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Public Risk Perception Attitude and Information-Seeking Efficacy on Floods: A Formative Study for Disaster Preparation Campaigns and Policies

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Abstract Floods are among the most frequent and devastating natural hazards and disasters in many southern states in the United States. This study examined the relationship and reciprocal predictability between two theoretical constructs—risk perception attitude (RPA) and information-seeking efficacy (ISE)—in regard to pluvial floods. In addition, this study extended these theoretical constructs to investigate differences in RPA and ISE among potential audience segments, providing practitioners with applicable insights for designing effective flood prevention and risk management campaigns. Analysis of data from 716 residents in south Louisiana revealed a statistically strong relationship between RPA and ISE. This research also identified specific audience segments that would benefit from an increase in RPA and ISE concerning floods. These meaningful findings inform a discussion of the theoretical and practical implications of the relationship between RPA and ISE and guide future disaster preparation campaigns and policies.

Keywords Communication campaign · Disaster preparation · Flood victims · Information-seeking efficacy · Pluvial flood · Risk perception attitude

1 Introduction

On Thursday, 11 August 2016, rain began to fall. It was not unusual for Louisiana to have heavy rain at that time of the year. However, the water began to rise over the thresholds of thousands of homes, and within days people had to be evacuated with the help of emergency rescuers or by their own fishing boats (Yan and Flores 2016). The heavy rain did not stop for four days and, as a result, south Louisiana experienced unprecedented and disastrous flooding, which caused severe damage to homes, businesses, and infrastructure.

An official investigative report of the flood damages showed that more than 30,000 people were rescued and at least 40,000 homes were damaged by this historic flood (NOAA 2016). The Federal Emergency Management Agency (FEMA) found that more than 66,000 people filed for assistance from FEMA, and more than 9000 flood insurance claims were subsequently filed with insurance companies (Crisp 2016). The flood swept through not only high risk flood zones but also locations that had never flooded before. Regardless of where they lived, many flood victims did not have flood insurance (Isidore and Vasel 2016). Only 42% of structures in flood-prone zones were covered by flood insurance and, worse, 88% of homes outside of designated flood zones were uninsured for floods. Despite the fact that south Louisiana has historically had more floods and hurricanes than most other states in the United States, why did a majority of flood victims fail to take protective actions, such as purchasing flood insurance? This extremely high rate of uninsured damages clearly revealed a low level of public risk perception attitude (RPA) and preparation among the population of south Louisiana.

The four days of continuous heavy rainfall provoked many questions that should be asked regarding the

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recovery of damages from the flood as well as the state of preparation for future natural hazards and disasters: What should flood victims do in such a desperate situation? Where and how could they get the necessary help? After experiencing a natural hazard and disaster, a person's confidence in seeking needed information, defined as information-seeking efficacy (ISE), can be directly related to how quickly and adequately flood victims can overcome and recover from a flood event as well as enhance their ability to prevent future damages (FEMA 2016).

Although RPA and ISE seem mutually synergic for public risk management and preparedness for natural hazards and disasters, little research has tested the relationship between these two theoretical constructs. This study has examined the relationship between RPA and ISE regarding the 2016 pluvial flood in south Louisiana. In order to contribute to the practical application of theoretical knowledge, we measured RPA and ISE among different groups of residents with demographic attributes identified as critical for disaster risk management in south Louisiana. The results of this study contribute to advancing theories related to disaster risk science by connecting an attitude-related psychological theory (for example, RPA) with a behavioral theory (for example, ISE) by investigating the relationship between the two, and by developing a wider theoretical scope for disaster risk science. Because this study identified different levels of RPA and ISE among people in south Louisiana, the results help to target specific audience segments for disaster preparation and risk management policies. Discussion of the results demonstrates how to generalize this study to other geographic areas prone to flooding or other disasters.

2 Review of Theories, Audience Segmentation, and Hypotheses

The following sections introduce risk perception attitude (RPA) and information-seeking efficacy (ISE), concepts that constitute the theoretical foundation of this study. We also identify audience segments to target with more effective and efficient campaigns, interventions, and policies based on different levels of RPA and ISE among various demographic groups. Based on these concepts, this study hypothesizes: (1) a close relationship between RPA and ISE; and (2) different levels of RPA and ISE among selected audience segments.

