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ORIGINAL PAPER

Cognitive and affective responses of Florida tourists after exposure to hurricane warning messages

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Abstract Tourists are particularly vulnerable to natural disasters such as hurricanes since they might be less informed and prepared than residents of disaster-prone areas. Thus, understanding how the traits of a tropical cyclone as well as specific characteristics of tourists influence affective and cognitive responses to a hurricane warning message is a critical component in disaster planning. Using scenarios that presented tropical cyclones with different relevant characteristics (such as category at landfall), tourists' knowledge, experience with hurricanes, trip traits, and the location of the survey (coastal or inland), this study contributes to the literature on sociological issues related to natural disasters. The findings suggest that risk perceptions and fear are influenced differently by the traits of the hurricanes and tourists' knowledge and experience. Risk is strongly influenced by the projected category of the hurricane at landfall, while fear is not as sensitive to this extremely relevant trait of cyclones. The results also suggest that the influence of risk and fear on evacuation likelihood is strong and positive. This study shows the value of studying cognitive and affective responses to uncertain events.

Keywords Hurricanes · Tourists · Fear · Risk · Evacuation · Florida

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1 Introduction

When faced with a natural disaster, tourists as a large, dynamic population are particularly at risk since they might not have the knowledge, material resources, or social networks that residents utilize in their decision-making process (Burnside et al. 2007; Perry and Green 1982; Mileti and Sorensen 1988). Many natural disasters such as earthquakes occur with little advance notice; however, improvements in hurricane forecasts (Rappaport et al. 2009) allow those in potentially affected areas to prepare for the storm's arrival and evacuate, if necessary. Although residents subject to landfalling hurricanes such as those living along the Gulf and East Coasts of the US may know how to prepare for their arrival, tourists often lack a familiarity with the region as well as with the hazards associated with hurricanes, including fast winds and flooding due to storm surges, and/or heavy rainfall (Rappaport 2000). So, it is important to understand tourists' responses that influence their decision making while in a location where a hurricane is forecast to make landfall.

The types of information used to help people make decisions during natural disasters such as hurricanes have been extensively explored (Dash and Gladwin 2007). Yet, not surprisingly, this extensive body of research has focused on residents of areas at risk, neglecting a vulnerable population: tourists who are vacationing in an area that might be impacted by a hurricane. With the exception of a recent paper by Matyas et al. (2011), the major body of research on tourist evacuation during a natural disaster has focused mostly on plan development and the traits of the members of the tourism industry more than on consumers' reactions (Drabek 1986, 1991, 1993, 1994, 1996). Thus, much remains to be studied in regard to the decision-making processes of tourists during natural disasters.

Research shows that both cognitive and affective responses influence the decision-making process in uncertain situations (Loewenstein et al. 2001; Slovic et al. 2004). In general, cognitive processes are seen as deliberate, slow, mental calculations, while affective responses are conceptualized as visceral, fast reactions to the environment (Loewenstein et al. 2001). Researchers who have focused in the communication of hurricane-related warnings have mostly studied an audience's cognitive processing of warning messages and its subsequent behavioral intention (Dash and Gladwin 2007). In general, the response of an audience depends on three major dimensions: (1) hurricane traits such as intensity and projected track, (2) individual/household differences, and (3) current conditions or resources to use in case of evacuation. These dimensions have been linked to intermediate outcomes such as risk perception and final outcomes such as likelihood or actual evacuation (Baker 1991; Dow and Cutter 2000; Whitehead et al. 2000). The current research focuses on two intermediate outcomes that might help understand behavior better: cognitive and affective responses.

Although some researchers still focus exclusively on cognitive elements of decision making, there is an increased and rigorously validated interest in the role of affect in decision making (Loewenstein et al. 2001; Lerner and Keltner 2000; Slovic et al. 2004; Zinn 2008). The results in many diverse areas of research suggest that affect can influence decision making, in some cases even more strongly that cognition (Frijda 1986; Damasio 1994; Isen 2004; Izard 2007; Le Doux 1996; Loewenstein et al. 2001; Slovic et al. 2004; Zajonc 2008).

The current study aids the understanding of sociological responses to natural disasters by exploring both cognitive and affective responses as intermediate outcomes that might help understand better the behavior of tourists after receiving hurricane information.

Matyas et al. (2011) found that tourists use their location (coastal/inland), hurricane traits (category), knowledge, and previous experience with hurricanes, and other

tourism-related factors such as method of transportation to evaluate their personal risk levels and their need to evacuate, but did not explore whether affective responses influence their evacuation likelihood. This current paper utilizes the framework of risk as feeling, a model proposed by Loewenstein et al. (2001) that integrates affect as a relevant element in decision making, to explore how the traits of hurricanes and relevant individual differences (knowledge, personal and vicarious experience, travel traits) influence a tourist's cognitive and affective responses and their subsequent effect on evacuation decision making. Based on elements of the risk-as-feeling model that are relevant to the study of evacuation decisions after exposure to hurricane warning messages, the general hypotheses are:

1. Hurricane traits (coast of landfall, time to landfall, hurricane category at landfall, wind duration, and hurricane projections) will influence differently tourists' cognitive and affective responses to warning messages.
2. Tourists' knowledge, previous experience with hurricanes, and travel traits will influence tourists' cognitive and affective responses to warning messages.
3. Tourists' location (coastal or inland) will interact with hurricane traits, knowledge, previous experience with hurricanes, and travel traits in their influence on cognitive and affective responses to warning messages.
4. Tourists' cognitive and affective responses to hurricane warning messages will have a positive strong effect on likelihood to evacuate.

We focus our efforts in Florida, a state that is host to over 80 million tourists a year (Visit Florida 2011) and the state in the USA most affected by tropical cyclones (Elsner et al. 2004). The data used to test the hypotheses were collected using stated preference surveys that were given to 235 US tourists who were visiting Pinellas or Orange counties in Florida during the summer of 2009. Participants were exposed to four different maps (scenarios) that depicted a hurricane forecast to affect their current location. For each scenario that participants were exposed to, they indicated the level of risk (cognitive response) and fear (affective response) that they perceived and the likelihood to evacuate (behavioral intention). The hypotheses were tested using ordered-response models (McKelvey and Zavonia 1975) where evacuation likelihood (behavioral intention), risk (cognitive response), and fear (affective response) were used as dependent variables and hurricane traits, the tourists' experience, knowledge, and trip characteristics as independent variables. Additionally, to test whether recent personal experience might have affected the responses provided by the tourists, Chi-square tests were performed after grouping responses according to whether they lived far from or close to the Gulf or Atlantic coasts of the US or the track of a tropical cyclone during the previous hurricane season.

2 Relevant literature

The distinction between decision making based on cognitive and affective processes derives from our understanding of the dual nature of thinking. Research at the neurological (Damasio 1994; Le Doux 1996) as well as psychological level (Frijda 1986; Isen 2004; Izard 2007; Zajonc 2008) suggests that human thinking is the product of an experiential as well as an analytical system. According to Slovic et al. (2004), the experiential (i.e., affective) system is oriented by pleasure-pain, it is encoded in a narrative modality, its processing can be quite fast, and the behavior based on this system is mediated by a holistic feeling of past experiences. In contrast, the analytic (i.e., cognitive) system is based on

reason and logic, it is encoded in words and numbers, usually is slower to be processed, and the behavior is based on the judgment of an event.

