



Risk Perception: Driving Factors

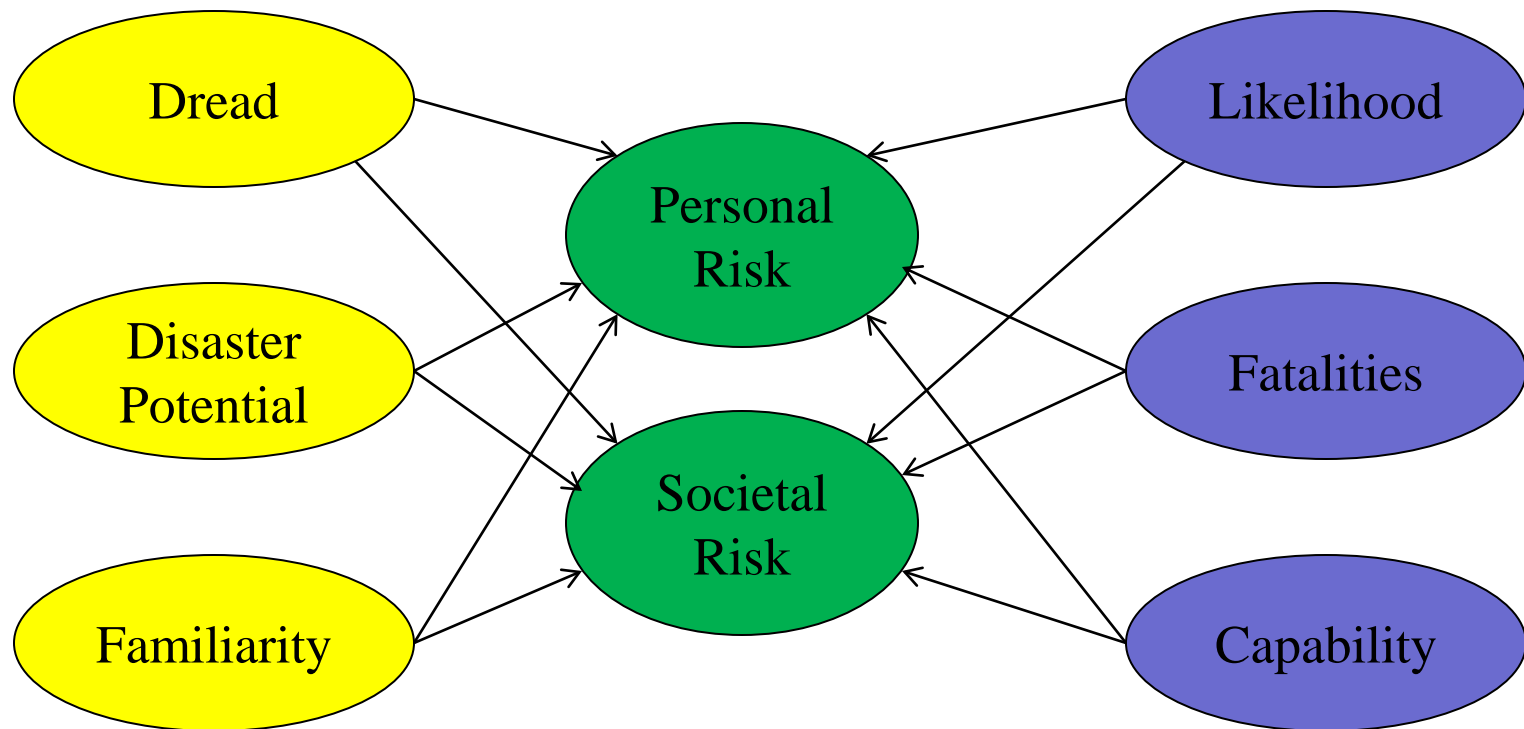
**Center for Risk and Economic
Analysis of Terrorism Events**

