It's all just in your head: How does a person's cultural identity affect their flood

risk perceptions and mitigation behaviors?

by

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Abstract

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As flood risk rises in the U.S., technology and insights rise too, but even with these advances we still see the consequences of flood risk. Together, the rational actor paradigm ("RAP"), psychometrics, and cultural theory help to explain risk perceptions and behaviors of 20 respondents. Results from the mixed-methods approach found the RAP insufficient, less accurate than a coin toss (48%), when explaining respondent behaviors. Rather, risk perceptions and behaviors of the RAP explain the behaviors of lower risk portrayal groups (66%) and higher income groups (80%), with higher risk portrayals being relying on respondents' trust in flood experts (45%) and cultural worldviews (55%). Cultural identities explain 65% of respondents' behaviors across levels of risk portrayal (500-, 100-, and 25-year floodplain), and risk portrayal types (cumulative and AAL). In a world with increased risk, technology, and knowledge, researchers need understand the explanatory power of the RAP, psychometrics, and cultural theory.

Dedication

This manuscript is dedicated to the role models in my life that sparked the interest in diving into cultural and political themes. This work is dedicated to my friends and family for their moral support and help. Though most instrumental in the drafting of this manuscript, I would like to dedicate this work to my girlfriend, Haley, who supported me and has proof-read this manuscript more times than either of us care to count.

Lastly, this manuscript is dedicated broadly to the field of science and the path that scientists stride forward upon, to the dreams of all those who've come before, and to the hopes of all those who'll follow. This manuscript is dedicated to those sets of hopes and dreams that weave together and form the path towards tomorrow.

It's all just in your head: How does a person's cultural identity affect their flood risk perceptions and mitigation behaviors?

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Chapter 1: Introduction

1.1 Problem Statement & Purpose Statement

Although it is common to believe that the potential for risk is a simple formula of probability times magnitude, the full story is much more multifaceted and involves variables scientists have been working to understand for decades now. Broadly, there are three frameworks which have been proposed to be influential in understanding the risk perceptions of people; these frameworks are the rational actor model or paradigm ("RAP"; Starr, 1969), the psychometric paradigm (Slovic, 1989), and cultural theory (Rayner, 1989; Kahan, 2011). The RAP provides a base framework of "how safe is safe enough" and asserts that human behaviors operate with intent to achieve maximization of expected utility in relation to "objective" scientific information about risk (Starr, 1969). The psychometric paradigm builds on the RAP by adding emotions to objective scientific risk information to help explain variations in risk perceptions (Marris et al., 1998). Cultural theory argues that cultural archetypes drive risk perceptions, sometimes even to the point of contradicting objective scientific risk information (Kahan, 2011).

This thesis will apply and compare, at varying depths, each of these frameworks as they relate to flood risk perceptions, mitigation, and home-buying behaviors. There are numerous papers and research questions that probe the concept of flood risk perceptions from the theoretical groundings of RAP framework (Botzen et al., 2013; Fan & Davlasheridze, 2016; Javeline et al., 2019; Liu et al., 2017; Mozumbder et al., 2011; Petrolia et al., 2013; Rey-Valette et al., 2019; Shao et al., 2020; Siegrist & Gutscher,

2008; Sikder & Mozumder, 2020; & Terpstra, 2011) and the psychological framework (Keller, Siegrist & Heinz, 2006; Siegrist & Heinz, 2006; Grothmann & Reusswig, 2006), though none are known to the writer that explicitly leverages cultural theory framework in explaining flood risk perceptions, mitigation, and home-buying behaviors, let alone the combination of the RAP, psychometrics, and cultural theory. The operationalization of the RAP, psychometrics, and cultural theory in this thesis has the potential to bring greater understanding to the field of risk communication, both within the context of flooding, as well as broadly to the communication of science as a whole.

The management of risks are intrinsically linked with the social relations that individuals make, just as much as risk management is linked with the evaluation of the probability and magnitude of the risk itself (Rayner & Canton, 1987). The importance of a person's societal relations, the cultural identity they most associate with, is more often than not downplayed in risk management and its assessment. It is critical to understand the cultural identity of a person to thoroughly understand how they perceive risk in their everyday lives and how those perceptions impact their decision-making.

The assessment of risk perceptions when exposed to risk hinges not solely on the risk an individual is exposed to, but also on the experiences and cultural identities that they carry with themselves. Cultural theory and the classifications of cultural identities have made tremendous strides in recent years, leading to the classification of the Egalitarian-Communitarian and the Hierarchical-Individualist (Kahan et al., 2012). These two groups are the most polarized cultural identities in terms of perceived risk regarding climate change, even more so than typical groups of polarization like Conservative Republicans and Liberal Democrats (Kahan et al., 2012). Despite an understanding that

risk perceptions are highly polarized between these two cultural identities, there is still little research that probes deeper into understanding more about risk perceptions, risk management, and mitigation behaviors. This research seeks to further the understanding of cultural theory by assessing how cultural identity plays a role in the interpretations of flood risk information, perceptions, mitigation, and home-buying behaviors.

1.2 Study Relevance

The 67 Florida counties plus the 35 Louisiana Parishes along the Gulf Coast make up approximately 7.5% of the total United States population. With rising sea levels, increased king tides, and other factors increasing the flood risk of these coastal communities, the population is finding themselves more vulnerable now than ever before as they move into the future (First Street Foundation, 2021). An analysis of the flood risk perceptions, mitigation, home-buying behaviors, flood risk literacy, and flood risk numeracy of these Gulf Coast residents will be instrumental in better understanding what they are perceiving and how they are, or are not, addressing those perceptions.

1.3 Study Significance

The states of Florida and Louisiana are known by tourists and visitors for their coastlines, with each states coastal communities having more intimate relationships with the water. Florida and Louisiana in particular have become a testing ground for what new innovations may or may not work in the future. This research is significant as a first step in understanding how flood risk information and cultural identity influence the perceptions, mitigation, and home-buying behaviors of Floridians and Louisianans. With this first step researchers, policymakers, and laypeople will be better equip to mitigate future flood risks and communicate flood risk information more effectively.

With an at-risk population of 25 million along the Gulf Coasts of Florida and Louisiana, and roughly 8.7 billion dollars of expected losses associated with residential properties for these areas this year alone (First Street Foundation, 2021), this study will provide vital insight into those counties to minimize the costly impacts of flooding. A successful analysis of homeowners can aid the individuals of the Gulf Coast as well as each state's respective policymakers. These understandings will then have the potential to aid not only these 25 million people, but also all communities across the United States that are impacted by flooding, allowing them to become more resilient to their independent flood risks.

1.4 Research Questions & Objectives

This research project addresses three research objectives, each with its own research question.

1.4.1 Research Objective 1

While Kahan (2015) has established that both climate change and global warming are deeply set in the cultural identities of a person, it is not yet known just how deeply. This research seeks to add depth to Kahan (2015) by assessing if these deeply held beliefs regarding climate change or global warming are present in one of the climate hazard events energized by them, specifically flooding. It is vital to the field of flood risk communication to know what information should be presented, and how. If flood risk communication sparks the same deep-seated ideals that Kahan (2015) found for climate change and global warming, then it would be true that flood risk communication does not follow the general rules of bounded rationality theory. In this sense, flood risk communications may need to focus less on flood risk per se (the objective scientific

information), and more on cultural features of the message. While bounded rationality theory asserts a reasonable belief that more information will help inform people when making decisions, the opposite could be true if flood risk communication is found to be a similar deeply held belief like climate change or global warming. There is a clear and present need to understand what, if any, polarized beliefs are present in flood risk communication. If such polarization exists, does the polarization grow larger with greater scientific numeracy?

1.4.2 Research Objective 2

Beyond the observations of polarization between the two most observed cultural identities groups, hierarchical-individualist, and egalitarian-communitarians, there is a need to dive deeper into understanding the two groups. Kahan (2013) and Kahan (2014) both observed how the two groups reacted to the same type of message with the actual information or presentation of the information varied slightly. The insights from Kahan (2013; Kahan, 2014) carry significant implications for not only climate change communications, but climate hazard communications more broadly. Knowing your audience is a key part of effective communication, because with the knowledge of your audience you can vary the same message across different platforms to achieve the best results. In the present case of flood risk in the United States in general, and the Gulf Coast coastal zone in particular, better results would manifest as fewer people living with high flood risk. If there is a type of flood risk communication that works better for some people but less for others, it is important to make note of the distinction between the two and to tailor communications to each group of people.

1.4.3 Research Objective 3

Understanding the degree to which a type of flood risk portrayal or risk portrayal level informs a person will be vital in constructing the "right" narrative and, in turn, to help said person learn the most information possible. Though if this information is taken in and was followed up with no action, was the communication of information even effective? Wong-Parodi & Fischhoff (2015) found that in hypothetical scenarios, when practical information was given to their respondents, there was an increase across all of their groups of study in "overall perceived risk." This shows that the introduction of information can have an impact on risk perceptions but fails to illustrate if the information prompts the appropriate follow-up actions and necessary next steps. The introduction of flood risk information and its assessment of the impact on risk perceptions is only the first step in understanding the impact of such information on people. The next step in understanding flood risk information is the assessment of its impact on necessary actions, flood risk mitigation, and home-buying behaviors.

Chapter 2: Literature Review

2.1 Flood Risk Overview

Flooding is one of the most sudden and frequently occurring climate hazard events all over the world (Bibi et al., 2019). It has become increasingly vital to understand and mitigate flood risk for Floridians and Louisianians, as stronger and more frequent flooding impacts their daily lives and properties as a result of higher daily high tides, rising sea level, and heavier rainfall (Ahmad & Pervez., 2011). With these factors increasing the flood risk of Floridians and Louisianians, there is a need now more than ever to understand what promotes adequate flood risk mitigation behaviors in Floridians and Louisianians.

Across the contiguous United States, there are 127 million people that live in coastal communities; these people make up nearly 40% of the United States population despite physically taking up only 10% of the total land in the contiguous United States (NOAA, 2017). The coastal areas of the United States are over five times greater in population density than the United States average, meaning that coastal communities are disproportionately impacted in the face of flood events. In the United States alone, the Federal Emergency Management Agency (FEMA) has identified more than 13 million Americans in high flood risk areas (the 100-year floodplain), with more recent studies and models ranging this level of risk at nearly 41 million Americans (Wing et al., 2018). These high-risk areas have at least a 1% chance of flooding in any given year, with a cumulative chance of flooding over the course of a 30-year mortgage of at least 26%

(FEMA, 2017). As sea levels rise, storm surges become more severe, and sunny-day

flooding becomes more commonplace, there is a need for people all across the world to

better understand their flood risk and the associated steps necessary to combat that risk.

Flooding wreaks economic hardship, not only on thousands of Americans each

year but also incurs billions of dollars in debt for the FEMA National Flood Insurance

Program (NFIP) (Insurance Information Institute, 2020). NFIP was brought into existence

due to the National Flood Insurance Act of 1968 and, generally, the NFIP has been

funded through three methods: receipts from the premiums of flood insurance policies,

direct annual appropriations for specific costs of the NFIP, and borrowing from the U.S.

Treasury when the income of the NFIP from premiums has been insufficient to pay the

NFIP's obligations (e.g., insurance claims). The NFIP has in recent decades found itself

borrowing more and more from the U.S. treasury to offset its obligations from

catastrophic events like 2005's Hurricane Katrina, 2012's Hurricane Sandy, and 2017's

Hurricane Harvey. With these billion-dollar flood events on the rise since the foundation

of the NFIP (First Street Foundation, 2021), it is clear that flood insurance should be a

way to transfer financial risk but only as a last resort, not as the primary mitigation effort

of the American people.

2.2 The Rational Actor Paradigm

In the wake of such incredible economic losses, several hundred annual deaths,

and billions of dollars indebted in federal programming (Figure 1), flooding has clearly

shown itself as a climate hazard event to be taken seriously. The economic damages of

flooding in the United States have grown more frequent and intense over the last century,

with the sum of economic losses from this last decade equaling more than the combined

losses of the entire century before it (EM-DAT, n.d.).

Figure 1. Combined bar and line chart showing deaths and economic damages to the United States from flooding since 1900. Data from: EM-DAT, CRED / UCLouvain, Brussels, Belgium – www.emdat.be (D. Guha-Sapir).

With flooding becoming more dangerous due to the effects of climate change, and flood

risk technologies improving only in recent years, this begs the question of why are we, as

the American people, allowing such damages to continue? Simon (1955) states that the

"economic man" is "rational" and:

> is assumed to have knowledge of the relevant aspects of his environment which, if
>
> not absolutely complete, is at least impressively clear and voluminous. He is
>
> assumed also to have a well-organized and stable system of preferences, and a
>
> skill in computation that enables him to calculate, for the alternative courses of
>
> action that are available to him, which of these will permit him to reach the
>
> highest attainable point on his preference scale. (p. 99)

What Simon (1955) references is commonly referred to as the RAP, in which a person

will use all of the information at their disposal to address a problem and reach the optimal

solution. However, if the RAP were in effect, and if there are a growing number of

technological advances that would aid people in rational decision-making, then why is it that people have not addressed the ongoing problems of flooding and have even allowed the problems to grow exponentially in recent years?

While many assume that when people are given ample and correct information, they will always make the "rational" decision based on their circumstance, such as in the case of the RAP, there is often a disconnect between the choices that people make and the information provided to them for decision making (Slovic, Kunreuther, & White 1974). This disconnect is best understood, with the argument Rayner & Canton (1987) make regarding societal risk, in that societal risk is not only the product of a person's assessment of their probability of risk but also their societal relations. This cultural and societal approach to risk management by Rayner & Canton (1987) showed that people are not supercomputers and can think in ways that are not fully rational when making decisions.

In an attempt to provide more information for decision-making, but making little attempt to address cultural identities, there has been an influx of using science to explain flooding and the general use of science communication tools (e.g. interactive flood risk maps). These science communication tools vary in what it is that they can do, but, generally, they assist stakeholders and everyday people in understanding risk. Unfortunately, because these science communication tools only inform people, there is still a chance that people will ignore this information in favor of their societal relations (Rayner & Canton, 1987). Informing a person is only one piece of understanding what makes them act the way that they do. Beyond the information packaged in these science communication tools that are necessary for the RAP, any given person's decision making

processes are extensive and interdisciplinary taking into consideration psychological,

demographic, political, practical information, and cultural comparisons just to name a

few of the possible influencing factors (Slovic, Kunreuther, & White 1974; Cutter 2013;

Ballew et al., 2020; Wong-Parodi Fischhoff, 2015; Kahan 2012; Rayner & Canton, 1987;

Kahneman & Tversky, 1979).

2.3 Socio-Economic Factors

There are more tangible factors that play into risk perception and risk

management, factors that typically fall in line with the assumptions of the RAP. These

factors are broadly known as socio-economic status (SES) and can heavily influence both

the societal relations that a person has, as well as the risks that they may be exposed to.

Common SES factors include age, race, education, and income. Two popular tools that

operationalize SES factors to measure vulnerability and resilience to environmental

hazards are the Social Vulnerability Index (SoVI) and the Baseline Resilience Indicator

for Communities (BRIC). These science communication tools have been developed in the

field of social vulnerability for years with the intent to understand what areas across the

contiguous United States are socially vulnerable or resilient, respectively (Cutter et al.,

2013 & Cutter et al., 2014). Each tool independently has the ability to inform

communities of likely places that are most susceptible to hazards, making them excellent

for communities as small as the county level where the SES were readily available

(Cutter et al., 2014).

There are two major limitations of the SoVI and BRIC tools that stem from the

data both drawn from. The first limitation is that the data is only available to the

granularity of the census tract. This lack of granularity makes the analysis useful for large

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projects that span states or the whole country but becomes increasingly less helpful at smaller resolutions. The second limitation is based on risk perception, social vulnerability, and resilience all being multifaceted issues that require interdisciplinary work that readily available census data is not going to produce in full. This second limitation means that these tools foreclose the opportunity to explore vital non-RAP decision-making factors like psychometrics or cultural theory.

2.4 Psychometrics

The psychological approach to understanding how people interpret and react to risk starts with the bounded rationality theory. This theory, as stated by Slovic, Kunreuther, & White (1974) "asserts that the cognitive limitations of the decision-maker force him to construct a simplified model of the world to deal with it." Bounded rationality theory is often used as a simplified version of the RAP. Bounded rationality theory expects that knowledge and experience in risk management are important correlates with a person's adaptation behaviors, but the work of Van Valkengoed (2019) poses that neither are as correlated to adaptation behaviors as expected. Rather, the factors that were found by Van Valkengoed (2019) to be most associated with adaptation behaviors were influences from descriptive norms, negative affect, perceived self-efficacy, and the outcome efficacy of the adaptive actions. These four influences strongly associate with adaptation behaviors as they are all associated with the societal views of the person: perceptions of the actions of people around me, perceptions of unease felt, perceptions of whether or not the action is possible, and perceptions of if the results will be significant, respectively. In addition to those influences of Van Valkengoed (2019), Bubeck et al. (2012) find that, for the final result of a risk to be a protective response,

people not only need a high-risk perception through their threat appraisal but also need to know what steps are necessary to take through their coping appraisal. This addition of understanding your self-efficacy and response efficacy (coping appraisal) to the already expected understanding of the probability and consequences of risk (threat appraisal) is called protection motivation theory.

2.5 Framing and Practical Information

A study by Wong-Parodi & Fischhoff (2015) built off and added to the idea of societal relations. This was done by using political theory and SES, with an additional element that Wong-Parodi & Fischhoff added and labeled "practical information." This "practical information" came in the form of a series of stimuli that they prepared across several study groups, with information ranging from the Climate Central's Surging Seas Risk Finder to access an elevation map to a brief about global warming. These stimuli were introduced or excluded from each of the study groups and used alongside their political theory question to determine what the strongest correlation for "overall perceived risk" was. Wong-Parodi & Fischhoff (2015) found that when correlated with their political theory question, there was little impact on what they defined as "overall perceived risk." The greatest impact came from correlating "overall perceived risk" with a respondents' exposures to "practical information," specifically the Climate Central's Surging Seas Risk Finder. Wong-Parodi & Fischhoff (2015) give an initial instance of exposure to stimuli and the impact that the stimuli have on individuals; however, the study fails to address two important things: the idea of stimuli not being "scientific" in nature and the idea that political party affiliation by itself is not the most inclusive or accurate way to categorize a person based on their beliefs.

