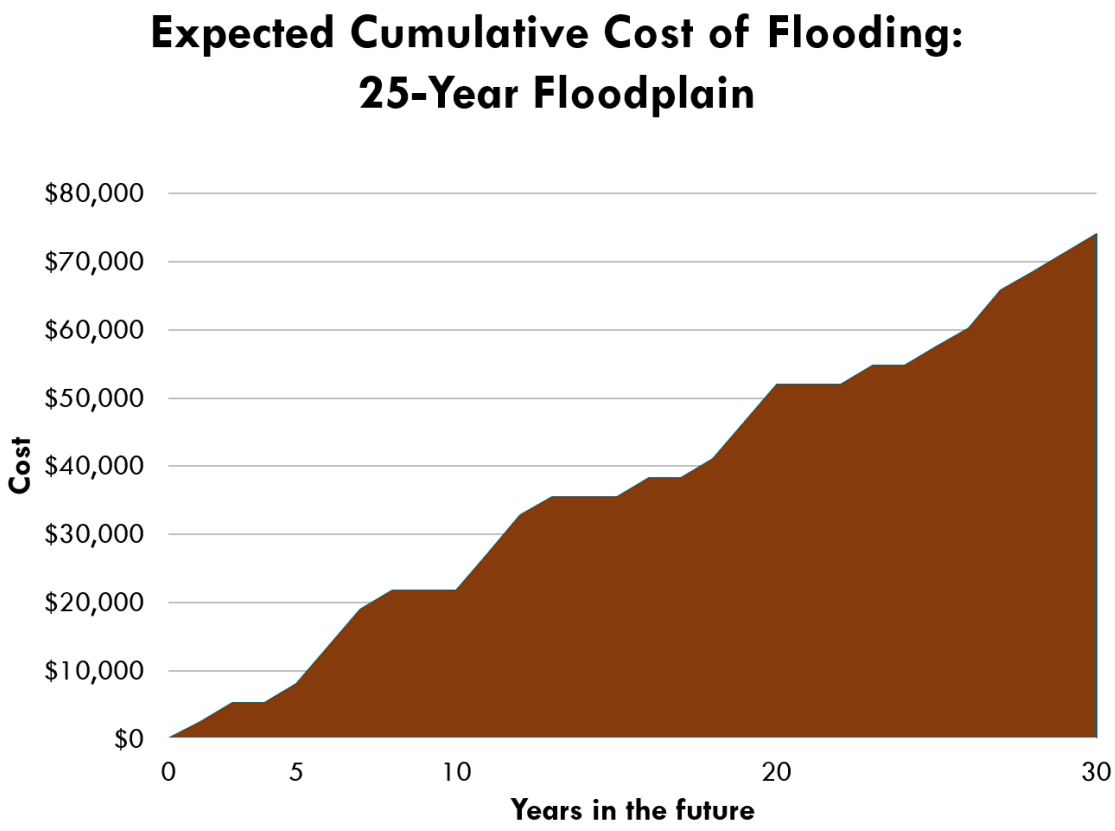
Section 3: Flood Cost

Now we are going to be looking at the **cost** of flooding for a hypothetical home over the next 30 years.

Recall that we define flooding as a temporary overflow of water onto land that is normally dry. Some floods make driving or playing in your yard difficult. Other floods damage homes and personal belongings such as cars. In severe cases floods can even lead to injury or death.

End of Block: AAL Risk Stimuli Into

Start of Block: AAL Risk Stimuli (Q25)

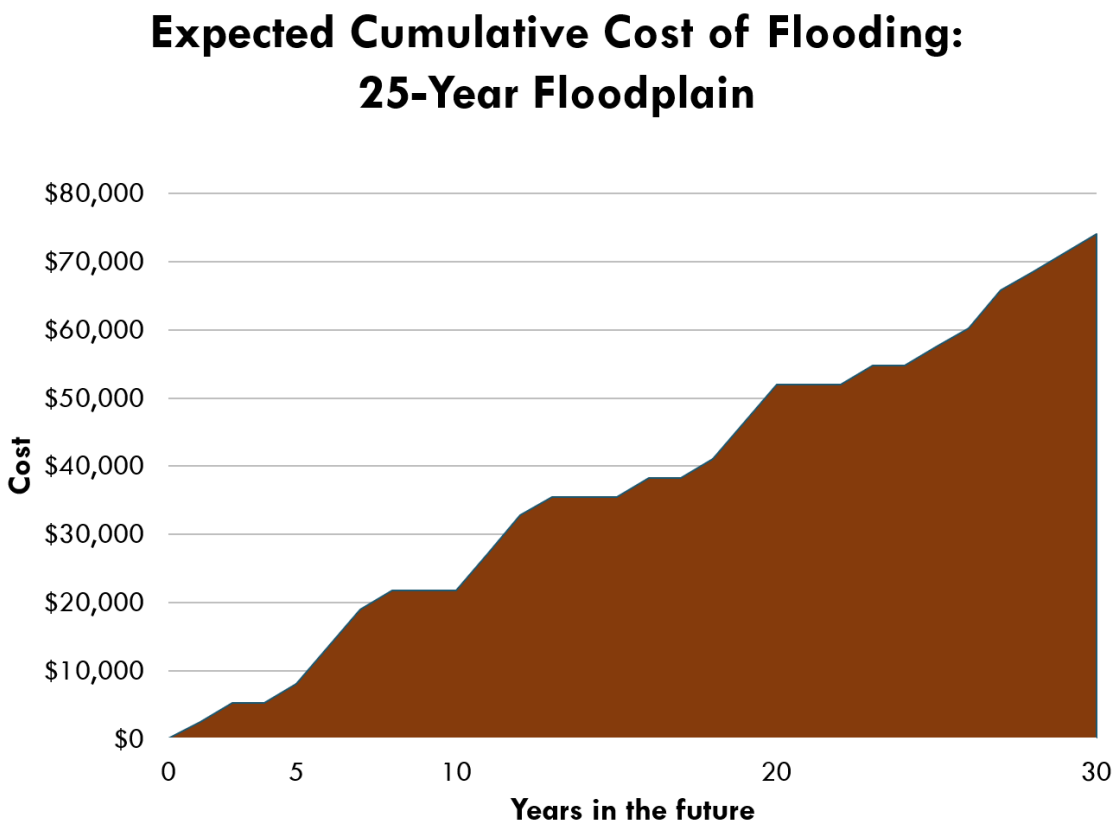


Q25. Assuming your home is in this floodplain, what is the expected total cost of flooding over the next 30 years?

- About $75,000
- About $20,000
- About $4,000
- Unsure

End of Block: AAL Risk Stimuli (Q25)

Start of Block: AAL Risk Stimuli (Q26)

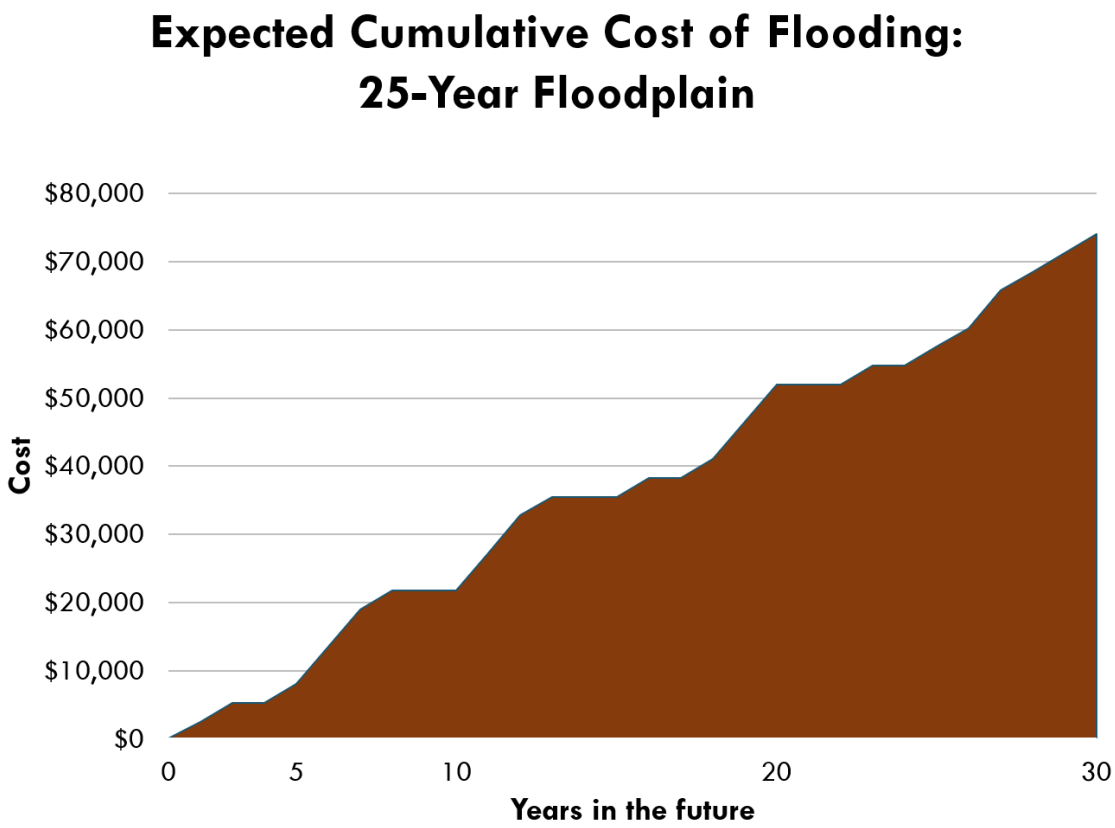


Q26. Assuming your home is in this floodplain, what is the expected cost of flooding for this particular home next year?

- ○ About $2,500
- ○ About $10,000
- ○ About $50,000
- ○ Unsure

End of Block: AAL Risk Stimuli (Q26)

Start of Block: AAL Risk Stimuli (Q27)

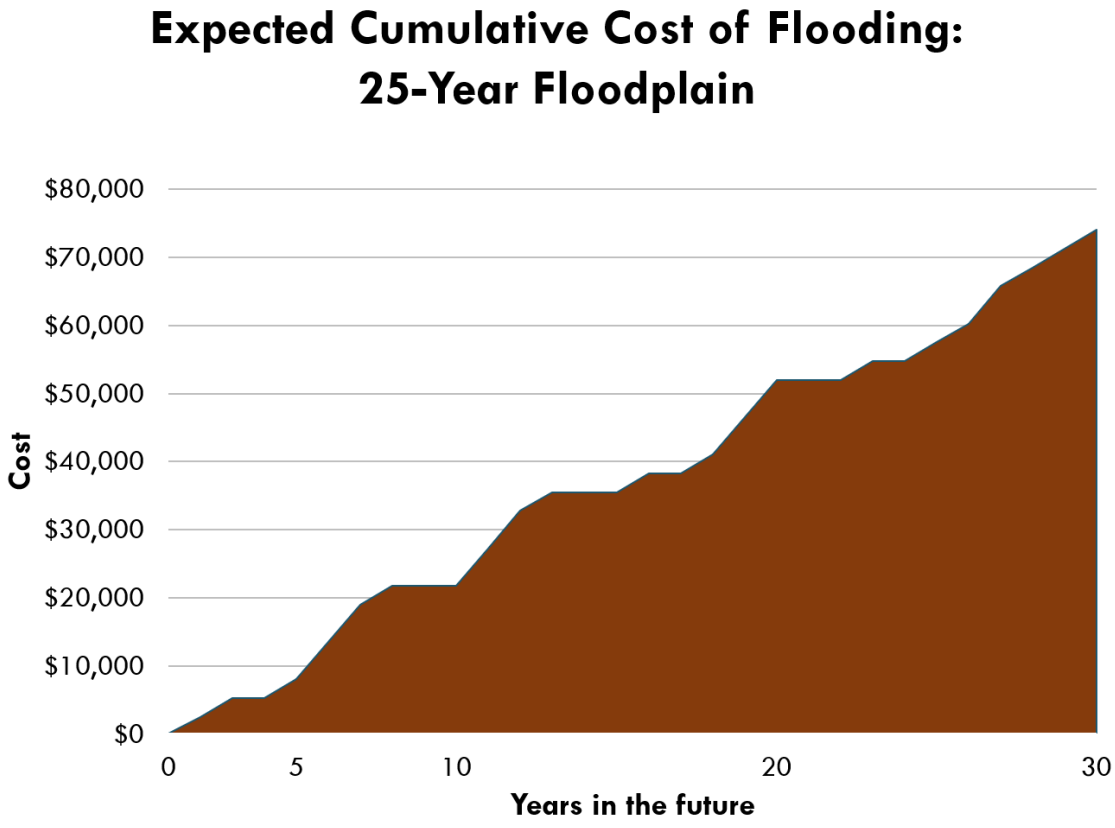


Q27. What does this graphic show about the cumulative cost of flooding?

- ○ This home's cumulative cost of flooding increases over time.
- ○ This home's cumulative cost of flooding does not change over time.
- ○ This home's cumulative cost of flooding decreases over time.
- ○ Unsure

End of Block: AAL Risk Stimuli (Q27)

Start of Block: AAL Risk Stimuli (Q28)



Q28. Assuming that this home meets all of your other needs and preferences (cost, size, etc.), how strongly do you agree or disagree with the following statement?: I would buy a home located in the kind of floodplain represented in the chart above.

- ○ Strongly Agree
- ○ Agree
- ○ Disagree
- ○ Strongly disagree

End of Block: AAL Risk Stimuli (Q28)

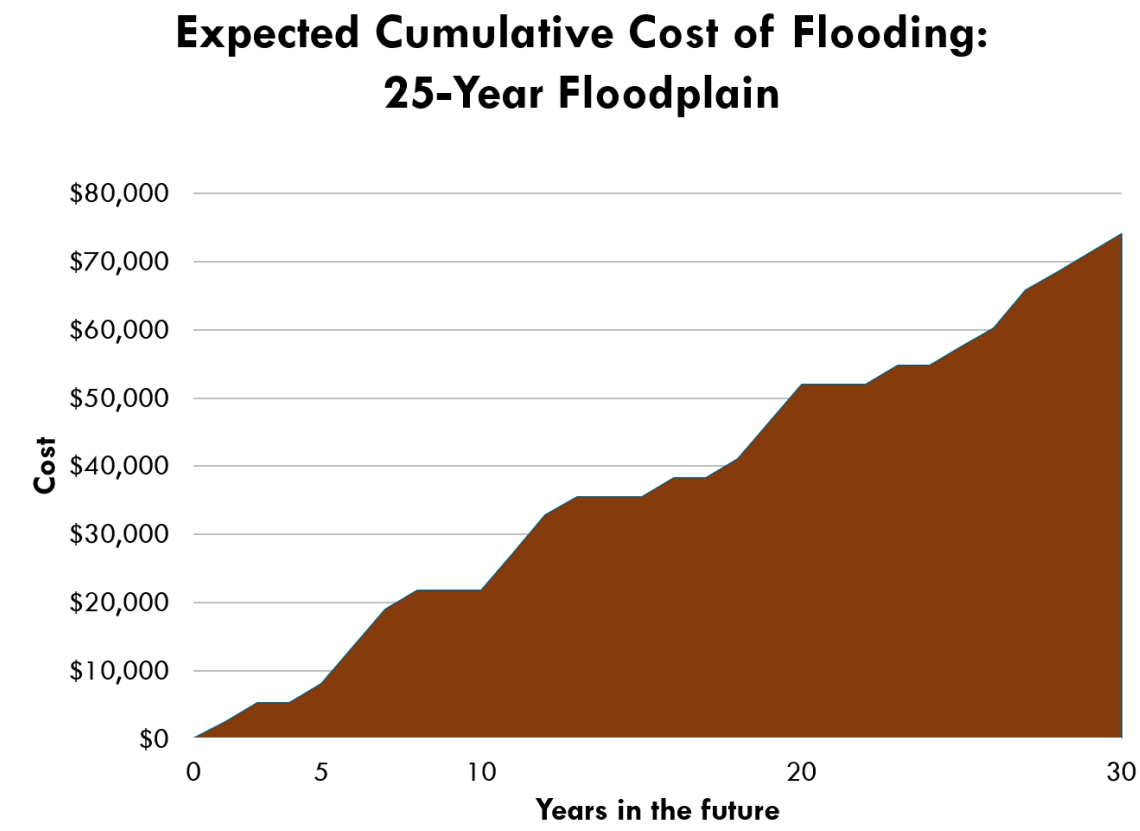
Start of Block: AAL Risk Stimuli (Q29)

Q29. From $1 to $100,000, what total cost of flooding over 30 years (the typical lifetime of a mortgage) would be too high for you to purchase a home?

- ○ Specify your cost below. Type your answer as a number (For example, use 63000 for $63,000) _____
- ○ The cost of flooding does not matter in my decision

End of Block: AAL Risk Stimuli (Q29)

Start of Block: AAL Risk Stimuli (Q30)



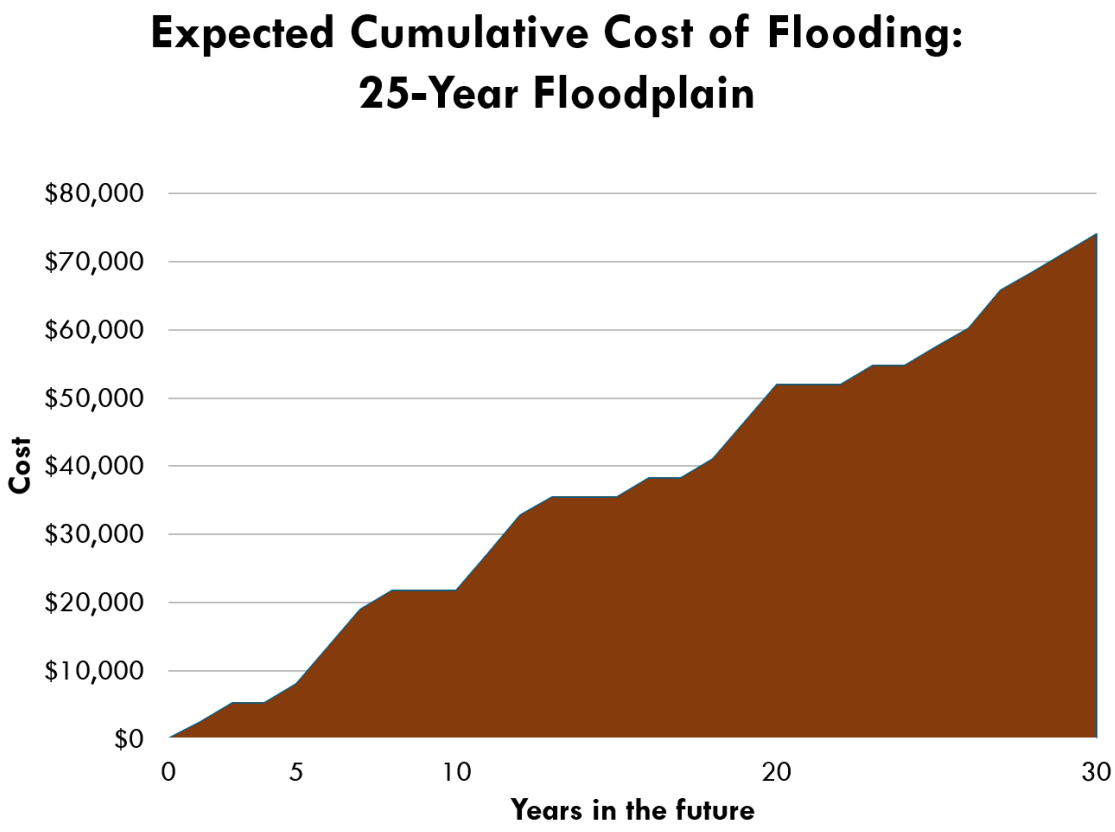
Assume you currently own a home located in the kind of floodplain represented in the chart above. Please answer as if this home was your own.

Q30. Looking at this graphic, how much do you think that flooding will impact you personally?