**August 11, 2009
Heather Rosoff & Richard John
University of Southern California**

Presentation Outline: Overview of Lessons Learned

- **Representative correlation designs:**
 - Identifies relationships between selected predictors and risk
 - Allows for individual risk perception analysis
 - Enables subgroup analysis
- **Factorial designs:**
 - Allows for systemic variation of manipulated factors
 - Presents an approach for assessing behavior change
 - Allows for assessment of changes in perception over time

Representative Correlation: Psychometric Paradigm





Representative Correlation: Hierarchical Linear Modeling

Used Hierarchical Linear Modeling

- Constructs individual regression models for each subject
- Conducts an aggregate test of whether mean regression coefficients are:
 - different from zero
 - differ by group membership

National Study

- Used the psychometric paradigm and HLM analysis
 - Evaluated both cognitive and emotional risk predictors
 - Assessed the risk of terror and non-terror events
- **Sample**
 - Size: 1,000 persons nationally
 - Representative sample by gender, location, age, income and education level
 - Distributed online using Qualtrics (vendor) services

Findings – Level 1

- Perceived risk (personal and societal) of **TERROR** and **NON-TERROR** events more closely related **likelihood** estimates than fatality estimates.
- Perceived (personal and societal) risk of **TERROR** and **NON-TERROR events** most closely related to the **disaster potential** of the attack.
- Judgments about terrorist **capability** and attack **familiarity** were found to be positively correlated with perceived risk (personal and societal) for **TERROR** and **NON-TERROR** events

Findings – Level 2

Gender

- Females had higher fatality estimates and judgments about disaster potential when estimating perceived risk

Location

- West had higher likelihood estimates when evaluating personal risk
- West estimated the disaster potential of terror attacks to be greater outside of regions of their own.

Education

- Less-educated subjects' terror risk perceptions were influenced more by consequence predictors
- Educated subjects perceived risk as greater relative to the terrorist's attack capability and their personal familiarity with the attack type

Findings – Level 2 cont'd

- Greater impact on the relationship between **cognitive** and **emotional** predictors of the perceived risk of **TERROR** events compared to **NON-TERROR** events.
- **Annual income**, **education level**, and **age** were more sensitive to **TERROR** attacks, while **location** had a stronger association with **NON-TERROR** events. **Gender** was the only demographic variable equally sensitive to both.
- **Gender**, **location**, **age**, and **annual income** findings showed no significant impact upon **PERSONAL** or **SOCIETAL** risk perceptions. Changes in **education** level, however, proved to have a greater impact on perceived **SOCIETAL** risk.

Lessons Learned...

Benefits

- Allowed for individual risk perception assessment
- Acquired insight into risk perceptions of population sub-sectors
- More useful policy implications:
 - Allocation of resources and education programs more streamlined and effective because directed by subgroup differences in risk perception → better public reaction

Study limitations

- Does not consider perceived behavioral responses to an event (critical to policy development related to emergency response)
- Does not characterize changes in reactions to events over time

Factorial Design: Vignettes Studies

- Involves the development of realistic scenarios
 - Used to evoke more realistic assessments of perceived risk
- Calls for the systemic variance of isolated components
 - Varied factors researchers believe are critical to the assessment of a disaster event

Burns and Slovic (in press)

- Vitals
 - CSUSM, N =121
 - Undergrad business students; approx half male
- 16 different theme park scenarios (within) subject
 - Domain: Terror vs. Non-terror
 - Mode of destruction: Bomb vs. Chemical
 - Motivation: Purposeful vs. Not
 - Target/Victims: Workers vs. Guests
- 6 groups of subjects; approx N = 20 per group
 - Suicide/Negligence
 - Casualties: 0 vs. 15 vs. 495
- Total of 96 different scenarios (16 X 6)

Dirty Bomb Vignette Study

- Vitals
 - USC undergraduate Psychology classes
 - N= 120
- Response variables for each vignette
 - Protect yourself
 - Personal and societal risk
 - Worry about your safety
 - Inclined to stay home
 - Vote to increase sales tax for radiation detection equipment
 - Probability of a similar attack

