Access to Warnings by People with Sensory Disabilities: A Review of the Social Science Warning Literature

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The goals of warning systems are to communicate either directly or indirectly with all persons at risk and to elicit an appropriate protective response to reduce or eliminate that risk. Ideally, all at risk should hear (or see or feel), understand, believe, personalize, and respond to the warning by taking protective action (e.g., evacuating, sheltering in place, etc.). The issue of access should also include whether those at risk actually hear or see warnings, not just be able to hear or see them, including whether the warning system is reasonably effective in reaching those at risk.

Social science research on disaster warnings has identified a consistent list of variables that affect whether recipients hear, understand, believe, personalize, and respond to warnings. Those variables can be classified as related to the source or sender, message content, message form, message media, recipient demographics, recipient experience, and warning context. There are variables associated positively and/or negatively with hearing, understanding, believing, personalizing, and responding to warnings.

The most common problem is not hearing the warning which may occur if the warning system simply does not reach people at risk, such as: sirens that cannot be heard in some areas of a community; warnings issued at night when people are asleep and not watching television or listening to radio; audio warning systems that cannot be heard by people who are deaf or hard of hearing; and visual systems (e.g., warning lights) that cannot be seen by people who are blind or visually impaired. Clearly not all people can receive warnings via television, radio, Internet, text messaging, or other communication media for sending messages. The common wisdom has been that alert and warning systems need to be multi-media, thus able to reach all or nearly all of the intended audience. No system reaches everyone.

In terms of receiving messages, social science research does not indicate that individuals who are disabled understand, believe, personalize, or respond to warnings differently than non-disabled individuals. The expectation is that the largest difficulty in providing warnings to people with disabilities is providing messages that they can hear, see, or feel. People with sensory disabilities, i.e., people who are deaf, hard of hearing, blind, visually impaired or deaf-blind, may need alternative means of “hearing” the warning, particularly to the extent that multiple channels may be necessary to convey and reinforce warning messages, as well as to assure that the message is received if some media or channels are not functioning. In many respects, this conforms to the common wisdom that there should be a variety of vehicles for alerts and warnings. Given that, some warning systems for people without sensory disabilities also have to accommodate impediments to visual or auditory cues. For example, the sound of sirens used for tornado warnings may not be heard by motorists in closed vehicles, particularly if air conditioning and/or radios are in use. Visual warnings, e.g., flashing lights, may be

more effective when outside sounds are muffled. Warnings may also be communicated through others, friends or family or caregivers. Given the importance of social cues in reinforcing warning messages, transmittal through trusted individuals may be the most effective method of communication.

Figure 1 lists the variables that may present difficulties for people with disabilities, beyond simply “hearing” the warning. People with sensory disabilities may need special technologies or approaches in order to receive informational content in an interpretable form. People with sensory disabilities may need alternative means of observing (seeing or hearing) the responses of family members, neighbors, coworkers, and others so that they get the requisite social and environmental cues that will confirm the disaster and the responses of people around them. Evacuation decisions, for example, typically are made by families and other social groupings. People consult with relatives, friends, and colleagues before deciding to evacuate. Social networks relay warning messages, confirm disasters, convey information on risk, and so on. To the extent that some individuals with disabilities may be isolated, without strong social connections, they may miss the warning, information on the disaster and the risk it poses, and other cues that might help them understand, believe, personalize, and respond to a warning. The same thing may happen to non-disabled individuals, but isolation may be more common among people with disabilities as it is with the elderly.

In general, however, the impacts of warning source, message, context and of recipient demographics and experience should be the same or very similar regardless of disability.

Figure 1
Variables Related to Positive Responses to Warnings

Source Related Variables

- Official source
- Familiar source
- Scientific source
- Credibility of sender
- Certainty of message

Message Content Variables

- Specific information
- Message with probability information
- Message in recipient's language

Message Form Variables

- Multiple channels
- Frequency of messages
- Consistency of messages
- Printed information

Message Media Variables

- Warning on TV, radio
- Warning via mass media
- Warning through personal channel
- Face-to-face contact with messenger

Recipient Demographic Variables

- Female
- Person with children
- Family together
- Actions of significant other
- Frequent family kinship experience
- Higher socioeconomic status
- Higher education levels
- Resources to respond (car, money, etc.)