2.1 Risk Perception Attitude

Risk perception is commonly defined as “the subjective judgment that people make about the characteristics and severity of risk” (Rehani 2015, p. 8) in reference to

disasters or health. Risk perception affects the personal decision-making process based on an individual's frame of reference and is developed over a lifetime (Brown 2014). Although local publics commonly experience natural hazards and disasters, risk perception of the disaster varies by individuals' psychological frames and/or previous experiences and reflects specific individual values. From the cultural theory perspective, risk perception is viewed within the social contexts in which an individual finds her/himself (Sjöberg 2000). This subjective variability, when coupled with sociocultural influences, often makes risk perception multifaceted and difficult to explain.

Extending from risk perception studies that have focused mainly on psychological variables, research centered on risk perception attitude (RPA) has explored the relationship between risk perception and changes in attitudes and behaviors, and has established causal relationships between risk perception and behavioral change (Rimal and Juon 2010). Over several decades, RPA research has employed many theories of motivation, perception, attitude change, and behavioral change. Because RPA research is ultimately related to an individual's likelihood of taking a substantial action for a future disaster, a great portion of research has adopted self-efficacy, an individual's belief in her/his ability to execute certain behaviors necessary to produce an anticipated outcome (Bandura 1977, 1986, 1997), as a main theoretical framework. The extant studies identified two specific dimensions that constitute RPA (Rimal and Real 2003; Rimal and Juon 2010; Mead and Rimal 2016): perceived susceptibility and perceived severity. Perceived susceptibility refers to perceptions of how easily an individual can be influenced by a risk factor. Perceived severity indicates how severe an individual perceives a risk factor.

2.2 Information-Seeking Efficacy

Information-seeking efficacy is defined as an individual's confidence in seeking necessary information to overcome difficult situations or to resolve problems (Burke et al. 2010; Mead et al. 2012). It is a type of self-efficacy within the context of information. Information-seeking efficacy determines how well an individual can secure information regarding assistance before, during, and after a disaster. Investigation of information-seeking efficacy at the public level is important because the population's information-seeking efficacy is a crucial factor in designing effective disaster preparation and risk management plans (Pipes n.d.; Spence et al. 2015; Velez et al. 2017). The present study focuses on information-seeking efficacy because seeking accurate and reliable information is also the public's first step in both preparing for and recovering from a disaster.

With these two theoretical constructs, this study anticipated a mutual relationship between RPA (perceived susceptibility + perceived severity) and ISE, hypothesizing that perceived susceptibility is predicted by ISE [Hypothesis (H) 1–1]; perceived severity is predicted by ISE (H1–2); RPA (susceptibility + severity) is predicted by ISE (H1–3); and ISE is predicted by RPA (susceptibility + severity) (H1–4).

2.3 Audience Segmentation: Demographic Factors Affecting Risk Perception Attitude and Information-Seeking Efficacy Regarding Floods

Identifying target audience segments for special attention has been widely employed to enhance effectiveness and efficiency of disaster campaigns and policies, especially by social marketing practitioners (Guttman 2011). Audience segmentation is often optimal to cover large populations and wide geographic areas with limited budgets and available resources. Change agents have operationalized audience segments to target specific groups of people who have greater need and/or higher degrees of readiness to adopt disaster recommendations (Man and Simpson-Housley 1988; Des Jarlais et al. 1994). Conventionally, audience segments with lower levels of knowledge and ability have a greater need and urgency to improve their understanding and skills related to preparation for and responses to disastrous situations (Cheng et al. 2011).

A number of studies have identified demographic factors that demonstrated different levels of public risk perception regarding natural hazards and disasters (Slovic 1987, 2000; Clayton et al. 2015; Liu and Wang 2018). The present study selected the most frequently identified factors found through previous disaster research and the most relevant factors related to floods. The first factor is whether a person lives in a flood zone or not, which is also often related to people's acquisition of flood insurance (Fox Business 2016). Previous studies also show that direct experience with disasters enhances people's risk perception (Kates 1962; Payne and Pigram 1981; Hansson et al. 1982; Man and Simpson-Housley 1988). Business and home ownership may also affect RPA as people desire to secure their properties (Stewart and Roth 2001). Owners of businesses and homes may have higher risk perceptions and more incentive to secure their properties in the event of a flood than lessees or nonhomeowners. The present study also selected "having dependents to take care of" as a relevant factor. The consequences of floods fall not only upon individuals, but all family members, and it is generally accepted as a human trait that individuals with dependents may feel greater responsibility to protect their dependents.