Dirty Bomb Vignette Study

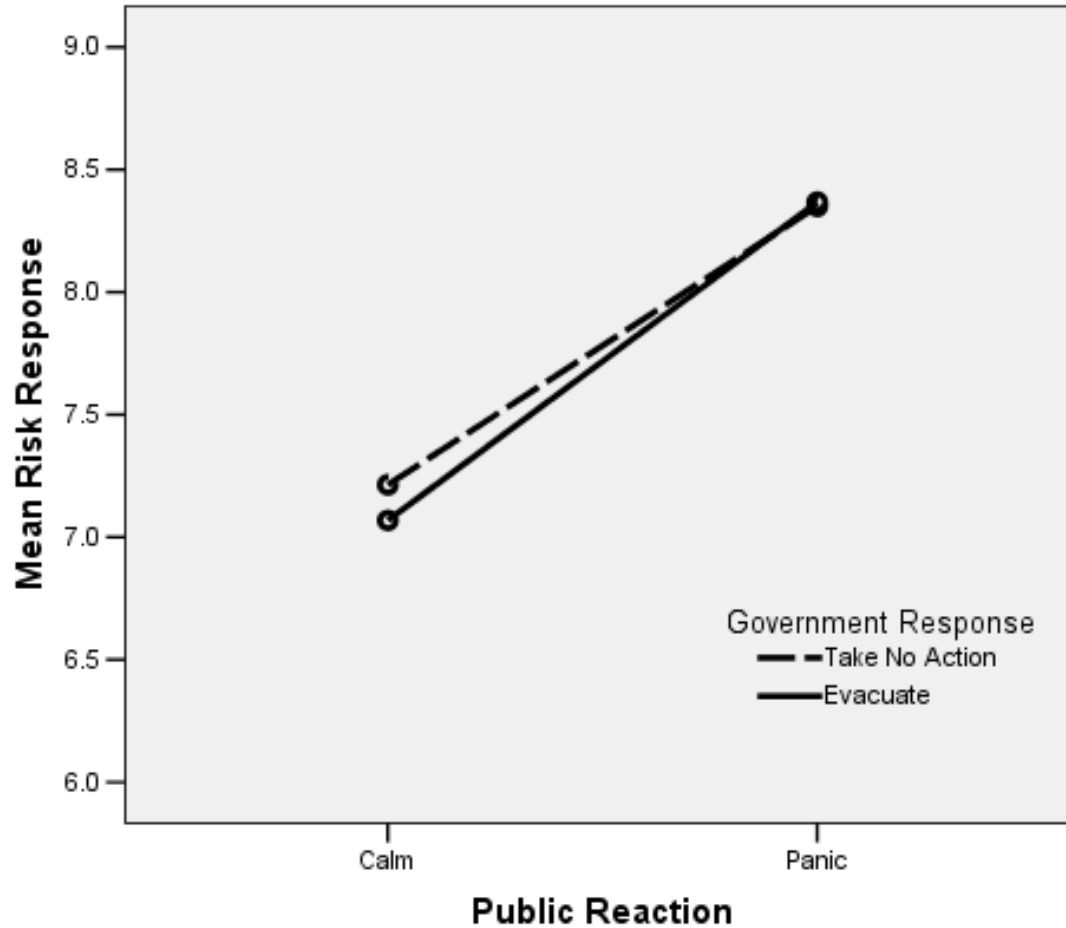
- Dirty bomb terrorist attack scenario
- 2 manipulated factors (2x2)
 - Public reaction: Calm vs. Panic
 - Government response: Take no action vs. Evacuate
- Four different vignettes developed using different LA locations
 - Rose Bowl, Staples Center, LAX, and Beverly Center
- Vignettes comparable except for location and the 2 manipulated factors