Figure 1 (continued)
Variables Related to Positive Responses to Warnings

Recipient Social Variables

- Membership in social networks
- Feeling of personal efficacy
- Having social influence
- Greater community involvement
- Care giving responsibilities
- Work for large organization
- Freedom to leave place of employment
- Greater perception of risk (such as living in less sturdy housing)

Recipient Experience Variables

- Recent disaster experience (can affect response to warning positively or negatively)
- Knowledge of protective actions
- Knowledge of hazard
- Proximity to hazard/disaster
- Belief in science – prediction
- Fear of forced evacuation
- Involvement in community response
- Loss of property

Warning Context Variables

- Environmental cues
- Social cues
- Confirmation of disaster

Similarly, the variables affecting non-response to warnings should be consistent among disabled and non-disabled individuals and their families. Some demographic variables have a negative influence on understanding, believing, personalizing, and responding to warnings. Older persons generally understand and believe warnings, but often choose to disregard them. Lower income persons tend to have resource constraints, such as not owning an automobile to use in evacuation or money to purchase food and water to sustain themselves and their families until emergency responders arrive. Those with little education may not understand warning messages, may not understand the information that is provided, and may not know where to get information on protective actions. They may not trust the sources of information, as well.

To the extent that there may be more people with disabilities in less affluent families and communities, officials may have to provide information in forms that can more easily be understood. Males and people without children tend not to personalize risk in the same ways as females and those with children and there is no reason to believe that the disabled would be any different. Similarly, those who are with peers when they receive warnings may tend to underestimate and not personalize risk. Recent disaster experience may encourage positive or negative responses to warnings. Those with recent experience may feel that they understand the hazard or disaster and can protect themselves, or they may feel that the disasters are serious enough to warrant taking protective action. There is little research on the impacts of particular kinds of disasters or the severity of disasters on individuals' willingness to heed warnings. Fear of looting does discourage individuals from evacuating and provisions for quick reentry following disasters so that home and business owners can check their property may encourage evacuation. Studies do support the idea that the elderly, in particular, often do not evacuate because they fear losing their possessions.

Figure 2

Variables Related to Negative Responses to Warnings

Recipient Demographic Variables

- Older persons
- Lower income individuals
- Lower educational levels
- Person without children
- Minority group member
- Males

Recipient Social Variables

- With peers when warning received
- Insufficient resources to respond

Recipience Experience Variables

- Recent experience with hazard (can affect response to warning positively or negatively)
- Fear of looting

Warning Context Variables

- Long time until disaster strikes – no sense of urgency

Some variables are of less certain importance. Ethnic groups may be isolated from the majority community and, thus, not receive warning messages. They may not understand messages in English. However, they may have more cohesive social networks than their neighbors and messages received may be relayed more effectively to all family and community members. Access may be more problematic, but once gained it may be more successful in reaching those at risk and encouraging appropriate protective action. There is also conflicting evidence regarding whether people disregard warnings and do not evacuate because of pets. One suggestion is that rural people tend to view their pets differently than do more urban people. For many urban people, pets may be viewed as "children" and the attachment is strong enough for them to put their own lives at risk. During the Hurricane Katrina disaster in New Orleans, for example, it was common for people to refuse rescue and not go to shelters because they could not take their pets.

The importance of social influences is clear in the social science literature, but it is also ambiguous. Participation in social networks, from involvement in the community to kinship relationships, influence whether warnings are received and how they are interpreted. Some ethnic groups may be more connected with their communities, but less trusting of authorities when warnings are issued. Immigrant populations may be similarly connected, via religious institutions, community centers, and businesses, like restaurants, but still lack an understanding of risk because they are new to the U.S. and unfamiliar with the hazards or unfamiliar with the role of the American government in protecting residents and property.

Having few resources may also increase the perception of risk, but make it more difficult to respond to warnings. Low-income families typically have less secure, less sturdy homes, and, thus, they frequently choose to respond to warnings. But, evacuation is problematic if they do not have private automobiles or other means of travel or do not have money to use to buy gasoline or food.

Clearly, little attention has been paid to the needs of people with sensory disabilities in the design of warning systems, as well as in emergency planning in general. While disability may complicate the receipt of warning messages and make it more difficult to pick up important cues concerning the hazard and the responses of others, most of the variables affecting the understanding, belief, personalization, and response to warnings is the same for all. There is a need, however, to include provisions for people with sensory disabilities when disabilities are more prevalent in particular special populations. Vision and hearing loss are more common among the elderly. Greater attention should also be paid to the technologies used to communicate warnings to people with sensory disabilities to assure that the messages are trusted.

In short, there are no indications that people with sensory disabilities are any different than other individuals in terms of how they interpret warnings, but research needs to be done on how differences among people with sensory disabilities and how the technologies used to transmit warnings affect the communication of risk.

Note: Information for the summary of the social science literature on warnings was provided by Dr. Dennis Mileti, Professor Emeritus, University of Colorado at Boulder.