Most researchers have studied the effect of risk focusing in the cognitive processing of specific events (Zinn 2008). In these cognitive-based models, the calculation of risk requires the mental multiplication of severity multiplied by likelihood of an adverse event to happen (Slovic et al. 2004). In contrast to this systematic approach to risk analysis, recent developments acknowledge that feelings, defined as visceral reactions like fear (Loewenstein et al. 2001), play an important role in decision making.

The specific mechanisms of how and when affect influence directly behavior have been presented by many researchers such as Finucane, et al. (2000), Lerner and Keltner (2000), Loewenstein et al. (2001), and Slovic (1987). Although the conceptualization of what is affect might differ between these proposed frameworks, there is a consensus that cognitive evaluations and affective reactions are (1) influenced by the nature of the event; (2) influence each other; (3) both have a direct, unmediated effect on behavior; and (4) individual differences such as gender or knowledge, and other factors such as previous affective states (like mood generated by an incidental stimulus) influence differently both of these processes.

Loewenstein et al. (2001) developed a model to explain mixed results in previous research on risk. In their framework called "risk-as-feelings," the authors indicate that in preceding research, subjects who participated in risk experiments did not modify their risk calculations even though they perceived, cognitively, a change in probabilities of the likelihood of an event. This insensitivity to probabilities can be explained by the risk-as-feeling framework since emotional reactions to risk are triggered by mental images of the outcomes of a decision. For example, being attacked by a shark in Florida's waters is an extremely unlikely event, yet it might elicit a strong mental image that would not be easily modified by a perceptible change of probability of the event to happen. As the authors state "feelings of fear or worry in the face of decisions under risk or uncertainty have an all-or-none characteristic; they may be sensitive to the possibility rather than the probability of negative consequences" (p. 276).

Recent research on affect has consistently found that behavior is influenced directly, without cognitive mediation, by affective states such as emotion. The main reason for this influence is that affective states' main objective is to make an individual ready to rapidly react to environmental changes in order to survive (Zajonc 2008). In a meta-analysis on the effects of discrete emotions on behaviors such as choice, reaction time, and specific actions, Lench et al. (2011) found numerous relationships between affective states and behavioral outcomes. For instance, a considerable number of researchers contrasted successfully the effect of happiness on behavior compared to other emotions like sadness and anxiety.

The feeling as risk framework is able to explain why cognitive and emotional reactions to uncertain events differ. According to this model, cognitive and affective processes are influenced differently by variables of the event and situation: While cognitive risk consists of calculations of severity and probability of outcome, affect-based risk is influenced by vividness of the uncertain event and time frame of the decision. An individual's forecast of how he is going to feel after the uncertain event occurs, labeled anticipatory emotion in this model, is the result of the mental imagery of the experience that is forecasted. The more vivid this imagery is, the higher the emotional reaction. Vividness is influenced by individual differences in mental imagery ability, the description of the outcome, and personal or vicarious experience. The time gap between the decision and its outcome also play an important difference between cognitive and affective appraisals of risk. Research suggests

that as an individual approaches in time a negative event, the levels of fear and perceptions of uncertainty increase. It is important to note that the event's severity and probability were not influenced by time proximity (Loewenstein et al. 2001).

Research that has explored risk in tourism suggests that travelers might differ in their processing of risky situations. For example, Roehl and Fesenmaier (1992) developed risk dimensions ranging from equipment, financial, physical, psychological, satisfaction, social, and time that have consistently influenced travel decisions and travel satisfaction (e.g., Sonmez and Graefe 1998; Pizam and Fleischer 2002). Further, they argued that one tourist might pay more attention to one dimension more than others. For example, in the context of hurricane risk, one tourist may focus on physical risks (i.e., being injured), while another may focus on financial risk (i.e., not getting a good value for money spent) for the same travel decision. Tourists averse to risk are likely to engage in risk reducing strategies such as searching extensively for information (Vogt and Fesenmaier 1998) to assist in their travel-related decisions.

The role of perceived risks in travel-related decision making has received significant attention over the past decade (Simpson and Siguaw 2008; Law 2006; Fuchs and Reichel 2011), with risk perception being a key factor that influences tourists in their travel decision making. If tourists perceive that potential risks might overweight benefits, they are likely to cancel or shorten their trip to and in the destination. Applying Rogers' (1983) protection motivation theory, Sonmez and Graefe (1998) found that tourists' intention to avoid a particular destination represents protective behavior or risk avoidance. Likewise, Law (2006) also found a significant difference between Asian and Western travelers, such that Asian travelers engaged in greater risk avoidance. Additionally, tourism scholars have also found that tourists not only felt varying degrees of safety during different travel activities and experiences, but they also form affective association, that is positive or negative feeling associated with a destination. This affective association is often derived from personal experiences or media exposure (Decrop 1999), which in turn influences their travel-related decisions (Sirakaya and Woodside 2005).

Unfortunately, research on tourists' affective and cognitive processes in settings related to specific natural disasters like hurricanes is scarce. However, it is a fertile ground since travelers who are in a different, unfamiliar environment will feel more anxiety, fear, and mistrust due to their perceptions of instability of the institutions that are trying to help them (Zinn 2008) as well as have a reduced social network. Researchers suggest that the networks of neighbors, friends, and family are important sources of information and help for decision makers during hurricanes (Perry and Green 1982; Mileti and Sorensen 1988). Further, due to the dynamic nature of tourism, this group of individuals will have very diverse levels of imagery vividness of a hurricane due to their heterogeneous levels of personal or vicarious experience with hurricanes, knowledge, and mediated or social sources of information (Matyas et al. 2011).

Researchers have found that the effect of past experiences has a mixed effect on evacuation rates (Baker 1991; Kusenbach et al. 2010; Lindell et al. 2005; Rincon et al. 2001; Sorensen 2000). At the same time, natural disaster communication models consider knowledge as a very important element in the processing of new information. For example, hurricane-savvy individuals tend to rely more on their own previous experiences and knowledge than on the recommendations of government sources when making evacuation decisions (Dow and Cutter 2000; Taylor et al. 2009).

Experience and knowledge of hurricanes are directly linked to where people live. Inhabitants of counties that had to evacuate due to a tropical system demonstrate different levels of knowledge, sources of information, and risk perceptions than people who live in

zones that did not require evacuation (Dow and Cutter 2000). More specifically, individuals might even have different risk perceptions based on the type of damage expected (storm surge vs. wind) in the area where they live (Stein et al. 2010). Distance from an event seems to also have an influence on affective responses since events that are judged as close are seen as concrete, while a distant stimulus is perceived more abstractedly. It appears that individuals respond emotionally to the principle of "distance equals safety" (Williams and Bargh 2008, p. 303).