Public Reaction: Calm

Government Response: Seek Shelter

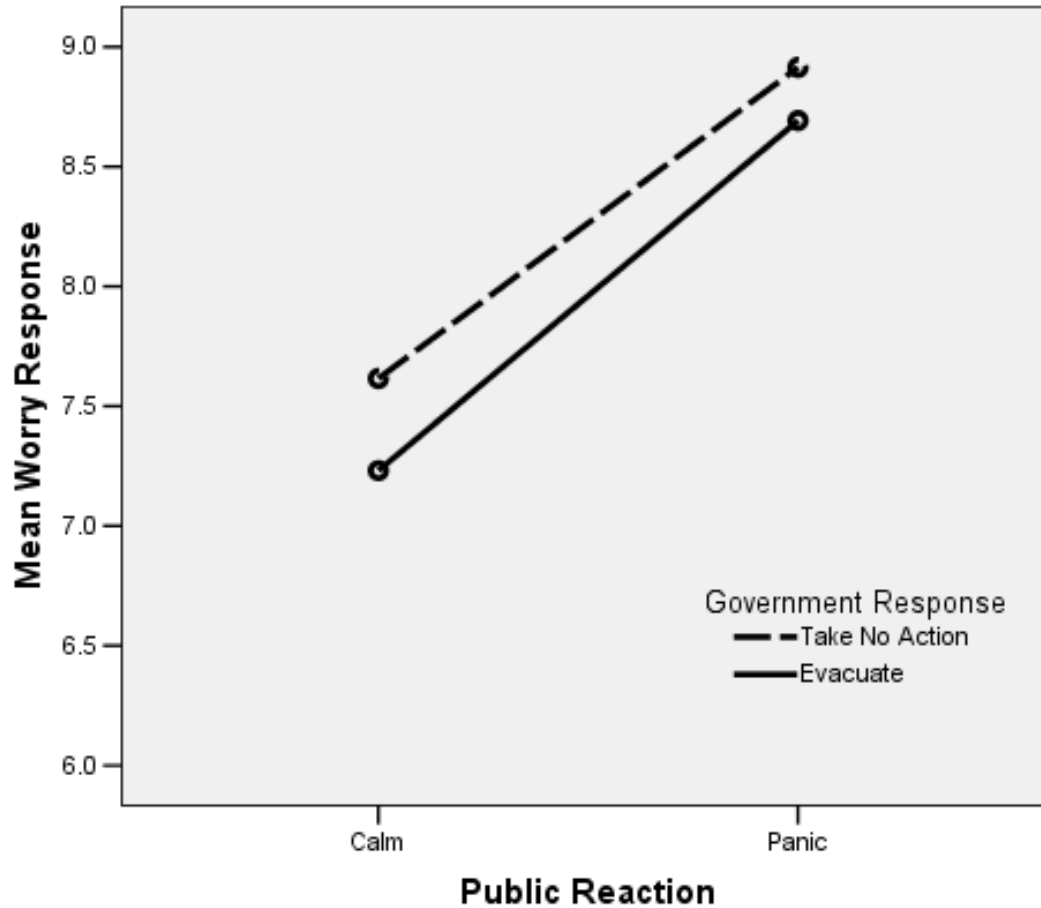
Terrorists used a radioactive dirty bomb* to attack Southwest Airlines (SW) Flight 815 shortly after the plane pulled into Los Angeles International Airport. The bomb was detonated amidst passengers in the Boeing 737-500 aircraft. Following the explosion large segments of the plane body collapsed, barricading passengers and preventing emergency responders from getting inside. The explosion tore open the aircraft roof and produced a mushroom-like cloud of radioactive material. The cloud blew southwest of the airport passing through Interstate 105 and towards Manhattan Beach. It extended southwest as far as Rancho Palos Verdes (over 10 miles from the Staples Center) before dissipating. Within the terminal, awaiting passengers were instructed to evacuate immediately. **While anxious to exit the premises, the passengers complied with instructions calmly and with no major problems. In fact, the passengers were quite resourceful in booking new flights out of nearby airports or checking into local hotels while waiting patiently for further instruction.** Hazardous materials specialists estimated that passengers aboard SW Flight 815 were exposed to radiation levels that will mostly likely result in radiation sickness and possibly death to those with weakened immune systems. Persons within the terminal were said to be exposed to radiation levels equivalent to that used during a CAT scan (a medical diagnostic procedure). **A government advisory was released stating that the airport be evacuated immediately. They asked all persons within a mile radius of the radioactive cloud to seek shelter until given further instruction.**

