

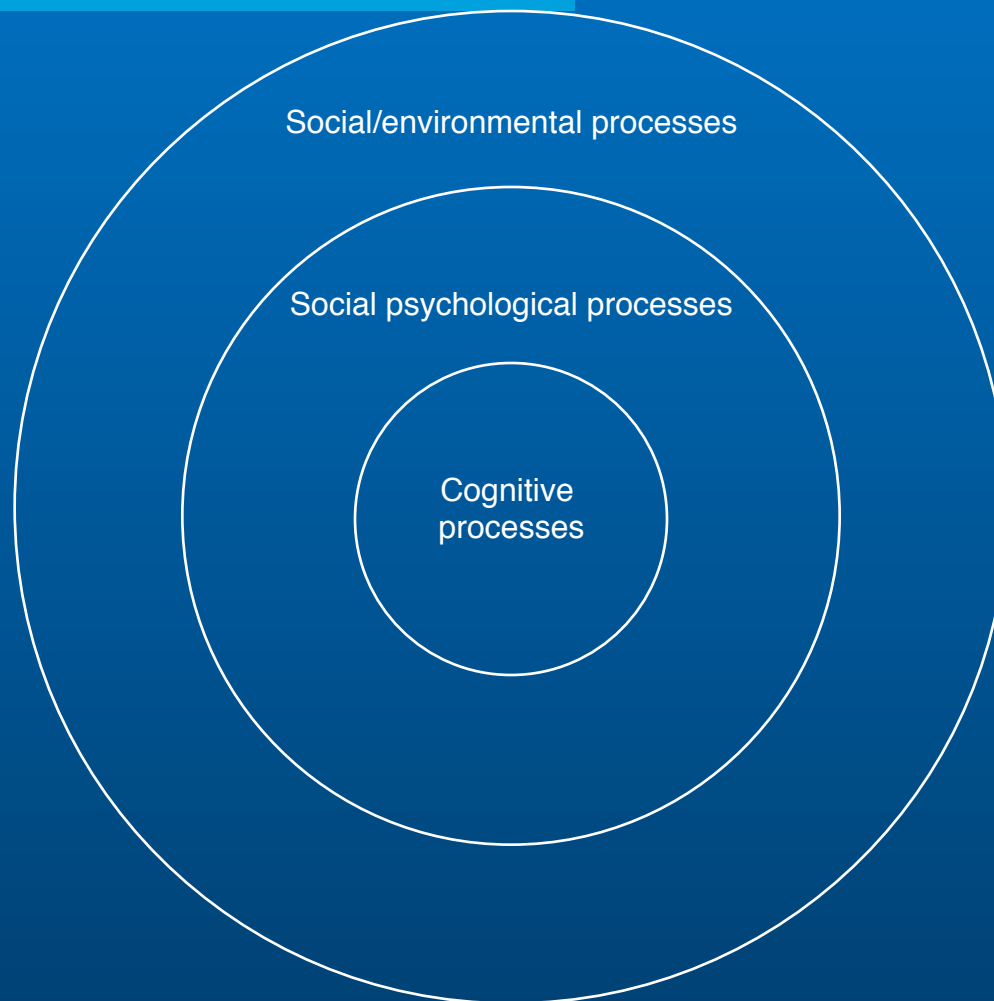
# The Protective Action Decision Model: Theoretical, Methodological, and Practical Issues

Michael K. Lindell

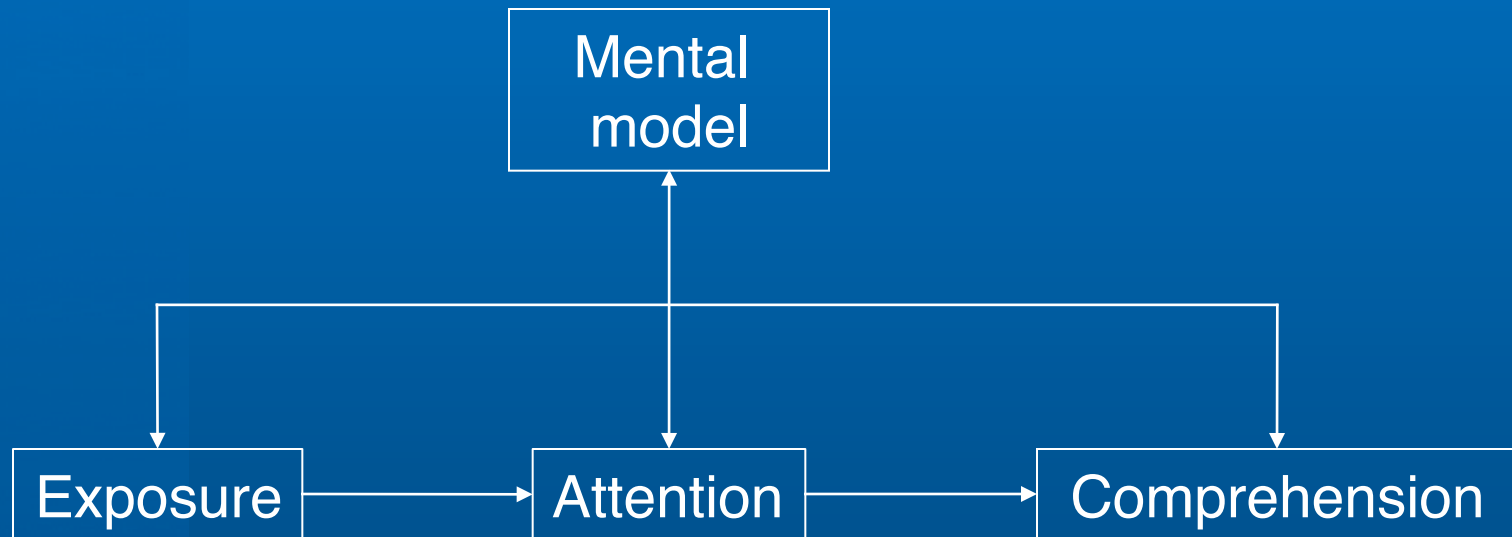
Texas A&M University Hazard Reduction & Recovery Center

University of Washington Department of Urban Design and  
Planning

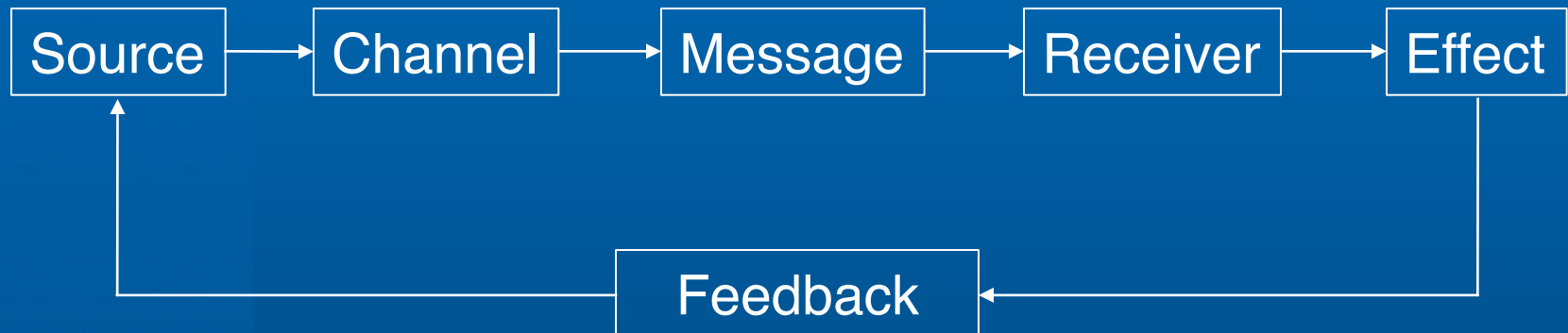
# Hierarchy of PADM Variables



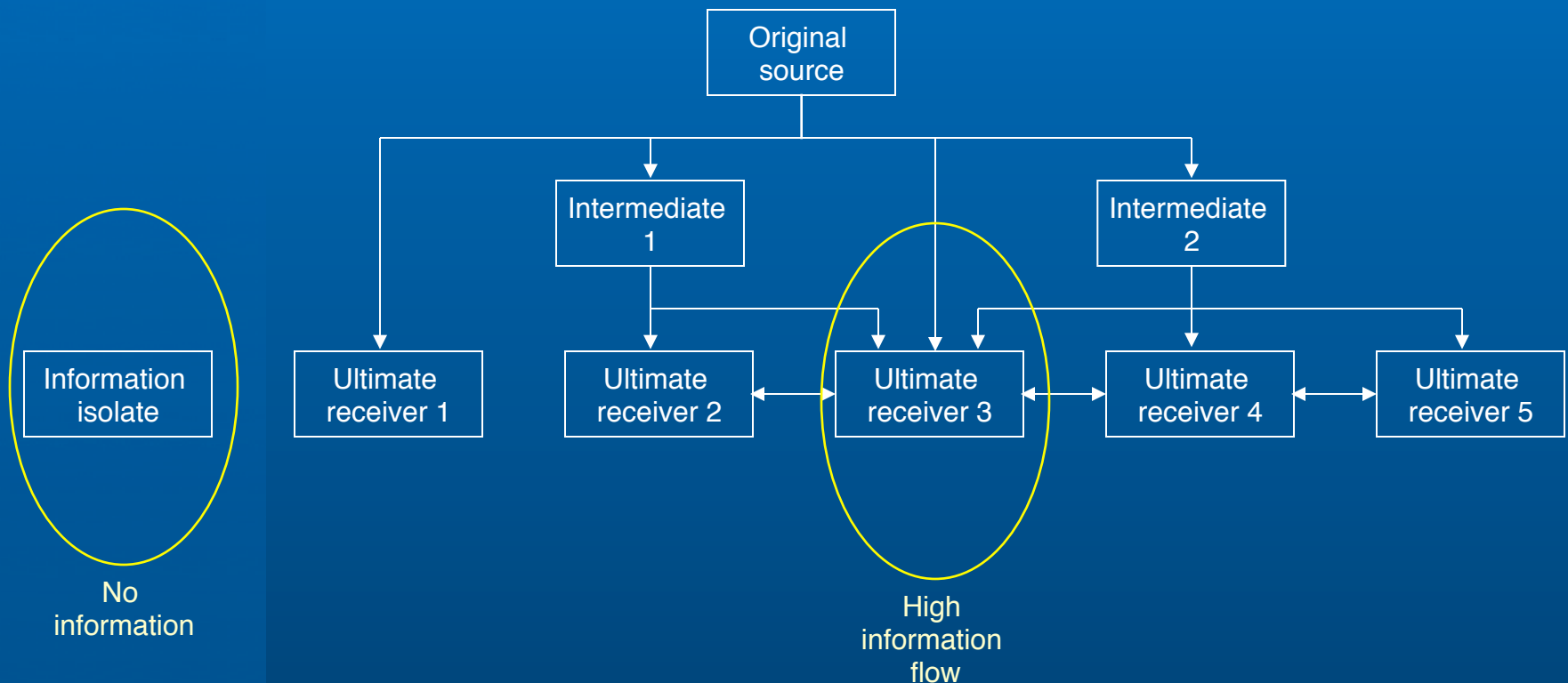
# Basic Elements of the Cognitive Component