2.6 Cultural Theory

To better understand those categories that best aid political theory, it is helpful to know where they were first formed. Rayner & Canton (1987) initially identified four groups of people to represent a social organization in the socioeconomic literature at the time and these groups were categorized by each group's preferred principles of consent, liability, and trust. Rayner & Canton (1987) go on to explain that societal conflict stems from the great difficulty that each of the four groups has in understanding the other three. These four groups are the Competitive/market, Atomized individual, Bureaucratic/hierarchical, and Egalitarian group.

These cultural groupings as the base of cultural theory lost traction in the 1980s after Rayner created the groups. Cultural theory did not emerge in prominent research again until the four groups were reworked by Kahan et al. (2012). Kahan et al. (2012) took the original four groups of Rayner & Canton (1987) and created a two-by-two matrix of four groups, similar to Rayner (Figure 2). Kahan uses each of the groups to classify people based on their closely held ideological beliefs on how the world should work.

Within the two-by-two matrix coined by Kahan et al. (2012), still exists some archetypes which reflect the past work of Rayner & Canton (1987). These archetypes are individualism with the opposing archetype of communitarianism, and hierarchy with the opposing archetype of egalitarianism. Kahan et al. (2012) use these four archetypes to group people according to their cultural identity; hierarchical-individualists, hierarchical-communitarians, egalitarian-individualists, and egalitarian-communitarians. The significance of cultural identity is that it reflects a greater precision of the cultural

worldviews of a given person than standard questions of political orientation or political

ideology (Kahan, 2015), allowing for a deeper understanding of the societal relations that

Rayner & Canton (1987) describes as influential on cultural biases. Cultural identity has

been used by Kahan et al. (2012; Kahan, 2015) to describe high and low-risk subjects

such as global warming, gun control, and the use of nuclear power to name a few.

Figure 2. Basic recreation of the Kahan et al. 2012 2x2 matrix of cultural theories using the icons coined in Chuang et al. 2020.

Each aspect of decision making is important and interesting to view in their own

rite, though this research will give greater depth to the decision-making aspects of

cultural identity (Kahan et al., 2012; Kahan, 2015) and "practical information" (Wong-

Parodi & Fichhoff, 2015). Kahan (2015) finds that the bounded rationality theoretical

method of decision making (Slovic, Kunreuther, & White 1974), despite being a popular

explanation for the controversy over topics like climate change, is not an adequate

theoretical framework for understanding the general public's decision-making processes.

Kahan (2015) shows this inadequacy in the bounded rationality theory by testing the

science comprehension of survey respondents and comparing the levels of science comprehension across political affiliations. The findings were that as a person's science comprehension increases, the polarization between the already polarized political affiliation groups becomes greater, the opposite of what bounded rationality theory asserts. Kahan (2015) goes on to explain that this phenomenon is likely due to climate change and similar topics, having become so heavily woven into each individual's cultural commitments. These commitments are so woven into certain groups that if an individual were to adopt a deviating stance from the individuals' associates on a topic like climate change, this could lead to devastating social consequences such as ostracization from their own group or other socially damaging consequences.

Knowing that climate change and similar topics act in opposition to bounded rationality theory is monumental in furthering climate change communication. Kahan (2013) and Kahan (2014) both made equally important strides forward in the field of climate change, communication, and cultural identity. Kahan (2013) used cultural identity as an independent variable and tested the reactions to varied writing styles of the same information that would be appearing in a prominent local newspaper. This study found that the science communication environment was fragile, the varied ways in which information was presented in the same newspaper was enough to send cultural identities to polarized positions (Kahan, 2013). Kahan (2014) took this insight on communication one step further and varied the presenter of the same information, recording the results across cultural identities. Kahan (2014) found that the support of hierarchical-individualist cultural identities would change based on the person conveying the message.

While the research that Kahan has produced over the last several years is comprehensive and important to cultural identity and decision-making literature, there is only so much breadth and depth that a series of studies can achieve. Kahan (2013) showcased how the polarization of cultural identities occurs based on varied writing styles, but this study fails to address if polarization would still be present if the methods of communication were varied with similar messages. Kahan (2015) has shown that climate change and global warming are topics that are heavily polarized and ignore bounded rationality theory but do not go deeply into the possible subset of hazard events that each of these topics instigates.

The purpose of this applied project is to fill some of these identified gaps in the literature, namely, the operationalization of a three-part approach to decision-making under flood risk. As discussed already, there have been a number of literatures that make reference to flood risk perceptions through the lens of the RAP (Botzen et al., 2013; Fan & Davlasheridze, 2016; Javeline et al., 2019; Liu et al., 2017; Mozumbder et al., 2011; Petrolia et al., 2013; Rey-Valette et al., 2019; Shao et al., 2020; Siegrist & Gutscher, 2008; Sikder & Mozumder, 2020; & Terpstra, 2011). There is even research that has added psychometrics to the RAP (Keller, Siegrist & Heinz, 2006; Siegrist & Heinz, 2006; Grothmann & Reusswig, 2006), but there's no literature, to the authors knowledge, that leverage RAP and psychometrics alongside cultural theory to give the greatest breadth that this multi-layered topic deserves. This research, though focused on a relatively small sub-section of the entire country, will serve as an opportunity to build upon decades of research and align the importance of all three aspects of decision-making. Does polarization of cultural identities and political affiliations occur based on scientific

numeracy when individuals are discussing flood risk? What type of flood risk portrayal or level of risk portrayal is most effective in communicating flood risk and does this vary significantly based on cultural identity? Are people more or less likely to alter their mitigation behavior based on their exposure to certain flood risk portrayal or level of risk portrayal and does this vary based on cultural identity? To better understand the answers to these questions, it is imperative to look at varied avenues in which subjective information is processed by people in addition to taking into consideration the type of person that is taking in such information.

Chapter 3: Methods

3.1 Study Area

Along the coast of Florida and Louisiana, there are more than 100 counties that are considered coastal by the National Oceanic and Atmospheric Administration (NOAA). These counties (Figure 3) all have the potential to be significantly impacted by the events along the coastline of the Gulf of Mexico. The counties collectively make up nearly 7.5% of the total population of the United States at nearly 25 million people across the counties of both Florida and Louisiana. The 102 counties listed in Table 3 (Appendix A: Tables and Figure) will serve as the study area for this research and will be all considered "Gulf Coast Counties."

Figure 3. Map of study area highlighting all counties in Florida and Louisiana that are considered coastal by NOAA with the addition of the West Feliciana Parish in LA.

This research project is a 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." The study area for this multi-university effort is comprised of the entire coastal area of the Gulf of Mexico. As a single part of a markedly larger project, this research project is only using a sub-section of the full possible study area.

3.2 Data Collection

Primary data was generated for this project as a result of a two-staged, mixed methodological approach. The first stage consisted of a 67 close-ended question (approximately 30 minutes) survey focused on quantitative data analysis with questions generated based on the literature (Bolsen, 2015; Cutter et al., 2013; Cutter et al., 2014; Kahan, 2015; Kahan et al., 2012; & Wong-Parodi & Fischhoff, 2015) and prior surveys (Kahan, 2015; Kahan et al., 2012; Leiserowitz, 2008; Leiserowitz, 2019; & Bolsen, 2020). The following key topics were addressed in the survey:

1. Flood Risk Literacy: questions intended to measure the level of prior flood risk-related knowledge that the respondent had. These questions were made 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 respondents had towards the flood risk information prompts. These questions focused entirely on the interpretation of information readily available in the flood risk information prompts.

3. Flood Risk Mitigation Behaviors: questions intended to measure the willingness of respondents to take mitigatory actions in the face of their respective flood risk information prompts. These questions focus both on mitigation behaviors shift costs (i.e., insurance), as well as mitigate impact altogether (e.g., elevating your home).

4. Home-Buying Behaviors: questions intended to measure the willingness of respondents to purchase the home represented in their respective flood risk information prompt.

5. Flood Risk Perceptions: questions intended to measure the perceptions that respondents have, both within the example of the flood risk information prompt, as well as outside of the prompt. These questions focus on the 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 prompt.

6. Cultural Identity: questions intended to group respondents based on their cultural worldviews into one of four cultural identities. These questions focus on how respondents feel that society and the government should function, both within a flooding context and outside of the flooding context.

7. Socio-Economic Status (SES): questions intended to characterize respondents by age, gender, education, household income, and other similar demographic style questions.

The full version of this survey can be found in Appendix B: Flood Risk Preparedness Survey. A total of 26 potential respondents were contacted for recruitment from May 14-

26. Surveys were distributed to 20 of the potential respondents who met the criteria of being over the age of 18, lived in the study area, and were homeowners. Additionally, the study population was purposefully recruited to be near equally split along political affiliation, mixed along race and ethnicity, with a slight skewing towards low-moderate income households (less than $68,000 for Florida respondents and less than $64,300 for Louisiana respondents). The 20 respondents were randomly assigned to one of three groups and received a different level of flood risk information prompt (500-year floodplain, 100-year floodplain, and 25-year floodplain) based on their group.

The second stage consisted of dividing the sampled survey respondents into three 6-7 person focus groups to dive deeper into the quantitative data collection for the surveys and provide additional qualitative data through semi-structured questioning. These focus groups took place on June 1st (500-year floodplain), June 2nd (100-year floodplain), and June 3rd (25-year floodplain). Focus groups were divided into the three flood risk information levels. Focus groups were approximately 75 minutes in length and asked a series of open-ended questions dealing with flood risk mitigation behaviors, flood risk information prompt design perceptions, flood risk knowledge, and knowledge of future flood risk. The full version of the focus group prompt can be found in Appendix C: Flood Risk Preparedness Focus Group Prompts. Surveys and focus groups were administered electronically through the Great Blue Research Inc.

The flood risk information prompts include two graphics for each of the three flood risk levels representing both a varied delivery of information and levels of risk. The two kinds of risk information shown to survey respondents are the cumulative risk as a percentage for the floodplain over a 30-year time horizon, and the average annualized

loss (AAL) for a hypothetical property in the given floodplain for the same timeframe.

Levels of risk vary between survey respondents and focus groups, where each focus

group will be exposed to, and answering questions regarding, a specific level of risk.

These levels of risk represent the 25-year floodplain (Figure 18 & Figure 19), the 100-

year floodplain (Figure 20 & Figure 21), and the 500-year floodplain (Figure 22 & Figure

23).

3.3 Data Analysis

This project made use of a mixed-methodological approach to best leverage the

nature of its smaller sample size. Following the administration of the 20 surveys, survey

results were exported from the Qualtrics server as an Excel spreadsheet before being

imported into IBM Statistical Package for the Social Sciences (SPSS) for initial analyses

(Figure 4).

Figure 4. Flowchart illustrating how the survey data collection and focus group data collection were conducted, and how both were used to complete the research objectives of this study.

Using the predetermined question sets from the survey, questions in the dataset were put through a test of reliability, specifically, Cronbach's Alpha. Cronbach's Alpha was initially developed by Lee Cronbach in 1951 (Cronbach, 1951) to provide a measure of internal consistency for a test or scale. The measure of Cronbach's Alpha can range from 0 to 1, with 1 being the highest level of internal consistency. Internal consistency describes the extent to which all the items in a test measure the same concept and are connected to the inter-relatedness of the items 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. The lowest acceptable value for a Cronbach's Alpha is typically set at 0.70 but can go as high as 0.95 (Tavakol & Dennick, 2011). There are three ways in which a set of questions can be interpreted to have validity: content – the test needs to measure the underlying construct; criterion – the test must correlate with another accepted and established test of the same underlying construct; and 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, 2017). For this research, indices created were required to return values of at least .70 for the size of their correlation coefficients to be considered internally consistent.

The formula used for Cronbach's Alpha is as follows (Equation 1). Where you can find the internal consistency of a series of items by calculating the number of items (N) times the averaged inter-item covariance of the items ($\bar{c}$) all divided by the number of items minus 1 times the averaged inter-item covariance of the items, plus the average variance ($\bar{v}$). This equation results in the Cronbach's Alpha, where the higher the number, the greater internal consistency you can expect. Though, the value of the Alpha

is also influenced by the number of items used, the more items you add to the Cronbach's Alpha, the more likely you are to artificially inflate the internal consistency of a set of items.

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

Equation 1. The formula used for Cronbach's Alpha test of internal consistency (Cronbach, 1951).

A series of indices were created based on the components that met the criteria of reliability. These indices included "Flood Risk Literacy" and "Flood Risk Numeracy" which were both created using two separate cumulative indices where respondents with 5 or more correct answers in each index were scored either as having "passed" and all others as "failed". "Flood Risk Mitigation Behaviors", "Flood Risk Perceptions", "Dread Risk", "Trust in Experts", "Trust in Institutions", "Home-Buying Behaviors" and "Social Solidarity" were all additional indices created through an averaged index score, where all questions that were associated with each of the respective indices were summed and divided by the number of questions in the index. Cultural Identities were broken up into four indices; "Simple Kahan Cultural Theory," "Kahan Cultural Theory", "Flood Risk Cultural Theory" and "Combination Cultural Theory" which were generated by recoding respondents' answers into two "Individualism" and "Hierarchical" scales. These scales were then used to bucket individuals into either individualism or communitarianism and either hierarchy or egalitarianism. The full methodological approach to the creation of these indices and a comprehensive list of questions associated with their indices can be found in Appendix F: Index Protocol.

Once the indices were codified within Excel, they were then imported into SPSS and incorporated with the full dataset. Within the SPSS program, the numerically coded spreadsheet was then re-coded into questions and answers that reflected the survey that respondents received and allowed for easier navigation of statistical analysis by the researchers. From there, frequency tables of all questions and indices, cross-tabulation tables of all demographic and index combinations, and chi-square tests of significance of all demographic and index combinations were generated (Appendix G: SPSS Frequency, Cross-tabulation, and Chi Square Tables). Frequency tables serve as a univariate analysis of the statistics of the data, how a single question was answered across respondents, and each question's standard deviation. Cross-tabulations serve as the bivariate analysis of the data, showing how two or more questions interact with each other. The Chi-Square tests of independence are a commonly used test that measures the relationships between categorical variables, like the Likert questions found in the flood risk survey.

Developed by Karl Pearson in 1900 (Pearson, 1900), a chi-square test for independence compares two categorical variables in a contingency table to see if they exhibit statistical association that suggests an underlying causal relationship. A chi-square test of independence is a way to argue for or against a relationship between two (or more, but typically two) categorical variables. The null hypothesis of the chi-square test for independence is that there is no association between the two variables, that their expected values and the values being reported are the same (statistically speaking). You can determine if you accept or reject your null hypothesis by using the p-value of the test, where small p-values of below 5% are typically the standard for indicating a significant association between the variables (Stephanie, n.d.).

The formula used for the chi-square test for independence is as follows. Where you can find the chi-square value by calculating the sum (Σ) of each cell for the table, by taking the expected values (E) minus their respective observed values (O), squared, divided by the expected value for that cell. This process is repeated for each of the cells within the table, represented by degrees of freedom (C). Then, using the chi-square value and the degrees of freedom, the p-value of the statistic can be calculated and used to interpret the significance (or lack thereof) of the correlation between the two. The expected values (E) for the equation are generated using the subtotals of the data, wherein each cell is calculated by multiplying the subtotal of the respective column (or row) of that cell by the row (or column), divided by the total. With the degrees of freedom being a product of the number of rows minus 1 and the number of columns minus 1.

$$x_c^2 = \Sigma \frac{(O_i - E_i)^2}{E_i}$$

Equation 2. The formula used for the Chi-Square test of independence (Pearson, 1900).

The focus group phase of research used a series of open-ended questions that were used to better understand thought processes, risk perceptions, and the overall effectiveness of each group's stimulus interactions. Specifically, respondents in the focus groups were asked about their thought processes regarding the useability and their understanding of the flood risk information prompts. These conversations were used to dive deeper into the concept of the RAP (Star, 1969) and bounded rationality theory (Slovic, Kunreuther, & White, 1974) to determine what, if any, influence the flood risk information prompts, or general flood literacy, had on the decisions of the survey

respondents and if the communication of risk was sufficient for each respondent to make the best decision possible. The RAP was operationalized using both prior knowledge in the form of flood risk literacy, as well as through the survey-specific numeracy questions based on the flood risk information prompts. Decision-making too was operationalized in multiple ways; through general flood risk perceptions, flood mitigation behaviors tied to the flood risk information prompts, and home-buying decisions as they related to the flood risk information prompts.

Following the discussion of the flood risk information prompts and their effectiveness, the focus group was then directed towards the conversations of cultural theory and dread of flooding. These additional layers of complexity were introduced to the focus groups through the use of simplified cross-tabulations and narrowing the focus to a specific cell or set of cells. For example, respondents were reintroduced with a cross-tabulation from earlier in the discussion that was then altered slightly to tie in one of the modulating factors to be discussed (cultural theory, dread, or trust), creating a "2-by-2-by-2" matrix where a specific cell or set of cells within the matrix were the focus. These illustrations helped clarify the rationale of certain cultural identities or levels of dread, as respondents were asked to explain their thought processes on why they believe that people would answer in the way that they did.

When time allowed, a final level of complexity was explored with focus groups, the introduction of all three operationalized influencers of risk in the survey: the RAP, cultural theory, and psychometric paradigm. This final layer of complexity required a similar setup to that of the previously mentioned discussion; because of this complexity, only a small and necessary selection of possible combinations from the three influencers

of risk were explored in depth. To assist with the discussion and spur more comprehensive feedback, respondents were shown the respective survey questions, flood risk information prompts, or simplified cross-tabulations being discussed throughout the focus group in the form of PowerPoint slides (Appendix C: Flood Risk Preparedness Focus Group Prompts).

Chapter 4: Results

4.1 Survey Overview

The sample of 20 survey respondents were intentionally screened for questions of age, political affiliation, race, income, and place of living to aid in getting an equal distribution of these demographic characteristics across the small sample. The sample was composed of 35% Republican, 15% Independent or No Party Affiliation, and 50% Democrat. Along political ideologies, there were 25% Liberal, 40% Conservative, and 35% middle of the road. Most of the sample skewed towards being female at 75%, the remaining portion identifying as male. Age groups varied with 30% being 18-34 years of age, 25% being 35-49, 30% being 50-64, and 15% being over the age of 65. Much of the sample skewed intentionally towards being below an annual household income of $75,000 at 75%, the remainder of the population had annual household incomes greater than $75,000. The sample skewed towards a majority of the racial and ethnic backgrounds being White only at 70%, with 5% being Asian, 5% being Black or African American, 10% being Hispanic, Latino, or Spanish origin, and 10% being both Hispanic, Latino, or Spanish origin and White. Much of the sample had some college or an associate degree for education 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 vocational school. A full breakdown of the demographic characteristics can be found in Appendix G: SPSS Frequency, Cross-tabulation, and Chi Square Tables, with a focused breakdown of SES in Table 5.