Repeated Measures(Within Analysis): Personal Risk



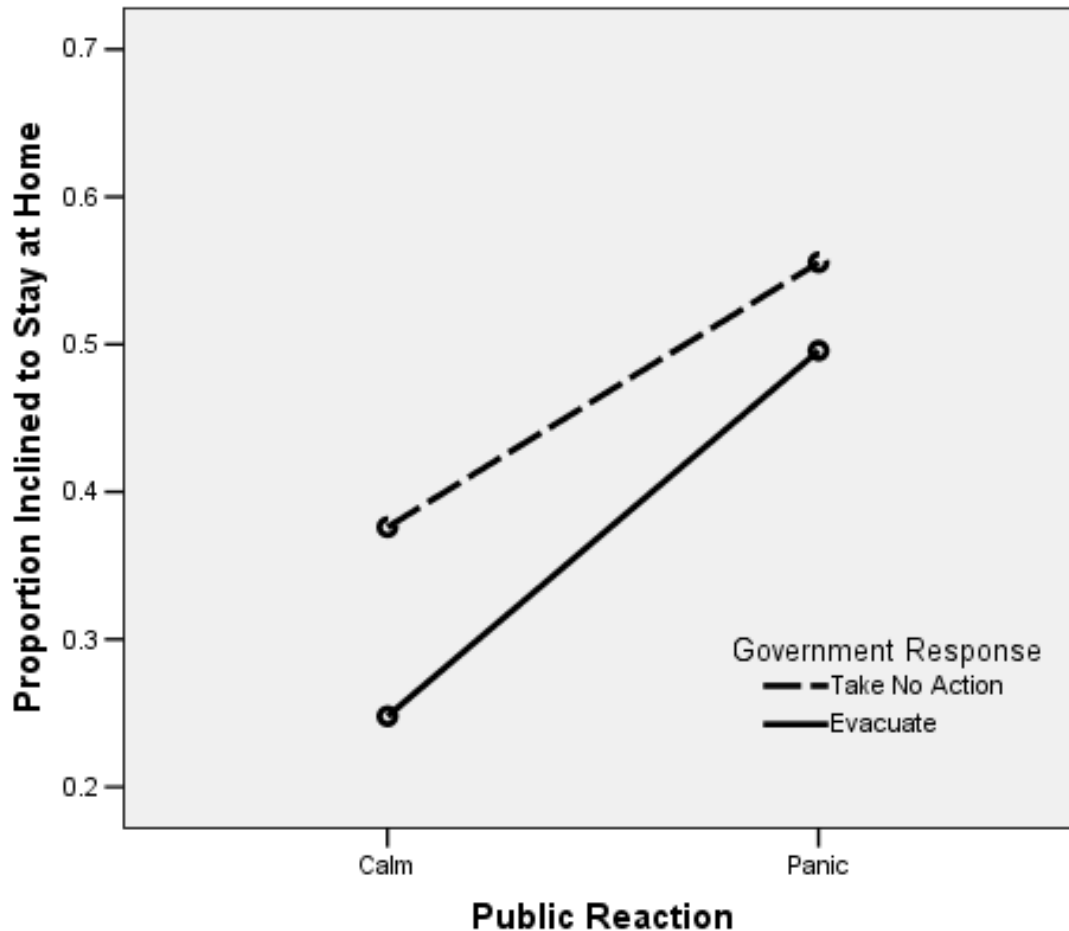
Risk	<u>F(1,116)</u>	<u>p</u>	<u>partial eta sqrd.</u>
PUB	52.00	0.001	0.310
GOV	< 1		
P X G	< 1		