- ○ Not at all
- ○ Only a little
- ○ A moderate amount
- ○ A great deal

End of Block: AAL Risk Stimuli (Q30)

Start of Block: AAL Risk Stimuli Risk Mitigation Behaviors (Q31-Q35)

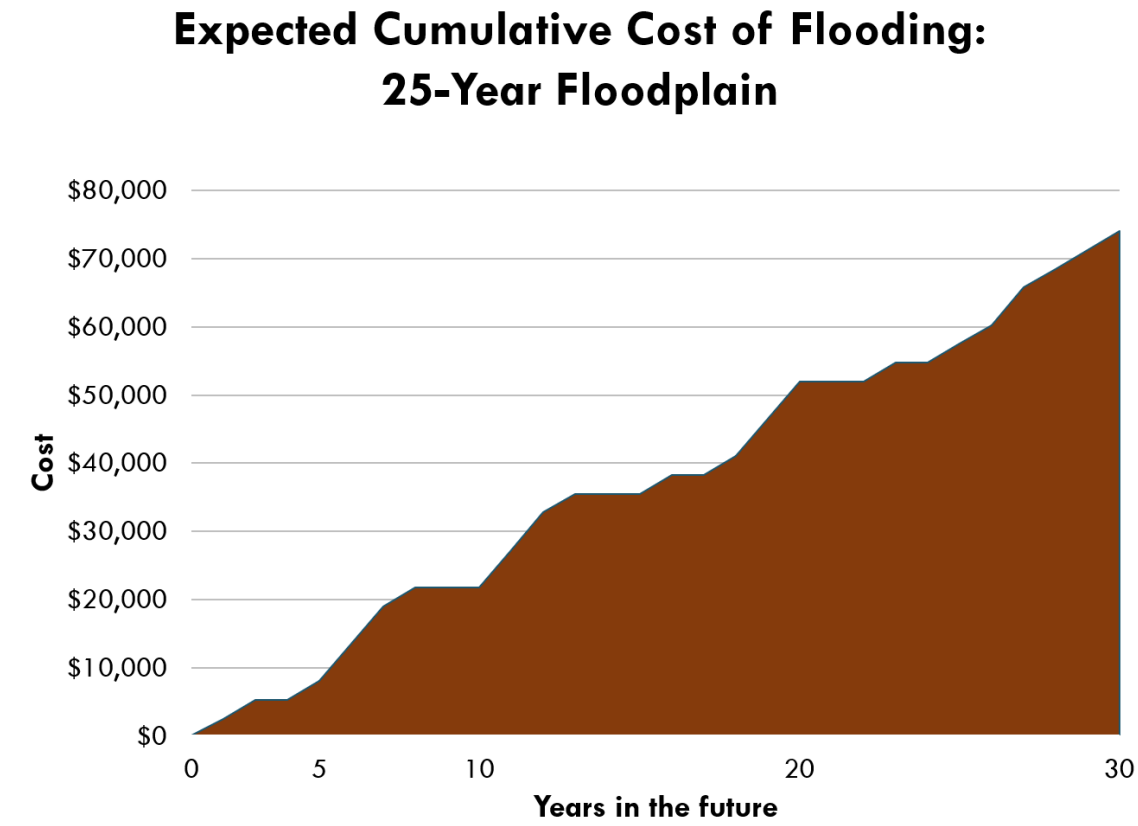


Assume you currently own a home located in the kind of floodplain represented in the chart above. Please answer as if this home was your own.
How likely are you to do the following?

	Not at all	Only a little	A moderate amount	A great deal
Q31. Pay to elevate your home to reduce flood damages.	○	○	○	○
Q32. Sell and move out if flood insurance was not available for this home.	○	○	○	○
Q33. Purchase flood insurance even if it becomes less affordable over time.	○	○	○	○
Q34. Install sandbags every time a flood advisory is issued for this home.	○	○	○	○
Q35. Pay to maintain and upgrade a seawall for this home.	○	○	○	○

End of Block: AAL Risk Stimuli Risk Mitigation Behaviors (Q31-Q35)

Start of Block: AAL Risk Stimuli (Q36)



Assume you currently own a home located in the kind of floodplain represented in the chart above. Please answer as if this home was your own.

Q36. Consider the following scenarios over the life of a 30-year mortgage for this home. Which of the following are you most likely to do to reduce your own flood risk? (choose one)

- ○ Do nothing; spend $0 and accept the probability that I will incur flood damages of up to $75,000
- ○ Invest in low-cost flood mitigation; spend $500 on sandbags, a rain garden, and/or inflatable bladders to slightly reduce the probability that I will incur flood damages of up to $75,000
- ○ Invest in medium-cost mitigation; spend $5,000 on a flood wall around my home to moderately reduce the probability that I will incur flood damages up to $75,000
- ○ Invest in high-cost mitigation; spend $20,000 on elevating my home to greatly reduce the probability that I will incur flood damages up to $75,000

End of Block: AAL Risk Stimuli (Q36)

Start of Block: Intro to Dread 2.0

Section 4: Opinions About Flooding & Flood Management

These questions gauge your opinions about flooding and flood management.

Recall that we define flooding as a temporary overflow of water onto land that is normally dry. Some floods make driving or playing in your yard difficult. Other floods damage homes and personal belongings such as cars. In severe cases floods can even lead to injury or death.

End of Block: Intro to Dread 2.0

Start of Block: Dread 2.0 (Q37-Q51)

How strongly do you agree or disagree with the following statements?

	Strongly Agree	Agree	Disagree	Strongly Disagree
Q37. It is up to me how serious the consequences of flooding will impact me.	○	○	○	○
Q38. Flooding causes feelings of dread in me, on the level of a gut reaction.	○	○	○	○
Q39. Flood news reports make me scared.	○	○	○	○
Q40. Flooding has me concerned for the future of my community, my family, and/or my daily life.	○	○	○	○
Q41. Flooding has me concerned for substantial damage to my house, possessions, and/or public infrastructure.	○	○	○	○
Q42. Flooding will become more and more dangerous over time.	○	○	○	○
Q43. The experts know enough about flooding to protect us.	○	○	○	○
Q44. I have confidence in the technical skills of flood control engineers.	○	○	○	○

Q45. The government should not be allowed to tell people where they can live, even if that location is at high risk of flooding.	○	○	○	○
Q46. The government should protect my community by investing in infrastructure such as better drainage systems and flood control structures.	○	○	○	○
Q47. If people wanted to lower their flood risk, then they should just do so.	○	○	○	○
Q48. Flooding impacts low-income and minority groups disproportionately and unfairly.	○	○	○	○
Q49. I believe that even if I do everything right, my home will still be at risk of flooding if my neighbors don't do the same things.	○	○	○	○
Q50. I would be willing to reduce the flood risk of my home for the good of my neighborhood.	○	○	○	○

Q51.I would be willing to reduce the flood risk of my home for the benefit of a wider group of people beyond my neighborhood who are particularly worse-off than me.	○	○	○	○

End of Block: Dread 2.0 (Q37-Q51)

Start of Block: Intro to CT & Demographics

Section 5: Our Way of Life

Lastly, flooding affects all Americans directly or indirectly, so now we want to learn how you think the country should manage this and similar challenges. Please recall that all answers are anonymous.

End of Block: Intro to CT & Demographics

Start of Block: Cultural Theory (Q52-58)

How strongly do you agree or disagree with the following statements?

	Strongly agree	Agree	Disagree	Strongly disagree
Q52. I trust the government to do what is right.	○	○	○	○
Q53. Science enables us to overcome almost any problem.	○	○	○	○
Q54. Our society would be better off if the distribution of wealth were more equal.	○	○	○	○
Q55. If the government spent less time trying to fix everyone's problems, we'd all be a lot better off.	○	○	○	○
Q56. We have gone too far in pushing equal rights in this country.	○	○	○	○
Q57. The government should do more to advance society's goals, even if it means limiting the choices of individuals.	○	○	○	○
Q58. Climate change poses a significant risk to human health, safety, or prosperity.	○	○	○	○

End of Block: Cultural Theory (Q52-58)

Start of Block: Demographics (Q59-66)

Section 6: Demographics

Q59. Which of these statements best describes your political party affiliation?

- Strongly Republican
- Leaning Republican
- Independent or No Party Affiliation
- Leaning Democratic
- Strongly Democratic

Q60. Which of these statements best describes your ideological views?

- Strongly Liberal
- Leaning Liberal
- Neither Liberal nor Conservative
- Leaning Conservative
- Strongly Conservative

Q61. Is the home in which you currently live:

- ○ Owned by you or someone in your household with a mortgage or loan?
- ○ Owned by you or someone in your household free and clear (without a mortgage or loan)?
- ○ Rented?
- ○ Occupied without payment or rent?

X→

Q62. With which gender do you most closely identify?

- ○ Male
- ○ Female
- ○ Other (please specify) _____
- ○ Prefer not to say

X→

Q63. What is your age?

- 18 - 34
- 35 - 49
- 50 - 64
- 65 and over

Q64. Please indicate your household's annual income.

- Less than $15,000
- $15,000 to $24,999
- $25,000 to $49,999
- $50,000 to $74,999
- $75,000 to $99,999
- $100,000 to $199,999
- $200,000 or more

Q65. With which racial and ethnic group(s) do you identify? Select all that apply.

- [ ] American Indian or Alaska Native
- [ ] Asian
- [ ] Black or African American
- [ ] Hispanic, Latino, or Spanish origin
- [ ] Middle Eastern or North African
- [ ] Native Hawaiian or other Pacific Islander
- [ ] White
- [ ] Another race or ethnicity not listed above

_____

- [ ] Prefer not to say

Q66. Which one of these best represents your educational background?

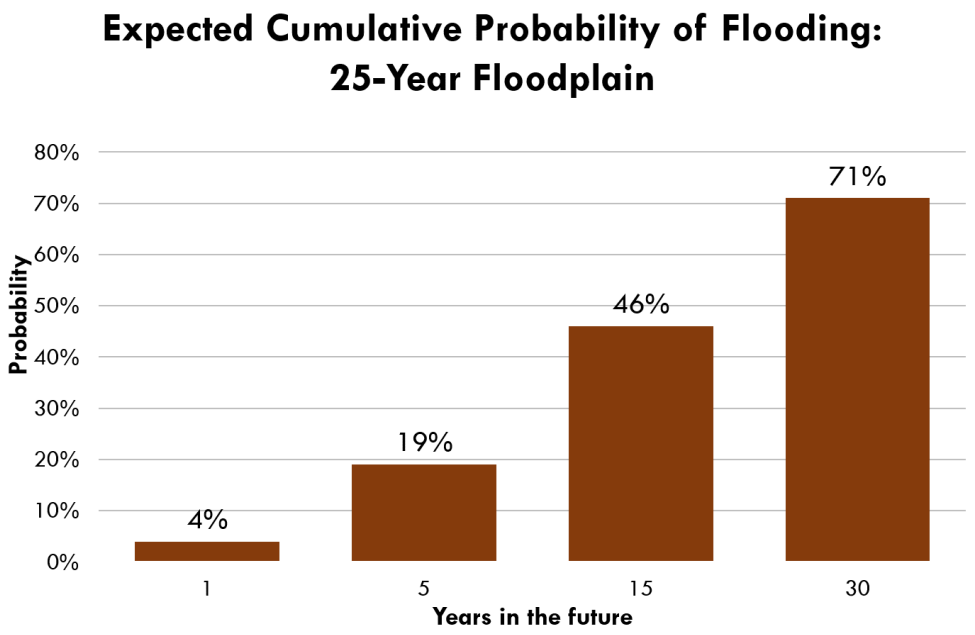
- ○ Science and engineering
- ○ Business
- ○ Education
- ○ Arts and humanities
- ○ Trade or vocational
- ○ Not applicable

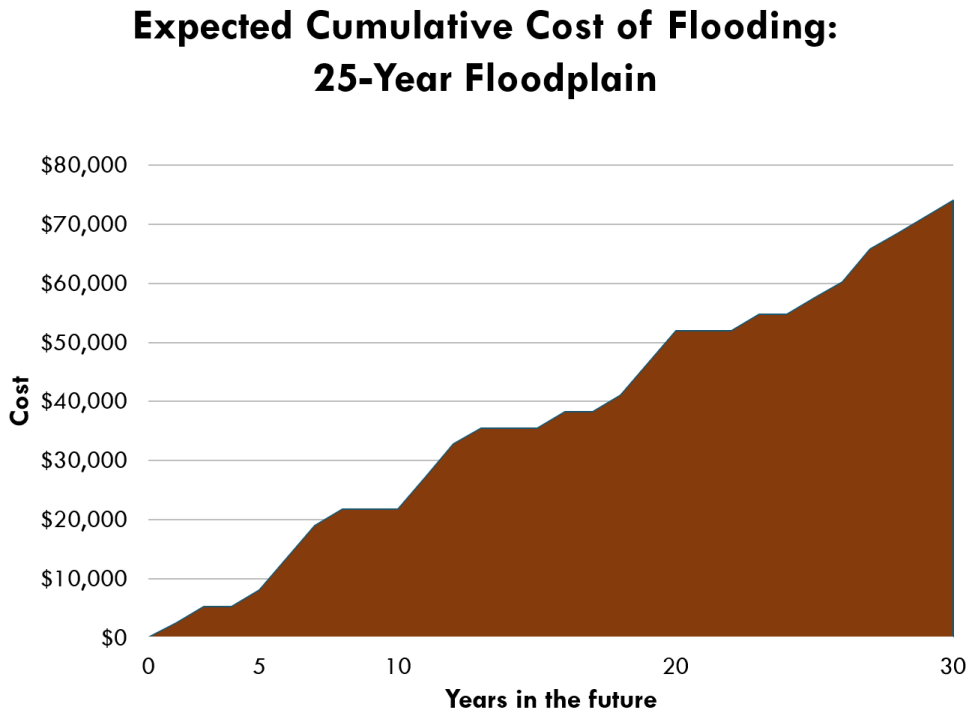
Q67. What is your highest level of education?

- ○ Less than high school
- ○ High school graduate (includes equivalency)
- ○ Some college or associate degree
- ○ Bachelor's degree
- ○ Master's degree
- ○ Doctoral degree
- ○ Military or vocational
- ○ Other _____

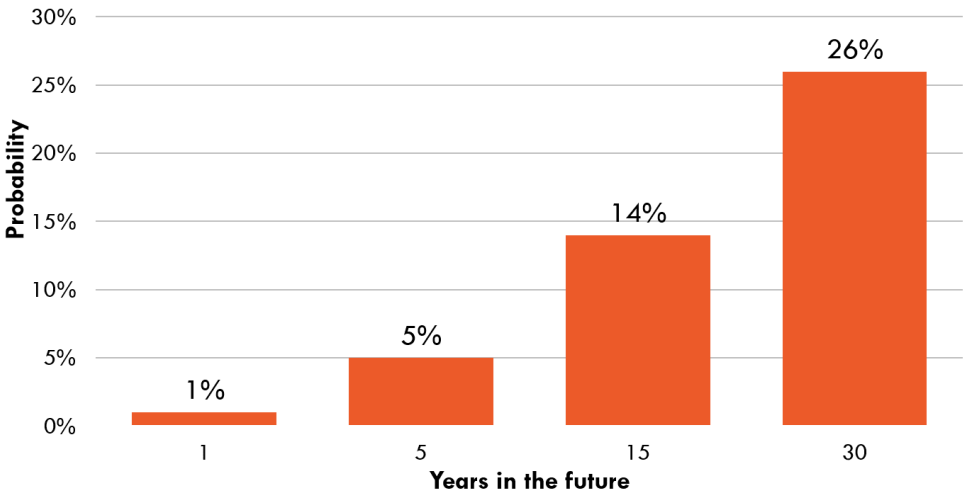
End of Block: Demographics (Q59-66)

Appendix B: Flood Risk Graphics

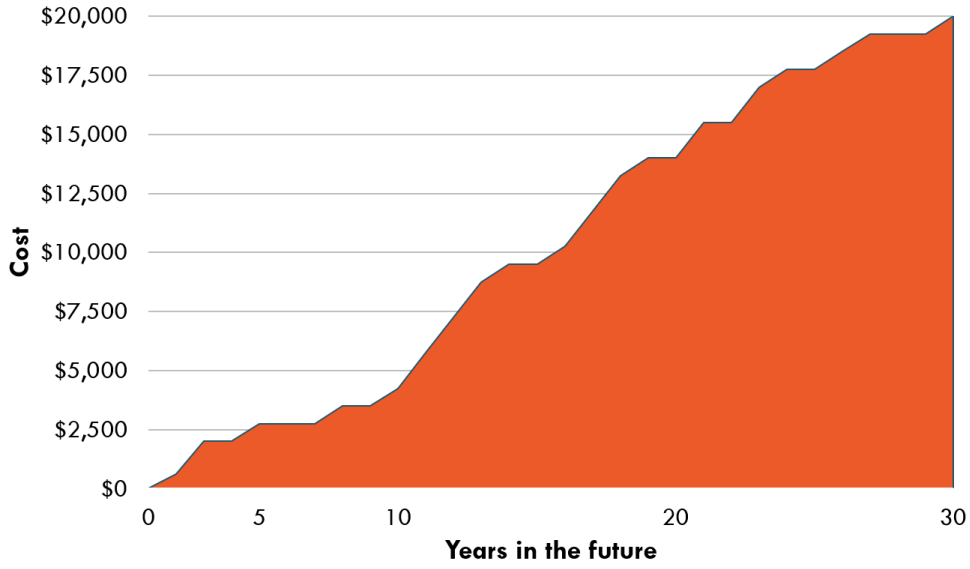


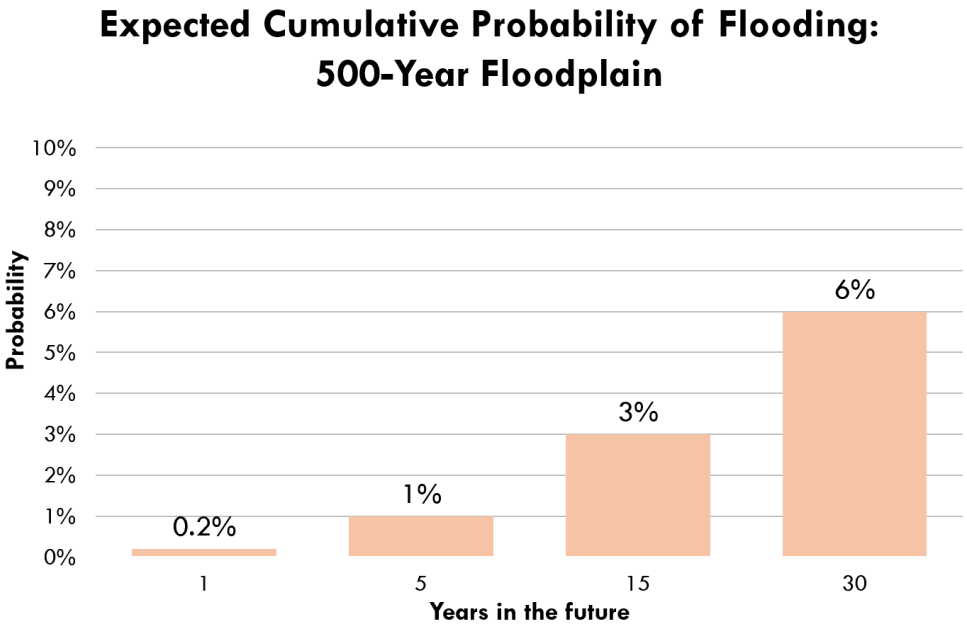


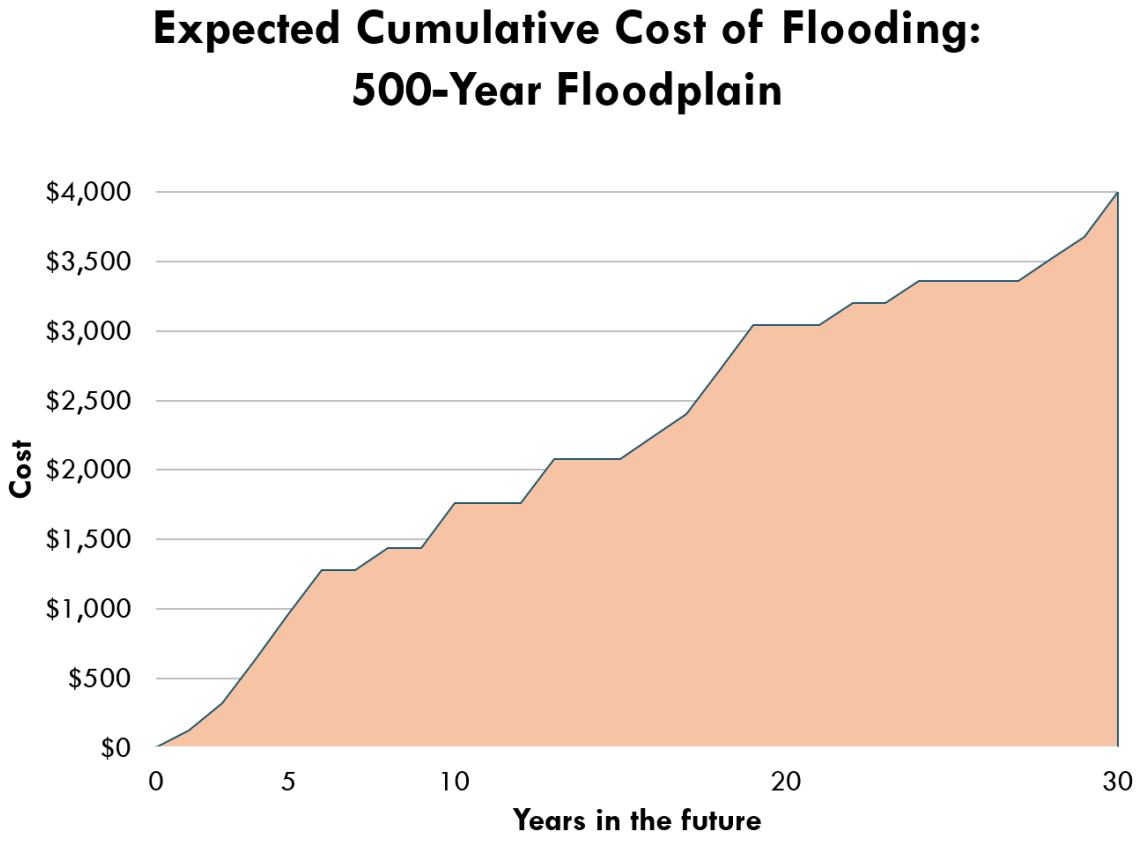
Expected Cumulative Probability of Flooding: 100-Year Floodplain



Expected Cumulative Cost of Flooding: 100-Year Floodplain




Expected Cumulative Probability of Flooding:
500-Year Floodplain
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
Probability
0.2%
1%
3%
6%
1
5
15
30
Years in the future


Expected Cumulative Cost of Flooding:
500-Year Floodplain
$4,000
$3,500
$3,000
$2,500
$2,000
$1,500
$1,000
$500
$0
Cost
0
5
10
20
30
Years in the future

Appendix C: Focus Group Screener

Florida Atlantic University Gulf Coast Focus Groups

[INTRODUCTION]

My name is _____, and I'm calling from GreatBlue Research, a professional market research firm located in Glastonbury, Connecticut. We are looking for a limited number of people to join us for a combined 30-mintute survey, followed by a 90-minute focus group session sponsored by Florida Atlantic University and the University of Florida, to be held virtually through the video conferencing service Zoom. We are looking to speak with Gulf Coast residents who live in Florida or Louisiana. The goal of this study is to examine how flood risk information, emotions, and cultural identity affect individual flood risk perceptions and mitigation behaviors, and discuss the implications for public and private community resilience initiatives.