4.2 Cronbach's Alpha and Content Validity

Following the protocol set forth in Appendix F: Index Protocol, it was found that the majority of indices measuring non-cultural theory concepts had returned with Cronbach's Alphas surpassing the 0.700 threshold except for "Flood Risk Literacy" (-0.013), "Flood Risk Numeracy" (0.407), and "Social Solidarity" (0.684). In addition to running Cronbach's Alpha for those indices specified in Appendix F: Index Protocol, alphas were produced for a subset of each of the possible cultural theory question sets to determine if cultural theory questions were internally consistent and measuring the same underlying concepts (individualism, hierarchy, flood specific individualism, etc.). Similar to the full cultural theory question indices already ran, these subset indices which were expected to measure the internal consistency of a single part of a given person's world view, also failed to reach the arbitrary 0.700 threshold.

To address some of the indices that lacked internal consistency, a closer look was necessary. The indices of "Flood Risk Literacy" and "Flood Risk Numeracy" stood out from all other indices as they were the only indices that did not have a scale-type set of answer choices. As such, the two indices were re-coded from multiple choice, true or false, and select all of the following type questions to a simple binary correct or incorrect scale. Using the simple binary scale, a new set of Alphas were generate for the indices, these indices were markedly higher than the original coding of the indices. "Flood Risk Numeracy" increase to 0.881, now meeting the threshold of 0.700. "Flood Risk Literacy" increased to 0.058, indicating that this index may be violating the unidimensionality assumption of Cronbach's Alpha. A full list of the Cronbach's Alphas can be seen below in Table 1.

While some of the indices even with potential adjustments still fall below the threshold for internal consistency, this does not necessarily indicate that the indices lack validity. Each of the indices listed above were intentionally made with the questions they have to measure their respective underlying construct. These indices are all considered to have content (or face) validity because of the intentional design each of them has. As for each of the measures of cultural theory, two of the full indices ran only fell slightly below

Table 1. Cronbach Alpha's for all indices referenced in Appendix E: Index Protocol. Asterisk indicates altered index from protocol in Appendix F.

Index	Cronbach's Alpha
Flood Risk Literacy	0.058*
Flood Risk Numeracy	0.881*
Flood Risk Mitigation Behavior	0.848
Flood "Risk Perception"	0.853
Dread Index	0.806
Trust in Experts	0.801
Trust in Institutions	0.883
Home-Buying Index (Categorical)	0.908
Social Solidarity	0.684
Kahan CT (Q55 & Q56)	0.664
Kahan et al. (2012) CT (Q55, Q56, Q54 Reverse Coded, & Q57 Reverse Coded)	0.536
Flood Specific CT (Q45, Q47, Q46 Reverse Coded, Q48 Reverse Coded)	0.333
Combo CT (Q45, Q47, Q46 Reverse Coded, Q48 Reverse Coded Q55, Q56, Q54 Reverse Coded, & Q57 Reverse Coded)	0.686
Kahan CT Hierarchy (Q56 & Q54 Reverse Coded)	0.520
Kahan CT Individualism (Q55 & Q57 Reverse Coded)	-0.823
Flood CT Hierarchy (Q47 & Q48 Reverse Coded)	0.309
Flood CT Individualism (Q45 & Q46 Reverse Coded)	-0.669
Full CT Hierarchy (Q56, Q47, Q54 Reverse Coded & Q48 Reverse Coded)	0.679
Full CT Individualism (Q55, Q45, Q57 Reverse Coded & Q46 Reverse Coded)	0.111

the threshold of 0.700, indicating that they are measuring the underlying construct of cultural theory only slightly less than the arbitrary cut-off and as such, have enough internal consistency to move forward without altering the indices.

4.3 Univariate Analysis

Using the indices listed above, it was found that across all floodplains, 85% of respondents failed the literacy check and were unable to correctly answer at least 5 of the 6 literacy check questions. Across all floodplains, 75% of respondents were successful in the flood risk graphic numeracy (comprehension) check and were able to correctly answer at least 5 of the 6 numeracy questions. Across all floodplains, respondents slightly favored low mitigation behaviors in the face of risk at 55%, with the remainder opting for high mitigation behaviors. Across all floodplains, 55% of respondents were classified as having high graphic-based risk perceptions, with the remainder being low. Broken out among each floodplain this was found to be a near-even split between low and high-risk perceptions for all floodplains; 50% saw high risk in the 500-year floodplain, 57% in the 100-year, 57% in the 25-year. Across all floodplains, a majority of respondents had high dread concerning flooding (75%), with the remaining being low in dread. Across all floodplains, most respondents (80%) had a high level of trust in flood experts and their technical skills. Slightly lower, across all floodplains, 65% of respondents had high levels of trust in scientific and governmental entities. Similarly, across all floodplains, 65% of respondents were classified as having a high willingness to purchase the home represented in the graphic. High willingness to purchase was found to be greatest within the 100-year floodplain (71%), followed by the 500-year floodplain (67%), followed by the 25-year floodplain which still has many respondents willing to purchase (57%).

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Across all floodplains, a majority of respondents (85%) were classified as being high in social solidarity. These initial index-based results have been compiled and can be viewed altogether in Table 6.

From the perspective of home-buying behaviors, it was found that across all floodplains, the highest tolerable cumulative risk level exceeded that of the 25-year floodplain over a 30-year period. Where the risk level for a 25-year floodplain over a 30-year period sits at 71%, the highest risk tolerable in both the 25- and 100-year floodplain groups was 75%, slightly above the highest mark for the 25-year floodplain and far above the 26% cumulative risk in the 100-year floodplain. Similarly, the 500-year floodplain also had multiple people who were more tolerable to flood risk than the depiction they received, with those people stating that they could tolerate up to 50% risk. On balance, when compared to their cumulative risk counterpart, the AAL risk portrayal tolerance was lower. Where the cumulative risk portrayal tolerance levels had multiple people who exceeded the 25-year risk threshold of 71%, the AAL risk portrayal tolerances did not break the equivalent risk of $75,000 damages that the 30-year period in the 25-year floodplain illustrated for the high-risk group. Most AAL risk tolerance levels were more conservative than their cumulative risk counterparts with two outliers in the 500-year floodplain who held two of the highest AAL risk tolerances of the study population. This gap between the cumulative and AAL risk portrayal tolerances can be seen below in Figure 5.

Figure 5. Person-by-person comparison of the varying risk tolerances when purchasing a home of respondents for each of the two graphic risk portrayals.

4.4 Bivariate Analysis

4.4.1 The RAP

Before adding in the additional layer of cultural theory, it is necessary to take a step back and first set up the expectations of the RAP. Simon (1955) establishes the "economic man" who is "rational" as having comprehensive knowledge of their environment, enough to make optimal decisions. Starr (1969) adds to this stating these decisions are made to achieve the maximization of expected utility.

The indices of Flood Risk Literacy and Flood Risk Numeracy will serve as the initial tests for respondents having (or not having) comprehensive knowledge about their environment. The RAP expects that the bulk of these respondents would pass both the literacy and numeracy checks and prove that, because they are living in environments that flood, they have the know-how to address flood risk. It has already been established that while respondents had little difficulty as a group in answering questions measuring numeracy (75% pass rate), their ability to tap into prior knowledge on flooding and flood risk was not as impressive (15% pass rate). This lack of consistency between the two

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measure of complete knowledge illustrates the first inconsistency of the RAP that was observed in the flood risk preparedness survey results.

The second inconsistency comes when comparing what a "rational" person *could* do and what they *should* do versus what respondents decided to do in the survey. This second inconsistency is operationalized using the previously mentioned Flood Risk Literacy and Flood Risk Numeracy 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 indices, cross-tabulated, would be expected to have certain groupings of people based on the level of risk and questions being asked such as the following example in Figure 6 for the high risk portrayals (the 25- and 100-year floodplains), but this is not the case.

Figure 6. Hypothetical examples of what a "rational" person (illustrated as a calculator), as depicted by the RAP, would react to high flood risk (25- and 100-year floodplains).

The actual survey results tell a different story about the "rationality" of the survey respondents. Using the two respondents that both passed the literacy check and were given promptings on either the 25- or 100-year floodplains, only one respondent was bucketed into the "rational" quadrant of high literacy and high mitigation behavior. Looking through the lens of home-buying behaviors, there were no respondents that

made the "rational" decision, as both were willing to purchase the hypothetical high-risk

homes. Switching from literacy to numeracy in both scenarios illustrated a different type

of inconsistency of the RAP. While in both mitigation behaviors and home-buying

behaviors, there were respondents that were considered "rational" (6 mitigation and 5

home-buying), but there were almost as many respondents who had the same high

numeracy that instead made irrational decisions (4 mitigation and 5 home-buying). A full

illustration of the high-risk cross-tabulations can be seen below in Figure 7.

Figure 7. Illustrative cross-tabulation of results showing how respondents that were given high-risk graphic portrayals answered in literacy, numeracy, mitigation behaviors, and home-buying behaviors. Literacy frequencies are in white font and numeracy frequencies in black. "Rational" choices are illustrated as a calculator.

This is not to say that the RAP is wholly unfounded, just that there is more to

decision-making in the face of risk than the "rational man" can explain. There are still

instances in Figure 7 where "rational" people can be found, and there are even more

instances of the RAP when looking at the data through the lens of the 500-year

floodplain. Looking at the rest of the data in the low-risk portrayal (500-year floodplain),

it can be seen that respondents who understood the graphics shown were more willing to

purchase the home and less willing to mitigate overall. Specifically, of the 6 respondents

that received the 500-year floodplain graphic risk portrayal, 5 respondents passed the

numeracy check, and of those 5, 4 of them answered both home-buying and mitigation behavior questions "rationally." This finding begins to explain the limitations of the RAP and the need for more explanatory influences in decision-making, especially as risk is increased.

Figure 8. Illustrative cross-tabulation of results showing how respondents that were given low-risk graphic portrayals answered in literacy, numeracy, mitigation behaviors, and home-buying behaviors. Literacy frequencies are in white font and numeracy frequencies in black. "Rational" choices are illustrated as a calculator.

4.4.2 SES

An additional aspect of the RAP that bridges the concept of the RAP to those concepts of psychometrics and cultural theory are SES, the demographic characteristics of respondents. These SES have been found in the past to be relatively consistent with the typical assumptions of the RAP and as such will typically not disqualify the RAP on their own. Running these SES against the indices generated for this research, it was found that respondents that scored high in numeracy were prominently either leaning or strongly democratic (45% of the sample, 90% of democrats), or were under the age of 50 (45% of the sample, 82% of people aged 18-34 and 35-49). Respondents over the age of 49 (50-64, and 65 or older) were mixed in their passing scores in numeracy (30% of the sample, 66% of people aged 50-64 and 65 or older). Those with passing scores in numeracy

among republicans were less impressive (20% of the sample, 57% of Republicans), with independents or those with no party affiliation following a similar trend (10% of the sample, 66% of independents).

While democrats were associated with high numeracy, liberals were associated with low mitigation behaviors. Leaning and strongly liberal respondents were unanimously low in their mitigation behaviors (25% of the sample, 100% of liberals). Conservatives not as one-sided and only slightly favored high mitigation behavior (25% of the sample, 63% of conservatives). Respondents that were neither liberal nor conservative leaned similarly towards high mitigation behaviors (10% of the sample, 57% of neither liberal nor conservative). Also showing a break between high and low mitigation behaviors, respondents that had annual household incomes greater than $75,000 were more likely to favor low mitigation behaviors (20% of the sample, 80% of respondents $75,000 to $99,999, $100,000 to $199,999, and $200,000 or more). Respondents that reported making less than $75,000 in annual household income nearly split with a slight favoring towards high mitigation behaviors (40% of the sample, 53% of respondents less than $15,000, $15,000 to $24,999, $25,000 to $49,999, and $50,000 to $74,999). A similar finding along household income was found when cross tabulated against home-buying behaviors, respondents that had annual household incomes greater than $75,000 were more likely to favor high home-buying behaviors (20% of the sample, 80% of respondents $75,000 to $99,999, $100,000 to $199,999, and $200,000 or more). Respondents that reported making less than $75,000 in annual household income slightly favored high home-buying behaviors as well, though not as strongly as their high income

counterparts (45% of the sample, 60% of respondents less than $15,000, $15,000 to $24,999, $25,000 to $49,999, and $50,000 to $74,999).

A full cross-tabulation of all the SES characteristics of the sample and all indices generated for research can be found in Appendix G: SPSS Frequency, Cross-tabulation, and Chi Square Tables.

4.5 Cultural Theory Results

4.5.1 Univariate Analysis

The frequencies generated based on the Kahan et al. (2012) cultural theory question set illustrated respondents had tendencies towards egalitarian worldviews and were typically neutral when it came to deciding between individualistic or communitarian worldviews. When asked on a 4-point Likert, 85% of respondents strongly agreed or agreed with question 54 which focused on Egalitarian worldviews, while 70% of respondents strongly disagreed or disagreed with question 56 which focused on hierarchical worldviews. The measure of individualism to communitarianism was similarly skewed, though in the same direction for both measures. Both question 55 (individualism) and question 57 (communitarianism) had 70% of respondents strongly disagree or disagree. Because of this consistent disagreement, respondents were typically coded based on their answers as "neutral" instead of either "individualistic" or "communitarian" as disagreeing with both questions would give you a score that is between the extremes of individualism and communitarianism (Figure 9).

Figure 9. Set of frequencies based on answers to Cultural Theory questions for each of the 20 respondents (x-axis) where 4=Strongly Agree and 1=Strongly Disagree (y-axis).

The frequencies generated from the flood-specific cultural theory questions resulted in a different set of cultural identities than those generated by the base Kahan et al. (2012) question set. This flood-specific set of questions illustrated that respondents had tendencies towards either egalitarianism or being neutral when deciding between egalitarian or hierarchical worldviews. When deciding between individualistic or communitarian worldviews, the flood-specific cultural theory question set showed respondents tended towards either communitarianism or neutrality. These closely split decisions on worldviews are illustrated in the frequency table (Figure 10) below. Question 45 (individualism) and question 46 (communitarianism) both had a majority of respondents in agreement, with each question having 70% and 100% of respondents either agreeing or strongly agreeing to the respective statements. Similarly, there was a

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majority in agreement for questions 47 (hierarchy) and 48 (egalitarianism) with 75% and

85% either agreeing or strongly agreeing, respectively.

Figure 10. Set of frequencies based on Flood-Specific Cultural Theory questions for each of the 20 respondents (x-axis) where 4=Strongly Agree and 1=Strongly Disagree (y-axis).

4.5.2 Bivariate Analysis

Using the eight questions between the Kahan et al. (2012) cultural theory question

set and the flood-specific cultural theory question set, it is possible to generate four

cultural identity indices. The frequencies and distributions of cultural identities varied

depending on which combination of cultural theory questions were used, a full set of

frequency tables for each combination is depicted below (Figure 11). While specific

distributions shifted between each possible combination of cultural theory questions, all

cultural identity indices classified the majority of respondents as either egalitarian-

communitarian or egalitarian-neutral. Specifically, the Kahan et al. (2012) cultural theory

question set had 40% of respondents classified as egalitarian-neutral, the flood-specific

question set 35% egalitarian-communitarian, the combination question set 40%

egalitarian-communitarian, and the simple Kahan question set 55% egalitarian-

communitarian.

Figure 11. Set of frequency charts illustrating the distribution of cultural identities based on four possible combinations of cultural theory-based questions.

This research made use of a subset of the four possible cultural theory indices.

One of the indices used was the simple Kahan index, which returned a Cronbach's Alpha

relatively close to the 0.700 threshold at 0.664, making its reliability in measuring the

underlying construct of cultural theory slightly below the arbitrary threshold. The Kahan

index is a tried-and-true measure that has been used in similar literature (Bolsen, 2015)

and constrains all possible combinations of cultural identities to the four base groups.

This research also contributes to the realm of cultural identity measures by using the

combination cultural theory index, which holds the highest measure for internal

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consistency of all the cultural theory measures at 0.686. This combination cultural theory index serves as an important counterpart and comparison point to the simple Kahan index as each brings to the table their own appealing characteristics.

4.6 The RAP and Cultural Theory

With the addition of previously discussed RAP concepts of mitigation behaviors, risk perceptions, home-buying behaviors, literacy, and numeracy; analyses moving forward become markedly more complex, both in their potential for cross-tabulation and their interpretations. On balance, it was found there are little to no patterns that emerge under the lens of cultural theory when looking at the pass rates for both literacy and numeracy in the small sample. As this sample skewed heavily to failing the literacy check and passing the numeracy check, the addition of cultural theory only served to break out those majority amongst the different possible cultural identities. For example, using the simple Kahan index, Egalitarian-Communitarians had a 9% pass rate in the literacy check with an 82% pass rate in the numeracy check. These percentages are in line with the direction in which the overall pass rates for each of the two indices were found to be (15% and 75% respectively).

The cultural identities which deviated from the tendency of a majority failing the literacy check and a majority passing the numeracy check are few and far between. Even more so, these deviations are inconsistent within the cultural identities in which they occur. While the simple Kahan cultural identities only saw deviations in the category of Hierarchical-Individualists (66% passing literacy and 33% passing numeracy), the Combination cultural theory index had several. It was found that Egalitarian-Neutrals, Egalitarian-Individualists, and Neutral-Communitarians were all cultural identities that

found themselves well below the numeracy pass rate of 75% (33%, 50%, and 50% respectively). Additionally, under the lens of the Combination cultural theory index, 100% of Egalitarian-Communitarians passed the numeracy check. A full breakout of the pass rates for the literacy and numeracy checks across the simple Kahan and combination cultural identity indices can be seen below (Table 2).

Table 2. Pass rates in literacy and numeracy across all possible cultural identities in both the Kahan and Combination cultural theory indices.