There is, however, little risk perception research that has tested having dependents as a variable.

Finally, gender, age, perceived economic status, and education level were selected as general demographic factors that may affect public perception on floods. Gotham et al. (2018) investigated the determinants of flood risk perceptions in the United States and found that women have higher flood risk perception. This gender difference in the level of risk perception appears universal, since a number of risk perception studies have found similar results in international cases (Ho et al. 2008; Keul et al. 2018). Age has also been one of the most commonly-chosen variables for risk perception research. Research investigating the relationship between age and risk perception or preparedness, however, has shown inconsistent results. Income level may also affect RPA. Because income is also closely related to an individual's financial ability to recover from flood damages, the present study added income level to the pool of variables for testing. Lastly, education level has been a variable commonly tested in risk perception research, and a vast number of studies has found that people with different levels of education showed different levels of risk perception on natural hazards (Wachinger et al. 2013) and climate change (Lee et al. 2015; Lujala et al. 2015). Based on all these considerations and literature review, the present study focused on 10 factors—flood zone, flood insurance, flood experience, business ownership, homeownership, dependents, gender, age, perceived economic status, and education level—and hypothesized that RPA depends on whether or not they live in a flood zone (H2–1), RPA is higher among people with flood insurance (H2–2), if they are flood victims (H2–3), business owners (H2–4), homeowners (H2–5), or have dependents (for example, children, spouse, elderly/disabled people) (H2–6). This study also hypothesized that RPA varies by sex (H2–7), age (H2–8), perceived economic status (H2–9), and education level (H2–10).

In terms of measuring ISE, this study also used age, perceived economic status, and education as influencing factors, while other factors listed above are less relevant to ISE. Finally, this study hypothesized that the higher a person's age (H3–1), perceived economic status (H3–2), and education level (H3–3), the higher would be that person's ISE.

3 Methods

This section explains how this study used a survey instrument with valid and reliable questions that measured RPA and ISE along with demographic factors. This section then describes the data collection procedure and data analysis strategies.

3.1 Survey Instrument Design

In order to measure RPA, this study employed the survey instrument developed by Rimal and Real (2003). The instrument is comprised of two elements of risk perception—perceived susceptibility and perceived severity. Although their study focused on risk perception regarding skin cancer, they designed the instrument as applicable for measuring risk perception for diverse types of risks, while maintaining its validity and reliability (Rimal and Juon 2010; Mead and Rimal 2016). To measure the first element of risk perception, perceived susceptibility, Mead and Rimal's (2016) questions asked perceptions of different lengths of time between the recurrences of a specific risk—specifically, in the next year, two years, and five years. Second, perceived severity was measured with three questions: (1) How deadly would it be? (2) Would it destroy both my family and me? and (3) Would it be impossible to recover from? A 5-point Likert-type scale was used to measure both respondents' perceived susceptibility and severity.

To measure information-seeking efficacy (ISE), this study employed the instrument from Vishwanath (2007) that developed a unidimensional measure of efficacy. Egbert and Reed (2016) described this instrument as generally applicable to research on information-seeking efficacy, as the questions were tested for generalizability with other topics (Egbert and Reed 2016). The instrument has five questions that begin with the same phrase "You can search for information on___," and then adds specific conditions, such as floods, and challenges to information searches to finish the sentences. The actual five questions are "You can search for information on flooding ... (1) if you know nothing about the topic; (2) without help from anyone; (3) if no one showed you how to search for the information; (4) if you had no access to computing technology such as the Internet or personal computers; and (5) even if the information is not available online." Lastly, the survey included questions asking 10 demographic factors for testing the hypotheses explained above.