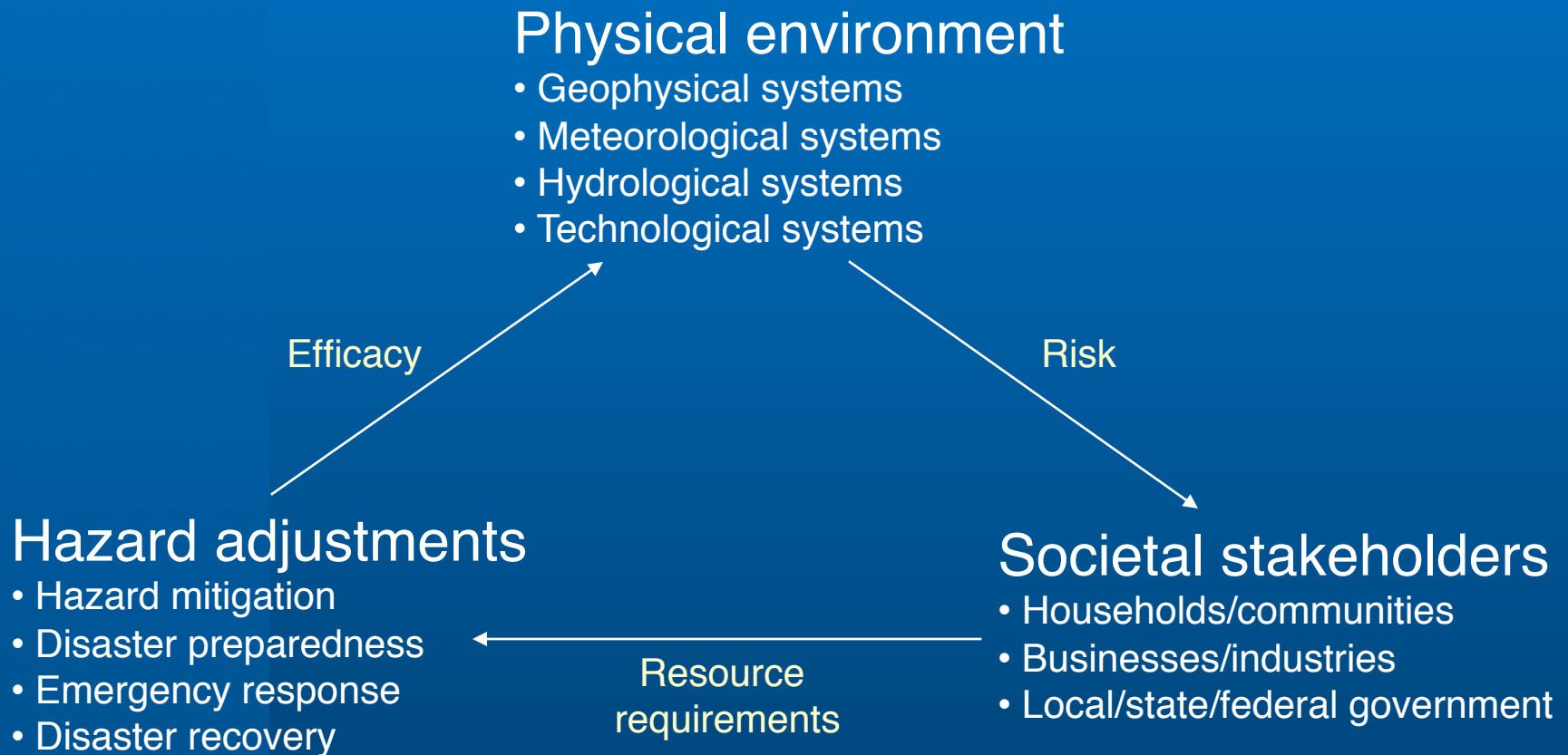
# Basic Elements of the Social Psychological Component



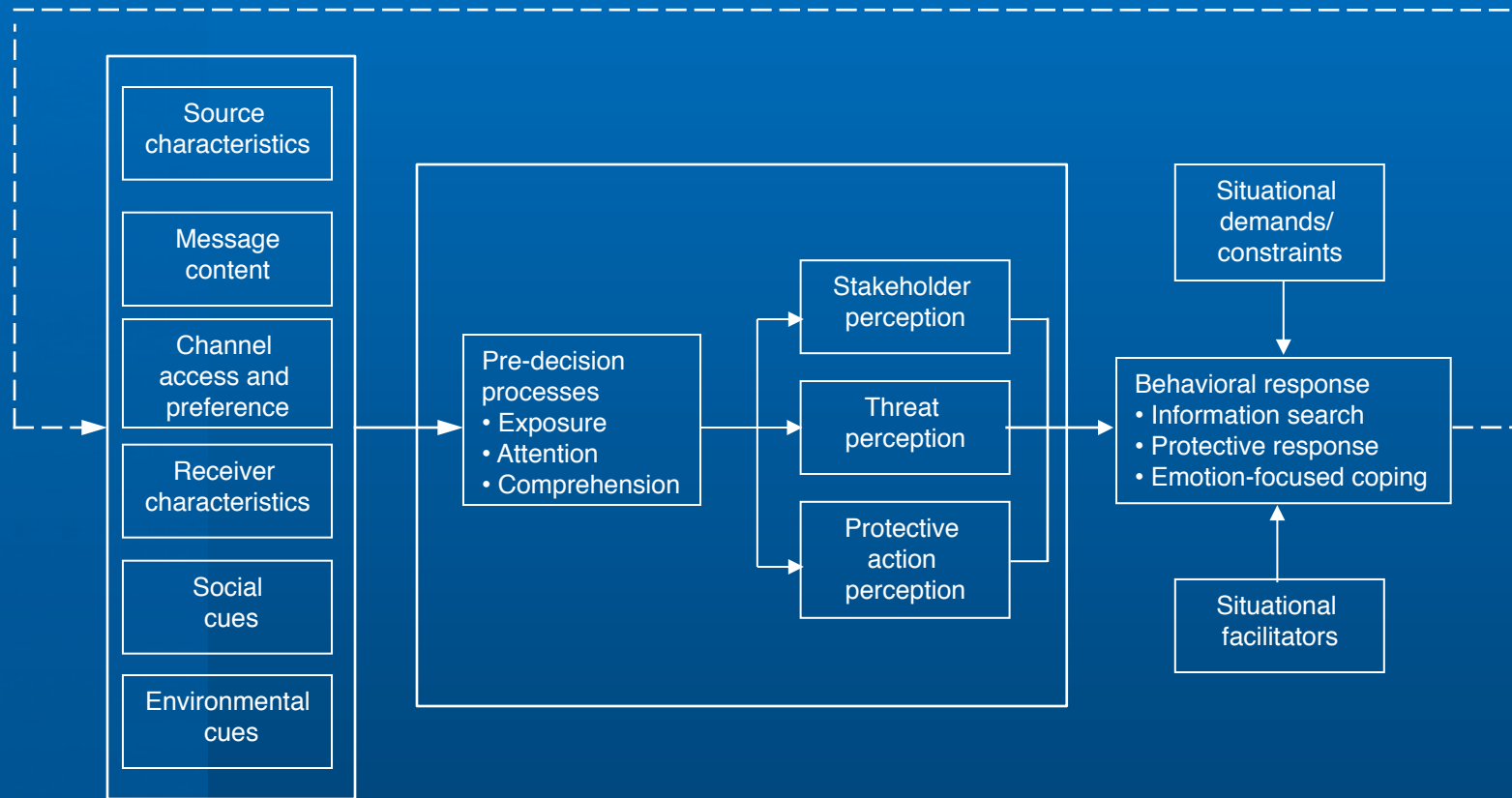
# Basic Elements of the Social Component



# Basic Elements of the Environmental Component



# Protective Action Decision Model



# Illustrative Data

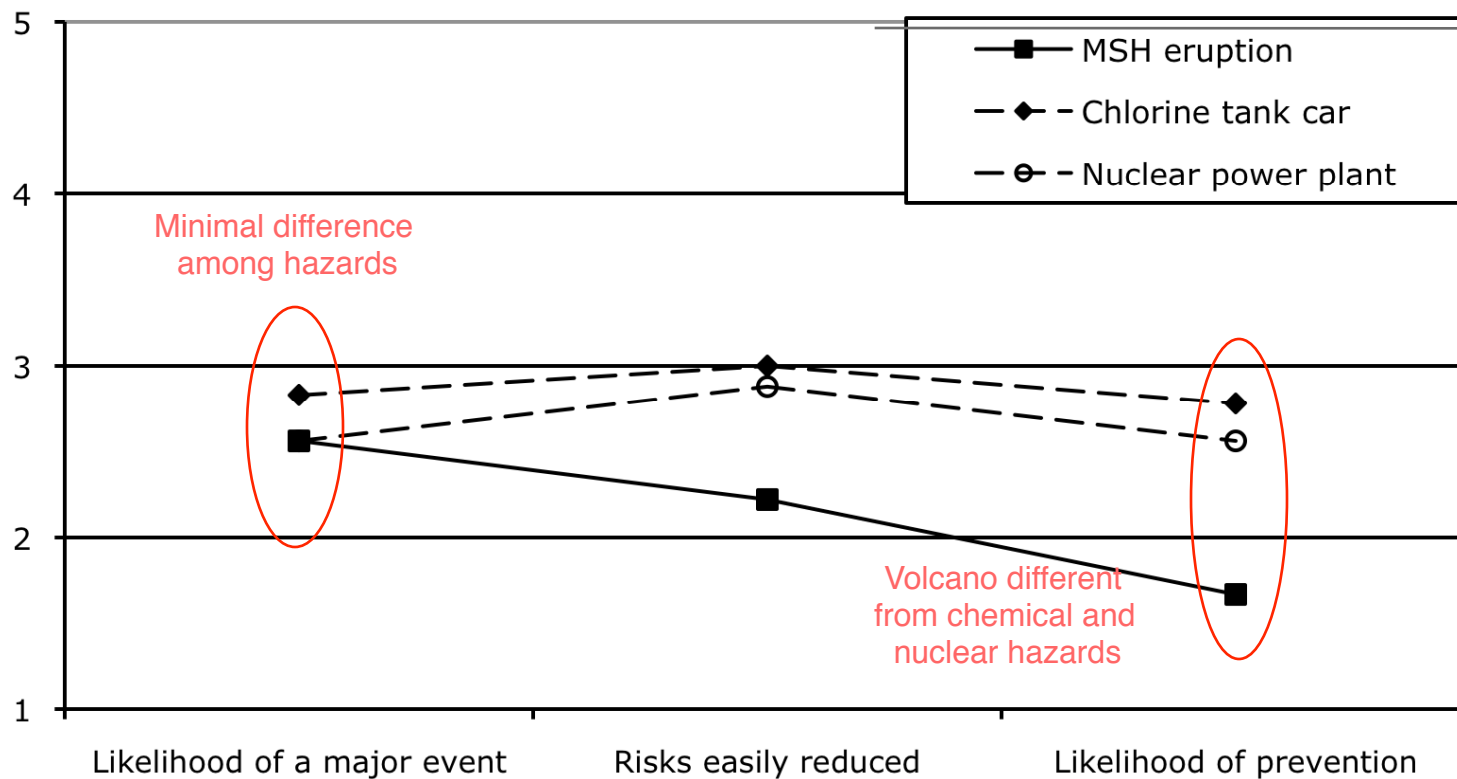
- Longview (1985) data: Hazard perceptions
  - Within the 10 mile EPZ of a nuclear power,
  - Adjacent to a major interstate highway, rail line, and shipping channel for hazardous materials, and
  - Forty miles west of the Mt. St. Helens.
- Six city (1997) Los Angeles and Seattle area data: Earthquake mitigation and preparedness.
- Houston (2003) data: Hurricane mitigation and preparedness.
- Hurricane Lili (2002), Katrina/Rita (2005), and Ike (2008) data: Evacuation decision making
- American Samoa (2009) earthquake and tsunami
- Christchurch and Tohoku (2011) earthquakes