Unfortunately, most researchers have not used affective as well as cognitive approaches to understand processing of information related to hurricane warnings. This study's main objective is to explore how location (coastal vs. inland) of the respondents influences the relationship between hurricane traits, tourists' knowledge and experience with hurricanes, and trip traits with affective and cognitive variables. These aims were pursued in the present study where different hurricane scenarios were presented to tourists and their affective and cognitive responses and behavioral intentions were measured.

3 Survey design

The methodology used to test the hypotheses was a stated preference survey. This type of survey presents a series of scenarios to a participant to elicit responses that include behavioral intention (in this study evacuation). Since the objective of this study is to understand the responses of Florida tourists to hurricane warning messages, five survey sites in Florida were selected. Two of these sites were in Orange County, an inland urban area in central Florida that has experienced hurricane-force winds in the past, and the other three sites were located on the beach in Pinellas, a Gulf of Mexico coastal county where past hurricanes have made landfall. Figure 1 presents a map of the geographic locations of the survey sites. Due to the increased damage experienced along the coast where the fastest winds and storm surge occur during landfall and the issuance of mandatory evacuations in coastal areas during hurricanes, we anticipate that coastal tourists will indicate higher levels of fear and risk than inland tourists.

In Orlando, the major city in Orange County, 304 surveys were collected at the Florida Mall and Wyndham Bonnet Creek Resort. Pinellas County's interview sites were the Sheraton Sand Key Resort, Clearwater Beach/Pier 60, and St. Pete Beach. The number of surveys collected in these three sites located within view of the ocean was 144. The surveys were conducted during July and August 2009 prior to the formation of the first named storm of the Atlantic Basin hurricane season.

An *n*th sampling procedure was used to minimize potential bias associated with the intercept approach that was applied in this study. After being intercepted, respondents were selected by screening potential participants using several screening questions, based on our definition of tourists, to ensure the eligibility of respondents. Only one person from each travel party that was intercepted was eligible to answer the questionnaire. A screening question was employed to identify tourists, which is defined by the US Travel Association as those who had travelled 50 miles or more, one way, away from home or including one or more nights away from home. We verified the definition's distance by plotting the location of each zip code supplied by the respondent within ArcGIS and calculating the straight-line distance between the coordinates of the survey location and those of the centroid of the polygon enclosing the zip code. Only one adult filled out the 27-question questionnaire per group. This questionnaire included four sections (1) trip characteristics (e.g., mode of transportation, number of companions), (2) a four question test to assess hurricane

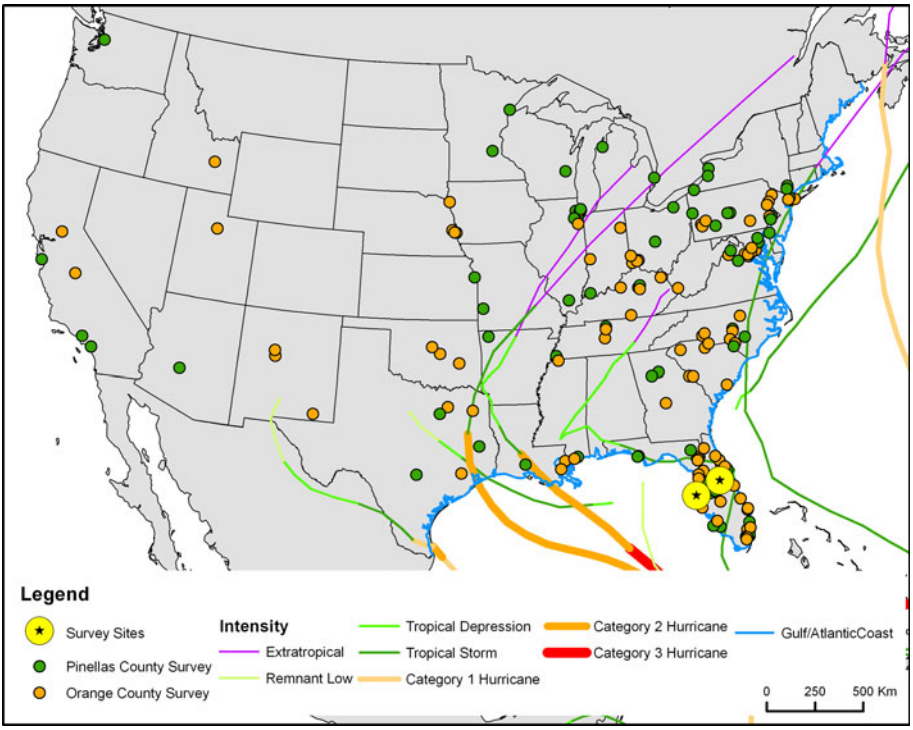

Fig. 1 Residence locations of tourists surveyed in Pinellas or Orange County, Florida and the Gulf and Atlantic coastlines and tropical cyclones tracks from the 2008 hurricane season from which the distance to the tourists' residences were calculated

knowledge as well as question to assess hurricane experience, (3) hurricane scenarios and stated preference questions, and (4) demographic information.

Respondents' level of knowledge about hurricanes was assessed through four true/false questions. The questions were (a) The "Hurricane Season" in Florida extends from June 1 to November 30. (b) It is rare for hurricane-force winds to affect cities that are located inland away from the coast. (c) A Category 1 hurricane has the least intensity among all hurricanes. (d) If a "Hurricane Warning" has been issued, it means that you should immediately start preparing to protect yourself as hurricane conditions will begin within 24 h. We used the number of a subject's correct answers to indicate hurricane knowledge. Personal or vicarious experience with hurricanes was assessed by two questions that asked whether the respondent (or family/friends) had been affected by a hurricane or typhoon.

We also tested for recent personal experience with a tropical cyclone to determine whether a tourist living in a hurricane-prone coastal region of the US or in an inland area affected by a tropical cyclone during the previous 2008 hurricane season exhibited different responses than those who do not live in these areas. Tourists who reside in coastal regions are likely to receive messages related to preparations for hurricane landfalls on an annual basis and more frequently if a storm approaches their area (Daniels and Loggins 2007), so their survey responses may differ from those living outside of coastal zones. For each tourist providing a valid US zip code, the Near function in ArcGIS was utilized to calculate the distance between the centroid coordinates for the zip code and the nearest

point along the US Gulf or East coastlines. A shapefile containing the tracks of Atlantic Basin tropical cyclones was obtained from NOAA Coastal Services http://csc.noaa.gov/hurricanes/# and entered into the GIS. We used the Near function again to measure the distance between each zip code centroid and the nearest cyclone track for 2008 storms. We selected only this season as we aimed to measure recent experience, and few respondents are likely to have relocated to another zip code within the past year. We establish 100 km from the coastline and 200 km from the storm track to differentiate the two groups. The remnants of Hurricane Ike (2008) (Fig. 1) brought hurricane-force winds to the Ohio Valley and caused considerable damage in eight states where 28 people died and 2.6 million people lost power (Brown et al. 2010); the 200 km distance is sufficient to encompass respondents residing in the areas affected by Ike.

