
**A REVIEW OF THE RISK-PERCEPTION AND
RISK-COMMUNICATION LITERATURE**

Communicating the recommended individual strategy successfully to the public is outside the scope of this report. But in its design and presentation, we have drawn on the main principles in the risk-perception and risk-communication literature. This appendix provides the more salient lessons from these literatures to build an understanding for how people perceive and behave in response to those perceptions and the information they are provided.

WHAT IS KNOWN ABOUT RISK PERCEPTION?

Four main theories have been proffered to explain how individuals process risk information, form risk perceptions, and make decisions about avoiding or minimizing risk. Together, these theories provide a foundation for considering and coordinating effective communication in high-concern situations (Covello et al., 2001).

The Risk Perception Model defines an individual's perception as a combination of a hazard, defined as the magnitude times the probability of mortality or morbidity, and outrage, which is the perceptual or emotional component of risk such as fear or anxiety (Sandman, 1991; 1993). Several factors directly related to the risk itself determine how we perceive it, as shown in Table D.1.

Risk also includes the subjective evaluation of that risk, and a number of principles from the behavioral and social sciences guide how people make these evaluations. Risk perception determines the level of concern, worry, anger, fear, and hostility, which are the subjective factors that influence how people interpret a threat. How people respond emotionally to perceived hazards (Slovic, Fischhoff, and Lichtenstein, 1990) in turn affects their attitudes and subsequent behaviors.

Table D.1
Factors Related to How We Determine Risk

Risk Factor	Perceptions of Risk Will Be Greater When the Threat Is Seen As:
Voluntariness	Involuntary or imposed
Controllability	Under the control of others
Familiarity	Unfamiliar
Equity	Unevenly and inequitably distributed
Benefits	Unclear or having questionable benefits
Understanding	Poorly understood
Uncertainty	Relatively unknown or having highly uncertain dimensions
Dread	Evoking fear, terror, or anxiety
Reversibility	Having potentially irreversible adverse effects
Trust in institutions	Requiring credible institutional response
Personal stake	Placing people personally and directly at risk
Ethical/moral nature	Ethically objectionable or morally wrong
Human versus natural origin	Generated by human action (versus “acts of God”)
Victim identity	Producing victims that one can identify with
Catastrophic potential	Producing fatalities/injuries/illness grouped spatially and temporarily

Somewhat by definition, catastrophic terrorism scenarios meet many of these criteria (e.g., uncontrollable, uncertain, human intent, catastrophic potential) and as such, the threat of terrorism to most individuals will be perceived as greater than its probability (Blendon et al., 2001; 2002). Therefore, strategies to educate, inform, and communicate with individuals about the threat of terrorism should be sensitive to these factors and consider strategies to address them directly to lessen potential fear.

The Mental Noise Model focuses on how people perceive information under conditions of stress, suggesting that in such high-concern situations as catastrophic terrorism, the ability for effective communication is impaired. If values are threatened, emotional arousal and/or mental agitation from feelings tend to create “mental noise.” Being exposed to risks with negative psychological attributes as listed above (e.g., involuntary, uncontrollable, low benefit, unfair, or dreaded) is accompanied by severe mental noise. Mental noise interferes with an individual’s ability to respond rationally.

The Negative Dominance Model describes processing of negative and positive information in high-concern situations as having an asymmetrical relationship between negative and positive information (with more weight on the negative). People tend to place greater value on losses (negative outcomes) than on gains (positive outcomes). Therefore, negative messages should be counterbalanced by a larger number of positive or “solution-oriented” messages. However, com-

munications that contain negatives (e.g., no, not, never, etc.) receive closer scrutiny, are remembered longer, and have greater impact.

Another model, the Trust Determination Model, emphasizes the importance of trust for effective risk communication. Trust is built over time through ongoing actions, listening, and communication skills, including caring and empathy, dedication and commitment competence and expertise, and honesty and openness. Individual or small group settings (information exchanges, public workshops) are most effective for communicating trust (Renn and Levine, 1991). Trust in individuals overrides trust in the organization. Perceived trust is lower if experts disagree, are insensitive or unwilling to disclose information, are perceived as being irresponsible, or do not coordinate their messages.

Other relevant theories and principles from social psychology include Expectancy-Value Theory (Fishbein and Ajzen, 1975), which purports that acceptability of risks is strongly and positively related to the perception of the benefits of the hazardous activities. Perceived Control (Ajzen, 1985) predicts individuals' behavioral intentions. Stress and Coping Theory (Lazarus and Folkman, 1984) suggests that primary appraisal processes focus on assessing the threat and secondary appraisal focuses on perceived coping abilities. Social Cognitive Theory (Bandura, 1986) views behavior as a function of self-efficacy expectations—i.e., whether individuals think they can take the appropriate action(s)—and Protection Motivation Theory (Rogers, 1983) views self-protective behavior as determined by danger or vulnerability to the threat, the probability of the threat, the extent to which an action is possible, and the perceived effectiveness of the action. The Precaution Adoption Process Model, for example, suggests that perception of personal risk susceptibility and severity determines the extent to which individuals will attend to information about risk and whether they will decide to alter their behavior.

A number of principles from social psychology can help explain individual preparatory and response behaviors about catastrophic terrorism. One is that people routinely employ heuristics (rules of thumb) and biases to simplify difficult mental tasks when evaluating risks (Tversky and Kahneman, 1974). The optimistic bias is a heuristic that leads to unrealistic perceptions of no or low risk compared with similar others (false illusion of control). This false notion creates overconfidence in the ability to overcome a risk and a desire for certainty to act on that risk. The availability heuristic leads people to judge events as likely or frequent if instances are easy to imagine or recall. For example, rare causes of death are overestimated (terrorism, pregnancy) and common causes are underestimated (lightning, diabetes). These are possible explanations for why many will not prepare for terrorism.