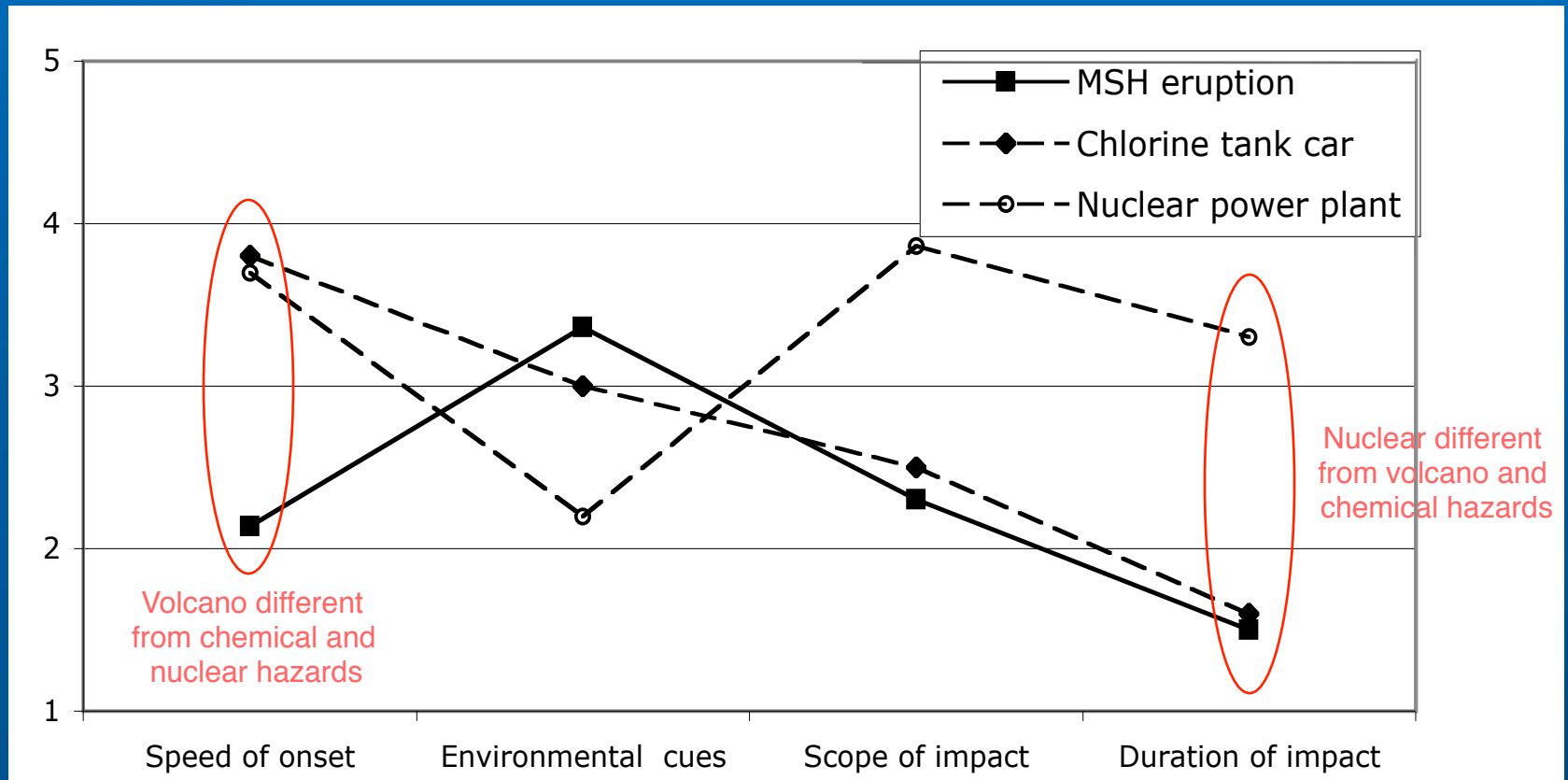
# Public Perceptions of Environmental Hazards

- Disaster research identifies the following dimensions of people's mental models of hazards as determinants of their warning responses
  - Hazard agent characteristics
  - Impact characteristics
  - Personal consequences
  - Affective and behavioral reactions
  - Alternative protective actions

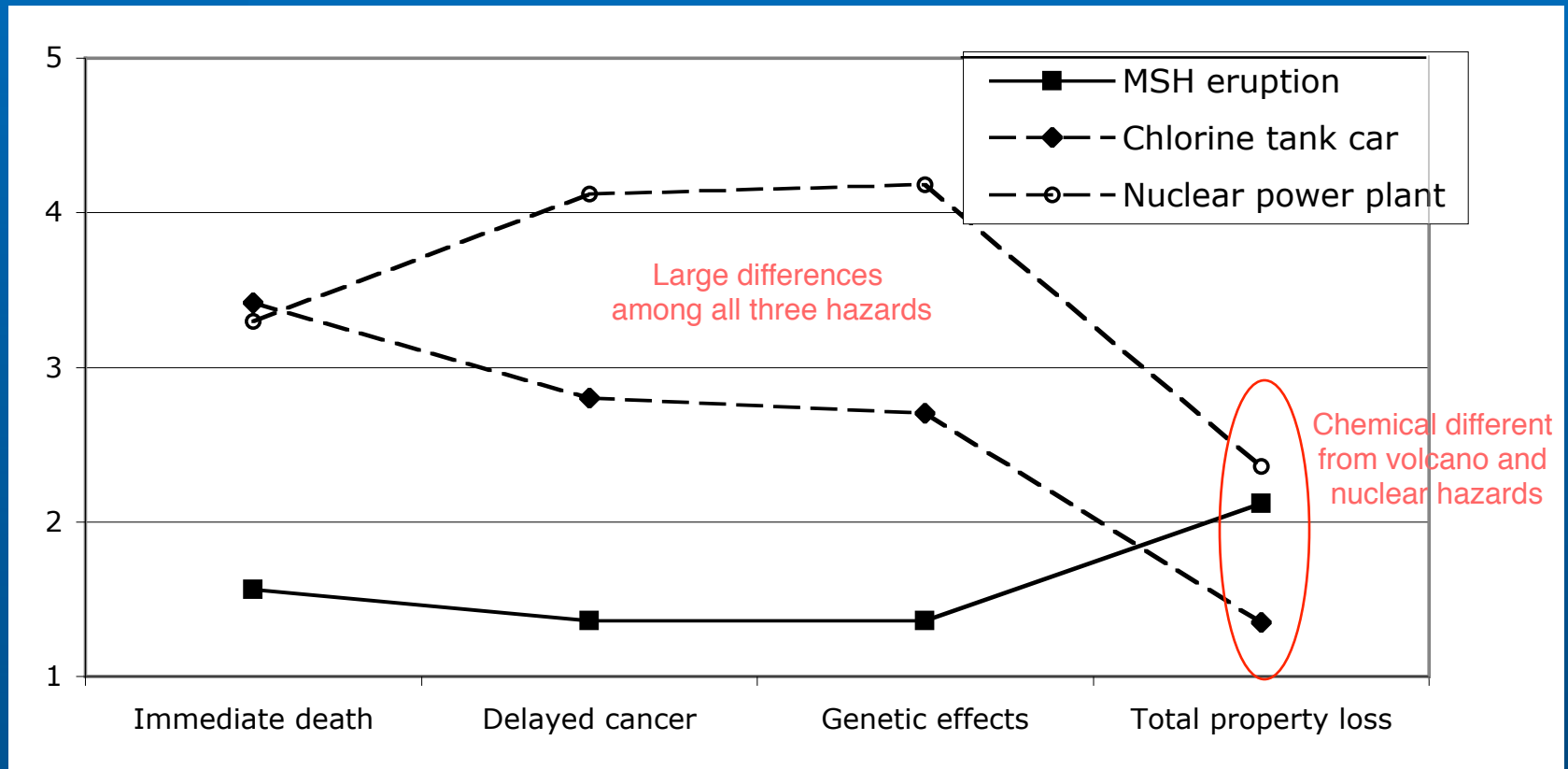
# Longview: Hazard Agent Characteristics



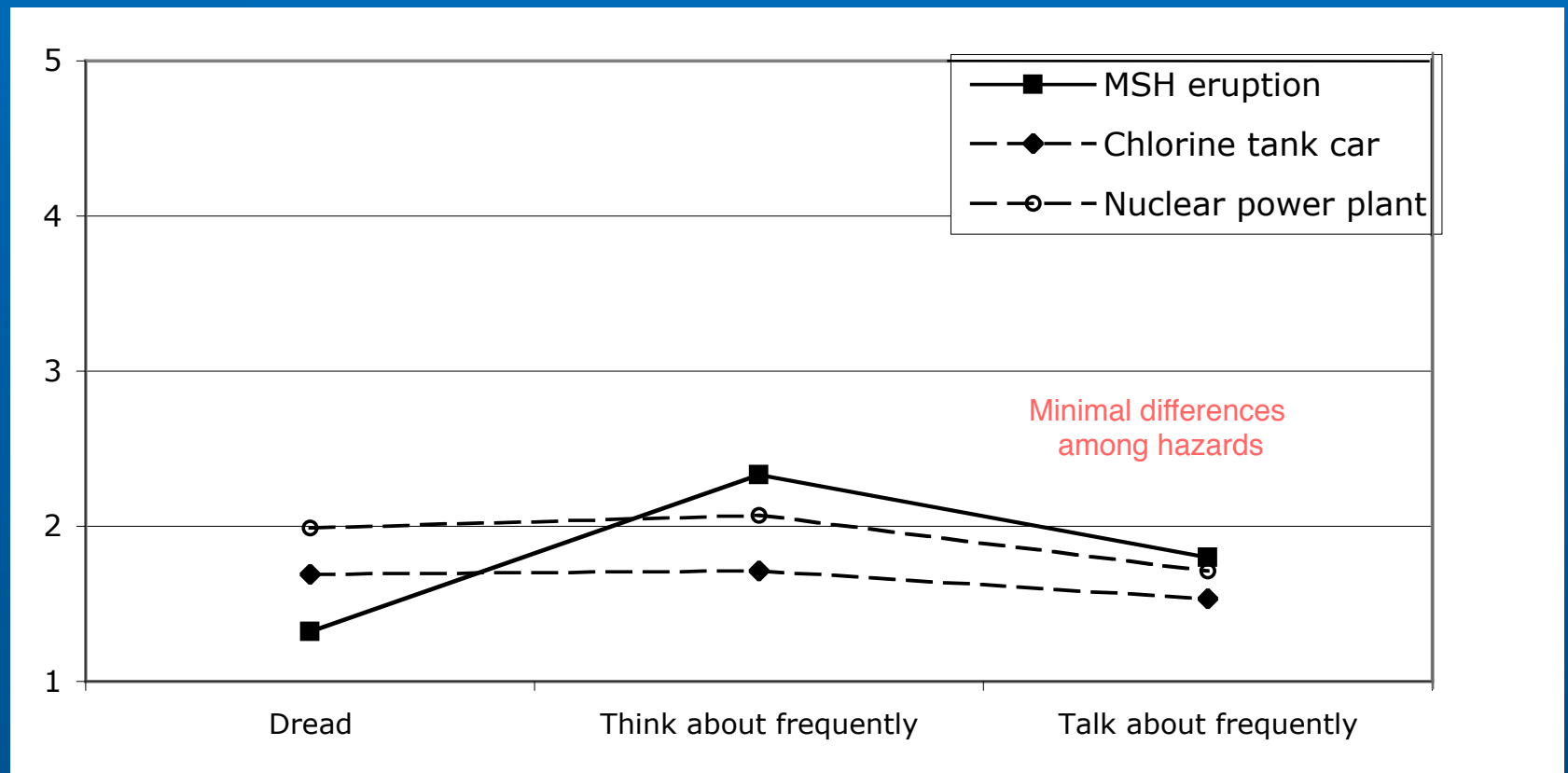
# Longview: Hazard Impact Characteristics