All participants will receive a $75 Amazon e-gift card for their time and participation. In order to receive the gift card, you must complete both the survey and participate in the focus group. Your responses will be anonymous.

1. Which of the following categories best describes your age? **[Recruiter note: recruit a mix / variety of ages]**

Under 18	( ) Thank and terminate
18 to 34	( ) Continue
35 to 54	( ) Continue
55 or older	( ) Continue

2. Do you own or rent your residence?

Own	( ) Continue
Rent	( ) Thank and terminate

3. What state do you currently reside in?

Florida	( ) Continue
Louisiana	( ) Continue
Other	( ) Thank and terminate

4. **[Ask only if Q3=Louisiana]** What Parish in Louisiana do you currently reside in? **[Recruiter note: thank and terminate respondent if not from one of Parishes listed.]**

Acadia Parish	Ascension Parish	Beauregard Parish
Allen Parish	Assumption Parish	Calcasieu Parish

Cameron Parish	Livingston Parish	St. Martin Parish
East Baton Rouge Parish	Orleans Parish	St. Mary Parish
East Feliciana Parish	Plaquemines Parish	St. Tammany Parish
Evangeline Parish	Pointe Coupee Parish	Tangipahoa Parish
Iberia Parish	St. Bernard Parish	Terrebonne Parish
Iberville Parish	St. Charles Parish	Vermilion Parish
Jefferson Parish	St. Helena Parish	Washington Parish
Jefferson Davis Parish	St. James Parish	West Baton Rouge Parish
Lafayette Parish	St. John the Baptist Parish	West Feliciana Parish
Lafourche Parish	St. Landry Parish	

5. **[Ask only if Q3=Florida]** What County in Florida do you currently reside in? **[Recruiter note: thank and terminate respondent if not from one of Counties listed.]**

Alachua County	Franklin County	Lee County
Baker County	Gadsden County	Leon County
Bay County	Gilchrist County	Levy County
Bradford County	Glades County	Liberty County
Brevard County	Gulf County	Madison County
Broward County	Hamilton County	Manatee County
Calhoun County	Hardee County	Marion County
Charlotte County	Hendry County	Martin County
Citrus County	Hernando County	Miami-Dade County
Clay County	Highlands County	Monroe County
Collier County	Hillsborough County	Nassau County
Columbia County	Holmes County	Okaloosa County
DeSoto County	Indian River County	Okeechobee County
Dixie County	Jackson County	Orange County
Duval County	Jefferson County	Osceola County
Escambia County	Lafayette County	Palm Beach County
Flagler County	Lake County	Pasco County

Pinellas County	Sarasota County	Volusia County
Polk County	Seminole County	Wakulla County
Putnam County	Sumter County	Walton County
St. Johns County	Suwannee County	Washington County
St. Lucie County	Taylor County	
Santa Rosa County	Union County	

6. What is your total household income?
   Income: _____

[Recruiter note : 2/3 of Florida residents must have an income below $68,000, and the other 1/3 must have an income above $68,000. 2/3 of Louisiana residents must have an income below $64,300 and the other 1/3 must have an income above $64,300.]

If income quotas already full, thank and terminate.

7. What is your race or ethnicity? **[Recruiter note: recruit a mix / variety of races / ethnicities]**

Caucasian	( ) Continue
Black / African American	( ) Continue
Hispanic, Latino, Spanish	( ) Continue
Asian, Pacific Islander	( ) Continue
Other	( ) Continue

8. What is your gender? **[Recruiter note: recruit a mix / variety of genders]**

Male	( ) Continue
Female	( ) Continue
Other	( ) Continue

9. What is your political affiliation? **[Recruiter note: recruit a mix; roughly 1/3 for each of the affiliations]**

Democrat	( ) Continue
Republican	( ) Continue
Independent, other, or no party affiliation	( ) Continue

10. Do you have access to a computer that can play audio?

Yes ( ) Continue

No ( ) Thank and terminate

11. Do you have a quiet area where you can sit and participate in the focus group for 90 minutes?

Yes ( ) Continue

No ( ) Thank and terminate

12. Are you familiar with the video conferencing service Zoom and able to download and use the application for the focus group?

Yes ( ) Continue

No ( ) Thank and terminate

IF ELIGIBLE TO PARTICIPATE:

Based on your answers, you are indeed qualified to participate in the market research study that we're conducting. As I mentioned before, this research will be conducted through an online survey and a follow-up Zoom video conferencing service.

Would you be willing to participate in an interview?

(CHECK SCHEDULE FOR AVAILABILITY)

YES → RECORD RESPONDENT INFORMATION

NO → CONTINUE

13. Which of the following dates and times work best for you, recalling that prior to the focus group you will need to take a 30-minute survey?

Tuesday, June 1 from 5:30 – 7 p.m.

Wednesday, June 2 from 5:30 – 7 p.m.

Thursday, June 3 from 5:30 – 7 p.m.

14. So that we can send you confirmation information, please provide me with your contact information. May I have your…

NAME: _____

PHONE: _____

E-MAIL ADDRESS: _____

Thank you very much Mr./Ms. _____! We'll send you a confirmation in the coming days. If any questions or problems come up in the meantime, please call our office at 860-740-4000 or email Catherine Veschi at catherine@greatblueresearch.com, and reference the FAU Gulf Coast survey.

Appendix D: Focus Group Prompt Document

Preparation To-Do List:

- Prepare voice recording back-up software (phones)
- Verify Zoom Recording is processing
- Time check

Overview

1. **Intro –** Introduce yourself, give context to the focus group, study, and the benefits of expected from the survey/focus group.
2. **General Qs –** Set up rules of engagement, expectations, and get consent. Ask ice breaker type questions about the survey to get a feel for how it was interpreted. (~5 minutes)
3. **RAP** – Test for understanding of flood risk and risk perceptions to see how the two correlate
    a. Introduce and check for validity the RAP Qs (literacy & numeracy) (3-5 Minutes)
    b. Introduce and check for validity the Risk Perceptions Qs (home-buying & mitigation behaviors) (3-5 Minutes)
    c. Introduce the concept of a crosstabulation, illustrate with a 2x2 assessment of RAP v. Risk Perceptions where we ask respondents to inform us as to why there are many or few people in one or more squares.
4. **Psychometrics** – Introduce and check for validity the Dread Qs in each respondent to understand how those gut reactions to flooding impact risk perceptions.
    a. Introduce and check for validity the Dread Qs.
    b. Add complexity to 2x2 assessments by introducing high/low Dread as a modulator.
5. **Politics Approach** – Briefly explain that many people believe there to be a distinction between Risk Perception Qs based on political affiliation.
    a. Layer politics on top of original 2x2 matrix to illustrate how politics does (or does not) interact with RAP and Risk Perceptions.
6. **CT-** Introduce the Our Way of Life section questions as questions that can be used to group people in a manner similar to political affiliations.
    a. Introduce and check for validity the CT & Flood CT Qs.
    b. Layer CT / Flood CT on top of original 2x2 matrix to illustrate how CT does (or does not) interact with RAP and Risk Perceptions.
7. **CT & Dread -** Build off topics previously mentioned to create a single set of boxes that uses the indices of RAP, Risk Perceptions, Dread, and CT to see if respondents can help inform why certain boxes are (or are not) significant.
8. **Time permitting.
    a. Trust in Experts
    b. Social Solidarity
    c. Trust in Gov. / Science
9. **Conclusion -** Wrap up conversations, thank respondents, and allow GreatBlue to do any housekeeping elements.

Focus Group Prompt Questions:
Goal: Understanding, more deeply than is afforded by the survey questions, how each combination of flood risk information framing and cultural identity type influenced participants' perceptions and behaviors, and how the communication could be improved.

- *** Learning about potential confusion associated with the Qs in this section
    - "This Q confused me"
    - Reading into feedback to see if people are thinking about Qs in the way we were thinking about them
- The question of why? Assuming we have consensus on a question, why did they answer the way that they did?***

1. **Intro** (~7 Minutes)
    1. Introductions: *Thank you for participating in our research study. Your feedback will go a long way in helping us better understand and characterize flood risk in your area.*
        1. *The focus group is structured as follows:*
            1. *We will have some brief time to go over how the focus group will work*
            2. *We will discuss some questions from the survey you have all recent taken, asking about if any of the questions were confusing or interesting*
            3. *And then will finish up by getting some general comments and feedback before signing off.*
    2. Reading of the consent form: *Now, everyone should have received the full consent form earlier from Catherine, if you have not, please say so now. If you agree to the consent form please state out loud that you agree by either saying "I agree" "I Consent".*
    3. Establishment of Rules of Engagement (how the focus group works)
        1. *We are going to take the first half of this time to discuss some of the more basic questions of the survey, what your thoughts on them were, if any of them were difficult to understand, and how we can make the questions better. The second half will be devoted to getting your feedback on the results of the survey and what each of you think about those results. Please respect time of others & allow chance to fully complete thoughts.*
    4. Ice Breaker
        1. *Have you seen the floods in Paris?*
            1. *It's inseine!*
        2. *What happened to the broom in the flood?*
            1. *He got swept away.*
    5. Transition into the focus group proper
2. **General Survey Questions** (~10 minutes) - Goal of understanding if the survey as a whole was comprehensive, easy to take, met the expectations of the respondents, and to address any difficulties on a grand scale.

1. *How did everyone feel taking the survey? Was it too long or anything that you would have changed if given the chance?*
2. *What about the questions, were there any odd questions that didn't make much sense at the time or just felt out of place?*
3. *How about the actual flow of the survey, did it ever feel like you were jumping around from question to question or were the transitions between questions smooth?*

3. **Core** (~25 Minutes) - Goal of assessing the effectiveness of the RAP instruments (literacy & comp), as well as the effectiveness of the risk perception measures (perceptions, home-buying, mitigation behavior). With additional intent to overlay the too to better understand how the two interact (if at all).
    1. **Flood Risk Literacy:** *What did everyone think about the first few questions in the survey *Slide 2* ? Did anyone find them odd? Difficult to answer? Like any of them were "trick questions?*
        1. Use results of the survey to determine what the easiest and hardest question(s) were in the survey and bring these questions to the forefront of the focus group.
            1. *What was everyone thinking for this *Slide 3*? Was it worded in a way that everyone understood it? What came to your minds while you read the question?*
            2. *What was everyone thinking for this *Slide 4*? Was it worded in a way that everyone understood it? What came to your minds while you read the question?*
    2. **Flood Risk Numeracy:** *Was there anything challenging about either of the two graphics that we showed *Slide 5*? What about the answering the questions where you needed to read the graphics? Was there one that was more difficult to read than the other? What about the title of XXX-Year Floodplain? Is that something that everyone understood or just was skipped over while reading the graph?*
        1. Use results of the survey to determine what the easiest and hardest question(s) were in the survey and bring these questions to the forefront of the focus group.
            1. *What was everyone thinking for this *Slide 7*? Was it worded in a way that everyone understood it? What came to your minds while you read the question?*
            2. *What was everyone thinking for this *Slide 8*? Was it worded in a way that everyone understood it? What came to your minds while you read the question?*
    3. **Flood Risk Mitigation:** What did you all think when we asked the question *Slide 10* *"Consider the following scenarios over the life of a 30-year mortgage for this home. Which of the following are you most likely to do to reduce your own flood risk?"*
        1. *Did you notice that you answered any differently between the first graphic and the second graphic for this answer? Why or why not?*

2. *Were any of the items listed unclear or just didn't make sense? What about the costs of each answer choice, did those make sense?*
3. *How did you decide how much to spend? Was it related to risk reduction or budget or both?*

4. **Flood Risk Mitigation:** *What did you all think when we asked the question* *Slide 11* *"Purchase flood insurance even if it becomes less affordable over time."*
    1. *What comes to mind when we start talking about flood insurance? What about affordability? How do you determine affordability?*
        1. *20% rate increase? 40% rate increase?*
5. **RAP Assessment: Bivariate assessment**
    1. Show a crosstabulation that is illustrating a "non-RAP" outcome (e.g. high comp x high home-buying x high risk portrayal *Slide 15*). Focus on a single cell and explain that cells story to the participants.
        1. *What do you think is happening here? If you were this person, what would you say to explain your decision to buy this home?*
            1. *Is the location important?*
            2. *Is the cost important?*
            3. *Did you have a different opinion based on the graphic?*
    2. Show a crosstabulation that is illustrating a "RAP" outcome (e.g. high comp x low home-buying x high risk portrayal * Slide 16*).
        1. *What do you think is happening here? If you were this person, what would you say to explain your decision to not buy this home?*
            1. *Is the location important?*
            2. *Is the cost important?*
            3. *Did you have a different opinion based on the graphic?*

4. **Psychometrics** (RA)
    1. **Dread Risk:** *What was everyone's initial thought about these questions * Slide 17*? *Did any of these questions feel difficult to answer or were unclear?*
        1. *What did you all think when we asked the question "Flooding causes feelings of dread in me, on the level of a gut reaction."*
        2. *What did you all think when we asked the question "Flood news reports make me scared." Do you remember the last time flooding was discussed in the news? What was that like?*

3. *What did you all think when we asked the question "Flooding has me concerned for the future of my community, my family, and my daily life." What kind of flooding came to mind?*

5. **Political Theory -** Goal of setting up political theory as a strawman that cultural theory will take down in part. The expectation being that politics are not a good measure of why we have varied beliefs regarding flood risk
    1. *Most people assume that these differences between understanding flood risk and buying homes or taking steps toward reducing risk are drawn along political lines. That there is something that one of the parties just don't seem to be getting, but from what we've found that isn't the case.* *Slide 24*
6. **Cultural Theory** (GO separately) (~20 Minutes) - Goal of tying in CT into the topics that have already been discussed, assess how respondents would rationalize certain cell or cell clusters within multiple 2x2x2 matrices. *Slide 29*
    1. *Knowing that these questions would result in the random results that they did, we had a series of questions that we used to understand the way people see the world more accurately.* *Slide 25* *What was everyone's initial thought about these questions? Did any of these questions feel difficult to answer or were unclear?*
        1. *We're now going to take a look at the responses of some of our respondents based on their responses to these questions.* *Slide 25*Slide 29*
        2. *Did the questions feel like they came out of nowhere? That they weren't what you had come to expect from the survey?*
7. **CT & Dread Risk** (RA & GO combined) (~10 Minutes) - Goal of tying everything together if possible. Getting feedback on the scenarios that we see predominantly when we overlay CT, Dread, RAP, and risk perceptions and discussing how respondents would rationalize certain cell or cell clusters within multiple 2x2x2x2 matrices.
    1. **Illustration of patterns:** *Now, we would like to show you all an interesting percentage that we found when the surveys were collected.* *Slide 38* *This percentage states that of all the participants in the survey,* *insert percent and base level assessment* *We would like you all to take a moment and reflect on this and let us know your initial reactions, what do you all think about this percentage? Do you all think that these finding make sense?*
    2. **Dread / Culture:** *Did any of you feel that more fearful of flooding after taking the survey? How much so?*
        1. Use focus groups to confirm or deny cultural patterns (i.e. H-I having low dread in situations that would otherwise demand a high dread response)
8. **Conclusion** (~5 Minutes)
    1. Request for any general feedback: *Now we would like to open the floor to everyone to see if any of you have any general questions or comments on the survey that we did not already talk about.*
    2. Outro and thanks: *Thank you for your time, your feedback is going to go a long way in assisting us in putting together a comprehensive survey that*

measure flood risk perceptions and mitigation behaviors across the Gulf Coast.

3. Housekeeping from GreatBlue

Time Permitting:

Trust in Experts: *What was everyone's initial thought about these questions *Slide 34*? Did any of these questions feel difficult to answer or were unclear?*

1. *What did you all think when we asked the question "The experts know enough about flooding to protect us." Who are the experts? What do they do? What is your confidence level based on?*
2. *What did you all think when we asked the question "I have confidence in the technical skills of flood control engineers." Who are they? What do they do? What is your confidence level based on?*

Trust / Culture: *Did your trust of experts change while you were taking the survey?*

3. Use focus groups to confirm or deny cultural patterns (i.e. H-I having low trust in experts in situations that would otherwise demand a high trust in expert response)

Appendix E: Survey Analysis & Protocol

All indices in the Flood Risk Survey will be tested for internal consistency prior to the creation of their index. Indices are subject to change based on the results of tests of internal reliability and should the index not achieve an Alpha that is greater than or equal to 0.70, that index will be altered to achieve the greatest accuracy possible before use.

SPSS Cronbach's Alpha Protocol: Run the question items for each of the indices through a test for internal reliability to determine if the items are an effective index.

- Start with SPSS output data
- Click Analyze > Scale > Reliability Analysis
- Input all questions in each of the respective indices listed below into the "Items" box
- Click "Statistics..."
    - Enable the following boxes
        - Item
        - Scale
        - Scale if item deleted
        - Correlations
    - Click "Continue" and "Ok"
- Repeat for each index

Flood Risk Literacy (Q1-6): Cumulative index: participants graded on 0-6 scale where correctly answering 5 or 6 of the below questions codes as "yes" flood literacy and all else as "no" flood literacy.

Variable	T4 survey question	Survey Q	Source(s)
Impervious Surfaces	1	True or false? Adding impervious surfaces like streets or sidewalks makes a neighborhood more prone to flooding.	T4
Stalled Car	2	At what depth will flood water begin to float most vehicles?	T4
Soils & Flooding	3	True or false? An area with sand-like soil is more likely to flood than an area with clay-like soil.	T4
Reducing Flood Risk	4	Select all of the following that are true. I can help reduce the flood risk of my community and my home by:	T4
Cause of Coastal Flooding	5	Of the choices below, what is the biggest cause of coastal flooding?	T4

Flood Fencing	6	True or False? Flood impacts can be limited by installing special fencing to block the water from entering the home.	T4

- Start with Excel output data
- Create new column (CS) titled “Literacy_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance with each respective row. Input the following code to add up all correct answers to flood risk literacy questions
    - =SUM((COUNTIF($S4,1)),(COUNTIF($T4,2)),(COUNTIF($U4,2)),COUNTIF($V4,"1,2"),(COUNTIF($W4,1)),(COUNTIF($X4,1)))
        - Count and sum only the correct answers to each of the literacy questions
- Repeat for all rows of data
- Export into SPSS
- Transform > Recode into same variables
    - Select “Literacy_Index” and add to Variables
    - Change Old and New Values
    - Group results into two buckets
        - 1-4 = 0
        - 5-6 = 1
- Label Values
    - 0 = Fail
    - 1 = Pass

Flood Risk Comprehension (Q13-15 & Q25-27): Cumulative index: participants graded on 0-6 scale where correctly answering 5 or 6 of the below questions codes as "yes" comprehension (numeracy) and all else as "no" comprehension (numeracy).

Variable	T4 survey question	Survey Q	Source(s)
Cumulative Flood (15-Year)	13	Assuming your home is in this floodplain, what is the chance of the home flooding over the next 15 years?	T4
Yearly Flood Risk	14	Assuming your home is in this floodplain, what is the chance of the home flooding next year?	T4
Flood Risk Increase/Decrease	15	What does this graphic show about the chance of flooding?	T4 & T1
Cumulative Cost Flood (30-Years)	25	Assuming your home is in this floodplain, what is the expected total cost of flooding over the next 30 years?	T4

Yearly Flood Cost	26	Assuming your home is in this floodplain, what is the expected cost of flooding for this particular home next year?	T4
Flood Cost Increase/Decrease	27	What does this graphic show about the cumulative cost of flooding?	T4 & T1

- Start with Excel output data
- Create new column (CT) titled “Comprehension_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 11, 12 through 19, and 20 through 27 and altered in accordance to each respective row. Input the following code to add up all correct answers to flood risk comprehension questions
    - 25-Year Floodplain
        - =SUM(COUNTIF($AK4,2),(COUNTIF($AL4,5)),(COUNTIF($AM4,1)),(COUNTIF($AX4,1)),COUNTIF($AY4,1),(COUNTIF($AZ4,1)))
            - Count and sum only the correct answers to each of the comprehension (numeracy) questions
    - 100-Year Floodplain
        - =SUM(COUNTIF($AK12,2),(COUNTIF($AL12,5)),(COUNTIF($AM12,1)),(COUNTIF($AX12,2)),COUNTIF($AY12,1),(COUNTIF($AZ12,1)))
            - Count and sum only the correct answers to each of the comprehension (numeracy) questions
    - 500-Year Floodplain
        - =SUM(COUNTIF($AK20,2),(COUNTIF($AL20,5)),(COUNTIF($AM20,1)),(COUNTIF($AX20,3)),COUNTIF($AY20,1),(COUNTIF($AZ20,1)))
            - Count and sum only the correct answers to each of the comprehension (numeracy) questions
- Repeat for all rows of data
- Export into SPSS
- Transform > Recode into same variables
    - Select “Comprehension_Index” and add to variables
    - Change Old and New Values
    - Group results into two buckets
        - 1-4 = 0
        - 5-6 = 1
- Label Values
    - 0 = Fail
    - 1 = Pass

Flood Risk Mitigation Behavior: Averaged Index: when analyzing overall mitigation behavior, these 12 questions will be summed and divided by the number of questions to create a mitigation behavior index where high scores correlate with high mitigation

behaviors and the inverse for low scores. Additional indices can be created to assess for either a specific mitigation behavior (insurance, elevation, etc.) or specific graphic (AAL or cumulative risk percentage).