	Literacy Pass Rate/ Simple Kahan	Numeracy Pass Rate/ Simple Kahan	Literacy Pass Rate/ Combination CT	Numeracy Pass Rate/ Combination CT
EGA-COM	9.1% (n=11)	81.8% (n=11)	12.5% (n=8)	100% (n=8)
EGA-IND	0.0% (n=3)	66.7% (n=3)	0.0% (n=2)	50.0% (n=2)
HIE-COM	0.0% (n=3)	100% (n=3)	0.0% (n=1)	100% (n=1)
HIE-IND	66.7% (n=3)	33.3% (n=3)	33.4% (n=3)	66.7% (n=3)
EGA-Neutral			0.0% (n=3)	33.3% (n=3)
Neutral-COM			50.0% (n=2)	50.0% (n=2)
Neutral-Neutral			0.0% (n=1)	100% (n=1)

Departing from the measure of the RAP and focusing more on those measures of cultural theory, a series of cross-tabulations between cultural theory and dependent variables were generated. These cross-tabulations focused on both (simple Kahan and combination) cultural theory measures, against risk perceptions, mitigation behaviors, and home-buying behaviors.

Egalitarian-Communitarians were found to be divided nearly evenly amongst themselves in risk perceptions (4 low and 4 high), mitigation behaviors (4 low and 4 high), and home-buying behaviors (5 high and 3 low) under the combination cultural

theory index. When broken out between high-risk and low-risk portrayals, these even

divides persisted amongst the Egalitarian-Communitarians under high-risk portrayals.

These findings, under the same high-risk portrayals, are consistent with those of the

simple Kahan index as Egalitarian-Communitarians continue to show no inclination for

or against mitigation, risk perceptions, or home-buying (Figure 12).

Figure 12. Simplified cross-tabulations of the Egalitarian-Communitarian cultural identity against mitigation behaviors, risk perceptions, and home-buying behaviors all within the 25- and 100-year floodplains where numbers in white are the product of the combination cultural theory index and numbers in black the Kahan index.

While the sample for the Hierarchical-Individualists was small and varied slightly

depending on the cultural theory index measure used, Hierarchical-Individualists

answered with relative consistency within the 25- and 100-year floodplains. Using the

Combination cultural theory index all Hierarchical-Individualists in either the 25- or 100-

year floodplain focus groups answered consistently. These respondents had decidedly

low-risk perceptions and mitigation behaviors, while at the same time having high home-

buying behaviors. With the same parameters but instead using the Kahan index, the same

set of results occurred where the Hierarchical-Individualist was found to have low-risk

perception, low mitigation behavior, and high home-buying behavior (Figure 13).

Figure 13. Simplified cross-tabulations of the Hierarchical-Individualist cultural identity against mitigation behaviors, risk perceptions, and home-buying behaviors all within the 25- and 100-year floodplains where numbers in white are the product of the combination cultural theory index and black the Kahan index.

The other two primary cultural identities of Egalitarianism-Individualism and

Hierarchical-Communitarianism were also recorded within the 25- and 100-year

floodplain. The Hierarchical-Communitarian that was recorded in the high-risk portrayal

was found to have little consistency between the combination cultural theory and simple

Kahan indices. This cultural identity was found to have high mitigation in both indices

but differed in both risk perceptions and home-buying behaviors. The Egalitarian-

Individualist cultural identity was found to have consistency between the two cultural

theory indices. Egalitarian-Individualist respondents typically had high-risk perceptions

and mitigation behaviors but were split on home-buying behaviors.

A full dataset of frequencies, simplified cross-tabulations, and simplified chi-square analyses are available in Appendix G: SPSS Frequency, Cross-tabulation, and Chi Square Tables.

4.7 Focus Group Overview

Each focus group was conducted over Zoom and lasted approximately 75 minutes. Respondents were given a moment at the beginning of each focus group to prepare their audio and video before consent was taken, a series of ice breaker-type questions were asked, and introductions were conducted. Respondents were then walked through the focus group to gain greater insight on both the content of the questions, as well as their validity. Respondents were shown and probed for insight on a series of questions, their associated frequencies from the survey results, the flood risk information prompts associated with the survey that the focus group took, and simplified cross-tabulations for topics of greater complexity. Finally, questions were asked regarding the actual content, organization of the survey, and whether they had any questions about the project as a whole.

Across all three of the focus groups, respondents overall did not have any issues with answering questions in a way that respondents would interpret as confusion. The actual questions that make up the indices of literacy, numeracy, mitigation behaviors, and home-buying behaviors were not found to be directly confusing to the respondents, rather some questions appeared to be confusing in more indirect ways. In many cases, respondents would bring up past exposure to flooding, a friend with prior flood experience, or a connection to flooding through work to explain their point of view when answering the questions of literacy, numeracy, mitigation behaviors, and home-buying

behaviors. These experiences were used by many respondents to answer at least approximately, questions with definite answers (literacy & numeracy) and to anchor themselves before answering more subjective questions (mitigation behaviors & home-buying behaviors). The consistency in which past exposure was brought up was interesting, as many respondents indicated that past exposure was an important topic to discuss, and one that should be included in the survey itself, but typically failed to recall without additional prompting a question already in the survey that asks specifically about the last flood the respondent experienced (Q7).

Respondents continued to make use of their past flood experiences beyond the sections that the researchers expected, specifically, the cultural theory section. As many of the respondents moved into the cultural theory section, some were still thinking about their past exposure to flooding and flooding generally, despite there being no prompts to think in such a way. It became more evident that respondents were thinking in terms of their own homes, especially for a select few in the 500- and 25-year floodplain focus groups. For instance, one respondent in the 500-year floodplain focus group took question 57's asking about the government doing more to advance society as possibly meaning requiring flood insurance or some other mitigatory efforts. A different respondent in the 25-year floodplain focus group seemingly misinterpreted the intent of questions 56 by focusing on flooding. This person's takeaway from the question was more about the equality between rich and poor neighborhoods, those neighborhoods receiving aid following floods, and other similar socio-economic focuses, rather than the broader and sweeping intent of simply asking about the state of the equalities of all peoples.

4.7.1 500-Year Floodplain Focus Group

While it was apparent that all focus groups felt some degree of dread following the introduction of the graphic risk portrayals, the 500-year floodplain focus group was the only focus group to explicitly reference the AAL graphic risk portrayal, as being "severe". This was because, like all the AAL graphic risk portrayals, most of the actual graphic is taken up by the shaded area of the growing cost of flooding over 30 years (Figure 19, Figure 21, & Figure 23). This was interesting in that the 500-year floodplain example was the lowest risk shown to respondents in the set of graphic risk portrayals for this research project. It is possible that because laypeople do not have all of the given information about flooding, they are making decisions with imperfect knowledge. This imperfect knowledge leads laypeople to mistake risk where there is none, or in this instance that the risk being shown is "risky" despite it being the least risky graphic of the three focus groups. As an additional layer of interest, only one of the respondents from the 500-year floodplain focus group stated a dollar amount of risk that they tolerate as lower than the 500-year floodplain, 30-year AAL amount, all other respondents in this group stated that they could tolerate risk anywhere between roughly equal to the risk of the 500-year, 30-year AAL ($5,000) and up to 10 times that ($50,000) of the 500-year, 30-year AAL.

4.7.2 100-Year Floodplain Focus Group

The 100-year floodplain focus group gravitated towards concepts of home-buying and mitigation behaviors. Most respondents claimed to have either first or secondhand experience with flooding that influenced their decision making, both with the hypothetical scenarios posed within the focus group and in their own personal

experiences. Respondents brought up that while in the process of buying their own homes, they would take into consideration flood risk specifically, looking for homes that were outside of riverine flood zones or were already elevated higher than nearby homes. Respondents were probed as to whether their own personal research into the flood risk of prospective homes was more intuitive or if it had a systematic structure to it; the overall response was that these decisions of flood risk aired on the side of intuition. This note of using intuition for the purposes of researching harks back to the concepts of Tversky and Kahneman (1979).

4.7.3 25-Year Floodplain Focus Group

The 25-year floodplain focus group, with the greatest risk given in the suite of graphic risk portrayals, primarily focused on the concepts of home-buying and dread. These two topics came up prevalently when home-buying was first introduced to the focus group. Question 29 asks respondents to put a dollar amount at the highest point in which they would be comfortable with risking as a result of flooding. This question is the "sister" of question 17, which asks a similar high point for a cumulative percent. However, the respondents did not see question 17 and question 29 as comparable, they saw question 29 as more difficult to answer because there was a physical dollar amount that needed to be lost or at least expected to be lost. Some respondents were under the impression that because question 29 was dealing in dollar amounts, the question focused more on the home as an investment, than as a risk. This concept is reminiscent of that of loss aversion introduced by Tversky and Kahneman (1979). This fear of losing money tied in well with the introduction of the concept of dread later on where respondents drew on past experiences with their own homes when answering the set of dread questions.

Chapter 5: Discussion

5.1 The RAP

The entirety of this research effort has been dedicated to the decidedly "simple" task of understanding and coming to terms with what thought processes and rationalities go through the minds of people as they experience decision-making under risk. As stated previously, risk is not a simple equation that can be calculated with the latest modeling software, rather it is a series of interconnected logical, emotional, and cultural elements that will vary from person-to-person. As this research illustrated, in the 500-year floodplain (Figure 8) people were more likely to operationalize the concept of the RAP when the stakes were low. This is despite the actual discussions in the 500-year floodplain focus group leading to respondents talking about how they felt that the 500-year floodplain risk portrayal graphics were "severe," especially in the context of the AAL graphic. It was also discussed in the 500-year floodplain focus group (as well as brought up in all other focus groups) that exposure is a key factor in how each of the respondents react to flood risk. Respondents in the 500-year floodplain focus group had varying degrees of working flood risk knowledge (despite only 1 of the 6 passing the literacy check) from their prior experiences with flood insurance or living within a floodplain themselves. These experiences seemed to help each respondent come to the decision to be more cautious in their future home-buying. It is clear that while cultural theory may have taken a back seat in the 500-year floodplain, both the RAP and emotional responses were front and center.

5.2 Psychometrics

As the risk increased, moving from the low-risk graphic (500-year) to the higher risk graphics (25- and 100-year), the RAP seemed to become less reliable in measuring and predicting the actions of survey respondents. In mitigation behavior and home-buying, these respondents were no more or less willing to do one or the other based on their literacy or numeracy (Figure 7). Without the RAP to do the heavy lifting of predicting responses, attention is turned to the emotions and cultural identities of the respondents. The 100-year floodplain focus group respondents were focused on the mitigation of flood risk and how that mitigation is incorporated into home-buying. There was a specific focus on the intuitive process by which respondents purchased homes in or out of high-risk floodplains, as well as mixed responses to a recurring theme of individuals being responsible for their own flood risk preparedness. The intuitive process by which some of the respondents measured a home's flood risk preparedness were typically simple in nature and didn't require additional "logical" thought. Some respondents simply checked if the home was in a high-risk floodplain and compared those homes to others outside of that high-risk floodplain or the respondents walked the neighborhood to see if the home respondents wanted was elevated by comparison to other nearby homes. These intuitions speak to the trust that respondents, in both 25- and 100-year floodplain focus groups had in the flood experts, as well as institutions, as high-risk respondents were more likely to purchase these high-risk homes when they believed that they could trust the government, science, and/or flood risk experts (Figure 14).

Figure 14. Simplified cross-tabulation of how trust in flood experts, institutions, and home-buying behaviors interact with each other in the 100- and 25- year floodplains.

The less logic-based and more intuitive or emotion-based frameworks continued to occur in focus group discussions, with the 25-year floodplain focus group showcasing an interesting non-RAP observation. A recurring theme of the 25-year floodplain focus group was grappling with cumulative risk. While these focus group respondents had roughly the same pass rate for numeracy (71%) to that of the rest of the sample, the topic of "a 50/50 chance of flooding" came up multiple times when discussing the 25-year floodplain flood risk. The respondents that brought up this concept were able to interpret the 25-year flood risk portrayal graphics, but when it came to the application of this understanding, it would seem that the respondents fell short. One of the 25-year floodplain respondent elaborated on this, the respondent anchored themselves in prior experiences with multiple near floods in low-risk floodplains and no flood events in high-risk floodplains, explaining that the risk of flooding at any given point may as well have been a "50/50 chance." This was an interesting topic of discussion as it shed some light

on a distinction that it would appear the RAP does not fully explore; the distinction between interpreting (what does this graphic *say*?), understanding (what does this graphic *mean*?), and acting upon a given stimulus (what should I *do* now?).

5.3 Cultural Patterns Across Risk Levels

With the RAP being called into question, at least for the 25- and 100-year floodplain focus groups, it becomes apparent that the hypothesized need for a shift towards other measures of risk perception is necessary. As illustrated earlier in Table 1 with the small sample that was observed, there was little to no consistency in which patterns emerged when literacy and numeracy were observed under the lens of cultural theory, let alone any with literacy and numeracy increasing or decreasing. This lack of consistency prompted a departure from a literacy and numeracy focused observation and a shift towards measures of cultural identity to find examples of polarization amongst the cultural identities.

The author started with a broad observation of how cultural identities emerged across the sample as a whole, between floodplains, and between measures of risk perceptions. Due to the small sample and the already established placement of respondents' answers being attributed to the 500-year floodplain, it became clear that respondents in this focus group were not exhibiting patterns based on their cultural identities. However, despite a lack of polarization on the level of Kahan's (2012) findings with climate change, patterns did begin to emerge amongst cultural identities as risk portrayals increased.

The 25- and 100-year floodplain focus groups started to exhibit patterns that appeared to be consistent even between measures of cultural theory (simple Kahan and

combination). Where it was hypothesized that Egalitarian-Communitarians would be the most risk averse group of people and be the most consistent with the RAP, this was not the case. Egalitarian-Communitarians were found to be lacking consistency across mitigation behaviors, risk perceptions, and home-buying behaviors at a rate close to 50/50 in most cases (Figure 12). This finding in itself was interesting, as it indicated to the author that the anticipated heralds of high-risk perceptions in the realm of climate change seem to falter as the focus shifts to a more nuanced aspect of climate change.

Even more interesting than the lack of patterns with Egalitarian-Communitarians, were the patterns that were found with Hierarchical-Individualists. While the sample for this cultural identity was small, the opinion of the Hierarchical-Individualists were consistent and illustrated the makings of a clear pattern. Under the lens of the high-risk graphic portrayals (25- and 100- year floodplains), Hierarchical-Individualists were found to be low in their mitigation behaviors, low in their risk perceptions, and high in their home-buying behaviors across both measures of cultural theory. These findings are consistent with the climate change risk perceptions that were hypothesized based on the findings of Kahan et al. (2012) where Hierarchical-Individualists exhibited patterns of low-risk perceptions in the face of climate change.

Alongside those patterns of the Hierarchical-Individualists and the consistently split perceptions of Egalitarian-Communitarians, the measures of cultural theory both had two more cultural identities that were shared between them, Egalitarian-Individualists and Hierarchical-Communitarians. While neither of these groups were hypothesized to have any noteworthy patterns, one group did appear to exhibit certain tendencies. The Egalitarian-Individualists, under the lens of high-risk portrayals, typically had high

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mitigation behaviors, high risk perceptions, and were split on their home-buying

behaviors. This finding is quite interesting as it indicates that there may be something

about the concept of flood risk that is triggering these reactions in Egalitarian-

Individualists that climate change risk is not speaking directly to.

5.4 Cultural Patterns Across Risk Communications

In addition to the variability between levels of risk throughout a given floodplain,

this research also operationalized varied forms of risk communication for each level of

risk. These risk communications came in the form of a cumulative bar graph illustrating

risk as a percent and a line graph representing risk as a dollar amount that was altered

based on the flood risk level being conveyed to the respondent. It was found immediately

that there were different "risk tolerances" between the cumulative risk and AAL

portrayals (Figure 5). These findings indicated that there were a number of respondents

comfortable with approaching or exceeding the cumulative risk of a given floodplain, but

far fewer willing to do the same for the AAL threshold. It is the authors instinct that these

findings are no accident, as people are more willing to write off percentage-based risks as

being "50/50 chances" and move on without giving the risk level any greater thought (as

was the case in the 25-year floodplain focus group). An additional note that bolsters this

claim comes from both the 500- and 25- year floodplain focus groups. During the 500-

year floodplain focus group, the AAL graphic risk portrayal was discussed at great length

by some of the respondents as being more "dramatic" or "severe" than the cumulative

risk graphic simply because of the space that the line graph for the AAL risk graphic was

taking up. The 25-year floodplain focus group had a less aesthetic and more emotionally

charged note on the AAL graphic in that they simply felt dread or fear upon seeing the graphic and wished that they were lower altogether.

With "risk tolerance" levels skewing so heavily towards AAL representing a greater degree of risk, it would be expected that this portrayal would continue to dominate across other measures of risk. However, in home-buying and mitigation behaviors, the differences between the cumulative risk portrayal and the AAL risk portrayal are negligible. It is only when asked directly about the respondents' risk perceptions regarding each portrayal that a distinction between the two is seen. These differences show respondents who classified as high risk perceptions increased from 50% in the cumulative portrayal to 70% in the AAL.

Applying cultural theory to these inter-portrayal results helps bring to light the types of people that are seeing AAL as a greater risk than the cumulative risk portrayal. Looking at cultural theory through the combination index, it was found that Egalitarian-Communitarians had greater proportions of high mitigation behaviors and high-risk perceptions when exposed to the AAL risk portrayal (Figure 15).

Figure 15. Simplified crosstabulation of Egalitarian-Communitarian risk perceptions and mitigation behaviors across both the cumulative and AAL risk portrayals where numbers in white are the product of the combination cultural theory index and black the simple Kahan index.

Similarly, when narrowed to only high-risk portrayals (25- and 100-year floodplains), these findings extended to the simple Kahan index as well (Figure 16). These findings under the lens of cultural theory are strikingly novel, as they seem to indicate that Egalitarian-Communitarians could benefit greatly from focusing on risk communication efforts that prioritize dollars over percentages.

Figure 16. Simplified crosstabulation of Egalitarian-Communitarian risk perceptions and mitigation behaviors across both the cumulative and AAL risk portrayals where numbers in white are the product of the combination cultural theory index and black the simple Kahan index.