Repeated Measures(Within Analysis): Worry about Safety



Worry	F(1,116)	p	partial eta sqrd.
PUB	66.76	0.001	0.365
GOV	4.54	0.035	0.038
P X G	< 1		

Repeated Measures(Within Analysis): Inclination to Stay at Home



	<u>F(1,116)</u>	<u>p</u>	<u>partial eta sqrd.</u>
Home			
PUB	38.35	0.001	0.248
GOV	11.46	0.001	0.090
P X G	< 1		

MANPADS Fly Study

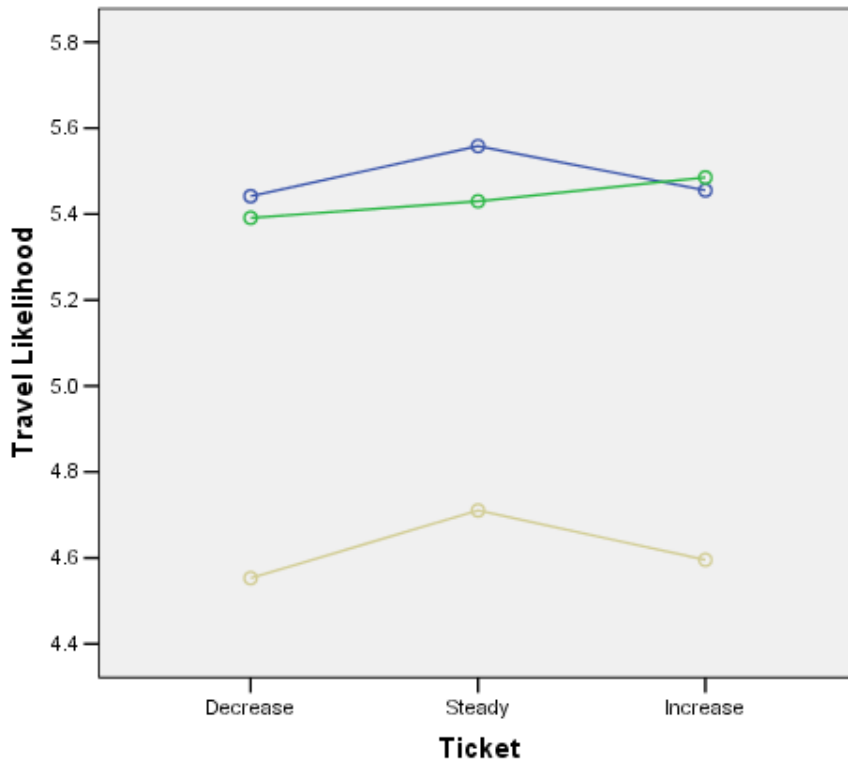
- **Vitals**
 - USC undergrad Psychology classes and CSULA
 - N=358
- **Research objectives focus**
 - Used dependent variable to measure behavior change
 - Inquired about willingness to travel to varied events
 - Wedding, job Interview, vacation
 - Measure in terms of likelihood of travel as well as asked for open-ended responses