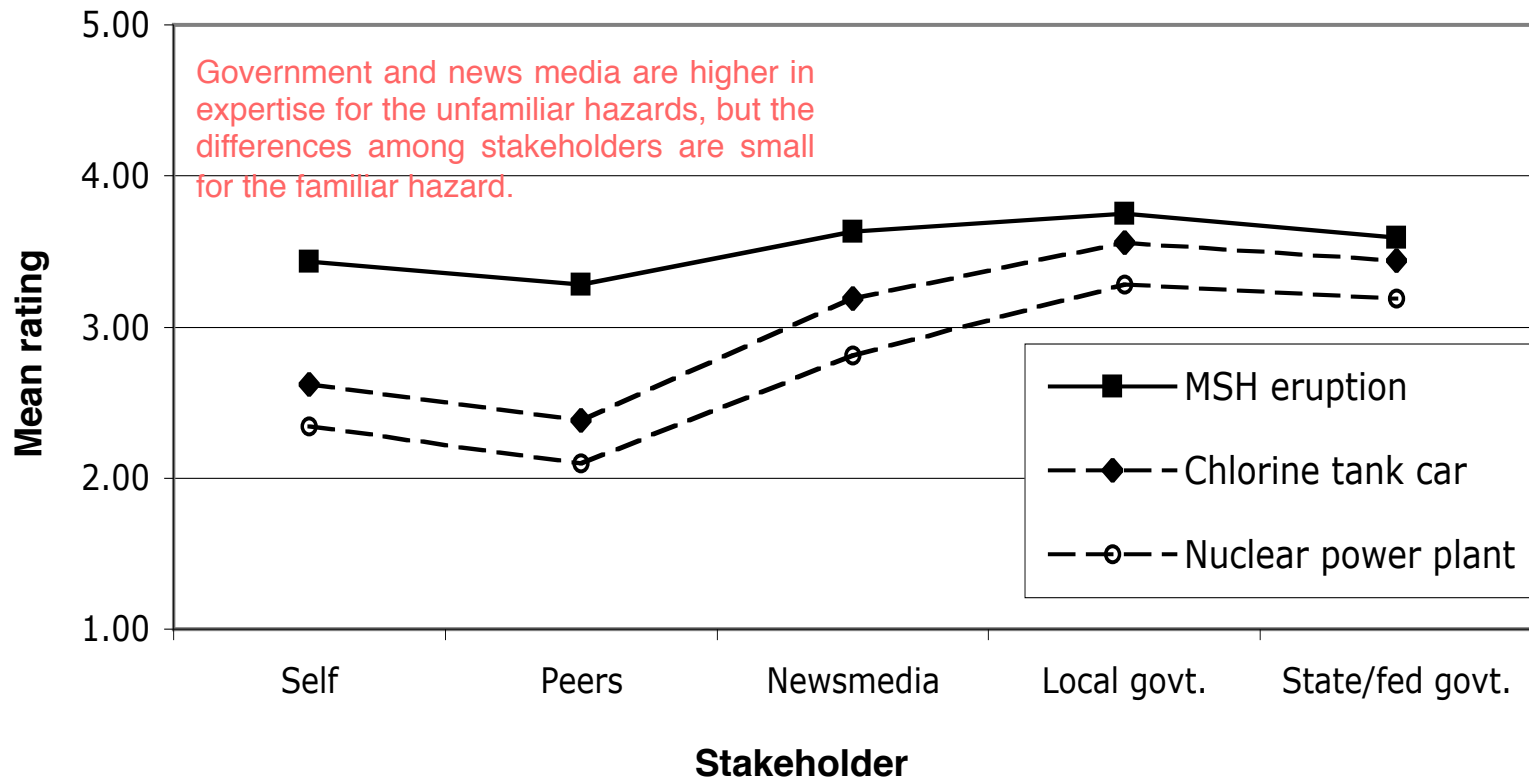
# Longview: Expected Personal Consequences



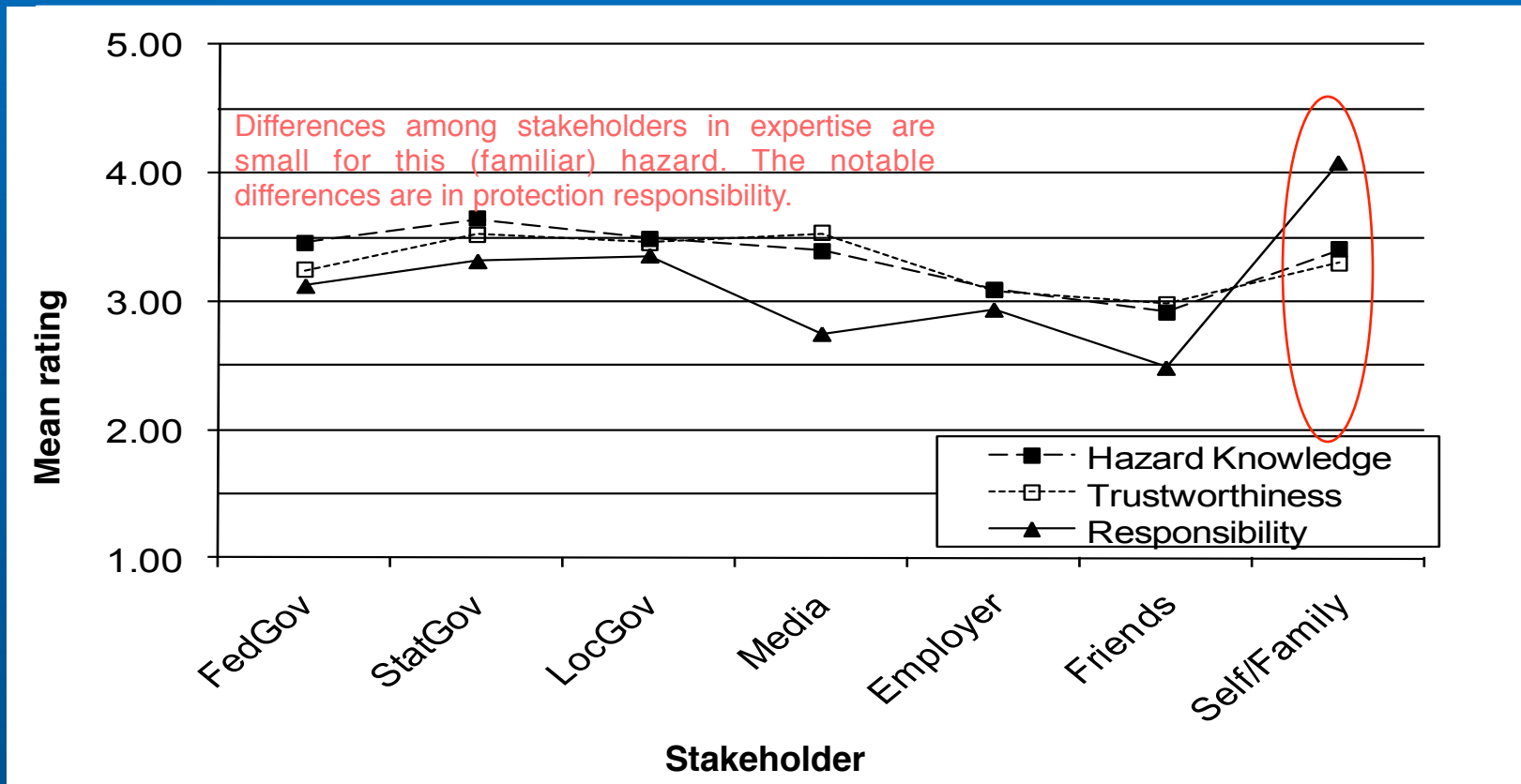
# Longview: Affective and Behavioral Reactions