3.2 Data Collection Procedure

After receiving Institutional Review Board (IRB) approval from the University of Louisiana at Lafayette, this study used an online survey tool and collected data through posting the weblink to the online survey to social media, such as Facebook and Twitter. Several studies have found social media to be effective for data collection from the public because social media reach more diverse people, including hard-to-reach people (Casler et al. 2013), simplify and accelerate the data collection procedure (King et al. 2014), and yield a snowball sample through sharing

posts and messages (Salmons 2016) among diverse contacts in participants' social media communication networks. With these advantages of using social media-based data collection, our study initially recruited volunteer students in junior and senior level college classes and asked them to post the survey link to their social media once a week for three weeks. Although the data collection began from college students' personal responses and their social media posts, due to the far-reaching nature of social media, the total number of general public participants ($n = 413$) was slightly higher than that of student participants ($n = 303$) by the end of the data collection period.

Initially, 820 participants completed the surveys. However, this study excluded 104 responses from the final analysis through a conservative detection process of coarse data, such as a high level of incompleteness and consistent responses on extreme or single levels on the scales. As a result, 716 complete surveys were entered for data analysis. A series of t tests revealed no significant differences between student participants and other participants in the focal variables, RPA and ISE. Therefore, all of the analyses for this study were conducted with data combined from both students and nonstudents as shown in Table 1.

3.3 Data Analysis Strategies

In order to examine the relationship between RPA (composed of susceptibility and severity) and ISE by investigating their correlations and their reciprocal predictabilities, we conducted a correlation test and a set of regression analyses. In addition, a comparative analysis was employed to investigate how different groups have different levels of RPA and ISE. To assess the differences in RPA, we carried out independent samples t tests for

Table 1 Descriptive statistics by groups

Variables (total $N = 716$)	Number (N)	Percentage (%)
Live in flood zone	190	26.5
Victim of LA flood	154	21.4
Have dependents	279	38.8
Homeowners	450	45.0
Flood insurance coverage	179	38.9
Business owners	95	13.2
Male	137	19.2
Variables (total $N = 716$)	Mean (M)	Standard deviation (SD)
Age	1.86	1.26
Perceived economic status	2.90	0.87
Education level	4.00	0.55

hypotheses with binary nominal independent variables of whether or not participants lived in a flood zone (H2-1), had flood insurance (H2-2), were flood victims (H2-3), owned a business (H2-4), owned a home (H2-5), had dependents (H2-6), and the gender of the respondent (H2-7). In terms of coding group variables, living in flood zones, having insurance, flood victims, business owners, homeowners, having dependents, and being male were coded “1” with their opposites coded as “2.”

Age, income (perceived economic status), and education level were continuous variables measured on 5-point Likert scales. Age categories included (1) 18–29 years old; (2) 30–39; (3) 40–49; (4) 50–59; and (5) 60 and older. To measure income level, we used perceived economic status, instead of asking for participants’ income directly, to avoid participants’ reluctance to reveal personal/privacy information. Perceived economic status categories included (1) Low; (2) Low to middle; (3) Middle; (4) Middle to high; and (5) High. Education categories included (1) Elementary education; (2) Middle school education; (3) High school education; (4) College education; and (5) Graduate school or higher. Since age (H2-8), perceived economic status (H2-9), and education level (H2-10) variables were continuous, RPA was tested through correlation analyses. To measure relationships between ISE with three variables—age (H3-1), perceived economic status (H3-2), and education (H3-3), the selected variables also were analyzed with correlation analysis.

4 Results

This section presents the results from data analyses that focused on the theoretical relationship between RPA and ISE and identified demographic groups with lower levels of RPA and ISE.

4.1 Relationship and Predictability Between Risk Perception Attitude and Information-Seeking Efficacy

The results of four linear regressions demonstrated that all the hypotheses on the relationship between specific elements of RPA and ISE were statistically significant. In other words, the perceived susceptibility to pluvial flooding was predicted by ISE (H1-1) as was the perceived severity (H1-2) and both susceptibility and severity combined (H1-3). Also, ISE was predicted by the combined RPA (H1-4). The equations showing all the hypothesis testing are as follows:

$$(H1-1) \text{ Susceptibility } (Y) = 2.914 - 0.12ISE + \varepsilon_i \\ (F(1,732) = 5.25, p < 0.01)$$

$$(H1-2) \text{ Severity } (Y) = 5.89 - 0.12ISE + \varepsilon_i$$

$$(F(1,732) = 7.53, p < 0.01)$$

$$(H1-3) \text{ Combined RPA } (Y) = 6.01 - 0.12ISE + \varepsilon_i$$

$$(F(1,732) = 10.44, p < 0.01)$$

$$(H1-4) \text{ ISE } (Y) = 4.12 - 0.12 \text{ combined RPA} + \varepsilon_i$$

$$(F(1,732) = 10.44, p < .01)$$

The relationship between RPA and ISE was negative and very strong based on the high level of correlation as shown in the equations above and in Table 2.