MANPADS Fly Study

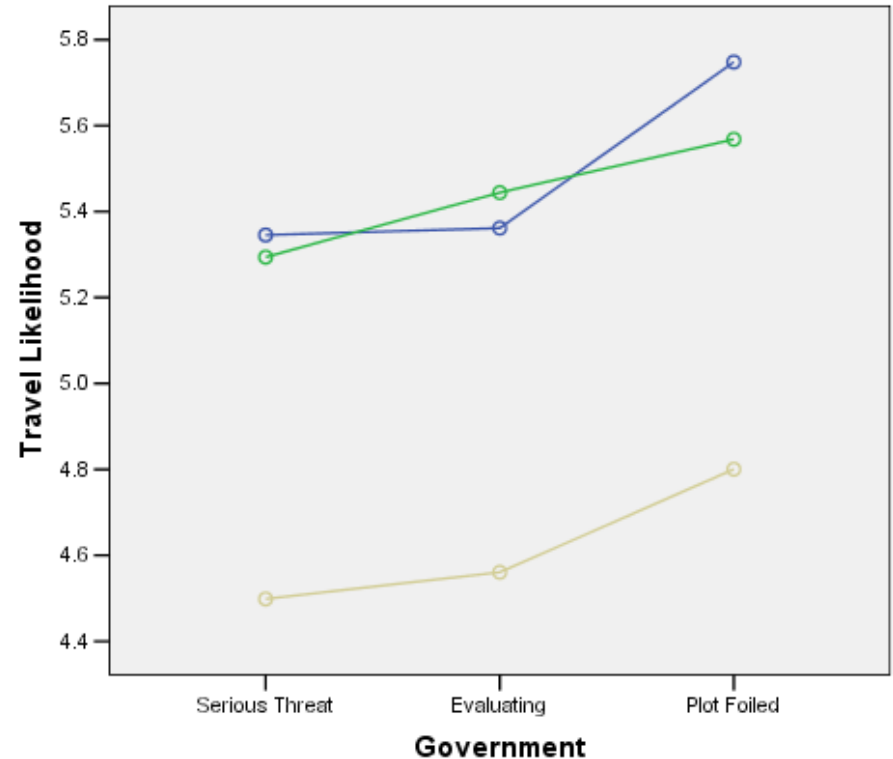
- MANPADS attack (between) per subject survey
- Systematically varied 2 factors (3x3)
 - Government reaction:
 - Reporting serious threat
 - Looking into the threat/following leads
 - Foiled plot
 - Public response:
 - 40% decrease in ticket sales, & 30% passengers no-show
 - Steady sales
 - 20% increase in ticket sales
- MANPADS scenario and 9 survey groups

Findings For Travel Likelihood

Cell means for Pub x Travel



Cell means for Gov x Travel



Blue = Wedding, Green = Interview, Beige = Vacation

MANPADS Escalation Study

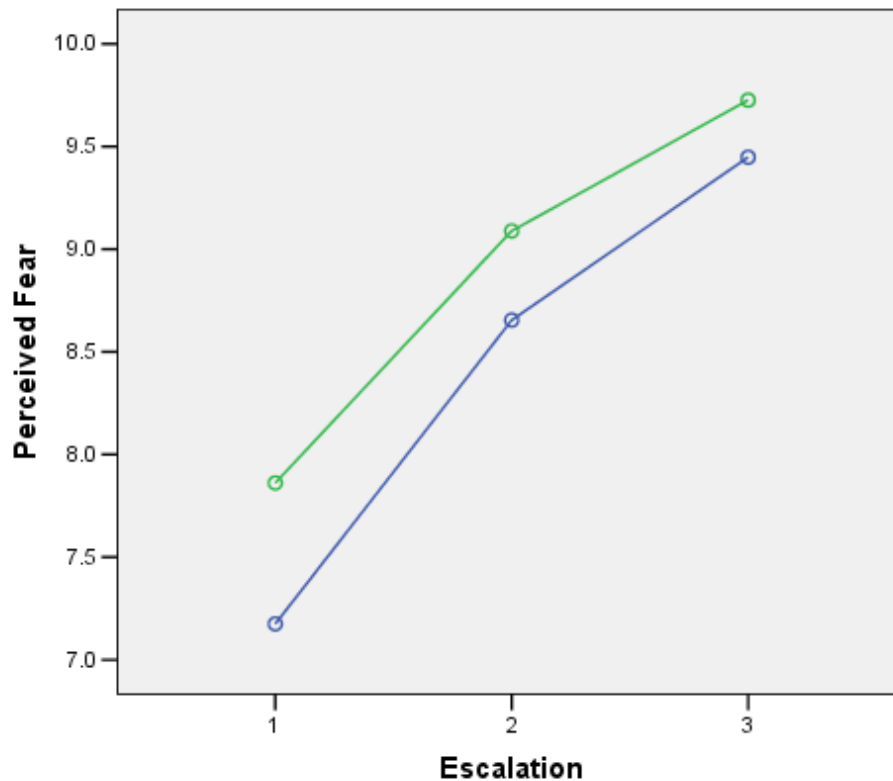
- **Vitals**
 - USC undergrad Psychology classes and CSULA
 - N=250
- **Research objectives focus**
 - Used dependent variable to measure behavior change
 - Inquired about importance/willingness to take a vacation
 - Focused assessment on behavior change over time