# Longview: Perceptions of Stakeholder Expertise on Multiple Hazards



# Six City: Perceptions of Seismic Stakeholders on Multiple Attributes

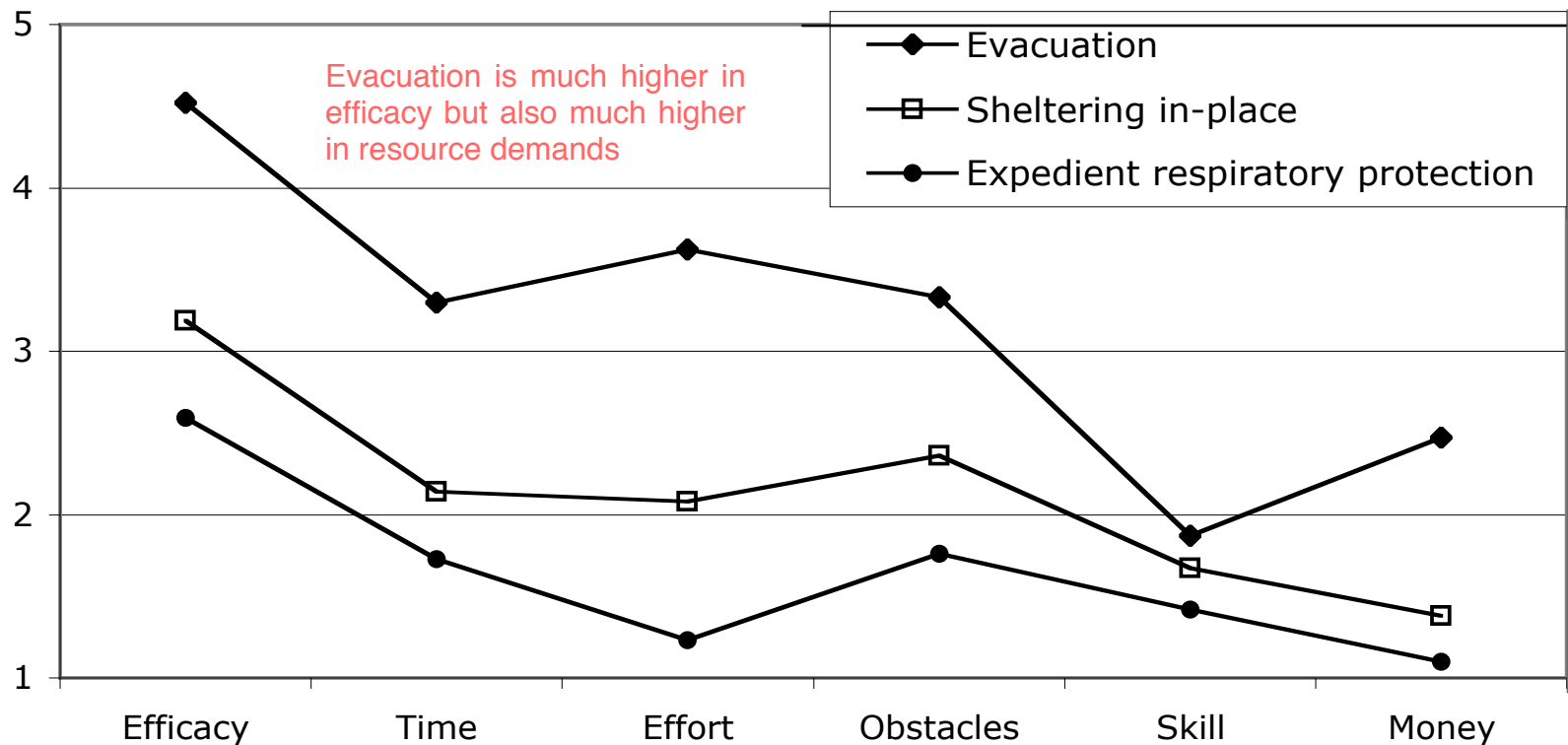


# Public Perceptions of Protective Actions

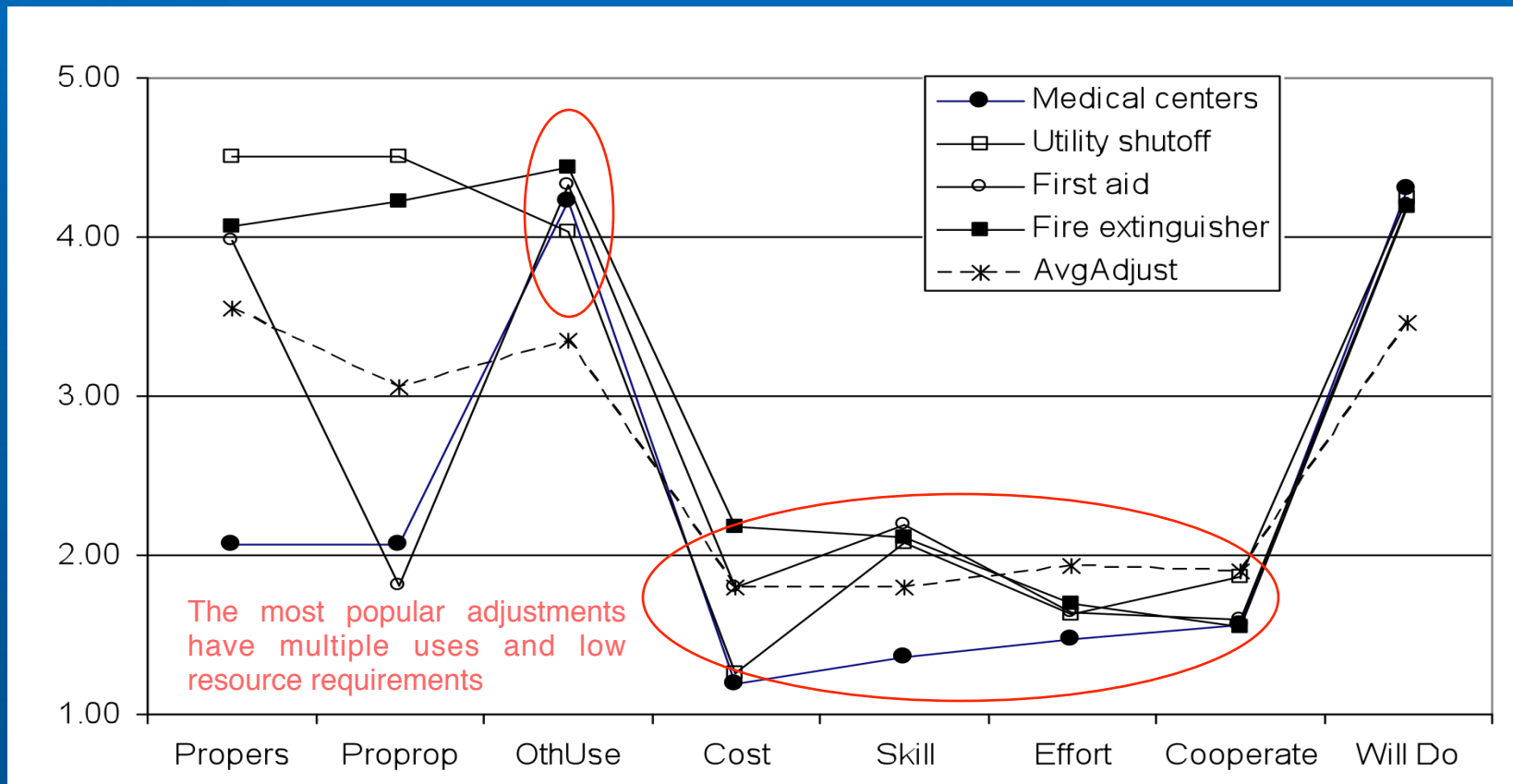
- Some studies have collected free response data showing that some people are
  - unaware of any protective action for a given hazard
  - believe all recommended actions are ineffective, or
  - believe all recommended actions require excessive resources.
- These findings underscore the importance of assessing people's perceptions of different protective actions.



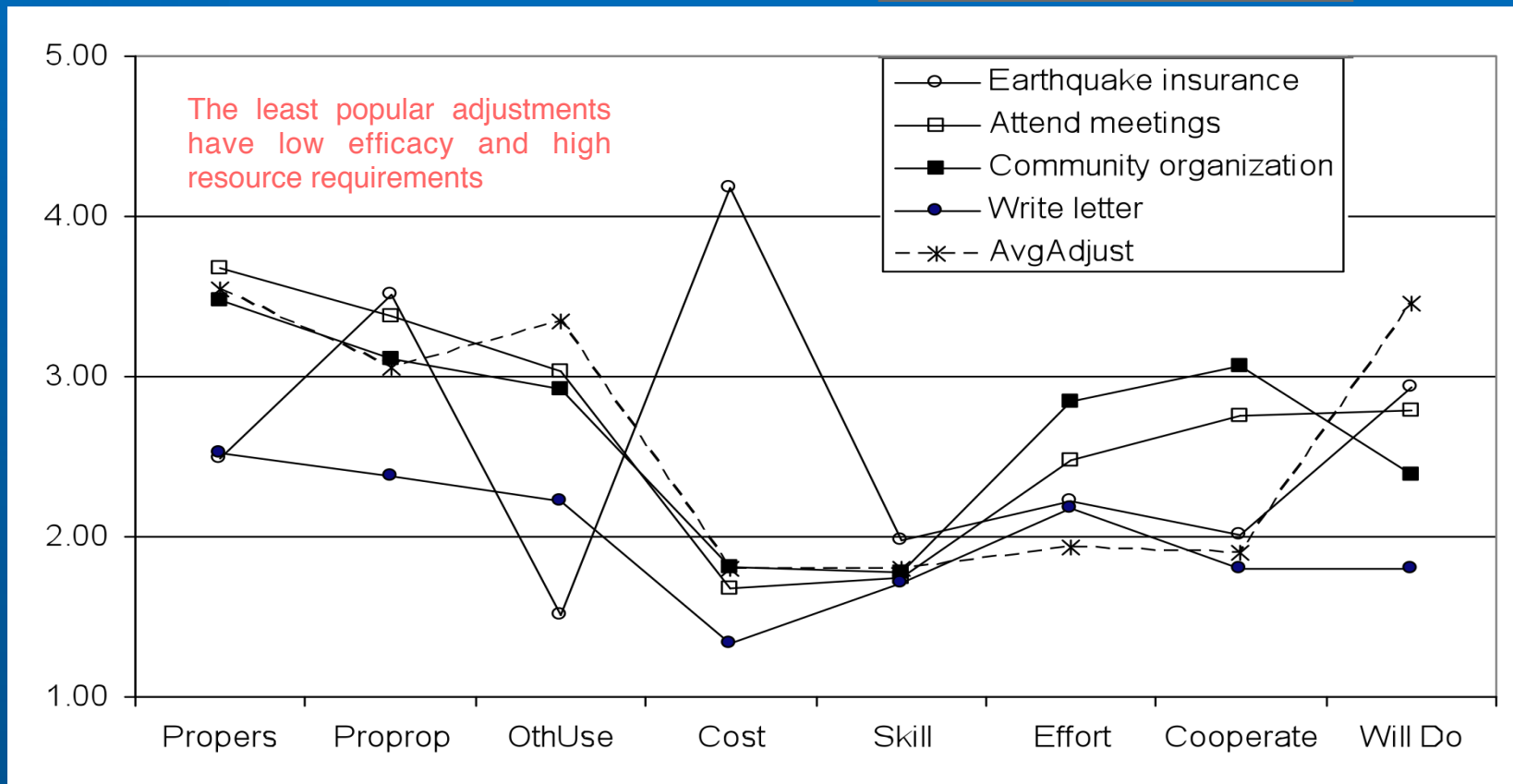
# Michigan State University: Perceptions of Toxic Chemical Protective Actions



# Profiles for Seismic Hazard Adjustments With the Highest Adoption Intentions



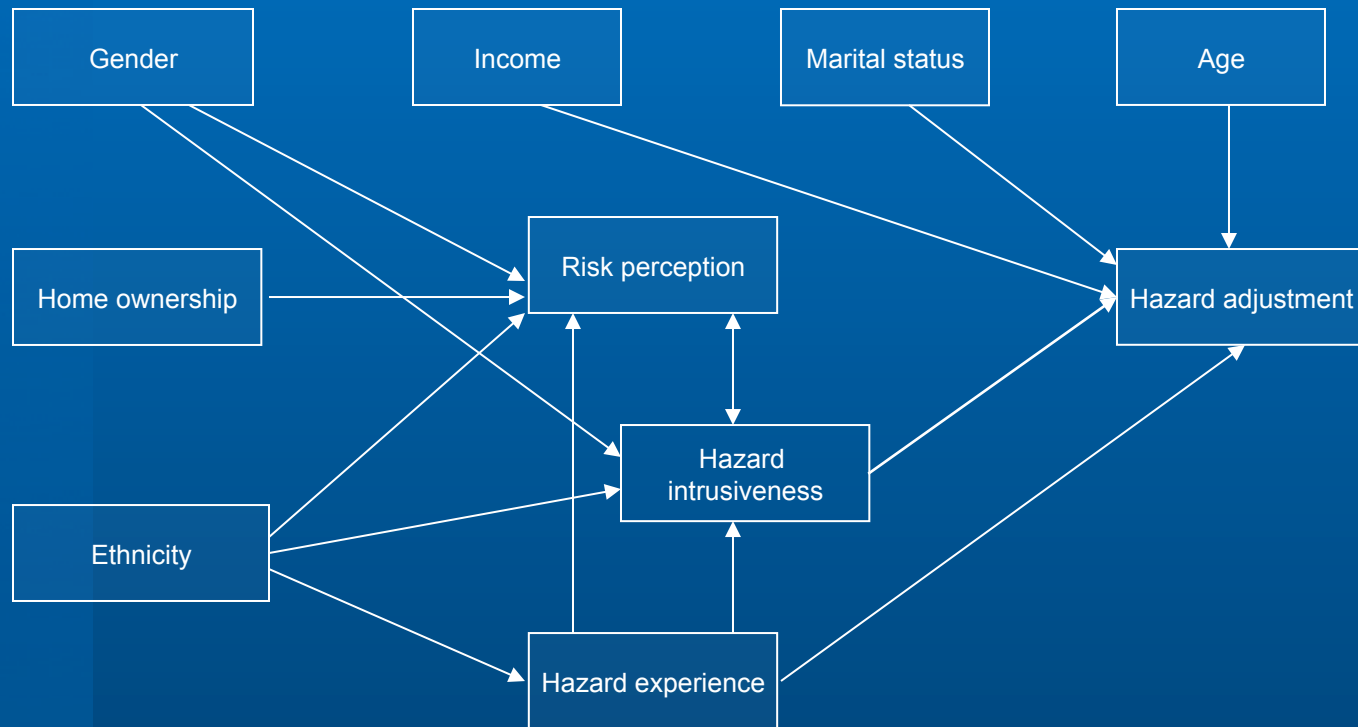
# Profiles for Seismic Hazard Adjustments With the Lowest Adoption Intentions