Variable	T4 survey question	Survey Q	Source(s)
Risk & Elevation	19	Pay to elevate your home to reduce flood damages.	T4
Cost & Insurance	20	Sell and move out if flood insurance was not available for this home.	Wong-Parodi & Fischhoff; T4
Cost & Insurance	21	Purchase flood insurance even if it becomes less affordable over time.	Wong-Parodi & Fischhoff; T4
Risk & Sandbags	22	Install sandbags every time a flood advisory is issued for this home.	T4
Risk & Seawall	23	Pay to maintain and upgrade a seawall for this home.	T4
Risk & Elevation	31	Pay to elevate your home to reduce flood damages.	T4
Cost & Insurance	32	Sell and move out if flood insurance was not available for this home.	Wong-Parodi & Fischhoff; T4
Cost & Insurance	33	Purchase flood insurance even if it becomes less affordable over time.	Wong-Parodi & Fischhoff; T4
Risk & Sandbags	34	Install sandbags every time a flood advisory is issued for this home.	T4
Risk & Seawall	35	Pay to maintain and upgrade a seawall for this home.	T4
Risk Laundry List	24	Consider the following scenarios over the life of a 30-year mortgage for this home. Which of the following are you most likely to do to reduce your own flood risk? (choose one)	T4
Cost Laundry List	36	Consider the following scenarios over the life of a 30-year mortgage for this home. Which of the following are you most likely to do to reduce your own flood risk? (choose one)	T4

- Start with Excel output data

- Create new column (CU) titled “Mitigation_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following code to average all 12 flood risk mitigation questions:
    - =((SUM($AR4:$AW4,$BE4:$BJ4))/12)
        - Sum and average all 12 flood risk mitigation questions
        - Where a score of 4 indicates the highest possible risk mitigation score and score of 1 indicates the lowest possible risk mitigation score.
- Repeat for all rows of data
- Export into SPSS
- Transform>Recode into Same Variables
    - Select "Mitigation_Index” and add to Variables
    - Select Old and New Values
    - Group averaged results into two buckets
        - 1-2.50 □ 1
        - 2.51-4 □ 2
    - Click continue and ok
- Label bucketed variables as follows:
    - 1 □ Low Mitigation
    - 2 □ High Mitigation

Flood “Risk Perception” (Q18 & 30): Averaged Index: when analyzing risk perceptions, these questions will be summed and divided by the number of questions to create a risk perceptions index where low scores correlate with low graphic-based perceptions and high scores with for high graphic-based perceptions.

Variable	T4 survey question	Survey Q	Source(s)
Risk Impact	18	Looking at this graphic, how much do you think that flooding will impact you personally?	Javeline 2019
Cost Impact	30	Looking at this graphic, how much do you think that flooding will impact you personally?	Javeline 2019

- Start with Excel output data
- Create new column (CV) titled “GraphicPerception_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following code to average the 2 flood risk perception questions:
    - =((SUM($AQ4,$BD4))/2)
        - Sum and average both flood graphic risk perception questions
        - Where a score of 4 indicates the highest possible graphic risk perception score and score of 1 indicates the lowest possible graphic risk perception score.
- Repeat for all rows of data

- Export into SPSS
- Transform>Recode into Same Variables
    - Select “GraphicPerception_Index” and add to Variables
    - Select Old and New Values
    - Group averaged results into two buckets
        - 1-2.50 □ 1
        - 2.51-4 □ 2
    - Click continue and ok
- Label bucketed variables
    - 1 □ Low Perception
    - 2 □ High Perception

Dread Risk (Q37-Q42): Averaged Index: when analyzing feelings of dread with regard to flooding, after question 37 is reverse coded, these questions will be summed and divided by the number of questions to create a dread risk index where low scores correlate with high feelings of dread and the inverse for high scores.

Variable	T4 survey question	Survey Q	Source(s)
Uncontrollable	37	It is up to me how serious the consequences of flooding will be for me .	Slovic, 1987
Dread	38	Flooding causes feelings of dread in me, on the level of a gut reaction .	Fischhoff & Slovic, 1978
Fear	39	Flood news reports make me scared .	Siegrist & Gutscher, 2008
High Risk to Future	40	Flooding has me concerned for the future of my community, my family, and/or my daily life.	Leiserowitz, 2020
Non-Fatal	41	Flooding has me concerned for substantial damage to my house, possessions, and/or public infrastructure.	Slovic, 1987
Increasing	42	Flooding will become more and more dangerous over time.	Slovic, 1987

- Start with Excel output data
- Create new column (CW) titled “Dread_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following code to reverse code Q34 and average the 6 Dread questions:
    - =SUM(($BK4-5)*-1,$BL4:$BP4)/6
        - Reverse code Q37, average all dread questions
        - Where a score of 4 indicates the lowest possible dread score and score of 1 indicates the highest possible dread score.
- Repeat for all rows of data
- Export into SPSS
- Transform>Recode into Same Variables
    - Select "Dread_Index” and add to Variables
    - Select Old and New Values
    - Group averaged results into two buckets
        - 1-2.50 □ 1
        - 2.51-4 □ 2
    - Click continue and ok
- Label bucketed variables - NOTE: Because Dread Risk is on a Strongly Agree to Strongly Disagree scale where 1 is coded as “Strongly Agree” and 4 is coded as “Strongly Disagree” the labeling process is reversed relative to the two previous indices.
    - 2 □ Low Dread
    - 1 □ High Dread

Trust in Experts (Q43-44): Averaged Index: when analyzing trust in experts, these questions will be summed and divided by the number of questions to create a trust in experts index where low scores correlate with high trust and the inverse for high scores. Trust in experts speaks to flood risk experts and their technical expertise.

Variable	T4 survey question	Survey Q	Source(s)
Risk known to experts	43	The experts know enough about flooding to protect us	Terpstra, 2011
Technological Skills	44	I have confidence in the technical skills of flood control engineers.	Terpstra, 2011; T4

- Start with Excel output data
- Create new column (CX) titled “TrustinExperts_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following code to average the 2 trust in experts questions:
    - =SUM($BQ4:$BR4)/2
        - Average all trust in experts questions

        - Where a score of 4 indicates the lowest possible trust in experts score and score of 1 indicates the highest possible trust in experts score.
- Repeat for all rows of data
- Export into SPSS
- Transform>Recode into Same Variables
    - Select “TrustinExperts_Index” and add to Variables
    - Select Old and New Values
    - Group averaged results into two buckets
        - 1-2.50 □ 1
        - 2.51-4 □ 2
    - Click continue and ok
- Label bucketed variables - NOTE: Because Trust in Experts is on a Strongly Agree to Strongly Disagree scale where 1 is coded as “Strongly Agree” and 4 is coded as “Strongly Disagree” the labeling process is reversed.
    - 2 □ Low Trust
    - 1 □ High Trust

Trust in Institutions (Q52-53): Averaged Index: when analyzing trust in institutions, these questions will be summed and divided by the number of questions to create a trust in institutions index where low scores correlate with high trust and the inverse for high scores. Trust in institutions speaks to governmental and scientific entities.

Variable	T4 survey question	Survey Q	Source(s)
Trust in Govt	52	I trust the government to do what is right.	Bolsen, 2015
Trust in Science	53	Science enables us to overcome almost any problem.	Bolsen, 2015

- Start with Excel output data
- Create new column (CY) titled “TrustinInstitutions_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following code to average the 2 trust in institutions questions:
    - =SUM($BZ4:$CA4)/2
        - Average all trust in institutions questions
        - Where a score of 4 indicates the lowest possible trust in institutions score and score of 1 indicates the highest possible trust in intuitions score.
- Repeat for all rows of data
- Export into SPSS
- Transform>Recode into Same Variables
    - Select "TrustinInstitutions_Index” and add to Variables
    - Select Old and New Values
    - Group averaged results into two buckets
        - 1-2.50 □ 1

        - 2.51-4 □ 2
    - Click continue and ok
- Label bucketed variables - NOTE: Because Trust in Institutions is on a Strongly Agree to Strongly Disagree scale where 1 is coded as “Strongly Agree” and 4 is coded as “Strongly Disagree” the labeling process is reversed to the two previous indices.
    - 2 □ Low Trust
    - 1 □ High Trust

Home-Buying Behaviors (Q16-17 & Q28-29): Averaged Index: when analyzing overall home-buying behavior, the two categorical questions, and the two continuous questions, will be summed and divided separately by each of their groups to create two willingness-to-buy indices. These questions will also be used together to generate a single overall willingness-to-buy index.

Averaged Index: when analyzing overall home-buying behavior, these four questions will be summed and divided by the number of questions to create a willingness-to-buy index where high scores correlate with high willingness-to-buy and the inverse for low scores.

Variable	T4 survey question	Survey Q	Source(s)
Risk Home-Buying	16	Assuming that this home meets all of your other needs and preferences (cost, size, etc.), how strongly do you agree or disagree with the following statement?: I would buy a home located in the kind of floodplain represented in the chart above.	T4
Cost Home-Buying	28	Assuming that this home meets all of your other needs and preferences (cost, size, etc.), how strongly do you agree or disagree with the following statement?: I would buy a home located in the kind of floodplain represented in the chart above.	T4
Risk Tolerance	17	From 1% to 100%, what cumulative chance of flooding over 30 years (the typical lifetime of a mortgage) would be too high for you to purchase a home?	T4
Cost Tolerance	29	From $1 to $100,000, what total cost of flooding over 30 years (the typical lifetime of a mortgage)	T4

		would be too high for you to purchase a home?	

- This index is variable based on the risk portrayal graphic
- Start with Excel output data
- Create new columns (CZ, DA, DB) titled “WTP_Index_CAT”, “WTP_Index_SCL”, & “WTP_Index_Combo”
- Below is the illustration for the coding for one respondent, codes are repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following codes to generate the three indices; 1 categorical willingness-to-buy index, 1 continuous willingness-to-but index, and 1 overall categorical willingness-to-but index:
    - “WTP_Index_CAT” (CZ) =((SUM($AN4,$BA4))/2)
        - Average categorical home-buying questions
        - Where a score of 4 indicates the lowest possible willingness to purchase score and score of 1 indicates the highest possible willingness to purchase score.
    - =IF((AND($BC4="",$AP4="")),0,(((SUM(((($AP4/25)+1),(($BC4/25000)+1))/2)-5)*-1))
        - Average and create a 0-4 scale for continuous home-buying questions, recoding answers of “The chance of flooding does not matter in my decision” and “The cost of flooding does not matter in my decision” into the highest willingness to purchase (0).
        - Where a score of 4 indicates the lowest possible willingness to purchase score and score of 0 indicates the highest possible willingness to purchase score.
            - Low risk tolerance (10% is too much risk) = low willingness to buy (That’s too much risk) = a 4 on the scale
            - High risk tolerance (risk isn’t an issue) = high willingness to buy (risk isn’t an issue) = a 0 on the scale
    - =($CZ4+$DA4)/2
        - Average both categorical and continuous willingness-to-buy questions
        - Where a score of 4 indicates the lowest possible willingness to purchase score and score of 1 indicates the highest possible willingness to purchase score.
- Repeat for all rows of data
- Export into SPSS
- Transform>Recode into Same Variables
    - Select “WTP_Index_CAT”, “WTP_Index_SCL”, & “WTP_Index_Combo” and add to Variables
    - Select Old and New Values
    - Group averaged results into two buckets
        - 1-2.50 □ 1
        - 2.51-4 □ 2

- Click continue and ok

- Label bucketed variables - NOTE: Because willingness to purchase is on a Strongly Agree to Strongly Disagree scale where 1 is coded as “Strongly Agree” and 4 is coded as “Strongly Disagree” the labeling process is reversed to the two previous indices. In cases of using scale data, scales were coded into similar 1-4 categories mirroring that of the categorical data.
  - 2 □ Low WTP
  - 1 □ High WTP

Social Solidarity (Q49-51): Averaged Index: when analyzing Social Solidarity, these questions will be summed and divided by the number of questions to create a Social Solidarity index where low scores correlate with high Social Solidarity and the inverse for high scores.

Averaged Index: when analyzing Social Solidarity, these questions will be summed and divided by the number of questions to create a Social Solidarity index where high scores correlate with high Social Solidarity and the inverse for low scores.

Variable	T4 survey question	Survey Q	Source(s)
Individual Efforts Matter	49	I believe that even if I do everything right, my home will still be at risk of flooding if my neighbors don’t do the same things.	O'Dell; T4
Community Solidarity	50	I would be willing to reduce the flood risk of my home for the good of my community.	Goudge 2012
Less Fortunate Solidarity	51	I would be willing to reduce the flood risk of my home for the benefit of a wider group of people who are particularly worse-off than me.	Goudge 2012

- Start with Excel output data
- Create new column (DC) titled “SocialSolidarity_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following code to average the 3 social solidarity questions:
  - =SUM($BW4:$BY4)/3
    - Average all social solidarity questions
    - Where a score of 4 indicates the lowest possible social solidarity score and score of 1 indicates the highest possible social solidarity score.

- Repeat for all rows of data
- Export into SPSS
- Transform>Recode into Same Variables
    - Select " SocialSolidarity_Index" and add to Variables
    - Select Old and New Values
    - Group averaged results into two buckets
        - 1-2.50 □ 1
        - 2.51-4 □ 2
    - Click continue and ok
- Label bucketed variables - NOTE: Because social solidarity is on a Strongly Agree to Strongly Disagree scale where 1 is coded as "Strongly Agree" and 4 is coded as "Strongly Disagree" the labeling process is reversed to the two previous indices.
    - 2 □ Low SS
    - 1 □ High SS

Cultural Theory (Q54-57):

Base Kahan CT **(Q55-56)**

Averaged Index: Participants will have scores "Hierarchy" and "Individualism" where higher scores (strongly agree) will place participants into one of those two buckets and lower scores (strongly disagree) will results in "Egalitarian" or "Communitarian" placement.

Variable	T4 survey question	Survey Q	Source(s)
Hierarchy	56	We have gone too far in pushing equal rights in this country	Kahan 2012; Bolsen 2015
Individualism	55	If the government spent less time trying to fix everyone's problems, we'd all be a lot better off	Kahan 2012; Bolsen 2015

- Start with Excel output data
- Create new column (DM) titled "HIE_IND_KahanCT_Index"
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following codes to generate an Individualism score, a hierarchy score, and a cultural theory placement based on the two scores:
    - =IF($CD4<2.5,"HIE",(IF($CD4=2.5,"Neutral",(IF($CD4>2.5,"EGA",))))) &"-
      "&IF($CC4<2.5,"IND",(IF($CC4=2.5,"Neutral",(IF($CC4>2.5,"COM",)))))
        - Combine IND & HIE to create Cultural Identity variable
- Repeat for all rows of data
- Export into SPSS

Kahan CT **(Q54-57)**

Averaged Index: Participants will have scores averaged as “Hierarchy" and as "Individualism" where higher scores will place participants into one of those two buckets and lower scores will results in "Egalitarian" or "Communitarian" placement. Egalitarian and communitarian scores will be reverse coded for analysis			
Variable	**T4 survey question**	**Survey Q**	**Source(s)**
Hierarchy	56	We have gone too far in pushing equal rights in this country	Kahan 2012; Bolsen 2015
Individualism	55	If the government spent less time trying to fix everyone’s problems, we’d all be a lot better off	Kahan 2012; Bolsen 2015
Communitarianism	57	The government should do more to advance society’s goals, even if it means limiting freedom and choices of individuals	Kahan 2012; Bolsen 2015
Egalitarianism	54	Our society would be better off if the distribution of wealth was more equal.	Kahan 2012

- Start with Excel output data
- Create new columns (DD, DE, DF) titled “KahanCT_IND”, “KahanCT_HIE”, & “KahanCT_Index”
- Below is the illustration for the coding for one respondent, codes are repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following codes to generate an Individualism score, a Hierarchy score, and a Cultural Theory placement based on the two scores:
    - =SUM(($CE4-5)*-1,$CC4)/2
        - Average reverse coded COM & IND into a single IND variable
    - =SUM(($CB4-5)*-1,$CD4)/2
        - Average reverse coded EGA & HIE into a single HIE variable
    - =IF($DE4<2.5,"HIE",(IF($DE4=2.5,"Neutral",(IF($DE4>2.5,"EGA",))))) &"-
      "&IF($DD4<2.5,"IND",(IF($DD4=2.5,"Neutral",(IF($DD4>2.5,"COM",)))))
        - Combine IND & HIE to create Cultural Identity variable
- Repeat for all rows of data
- Export into SPSS

Flood CT **(Q45-48)**

Averaged Index: Participants will have scores averaged as "hierarchy" and as "individualism" where higher scores will place participants into one of those two buckets and lower scores will results in "Egalitarian" or "Communitarian" placement. Egalitarian and communitarian scores will be reverse coded for analysis			
Variable	**T4 survey question**	**Survey Q**	**Source(s)**
Flood Specific Hierarchy	47	If people wanted to lower their flood risk, then they should just do so.	T1; GO
Flood Specific Egalitarianism	48	Flooding impacts low-income and minority groups disproportionately and unfairly.	T1; GO
Flood Specific Individualism	45	The government should not be allowed to tell people they can or cannot live somewhere, even if that location is at high risk of flooding.	T1; GO
Flood Specific Communitarianism	46	The government should protect my community by investing in infrastructure such as better drainage systems and flood control structures.	T1; GO

- Start with Excel output data
- Create new columns (DG, DH, DI) titled “FloodCT_IND”, “FloodCT_HIE”, & “FloodCT_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following codes to generate a flood-specific Individualism score, a flood-specific hierarchy score, and a flood-specific cultural theory placement based on the two scores:
    - “FloodCT_IND” (DG) =SUM(($BT4-5)*-1,$BS4)/2
        - Average reverse coded Flood EGA & Flood IND into a single Flood IND variable
    - “FloodCT_HIE” (DH) =SUM(($BV4-5)*-1,$BU4)/2
        - Average reverse coded Flood COM & Flood HIE into a single Flood HIE variable
    - “FloodCT_Index” (DI) =IF($DH4<2.5,"HIE",(IF($DH4=2.5,"Neutral",(IF($DH4>2.5,"EGA",)))))&"-"&IF($DG4<2.5,"IND",(IF($DG4=2.5,"Neutral",(IF($DG4>2.5,"COM",))))))
        - Combine Flood IND & Flood HIE to create Flood Cultural Identity variable

- Repeat for all rows of data
- Export into SPSS

Full CT **(Q45-48 & Q54-57)**

Averaged Index: Participants will have scores averaged as "hierarchy" and as "individualism" where higher scores will place participants into one of those two buckets and lower scores will results in "Egalitarian" or "Communitarian" placement. Egalitarian and communitarian scores will be reverse coded for analysis.