4.2 Demographic Factors Affecting Risk Perception Attitude

As Table 3 shows, the *t* test results revealed significantly higher RPA among those groups who lived in flood zones [$t(716) = 4.19, p < 0.01$]; those who were nonbusiness owners [$t(716) = -2.18, p < 0.05$]; people who were not homeowners, [$t(716) = -2.98, p < 0.01$]; and women, [$t(713) = -4.01, p < 0.00$]. The results of hypothesis testing with the variables of whether or not participants (1) had flood insurances (H2-2); (2) were flood victims (H2-3); and (3) had dependents (H2-6) were statistically insignificant.

A correlation test with three continuous variables—age, perceived economic status, and education level—revealed that perceived economic status and education level were both negatively correlated with RPA, while the correlation between RPA and age was not statistically significant. These results supported hypotheses H2-9 (economic status on RPA) and H2-10 (education level on RPA) (Table 4). In terms of relationships between ISE and three selected variables—age (H3-1), perceived economic status (H3-2), and education level (H3-3)—the results of correlation tests supported only H3-3 (education level), in which education level was positively correlated with ISE. Test results for other hypotheses were statistically insignificant (Table 4).

4.3 Limitations

Although use of social media presents many advantages to data collection, this type of data collection based on online communication technology may exclude people without Internet access, people with limited ability to use an Internet application, and low income populations from the data collection. Another potential limitation of this study concerns the limited reflection of people who are socioeconomically marginalized, living in extreme poverty, and the very young and the elderly. These groups are often identified as the most vulnerable to severe natural hazards and disasters.

Table 2 Correlation between risk perception attitude (RPA) and information-seeking efficacy (ISE)

	ISE	RPA (total)	RPA (susceptibility)	RPA (severity)
ISE	1			
RPA (total)	− 0.12**	1		
RPA (susceptibility)	− 0.08*	0.82**	1	
RPA (severity)	− 0.10**	0.72**	0.20**	1

This table presents the results of hypothesis testing for all possible relationships between RPA and ISE (H1–1 through H1–4)

*Correlation is significant at the 0.05 level

**Correlation is significant at the 0.01 level

Table 3 *t*-Tests on risk perception attitude (RPA) and information-seeking efficacy (ISE) by groups

Variables	Yes (= 1)		No (= 2)		<i>T</i>	<i>df</i>	<i>p</i>
	Mean (<i>M</i>)	Standard deviation (<i>SD</i>)	Mean (<i>M</i>)	Standard deviation (<i>SD</i>)			
Live in flood zone?							
RPA	2.60	0.75	2.33	0.78	4.19	716	0.00**
ISE	3.85	0.76	3.92	0.79	0.96	716	0.34
Flood insurance?							
RPA	2.41	0.79	2.39	0.68	− 0.71	716	0.48
ISE	3.84	0.86	3.62	0.84	− 1.22	716	0.22
Flood victim?							
RPA	2.49	0.76	2.39	0.76	1.52	716	0.13
ISE	3.88	0.74	3.87	0.87	− 0.02	716	0.98
Business owner?							
RPA	2.24	0.77	2.43	0.71	− 2.18	716	0.03*
ISE	3.89	0.75	3.76	0.89	− 1.59	716	0.13
Homeowner?							
RPA	2.30	0.75	2.48	0.77	− 2.98	716	0.00**
ISE	3.88	0.76	3.86	0.78	− 0.41	716	0.68
Dependent?							
RPA	2.40	0.71	2.41	0.84	− 0.11	716	0.91
ISE	3.80	0.77	3.98	0.77	3.16	716	0.00**
Gender (male: Y, female: N)							
RPA	2.17	0.75	2.46	0.78	− 4.01	713	0.00**
ISE	3.86	0.75	3.92	0.83	0.86	713	0.39