Based upon results of previous literature, we determined that five hurricane traits should be tested to determine their cognitive and affective responses in Florida tourists. We developed 32 scenarios to systematically manipulate the variables of interest: landfall coast (Atlantic or Gulf), time to landfall (24 or 48 h) category (1 or 4), wind duration (short or long), and track (offset or over survey site). The scenarios consisted of large-sized graphics that presented the forecasted projection and other manipulated hurricane traits (See Fig. 2 for an example of a scenario) and were designed to mimic actual hurricane warning graphics issued by the National Hurricane Center (Broad et al. 2007). Information regarding hurricane category and the duration of hurricane conditions was printed at the

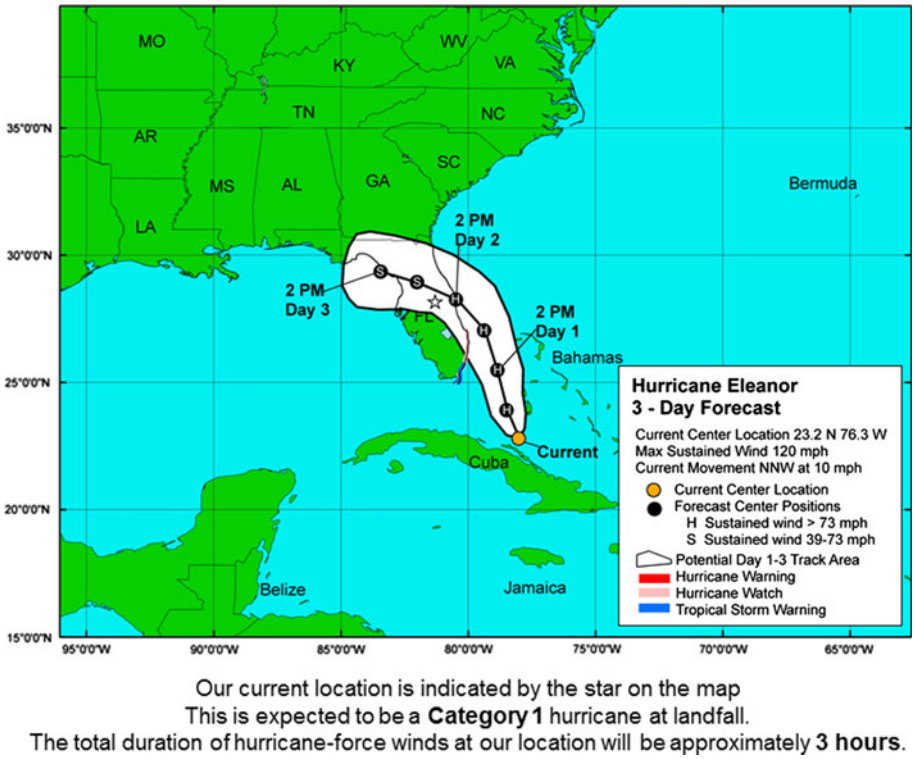

Fig. 2 Example of scenario used in the study

bottom of the page so that respondents did not have to infer this information from the image itself.

Each subject was exposed to four out of the 32 scenarios, and all subjects viewed alternating Gulf and Atlantic coast landfalls with alternating overhead or offset tracks. After viewing each scenario, subjects answered three questions to assess affective and cognitive responses as well as behavioral intention measurements. The first one gauged the felt level of fear by asking "How afraid do you feel on seeing this message?" Fear was considered a relevant affective outcome since researchers like Loewenstein et al. (2001) see this emotion as an almost inevitable reaction to uncertain events. The following question was "How risky do you think it would be for you to stay in your current location through this hurricane scenario?" This question was used as a measure of cognitive processing since risk can be seen as a mental calculation of probability and consequences of an event (Dash and Gladwin 2007; Loewenstein et al. 2001) A five-point Likert-like scale where 1 was not at all and 5 was extremely was used for both questions. The final question per scenario measured the likelihood of evacuation: "How likely are you to evacuate/leave your current location at this time and under this situation?" A five-point Likert scale, where 1 was very unlikely and 5 was very likely, was utilized.

We hypothesize that coastline of landfall will be an important factor for Pinellas County tourists, but may not be important for tourists in Orange County. However, we expect higher ratings for cognition (risk) to result at both locations when tourists view scenarios with a Category 4 intensity, 24-h landfall time, track directly over their location, and a long duration. Affective responses may not differ as much between the two choices for these traits as those fearing a hurricane may feel this way regardless of its intensity or whether the track will pass directly overhead.

4 Profile of respondents

434 tourists answered the questionnaire. In order to simplify the analysis, the current study used exclusively the 235 responses from respondents who indicated that their country of residence was the USA. 132 of the questionnaires used were collected in Orange and 103 in Pinellas counties. The first county is inland and includes the city of Orlando, while Pinellas is a coastal county that includes the cities of St. Petersburg and Clearwater. The demographic data collected indicate that 46% of the respondents were male, the mean age was 43.4 years (Maximum = 80, Minimum = 18, SD = 14.23), and participants' income and education were relatively high. In terms of accommodations during the trip, 40% indicated that they were staying in resorts, 35% at hotels, and 14% with friends. See Table 1 for a thorough description of these results.

Table 2 presents a detailed report of the variables (fear, risk, and evacuation likelihood) used in the models developed to answer the hypotheses of the study as well as tourists' hurricane-related knowledge, experience, and travel traits. The results of the table suggest that likelihood of evacuation and perceived risk were relatively high. When asked about their likelihood to evacuate and perceived risk, 42 and 44% of the respondents, respectively, indicated very high or high levels. However, the levels of fear expressed by the respondents were lower: only 32% of tourists indicated ratings of 4 or 5 for the affective measure. In terms of knowledge, a majority of respondents, 72%, answered correctly three or more of the four questions asked (equivalent to a 75–100 grade). Approximately, one-third of the tourists indicated personal experience with hurricanes. Vicarious experience, through friends or family members, was mentioned more by the respondents (38%). In

Table 1 Demographic information of respondents

	Freq	%
Gender		
Male	108	46.0
Female	127	54.0
Highest level of education		
High school	56	23.8
Bachelor degree	86	36.6
Master degree	55	23.4
Other	35	14.9
Household income for 2008		
<$24,000	14	6.0
$24,000–$35,000	14	6.0
$35,000–$50,000	21	8.9
$50,000–$75,000	46	19.6
$75,000–$100,000	39	16.6
$100,000–$125,000	42	17.9
Above $125,000	45	19.1
Ethnicity		
White	172	74.3
Black	17	6.7
Hispanic	25	8.2
Asian	10	4.1
Native American	2	.9
Mixed	6	2.6
Other	3	1.3
Residence		
Florida residents	77	32.8
Residents other US states	158	67.2
Accommodations		
Resort	94	40.0
Hotel	83	35.7
Friend's house	33	14.1
Other	25	10.2

$n = 235$

terms of the characteristics of the trip, almost half of the respondents travelled to the location using their personal vehicle (48%), while air traveling was the second more popular option (45%). A majority of respondents were traveling with at least one companion who was younger than 18 years old (63%).