Variable	T4 survey question	Survey Q	Source(s)
Hierarchy	56	We have gone too far in pushing equal rights in this country	Kahan 2012; Bolsen 2015
Flood Specific Hierarchy	47	If people wanted to lower their flood risk, then they should just do so.	T1; GO
Flood Specific Egalitarianism	48	Flooding impacts low-income and minority groups disproportionately and unfairly.	T1; GO
Individualism	55	If the government spent less time trying to fix everyone's problems, we'd all be a lot better off	Kahan 2012; Bolsen 2015
Communitarianism	57	The government should do more to advance society's goals, even if it means limiting freedom and choices of individuals	Kahan 2012; Bolsen 2015
Flood Specific Individualism	45	The government should not be allowed to tell people they can or cannot live somewhere, even if that location is at high risk of flooding.	T1; GO
Flood Specific Communitarianism	46	The government should protect my community by investing in infrastructure such as better drainage systems and flood control structures.	T1; GO
Egalitarianism	54	Our society would be better off if the distribution of wealth was more equal.	Kahan 2012

- Start with Excel output data
- Create new columns (DJ, DK, DL) titled “Combo_IND”, “Combo_HIE”, & “Combo_Index”
- Below is the illustration for the coding for one respondent, codes area repeated for rows 4 through 27 and altered in accordance to each respective row. Input the following codes to generate an aggregate Individualism score, an aggregate hierarchy score, and an aggregate cultural theory placement based on the two scores:
    - “Combo_IND” (DJ) =($DD4+$DG4)/2
        - Average reverse coded Flood EGA & Flood IND into a single Flood IND variable
    - “Combo_HIE” (DK) =($DE4+$DH4)/2
        - Average reverse coded Flood COM & Flood HIE into a single Flood HIE variable
    - “Combo_Index” (DL) =IF($DK4<2.5,"HIE",(IF($DK4=2.5,"Neutral",(IF($DK4>2.5,"EGA",)))))&"-"&IF($DJ4<2.5,"IND",(IF($DJ4=2.5,"Neutral",(IF($DJ4>2.5,"COM",))))))
        - Combine Flood IND & Flood HIE to create Flood Cultural Identity variable
- Repeat for all rows of data
- Export into SPSS

Appendix F: SPSS Frequency, Cross Tabulation, and Chi Square Tables

Frequencies

Q1. True or false? Adding impervious surfaces like streets or sidewalks makes a neighborhood more prone to flooding.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	13	65.0	65.0	65.0
	False	6	30.0	30.0	95.0
	Unsure	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q2. At what depth will flood water begin to float most vehicles?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	About 6 inches	9	45.0	45.0	45.0
	About 1-2 feet	9	45.0	45.0	90.0
	More than 2 feet	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q3. True or false? An area with sand-like soil is more likely to flood than an area with clay-like soil.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	4	20.0	20.0	20.0
	False	13	65.0	65.0	85.0
	Unsure	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q4. Select all of the following that are true. I can help reduce the flood risk of my community and my home by:

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Removing debris from storm drains	7	35.0	35.0	35.0
	None of the above	1	5.0	5.0	40.0
	Removing debris from storm drain & planting a rain garden	10	50.0	50.0	90.0
	123	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q5. Of the choices below, what is the biggest cause of coastal flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Storm surge	18	90.0	90.0	90.0
	Clogged gutters	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q6. True or False? Flood impacts can be limited by installing special fencing to block the water from entering the home.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	8	40.0	40.0	40.0
	False	3	15.0	15.0	55.0
	Unsure	9	45.0	45.0	100.0
	Total	20	100.0	100.0	

Q7. When did you last experience a flood?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	This past year	6	30.0	30.0	30.0
	1-2 years ago	4	20.0	20.0	50.0
	3-5 years ago	4	20.0	20.0	70.0
	6-10 years ago	1	5.0	5.0	75.0
	More than 10 years ago	1	5.0	5.0	80.0

	I have never experienced a flood	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Q8. Have you ever experienced the following as a result of flooding? (Select all that apply)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Temporarily evacuated during an event (e.g., stayed at a shelter, hotel, or with a friend)	11	55.0	55.0	55.0
	Been displaced for a short period of time (1-2 weeks)	2	10.0	10.0	65.0
	I have never experienced a flood	4	20.0	20.0	85.0
	Temporarily evacuated & displaced for a short time	2	10.0	10.0	95.0
	Temporarily evacuated, displaced for a short time, displaced for a long time, & lost home and relocated	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q9. When you imagine a flood, what would be the worst thing for you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Casualties, death	12	60.0	60.0	60.0
	Evacuation	1	5.0	5.0	65.0
	Destruction (house, landscape, possessions, etc.)	6	30.0	30.0	95.0
	Effort for cleaning up	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q10. I already seek information about being prepared for flooding.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	35.0	35.0	35.0
	Agree	7	35.0	35.0	70.0
	Disagree	3	15.0	15.0	85.0
	Strongly disagree	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q11. I intend to be better prepared for future flooding.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	8	40.0	40.0	40.0
	Agree	10	50.0	50.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q12. Please rank the following - Location (Distance to work, shopping, restaurants, entertainment, etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Most important	2	10.0	10.0	10.0
	Important	5	25.0	25.0	35.0
	Neither important nor unimportant	4	20.0	20.0	55.0
	Unimportant	4	20.0	20.0	75.0
	Most Unimportant	5	25.0	25.0	100.0
	Total	20	100.0	100.0	

Q12. Please rank the following - Neighborhood (Low crime rates, quality of public schools, etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Most important	11	55.0	55.0	55.0

	Important	3	15.0	15.0	70.0
	Neither important nor unimportant	3	15.0	15.0	85.0
	Most Unimportant	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q12. Please rank the following - Risk level (Flood, hurricane, wind, etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Most important	1	5.0	5.0	5.0
	Important	3	15.0	15.0	20.0
	Neither important nor unimportant	6	30.0	30.0	50.0
	Unimportant	8	40.0	40.0	90.0
	Most Unimportant	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q12. Please rank the following - Size (Number of bedrooms, bathrooms, square footage, etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Most important	6	30.0	30.0	30.0
	Important	7	35.0	35.0	65.0
	Neither important nor unimportant	3	15.0	15.0	80.0
	Unimportant	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Q12. Please rank the following - Amenities (Garage, premium interior, pool, etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Important	2	10.0	10.0	10.0

	Neither important nor unimportant	4	20.0	20.0	30.0
	Unimportant	4	20.0	20.0	50.0
	Most Unimportant	10	50.0	50.0	100.0
	Total	20	100.0	100.0	

Q12. Please rank the following - Other (please specify)

		Frequency	Percent
Missing	System	20	100.0

Q12. Please rank the following - Other Text

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		20	100.0	100.0	100.0

Q13. Assuming your home is in this floodplain, what is the chance of the home flooding over the next 15 years?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	71%	2	10.0	10.0	10.0
	46%	16	80.0	80.0	90.0
	19%	1	5.0	5.0	95.0
	Unsure	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q14. Assuming your home is in this floodplain, what is the chance of the home flooding next year?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	46%	3	15.0	15.0	15.0
	19%	1	5.0	5.0	20.0
	4%	15	75.0	75.0	95.0

	Unsure	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q15. What does this graphic show about the chance of flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	This home's cumulative chance of flooding increases over time.	18	90.0	90.0	90.0
	This home's cumulative chance of flooding does not change over time.	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q16. I would buy a home located in the kind of floodplain represented in the chart above.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	10.0	10.0	10.0
	Agree	10	50.0	50.0	60.0
	Disagree	6	30.0	30.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q17. From 1% to 100%, what cumulative chance of flooding over 30 years (the typical lifetime of a mortgage) would be too high for you to purchase a home? - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Flooding matters in my decision	18	90.0	90.0	90.0
	The chance of flooding does not matter in my decision	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q17. From 1% to 100%, what cumulative chance of flooding over 30 years (the typical lifetime of a mortgage) would be too high for you to purchase a home? - Specify your percentage below. Type your answer as a number (For example, use 63 for 63%) - Text

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	10.0	10.0	10.0
	10	3	15.0	15.0	25.0
	20	3	15.0	15.0	40.0
	25	2	10.0	10.0	50.0
	40	2	10.0	10.0	60.0
	50	3	15.0	15.0	75.0
	70	1	5.0	5.0	80.0
	75	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Q18. Looking at this graphic, how much do you think that flooding will impact you personally?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Only a little	10	50.0	50.0	50.0
	A moderate amount	6	30.0	30.0	80.0
	A great deal	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Q19. Pay to elevate your home to reduce flood damages.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	9	45.0	45.0	45.0
	Only a little	5	25.0	25.0	70.0
	A moderate amount	3	15.0	15.0	85.0
	A great deal	3	15.0	15.0	100.0

	Total	20	100.0	100.0	

Q20. Sell and move out if flood insurance was not available for this home.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	5	25.0	25.0	25.0
	Only a little	6	30.0	30.0	55.0
	A moderate amount	4	20.0	20.0	75.0
	A great deal	5	25.0	25.0	100.0
	Total	20	100.0	100.0	

Q21. Purchase flood insurance even if it becomes less affordable over time.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Only a little	7	35.0	35.0	35.0
	A moderate amount	7	35.0	35.0	70.0
	A great deal	6	30.0	30.0	100.0
	Total	20	100.0	100.0	

Q22. Install sandbags every time a flood advisory is issued for this home.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Only a little	9	45.0	45.0	45.0
	A moderate amount	4	20.0	20.0	65.0
	A great deal	7	35.0	35.0	100.0
	Total	20	100.0	100.0	

Q23. Pay to maintain and upgrade a seawall for this home.

		Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Not at all	4	20.0	20.0	20.0
	Only a little	8	40.0	40.0	60.0
	A moderate amount	6	30.0	30.0	90.0
	A great deal	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q24. Consider the following scenarios over the life of a 30-year mortgage for this home. Which of the following are you most likely to do to reduce your own flood risk? (choose one)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Do nothing	2	10.0	10.0	10.0
	Invest in low-cost flood mitigation	9	45.0	45.0	55.0
	Invest in medium-cost flood mitigation	8	40.0	40.0	95.0
	Invest in high-cost flood mitigation	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q25. Assuming your home is in this floodplain, what is the expected total cost of flooding over the next 30 years?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	About $75,000	7	35.0	35.0	35.0
	About $20,000	7	35.0	35.0	70.0
	About $4,000	6	30.0	30.0	100.0
	Total	20	100.0	100.0	

Q26. Assuming your home is in this floodplain, what is the expected cost of flooding for this particular home next year?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	About $2,500	15	75.0	75.0	75.0

	About $10,000	1	5.0	5.0	80.0
	About $50,000	1	5.0	5.0	85.0
	Unsure	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q27. What does this graphic show about the cumulative cost of flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	This home's cumulative chance of flooding increases over time.	18	90.0	90.0	90.0
	This home's cumulative chance of flooding does not change over time.	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q28. I would buy a home located in the kind of floodplain represented in the chart above.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	15.0	15.0	15.0
	Agree	10	50.0	50.0	65.0
	Disagree	4	20.0	20.0	85.0
	Strongly disagree	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q29. From $1 to $100,000, what total cost of flooding over 30 years (the typical lifetime of a mortgage) would be too high for you to purchase a home? - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Flooding matters in my decision	16	80.0	80.0	80.0

	The chance of flooding does not matter in my decision	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Q29. From $1 to $100,000, what total cost of flooding over 30 years (the typical lifetime of a mortgage) would be too high for you to purchase a home? - Specify your cost below. Type your answer as a number (For example, use 63000 for $63,000) - Text

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	20.0	20.0	20.0
	1000	1	5.0	5.0	25.0
	10000	2	10.0	10.0	35.0
	15000	1	5.0	5.0	40.0
	20000	1	5.0	5.0	45.0
	25000	1	5.0	5.0	50.0
	30000	3	15.0	15.0	65.0
	45000	1	5.0	5.0	70.0
	50,000	1	5.0	5.0	75.0
	5000	3	15.0	15.0	90.0
	50000	1	5.0	5.0	95.0
	8000	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q30. Looking at this graphic, how much do you think that flooding will impact you personally?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Only a little	6	30.0	30.0	30.0
	A moderate amount	8	40.0	40.0	70.0
	A great deal	6	30.0	30.0	100.0
	Total	20	100.0	100.0	

Q31. Pay to elevate your home to reduce flood damages.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	5	25.0	25.0	25.0
	Only a little	10	50.0	50.0	75.0
	A moderate amount	2	10.0	10.0	85.0
	A great deal	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q32. Sell and move out if flood insurance was not available for this home.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	8	40.0	40.0	40.0
	Only a little	2	10.0	10.0	50.0
	A moderate amount	3	15.0	15.0	65.0
	A great deal	7	35.0	35.0	100.0
	Total	20	100.0	100.0	

Q33. Purchase flood insurance even if it becomes less affordable over time.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Only a little	5	25.0	25.0	25.0
	A moderate amount	12	60.0	60.0	85.0
	A great deal	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q34. Install sandbags every time a flood advisory is issued for this home.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	1	5.0	5.0	5.0
	Only a little	4	20.0	20.0	25.0

	A moderate amount	7	35.0	35.0	60.0
	A great deal	8	40.0	40.0	100.0
	Total	20	100.0	100.0	

Q35. Pay to maintain and upgrade a seawall for this home.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	4	20.0	20.0	20.0
	Only a little	6	30.0	30.0	50.0
	A moderate amount	7	35.0	35.0	85.0
	A great deal	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q36. Consider the following scenarios over the life of a 30-year mortgage for this home. Which of the following are you most likely to do to reduce your own flood risk? (choose one)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Do nothing	1	5.0	5.0	5.0
	Invest in low-cost flood mitigation	9	45.0	45.0	50.0
	Invest in medium-cost flood mitigation	9	45.0	45.0	95.0
	Invest in high-cost flood mitigation	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q37. It is up to me how serious the consequences of flooding will impact me.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	20.0	20.0	20.0
	Agree	8	40.0	40.0	60.0
	Disagree	7	35.0	35.0	95.0

	Strongly disagree	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q38. Flooding causes feelings of dread in me, on the level of a gut reaction.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	20.0	20.0	20.0
	Agree	11	55.0	55.0	75.0
	Disagree	3	15.0	15.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q39. Flood news reports make me scared.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	7	35.0	35.0	35.0
	Agree	5	25.0	25.0	60.0
	Disagree	7	35.0	35.0	95.0
	Strongly disagree	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q40. Flooding has me concerned for the future of my community, my family, and/or my daily life.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	30.0	30.0	30.0
	Agree	7	35.0	35.0	65.0
	Disagree	5	25.0	25.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q41. Flooding has me concerned for substantial damage to my house, possessions, and/or public infrastructure.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	30.0	30.0	30.0
	Agree	8	40.0	40.0	70.0
	Disagree	4	20.0	20.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q42. Flooding will become more and more dangerous over time.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	9	45.0	45.0	45.0
	Agree	7	35.0	35.0	80.0
	Disagree	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Q43. The experts know enough about flooding to protect us.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	10.0	10.0	10.0
	Agree	10	50.0	50.0	60.0
	Disagree	5	25.0	25.0	85.0
	Strongly disagree	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q44. I have confidence in the technical skills of flood control engineers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	25.0	25.0	25.0
	Agree	11	55.0	55.0	80.0
	Disagree	3	15.0	15.0	95.0

	Strongly disagree	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q45. The government should not be allowed to tell people where they can live, even if that location is at high risk of flooding.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	25.0	25.0	25.0
	Agree	9	45.0	45.0	70.0
	Disagree	5	25.0	25.0	95.0
	Strongly disagree	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q46. The government should protect my community by investing in infrastructure such as better drainage systems and flood control structures.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	13	65.0	65.0	65.0
	Agree	7	35.0	35.0	100.0
	Total	20	100.0	100.0	

Q47. If people wanted to lower their flood risk, then they should just do so.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	6	30.0	30.0	30.0
	Agree	9	45.0	45.0	75.0
	Disagree	5	25.0	25.0	100.0
	Total	20	100.0	100.0	

Q48. Flooding impacts low-income and minority groups disproportionately and unfairly.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	10	50.0	50.0	50.0
	Agree	7	35.0	35.0	85.0
	Disagree	2	10.0	10.0	95.0
	Strongly disagree	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q49. I believe that even if I do everything right, my home will still be at risk of flooding if my neighbors don't do the same things.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	25.0	25.0	25.0
	Agree	6	30.0	30.0	55.0
	Disagree	9	45.0	45.0	100.0
	Total	20	100.0	100.0	

Q50. I would be willing to reduce the flood risk of my home for the good of my neighborhood.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	25.0	25.0	25.0
	Agree	13	65.0	65.0	90.0
	Disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q51. I would be willing to reduce the flood risk of my home for the benefit of a wider group of people beyond my neighborhood who are particularly worse-off than me.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	25.0	25.0	25.0
	Agree	11	55.0	55.0	80.0
	Disagree	2	10.0	10.0	90.0

	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q52. I trust the government to do what is right.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	5.0	5.0	5.0
	Agree	9	45.0	45.0	50.0
	Disagree	7	35.0	35.0	85.0
	Strongly disagree	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q53. Science enables us to overcome almost any problem.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	15.0	15.0	15.0
	Agree	9	45.0	45.0	60.0
	Disagree	6	30.0	30.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q54. Our society would be better off if the distribution of wealth were more equal.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	9	45.0	45.0	45.0
	Agree	8	40.0	40.0	85.0
	Disagree	1	5.0	5.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q55. If the government spent less time trying to fix everyone's problems, we'd all be a lot better off.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	10.0	10.0	10.0
	Agree	4	20.0	20.0	30.0
	Disagree	12	60.0	60.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q56. We have gone too far in pushing equal rights in this country.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	25.0	25.0	25.0
	Agree	1	5.0	5.0	30.0
	Disagree	7	35.0	35.0	65.0
	Strongly disagree	7	35.0	35.0	100.0
	Total	20	100.0	100.0	

Q57. The government should do more to advance society's goals, even if it means limiting the choices of individuals.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	15.0	15.0	15.0
	Agree	3	15.0	15.0	30.0
	Disagree	12	60.0	60.0	90.0
	Strongly disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q58. Climate change poses a significant risk to human health, safety, or prosperity.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	11	55.0	55.0	55.0
	Agree	6	30.0	30.0	85.0
	Neither agree nor disagree	1	5.0	5.0	90.0

	Disagree	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q59. Which of these statements best describes your political party affiliation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Republican	3	15.0	15.0	15.0
	Leaning Republican	4	20.0	20.0	35.0
	Independent or No Part Affiliation	3	15.0	15.0	50.0
	Leaning Democratic	6	30.0	30.0	80.0
	Strongly Democratic	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

Q60. Which of these statements best describes your ideological views?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Liberal	2	10.0	10.0	10.0
	Leaning Liberal	3	15.0	15.0	25.0
	Neither Liberal nor Conservative	7	35.0	35.0	60.0
	Leaning Conservative	5	25.0	25.0	85.0
	Strongly Conservative	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q61. Is the home in which you currently live:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Owned by you or someone in your household with a mortgage or loan?	13	65.0	65.0	65.0

	Owned by you or someone in your household free and clear (without a mortgage or loan)?	6	30.0	30.0	95.0
	Rented?	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q62. With which gender do you most closely identify? - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	5	25.0	25.0	25.0
	Female	15	75.0	75.0	100.0
	Total	20	100.0	100.0	

Q62. With which gender do you most closely identify? - Other (please specify) - Text

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		20	100.0	100.0	100.0

Q63. What is your age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-34	6	30.0	30.0	30.0
	35-49	5	25.0	25.0	55.0
	50-64	6	30.0	30.0	85.0
	65 and over	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Q64. Please indicate your household's annual income.

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	$15,000 to $24,999	1	5.0	5.0	5.0
	$25,000 to $49,999	7	35.0	35.0	40.0
	$50,000 to $74,999	7	35.0	35.0	75.0
	$75,000 to $99,999	2	10.0	10.0	85.0
	$100,000 to $199,999	2	10.0	10.0	95.0
	$200,000 or more	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q65. With which racial and ethnic group(s) do you identify? Select all that apply. - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Asian	1	5.0	5.0	5.0
	Black or African American	1	5.0	5.0	10.0
	Hispanic, Latino, or Spanish origin	2	10.0	10.0	20.0
	White	14	70.0	70.0	90.0
	Hispanic & White	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Q65. With which racial and ethnic group(s) do you identify? Select all that apply. - Another race or ethnicity not listed above - Text

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		20	100.0	100.0	100.0

Q66. Which one of these best represents your educational background?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Science and engineering	2	10.0	14.3	14.3
	Business	5	25.0	35.7	50.0
	Education	2	10.0	14.3	64.3
	Arts and humanities	3	15.0	21.4	85.7

	Trade or vocational	2	10.0	14.3	100.0
	Total	14	70.0	100.0	
Missing	System	6	30.0		
Total		20	100.0		

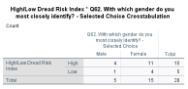
Q67. What is your highest level of education? - Selected Choice

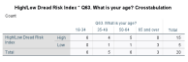
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school graduate (includes equivalency)	3	15.0	15.0	15.0
	Some college or associate degree	10	50.0	50.0	65.0
	Bachelor's degree	4	20.0	20.0	85.0
	Master's degree	2	10.0	10.0	95.0
	Other	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Q67. What is your highest level of education? - Other - Text

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		19	95.0	95.0	95.0
	Some college, finished vocational school	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Cross Tabulations





Pass/Fail Literacy Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fail	17	85.0	85.0	85.0
	Pass	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Pass/Fail Numeracy Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fail	5	25.0	25.0	25.0
	Pass	15	75.0	75.0	100.0
	Total	20	100.0	100.0	

Low/High Mitigation Behaviors Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	11	55.0	55.0	55.0
	High	9	45.0	45.0	100.0
	Total	20	100.0	100.0	

Low/High Graphic Risk Perceptions Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	9	45.0	45.0	45.0
	High	11	55.0	55.0	100.0
	Total	20	100.0	100.0	

High/Low Dread Risk Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	15	75.0	75.0	75.0
	Low	5	25.0	25.0	100.0
	Total	20	100.0	100.0	

High/Low Trust in Experts Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	16	80.0	80.0	80.0
	Low	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

High/Low Trust in Institutions Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	13	65.0	65.0	65.0
	Low	7	35.0	35.0	100.0
	Total	20	100.0	100.0	

High/Low Willingness to Purchase Index (Categorical)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	13	65.0	65.0	65.0
	Low	7	35.0	35.0	100.0
	Total	20	100.0	100.0	

High/Low Willingness to Purchase Index (Scale)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	10	50.0	50.0	50.0
	Low	10	50.0	50.0	100.0
	Total	20	100.0	100.0	

High/Low Willingness to Purchase Index (Combo)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	10	50.0	50.0	50.0
	Low	10	50.0	50.0	100.0
	Total	20	100.0	100.0	

High/Low Social Solidarity Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	17	85.0	85.0	85.0
	Low	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

Kahan Cultural Theory Placement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EGA-COM	3	15.0	15.0	15.0
	EGA-IND	2	10.0	10.0	25.0
	EGA-Neutral	8	40.0	40.0	65.0
	HIE-IND	2	10.0	10.0	75.0
	Neutral-COM	2	10.0	10.0	85.0
	Neutral-IND	1	5.0	5.0	90.0
	Neutral-Neutral	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Flood Cultural Theory Placement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EGA-COM	7	35.0	35.0	35.0
	EGA-Neutral	1	5.0	5.0	40.0

	HIE-COM	1	5.0	5.0	45.0
	HIE-Neutral	2	10.0	10.0	55.0
	Neutral-COM	3	15.0	15.0	70.0
	Neutral-Neutral	6	30.0	30.0	100.0
	Total	20	100.0	100.0	

Combo Cultural Theory Placement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EGA-COM	8	40.0	40.0	40.0
	HIE-COM	2	10.0	10.0	50.0
	HIE-IND	2	10.0	10.0	60.0
	HIE-Neutral	1	5.0	5.0	65.0
	Neutral-COM	6	30.0	30.0	95.0
	Neutral-Neutral	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Base Kahan Placement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EGA-COM	10	50.0	50.0	50.0
	EGA-IND	3	15.0	15.0	65.0
	HIE-COM	3	15.0	15.0	80.0
	HIE-IND	4	20.0	20.0	100.0