This table presents the results of hypothesis testing with selected demographic variables (H2–1 through H2–7)

* $p < 0.05$; ** $p < 0.01$

5 Discussion

As evidence of low RPA among the public in the United States, particularly with floods, FEMA (2016) conducted a survey in 2013 to investigate the general population's awareness of flood risk, knowledge of specific ways to mitigate flood risk, perceptions of barriers to mitigation activities, and understanding of steps taken to reduce risks. The results showed that only three out of 10 people

believed their communities were at risk of flooding, and only 10% of survey respondents stated they believed their residences were at risk (FEMA 2016).

To respond to low public awareness of and vulnerability to natural hazards and disasters, it is important to construct effective crisis management plans in all three phases of crises (Coombs 2007a, 2007b): (1) precrisis; (2) crisis response; and (3) postcrisis. The precrisis phase is concerned with prevention and preparation. The crisis

Table 4 Correlation results between risk perception attitude and continuous variables

	RPA	ISE	Age	Perceived economic status	Education level
RPA	1				
ISE	− 0.12**	1			
Age	− 0.04	− 0.01	1		
Perceived economic status	− 0.21**	− 0.03	0.24**	1	
Education level	− 0.08*	0.08*	0.07	0.17**	1

This table presents the results of hypothesis testing with all the continuous variables (H2–8 through H2–10)

RPA risk perception attitude, ISE information-seeking efficacy

* $p < 0.05$; ** $p < 0.01$

response phase begins when management or public officials must actually respond to a crisis. The postcrisis phase develops ways to better prepare for subsequent crises and fulfills commitments made during the crisis phase, including providing follow-up information. Risk perception attitude is directly related to crisis management at all levels, and information-seeking efficacy is a core skill that enhances the effectiveness of crisis management. Although RPA and ISE are seemingly related, previous studies have focused mainly on relationships between risk perception and need for information-seeking (Huurne and Gutteling 2008; Terpstra et al. 2014; Cahyanto et al. 2016) instead of actual information-seeking ability. Little research has examined their theoretical relationship within the context of response to disasters, especially in the areas prone to frequent flooding (Zhu et al. 2011; Richard et al. 2017; Schumann et al. 2018). Therefore, we examined the relationship between the two theoretical constructs and, to some extent, their reciprocal predictability. In addition, investigation of group differences on RPA and ISE identified audience segments for campaigns and policies that can effectively increase RPA and ISE.

The data analysis extended the theories of risk and crisis science by demonstrating a close yet negative relationship between RPA and ISE. For a more detailed analysis, we dissected RPA into two specific elements—perceived susceptibility and severity—and tested relationships between ISE and the specific elements of RPA by both separating and combining them. Using the data collected with the historical case of the 2016 Louisiana flood, all the tests consistently showed a strong negative relationship between RPA and ISE; the higher ISE, the lower the RPA.

The consistent negative relationship between RPA and ISE can be interpreted as RPA is low among those who are confident in information-seeking because they believe that they can get necessary information effectively once a disaster occurs. While this finding suggests a rational explanation for the relationship between an individual's psychology and responsive behavior, there may be a

potentially serious problem in applying this theoretical finding to designing public campaigns and policies. Strong confidence in information-seeking ability is necessary for disaster prevention and preparation (Attems et al. 2020). Regardless of whether an individual has a higher level of information-seeking ability than others, the whole public should have a sufficient level of preparedness before a disaster occurs. Therefore, one of the groups that campaign designers should target for increasing RPA is people with high levels of information-seeking ability, as the results of present study show that people with higher levels of ISE tend to have lower RPA.