MANPADS Escalation Study

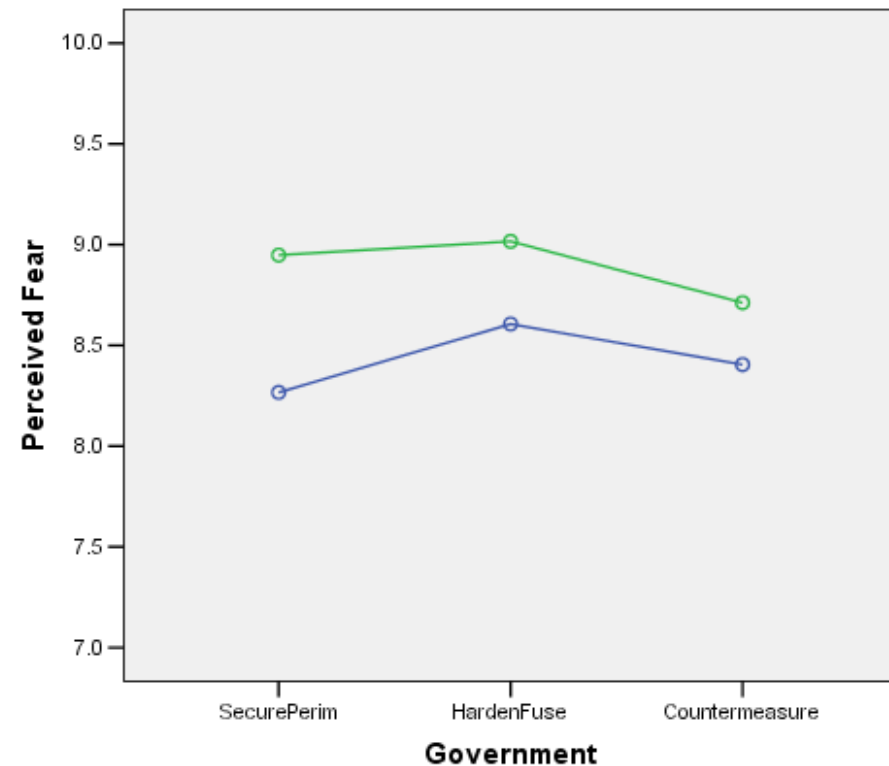
- MANPADS scenario (within) and 9 survey groups
- Systematically varied 3 factors (3x3x3):
 - Government action
 - Securing the perimeter
 - Hardening the fuselage
 - Implementing on-plane countermeasures
 - Public response
 - Steady sales
 - 10% decrease in ticket sales
 - 50% decrease in ticket sales
 - Attack escalation
 - Initial vignette: First MANPADS attack
 - One week later: Second MANPADS attack
 - Two weeks later: Multiple MANPADS attack

Findings For Change in Fear Over Time

Cell means for Escal x Fear



Cell means for Gov x Fear



Blue = Personal Fear, Green = Societal Fear

Lessons Learned...

- Just began to scratch the surface in exploring behavioral response information and perception change over time.

Next Steps:

- Creating audio and video scenarios to simulate disasters – in the spirit of more realistically evoking emotional and behavioral responses
- Continuing to develop written vignette risk perception studies looking at different factors and change over time
- Implementing the articulated thoughts in simulated situation (ATSS) research design to assess risk perceptions



Risk Perception: Driving Factors

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