5 The effect of individual differences on risk perception, fear, and likelihood of evacuation

In the previous study based on these data, Matyas et al. (2011) found that one of the most relevant influences on perceived risk and evacuation likelihood was destination location

Table 2 Response distribution for variables used in the study

	Freq	%
Responses after exposure to maps[a]		
Likelihood of evacuation		
Do not know[b]	28	3.0
1 = not at all	159	16.9
2	169	18.0
3	186	19.8
4	145	15.4
5 = very much	254	27.0
Perceived risk		
Do not know[b]	19	2.0
1 = not at all	113	12.0
2	170	18.0
3	222	23.5
4	201	21.3
5 = very much	220	23.3
Fear		
Do not know[b]	20	2.1
1 = not at all	191	20.3
2	200	21.3
3	225	23.9
4	185	19.7
5 = very much	120	12.8
Knowledge and experience		
Hurricane knowledge		
0 answers correct	9	3.8
1	17	7.2
2	38	16.2
3	90	38.3
4 answers correct	81	34.5
Personal experience		
Yes	75	31.9
Vicarious experience		
Yes	90	38.3
Travel characteristics		
Method of transportation		
Plane	107	45.5
Personal vehicle	113	48.1
Traveling with people <18 years old		
Yes	146	62.9

[a] Subjects indicated for each map (four in total) their evacuation, perceived risk, and fear assessments

[b] Do not know responses were not included in the ordered-response models

(coastal versus inland). This result that can be explained by research shows that hurricanes have a more negative effect in coastal than inland sites since storm surge and sustained winds are stronger closer to the shore (Rappaport 2000). Therefore, in the current study, the ordered-response models (McKelvey and Zavonia 1975) were run separating the data

obtained at Orange (inland) and Pinellas (coastal) counties. As the responses to questions about risk, fear, and evacuation were obtained on a Likert scale (1–5), ordered-probit models were used for analysis. This methodology, compared to other types of regression analysis, recognizes the inherent ordering in the outcome variables of interest and allows us to calculate the probability of each level of outcome as a function of explanatory factors. In the ordered-probit models presented in the rest of this paper, a positive parameter indicates that the corresponding factor is associated with higher levels of perceived risk, fear, or likelihood of evacuation (depending on the outcome being analyzed), and a negative parameter indicates the opposite effect.

5.1 Effect of hurricane characteristics

According to Loewenstein et al. (2001), affect and cognition vary from each other since they are influenced differently by the elements of an uncertain event. The following set of ordered-response models explores the effects of the characteristics of the hurricanes used in the scenarios on respondents' fear and risk perceptions. Since one of the hypothesis of this study expects an interaction effect of location of the tourist (coastal vs. inland), the data collected in the two sites of the survey, Pinellas and Orange counties, were used separately to create the models.

In the model for risk perception in Orange County, only one hurricane trait had a significant impact on risk. This result suggests that a projection that forecasted a hurricane path directly over the location and a stronger hurricane (category 4 vs. 1) were perceived as more risky. The model for Pinellas County indicates that a category four hurricane, a Gulf of Mexico coast landfall, and a track that passes over the site of the survey were perceived as more risky. This is an expected result since Pinellas is located on the coast of the Gulf of Mexico rendering it more vulnerable to a tropical cyclone approaching from Gulf than from the Atlantic. As in the case of risk perception, the model for fear in Orange County, one parameter was significant. Based on this model, a brief time of arrival (24 vs. 48 h) triggered a stronger negative emotion. For the coastal county of Pinellas, the results suggest that a category four hurricane and a Gulf landfall created more fear.

The models presented in Table 3 suggest that subjects in the Orange County survey site perceived that a category four hurricane is riskier than a category one; however, a similar influence was not found in their fear responses. As Loewenstein et al. (2001) argue, the characteristics of uncertain events are processed differently by the cognitive and affective resources of individuals.

The models' results also indicate the importance of location to understand tourists' assessment of fear and risk. As expected, tourists in Pinellas County were more concerned when a hurricane was approaching from the Gulf than from the Atlantic. Also, it seems that tourists vacationing in Pinellas County considered more traits of the hurricane to determine affective and cognitive perceptions. This result reflects research that suggests that individuals who are more motivated, due to higher perceived vulnerability, are willing to evaluate more parameters to make a decision (Petty et al. 1983).

The differences between the effect of the traits of the hurricane on cognitive and affective evaluations also imply that individuals might be risk insensitive to small changes of an event. One of the most salient traits of a hurricane is its category; however, this information was not used by the respondents of the study to determine their fear in the inland county. This result seems to follow Loewenstein et al. (2001) results suggesting that the strength of the mental imagery that individuals create in their minds when they think about an event might be relatively insensitive to the specific traits of the event. In other

Table 3 Ordered-response models for the effect of hurricane characteristics on perceived risk and fear

	Perceived risk			
	Orange (Inland)		Pinellas (Coastal)	
Model				
df	5		5	
p	.003		.000	
Log-likelihood model	−214.24		−196.62	
Log-likelihood equal shares model	−793.45		−624.46	
	Estimate	*p*	Estimate	*p*
Parameters				
Time to landfall	.082	.394	.137	.209
S.S. category at landfall	.357	.000	.576	.000
Florida coast of landfall	−.081	.392	.546	.000
Wind duration	−.096	.316	.082	.452
Track passage relative to site	.179	.050	.394	.000
	Fear			
	Orange (Inland)		Pinellas (Coastal)	
Model				
df	5		5	
p	.163		.000	
Log-likelihood model	−204.48		−187.75	
Log-likelihood equal shares model	−793.45		−624.46	
	Estimate	*p*	Estimate	*P*
Parameters				
Time to landfall	.192	.044	.154	.157
S.S. category at landfall	.133	.164	.402	.000
Florida coast of landfall	−.130	.169	.324	.003
Wind duration	−.003	.977	−.188	.082
Track passage relative to site	.078	.407	.130	.228
Values used in maps				
Time to landfall			1 = 24 h, 0 = 48 h	
S.S. category at landfall			1 = category 4, 0 = category 1	
Florida coast of landfall			1 = Gulf, 0 = Atlantic	
Wind duration			1 = long, 0 = short	
Track passage relative to site			1 = through, 0 = offset	

words, a tourist who is exposed to a hurricane warning message might develop vivid images (i.e., mental images of disappointed family members, outdoor activities interrupted for days due to rain) regardless of the specific traits of the tropical cyclone. These mental pictures would create an affective response that might not parallel the cognitive risk perception, which is more sensitive to the specific characteristics of the event.

5.2 Effect of tourists' knowledge, experience, and trip traits

Research on evacuation behavior as well as studies that have explored the affect as risk model suggest that individuals' level of knowledge and previous experience with an event as well as situational constrains influence their responses to events such as hurricanes. In order to test the relationship between these tourists' traits and their fear and risk perceptions, a second series of ordered-response models were developed for each county.