5.5 Cultural Theory Meta-Analysis

As many of the cases in which cultural theory has been a focus of the research have been primarily quantitative in nature, this mixed methodological approach was positioned in a unique way to dive deeper into the questions about the cultural theory questions. In each of the focus groups there were mixed reactions to the introduction of the cultural theory questions (questions 54-57), most respondents felt that these questions were broad or vague, some that they were not in line with the rest of the flood-based survey, and several that thought these questions were an extension of the hypothetical flood scenario. Some of these deeper probes into the interpretation of the cultural theory question set called into question the question sets validity. The perceived broadness of the question set seemed to force respondents to make up their own scenarios or in some cases

use flood risk as the basis for them, potentially reshaping the question sets intent within the minds of each respondent as an entirely new question set.

Alongside the validity of the questions, the reliability of these questions appears to be shaky as well. Table 1 illustrates the collective Cronbach's Alphas for each of the indices used in this research effort, and in every reasonably possible combination of both sets of cultural theory questions (questions 45-48 & 54-57), none of the Alphas reached the threshold of 0.700. This finding calls into question what exactly the underlying construct of each of these question sets are. If Communitarianism is the presumed inversion of Individualism, these two concepts should have an internal consistency when one of them is reverse coded, with the same being true for Hierarchy and Egalitarianism. Additionally, and just as peculiar were the cases in which all the cultural theory questions (or questions 55 and 56 in the simple Kahan index) were ran, as these cases returned higher Cronbach's Alphas than any other combination of the questions in the cultural theory question sets. This indicates that there is a single underlying construct shared by each of these combinations of questions, one that may simply be "cultural theory" or one that is not as easily perceived.

This research effort also sought to incorporate its own cultural theory questions to compare with previously established cultural theory question sets. These flood specific cultural theory questions were designed with the intent to be a similar measure to cultural theory as the already established questions, with the added layer of relating directly to flooding. However, it was found that these flood specific questions, potentially due to their connection with flooding instead of more polarizing cultural worldviews, were more agreeable than their counterparts. Respondents were more likely to agree to the flood

specific question set in Hierarchy, Individualism, and Communitarianism, over their established cultural theory counterparts.

An additional oddity that was found in this flood specific question set was the question of Communitarianism in the flood context, where all 20 respondents either agreed or strongly agreed with this statement. This question was quite interesting as it posed the statement of "The government should protect my community by investing infrastructure such as better drainage system and flood control structures" and received unanimous support. This consensus is especially interesting given that there were a number of respondents who held individualistic worldviews, views that focus on individuals protecting themselves instead of the government. This question was explored within focus groups and most respondents felt that it was the duty of the government to invest in these infrastructures. The author believes that this question may be a good representation of a communitarian worldview but lacks the "trade-off" that is present in the established cultural worldview communitarian question (the limiting of freedoms). A future communitarian question should include a similar trade-off to see if results still skew heavily towards communitarianism.

Chapter 6: Conclusion & Future Studies

Having seen the results of the RAP operationalized within this research project, it is fair to say that a coin toss is about as good a predictor of "rational" flood preparedness behavior than the use of the RAP. Given the inaccuracy of the RAP, for people that use objective climate hazard tools, this research projects finding is that these people should still use these tools, but know that they are likely to miss their mark a little more than half the time. For example, 28% of people who exhibit flood literacy – an evident theoretical expectation and assumption of the RAP – chose the "irrational" options in the flood mitigation and home-buying questions. It was found that out of the 40 possible cases between mitigation behaviors and home-buying behaviors exposed to objective risk portrayals, only about half (48%) of these cases resulted in rational behavior. Of the remaining (52%) of cases, nearly half of these remaining cases had low numeracy, with the other half of cases having the high numeracy necessary but still failing to make the rational decisions the RAP would have predicted.

There is no objective minimum threshold for what percent of a sample should exhibit "rationality" before we can claim that the sample (and ultimately the population once the sample size reaches a minimum) is "rational." In this case, we feel that not exceeding the coin-toss threshold calls the RAP into serious question. With the RAP falling short of the mark, a common first conceptual domain for explanation is the set of socio-economic status (SES) factors, such as income, age, education level, race. To some extent, this is true, as high-income respondents were more prone than low-to-moderate

(LMI) respondents to make "rational" decisions [as they are often consistent in numeracy, dread, trust in experts, mitigation behaviors, and home-buying behaviors]. This point is illustrated by the 80% of high-income cases being rational decisions. In the cases with LMI respondents, the RAP is less apparent, though not so must so that this group can be explained as lacking rationality overall. Rather, 37% of the LMI cases can be characterized as being rational. This finding suggests that the higher a household's income, the more prevalent is the rational behavior in our flood context.

It is therefore clear that in our sample, rationality and income explain a small portion of the studied flood risk behaviors. Two other factors appear to tell some of the remainder of the story. First, trust in flood experts appears to be associated with home-buying. In the high-risk scenario, a high level of trust in flood experts appears to account for nearly half of the 52% of cases noted above that appear as irrational. Additionally, this finding indicates that people are more willing to purchase a risky home if they believe that there is someone, who they consider an expert, protecting them from flood risk. This was even evident in some of the focus group discussions as there were several respondents in the 25- and 100-year floodplain groups that made real-world decisions in home-buying based partly on the guidance of people that would be deemed experts.

Second, cultural identity illuminates some of the studied flood risk behaviors. Despite the small sample overall, and the smaller number of respondents who are classified into one of the two most prominent cultural identities, it is noteworthy that 100% of the hierarchical-individualist cases performed as expected. These individuals favor, regardless of flood risk level, risk tolerant decisions (low mitigation behaviors and high home-buying behaviors). However, the second of the two major cultural identities

did not discriminate as well, as the egalitarian-communitarians showed little inclination towards risk tolerance or risk aversion in response to objective flood risk information, this is despite the expectation that egalitarian-communitarians would be the most risk averse group of people.

Fortunately, earlier works by Kahan (2013) set the stage for an additional probe into cultural identities under the lens of the type of portrayal being used. In this case, the egalitarian-communitarians, while mixed in their responses overall, allowing for the small sample size, show hints of both risk tolerance and risk aversion when compared across objective flood risk portrayals. Where, in high-risk portrayals, a slight majority of egalitarian-communitarians are risk tolerant towards risk portrayed as likelihood (57%), with that majority (71%) shifting to risk averse in response to risk portrayed as average annualized dollar losses. This finding insinuates that egalitarian-communitarians could be more risk averse to certain types of risk portrayals, a finding that differs slightly from Kahan (2013), which would have expected this group to be consistent regardless of portrayal type.

6.1 Research Objective 1

Does polarization of cultural identities and political affiliations exist in the realm of flood risk? And do these polarizations grow stronger based on scientific numeracy?

While it was found that there were no strong polarizations that occurred between cultural identities on the level of those experienced in the topics of climate change or gun control, there were still noteworthy patterns that occurred within certain cultural identities. Additionally, cultural identities viewed under the lens of flood risk literacy and numeracy showed that any given identity was no more or less likely to act in a given way

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based on either literacy or numeracy. The lack of polarization and increased polarization

under the lens of literacy or numeracy indicate to the author that flood risk, while a

product of the polarizing topic of climate change, is not, in itself, a polarizing topic.

However, cultural worldviews and their associated identities were found to have patterns

under certain conditions. These patterns indicate that while there may be no clear

polarization, cultural worldviews are still an important intuition that have nuanced

impacts on decisions-making in the face of flood risk.

6.2 Research Objective 2

What type of flood risk portrayal or level of risk portrayal is most effective in

communicating flood risk and does this vary significantly based on cultural identity?

Both the level of flood risk and the flood risk portrayal shown to respondents

prompted varied results under the lens of cultural theory. In high-risk (100- and 25- year

floodplain) portrayals Egalitarian-Communitarians were found to be split on their

mitigation behaviors, risk perceptions, and home-buying behaviors. These findings are

contrary to the anticipated hypothesis of Egalitarian-Communitarians being the most

sensitive group to risk. When the frame of reference was shifted from a high-risk

portrayal, to one that compared the cumulative risk as a percent and the AAL,

Egalitarian-Communitarians started to show more noteworthy patterns. Specifically, this

group was found to have an increase in respondents that had high mitigation behaviors

and high risk perceptions when risk was communicated in dollars as opposed to

percentages.

Hierarchical-Individualists were not impacted by the change from cumulative risk

portrayal to AAL, rather they were consistent in their behaviors regardless of the

portrayal type. Hierarchical-Individualists were also found to be consistent within the high-risk portrayal groups. In the high-risk portrayals, this group showed patterns of having low risk perceptions, low mitigation behaviors, and high home-buying. These findings are consistent with the anticipated hypothesis of Hierarchical-Individualists being the most risk averse or risk tolerant of the four cultural identities.

In addition to the Egalitarian-Communitarians and Hierarchical-Individualists, which were anticipated to have patterns in their flood risk perceptions and behaviors, the two groups of Egalitarian-Individualists and Hierarchical-Communitarians were also showing patterns. The Egalitarian-Individualists, under high-risk portrayals, showed patterns of having high risk perceptions and mitigation behaviors. Under the lens flood risk portrayal types, both Egalitarian-Individualists and Hierarchical-Communitarians reported as having higher risk perceptions in AAL than in the cumulative risk portrayals. This is an interesting finding as the anticipated hypothesis for the cultural identities excluded the notion of any noteworthy patterns occurring in either of these groups.

6.3 Research Objective 3

Are people more or less likely to alter their mitigation behavior based on their exposure to certain flood risk portrayal or level of risk portrayal and does this vary based on cultural identity?

This research project has illustrated that there are patterns that occur within and across cultural identities that are likely to alter, at varying degrees, the mitigation behaviors, risk perceptions, and home-buying behaviors. While there is no risk level or risk portrayal type that impacts all people or all cultural identities, this research has shown that there are certain approaches that fit the needs of certain cultural identities.

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Egalitarian-Communitarians showed patterns of higher mitigation behaviors after being exposed to the AAL risk portrayal. Hierarchical-Individualists showed patterns of lower mitigation behaviors as the group was exposed to greater levels of risk. Egalitarian-Individualists showed the opposite effect and had increased mitigation behaviors when exposed to high levels of risk. Hierarchical-Communitarians were the only group of all the cultural identities that did not have an incredibly noteworthy and prominent pattern based either on flood risk level or risk portrayal.

6.4 Limitations & Future Studies

This research project, as a part of the collective work of several research facilities across the contiguous United States under the National Academy of Sciences Gulf Research Program research project, was by design, a small step in a larger endeavor. As such, the scope of this research project was purposefully constrained and small in order to set the stage for a larger sampling based on this research project's focus group discussions. Due to the small sample, the patterns and findings of this research project do not have statistical significance, they are instead to be taken as an observation of a specific group of people that the author expects will have value in guiding future large sample studies.

One of the first amendments that future studies should research involves the low Cronbach's Alpha of the "Flood Risk Literacy" index. As this index, even when adjusted, came out to be only 0.058, it is clear that this index lacked unidimensionality, showcasing just how complex the concept of "Flood Risk Literacy" is. As an initial probe into the possibility of this 6-item index being multiple concepts, the researchers ran a Principal Components Analysis on the 6 items and found that there are three indices within the

concept of "Flood Risk Literacy" that make up a total of 69% of the variance of these questions (Table 7). This finding itself is a tremendous step towards understanding what concepts are hiding beneath the surface of what it is that this research called "Flood Risk Literacy."

In the same theme of optimizing the survey administered to respondents, future research endeavors would benefit from refining, both the flood-specific and the already established, cultural theory question sets. These questions were found to lack the internal consistency expected of a question set measuring the same series of underlying concepts (egalitarianism, hierarchy, individualism, and communitarianism). Refining these question sets to better reflect their underlying values will be vital in the continual refinement of cultural theory.

Beyond the consolidation of the content of the survey and its their respective sub-concepts, it is the recommendation of the author that future studies explore taking this research project and both expanding the scope and the sample. A future research project that uses similar methods to this project, with a larger sample, would be a monumental step forward. Taking the information found in this research project's focus groups, building on them, and having the statistical significance of a large sample would be a tremendous next step forward.

This research took an important first step in looking at the variability in the effectiveness of both risk portrayal levels and risk portrayal types. Future studies would benefit from building on these topics, particularly with risk portrayal types. There are a number of new and exciting risk communication tools that are being introduced to the general public that may or may not be doing their best job in risk communication. Taking

the understandings of decision-making under flood risk that this research project has started and using one or more of these risk communication tools as a stimulus would be a logical next step in understanding how the RAP, psychometrics, and cultural theory interact with these tools.

Chapter 7: Appendices

Appendix A: Tables and Figure

Table 3. Data.census.gov data output of the populations for the 102 counties along the gulf coast of Florida and Louisiana from the 2019 American Community Survey.

GEOID10	State	Name
12001	Florida	Alachua County
12003	Florida	Baker County
12005	Florida	Bay County
12007	Florida	Bradford County
12009	Florida	Brevard County
12011	Florida	Broward County
12013	Florida	Calhoun County
12015	Florida	Charlotte County
12017	Florida	Citrus County
12019	Florida	Clay County
12021	Florida	Collier County
12023	Florida	Columbia County
12027	Florida	DeSoto County
12029	Florida	Dixie County
12031	Florida	Duval County
12033	Florida	Escambia County
12035	Florida	Flagler County
12037	Florida	Franklin County
12039	Florida	Gadsden County
12041	Florida	Gilchrist County
12043	Florida	Glades County
12045	Florida	Gulf County
12047	Florida	Hamilton County
12049	Florida	Hardee County
12051	Florida	Hendry County
12053	Florida	Hernando County
12055	Florida	Highlands County
12057	Florida	Hillsborough County
12059	Florida	Holmes County
12061	Florida	Indian River County
12063	Florida	Jackson County
12065	Florida	Jefferson County
12067	Florida	Lafayette County
12069	Florida	Lake County
12071	Florida	Lee County
12073	Florida	Leon County
12075	Florida	Levy County
12077	Florida	Liberty County

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GEOID10	State	Name
12079	Florida	Madison County
12081	Florida	Manatee County
12083	Florida	Marion County
12085	Florida	Martin County
12086	Florida	Miami-Dade County
12087	Florida	Monroe County
12089	Florida	Nassau County
12091	Florida	Okaloosa County
12093	Florida	Okeechobee County
12095	Florida	Orange County
12097	Florida	Osceola County
12099	Florida	Palm Beach County
12101	Florida	Pasco County
12103	Florida	Pinellas County
12105	Florida	Polk County
12107	Florida	Putnam County
12109	Florida	St. Johns County
12111	Florida	St. Lucie County
12113	Florida	Santa Rosa County
12115	Florida	Sarasota County
12117	Florida	Seminole County
12119	Florida	Sumter County
12121	Florida	Suwannee County
12123	Florida	Taylor County
12125	Florida	Union County
12127	Florida	Volusia County
12129	Florida	Wakulla County
12131	Florida	Walton County
12133	Florida	Washington County
22001	Louisiana	Acadia Parish
22003	Louisiana	Allen Parish
22005	Louisiana	Ascension Parish
22007	Louisiana	Assumption Parish
22011	Louisiana	Beauregard Parish
22019	Louisiana	Calcasieu Parish
22023	Louisiana	Cameron Parish
22033	Louisiana	East Baton Rouge Parish
22037	Louisiana	East Feliciana Parish
22039	Louisiana	Evangeline Parish
22045	Louisiana	Iberia Parish
22047	Louisiana	Iberville Parish

GEOID10	State	Name
22051	Louisiana	Jefferson Parish
22053	Louisiana	Jefferson Davis Parish
22055	Louisiana	Lafayette Parish
22057	Louisiana	Lafourche Parish
22063	Louisiana	Livingston Parish
22071	Louisiana	Orleans Parish
22075	Louisiana	Plaquemines Parish
22077	Louisiana	Pointe Coupee Parish
22087	Louisiana	St. Bernard Parish
22089	Louisiana	St. Charles Parish
22091	Louisiana	St. Helena Parish
22093	Louisiana	St. James Parish
22095	Louisiana	St. John the Baptist Parish
22097	Louisiana	St. Landry Parish
22099	Louisiana	St. Martin Parish
22101	Louisiana	St. Mary Parish
22103	Louisiana	St. Tammany Parish
22105	Louisiana	Tangipahoa Parish
22109	Louisiana	Terrebonne Parish
22113	Louisiana	Vermilion Parish
22117	Louisiana	Washington Parish
22121	Louisiana	West Baton Rouge Parish
22125	Louisiana	West Feliciana Parish

Table 4. Accompanying table to Figure 1 with deaths and economic losses from flooding.

Year	Total Deaths	Total Damages
1900-1909	322	480,000,000
1910-1919	0	0
1920-1929	246	230,000
1930-1939	337	438,000,000
1940-1949	55	900,000,000
1950-1959	148	1,029,000,000
1960-1969	224	1,220,000,000
1970-1979	599	861,000,000
1980-1989	140	886,400,000
1990-1999	383	28,257,300,000
2000-2009	8	286,000,000
2010-2019	251	41,768,000,000

Figure 17. Bar chart from 1978 - 2018 showcasing the massive spikes in NFIPs dollars lost compared to their yearly premiums earned.

Figure 18. High risk (25-year floodplain) bar chart of flood risk information stimulus illustrating the hypothetical risk of a home in the 25-year floodplain.

Figure 19. High risk (25-year floodplain) average annualized loss chart of flood risk information stimulus illustrating the hypothetical cost of a home in the 25-year floodplain.

Figure 20. Medium risk (100-year floodplain) bar chart of flood risk information stimulus illustrating the hypothetical risk of a home in the 100-year floodplain.

Figure 21. Medium risk (100-year floodplain) average annualized loss chart of flood risk information stimulus illustrating the hypothetical cost of a home in the 100-year floodplain.

Figure 22**.** Low risk (500-year floodplain) bar chart of flood risk information stimulus illustrating the hypothetical risk of a home in the 500-year floodplain.

Figure 23. Low risk (500-year floodplain) average annualized loss chart of flood risk information stimulus illustrating the hypothetical cost of a home in the 500-year floodplain.

Table 5. Demographic statistics of the survey sample.