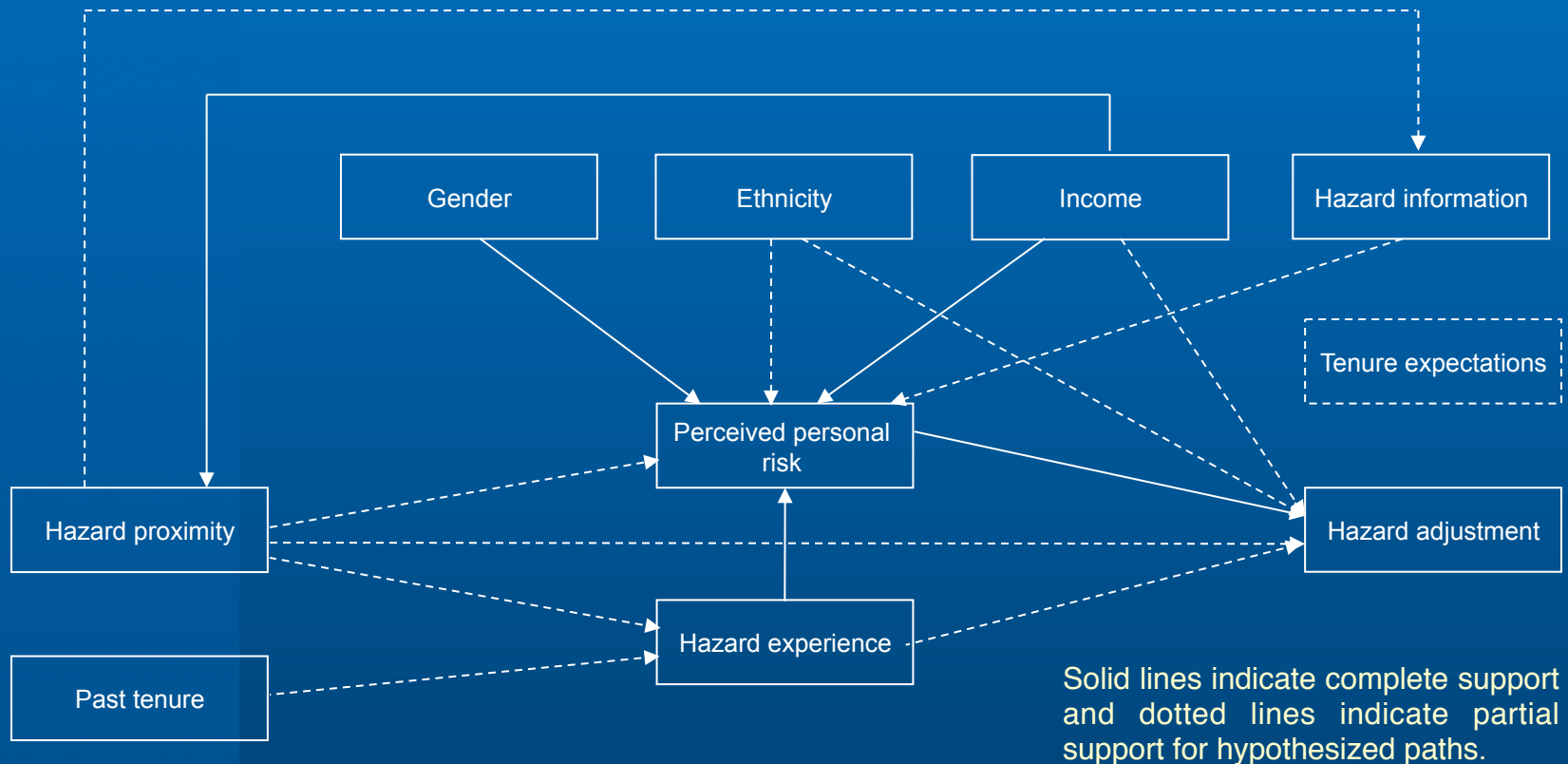
# The Social and Environmental Context of Hazard Adjustment Adoption

- Two studies modeled the adoption of hazard adjustments—one for earthquakes (Six city study) and the other for hurricanes (Houston study).

# The Social/Environmental Context of Seismic Hazard Adjustment Adoption



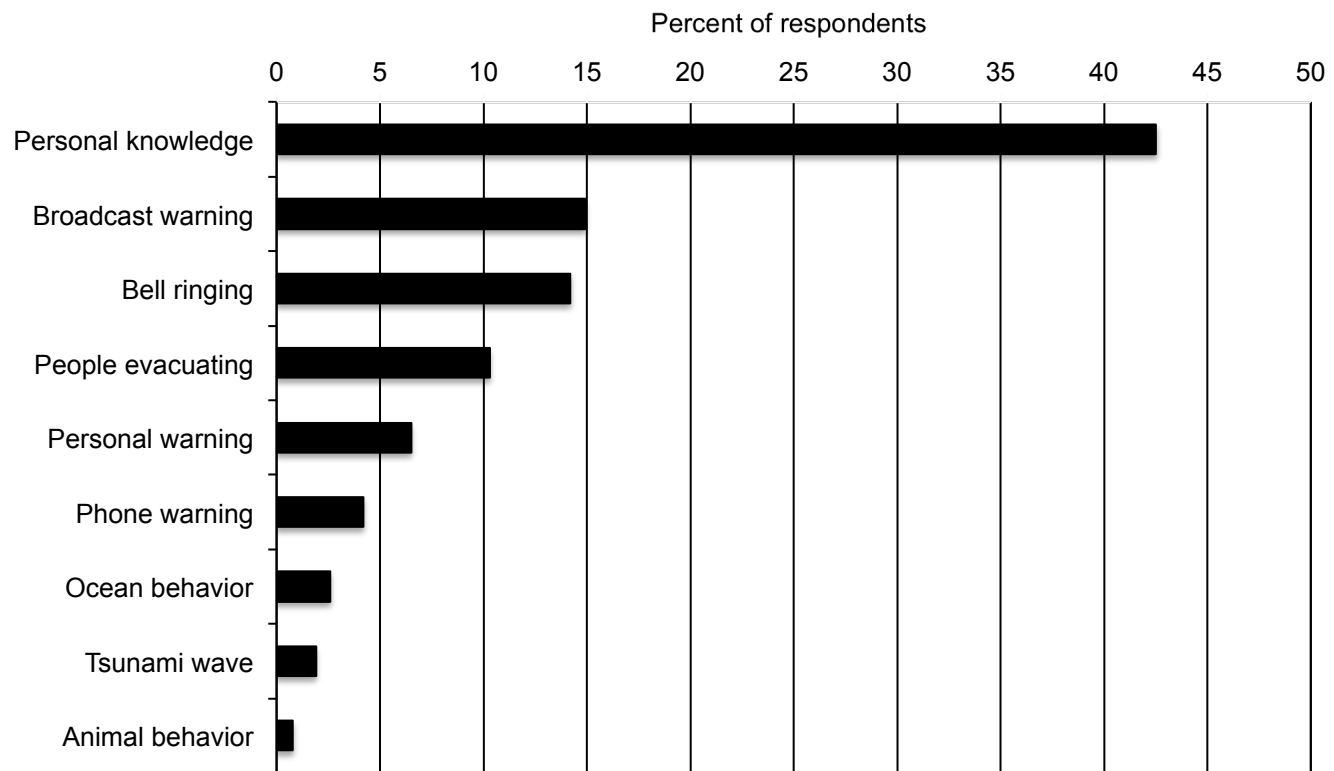
# The Social/Environmental Context of Hurricane Hazard Adjustment Adoption



# Sources of Information in Rapid Onset Disasters

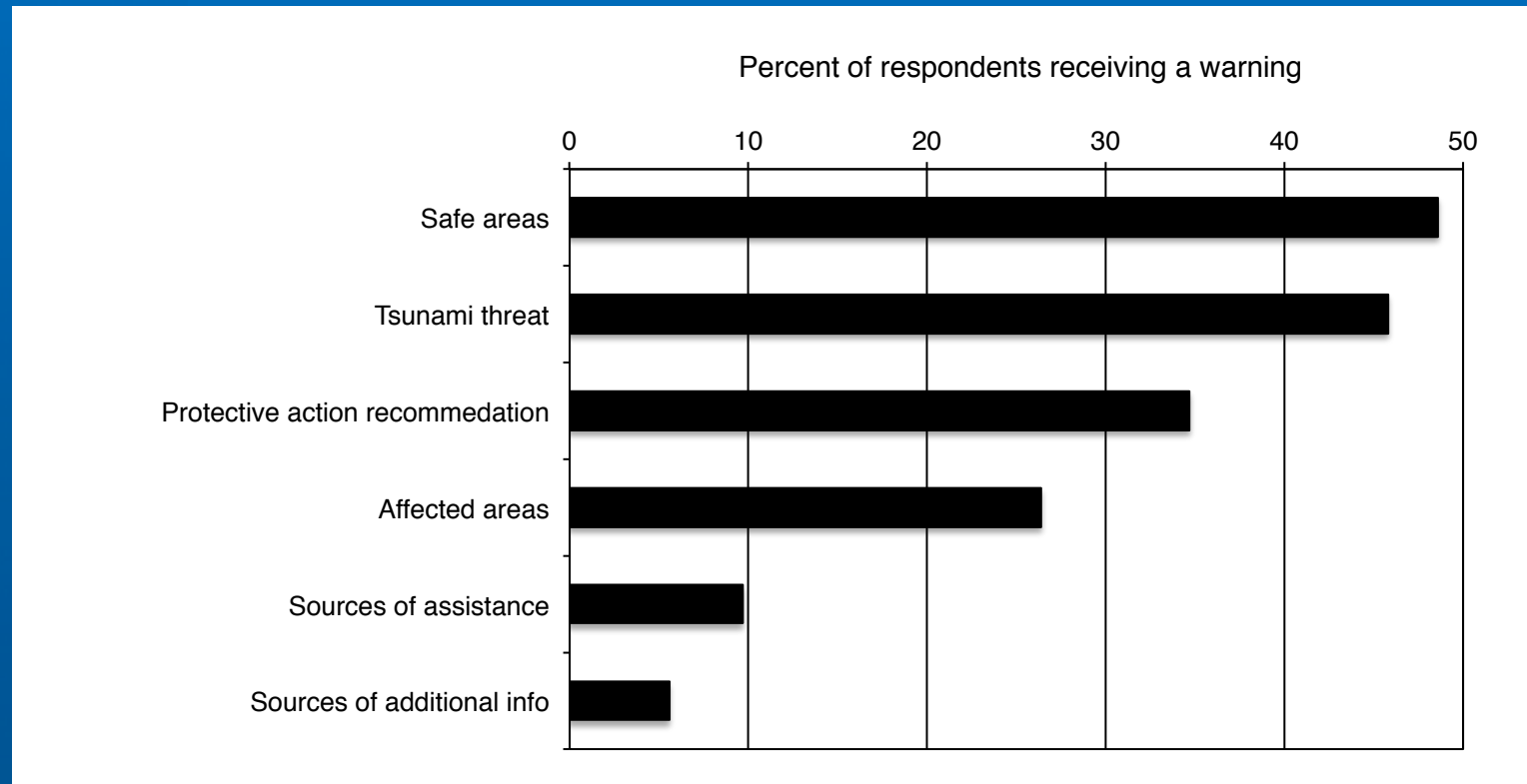
- The American Samoa earthquake and tsunami provides an example of the prevalence of environmental cues, social cues, and social warnings in a rapid onset disaster.