As Table 4 suggests, personal experience with hurricanes had a negative effect on the fear and perceived risk for tourists in both inland and coastal locations. These results indicate that some tourists personally affected by hurricanes showed lower perceived levels of risk and fear than those without prior experience with tropical cyclones. It is important to notice that the severity of previously experienced hurricanes was not explored in this study. However, Matyas et al. (2011) found that having personal experience with hurricanes was associated with lower ratings of likelihood to evacuate as well as lower ratings of perceived risk. These findings coincide with empirical results from researchers such as Rincon et al. (2001) and Kusenbach et al. (2010), who found a negative relationship between previous experience and evacuation rates.

Another interesting finding is the different results of the role of knowledge of hurricanes among tourists interviewed at the coastal or inland sites. In the case of Orange County, knowledge about hurricanes had no significant impact on fear or risk. This result suggests that other factors such as personal experience with previous hurricanes played a stronger role in modulating respondents' cognitive and affective responses to the hurricane scenarios. In contrast, tourists in Pinellas County showed a strong positive relationship between knowledge and the cognitive judgment, risk perception. These results show that inland tourists use less cognitive resources as compared to coastal tourists to determine their response to a hurricane warning message. In the literature on persuasion, a consistent finding suggests that subjects with a low level of involvement with a situation or message uses less cognitive resources (Petty et al. 1983). The results of the present study show that knowledge about hurricanes did not have a significant association with level of fear for Pinellas County tourists. This result suggests that an individual's cognitive resources are relevant for those directly in harm's way on the coast.

The results of these models also indicate that method of transportation did not influence risk and fear perceptions except for tourists interviewed in the coastal sites of the survey. Apparently, travelling using a personal vehicle reduces the level of fear. Perhaps tourists who can control their vacation plans (compared to individuals who need to contact an airline to change dates of departure) might have a less negative imagery of what would happen if they had to evacuate the coastal city. Interestingly, the presence of companions less than 18 year old was a significant and positive influence on risk and fear in Orange county models. According to Dash and Gladwin (2007), factors such as children in a household influence differently the decision-making process depending on other variables like resources available. Future research should investigate the reasons behind the lack of an effect of children presence on risk and fear among tourists in coastal locations.

5.3 Effect of distance of residence to the coast and previous hurricane tracks

Since a brief questionnaire does not allow for a comprehensive assessment of respondents' knowledge and experience with hurricanes, calculations of distance of the residence of the respondents to the coast and to previous hurricane tracks were used as proxies of previous experiences and exposure to hurricane warning messages.

Table 4 Ordered-response models for knowledge, personal and vicarious experience, and travel traits on perceived risk and fear

	Perceived risk			
	Orange (Inland)		Pinellas (Coastal)	
Model				
df	6		6	
p	.030		.031	
Log-likelihood model	−384.12		−273.63	
Log-likelihood equal shares model	−793.45		−624.46	
	Estimate	*p*	Estimate	*p*
Parameters				
Knowledge about hurricanes	−.215	.249	.587	.013
Personally affected by hurricane	−.211	.037	−.247	.050
Family/friends affected by hurricane	.006	.267	.010	.110
Travel by plane	.029	.861	.014	.826
Travel by personal vehicle	.060	.721	−.016	.806
Travelers younger than 18	.268	.011	.069	.530
	Fear			
	Orange (Inland)		Pinellas (Coastal)	
Model				
df	6		6	
p	.000		.000	
Log-likelihood model	−288.64		−281.23	
Log-likelihood equal shares model	−793.45		−624.46	
	Estimate	*p*	Estimate	*p*
Parameters				
Knowledge about hurricanes	−.095	.249	.346	.139
Personally affected by hurricane	−.446	.037	−.253	.045
Family/friends affected by hurricane	.006	.237	.005	.376
Travel by plane	−.141	.393	−.341	.072
Travel by personal vehicle	.005	.974	−.540	.005
Travelers younger than 18	.296	.005	.072	.510
Variable values				
Knowledge about hurricanes	100 = 4 responses correct, 0 = no responses correct.			
Personally affected by hurricane	1 = yes, 0 = no			
Family/friends affected by hurricane	1 = yes, 0 = no			
Travel by plane	1 = yes, 0 = no			
Travel by personal vehicle	1 = yes, 0 = no			
Travelers younger than 18	1 = yes, 0 = no			

Responses from 188 tourists who provided valid US zip codes were included in this analysis. In order to analyze these data, the responses were grouped according to their distance from the Gulf or Atlantic Coasts and distance from a storm track from the 2008 hurricane season. The 2008 storm tracks were selected for analysis because they are from the most recent season prior to the administration of the surveys since research of the effects of time in individuals' memory suggests that people tend to be more sensitive to more current events (Barron and Erev 2003). Also, few tourists are likely to have moved within the past year. Three hurricanes and three tropical storms made landfall in the US during the 2008 season. Figure 1 presents residence locations of tourists surveyed in Pinellas and Orange County and tropical cyclones tracks from the 2008 hurricane season from which the distance to the tourists' residences were calculated.

The mean distance to coast was 122 km, and mean distance to track was 126 km. Therefore, two groups were formed: those within 100 km of the coast or track, and those more than 200 km away. This split of the sample between respondents was designed to separate those who are more likely to have been exposed to hurricane-related messages and, therefore, more knowledgeable (respondents whose residence's zip code is within 100 km of the coastline or a recent storm track) from respondents who would be less likely to be exposed to this type of messages and experiences (more than 200 km from the coast or a 2008 track). Responses were also separated according to the survey location in Orange or Pinellas County. Chi-square tests were performed for fear and risk evaluation. Table 5 presents the p values for the Chi-square tests. The table also reports whether the tourists residing within 100 km had higher or lower ratings than expected for p values that are <0.100.

Tourists visiting Orlando Orange County who reside within 100 km of the Gulf or East Atlantic Coasts or within 100 km of a tropical cyclone track from the 2008 hurricane season had lower fear, and risk, ratings than those living more than 200 km from the coast or a 2008 storm track in 2008. When examining actual versus predicted ratings, those living close within 100 km indicated more responses of 1 (no fear at all, not at all risky) than expected. So, this suggests for Orlando inland tourists that when they are not as exposed to tropical cyclones at home, they are more likely to have some fear and detect some risk. On the other hand, Orlando inland tourists who live near the coast or a storm track indicated lower ratings possibly because they believe that they are at less risk being inland and/or could be less afraid because they are used to these storms (Arlikatti et al. 2006).

Results differ for Pinellas County tourists. Tourists residing within 100 km of the Gulf or East Atlantic Coasts had higher ratings for fear and risk, and those within 100 km of a track from the 2008 hurricane season had higher ratings of fear than those living more than 200 km away from the coast or a storm track. Those living within 100 km of the coast or a

Table 5 Chi-square results of coastal distance and hurricane track effect on perceived risk and fear

	Orange County		Pinellas County	
	Chi-square	Within 100 km	Chi-square	Within 100 km
Coastal distance × fear	0.051	Lower ratings	0.023	Higher ratings
Coastal distance × risk	0.032	Lower ratings	0.084	Higher ratings
Track 2008 distance × fear	0.013	Lower ratings	0.059	Higher ratings
Track 2008 distance × risk	0.000	Lower ratings	0.456	–

track had fewer ratings of 1 and more ratings of 4 or 5 than expected. Those living within 100 km of the coast or a track may have more fear because they have more experience and as their current location is on the beach, so they realize that the scenarios pose a threat, regardless of specifics like intensity, time to landfall, or whether the centerline of the Track Forecast Cone passes directly over their location rather than being offset.