In addition to testing a theoretical relationship, this study identified groups with low RPA and/or ISE for targeting with effective campaigns and policies for preparation for and recovery from disasters. The specific groups that showed lower levels of RPA in the data analysis were those who live in nonflood zones, homeowners, business owners, men, and have higher perceived economic status and educational levels (Tables 3 and 4). Although those groups were identified as ones with lower RPA, they are more likely to be among more privileged groups with greater ability to recover from damages than those who live in flood zones, are not homeowners or business owners, and are women with lower economic and educational levels. Because of this reality, it would be difficult to argue that the audience segments with lower RPA should be the only groups to which flood preparation campaigns should be targeted. Instead, although such campaigns would make efforts to enhance RPA among those with lower RPA, they should not neglect socioeconomically and educationally marginalized people—these groups are the one who suffer the most in the aftermath of floods or other disasters.

As observed during the 2016 flood in south Louisiana, damages from floods are unpredictable and unbound to any geographical locations or demographic categories. This history of uncertain consequences implies the importance of comprehensive campaigns and policies to increase RPA among the public as a whole. Campaign designers and

policymakers should be aware of the importance of this holistic approach because RPA to pluvial flooding is hazard-specific due to the relatively unpredictable frequency and magnitude in different geographical locations when compared to other types of flooding such as river or torrential floods. Therefore, along with improving RPA among those in the identified groups, it is equally important to reinforce risk perception among people with higher levels of RPA so that they may not only maintain their RPA, but also serve to influence other groups' attitudes and behavioral changes (Rogers 2003; Kim and Dearing 2016).

In terms of information-seeking efficacy (ISE), the results of the correlation test showed only education level was positively correlated with ISE (Table 4). This indicates that people with a higher level of education would be able or confident to find needed information more effectively than the less educated. This result is also consistent with and supported by other related research. For example, Griffin et al. (1999) synthesized environmental research that investigated the relationship between risk information-seeking and processing to the development of preventive behaviors and found that personal capacity to learn is closely related to an individual's information-seeking ability. Similarly, Mead et al. (2012) argued in their research on information-seeking behavior regarding climate change that educational surroundings also influence information-seeking behavior. They found adolescents whose parents had higher levels of education discussed global warming more often and engaged in more information-seeking than those with lower levels of education. The results of the present study demonstrate additional support for the positive correlation between education level and ISE as education itself requires information-seeking to learn and consume new ideas. In other words, higher learning requires a greater need for and expanded experience in the use of information-seeking skills.

As education and ISE are positively related, researchers and practitioners should collaborate with each other to develop effective education programs to ensure the public has a sufficient level of information-seeking ability. Because information-seeking activities nowadays are mostly related to an individual's ability to use the Internet and mobile communication technologies, it is important to educate target populations (for example, people with lower levels of education) to have sufficient efficacy for using the Internet and mobile communication technology to connect with necessary information and resources. Another important and even long-term means to increase ISE among the public in the areas that often experience floods or other natural hazards and disasters is for K-12 school systems to adopt or mandate an environmental education curriculum, teach students about disaster preparation in the early stages of education, and improve information-seeking

skills by training students with diverse communication technologies.

6 Conclusions

Natural hazards and disasters are often uncertain, unpredictable, and uncontrollable. Therefore, it is necessary that the public should maintain a sufficient level of risk perception attitude and information-seeking efficacy to help prepare for and recover from such disasters. Focusing on floods, this study examined the theoretical relationship between risk perception attitude (RPA) and information-seeking efficacy (ISE) and investigated them among people in south Louisiana who often experiences pluvial floods. This study found a strong relationship between RPA and ISE, which contributes to the theoretical development of disaster risk science, and identified groups of people with lower RPA and ISE whom disaster campaigns and policies should prioritize for educating and enhancing the awareness of flood-related issues. Based on these results, this study suggests some research agendas for future studies.

First of all, human behaviors are determined by many influential factors. For theory development and practical application, more studies are needed regarding those factors with potential to influence disaster preparation and recovery, such as the target populations' communication channels, sociocultural features, and attitudinal and behavioral tendencies (Atkin and Rice 2014). In order to account for the dynamics involved with the passage of time, future studies should consider longitudinal approaches by building time series data. By their very nature, floods have persistent effects that may last for years (over a decade after Hurricane Katrina). For example, it is highly anticipated that RPA and ISE would differ as flood victims bicker with insurance companies over a long period of time and deal with damages to their homes and businesses (Terpstra et al. 2014). Therefore, longitudinal studies are crucial for assessing the dynamics of RPA and ISE before, during, and after natural disasters.

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