Total	20	100.0	100.0	

Simplified Cross Tabulations

			Q59. Which of these statements best describes your po affiliation?			
			Strongly Republican	Leaning Republican	Independent or No Part	Leaning Democratic
Pass/Fail Literacy Index	Fail	Count	3	2	3	5
	Pass	Count	0	2	0	1
Pass/Fail Comprehension Index	Fail	Count	1	2	1	0
	Pass	Count	2	2	2	6
Low/High Mitigation Behaviors Index	Low	Count	1	2	3	1
	High	Count	2	2	0	5
Low/High Graphic Risk Perceptions	Low	Count	2	2	0	3
	High	Count	1	2	3	3
High/Low Dread Risk Index	High	Count	2	3	3	5
	Low	Count	1	1	0	1
High/Low Trust in Experts Index	High	Count	2	2	3	5
	Low	Count	1	2	0	1
High/Low Trust in Institutions	High	Count	2	2	1	5
	Low	Count	1	2	2	1
High/Low Willingness to Purchase Index (Categorical)	High	Count	2	2	3	4
	Low	Count	1	2	0	2
High/Low Social Solidarity Index	High	Count	2	3	3	6
	Low	Count	1	1	0	0
Kahan Cultural Theory Placement	EGA-COM	Count	0	0	0	2
	EGA-IND	Count	1	1	0	0
	EGA-Neutral	Count	0	0	3	3
	HIE-IND	Count	1	1	0	0
	Neutral-COM	Count	0	0	0	1
	Neutral-IND	Count	0	1	0	0
	Neutral-Neutr	Count	1	1	0	0

Flood Cultural Theory Placement	EGA-COM	Count	0	0	1	4
	EGA-Neutral	Count	0	1	0	0
	HIE-COM	Count	0	0	0	1
	HIE-Neutral	Count	0	2	0	0
	Neutral-COM	Count	0	1	0	1
	Neutral-Neutr	Count	3	0	2	0
Combo Cultural Theory Placement	EGA-COM	Count	0	0	1	5
	EGA-IND	Count	1	1	0	0
	EGA-Neutral	Count	0	0	2	0
	HIE-COM	Count	0	0	0	1
	HIE-IND	Count	1	2	0	0
	Neutral-COM	Count	0	1	0	0
	Neutral-Neutr	Count	1	0	0	0
HIE_IND_KahanCT_Index	EGA-COM	Count	0	0	3	5
	EGA-IND	Count	1	2	0	0
	HIE-COM	Count	2	0	0	1
	HIE-IND	Count	0	2	0	0

litical party	Q60. Which of these statements best describes your ideological views?					Q61. Is t
Strongly Democratic	Strongly Liberal	Leaning Liberal	Neither Liberal nor	Leaning Conservative	Strongly Conservative	Owned by you or
4	2	3	6	3	3	11
0	0	0	1	2	0	2
1	0	1	2	2	0	3
3	2	2	5	3	3	10
4	2	3	3	2	1	6
0	0	0	4	3	2	7
2	1	0	2	3	3	5
2	1	3	5	2	0	8
2	2	1	7	4	1	10
2	0	2	0	1	2	3
4	2	2	7	3	2	11
0	0	1	0	2	1	2
3	1	1	6	3	2	10
1	1	2	1	2	1	3
2	2	1	5	3	2	10
2	0	2	2	2	1	3
3	2	3	6	4	2	13
1	0	0	1	1	1	0
1	0	1	2	0	0	3
0	0	0	1	1	0	2
2	1	2	4	1	0	4
0	0	0	0	1	1	0
1	1	0	0	0	1	2
0	0	0	0	1	0	1
0	0	0	0	1	1	1

2	1	2	3	0	1	5
0	0	0	0	1	0	1
0	0	0	1	0	0	0
0	0	0	0	2	0	1
1	1	0	0	2	0	3
1	0	1	3	0	2	3
2	1	2	3	1	1	6
0	0	0	1	1	0	2
1	0	1	2	0	0	2
0	0	0	1	0	0	0
0	0	0	0	2	1	1
1	1	0	0	1	0	2
0	0	0	0	0	1	0
3	1	3	6	1	0	7
0	0	0	1	2	0	3
0	0	0	0	0	3	1
1	1	0	0	2	0	2

the home in which you currently live:			Q62. With which gender do you most closely identify? - Selected Choice			
Owned by you or	Rented?	Occupied without	Male	Female	Other	Prefer not to say
5	1	0	5	12	0	0
1	0	0	0	3	0	0
2	0	0	2	3	0	0
4	1	0	3	12	0	0
4	1	0	3	8	0	0
2	0	0	2	7	0	0
4	0	0	2	7	0	0
2	1	0	3	8	0	0
4	1	0	4	11	0	0
2	0	0	1	4	0	0
5	0	0	3	13	0	0
1	1	0	2	2	0	0
3	0	0	2	11	0	0
3	1	0	3	4	0	0
3	0	0	4	9	0	0
3	1	0	1	6	0	0
3	1	0	4	13	0	0
3	0	0	1	2	0	0
0	0	0	0	3	0	0
0	0	0	1	1	0	0
3	1	0	2	6	0	0
2	0	0	1	1	0	0
0	0	0	1	1	0	0
0	0	0	0	1	0	0
1	0	0	0	2	0	0

1	1	0	2	5	0	0
0	0	0	0	1	0	0
1	0	0	0	1	0	0
1	0	0	0	2	0	0
0	0	0	0	3	0	0
3	0	0	3	3	0	0
1	1	0	2	6	0	0
0	0	0	1	1	0	0
1	0	0	1	2	0	0
1	0	0	0	1	0	0
2	0	0	1	2	0	0
0	0	0	0	2	0	0
1	0	0	0	1	0	0
3	1	0	2	9	0	0
0	0	0	1	2	0	0
2	0	0	2	1	0	0
1	0	0	0	3	0	0

Q63. What is your age?				Q64. Please indicate		
18-34	35-49	50-64	65 and over	Less than $15,000	$15,000 to $24,999	$25,000 to $49,999
5	4	6	2	0	1	7
1	1	0	1	0	0	0
0	2	1	2	0	0	2
6	3	5	1	0	1	5
4	3	2	2	0	1	4
2	2	4	1	0	0	3
3	1	3	2	0	1	3
3	4	3	1	0	0	4
6	4	5	0	0	1	4
0	1	1	3	0	0	3
6	3	4	3	0	1	6
0	2	2	0	0	0	1
5	3	4	1	0	1	4
1	2	2	2	0	0	3
5	2	4	2	0	0	4
1	3	2	1	0	1	3
5	5	5	2	0	0	7
1	0	1	1	0	1	0
2	1	0	0	0	0	0
0	1	1	0	0	0	0
3	1	3	1	0	1	4
0	0	1	1	0	0	0
1	0	1	0	0	0	1
0	1	0	0	0	0	1
0	1	0	1	0	0	1

4	1	2	0	0	1	2
0	1	0	0	0	0	0
0	0	1	0	0	0	1
0	1	0	1	0	0	1
1	1	1	0	0	0	0
1	1	2	2	0	0	3
4	1	3	0	0	1	2
0	1	1	0	0	0	0
1	1	0	1	0	0	2
0	0	1	0	0	0	1
0	1	1	1	0	0	1
1	1	0	0	0	0	0
0	0	0	1	0	0	1
5	2	3	1	0	1	4
0	2	1	0	0	0	1
0	0	2	1	0	0	2
1	1	0	1	0	0	0

e your household's annual income.				Q65. With which ra		
$50,000 to $74,999	$75,000 to $99,999	$100,000 to $199,999	$200,000 or more	American Indian or	Asian	Black or African
4	2	2	1	0	0	1
3	0	0	0	0	1	0
3	0	0	0	0	1	0
4	2	2	1	0	0	1
2	2	1	1	0	0	0
5	0	1	0	0	1	1
2	0	2	1	0	0	1
5	2	0	0	0	1	0
6	1	2	1	0	1	1
1	1	0	0	0	0	0
5	2	1	1	0	0	1
2	0	1	0	0	1	0
5	1	1	1	0	1	1
2	1	1	0	0	0	0
5	1	2	1	0	0	1
2	1	0	0	0	1	0
6	2	1	1	0	1	1
1	0	1	0	0	0	0
2	1	0	0	0	0	0
2	0	0	0	0	0	0
1	1	1	0	0	0	1
1	0	1	0	0	0	0
0	0	0	1	0	0	0
0	0	0	0	0	0	0
1	0	0	0	0	1	0

2	2	0	0	0	0	0
1	0	0	0	0	0	0
0	0	0	0	0	0	0
1	0	0	0	0	0	0
1	0	1	1	0	1	1
2	0	1	0	0	0	0
2	2	1	0	0	0	1
2	0	0	0	0	0	0
1	0	0	0	0	0	0
0	0	0	0	0	0	0
1	0	1	0	0	0	0
1	0	0	1	0	1	0
0	0	0	0	0	0	0
3	2	1	0	0	0	1
2	0	0	0	0	0	0
0	0	1	0	0	0	0
2	0	0	1	0	1	0

cial and ethnic group(s) do you identify? Select all that apply. - Selected Choice

Hispanisc, Latino, or	Middle Eastern or	Native Hawaiian or	White	Another race or ethnicity	Prefer not to say	Hispanic & White
2	0	0	13	0	0	1
0	0	0	1	0	0	1
0	0	0	4	0	0	0
2	0	0	10	0	0	2
1	0	0	9	0	0	1
1	0	0	5	0	0	1
2	0	0	6	0	0	0
0	0	0	8	0	0	2
2	0	0	9	0	0	2
0	0	0	5	0	0	0
2	0	0	11	0	0	2
0	0	0	3	0	0	0
2	0	0	8	0	0	1
0	0	0	6	0	0	1
2	0	0	8	0	0	2
0	0	0	6	0	0	0
2	0	0	11	0	0	2
0	0	0	3	0	0	0
1	0	0	1	0	0	1
0	0	0	2	0	0	0
0	0	0	6	0	0	1
0	0	0	2	0	0	0
1	0	0	1	0	0	0
0	0	0	1	0	0	0
0	0	0	1	0	0	0

1	0	0	4	0	0	2
0	0	0	1	0	0	0
0	0	0	1	0	0	0
0	0	0	2	0	0	0
1	0	0	0	0	0	0
0	0	0	6	0	0	0
1	0	0	4	0	0	2
0	0	0	2	0	0	0
0	0	0	3	0	0	0
0	0	0	1	0	0	0
0	0	0	3	0	0	0
1	0	0	0	0	0	0
0	0	0	1	0	0	0
1	0	0	7	0	0	2
0	0	0	3	0	0	0
0	0	0	3	0	0	0
1	0	0	1	0	0	0

Q66. Which one of these best represents your educational background?						
Science and engineering	Business	Education	Arts and humanities	Trade or vocational	Not applicable	Less than high school
1	5	2	3	2	0	0
1	0	0	0	0	0	0
0	2	0	1	0	0	0
2	3	2	2	2	0	0
1	2	2	2	1	0	0
1	3	0	1	1	0	0
1	2	1	0	1	0	0
1	3	1	3	1	0	0
2	4	1	2	1	0	0
0	1	1	1	1	0	0
1	4	2	2	2	0	0
1	1	0	1	0	0	0
1	3	2	0	2	0	0
1	2	0	3	0	0	0
2	4	1	2	1	0	0
0	1	1	1	1	0	0
1	5	2	3	2	0	0
1	0	0	0	0	0	0
1	0	1	0	0	0	0
0	1	0	1	0	0	0
0	3	0	2	1	0	0
1	0	0	0	0	0	0
0	1	1	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	1	0	0

1	2	1	1	0	0	0
0	0	0	1	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	1	1	0	0	0	0
1	2	0	1	2	0	0
1	3	1	1	0	0	0
0	1	0	1	0	0	0
0	1	0	1	1	0	0
0	0	0	0	0	0	0
1	0	0	0	0	0	0
0	0	1	0	0	0	0
0	0	0	0	1	0	0
1	3	1	2	1	0	0
0	1	0	1	0	0	0
1	1	0	0	1	0	0
0	0	1	0	0	0	0

Q67. What is your highest level of education? - Selected Choice						
High school graduate	Some college or associate	Bachelor's degree	Master's degree	Doctoral degree	Military or vocational	Other
2	9	3	2	0	0	1
1	1	1	0	0	0	0
1	2	2	0	0	0	0
2	8	2	2	0	0	1
2	4	2	2	0	0	1
1	6	2	0	0	0	0
2	5	0	2	0	0	0
1	5	4	0	0	0	1
2	8	2	2	0	0	1
1	2	2	0	0	0	0
3	9	2	1	0	0	1
0	1	2	1	0	0	0
2	7	2	1	0	0	1
1	3	2	1	0	0	0
1	8	1	2	0	0	1
2	2	3	0	0	0	0
1	10	4	1	0	0	1
2	0	0	1	0	0	0
0	2	1	0	0	0	0
0	1	1	0	0	0	0
2	4	1	0	0	0	1
1	0	0	1	0	0	0
0	1	0	1	0	0	0
0	1	0	0	0	0	0
0	1	1	0	0	0	0

1	5	1	0	0	0	0
0	0	1	0	0	0	0
1	0	0	0	0	0	0
1	1	0	0	0	0	0
0	1	1	1	0	0	0
0	3	1	1	0	0	1
1	6	1	0	0	0	0
0	1	1	0	0	0	0
0	1	1	0	0	0	1
1	0	0	0	0	0	0
1	1	0	1	0	0	0
0	0	1	1	0	0	0
0	1	0	0	0	0	0
2	6	2	0	0	0	1
0	2	1	0	0	0	0
0	2	0	1	0	0	0
1	0	1	1	0	0	0

Pass/Fail Literacy Index		Pass/Fail Comprehension Index		Low/High Mitigation Behaviors Index		Low/High G Percep
Fail	Pass	Fail	Pass	Low	High	Low
17	0	3	14	10	7	8
0	3	2	1	1	2	1
3	2	5	0	3	2	1
14	1	0	15	8	7	8
10	1	3	8	11	0	5
7	2	2	7	0	9	4
8	1	1	8	5	4	9
9	2	4	7	6	5	0
13	2	3	12	8	7	6
4	1	2	3	3	2	3
14	2	4	12	9	7	8
3	1	1	3	2	2	1
11	2	2	11	5	8	7
6	1	3	4	6	1	2
11	2	4	9	8	5	7
6	1	1	6	3	4	2
15	2	4	13	8	9	6
2	1	1	2	3	0	3
2	1	0	3	1	2	1
2	0	1	1	0	2	0
8	0	2	6	6	2	2
1	1	1	1	2	0	2
2	0	0	2	1	1	2
1	0	0	1	1	0	1
1	1	1	1	0	2	1

6	1	0	7	4	3	3
1	0	0	1	0	1	0
1	0	0	1	0	1	0
1	1	1	1	2	0	2
2	1	1	2	1	2	2
6	0	3	3	4	2	2
7	1	0	8	4	4	4
2	0	1	1	0	2	0
3	0	2	1	3	0	0
1	0	0	1	0	1	0
2	1	1	2	3	0	3
1	1	1	1	1	1	1
1	0	0	1	0	1	1
10	1	2	9	7	4	3
3	0	1	2	1	2	1
3	0	0	3	1	2	3
1	2	2	1	2	1	2

iraphic Risk ptions	High/Low Dread Risk Index		High/Low Trust in Experts Index		High/Low Trust in Institutions	
High	High	Low	High	Low	High	Low
9	13	4	14	3	11	6
2	2	1	2	1	2	1
4	3	2	4	1	2	3
7	12	3	12	3	11	4
6	8	3	9	2	5	6
5	7	2	7	2	8	1
0	6	3	8	1	7	2
11	9	2	8	3	6	5
9	15	0	11	4	10	5
2	0	5	5	0	3	2
8	11	5	16	0	12	4
3	4	0	0	4	1	3
6	10	3	12	1	13	0
5	5	2	4	3	0	7
6	10	3	12	1	8	5
5	5	2	4	3	5	2
11	13	4	14	3	12	5
0	2	1	2	1	1	2
2	2	1	3	0	3	0
2	2	0	1	1	1	1
6	7	1	7	1	4	4
0	1	1	1	1	0	2
0	1	1	2	0	2	0
0	1	0	1	0	1	0
1	1	1	1	1	2	0

4	5	2	6	1	5	2
1	1	0	0	1	0	1
1	1	0	1	0	1	0
0	1	1	2	0	1	1
1	3	0	2	1	3	0
4	4	2	5	1	3	3
4	6	2	7	1	6	2
2	2	0	1	1	1	1
3	2	1	3	0	1	2
1	1	0	1	0	1	0
0	2	1	2	1	1	2
1	2	0	1	1	2	0
0	0	1	1	0	1	0
8	9	2	10	1	7	4
2	3	0	2	1	2	1
0	1	2	2	1	2	1
1	2	1	2	1	2	1

High/Low Willingness to Purchase Index (Categorical)		High/Low Social Solidarity Index		Kahan Cu		
High	Low	High	Low	EGA-COM	EGA-IND	EGA-Neutral
11	6	15	2	2	2	8
2	1	2	1	1	0	0
4	1	4	1	0	1	2
9	6	13	2	3	1	6
8	3	8	3	1	0	6
5	4	9	0	2	2	2
7	2	6	3	1	0	2
6	5	11	0	2	2	6
10	5	13	2	2	2	7
3	2	4	1	1	0	1
12	4	14	2	3	1	7
1	3	3	1	0	1	1
8	5	12	1	3	1	4
5	2	5	2	0	1	4
13	0	11	2	2	1	5
0	7	6	1	1	1	3
11	6	17	0	3	2	7
2	1	0	3	0	0	1
2	1	3	0	3	0	0
1	1	2	0	0	2	0
5	3	7	1	0	0	8
2	0	0	2	0	0	0
2	0	2	0	0	0	0
1	0	1	0	0	0	0
0	2	2	0	0	0	0

4	3	6	1	3	0	3
0	1	1	0	0	1	0
0	1	1	0	0	0	1
2	0	1	1	0	0	0
2	1	3	0	0	0	1
5	1	5	1	0	1	3
5	3	7	1	3	0	4
1	1	2	0	0	2	0
3	0	3	0	0	0	3
0	1	1	0	0	0	1
3	0	1	2	0	0	0
1	1	2	0	0	0	0
0	1	1	0	0	0	0
7	4	10	1	3	0	8
2	1	3	0	0	2	0
2	1	2	1	0	0	0
2	1	2	1	0	0	0

Itural Theory Placement				Flood Cultural Th		
HIE-IND	Neutral-COM	Neutral-IND	Neutral-Neutral	EGA-COM	EGA-Neutral	HIE-COM
1	2	1	1	6	1	1
1	0	0	1	1	0	0
1	0	0	1	0	0	0
1	2	1	1	7	1	1
2	1	1	0	4	0	0
0	1	0	2	3	1	1
2	2	1	1	3	0	0
0	0	0	1	4	1	1
1	1	1	1	5	1	1
1	1	0	1	2	0	0
1	2	1	1	6	0	1
1	0	0	1	1	1	0
0	2	1	2	5	0	1
2	0	0	0	2	1	0
2	2	1	0	4	0	0
0	0	0	2	3	1	1
0	2	1	2	6	1	1
2	0	0	0	1	0	0
0	0	0	0	3	0	0
0	0	0	0	0	1	0
0	0	0	0	3	0	1
2	0	0	0	0	0	0
0	2	0	0	1	0	0
0	0	1	0	0	0	0
0	0	0	2	0	0	0

0	1	0	0	7	0	0
0	0	0	0	0	1	0
0	0	0	0	0	0	1
1	0	1	0	0	0	0
0	1	0	1	0	0	0
1	0	0	1	0	0	0
0	1	0	0	7	0	0
0	0	0	0	0	1	0
0	0	0	0	0	0	0
0	0	0	0	0	0	1
2	0	1	0	0	0	0
0	1	0	1	0	0	0
0	0	0	1	0	0	0
0	0	0	0	6	0	1
0	0	1	0	0	1	0
1	1	0	1	1	0	0
1	1	0	1	0	0	0

heory Placement			Combo Cultural Theory P			
HIE-Neutral	Neutral-COM	Neutral-Neutral	EGA-COM	EGA-IND	EGA-Neutral	HIE-COM
1	2	6	7	2	3	1
1	1	0	1	0	0	0
1	1	3	0	1	2	0
1	2	3	8	1	1	1
2	1	4	4	0	3	0
0	2	2	4	2	0	1
2	2	2	4	0	0	0
0	1	4	4	2	3	1
1	3	4	6	2	2	1
1	0	2	2	0	1	0
2	2	5	7	1	3	1
0	1	1	1	1	0	0
1	3	3	6	1	1	1
1	0	3	2	1	2	0
2	2	5	5	1	3	0
0	1	1	3	1	0	1
1	3	5	7	2	3	1
1	0	1	1	0	0	0
0	0	0	3	0	0	0
0	0	1	0	2	0	0
0	1	3	4	0	3	1
1	0	1	0	0	0	0
0	1	0	1	0	0	0
1	0	0	0	0	0	0
0	1	1	0	0	0	0

0	0	0	7	0	0	0
0	0	0	0	1	0	0
0	0	0	0	0	0	1
2	0	0	0	0	0	0
0	3	0	1	0	0	0
0	0	6	0	1	3	0
0	1	0	8	0	0	0
0	0	1	0	2	0	0
0	0	3	0	0	3	0
0	0	0	0	0	0	1
2	0	1	0	0	0	0
0	2	0	0	0	0	0
0	0	1	0	0	0	0
0	1	3	7	0	3	1
1	0	1	0	2	0	0
0	0	2	1	0	0	0
1	2	0	0	0	0	0