5.4 Relationship of cognitive and affective responses to evacuation likelihood

The study of how cognitive and affective responses are influenced by individual and environmental traits requires the inclusion of a link to a behavior-related to a decision-making process. In this study, two ordered-response models, one per county, designed to test the effect of fear and perceived risk on evacuation likelihood were analyzed. These models suggest that these relationships are consistent in the two sampling sites (See Table 6). For both inland and coastal survey locations, both parameters were significant at $\alpha = 0.0001$. Interestingly, the perceived risk parameters on both models are apparently stronger than fear's parameters. This result might be explained by research that has consistently found that individuals who need to make important decisions are highly motivated to arrive to a correct decision and, therefore, rely more on cognitive than affective information (Petty et al. 1983; Svenson and Salo 2007).

6 Conclusions and future research

Landfalling tropical cyclones can impact society before, during, and after the storm. This study's key objective was to address the paucity of research on how tourists respond cognitively and effectively to hurricane warning messages. More specifically, the influence of fear, an affective response, and risk perception, a cognitive response, on evacuation likelihood of tourists in two different destinations (coastal and inland) was explored. The results suggest that evacuation likelihood is strongly influenced by cognitive and affective responses among inland as well as coastal tourists. At the same time, fear and risk perception were influenced differently by hurricane traits, and individual differences among tourists like knowledge and previews or vicarious experience with hurricanes.

Table 6 Ordered-response models for the effect of risk perception and fear on evacuation likelihood

	Evacuation Likelihood			
	Orange (Inland)		Pinellas (Coastal)	
Model				
df	2		2	
p	.0001		.0001	
Log-likelihood model	−203.30		−161.05	
Log-likelihood equal shares model	−793.45		−624.45	
	Estimate	*p*	Estimate	*p*
Parameters				
Perceived risk	.810	.000	1.04	.000
Fear	.385	.000	.177	.003

Even though this research provides an initial step toward understanding how affective and cognitive responses to hurricane warning messages are utilized by tourists to determine their likelihood of evacuation, other important issues still remain. For example, it is important to note that in this study, simple dichotomical (yes/no) questions were asked in regard to experience with hurricanes. Previous experience with hurricanes is a complex issue since researchers have found a very diverse number of cognitive and behavioral consequences. For example, Dow and Cutter (1998) found that the effects of false hurricane alarms among South Carolina residents did not change their evacuation decisions (a behavioral measure), but reduced the confidence in official sources of information (a cognitive measure). Recently, Dillon et al. (2011) suggested that people who were not affected, because of chance, by a negative event such as a hurricane tend to reduce their perceptions of risk. Also, Dash and Morrow (2001) found that a vicarious experience through media might influence more behavioral intention than a previous personal experience.

One possible limitation of this study is self-selection of its participants. There is the possibility that individuals who are more worried or knowledgeable about hurricanes might avoid Florida, as well as other hurricane-prone destinations, during the months when tropical cyclones are more frequent. Future research should assess knowledge and attitudinal differences between current and potential tourists of Atlantic and Gulf coast states or compare the responses of tourists that visit these states in different months of the year.

Another possible future step would be to examine how tourists obtain information when an emergency presents itself. Mileti and Sorensen (1988) suggest that media, emergency officials, and an individual's social network (friends, neighbors, and family members) are important sources of information during evacuation decision making. The process of information gathering and sharing of multiple sources helps individuals to develop a personalized and relevant risk assessment. Each of these sources would have different effects on behavior since the delivery of the message varies in terms of modality (visual or verbal), hence vividness, (Burnside et al. 2007) and bias (Slovic 1987). These issues are of extreme importance since vividness of an event strongly influences affective risk evaluations (Loewenstein et al. 2001) and tourists in a non-familiar environment do not count with the large social network that they might use at their residence (Phillips and Morrow 2007).

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References

Arlikatti S, Lindell MK, Prater CS, Zhang Y (2006) Risk area accuracy and hurricane evacuation expectations of coastal residents. Environ Behav 38:226–247

Baker EJ (1991) Hurricane evacuation behavior. Int J Mass Emerg Dis 9(2):287–310

Barron G, Erev I (2003) Feedback-based decisions and their limited correspondence to description-based decisions. J Behavl Decis Making 16:215–233

Broad K, Leiserowitz A, Weinkle J, Steketee M (2007) Misinterpretations of the "cone of uncertainty" in Florida during the 2004 hurricane season. Bull Am Meteorol Soc 88(5):651–667. doi:10.1175/bams-88-5-651

Brown DP, Beven JL, Franklin ES, Blake ES (2010) Atlantic hurricane season of 2008. Mon Weather Rev 138(5):1975–2001

Burnside R, Miller DS, Rivera JD (2007) The impact of information and risk perception on the hurricane evacuation decision-making of greater New Orleans residents. Sociol Spect 27(6):727–740. doi:10.1080/02732170701534226