Socio-Economic Status	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6
Political Affiliations	Republican - 35%	No Party Affiliation - 15%	Democrat - 50%			
Political Ideologies	Conservative - 40%	Neither Liberal nor Conservative - 35%	Liberal - 25%			
Homeownership Status	Owned with a loan - 65%	Owned free and clear - 30%	Rented - 5%			
Gender	Male - 25%	Female - 75%				
Age	18-34 - 30%	35-49 - 25%	50-64 - 30%	65 and over - 15%		
Household Income	$15,000 to $24,999 - 5%	$25,000 to $49,999 - 35%	$50,000 to $74,999 - 35%	$75,000 to $99,999 - 10%	$100,000 to $199,999 - 10%	$200,000 or more - 5%
Race & Ethnicity	Asian - 5%	Black or African American - 5%	Hispanic, Latino, or Spanish origin - 10%	White - 70%	Hispanic & White - 10%	
Educational Background	Science and engineering - 10%	Business - 25%	Education - 10%	Arts and humanities - 15%	Trade or vocational - 10%	Missing - 30%
Education Level	High school graduate (includes equivalency) - 15%	Some college or associate degree - 50%	Bachelor's degree - 20%	Master's degree - 10%	Other - 5%	
State of Origin	Florida - 75%	Louisiana - 20%	Other - 5%			

Table 6. Dependent variable statistics of the survey sample.

Socio-Economic Status	High	Low
Flood Risk Literacy	15%	85%
Flood Risk Numeracy	75%	25%
Mitigation Behaviors	45%	55%
Graphic Risk Perceptions	55%	45%
Dread	75%	25%
Trust in Experts	80%	20%
Trust in Institutions	65%	35%
Willingness to Purchase	65%	35%
Social Solidarity	85%	15%

Table 7. Principal Component Analysis of "Flood Risk Literacy" question set (Q1-6), illustrating that three components emerge to explain 69% of the variance in the topic.

Rotated Component Matrix[a]			
	Component		
	1	2	3
Q1. True or false? Adding impervious surfaces like streets or sidewalks makes a neighborhood more prone to flooding.	-.021	-.127	.882
Q2. At what depth will flood water begin to float most vehicles?	-.084	.709	.555
Q3. True or false? An area with sand-like soil is more likely to flood than an area with clay-like soil.	.599	.360	-.189
Q4. Select all of the following that are true. I can help reduce the flood risk of my community and my home by:	-.813	.044	.137
Q5. Of the choices below, what is the biggest cause of coastal flooding?	.700	-.173	.284
Q6. True or False? Flood impacts can be limited by installing special fencing to block the water from entering the home.	.008	.824	-.266
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 4 iterations.			

NAS-Gulf T4 Prototype Stimulus Survey - 25-Year Floodplain[1]

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.

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[1] Title was altered based on the floodplain being given to each focus group. Focus group 1 received the 500-year floodplain survey, focus group 2 the 100-year floodplain survey, and focus group 3 the 25-year floodplain survey.

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. Respondents 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 respondents 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

Section 1: Flood Awareness

X→

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

○ True

○ False

○ Unsure

X→

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

X→

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

X→

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

X→

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

○ Storm surge

○ Clogged gutters

○ Algal blooms

○ Plumbing issues

○ Unsure

X→

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

○ True

○ False

○ Unsure

X→

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

X→

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.	○	○	○	○

* X→

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.

Expected Cumulative Probability of Flooding: 25-Year Floodplain

2

X→

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2 For all instances from Q13 – Q24 when the cumulative risk bar chart was used in the 100-year floodplain and the 500-year floodplain, they were replaced with Figure 20 and Figure 2223, respectively.

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

Expected Cumulative Probability of Flooding: 25-Year Floodplain

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

○ 71%

○ 46%

○ 19%

○ 4%

○ Unsure

Expected Cumulative Probability of Flooding: 25-Year Floodplain

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

Expected Cumulative Probability of Flooding: 25-Year Floodplain

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

✳ X→

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

Expected Cumulative Probability of Flooding: 25-Year Floodplain

Bar chart titled "Expected Cumulative Probability of Flooding: 25-Year Floodplain." Y-axis labeled "Probability" from 0% to 80%. X-axis labeled "Years in the future." Bars: 1 year = 4%, 5 years = 19%, 15 years = 46%, 30 years = 71%.

X→

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)

Expected Cumulative Probability of Flooding: 25-Year Floodplain

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)

Expected Cumulative Probability of Flooding: 25-Year Floodplain

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)

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.

Expected Cumulative Cost of Flooding: 25-Year Floodplain

3

X→

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)

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3 For all instances from Q25 – Q36 when the average annualized loss (AAL) risk chart was used in the 100-year floodplain and the 500-year floodplain, they were replaced with Figure 21 and Figure 23, respectively.

Expected Cumulative Cost of Flooding: 25-Year Floodplain

X→

Q26. Assuming your home is in this floodplain, what is the expected cost of flooding for this particular home next year?[4]

○ About $2,500

○ About $10,000

○ About $50,000

○ Unsure

End of Block: AAL Risk Stimuli (Q26)

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[4] Answer choices for Q26 varied depending on the survey being administered. The 100-Year floodplain survey had choices of; "About $600", "About $3,000", "About $15,000", and "Unsure". The 500-Year floodplain survey had choices of; "About $150", "About $750", "About $3,000", and "Unsure".

Expected Cumulative Cost of Flooding: 25-Year Floodplain

X→

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

Expected Cumulative Cost of Flooding: 25-Year Floodplain

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

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

Expected Cumulative Cost of Flooding: 25-Year Floodplain

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

Expected Cumulative Cost of Flooding: 25-Year Floodplain

X→

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)

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Expected Cumulative Cost of Flooding: 25-Year Floodplain

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

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.

X→

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.	○	○	○	○

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.

X→

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. | ○ | ○ | ○ | ○ |

Section 6: Demographics

X→

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

○ Strongly Republican

○ Leaning Republican

○ Independent or No Party Affiliation

○ Leaning Democratic

○ Strongly Democratic

X→

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

○ Strongly Liberal

○ Leaning Liberal

○ Neither Liberal nor Conservative

○ Leaning Conservative

○ Strongly Conservative

X→

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

X→

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

X→

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

X→

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

○ Science and engineering

○ Business

○ Education

○ Arts and humanities

○ Trade or vocational

○ Not applicable

X→

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)

Flood Risk Perception Survey

Flooding* has cost over $1 trillion in inflation adjusted dollars since 1980.

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.

1

*Combination of Winter Flooding, Flooding, and Tropical Cyclones.

Flood Risk Perceptions

1. Introductions
2. How the focus group works
3. Consent

Let's go!

2

Flood Awareness

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

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

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

44% Correct
Q4. Select all of the following that are true. I can help reduce the flood risk of my community and my home by:

89% Correct
Q5. Of the choices below, what is the biggest cause of coastal flooding?

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

3 High / 15 Low

3

Flood Chart Understanding

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

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

89% Correct
Q15. What does this graphic show about the chance of flooding?

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

72% Correct
Q26. Assuming your home is in this floodplain, what is the expected cost of flooding for this particular home next year?

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

13 High / 5 Low

4

117

Flood Mitigation

39% "Not at all"

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.

42% "A great deal"

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

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

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)

9 High / 9 Low

5

Likelihood of Flooding & Cost of Flooding

Expected Cumulative Probability of Flooding: 25-Year Floodplain

Expected Cumulative Cost of Flooding: 25-Year Floodplain

6

64% "strongly agree" or "agree"

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

Home-Buying Behavior

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?

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?

12 High / 6 Low

56% "strongly agree" or "agree"

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

79% "strongly agree" or "agree"

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

Q39. Flood news reports make me scared.

Emotions About Flooding (Fear or Dread)

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.

13 High Dread / 5 Low Dread

Political Questions

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

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

6 Republican / 9 Democrat / 3 Independent
7 Conservative / 5 Liberal / 6 Neither

Way of Life Questions

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.

33% "strongly agree" or "agree"

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

33% "strongly agree" or "agree"

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

Way of Life Questions (Flooding)

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

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

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

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

100% "strongly agree" or "agree"

Q46 x Home-Buying & Mitigation

	Willingness to Buy (Low)	Willingness to Buy (High)
Strongly Agree or Agree with Q46	12	7
Strongly Disagree or Disagree with Q46	0	0

	Mitigation Behavior (Low)	Mitigation Behavior (High)
Strongly Agree or Agree with Q46	10	9
Strongly Disagree or Disagree with Q46	0	0

Questions or comments?

THANK YOU!

Thank you for taking the time to complete this survey & focus group. You have greatly added to our understanding of flood risk perception, mitigation, and communication. Your contribution to this study has the potential to transform current understandings about flood management to make communities more resilient. If you have any questions or comments, please email us:
ThemeFourNASGulf@fau.edu

Appendix D: Focus Group Notes

500-Year Floodplain Focus Group
- Start Time: 5:39PM
- Respondents: DE, RC, AG, MF, & SG
- Introductions by Colin, the NAS-Gulf project, the scope of the project, etc.
- Introductions by Glen and Ryan
- 5:41PM - Colin talks briefly about the zoom conference call, the expectations, and how the focus group will be run (free flowing conversation that is looking for the perceptions and opinions of the respondents). The introduction of this focus group being the set up for a series of focus groups and a survey over the summer.
- 5:45PM – Consent, recognition of the volunteer nature of the focus group, the acknowledgement that respondents remain anonymous, over 18, and living in the gulf coast. Consent given
- 5:46PM – Initial screen sharing and introduction, definition of flooding, etc.
- 5:47PM – Transitional Introduction slide
- 5:48PM – Flood Awareness questions, introduction of wanting to get a sense of the content knowledge, what was easy, what was hard, etc.
- 5:49PM – **DE**: There wasn't anything too confusing about the questions. **AG**: The questions are good. **RC**: Thinking about question #4, I have been through two different kinds of flooding, one "Noah's Ark" (19 Inches of Rain) where the drainage system couldn't handle the water, and the other was Katrina where you can claim that the storm drains are the result, put down sandbags, but there isn't much else that can be done. **RC:** Probably got this Q wrong having the hurricane experience
- 5:53PM – There were not too many people who scored well on the Flood Awareness Index. **AG:** Dug a ditch to relocate the water so that every time there is rain the water is rerouted. **RC:** Before Katrina the city RC resided in did not have any retention ponds, this has improved since that time. **DE:** Also has a bunch of flood retention ponds, but these ponds will still be topped in certain situations
- 5:56PM – Reintroduction of likelihood of flooding and cost of flooding and that numeracy is high amongst the group
- 5:59PM – **MF**: The graphics were pretty intuitive, the line graph that had a larger surface area was more effective in being dramatic than the cumulative. There is more severeness to the line graph to the bar graph. **RC**: Thought the graphs were very clear, but this needs to be tempered with the type of people that are in the area. Flood insurance is very cost prohibitive. After Katrina a neighbor of his had his insurance increase greatly. **SG**: Agrees that the graphics were easy enough to interpret. Hoping to continue living in Florida, unnerved based on the simple fact that they do plan on living in the state of Florida for at least another 30 years.
- 6:04PM – Introduction of flood mitigation behavior questions, what people can do in the face of flooding. **DE:** The next person to buy your home would need to buy without understanding flood or flood insurance

- 6:05PM – **RC:** You can't even get a mortgage in the state of LA without having flood insurance. There are people that they know that packed up and left their houses because they could not afford to build back their homes. They have plenty of experience in the area. **SG:** Instead of Q19, SG lived in a red flood zone a mile from the coast in a home that was already elevated. They live in a home (built in 2003) now that is already elevated, and they looked at this specifically while moving into their home. About an hour away from the area that Hurricane Charly tore through. SG was expecting the risk of water above their roof and anticipated this while buying their home.
- 6:09PM – Realigning with the intro of the flood mitigation index
- 6:11PM – Introduction of home-buying behaviors / preferences. **RC:** About the floodplain, there would be no way that RC would buy a home in a floodplain. You cannot trust FEMA or the Gov't to come up with a valid floodplain, they are constantly changing the floodplain. Insurance companies will try to weasel out of every flood claim from Katrina, even when RC's home was completely messed up. Even if you have an iron-clad insurance policy, you are not protected.
- 6:15PM – Awkward silence
- 6:17PM – Introduction of the dread risk question suite. **MF:** Q37 was worded a little strange, were we trying to avoid the word "responsible"? There was some confusion in questions structure. **DE**: Flooding that causes feelings of dread can impact the emotions of people not just from the stance of the danger but also from the stance of harmful bacteria. **AG:** Q39 There are a lot of people who are watching the news and the fear tends to compound because the news is bringing these things up. This was a personal experience with Irma because it was said that the hurricane was impending so they evacuated. AG does not watch the news anymore because of this
- 6:23PM – Introduction of the political framework for flood risk
- 6:24PM – **RC:** Conservative and Republican he is, when a hurricane is on its way, we are all citizens and we are all at risk. **DE:** Did not see the connection between politics, CT, etc. and the flooding questions. The questions felt like they were out of place. **SG:** Thought that these were general demographic questions, SG thinks that a good question to ask would be an experience level type of question that informs us as to how much time the person has lived in the state they live in
- 6:28PM – Introduction of the CT / Way of life questions
- 6:31PM – **DE:** Q54 is focused on whether we are going to be living in Russia or the U.S., this indicated to SG a "more equal, but which direction" type of thought. SG thought this Q was broad. **MF:** Thought that these Qs were a good transition into (from?) the policy(?) portions of the survey. MF is thinking that there should be a policy section that follows this. It might be helpful to have an "other" section for each of the CT questions to explain the nuance for their answers.
- 6:35PM – SG: SG thought that Q57 in terms of flood might end up requiring flood insurance or some other mitigation behaviors, which she does not agree with.
- 6:36PM – Introduction of flood CT

- 6:38PM – **DE**: Q47 The only way that you can reduce your flood risk is to makes sure that they move to a place that does not have any flooding. People that live along the coasts choose to live there, they're bound to get hit with storm surge. These people are building homes in the floodplain and when they are destroyed, the build right back. Q47 isn't really a yes/no question or a SA/SD question, it was a hard question to answer. **SG**: Looked at this Q more from a mitigation stance, the sandbags may be gone or the construction workers may be too busy to help you at a certain point, so it is important to prepare when you have the chance. **AG**: agrees with Q48, if a flood is to happen to these vulnerable people, they cannot bounce back as quickly.
- 6:42PM – Flooding is something that involves everybody and there are changes to the private sector that are coming
- 6:44PM – request for additional questions, comments, concerns
- 6:44PM – **SG**: The only other survey thing that SG would change, the installation of the seawall question was answered as if they did have a seawall. SG recommends the addition of a "not applicable" option to the question.
- 6:45PM – **RC**: Thanks for inclusion in the focus group. The survey has dredged up past experiences, of which RC has plenty of experience. The weatherman says it is coming but the hurricane shifts at the last moment, causing high anxiety and a difficulty to believe the weatherman and the information being given to them.
- 6:48PM – Closing remarks
- 6:49PM – Catherine closing remarks
- 6:50PM – Recording stopped

100-Year Floodplain Focus Group
- Start Time: 5:36PM
- Respondents: R, DE, JN, 1-850 (CS), MG, SW, DO
- 5:36PM – Introductions by Colin re: flooding, flood risk, perceptions, etc.. Setting up the scope of the project and extending thanks for the focus group
- 5:37PM – Introductions of Glen and Ryan
- 5:39PM – Background of the study, study area, establishing the importance of flooding, setting up the rules for the focus group, and getting consent from respondents
- 5:43PM – Consent given
- 5:45PM – Introduction to the powerpoint for the focus group and setting the table for the survey
- 5:46PM – Flood awareness questions introduction. **DO**: Thought the questions were simple and straightforward, did not have a problem. **DE**: Found that for some of the questions difficult to parse out if they were hypothetical or if they were using real money for these questions. **CS**: Found them pretty simple.
- 5:50PM – Flood chart understanding introduction.
- 5:51PM – **DO**: DO is forced to purchase flood insurance, they felt that these questions do not apply very much to their situation because they are forced to

purchase flood insurance. **DE:** thought that these questions were not confusing. **DO:** The charts do show some areas that flood really bad around DO's area, they are correct to certain areas.