Placement			HIE_IND_KahanCT_Index			
HIE-IND	Neutral-COM	Neutral-Neutral	EGA-COM	EGA-IND	HIE-COM	HIE-IND
2	1	1	10	3	3	1
1	1	0	1	0	0	2
1	1	0	2	1	0	2
2	1	1	9	2	3	1
3	1	0	7	1	1	2
0	1	1	4	2	2	1
3	1	1	3	1	3	2
0	1	0	8	2	0	1
2	2	0	9	3	1	2
1	0	1	2	0	2	1
2	1	1	10	2	2	2
1	1	0	1	1	1	1
1	2	1	7	2	2	2
2	0	0	4	1	1	1
3	1	0	7	2	2	2
0	1	1	4	1	1	1
1	2	1	10	3	2	2
2	0	0	1	0	1	1
0	0	0	3	0	0	0
0	0	0	0	2	0	0
0	0	0	8	0	0	0
2	0	0	0	0	1	1
0	1	0	0	0	1	1
1	0	0	0	1	0	0
0	1	1	0	0	1	1

0	0	0	6	0	1	0
0	0	0	0	1	0	0
0	0	0	1	0	0	0
2	0	0	0	1	0	1
0	2	0	1	0	0	2
1	0	1	3	1	2	0
0	0	0	7	0	1	0
0	0	0	0	2	0	0
0	0	0	3	0	0	0
0	0	0	1	0	0	0
3	0	0	0	1	1	1
0	2	0	0	0	0	2
0	0	1	0	0	1	0
0	0	0	11	0	0	0
1	0	0	0	3	0	0
1	0	1	0	0	3	0
1	2	0	0	0	0	3

Simplified Chi-Square Analyses

		Q59	Q60	Q61	Q62	Q63	Q64
Q59	Chi-square	.	30.04	4.701	5.778	20.222	18.69
	df	.	16	8	4	12	20
	Sig.	.a	.018*,c,d	.789c,d	.216c,d	.063c,d	.542c,d
Q60	Chi-square	30.04	.	10.144	5.27	17.295	28.02
	df	16	.	8	4	12	20
	Sig.	.018*,c,d	.a	.255c,d	.261c,d	.139c,d	.109c,d
Q61	Chi-square	4.701	10.144	.	3.863	5.376	7.894
	df	8	8	.	2	6	10
	Sig.	.789c,d	.255c,d	.a	.145c,d	.497c,d	.639c,d
Q62	Chi-square	5.778	5.27	3.863	.	8.622	3.619
	df	4	4	2	.	3	5
	Sig.	.216c,d	.261c,d	.145c,d	.a	.035*,c,d	.605c,d
Q63	Chi-square	20.222	17.295	5.376	8.622	.	15.381
	df	12	12	6	3	.	15
	Sig.	.063c,d	.139c,d	.497c,d	.035*,c,d	.a	.424c,d
Q64	Chi-square	18.69	28.02	7.894	3.619	15.381	.
	df	20	20	10	5	15	.
	Sig.	.542c,d	.109c,d	.639c,d	.605c,d	.424c,d	.a
Q65	Chi-square	12.262	17.102	4.615	2.857	16.429	26.837
	df	16	16	8	4	12	20
	Sig.	.726c,d	.379c,d	.798c,d	.582c,d	.172c,d	.140c,d
Q66	Chi-square	20.028	12.289	5.32	8.338	13.432	16.473
	df	16	16	8	4	12	16
	Sig.	.219c,d	.724c,d	.723c,d	.080c,d	.338c,d	.420c,d
Q67	Chi-square	21.111	17.505	11	4.533	12.378	24.214
	df	16	16	8	4	12	20
	Sig.	.174c,d	.354c,d	.202c,d	.339c,d	.416c,d	.233c,d
Literacy	Chi-square	5.621	3.866	0.191	1.176	1.961	6.555
	df	4	4	2	1	3	5
	Sig.	.229c,d	.425c,d	.909c,d	.278c,d	.581c,d	.256c,d
Comprehension	Chi-square	3.556	2.425	0.581	0.8	5.6	3.238
	df	4	4	2	1	3	5
	Sig.	.469c,d	.658c,d	.748c,d	.371c	.133c,d	.663c,d
Mitigation	Chi-square	9.899	5.532	1.559	0.067	1.684	5.281
	df	4	4	2	1	3	5
	Sig.	.042*,c	.237c,d	.459c,d	.795c	.641c	.383c,d
Perceptions	Chi-square	3.165	7.359	2.181	0.067	1.953	7.302
	df	4	4	2	1	3	5
	Sig.	.531c	.118c,d	.336c,d	.795c	.582c	.199c,d
Dread	Chi-square	2.667	8.622	0.581	0.089	11.289	3.619
	df	4	4	2	1	3	5

	Sig.	.615c,d	.071c,d	.748c,d	.766c	.010*,c,d	.605c,d
Trust in Experts	Chi-square	4.375	4.167	4.215	1.667	4.167	2.589
	df	4	4	2	1	3	5
	Sig.	.358c,d	.384c,d	.122c,d	.197c,d	.244c,d	.763c,d
Trust in Institutions	Chi-square	2.784	2.899	3.263	1.832	2.271	1.79
	df	4	4	2	1	3	5
	Sig.	.595c	.575c,d	.196c,d	.176c	.518c	.877c,d
Home-Buying	Chi-square	2.418	2.585	3.263	0.659	2.271	3.987
	df	4	4	2	1	3	5
	Sig.	.659c	.629c,d	.196c,d	.417c	.518c	.551c,d
Social Solidarity	Chi-square	3.007	1.774	8.235	0.131	1.699	9.356
	df	4	4	2	1	3	5
	Sig.	.557c,d	.777c,d	.016*,c,d	.718c,d	.637c,d	.096c,d
Kahan Cultural Theory Placement	Chi-square	26.528	23.258	10.737	4	15.944	27.5
	df	24	24	12	6	18	30
	Sig.	.327c,d	.505c,d	.552c,d	.677c,d	.596c,d	.597c,d
Flood Cultural Theory Placement	Chi-square	29.484	23.229	8.059	4.381	14.206	19.218
	df	20	20	10	5	15	25
	Sig.	.079c,d	.278c,d	.623c,d	.496c,d	.510c,d	.787c,d
Combo Cultural Theory Placement	Chi-square	34.028	22.671	10.78	2.222	17.583	24.464
	df	24	24	12	6	18	30
	Sig.	.084c,d	.539c,d	.548c,d	.898c,d	.483c,d	.751c,d
HIE_IND_KahanCT_Index	Chi-square	24.343	31.03	4.134	4.162	10.141	15.238
	df	12	12	6	3	9	15
	Sig.	.018*,c,d	.002*,c,d	.659c,d	.245c,d	.339c,d	.434c,d
Results are based on nonempty rows and columns in each innermost subtable.							
* The Chi-square statistic is significant at the .05 level.							
a The Chi-square test is not performed for this subtable because row and column variables are identic							

c More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may
d The minimum expected cell count in this subtable is less than one. Chi-square results may be invalid

Q65	Q66	Q67	Literacy	Comprehension	Mitigation	Perceptions	Dread
12.262	20.028	21.111	5.621	3.556	9.899	3.165	2.667
16	16	16	4	4	4	4	4
.726c,d	.219c,d	.174c,d	.229c,d	.469c,d	.042*,c	.531c	.615c,d
17.102	12.289	17.505	3.866	2.425	5.532	7.359	8.622
16	16	16	4	4	4	4	4
.379c,d	.724c,d	.354c,d	.425c,d	.658c,d	.237c,d	.118c,d	.071c,d
4.615	5.32	11	0.191	0.581	1.559	2.181	0.581
8	8	8	2	2	2	2	2
.798c,d	.723c,d	.202c,d	.909c,d	.748c,d	.459c,d	.336c,d	.748c,d
2.857	8.338	4.533	1.176	0.8	0.067	0.067	0.089
4	4	4	1	1	1	1	1
.582c,d	.080c,d	.339c,d	.278c,d	.371c	.795c	.795c	.766c
16.429	13.432	12.378	1.961	5.6	1.684	1.953	11.289
12	12	12	3	3	3	3	3
.172c,d	.338c,d	.416c,d	.581c,d	.133c,d	.641c	.582c	.010*,c,d
26.837	16.473	24.214	6.555	3.238	5.281	7.302	3.619
20	16	20	5	5	5	5	5
.140c,d	.420c,d	.233c,d	.256c,d	.663c,d	.383c,d	.199c,d	.605c,d
.	12.18	11.786	8.796	4.762	2.973	6.147	2.857
.	12	16	4	4	4	4	4
.a	.431c,d	.759c,d	.066c,d	.313c,d	.562c,d	.188c,d	.582c,d
12.18	.	19.639	6.462	2.913	2.294	2.24	1.913
12	.	12	4	4	4	4	4
.431c,d	.a	.074c,d	.167c,d	.572c,d	.682c,d	.692c,d	.752c,d
11.786	19.639	.	1.83	2.578	3.569	7.205	2.578
16	12	.	4	4	4	4	4
.759c,d	.074c,d	.a	.767c,d	.631c,d	.467c,d	.125c,d	.631c,d
8.796	6.462	1.83	.	3.268	0.669	0.194	0.131
4	4	4	.	1	1	1	1
.066c,d	.167c,d	.767c,d	.a	.071c,d	.413c	.660c	.718c,d
4.762	2.913	2.578	3.268	.	0.067	1.684	0.8
4	4	4	1	.	1	1	1
.313c,d	.572c,d	.631c,d	.071c,d	.a	.795c	.194c	.371c
2.973	2.294	3.569	0.669	0.067	.	0.002	0.067
4	4	4	1	1	.	1	1
.562c,d	.682c,d	.467c,d	.413c	.795c	.a	.964c	.795c
6.147	2.24	7.205	0.194	1.684	0.002	.	0.606
4	4	4	1	1	1	.	1
.188c,d	.692c,d	.125c,d	.660c	.194c	.964c	.a	.436c
2.857	1.913	2.578	0.131	0.8	0.067	0.606	.
4	4	4	1	1	1	1	.

.582c,d	.752c,d	.631c,d	.718c,d	.371c	.795c	.436c	.a
5.268	2.319	5	0.392	0	0.051	0.808	1.667
4	4	4	1	1	1	1	1
.261c,d	.677c,d	.287c,d	.531c,d	1.000c,d	.822c	.369c	.197c,d
2.732	7.058	1.245	0.004	1.832	4.105	1.174	0.073
4	4	4	1	1	1	1	1
.604c,d	.133c,d	.871c,d	.948c	.176c	.043*,c	.279c	.787c
4.929	1.913	6.74	0.004	0.659	0.642	1.174	0.073
4	4	4	1	1	1	1	1
.295c,d	.752c,d	.150c,d	.948c	.417c	.423c	.279c	.787c
1.513	6.462	10.85	0.93	0.131	2.888	4.314	0.131
4	4	4	1	1	1	1	1
.824c,d	.167c,d	.028*,c,d	.335c,d	.718c,d	.089c	.038*,c	.718c,d
20.893	24.111	18.125	6.928	4	9.226	9.226	3.778
24	20	24	6	6	6	6	6
.645c,d	.238c,d	.797c,d	.328c,d	.677c,d	.161c,d	.161c,d	.707c,d
21.361	10.018	19.31	4.127	5.778	4.993	4.993	2.603
20	12	20	5	5	5	5	5
.376c,d	.614c,d	.502c,d	.531c,d	.328c,d	.417c,d	.417c,d	.761c,d
20.893	22.867	25.347	3.987	7.556	9.899	9.899	4.889
24	20	24	6	6	6	6	6
.645c,d	.295c,d	.387c,d	.678c,d	.273c,d	.129c,d	.129c,d	.558c,d
11.775	10.442	10.162	7.641	4.162	1.635	5.797	4.162
12	12	12	3	3	3	3	3
.464c,d	.577c,d	.602c,d	.054c,d	.245c,d	.652c	.122c	.245c,d
al.							

Trust in Experts	Trust in Institutions	Home-Buying	Social Solidarity	Kahan Cultural Theory	Flood Cultural Theory	Combo Cultural Theory	HIE_IND_KahanCT_Index
4.375	2.784	2.418	3.007	26.528	29.484	34.028	24.343
4	4	4	4	24	20	24	12
.358c,d	.595c	.659c	.557c,d	.327c,d	.079c,d	.084c,d	.018*,c,d
4.167	2.899	2.585	1.774	23.258	23.229	22.671	31.03
4	4	4	4	24	20	24	12
.384c,d	.575c,d	.629c,d	.777c,d	.505c,d	.278c,d	.539c,d	.002*,c,d
4.215	3.263	3.263	8.235	10.737	8.059	10.78	4.134
2	2	2	2	12	10	12	6
.122c,d	.196c,d	.196c,d	.016*,c,d	.552c,d	.623c,d	.548c,d	.659c,d
1.667	1.832	0.659	0.131	4	4.381	2.222	4.162
1	1	1	1	6	5	6	3
.197c,d	.176c	.417c	.718c,d	.677c,d	.496c,d	.898c,d	.245c,d
4.167	2.271	2.271	1.699	15.944	14.206	17.583	10.141
3	3	3	3	18	15	18	9
.244c,d	.518c	.518c	.637c,d	.596c,d	.510c,d	.483c,d	.339c,d
2.589	1.79	3.987	9.356	27.5	19.218	24.464	15.238
5	5	5	5	30	25	30	15
.763c,d	.877c,d	.551c,d	.096c,d	.597c,d	.787c,d	.751c,d	.434c,d
5.268	2.732	4.929	1.513	20.893	21.361	20.893	11.775
4	4	4	4	24	20	24	12
.261c,d	.604c,d	.295c,d	.824c,d	.645c,d	.376c,d	.645c,d	.464c,d
2.319	7.058	1.913	6.462	24.111	10.018	22.867	10.442
4	4	4	4	20	12	20	12
.677c,d	.133c,d	.752c,d	.167c,d	.238c,d	.614c,d	.295c,d	.577c,d
5	1.245	6.74	10.85	18.125	19.31	25.347	10.162
4	4	4	4	24	20	24	12
.287c,d	.871c,d	.150c,d	.028*,c,d	.797c,d	.502c,d	.387c,d	.602c,d
0.392	0.004	0.004	0.93	6.928	4.127	3.987	7.641
1	1	1	1	6	5	6	3
.531c,d	.948c	.948c	.335c,d	.328c,d	.531c,d	.678c,d	.054c,d
0	1.832	0.659	0.131	4	5.778	7.556	4.162
1	1	1	1	6	5	6	3
1.000c,d	.176c	.417c	.718c,d	.677c,d	.328c,d	.273c,d	.245c,d
0.051	4.105	0.642	2.888	9.226	4.993	9.899	1.635
1	1	1	1	6	5	6	3
.822c	.043*,c	.423c	.089c	.161c,d	.417c,d	.129c,d	.652c
0.808	1.174	1.174	4.314	9.226	4.993	9.899	5.797
1	1	1	1	6	5	6	3
.369c	.279c	.279c	.038*,c	.161c,d	.417c,d	.129c,d	.122c
1.667	0.073	0.073	0.131	3.778	2.603	4.889	4.162
1	1	1	1	6	5	6	3

Appendix G: IRB Approval Letter - FAU

Institutional Review Board
Division of Research
777 Glades Rd.
Boca Raton, FL 33431
Tel: 561.297.1383
fau.edu/research/researchint

Charles Dukes, Ed.D., Ph.D., Chair

DATE:	May 17, 2021
TO:	Colin Polsky
FROM:	Florida Atlantic University Social, Behavioral and Educational Research IRB
PROTOCOL #:	1647542-4
PROTOCOL TITLE:	[1647542-4] How do flood risk information and cultural identity affect flood risk perceptions and flood risk mitigation behaviors?
SUBMISSION TYPE:	Amendment/Modification
ACTION:	APPROVED
EFFECTIVE DATE:	May 14, 2021

Thank you for your submission of Amendment materials for this research protocol. The Florida Atlantic University IRB has approved your request to modify your protocol as outlined below:

- Amendment to protocol and consent waiver to reflect changes for obtaining focus group consent

Please use the stamped, revised (consents, instruments, etc.) that accompany this approval letter.

- Protocol - FAU CES NAS Gulf Research Protocol_5.14.21_CLEANCOPY.docx (stamped)
- Consent Form - FAU CES NAS Gulf Research - Consent Paragraph_OnlineFocusGroups_Low Risk Anonymous Research_5.14.21.doc (stamped)

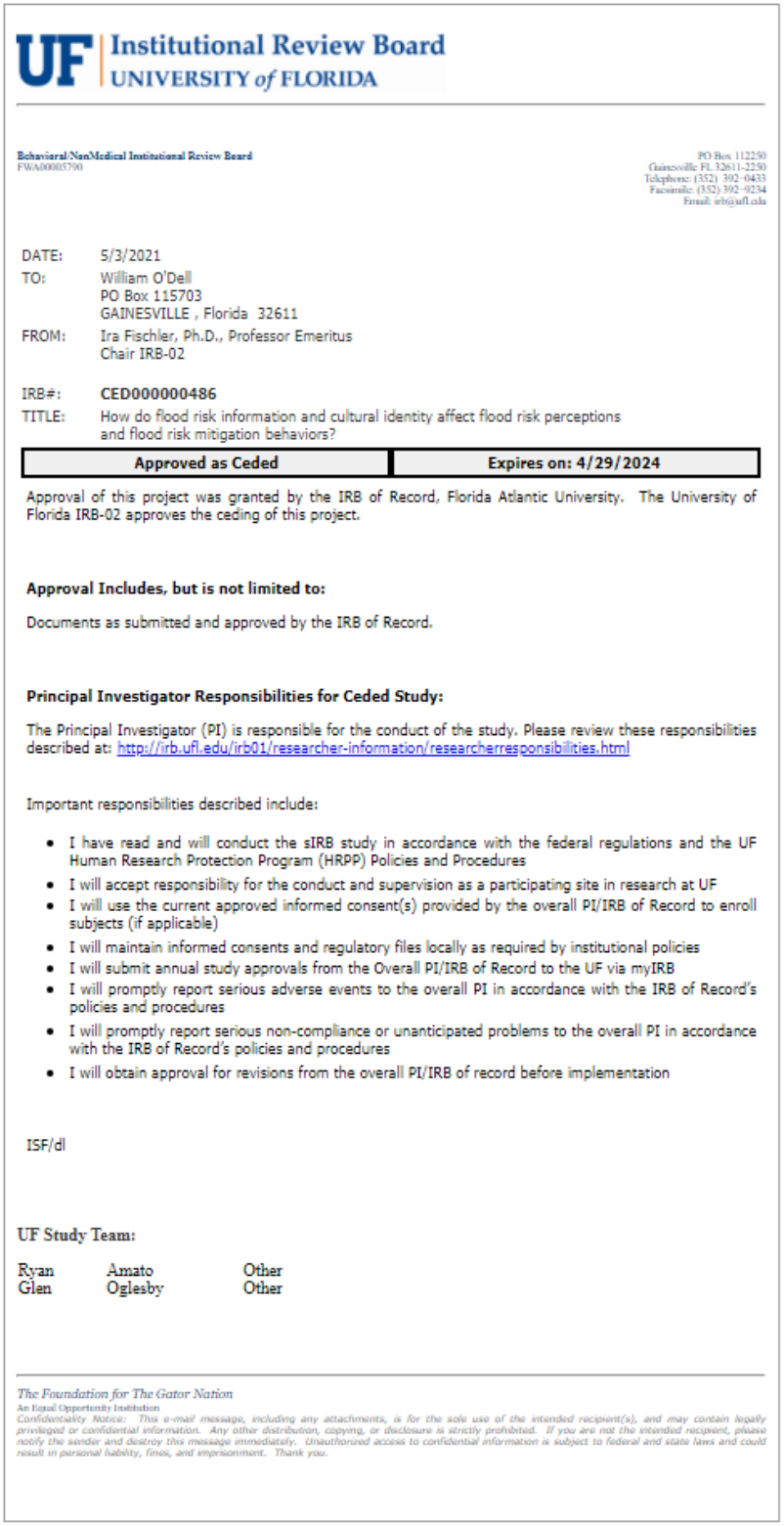
If you have any questions or comments about this correspondence, please contact Judith Martinez at:

Institutional Review Board
Research Integrity/Division of Research
Florida Atlantic University
Boca Raton, FL 33431
Phone: 561.297.1383
researchintegrity@fau.edu

* Please include your protocol number and title in all correspondence with this office.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within our records.

Appendix H: IRB Approval Letter - UF



UF Institutional Review Board
UNIVERSITY of FLORIDA

Behavioral/NonMedical Institutional Review Board
FWA00005790

PO Box 112250
Gainesville FL 32611-2250
Telephone: (352) 392-0433
Facsimile: (352) 392-9234
Email: irb@ufl.edu

DATE: 5/3/2021

TO: William O'Dell
PO Box 115703
GAINESVILLE , Florida 32611

FROM: Ira Fischler, Ph.D., Professor Emeritus
Chair IRB-02

IRB#: **CED000000486**

TITLE: How do flood risk information and cultural identity affect flood risk perceptions and flood risk mitigation behaviors?

Approved as Ceded	Expires on: 4/29/2024

Approval of this project was granted by the IRB of Record, Florida Atlantic University. The University of Florida IRB-02 approves the ceding of this project.