# First Source of Information About the Tsunami

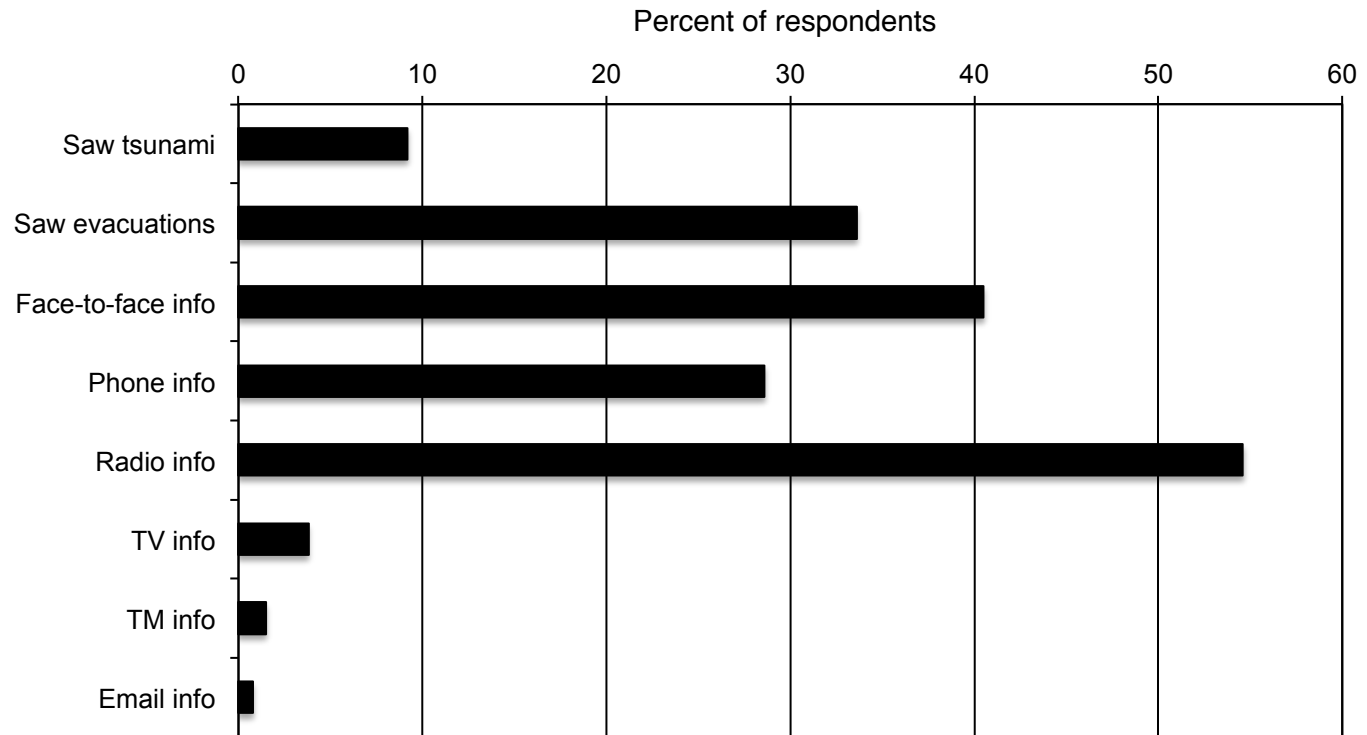




# Warning Message Content (N = 72)



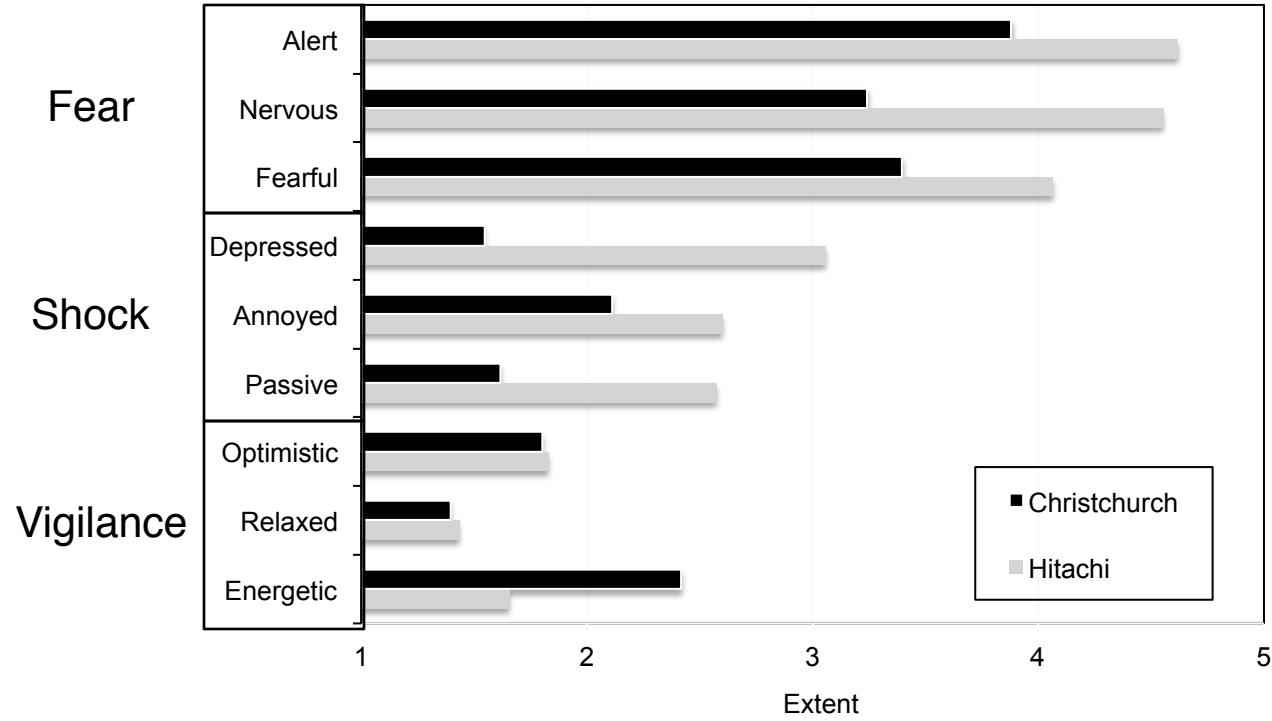
# Further Information After the Shaking Stopped



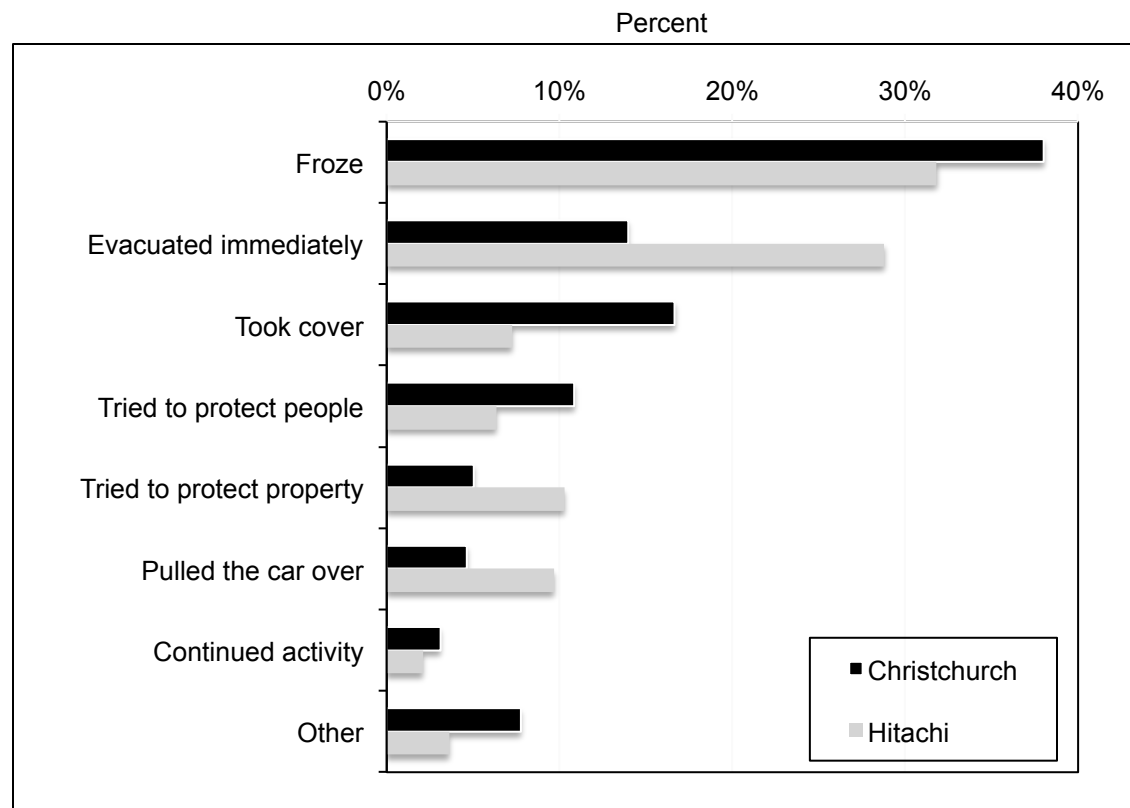
# Emotional and Behavioral Response to Rapid Onset Disasters

- The Christchurch and Tohoku earthquakes provide examples of the role of emotional response in a rapid onset disaster.