- 5:55PM – **JN**: Thought that these were straightforward, there shouldn't be a lot of confusion on these questions if you took the time to read the charts. **CS:**
- 5:57PM – Introduction of mitigation behavior section
- 5:59PM – **DO:** Was not sure what we meant by elevating the house, DO initially thought that this would just be standing the house up on stilts. DO did not know that you could elevate homes.
- 6:00PM – **DE:** DE lives in an area where if you are building a new home, you are actually required to elevate your home. DE lives in a home that needs to be elevated and is currently looking for grants to assist them in that process
- 6:02PM – **R:** R does not live in a floodplain, but has experience through their friend that is exposed to riverine flooding. R looked at the charts and cost, got a little bit of outside help from his friend, and answered these questions with additional research. R wanted to make sure that he had the information on the floodplain, insurance, etc.
- 6:04PM – **DO:** DO moved to a "flood zone" but made sure that their house was elevated higher than those in the area
- 6:05PM – Home-buying behavior introduction
- 6:07PM – **DO**: sounds simple, if you buy a home in this area, you need to know what mitigation efforts should be done to the house
- 6:08PM **– JN**: re:Flood Mitigation did not take the affordability of the mitigation efforts into account when they were answering these questions
- 6:09PM – Return to home-buying. **DE:** Questions were self-explanatory. **R:** R bought a house in 2014, the one that they ended up buying was purposefully outside of the riverine flood zone in the area.
- 6:11PM – Question posed, was is the risk measing intuitive or otherwise? R: R didn't feel strongly one way or the other about the houses in or out of the flood zones. R intuitively bought the house he bought because he liked it slightly more than others.
- 6:12PM – **JN:**
- 6:13PM – **DO**: Flood insurance was sprung on DO at the last moment prior to the buying of the home. DO felt like they didn't really have a choice. They would not have purchased a home in a flood area because this would have been just an additional expense.
- 6:15PM – **1850**: 1850 has 24 years of insurance industry experience, since hurricane Michael 1850 has flooded 2-3 additional times. They carry flood insurance despite not being required to carry it.
- 6:17PM – **1850:** A recent flood came through 1850s front door causing a fair bit of dread. 1850 says that if you are in the business of insurance and people know you are in the business, you are treated differently
- 6:19PM – Introduction of dread/fear.
- 6:21PM – **DE**: Did not know what we meant by Q37. For low-income people, these people sometimes cannot afford to prepare for flooding

- 6:22PM – DO: These questions were easy to understand, don't think anyone would get confused with them. **1850 & MG**: Agreed
- 6:23PM – Discuss dread index and high dread people. **DO**: Thinks that people need to focus less on what the cost of the flood, and more on the emotional impacts of the flood. It is stressful to have to deal with the flood. **1850**: added that even with flood insurance it is stressful and scary to work through a flood.
- 6:24PM – Introduction of politics in flooding
- 6:26PM – **DO:** Doesn't think that politics come into flooding, it is a matter of individualism. Does not believe that it is feasibly for the gov't to protect your property, you need to rely on yourself
- 6:27PM – **DE**: With enough rain, there will be flooding in the area DE lives. DE says that political party does not weigh heavily in addressing flood risk
- 6:28PM – 1850: Believes that personally they need to be proactive in addressing flooding personally, but also believes that their state (LA) should also be taking proactive steps to address flooding
- 6:29PM – Introduction of cultural theory
- 6:30PM – **DO:** DO does not believe in the redistribution of wealth, does not believe that it is fair, equal, etc. Believes that people should be paid comparable to their work. Does not see politicians or actors giving up their money for poorer people
- 6:32PM – **R:** Was wondering when these questions came up, since this survey was all about flooding, was wondering as to how these questions related to flooding. R feels that whether a person gets insurance or not, is based on their faith in insurance, not necessarily these CT questions. To a certain extent, risk and risk perceptions should play into flood mitigation
- 6:34PM – Introductions of flood-based CT questions
- 6:36PM – **DO:** Would like to see the government take care of more infrastructural issues. **DE**: Q48 is true. Q46 is something that should be invested into by the gov't. DE had an experience where the local gov't came out and did nothing for their property. **1850**: 1850 doesn't think that anyone minds helping out after a disaster, but there is a need to fix these problems so that they don't happen again
- 6:38PM – Have there been repairs after Katrina? **DE**: Believes that there were pump installations for after the flood has happened, but nothing in the way of mitigation pre-flood efforts.
- 6:39PM – **DO:** Would like to see the gov't take more proactive steps in an effort to prevent flooding from taking place. Take care of these things (flooding) before damage is done. **1850**: How has the same kind of effect happened time and again? Holland has fixed this issue, so why haven't we adopted similar mitigation efforts?
- 6:41PM – America has a different form of gov't than the Netherlands, proving it difficult to adopt their approach in the U.S.
- 6:42PM – Thanks for feedback
- 6:43PM – Catherine outro

25-Year Floodplain Focus Group

- Start Time: 5:39PM
- Respondents: Mc, MD, L, E, J, CJ, JS
- 5:39PM – Introductions by Colin
- 5:42PM – Discussion of Focus group mechanics and rules of engagement
- 5:44PM – Consent given
- 5:46PM – Introduction of flooding, the perils, definitions of flooding, etc.
- 5:49PM – Introduction of flood awareness questions
- 5:49PM – **JS:** Has experience with their parents being impacted by storm surge. **MD**: While they were answering these questions, MD was thinking about their personal home. They answered these questions based on their own personal experiences. MD understood all of these questions because they had prior experience.
- 5:51PM – **EF**: Was thinking of their own experience back during a few hurricanes. There are some people that have been hit significantly along the West Coast of FL
- 5:52PM – Adding that the flood awareness index was overall on the lower side
- 5:53PM – Introduction to flood chart understanding and graphics
- 5:55PM – **MD:** Based on the graphics and the questions given, it was overall pretty self-explanatory as to what we were asking. There was little confusing on these questions. MD also based the answers to these questions based on their (lack of) experience with prior flooding.
- 5:57PM – **EF:** EF wanted to have the chances of flooding to be lower, EF actually thought about this from an emotional standpoint instead of intellectual. EF didn't interpret them one way or the other, just wanted them to be lower overall.
- 5:58PM – **Mc**: Thought about this from the stance of having a 50/50 chance of flooding. Mc is under the impression that there is the chance that you could get hit with a flood back-to-back.
- 6:00PM – **L:** Has little experience with flooding as they have not lived in FL for very long. Was curious as to what the 100-year floodplain is.
- 6:01PM – Introduction of flood mitigation behaviors
- 6:03PM – **J:** Where J is located, there are no seawalls, so this was a point that did not have any grounding for her.
- 6:04PM – **Mc:** When Irma came through and many of the seawall were topped / destroyed, Mc found that many people were surprised to find out the need and effort associated with maintaining a seawall. Mc says that seawalls are not covered under a person's homeowners' insurance, and this could be a point of confusion.
- 6:06PM – **L:** For Q19, L would not consider buying a home on the water that is not already elevated. L says that there is a distinction between already having the home elevated when they buy the home and having to elevate the home after the fact.
- 6:07PM – Introduction of home-buying behaviors
- 6:08PM – **EF**: To some extent, the charts were a little difficult to understand. If the charts were more clear about the associated risk in a given area, people may be better able to understand the risk.

- 6:10PM – **EF:** Q17 / Q29 seem to be easier to understand than the charts, but EF did not see these two questions as asking the same thing. Q29 was asking more about investments and Q17 was not…
- 6:11PM – **MD:** Q17 for MD was based off of the neighborhood and their specific flood zone. This question was relatively easy for MD because they see flooding as a 50/50 chance if a storm or flood comes. Q29 was harder to give a dollar amount because they do not want to put a dollar amount on loss, it was hard to do
- 6:14PM – **J**: Is drive primarily by data, so J would like to see realtors show up with more information like these charts, similar to how some areas need to show "X" zones or "AE" zones.
- 6:16PM – **Mc**: People should be made aware of the costs of flood insurance and see just how much people are willing to pay for flood insurance as well.
- 6:17PM – introduction of dread risk
- 6:19PM – **EF:** These questions were some of the easiest for EF to understand, these were exactly what EF was thinking about during the comprehension section. EF has some pretty vivid memories about flooding that draw on dread. Re: Mitigation behaviors, EF feels that flooding happens so often that if every time a flood advisory is put into place, you put out sandbags, you may as well leave those bags out
- 6:21PM – **EF:** Thinks that the first thing to look at when home-buying would be if it was in a flood zone. **Mc**: thinks that if you want to live by a river, close to the gulf, etc. you should be prepared to address flooding yourself.
- 6:22PM – **MD:** MD has lived in their home near a river for 20 years, over this time period they have only had 1 dreadful experience. MD put down sandbags, but the flood never got to that point of flooding. MD is low dread because of this lack of large events. MD thinks that most people do their homework, but also that people are more likely to but in these flood prone areas because they know that there are things you can do to prevent flooding.
- 6:25PM – **J:** Lives in an areas not around a flood zone. The level of fear that J has towards floods has steadily increased, they recently had a near miss flood event that spiked J's fear. Even in news reports, they are talking about how the chances of flooding are increasing in the area around J.
- 6:27PM – Introduction of politics in flooding
- 6:29PM – **EF:** These were the easiest questions and did not require any thinking.
- 6:30PM – Awkward silence to the question of if politics was linked to flooding
- 6:31PM – Introduction of the CT questions.
- 6:32PM – **MD:** As MD was answering these questions, MD assumed that if there were flooding in an area (poor or rich), that flooding would be treated the same in both these areas. Thought that Q56 was a tricky question in reference to flooding. MD thinks that people should be treated the same regardless of where they live. Thought that the questions could be worded a little but different, it was difficult to give the answer to these questions
- 6:34PM – Introduction of flood CT questions

- 6:36PM – **L:** Looking at Q45, L thought that this should be true, but also believes that people should be told that homes are at high risk of flooding. Specifically, realtors, should be the people that tell buyer they are buying into a high-risk home. Because L is new to FL, they don't have anyone, any resources, etc. additionally, they feel that they can't trust their insurance people because their just trying to sell insurance
- 6:38PM – **MD:** MD agrees with Q48 because the cost of the higher-end houses are typically worth more than those in poorer parts. People that are impacted by flood, the money typically goes to where the money is. MD also agrees with Q45, you should do your due diligence and research a home that you are buying. MD never assumes that they are going to be impacted by a hurricane, so they buy based off of affordability, the neighborhood, etc.. MD agrees with Q47, but with the caveat that if a flood season came through during a bad year for that person, how do they get help? MD also agrees with Q46 and feels that Q46 should be automatically included with the community you are buying into,
- 6:42PM – **L:** Moving to FL, L did not think about flooding at all. L agrees with MD about not thinking about flooding. L is planning to make up a list of key issues that would prompt her to pack up and leave in the face of a hurricane.
- 6:44PM – Probing on the 50/50 chance of flooding thing
- 6:44PM – **MD**: Has lived in FL since 1998 where they lived in one area that was not a flood zone and one that was. MD has an experience where she has almost been impacted by flooding in the non-flood zone, but has yet to experience a flood in the flood zone. Most of MD's experiences with flooding are based on the backing up of water through the storm drains. So for MD, a 50/50 chance just means that they do not know
- 6:46PM – Outro
- 6:48PM – Catherine outro

Appendix E: Great Blue Contract

GreatBlue Services Agreement

This SERVICES AGREEMENT (this "Agreement"), entered into as of January 29, 2021 (the "Effective Date"), is between GREAT BLUE RESEARCH, INC., a Connecticut corporation with its principal place of business at 20 Western Boulevard, First Floor, Glastonbury, Connecticut 06033 ("GreatBlue"), and FLORIDA ATLANTIC UNIVERSITY, with its principal place of business at 3200 College Ave., Building DW Room 312, Davie, Florida 33314 and UNIVERSITY OF CENTRAL FLORIDA, with its principal place of business at 4000 Central Florida Blvd. Orlando, Florida, 32816 (hereinafter, "Clients" and together, the "Parties").

WITNESSETH

WHEREAS, Clients seeks full-scale focus group participant recruiting efforts to conduct three focus group sessions;

WHEREAS, GreatBlue, a full-service market research and data analytics firm, has the competencies to perform such work for Clients; and

NOW, THEREFORE, in consideration of good and valuable commitment, the receipt, adequacy and legal sufficiency of which hereby is acknowledged, intending to be legally bound, the parties hereto agree as follows:

I. GreatBlue Responsibilities

1. Provide focus group participant recruiting efforts for Clients' *Theme 4 Qualitative Research*, inclusive of three focus groups to be held on to be determined dates in 2021.
2. Organize a project initiation meeting to ensure project alignment and agree to a Timeline/ Deliverable Schedule.
3. Develop a custom participant recruitment screener.
4. Randomly recruit a total of 24 participants for three focus groups which meet all demographic criteria as listed in section III.2.
5. Eight (8) participants will be recruited for each focus group to ultimately seat 6-8.
6. Focus groups to occur online utilizing a digital meeting platform (example :: Zoom). Each focus group is approximately 60-75 minutes in length. GreatBlue will manage the setup of meeting platform and distribute applicable login credentials to Client no later than 48 hours prior to each scheduled group.
7. Provide participant recruitment grid and regular recruiting updates to Clients (frequency as agreed to during the project initiation meeting).
8. Program Clients' survey instrument of 30-45 minutes in length.
9. Distribute the survey instrument to all participants and ensure completion prior to each focus group.
10. Provide survey raw data to Client no later than 48 hours prior to the start of each focus group.
11. Conduct confirmation calls and digital meeting platform test with each participant leading up to the dates of each scheduled group. This confirmation will include communication with the digital meeting platform login details and information.
12. Provide a final list of confirmed participants to Clients within 24 hours of each focus group.
13. Sign on to each focus group and ensure moderator has full control and each participant is present.
14. Conduct audio recordings of each group and provide to Client within 24 hours of the completion of each group.
15. Distribute monetary incentives to each respondent who participates in the the required focus group and completes the pre-group survey. Each participant will receive a $75 incentive via an e-gift card. If respondent ultimately does not participate in a scheduled focus group, Clients will not be billed for their correlating incentive.

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II. Clients' Responsibilities

1. Provide final approval of the participant recruitment screener.
2. Provide a final survey instrument.
3. Provide moderation of each focus group.

III. Other

1. Parties agree to meet the Timeline/Delivery Schedule as agree to during the project initiation meeting. Parties further recognize any deadline not met may affect other subsequent deliverables. The following timeline has been developed based on GreatBlue's understanding of Clients' need:
   1. Project initiation meeting — to be determined date
   2. First draft of participant recruitment screener sent to Clients — 2 days following project initiation meeting
   3. Survey instrument sent to GreatBlue — 2 days following project initiation meeting
   4. Clients' edits to participant recruitment screener sent to GreatBlue — 2 days following first draft
   5. Survey programming — 2 days
   6. Final approval of participant screener — provided 2 days following edits
   7. Final survey programming approval — 2 days
   8. First focus group recruitment and confirmation — to be determined date/time - a minimum of three weeks time is required
   9. Second focus group recruitment and confirmation — to be determined date/time - a minimum of three weeks time is required
   10. Third focus group recruitment and confirmation — to be determined date/time - a minimum of three weeks time is required
   11. A minimum of 4 days is required between each focus group
   12. Survey instrument sent to participants — within 24 hours of being recruited
   13. Audio recordings sent to Clients — within 48 hours upon completion of focus group
   14. Incentive distribution to participants — within 48 hours upon completion of focus group
2. Parties agree to the Demographic criteria as discussed, agreed upon and listed below. Any changes to this Demographic criteria may result in a change to the total fee:
   1. All participants shall be at least 18 years of age or older
   2. Only one participant per household will be recruited for each focus group
   3. All participants must currently be homeowners
   4. 2/3 of the participants must have a household income below $68,000 if currently residing in the state of Florida or below $64,300 if residing in the state of Louisiana
   5. 1/3 of the participants must have a household income above $68,000 if currently residing in the state of Florida or above $64,300 if residing in the state of Florida
   6. All participants must currently reside in 1 of 102 Counties/Parishes throughout Florida and Louisiana. This list was provided to GreatBlue by Client on 1/15/2021 and entitled "Study Area Counties.csv"
   7. Mix of ethnicities with a targeted but not guaranteed goal of 1/3 Black/African American, 1/3 Hispanic, Latino, Spanish, 1/3 Caucasian
   8. Mix of political affiliations with targeted but not guaranteed goal of 1/3 Democrat, 1/3 Republican, 1/3 No Party Affiliation/Independent
3. If there are changes to the survey instrument and survey programming link (i.e. additional questions or edits) for each group, an additional fee will apply.

IV. Payment Terms

Clients hereby agree to a total fee of $4,800.00 (the "Fee") for the market research recruiting services described herein. Payment terms are as follows:

1. 100% of the Fee will be invoiced upon execution of this agreement and due prior to the start of the first focus group.
2. Invoices are to be paid on Net 15 terms.
3. GreatBlue reserves the right to withhold any and all deliverables if invoices are not current.
4. Final invoice will be adjusted to reflect incentive payments based on the number of respondents who ultimately participate in a focus group.

Signature on following page

The Supplemental Addendum attached hereto is hereby incorporated by this reference.

Intending to be legally bound, the parties have signed or caused their duly authorized representative to sign this Agreement as of the date first written above.

GREAT BLUE RESEARCH, INC.

By:

Name: Michael J. Vigeant

Title: CEO

Date: February 4, 2021

CLIENTS:

By: *Melody Thelwell*
226EA2B0EB3A4E2...

Name: Melody Thelwell

Title: Director of Procurement

Date: 2/4/2021

Please provide the following information to ensure accuracy when submitting invoices to Clients.

Invoice Contact Name for Florida Atlantic University: Colin Polsky

Email Address: cpolsky@fau.edu

Telephone Number: 954-236-1334

Address: 3200 College Ave., Building DW Room 312, Davie, Florida 33314

1. Incorporation by Reference. The Florida Atlantic University Board of Trustees ("FAU") and the undersigned ("Vendor") hereby incorporate this Supplemental Addendum – Basic General ("Addendum") into the agreement between FAU and Vendor (the "Agreement").

2. Payment. In the event FAU owes payment to Vendor, Vendor shall submit bills for compensation for goods, services and/or expenses in detail sufficient for a pre- and post-audit. Each bill or invoice must clearly identify the services, portion of services, and expenses for which compensation is sought. If FAU does not issue payment within forty (40) days of receipt of an acceptable invoice and receipt, and after inspection and acceptance of the goods, services or both, as provided in accordance with the terms and conditions of the Agreement, FAU may pay Vendor an interest penalty at the rate established pursuant to § 55.03(1), F.S. Vendors experiencing payment problems may contact Vendor Ombudsman at (561) 297-3693. FAU's performance and obligation to pay is contingent upon the legislature's annual appropriation; FAU will give notice to Vendor of the non- availability of funds when FAU has knowledge thereof. FAU will be responsible for paying only for any goods/services it receives; Vendor must refund any payment for goods/services that are unused upon the termination of the Agreement. Invoices which have been returned because of vendor preparation errors will result in delay in payment. The invoice payment requirements do not commence until a properly completed invoice is provided to FAU. FAU is a tax immune sovereign and exempt from the payment of sales, use or excise taxes. Vendor is responsible for and shall pay any taxes due under the Agreement. FAU may require Vendor to accept payments via FAU's EFT/ACH payment process. If Vendor is making any payment to FAU, Vendor shall pay timely and not offset any amounts. FAU shall not make any deposits or prepay any amounts; any deposits are refundable.

3. Relationship of the Parties. Each of the parties is an independent contractor and nothing in the Agreement shall designate any of the employees or agents of one party as employees or agents of the other. Vendor represents and warrants that it is not on the Convicted Vendor List (see § 287.133, F.S.). Vendor is not authorized to bind FAU to any contracts or other obligations.

4. Assumption of Risk. Each party assumes any and all risk of personal injury and property damage attributable to the willful or negligent acts or omissions of that party and its own officers, employees and other agents. Vendor also assumes such risk with respect to the willful or negligent acts or omissions of persons subcontracting with Vendor or otherwise acting or engaged to act at the instance of Vendor in furtherance Vendor's obligations.

5. Confidentiality. To the extent Vendor has access to FAU information (e.g., financial, business, strategic, or student records), Vendor agrees to maintain the confidentiality of such information and shall not disclose, discuss, or divulge any such information other than as directly and expressly required to fulfill Vendor's obligations under the Agreement or as other required by law.

6. Public Records: FAU is subject to Chapter 119 of Florida Statutes, known as the Public Records Law. The Agreement, this Addendum and any related documents and/or correspondence shall also become a public record subject to the Public Records Law, regardless of any confidentiality provision outlined in the Agreement. FAU may respond to public records requests without providing Vendor notice. FAU may unilaterally cancel the Agreement for Vendor's refusal to allow public access to public records related to the Agreement. Vendor shall comply with all applicable requirements of the Public Records Laws, particularly if Vendor is a "Contractor" as defined under § 119.0701, F.S. This provision shall survive the expiration or termination of the Agreement.