Approval Includes, but is not limited to:

Documents as submitted and approved by the IRB of Record.

Principal Investigator Responsibilities for Ceded Study:

The Principal Investigator (PI) is responsible for the conduct of the study. Please review these responsibilities described at: http://irb.ufl.edu/irb01/researcher-information/researcherresponsibilities.html

Important responsibilities described include:

- I have read and will conduct the sIRB study in accordance with the federal regulations and the UF Human Research Protection Program (HRPP) Policies and Procedures
- I will accept responsibility for the conduct and supervision as a participating site in research at UF
- I will use the current approved informed consent(s) provided by the overall PI/IRB of Record to enroll subjects (if applicable)
- I will maintain informed consents and regulatory files locally as required by institutional policies
- I will submit annual study approvals from the Overall PI/IRB of Record to the UF via myIRB
- I will promptly report serious adverse events to the overall PI in accordance with the IRB of Record's policies and procedures
- I will promptly report serious non-compliance or unanticipated problems to the overall PI in accordance with the IRB of Record's policies and procedures
- I will obtain approval for revisions from the overall PI/IRB of record before implementation

ISF/dl

UF Study Team:

Ryan	Amato	Other
Glen	Oglesby	Other

The Foundation for The Gator Nation
An Equal Opportunity Institution
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Appendix I: Focus Group Notes

500-Year Floodplain Focus Group 6.1.21

1. **Flood Awareness**
    a. New Orleans Man:
        i. Few different ways to look at it
        ii. Two different kinds of flooding near New Orleans
            1. 19 inches of rain in 24 hours
                a. Little bit of water in house
            2. Hurricane Katrina
                a. 5.5 feet of water in house
                    i. "You can clean storm drains but not much else you can do"
                    ii. "You can only put so many sandbags out"
                    iii. Before Katrina, had no retention ponds
                        1. *SPECULATION: Not aware of other mitigation efforts such as walls, bladders, etc.*
                            a. *Also, flood depth is often variable in people's minds based on their past experiences.*
    b. Middle aged Woman with glasses:
        i. We made a ditch to funnel the water closer to the river
    c. Older Woman:
        i. Someone tried to drive golf cart through a flooded tunnel and got stuck after Hurricane Irma
2. **Flood Chart Understanding**
    a. Young Woman:
        i. Graphics were intuitive but the line graph with larger surface area was more effective in being dramatic and showing severity (than the bar chart with probabilities)
        ii. Line graph felt more severe
            1. *SPECULATION: The numbers on the graphics are less impactful than the overall image itself. People tend to look quickly at the graphic and process a certain emotion or feeling on what it implies (System 1) rather than spend extra time to think through what the numbers are trying to convey (System 2).*
    b. New Orleans Man:
        i. Graphs were clear. I fully understood what they were trying to say.
        ii. Ex neighbor was paying $2,000 a year for flood insurance
            1. After fixing house & Katrina it went up to $35,000/yr!

c. 30 year old woman:
    i. Seeing the graph go up over next 30 years is unnerving b/c I plan to live in Florida for the rest of my life.
        1. *SPECULATION: Didn't consider flood risk over time in decision to move to FL.*

3. Flood Mitigation

a. New Orleans Man:
    i. You can't get a mortgage here anymore without flood insurance
    ii. I know people that walked away from their house after Katrina
    iii. No one can afford that bill to build back your home, but you have to have flood insurance
    iv. Government seems to be lacking most of the time
b. 30 year old Woman:
    i. Parents have a raise on their property
    ii. When I moved I made sure my next house was elevated. Most in this community are.
        1. House built in 2003. Thinks it's normal for neighborhood.
        2. We are close to Port Charlotte /Punta Gorda where Hurricane Charlie did damage.
            a. My biggest thing with this house was having it raised and no risk of water above roof.

4. Home-Buying Behavior

a. New Orleans Man:
    i. No way I would ever buy a home in a floodplain
        1. The risk is too high
    ii. You can't trust FEMA or the gov. to come up with a valid flood plain
        1. They kept changing the floodplain after Katrina
            a. SPECULATION: changing of information over time is perceived as bad or that the experts don't know what they're doing (certainty effect / similar arguments against climate change and weather).
    iii. Insurance companies would try to weed people out on every flood claim after Katrina
        1. We got $500 for spoiled food after losing windows and getting flooded
            a. Can't trust insurance companies
b. **No comments from sliding scale home buying Qs**

5. Emotions About Flooding

a. Young Woman:
    i. Q37 wording was a little strange
        1. Consider "I am responsible for consequences"

b. Older Woman:
    i. Flooding can also cause health impacts, diseases, sewage floating around, etc.
        1. Emotional impact worrying about new bacteria floating around
c. Middle-aged Woman with glasses:
    i. The news is saturated. It's not really dangerous but people watch the news and feel scared.
    ii. We evacuated Hurricane Irma to South Carolina b/c the news scared us.
        1. *SPECULATION: unless a hurricane makes direct landfall over one's home and it experiences severe damage, they don't think it's worth evacuating.*

6. Political Questions

a. New Orleans Man:
    i. I'm a strong republican / conservative but when a strong CAT 5 hurricane approaches your house we are all citizens at risk
b. Older Woman:
    i. I didn't see the political connection to flooding
        1. Came out of nowhere
        2. Out of place
c. 30 year old Woman:
    i. Consider asking if people have lived in location forever or first time
        1. Irma was terrifying for me since I just moved to Florida

7. Way of Life

a. Older Woman:
    i. Depends if you're living in US or Russia if we would be better off being more equal.
        1. All poor or…?
b. Young Woman:
    i. These Qs are good segway to public policy Qs
    ii. There could be more discussion to explain reason why
        1. Maybe allow for more public policy related Qs
        2. Allow for "Other" choice with text box
            a. SPECULATION: There are many nuances / caveats to these questions that seem to need further explanation
c. 30 year old Woman:
    i. Don't always agree with requiring flood insurance and mitigation activities b/c it's not affordable

8. Way of Life (Flooding)

a. Older Woman:

i. The only way you can lower your own flood risk is to not live in a floodplain
    1. *SPECULATION: Unaware of other mitigation options*
ii. I'm in Central Florida so I'm far enough from the coast to not worry about storm surge
    1. But some people insist on living near the beach, but only takes one hurricane to knock em out, then they rebuild in same area
    2. Q47 isn't a simple Q
        a. Hard to answer

b. 30 year old Woman:
    i. Have to think in advance to mitigate flood risk on own
c. Middle aged Woman with glasses:
    i. Not fair for low income groups who can't afford insurance or mitigation

9. Final Comments

a. 30 year old Woman:
    i. The repair sea wall Q doesn't apply to me but I answered it so consider "N/A"
        1. *SPECULATION: Most people think about their personal situations rather than imagine hypothetical scenarios*
b. New Orleans Man:
    i. This whole thing has dredged up some bad memories for me. Would love to do this again in future. I have a lot of experience w/ flooding.
    ii. We've been chased out of town so many times by hurricanes
        1. Weather man says it's coming then it veers
        2. Never know when it's going to be your turn again
        3. Causes high anxiety
        4. Don't know who to believe
        5. When it's your turn, RUN!
            a. SPECULATION: The dread is high but the trust in experts is very low for this lifelong republican/conservative

<u>100-Year Floodplain Focus Group 6.2.21</u>

1. Flood Awareness

a. Middle aged FL woman
    i. Questions were simple and straight forward. No issues.
b. Younger Louisiana woman
    i. Am I supposed to pretend like I had the money for mitigation actions or how much they cost?
c. Older woman

i. Pretty simple

2. **Flood Chart Understanding**
    a. Middle aged FL woman
        i. I'm forced to buy flood insurance so these questions don't really fit
        ii. My house sits up, my neighbor's house floods when we get a lot of rain
    b. Younger Louisiana woman
        i. No confusion, I understood them
    c. Middle aged man
        i. Straight forward, no confusion if you took the time to read the charts
3. **Flood Mitigation**
    a. Middle aged FL woman
        i. What did you mean by elevate house? Stick it up on stilts?
            1. I didn't know you could do that in Florida
            2. We moved to an area where we are in a flood zone, but we made sure our house is higher set than most in neighborhood.
                a. Tried to mitigate as much as we could
                    i. Higher elevation
    b. Younger Louisiana woman
        i. It's mandatory to elevate home now in my area. We are in the process of trying to get my house elevated. It's over 70 years old. Applying for grants now.
    c. Older Jacksonville man
        i. I'm not in a floodplain but my friend is. St. John's river overflows its banks at times.
            1. Consulted my friend but I don't know how much flood insurance costs
            2. If I don't get insurance and something happens what are the costs?
4. **Home-Buying Behavior**
    a. Middle aged FL woman
        i. It's simple. If you buy a house in that area you know what to do. Elevate it or buy stilts.
        ii. We were already buying the home, doing paperwork, putting money down and then considered flood insurance after.
            1. It was an added expense after the fact we didn't want to pay.
            2. Didn't want to lose deposit over it.
    b. Middle aged man
        i. I didn't take affordability into account. I based it on if I wanted to do it or not.

ii. Would it be worth knowing how recently these people had a flood experience? That would effect answers.

c. Younger Louisiana woman
    i. Easy straightforward
d. Older Jacksonville man
    i. I wasn't too concerned about flooding I just liked the house I bought but it was nice not to be in a flood zone. Bought in 2014.
    ii. I didn't factor cost of flooding into home purchase decision.
e. Older FL Panhandle woman
    i. Been in insurance industry over 20 years. No issue until Hurricane Michael came.
        1. Since then have flooded 2 or 3 times. I carried flood insurance but many don't.
        2. For first time in 20 years I was flooded. Came through front door.
            a. Weeks of drying it out, replacing floors and carpeting
            b. Thank goodness I had flood insurance
                i. The cost the other way for most people would be bankruptcy
                ii. Get treated differently if in the business
                    1. SPECULATION: believes that most people are uninsured or underinsured for flood

5. Emotions About Flooding

a. Younger Louisiana woman
    i. What did you mean by "It is up to me how serious the consequences of flooding will impact me"?
    ii. It's not really up to people sometimes if they can't afford it
b. Middle aged FL woman
    i. These are easy to understand
    ii. People need to concentrate less on what it costs $$ and more what it's going to put you through if you have a flood without insurance
        1. Very stressful dealing with damage and insurance companies
            a. SPECULATION: Even small amounts of monetary damages can cause high levels of emotional stress
c. Older FL Panhandle woman
    i. Easy to understand
    ii. Stressful and scary even with flood insurance
d. Younger woman (no cam)
    i. Easy to understand

6. Political Questions

a. Middle aged FL woman
    i. For me politics don't come in to it
    ii. You protect your home or you don't
    iii. Nice to have government come in after disaster and hand you a bunch of stuff but not always feasible
        1. Don't rely on politics
b. Younger Louisiana woman
    i. We can flood just with normal rain b/c we are on an island
    ii. Political party doesn't matter when you flood. We have both down here.
c. Older FL Panhandle woman
    i. I believe you should take your own responsibility for flooding but something needs to be done in Louisiana. A lot of flooding going on there.
        1. *SPECULATION: There are limits to personal responsibility / agency*

7. Way of Life

a. Middle aged FL woman
    i. I used to work as a waitress and we pooled our tips, which was nice. But I worked my butt off and others girls didn't but we all got the same money and that's not fair.
    ii. It would be nice if everything in the world was equal but it's not. You can't give a bunch of stuff away to one group and not the others.
    iii. Not fair my husband can work for his company for 30 years and someone can come out of high school making the same.
    iv. I don't see politicians and actors willing to give up their millions to poor people.
b. Older Jacksonville man
    i. I wondered when these questions came up when the survey has been all about flooding. How do they relate?
    ii. Some people feel like insurance is a good thing and others are skeptical or it's too expensive.
        1. How you feel about insurance in general is going to factor in
        2. How you feel about risk in general will impact decisions

8. Way of Life (Flooding)

a. Middle aged FL woman
    i. I think the gov. needs to reinforce stuff around Lake Okeechobee.
        1. Better drainage pipes
b. Younger Louisiana woman
    i. If people don't have the money to invest in flood mitigation they can't do it

ii. Gov. has been around here a few times marking off an area to build a levee but the levee never comes
    1. They should invest and be more proactive
iii. I think they did improve the pumps in New Orleans, but not much for us to prevent flooding from happening.
    1. Just things that once it happens they try to get it down quicker

c. Older FL Panhandle woman
    i. People don't mind helping after a catastrophe like Katrina but you (gov.) need to fix it so it doesn't happen again

9. Final Comments

a. Middle aged FL woman
    i. I'd like to see gov. take more proactive measures.
        1. Maybe a seawall or better levees

b. Older FL Panhandle woman
    i. Holland has the same soup bowl effect but they take better measures to deal with it
        1. They've developed a levee system that really works

<u>25-Year Floodplain Focus Group 6.3.21</u>

1. Flood Awareness

a. Older west coast FL man:
    i. Questions not confusing. I was thinking of my own experience during hurricanes. This is something we have gone through a lot here on west coast of FL.

b. Middle aged woman:
    i. I was thinking of my home answering these Qs. We have a river behind our house in the woods. Answered based on my experiences so far. No confusion.

c. Middle aged man w/ beard:
    i. Staying with my parents so storm surge shouldn't have much impact on them. My main concern was impacts on them and their property.

2. Flood Chart Understanding

a. Older west coast FL man:
    i. I wanted the chances of flooding to be low.
        1. I was being more emotional than intellectual by wishing the chances would be lower in the future.
            a. SPECULATION: He was surprised at how high the risk of flooding over 30 years was and had an emotional reaction that caused him some sense of

dread/fear, leading to him wishing of a different reality than what he saw. Tough to accept/process difficult emotions and the implications of science at times.

b. Older woman w/ glasses short hair pink shirt 1:
    i. I took it as a 50/50 chance every year. You could flood 2 or 3 times in a row and then not again for a few years.
        1. *SPECULATION: "50/50" is a generic phrase used for uncertainty. They don't really mean a 50%/50% chance of flooding, they just mean that it's not certain to happen every year but it's possible. 50/50 = nobody really knows and it can happen anytime. Justifies the certainty effect and struggles people have with probabilistic thinking.*
c. Older woman w/ glasses short hair pink shirt 2:
    i. I'm new to this being new to FL. What does a 100-year floodplain mean?
d. Middle aged woman:
    i. Based on graphs shown and questions given for graphs it was self-explanatory. No confusion.
    ii. Once again based in on how long I've been in home and experiences I've had. Been in home almost 20 years, never experienced flooding.
        1. We took the precautions to prevent it.

3. Flood Mitigation

a. Younger woman:
    i. Where we are located no one has sea walls so it wasn't a point I understood very well.
        1. We would stick out like a sore thumb if we built a sea wall in our area.
            a. SPECULATION: Fear of not fitting in with rest of neighborhood/social group/ culture
b. Older woman w/ glasses short hair pink shirt 1:
    i. When Irma came through a lot of sea walls were destroyed
        1. People were surprised that they have to maintain them and what they can or cannot do
        2. I think they were surprised sea walls weren't covered under homeowner insurance
c. Older woman w/ glasses short hair pink shirt 2:
    i. I thought about elevating home, if I were going to live right on the water I would want a home already elevated. Wouldn't want one I had to do that to.
        1. SPECULATION: Don't want to deal with the life disruption of elevating a home regardless of flood risk / costs

4. **Home-Buying Behavior**
    a. Older west coast FL man:
        i. To some extent the charts were a little bit difficult to understand.
            1. If it were more clear to the home buyer they would understand better and be more hesitant to buy in that area.
            2. The fill in the blank questions were easier to understand but seem to be two totally different things.
    b. Younger woman:
        i. I'm pretty data driven so I wish realtors had to give you charts like that. This is the actual % you could have to pay out over life of mortgage
            1. We get flood zone charts that tell you what zone you're in but don't explain it like these charts
                a. SPECULATION: FEMA flood zones are difficult to understand and don't lay out probabilities or costs clearly
    c. Older woman w/ glasses short hair pink shirt 1:
        i. People should be made aware what flood insurance costs and see how much they are willing to pay per year b/c it can get expensive.
    d. Middle aged woman:
        i. I based Q17 off of the neighborhood if you were in a flood zone.
            1. You have a 50/50 chance if you're going to flood or not no matter the flood zone
                a. SPECULATION: "50/50" is a generic phrase used for uncertainty. They don't really mean a 50%/50% chance of flooding, they just mean that it's not certain to happen every year but it's possible. 50/50 = nobody really knows and it can happen anytime. Justifies the certainty effect and struggles people have with probabilistic thinking.
            2. For Q29 it was hard to give a dollar amount b/c I don't want to spend any money to repair damages to my home.
                a. You buy a home hoping you don't have to spend any money on it
                    i. SPECULATION: you don't plan for long term costs common to many homeowners. Think/buy with short term emotion of house, location, safety, etc.
                b. Some years you have nothing happening when storms come through and some are worse than others
5. **Emotions About Flooding**

a. Older west coast FL man:
    i. These were some of the easiest questions. I was thinking about previous experiences with flooding, like Hurricane Irma.
        1. The feeling of dread, getting ready doing all you can
        2. If we put up sand bags every time it's a flood advisory we may as well leave them up as we have flood advisories very frequently.
    ii. First thing I would want to know when looking at a home is if it's in a flood zone
b. Younger woman:
    i. Level of fear is creeping up b/c water level is getting closer
    ii. We watched water back up in drainage system and get closer than ever to our home
    iii. Local gov. is doing a moratorium b/c areas that never flooded are now
        1. Personal anxiety is going up.
        2. We were safe, but may not always be b/c of those man made things
            a. SPECULATION: not considering factors such as sea level rise, increased precipitation in atmosphere, etc. Just thinking about things they see in daily life.
c. Older woman w/ glasses short hair pink shirt 1:
    i. If you have dread of flooding you shouldn't buy a home in that area to begin with (close to the coast).
d. Middle aged woman:
    i. Over 20 year period only had one scare of flooding about 5 or 6 years ago.
        1. We put sandbags down but water never came over. We put them down as a precaution.
        2. When you move into a neighborhood and really like the house, you do your homework but you know there are things you can do to prevent flooding.
            a. I don't fear it b/c I know there are things I can do to prevent it or keep it from getting really bad.
            b. Based these Qs on how long I've been in house and experiences we've had. Only one time.
                i. SPECULATION: basing it on previous flood experience but not increased risk over time

6. Political Questions

a. Older west coast FL man:
    i. These were the easiest questions and didn't require any thought. Automatic.

7. **Way of Life**
    a. Middle aged woman:
        i. As I answered these Qs, like Q54, I would assume that if there was flooding in an area regardless of where it was (rich or poor) it would be treated the same.
            1. Flooding is flooding regardless, it has to be fixed and people need help
                a. Some need help some don't
                b. We all have choices in life. We live it in different ways.
                    i. Some live better than others and some choose to live better than others
            2. Regarding equal rights, some people feel like nicer neighborhoods will get responded to first. Not nice neighborhoods feel the same way.
                a. Shouldn't the response be the same?
        ii. Questions could be worded different? Difficult to answer but I have my opinion.
8. **Way of Life (Flooding)**
    a. Older woman w/ glasses short hair pink shirt 2:
        i. I'm looking at Q45 (gov. should not be able to tell people where they can live).
            1. I agree with that but people should be told if an area has a high risk of flooding
                a. A realtor won't tell you that but maybe they should have to
                b. Being new to FL, I wouldn't know where to go or who to ask
                    i. Can't trust insurance company
                        1. *SPECULATION: Need for independent, trustworthy source like First Street Foundation to provide data and options*
    b. Middle aged woman:
        i. If I can go through these questions, Q48 (low income/minority groups) I would say yes
            1. Nicer neighborhoods houses are worth more. Not nice neighborhoods aren't priced as high.
                a. Moneys that are spent helping certain neighborhoods aren't going to be as high in a low income area as it would in a more prestigious area.
            2. Q45 (gov. should not be able to tell people where to live) I agree with that b/c people should do their due diligence.

        a. I live in FL and we know hurricane season is coming but we never assume we will be impacted by flooding from a hurricane so we buy a house based on location, affordability, and feeling safe.
    3. Q47 (if people wanted to lower flood risk they should do so). I agree however sometimes people can't.
        a. What happens if you can't? How do you get that help?
    4. Q46 (gov should protect my community by investing in infrastructure…) I agree but when a community is built they should have that anyway.
        a. When we build communities, these things should be put in place to begin with.
            i. SPECULATION: There are many nuances / caveats to these questions that seem to need further explanation

9. Final Comments

a. Older woman w/ glasses short hair pink shirt 1:
b. Older woman w/ glasses short hair pink shirt 2:
    i. When I moved here I didn't think about flooding at all
        1. Moving forward, I need to make a list of everything that's most important to me so that when a hurricane comes I pack up those things in my car and leave.
            a. SPECULATION: This process made her more aware and fearful of flooding. Inspired to leave next time a hurricane approaches.
c. Middle aged woman:
    i. I say 50/50 chance b/c I've lived in FL since 1998 in two different houses
        1. The one that wasn't in a flood zone experienced a little almost flooding
            a. Poor drainage contributed b/c when people mow their yards and blow grass into the streets it's backs up the drainage system and streets flood into yards
            b. We could prevent it if people cleaned up their grass from drains
        2. The home I'm in now is in a flood zone and has never experienced flooding
            a. SPECULATION: "50/50" is a generic phrase used for uncertainty. They don't really mean a 50%/50% chance of flooding, they just mean that it's not certain to happen every year but it's possible. 50/50

= nobody really knows and it can happen anytime. Justifies the certainty effect and struggles people have with probabilistic thinking.

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