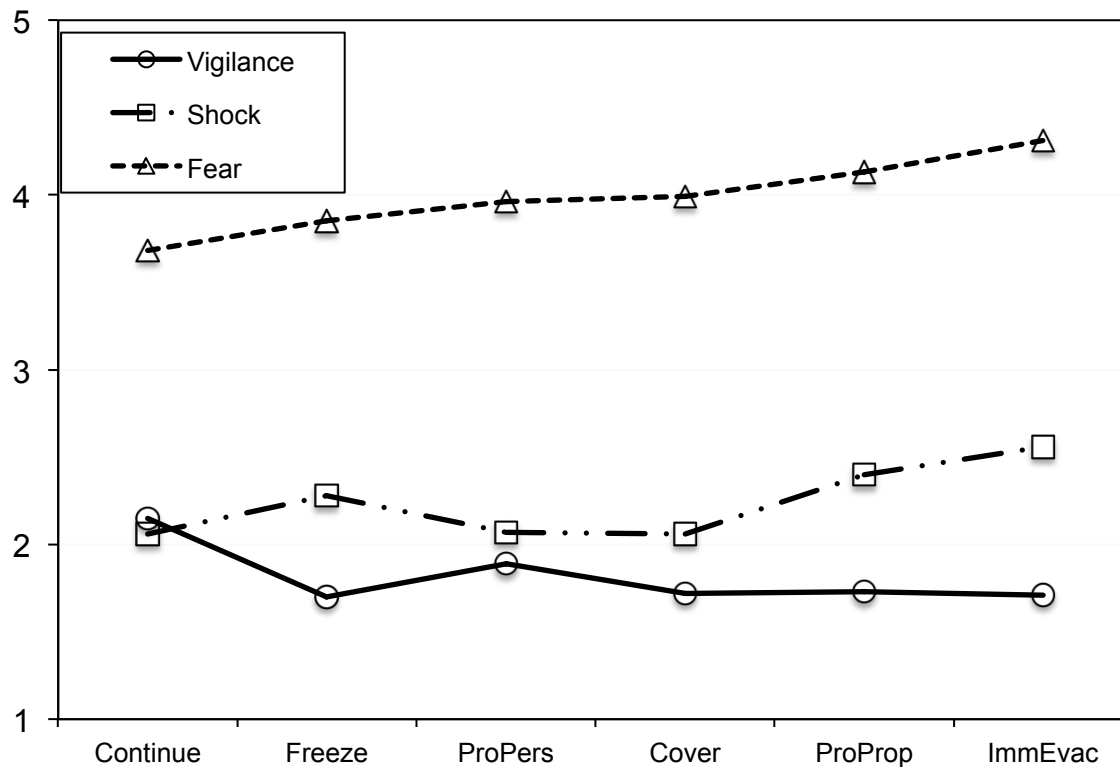
# Emotional Response to Seismic Shaking



# Initial Behavioral Response to Seismic Shaking



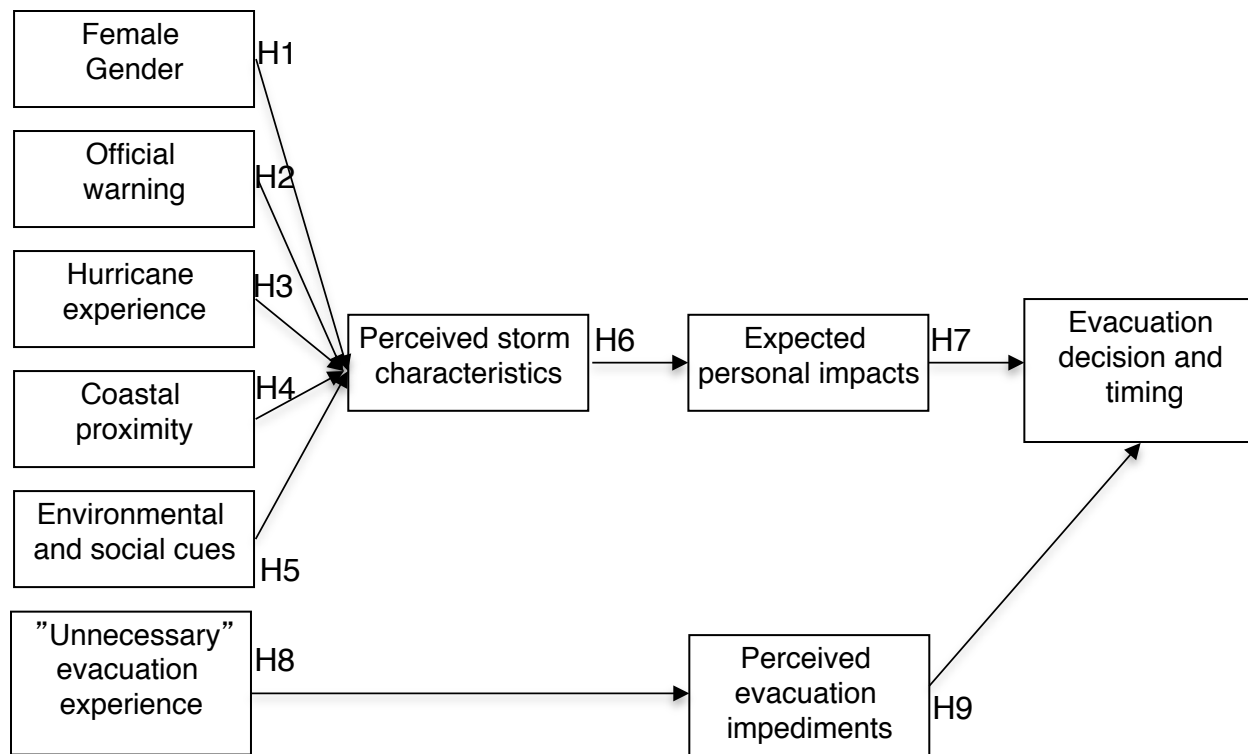
# Emotion Profiles For Behavioral Responses to Seismic Shaking



# The Social/Environmental Context of Disaster Response

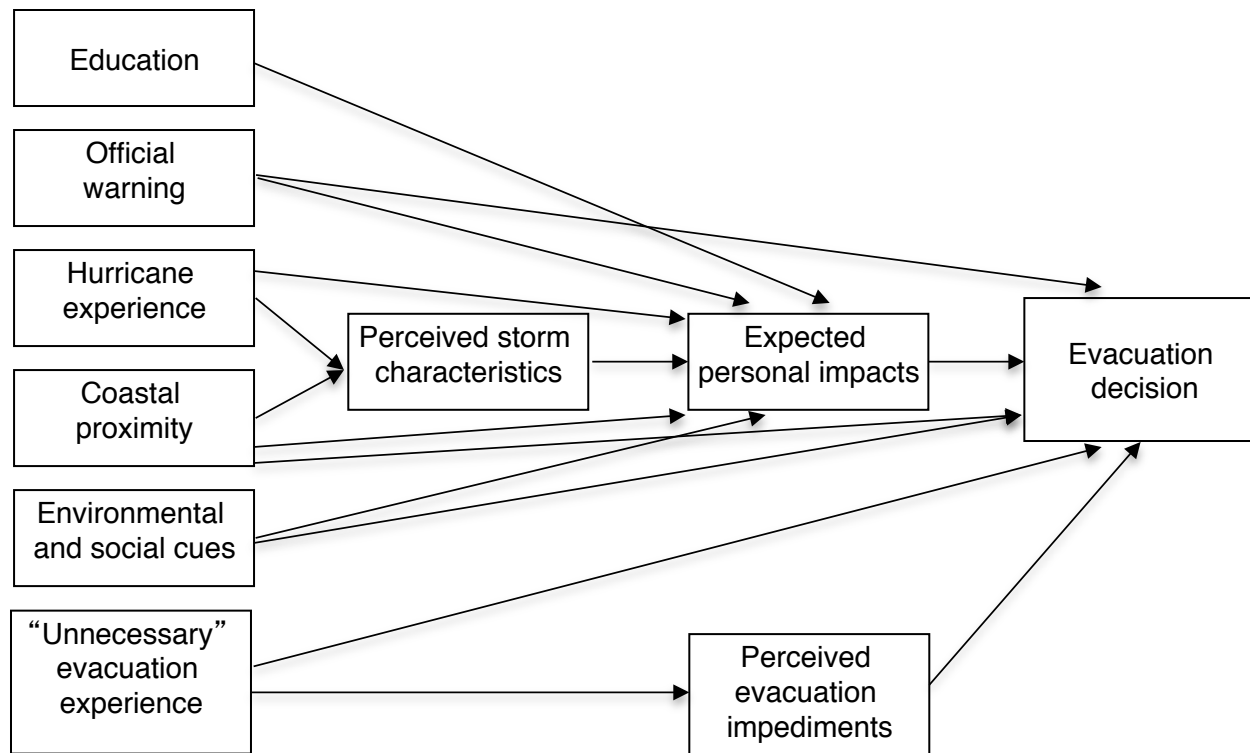
- Recent studies have begun to test multi-stage causal models of household hurricane evacuation.

# Household Evacuation From Hurricane Ike: Hypothesized Model





# Household Evacuation From Hurricane Ike: Final Model



# Some Criticisms of the PADM

- Some researchers and practitioners think the PADM is too rational an account of individual decision making in emergencies
  - In fact, people are generally rational (although not always adaptive) in emergencies; reports of irrational behavior such as panic and incapacitating shock are greatly exaggerated.
  - People can move through information processing stages quickly, especially when disaster impact is imminent.
  - Moreover, they might skip some stages and go directly to protective action (e.g., compliance with an authority).
  - In addition, they might return to earlier stages of the decision process—especially when the situation is uncertain and there seems to be enough time before impact.

# Future Directions for PADM Research

- Examine the relationship between risk perception and hazard intrusiveness.
  - Risk perception involves the subjective probability of personal consequences occurring within a given time interval.
  - Hazard intrusiveness involves the frequency of thought and discussion about a hazard.
  - They are related, but it is unclear which is more important in changing behavior—emphasizing the likelihood of personal consequences or reminding people frequently about those likelihoods.

# Future Directions for PADM Research

- Examine the relationship between problem-focused and emotion-focused coping over time and between behavioral domains.
  - Problem-focused coping reduces hazard vulnerability but only indirectly reduces fear—especially if hazard adjustments are not perceived to be 100% effective.
  - Emotion-focused coping directly reduces fear through denial, distraction, or self-medication but generally does little to reduce hazard vulnerability.
  - Fatalism, hopelessness, and denial can be interpreted as arising from lack of knowledge of protective actions that are effective and feasible.

# Future Directions for PADM Research

- Examine the impacts of task demands on the adoption of hazard adjustments
  - Frequency of repetition
    - Habits: Keeping the gas tank full during hurricane season
    - Periodic behaviors: Renewing hazard insurance annually
    - Unique acts: Bolting a house to its foundation
- Develop better measures of the effects of “experience”.
  - This variable yields conflicting results because it is quite complex (e.g., personal vs. vicarious) and has been measured in so many different ways.

# Future Directions for PADM Research

- Examine the group decision processes that take place within households.
  - We usually collect data from one respondent but many times household members collectively negotiate investments in hazard adjustments, especially if they are resource intensive.

# Future Directions for PADM Research

- Develop better assessments of the “microscopic” cognitive processes involved in attention, comprehension, judgment, and decision making.
  - These can take place very rapidly (milliseconds to minutes) and might not be susceptible to accurate recall in surveys conducted weeks or months after a major emergency.
  - Laboratory experiments provide rapid measurement but lack the population diversity and situational characteristics of true emergencies.
  - Web experiments using *DynaSearch* and *Stormview* provide an opportunity to examine the effects of different warning messages on protective action decision processes in diverse population samples.

# Future Directions for PADM Research

- Conduct multi-level analyses (within a single study) or statistical meta-analyses that examine the effects of contextual variables at disasters varying in
  - event characteristics (e.g., scope of impact, time of day)
  - geography (i.e., hills, valleys, rivers).
  - culture (including typical social, physical, and household contexts),
  - household hazard education and emergency preparedness,
  - community warning technology (e.g., electronic sirens), and
  - disaster-relevant resources (e.g., access to cars and hazard resilient structures such as steel reinforced parking structures for tsunami evacuation),



# Lessons from the PADM for Risk Communication

- Perceptions of the risk of an *event* have less impact on behavior than expectations of *personal consequences*.
  - Perceived earthquake probability has a lower correlation with long-term hazard adjustment than does the perceived probability of personal consequences from an earthquake.
  - Perceived hurricane characteristics have lower correlations with evacuation than do expected personal consequences.
- Lesson: Don't talk to people about the probability that an event will happen; talk to them about the probability of that event's consequences for them.

# Lessons from the PADM for Risk Communication

- Risk perception arouses protection motivation but does not provide a means of resolving that motivation.
- Lesson: Don't talk to people *only* about the probability of personal consequence; also talk to them about
  - Protective actions being taken by authorities,
  - Alternative protective actions they should consider,
  - The characteristics of those protective actions, and
  - Sources of assistance if this is needed to implement protective action.

# Lessons from the PADM for Risk Communication

- Long-term hazard adjustments vary in their hazard-related and resource-related attributes.
- Lesson: Help people to identify the the most cost-effective hazard adjustments
  - Encourage them to develop a plan for adopting hazard adjustments sequentially as money, time, and effort allow.

# Acknowledgements

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