IF VENDOR HAS QUESTIONS REGARDING THE APPLICABILITY OF CHAPTER 119 TO VENDOR'S DUTY TO PROVIDE PUBLIC RECORDS, VENDOR MAY CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT 561.297.2452, publicrecords@fau.edu, DIVISION OF PUBLIC AFFAIRS, FLORIDA ATLANTIC UNIVERSITY, 777 GLADES ROAD, ADM, BOCA RATON, FL 33431.

7. Indemnity. Vendor agrees to indemnify, hold free and harmless, and defend the State of Florida, the Board of Trustees, Florida Atlantic University and their officers, trustees, employees and agents, from and against any and all actions, claims, liabilities, assertions of liability, losses, costs and expenses, including attorneys' fees, which in any manner directly or indirectly may arise or be alleged to have arisen, or resulted or alleged to have resulted from the presence, activities and promotions of every kind and nature of Vendor or its officers, employees, agents and contractors, in connection with the Contract, specifically including claims for infringement or misappropriation of a copyright, patent, trade secret or other third party proprietary right. Any limitations of liability of Vendor set forth in the Contract shall not apply to: (a) claims for infringement or misappropriation of a copyright, patent, trade secret or other third-party proprietary right or (b) claims for personal injury or damages to real or personal property caused by Vendor's negligence or willful misconduct. Nothing in the Agreement shall be construed as a waiver of FAU's sovereign immunity nor as an indemnification by FAU, and then such indemnification is limited to the extent permitted by § 768.28, F.S.

8. Compliance. Vendor agrees to abide by all applicable federal, state and local laws, ordinances and regulations and all FAU regulations and policies, specifically including without limitation those pertaining to the privacy and use of student records, health information, and other FAU data. Specifically, Vendor certifies its compliance with Section 889 of the McCain National Defense Authorization Act (prohibition against use of covered telecommunications equipment), and §448.095, F.S. (Vendor's use of the E-Verify system pursuant to the terms thereof)Vendor warrants and represents that it shall have all applicable permits, licenses, consents, and approvals necessary to perform under the Agreement. .

9. Insurance. FAU, as a public body corporate, warrants and represents that it is self-funded for liability insurance, with said protection being applicable to officers, employees, servants, and agents while acting within the scope of their employment by FAU. Any provision requiring FAU to provide or acquire insurance coverage other than such self-insurance shall not be effective. Vendor shall have and maintain the types and amounts of insurance that, at minimum, will cover Vendor's (or subcontractor's) exposure under the Agreement.

10. Third Parties. FAU is not liable for the acts of third parties or the consequences of the acts of third parties. There shall be no third-party beneficiary to the Agreement.

11. Governing Law. The Agreement is governed by the laws of the State of Florida, without regards to its conflicts of law principles. Exclusive venue of any actions shall be in the state courts of Palm Beach County, Florida. FAU is entitled to the benefits of sovereign immunity.

12. Travel Expenses. If FAU is responsible for reimbursing Vendor for travel expenses pursuant to the Agreement, bills shall be subject to, and shall be submitted by Vendor in accordance with, § 112.061, F.S. FAU reserves the right not to pay travel expenses unless FAU preapproves such expenses in writing. FAU has the right to make travel arrangements for Vendor.

13. Termination. Upon giving at least thirty (30) days' written notice to Vendor, FAU may terminate the Agreement, at any time, with no further obligation to Vendor, other than to pay for any goods received or services rendered in compliance with the Agreement prior to the effective date of termination. FAU shall not be liable for any early termination charges.

14. Notices. All notices required to be given to FAU under the Agreement shall be sent by certified mail to: Florida Atlantic University, Attn: Purchasing, ADM 121, 777 Glades Road, Boca Raton, FL 33431-0991.

15. Deletion. Any terms in the Agreement related to the following are null and void and hereby deleted in their entirety: (a) Limitation of time to bring suit; (b) Attorneys' or collection fees provisions; (c) Arbitration or mediation clauses; (d) personal guaranties by the FAU signatory; (e) grants of exclusivity by FAU; (f) restrictions of the hiring of Vendor's employees; (g) non-compete provisions; (h) waiver of jury trials, notices, or hearings; (i) Vendor's liability limitations; (j) granting Vendor any audit rights; (k); FAU's tort liability; (l) indemnification of Vendor by FAU; (m) that FAU performs reporting functions and/or certain operations; and (n) auto-renewal of the Agreement.

16. Assignment. Vendor may not, without the advance written approval of FAU, not to be unreasonably withheld), assign any right or duties under the Agreement, or transfer, pledge, surrender or otherwise encumber its interest in any portion of the Agreement. Any assignment made without FAU's consent shall be, at FAU's option, null and void. No subcontracting or delegation shall in any event relieve Vendor of any obligation or liability under the Agreement.

17. Entire Agreement. In the event of inconsistency between the Agreement and this Addendum, this Addendum will govern. This Addendum and the Agreement embody the entire agreement of the parties, and there are no other representations, promises, agreements, conditions or understandings, either oral or written, between FAU and Vendor other than are set forth. Any renewals, amendments, alterations or modifications to the Agreement must be signed or initialed and approved by all signatories of the Agreement. To be clear, the Agreement shall not auto-renew and must be upon the written agreement of the parties.

18. Signatures. The parties represent and warrant that any person signing the Agreement has the authority to do so and that such signature shall be sufficient to bind Vendor. The Agreement may be signed electronically and shall be considered signed if/when a party's signature is delivered by facsimile or e-mail transmission of a ".pdf" format date file, including via DocuSign. Such signature shall be treated in all respects as having the same force and effect as an original signature.

By signing below, Vendor's authorized representative agrees to incorporate this Addendum into the Agreement, and hereby executes this Addendum as of the date set forth below.

VENDOR: Great Blue Research, Inc.

By: _____

Name: Michael Vigeant

Title: CEO

Date: February 4, 2021

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

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 "Numeracy_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 numeracy 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 numeracy (comprehension) 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 numeracy (comprehension) 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 numeracy (comprehension) questions
- Repeat for all rows of data
- Export into SPSS
- Transform > Recode into same variables
  - Select "Numeracy_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.

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- 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 .	Fischoff & 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:

- o =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
  - o Select "TrustinExperts_Index" and add to Variables
  - o Select Old and New Values
  - o Group averaged results into two buckets
    - ▪ 1-2.50 -> 1
    - ▪ 2.51-4 -> 2
  - o 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.
  - o 2 -> Low Trust
  - o 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:
  - o =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

- o Select "TrustinInstitutions_Index" and add to Variables
- o Select Old and New Values
- o Group averaged results into two buckets
    - ▪ 1-2.50 -> 1
    - ▪ 2.51-4 -> 2
- o 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.
    - o 2 -> Low Trust
    - o 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) would be too high for you to purchase a home?	T4

- 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

- o Select "WTP_Index_CAT", "WTP_Index_SCL",
  & "WTP_Index_Combo" and add to Variables
- o Select Old and New Values
- o Group averaged results into two buckets
  - ▪ 1-2.50 -> 1
  - ▪ 2.51-4 -> 2
- o 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.
  - o 2 -> Low WTP
  - o 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):
Simple Kahan CT **(Q55-56)**

Averaged Index: Respondents will have scores "Hierarchy" and "Individualism" where higher scores (strongly agree) will place respondents 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)**

<table>
<tr><td colspan="4">**Averaged Index: Respondents will have scores averaged as "Hierarchy" and as "Individualism" where higher scores will place respondents 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**</td></tr>
<tr><td>**Variable**</td><td>**T4 survey question**</td><td>**Survey Q**</td><td>**Source(s)**</td></tr>
<tr><td>Hierarchy</td><td>56</td><td>We have gone too far in pushing equal rights in this country</td><td>Kahan 2012; Bolsen 2015</td></tr>
<tr><td>Individualism</td><td>55</td><td>If the government spent less time trying to fix everyone's problems, we'd all be a lot better off</td><td>Kahan 2012; Bolsen 2015</td></tr>
<tr><td>Communitarianism</td><td>57</td><td>The government should do more to advance society's goals, even if it means limiting freedom and choices of individuals</td><td>Kahan 2012; Bolsen 2015</td></tr>
<tr><td>Egalitarianism</td><td>54</td><td>Our society would be better off if the distribution of wealth was more equal.</td><td>Kahan 2012</td></tr>
</table>

- 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

- o =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: Respondents will have scores averaged as "hierarchy" and as "individualism" where higher scores will place respondents 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:
  - o "FloodCT_IND" (DG) =SUM(($BT4-5)*-1,$BS4)/2
    - ▪ Average reverse coded Flood EGA & Flood IND into a single Flood IND variable

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- - "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: Respondents will have scores averaged as "hierarchy" and as "individualism" where higher scores will place respondents 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 G: 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		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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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		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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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

		Frequency	Percent		
	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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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

		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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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	20	100.0	100.0	100.0

Pass/Fail Literacy Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fail	17	85.0	85.0	85.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	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

		Frequency	Percent	Valid Percent	Cumulative Percent
	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 |
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

$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

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

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

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 Perce
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

raphic 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 Cul		
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

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

Combo Cultural Theory F

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

.197c,d	.787c	.787c	.718c,d	.707c,d	.761c,d	.558c,d	.245c,d
.	3.516	3.516	0.392	5.156	5.268	4.115	1.818
.	1	1	1	6	5	6	3
.a	.061c	.061c	.531c,d	.524c,d	.384c,d	.661c,d	.611c,d
3.516	.	0.196	1.556	9.011	4.929	5.348	0.02
1	.	1	1	6	5	6	3
.061c	.a	.658c	.212c	.173c,d	.425c,d	.500c,d	.999c
3.516	0.196	.	0.004	6.63	5.871	7.363	0.02
1	1	.	1	6	5	6	3
.061c	.658c	.a	.948c	.356c,d	.319c,d	.289c,d	.999c
0.392	1.556	0.004	.	13.137	2.82	7.908	2.412
1	1	1	.	6	5	6	3
.531c,d	.212c	.948c	.a	.041*,c,d	.728c,d	.245c,d	.491c,d
5.156	9.011	6.63	13.137	.	36.964	63.75	40
6	6	6	6	.	30	36	18
.524c,d	.173c,d	.356c,d	.041*,c,d	.a	.178c,d	.003*,c,d	.002*,c,d
5.268	4.929	5.871	2.82	36.964	.	71.111	23.232
5	5	5	5	30	.	30	15
.384c,d	.425c,d	.319c,d	.728c,d	.178c,d	.a	.000*,c,d	.079c,d
4.115	5.348	7.363	7.908	63.75	71.111	.	39.242
6	6	6	6	36	30	.	18
.661c,d	.500c,d	.289c,d	.245c,d	.003*,c,d	.000*,c,d	.a	.003*,c,d
1.818	0.02	0.02	2.412	40	23.232	39.242	.
3	3	3	3	18	15	18	.
.611c,d	.999c	.999c	.491c,d	.002*,c,d	.079c,d	.003*,c,d	.a

Appendix H: IRB Approval Letters

FAU FLORIDA ATLANTIC UNIVERSITY

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: January 20, 2021

TO: Colin Polsky
FROM: Florida Atlantic University Social, Behavioral and Educational Research IRB

PROTOCOL TITLE: How do flood risk information and cultural identity affect flood risk perceptions and flood risk mitigation behaviors?
IRBNET ID #: 1647542-2

SUBMISSION TYPE: New Project
ACTION: APPROVED

APPROVAL DATE: January 20, 2021
NEXT REPORT DATE: January 20, 2022

REVIEW TYPE: Expedited Review
REVIEW CATEGORY: Expedited review category # *B7*

Thank you for your submission of New Project materials for this research study. The Florida Atlantic University Social, Behavioral and Educational Research IRB has APPROVED your New Project. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission. NO CONTINUING REVIEW IS REQUIRED FOR THIS PROTOCOL. Instead please submit, via e-mail, a brief progress report on or before the "Next Report Date".

- This study is approved for a maximum of *120* subjects.

- Please submit a progress report before the indicated date via email describing whether the project is continuing as is, if changes are needed, or if the project has been completed.

- It is important that you use the approved, stamped consent documents or procedures listed below:

  ○ FAU CES NAS Gulf Research Protocol_12.22.2020 (stamped)
  ○ FAU CES NAS Gulf Research - Consent Paragraph_OnlineSurvey_Low Risk Anonymous Research_1.5.2021.doc
  ○ FAU CES NAS Gulf Research - Consent Paragraph_OnlineFocusGroups_Low Risk Anonymous Research_1.5.2021.doc (stamped)

- ****Please note that any revision to previously approved materials or procedures, including modifications to numbers of subjects, must be approved by the IRB before it is initiated.** Please use the amendment form to request IRB approval of a proposed revision.

- All SERIOUS and UNEXPECTED adverse events or unanticipated problems must be reported to this office. Please use the appropriate serious adverse event (SAE)/ Unanticipated Problems (UP)

- 1 -

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report form for this procedure. All regulatory and sponsor reporting requirements should also be followed, if applicable.

- Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.
- Please note that all research records for federally funded or non-funded investigator initiated studies must be retained for a minimum of three years after completion of the research. For multisite, international studies conducted under ICH Guidelines, records must be retained until notification by the sponsor that all marketing applications have been completed. Research records involving protected health information (PHI) must be retained for a minimum of six years.
- Please submit an IRB final report when the study is completed or discontinued.

[If applicable] This approval is contingent on the successful execution of a [material or data] agreement.

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: 561-297-0777
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.

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

Appendix I: Cronbach's Alpha & Chi-Square Illustrative Examples

An illustrative example of the output data from Cronbach's Alpha is shown below in Table 8 and Table 9. Table 8 is a simple illustration of the output of a 5-item Cronbach's Alpha that was run through SPSS. Along the right side of Table 8 is the number of items that were entered into the formula and highlighted along the left side is the actual value of the alpha at 0.779 which is used to verify the internal consistency of the items. There is subjectiveness in the interpretation of a Cronbach's Alpha, as such, it was decided arbitrarily by the researchers that the cut-off point for Cronbach's Alpha in this study would be around the .700 threshold.

Table 8. Illustrative table of Cronbach's Alpha ran through IBM SPSS, showing the Alpha, number of items, and standardized alpha.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.779	.785	5

If Cronbach's Alpha returned as anything less than .70, the following table (Table 9) was generated to better understand what alteration to the item set could improve the internal consistency of the item set. Along the left side of Table 9 are the questions that make up the items of the Cronbach's Alpha generated for Table 8. Highlighted in Table 9 and along the right side is a series of numbers which represent the Cronbach's Alpha of the items listed if the item in that row were to be deleted from the item set. In this case

with Table 9, none of the Alphas produced by the deletion of one of these items would improve the Cronbach Alpha generated by all five together (.779). As such, it can be stated that there is enough internal consistency to create an index of these five items, but internal consistency cannot be improved any further by removing any one of the items from the set.

Table 9. Illustrative table of Cronbach's Alpha ran through IBM SPSS, showing the correlations among the items and possible Alphas should one item be deleted.

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
How strongly do you agree or disagree with the following statements? "Dogs are Awesome."	7.08	11.077	.613	.716	.727
How strongly do you agree or disagree with the following statements? "Cats are Awesome."	7.00	10.500	.505	.736	.755
How strongly do you agree or disagree with the following statements? "Fish are Awesome.".	7.00	11.000	.549	.717	.741
How strongly do you agree or disagree with the following statements? "Turtles are Awesome.".	6.23	7.692	.703	.549	.689
How strongly do you agree or disagree with the following statements? "Crested Geckos are Awesome.".	7.15	11.808	.472	.674	.764

The sample below in Table 10 represents the initial cross-tabulation of two questions with their hypothetical observed count and expected count. In this illustration, the responses of 100 respondents were cross tabulated to better understand their beliefs

that cats and/or dogs are awesome. Of the 100 respondents, 38 agree that both animals

are awesome, 25 only agree that dogs are awesome, 11 only agree cats are awesome, and

26 disagree with both animals. The actual responses for this illustrative example can be

seen in the "Count" rows for "agree" and "disagree" respectively. These rows represent

the actual observed responses for the hypothetical cross-tabulation. Additionally, a set of

"Expected Count" numbers were generated automatically by the software using the

formula above using the sub-totals for these cross-tabulations, representing what would

be expected if there was no difference between the two variables and the response array

was random.

Table 11 represents the results of the chi-square analysis, showing the chi-square value, degrees of freedom, and significance of the chi-square analysis in the form of a p-value. The highlighted value below under "Asymptotic Significance (2-sided)" represents the p-value of the cross-tabulation in Table 10, where the closer this number is to .000, the greater the significance and likelihood of rejecting the null hypothesis of there being no association between the two variables. Therefore, in this illustration, it is concluded that the two variables are associated.

The interpretation of the chi-square analysis involves the data from both the full cross-tabulation table and its associated chi-square tests table. In the cross-tabulation table (Table 10), it is important to understand what deviation(s), if any, are represented in the table. What part(s) of the table shows where the observed count and the expected count are different, for those tables showing a statistically significant chi-square test value? In some cases, answering these questions is obvious based on visual inspection of the tables. In other cases, answering these questions requires the analyst to make a judgment call using intuition. These areas represent how the table is unbalanced, in Table 10 each set of expected and observed counts have the same difference of +/- 7. 1, indicating that there is no cell causing the imbalance. This consistent difference of +/- 7.1 indicates that there may not be a readily discernible rationalization for the correlation between these two questions and additional reading of the literature and structured questioning via focus groups will be necessary.

Table 10. Illustrative table of Chi-Square ran through IBM SPSS, showing the observed and expected counts among the given items.

Dogs are Awesome * Cats are Awesome Cross-tabulation					
			Cats are Awesome		
			Agree	Disagree	Total
Dogs are Awesome	Agree	Count	38	25	63
		Expected Count	30.9	32.1	63.0
	Disagree	Count	11	26	37
		Expected Count	18.1	18.9	37.0
Total		Count	49	51	100
		Expected Count	49.0	51.0	100.0

Table 11. Illustrative table of Chi-Square ran through IBM SPSS, showing the various significance of the Chi-Square statistics and others.

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.727[a]	1	.003		
Continuity Correction[b]	7.546	1	.006		
Likelihood Ratio	8.922	1	.003		
Fisher's Exact Test				.004	.003
Linear-by-Linear Association	8.640	1	.003		
N of Valid Cases	100				

Chapter 8: References

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