As such, communication strategies about the threat of terrorism, as well as about how to prepare and respond to terrorism, should take these factors into consideration.

What Is Known About Risk Communication?

In the context of emergency situations, there are two types of risk communication to the public (Sorensen and Mileti, 1991): preemergency risk communication, which provides information and education about hazards and includes the nature of the hazard, ways to mitigate losses and protective actions to take in an emergency, and emergency risk communication, which provides communications by officials just before (warnings) or during (guidance) an emergency. While both types of risk communication are critical, we focus here only on research surrounding preemergency risk communications because the individual strategies presented in this report are designed to help people respond to, and prepare for, a terrorist attack prior to the attack.

Changing Behavior Through Preemergency Risk Communication. The main goal of preemergency risk communication is to change people's behavior. In this regard, the literature on public health and social marketing (Andreason, 1995) campaigns provides a number of lessons about how to influence behavior change. Examples of successful public education efforts include increasing the use of seat belts, decreasing smoking, antilittering, and changing dietary habits, especially with respect to low-fat diets. All of these well-known campaigns were successful for three key reasons: they raised the awareness and created questions in the minds of their recipients, they offered fairly straightforward answers, and they had authorities available over time to reinforce the message.

The primary mechanism through which these public health efforts are realized is through changing the perceptions of normative behavior. One route to changing norms is through linking them to social values and also by imposing clear, nonambiguous sanctions when those standards are violated.

The more-effective campaigns also tended to use multiple forms of media, used a systems approach to combine mass media and community/small group activities, and targeted the groups they wanted to reach using fairly modest, attainable goals. For example, successful programs for promoting safety belt use have attributed their success to availability to local grassroots organizations and volunteers to help implement and institutionalize the behavior change program (Geller, 1984).

Punitive measures (e.g., laws or fines) are generally viewed as undesirable strategies for inducing responsible protective behavior, particularly since they can be perceived as threatening individual freedom. Further, they may be less

sensible for inducing a protective behavior than for the more typical “law-breaking” behavior. However, fear appeals can be useful if they are paired with mechanisms for reducing associated anxiety and fear.

Incentives and other positive reinforcement (e.g., lottery prizes, coupons, or direct payment) as in paying citizens to recycle are a promising approach to changing behavior. However, the incentives themselves are often impractical and their removal generally results in a lack of sustained behavior change. In the case of preparing for terrorism, it may be difficult to identify meaningful incentives for every type of preparatory action.

Designing Preemergency Risk Communication Messages to Change Behavior.

In the case of preparing for and responding to catastrophic terrorism, the focus of preemergency risk communication is on encouraging the development of new behaviors (Rothman, 2000). As such, the literature has some suggestions about how to design such messages.

- Messages should emphasize favorable expectations about future outcomes (e.g., keeping duct tape and plastic sheeting on hand to use for sealing rooms to reduce exposure to a chemical attack). In addition, messages framed as having potential “gains” rather than as “losses” are more effective at encouraging preventive behavior (Detweiler et al., 1999). For example, encouraging quarantining to “save lives” would be recommended over one that suggested that quarantine will “minimize loss of life.”
- Messages should provide a core set of information to maximize effectiveness. In general, a problem-solving approach is more effective than a rule-based approach to risk communication, because the former can help risk communicators understand barriers to successful communication and to anticipate future difficulties to overcome (Rowan, 1994). First, recipients of a risk message need to know the nature of the risk. What are the consequences of exposure? Are they short-term or prolonged? How many people could be harmed? People also need a clear understanding of the extent to which there could be benefits to averting or preventing a risk.
- Messages should put risks into perspective (Slovic, Fischhoff, and Lichtenstein, 1979) to help reduce the emotional impact of a threat. For example, risk communicators might compare unfamiliar or unusual risks (anthrax exposure) to familiar risks (driving to work), which can illustrate the fact that we face many risks in our daily lives and are able to cope with them.
- Messages should list the most relevant emotional effects that could accompany the risk to help prepare people for what to expect. Personalizing risk comparisons to a particular person or situation can also increase the impact of the communication.

- Messages should communicate any uncertainty, which will improve the acceptability of the message by increasing trust, especially if there is suspicion about the motive for issuing a warning or change.
- Messages should provide recipients with information about risk-related decisions so they know the circumstances under which a decision is reached. People will want to know who made the decision, what factors may have constrained the decision options, and what resources contributed or may contribute to the change.

Disseminating Prermergency Risk Communications. From our focus groups and review of the literature, we offer several suggestions on methods for disseminating such communications:

- Use multiple dissemination strategies that may tailor and be sensitive to heterogeneous populations. Some principles from “social marketing” may be useful here, such as audience segmentation. While the media is critical in moving information to people, this modality will not reach everyone.
- Consider disseminating through existing information and support systems, such as schools, churches, and retirement communities.
- Disseminate appealing and easy-to-use information cards, binders, or websites that provide basic and important information but allow users to drill down or find more detailed educational information if they so desire.
- Use an opinion leader model to disseminate and encourage behavior change. The opinion leader should come from within the community where the behavior change is desired and be seen as “trustworthy.”
- Use workshops and trainings to teach people “how to do” certain actions that may seem difficult to them, understanding from their perspective what this might include.