Damasio AR (1994) Descartes' error: emotion, reason, and the human brain. Putnam, New York
Daniels RJ, Loggins GM (2007) Conceptualizing continuous coverage: a strategic model for wall-to-wall local television weather broadcasts. J Appl Commun Res 35(1):48–66
Dash N, Gladwin H (2007) Evacuation decision making and behavioral responses: individual and household. Nat Hazards Rev 8(3):69–77
Dash N, Morrow BH (2001) Return delays and evacuation order compliance: the case of Hurricane Georges and the Florida Keys. Environ Hazards 2:119–128
Decrop A (1999) Tourists' decision-making and behavior processes. In: Pizam A, Mansfeld Y (eds) Consumer behavior in travel and tourism. Haworth Press, London, pp 103–133
Dillon RL, Tinsley CH, Cronin M (2011) Why near-miss events can decrease an individual's protective response to hurricanes. Risk Anal 31(3):440–449
Dow K, Cutter SL (1998) Crying wolf: repeat responses to hurricane evacuation orders. Coast Manage 26:237–252
Dow K, Cutter SL (2000) Public orders and personal opinions: household strategies for hurricane risk assessment. Global Environ Change B Environ Hazards 2(4):143–155
Drabek TE (1986) Human system responses to disaster. Springer, New York
Drabek TE (1991) Anticipating organizational evacuations: disaster planning by managers of tourist-oriented private firms. Int J Mass Emerg Disasters 9:219–245
Drabek TE (1993) Variations in disaster evacuation behavior: public responses versus private sector executive decision-making processes. Disasters 16:104–118
Drabek TE (1994) Disaster evacuation and the tourist industry. In: Environment and behavior monograph no. 57. Natural Hazards Research and Application Information Center, Boulder, CO, p 282
Drabek TE (1996) Disaster evacuation behavior: tourists and other transients. In: Environment and behavior monograph no. 58. Natural Hazards Research and Application Information Center, Boulder, CO, p 354
Elsner JB, Niu XF, Jagger TH (2004) Detecting shifts in hurricane rates using a Markov chain Monte Carlo approach. J Clim 17:2652–2666
Finucane ML, Alhakami A, Slovic P, Johnson SM (2000) The affect heuristic in judgments of risks and benefits. J Behav Decis Mak 13(1):1–17. doi:10.1002/(sici)1099-0771(200001/03)13:1<1:aid-bdm333>3.0.co;2-s
Frijda NH (1986) The emotions. Cambridge University Press, Cambridge
Fuchs G, Reichel A (2011) An exploratory inquiry into destination risk perceptions and risk reduction strategies of first time vs. repeat visitors to a highly volatile destination. Tour Manag 32:266–276
Isen AM (2004) Some perspectives on positive feelings and emotions: positive affect facilitates thinking and problem solving. In: Manstead ASR, Frijda N, Fischer A (eds) Feelings and emotions: the Amsterdam symposium. Studies in emotion and social interaction. Cambridge University Press, New York, pp 263–281
Izard CE (2007) Basic emotions, natural kinds, emotion schemas, and a new paradigm. Perspect Psychol Sci 2(3):260–280. doi:10.1111/j.1745-6916.2007.00044.x
Kusenbach M, Simms JL, Tobin GA (2010) Disaster vulnerability and evacuation readiness: coastal mobile home residents in Florida. Nat Hazards 52(1):79–95. doi:10.1007/s11069-009-9358-3
Law R (2006) The perceived impact of risks on travel decisions. Int J Tour Res 8(4):289–300
Le Doux JE (1996) The emotional brain. Simon & Schuster, New York
Lench HC, Flores SA, Bench SW (2011) Discrete emotions predict changes in cognition, judgment, experience, behavior, and physiology: a meta-analysis of experimental emotion elicitations. Psychol Bull (Suppl). doi:10.1037/a0024244
Lerner JS, Keltner D (2000) Beyond valence: toward a model of emotion-specific influences on judgement and choice. Cogn Emot 14(4):473–493. doi:10.1080/026999300402763
Lindell MK, Lu JC, Prater CS (2005) Household decision making and evacuation in response to Hurricane Lili. Nat Hazards Rev 6:171–179
Loewenstein GF, Weber EU, Hsee CK, Welch N (2001) Risk as feelings. Psychol Bull 127(2):267–286. doi:10.1037/0033-2909.127.2.267
Matyas C, Srinivasan S, Cahyanto I, Thapa B, Pennington-Gray L, Villegas J (2011) Risk perception and evacuation decisions of Florida tourists under hurricane threats: a stated preference analysis. Nat Hazards 59(2):871–890. doi:10.1007/s11069-011-9801-0
McKelvey RD, Zavonia W (1975) A statistical model for the analysis of ordinal level dependent variables. J Math Sociol 4:103–120
Mileti DS, Sorensen JH (1988) Planning and implementing warning systems. In: Lystad M (ed) Mental health response to mass emergencies: theory and practice. Brunner/Mazel psychosocial stress series; no. 12. Brunner/Mazel, Philadelphia, PA, USA, pp 321–345

Perry RW, Green MR (1982) The Role of ethnicity in the emergency decision-making process. Sociol Inq 52(4):306–334
Petty RE, Cacioppo JT, Schumann DW (1983) Central and peripheral routes to advertising effectiveness: the moderating role of involvement. J Consumer Res 10:134–148
Phillips BD, Morrow BH (2007) Social science research needs: focus on vulnerable populations, forecasting, and warnings. Nat Hazards Rev 8(3):61–68
Pizam A, Fleischer A (2002) Severity versus frequency of acts of terrorism: which has a larger impact on tourism demand? J Travel Res 40(3):337–339
Rappaport EN (2000) Loss of life in the United States associated with recent Atlantic tropical cyclones. Bull Am Meteorol Soc 81:2065–2073
Rappaport EN et al (2009) Advances and challenges at the National Hurricane Center. Weather Forecast 24:395–419
Rincon E, Linares MYR, Greenberg B (2001) Effect of previous experience of a hurricane on preparedness for future hurricanes. Am J Emerg Med 19(4):276–279
Roehl W, Fesenmaier D (1992) Risk perceptions and pleasure travel: an exploratory analysis. J Travel Res 30(4):17–26
Rogers RW (1983) Cognitive and physiological process in fear appeals and attitude change: a revised theory of protection motivation. In: Cacioppo J, Petty R (eds) Social psychophysiology. Guilford, New York, pp 153–174
Simpson PM, Siguaw JA (2008) Perceived travel risks: the traveler perspective and manageability. Int J Tour Res 10:315–327
Sirakaya E, Woodside AG (2005) Building and testing theories of decision making by travelers. Tour Manage 26:815–832
Slovic P (1987) Perception of risk. Science 236(4799):280–285
Slovic P, Finucane ML, Peters E, MacGregor DG (2004) Risk as analysis and risk as feelings: some thoughts about affect, reason, risk, and rationality. Risk Anal Int J 24(2):311–322. doi:10.1111/j.0272-4332.2004.00433.x
Sonmez S, Graefe A (1998) Determining future travel behavior from past travel experience and perceptions of risk and safety. J Travel Res 37(2):171–177
Sorensen JH (2000) Hazard warning systems: review of 20 years of progress. Nat Hazards Rev 1(2):119–125
Stein RM, Duenas-Osorio L, Subramanian D (2010) Who evacuates when hurricanes approach? The role of risk, information, and location. Soc Sci Q 91(3):816–834
Svenson O, Salo I (2007) Mental representations of important real-life decisions. Eur J Oper Res 177(3):1353–1362. doi:10.1016/j.ejor.2005.04.007
Taylor K, Priest S, Sisco HF, Banning S, Campbell K (2009) Reading hurricane Katrina: information sources and decision-making in response to a natural disaster. Soc Epistemol 23(3/4):361–380. doi:10.1080/02691720903374034
Visit Florida (2011) 2010–2011 annual report. Visit Florida, Talahassee, FL
Vogt CA, Fesenmaier DR (1998) Expanding the functional information search model. Ann Tour Res 25:551–578
Whitehead JC, Edwards B, Van Willigen M, Maiolo JR, Wilson K, Smith KT (2000) Heading for higher ground: factors affecting real and hypothetical hurricane evacuation behavior. Environ Hazards 2:133–142
Williams LE, Bargh JA (2008) Keeping one's distance: the influence of spatial distance cues on affect and evaluation. Psychol Sci 19(3):302–308. doi:10.1111/j.1467-9280.2008.02084.x
Zajonc RB (2008) Feeling and thinking: preferences need no inferences. In: Fazio RH, Petty RE (eds) Attitudes: their structure, function, and consequences. Key readings in social psychology. Psychology Press, New York, pp 143–168
Zinn JO (2008) Heading into the unknown: everyday strategies for managing risk and uncertainty. Health Risk Soc 10(5):439–450. doi:10.1080/13698570802380891