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ABSTRACT

Using radon (a naturally-occurring radioactive gas linked to lung cancer) as the health risk factor, a study examined which risk-taking tendencies interact with different health-risk message strategies. A phone survey pretested 837 randomly selected homeowners from three Florida counties with the highest levels of radon in the state (706 agreed to continue the study). Sixteen message conditions were manipulated from four experimental factors: (1) message source (newspaper article or government brochure); (2) health hazard target (children or adults); (3) complexity of comparative risks (smoking and x-rays, or nuclear power); and (4) specificity of information about actions to reduce the risk (a detailed step-by-step plan or an address for further information). Subjects were mailed questions based on one of the 16 message manipulations (with a 44.9% response rate). Some 317 persons returned the test booklets. Questions concerning media dependencies, personality attributes, home construction, and demographic attributes were measured, along with two dependent variables: fear of radon and estimates of the likelihood that the risk would affect the subject's own home. Risk-taking tendencies were measured by questions concerning personal freedom, sense of control, and sensation seeking. Results revealed that the risk-taking tendencies of adventurousness, impulsiveness, and rebelliousness interacted with message source, risk schema complexity, and target to affect estimates of the likelihood that the risk was a threat, and self-reported fear resulting from the risk. (Eleven figures are included, and two photocopied newspaper articles used in the study and 54 references are appended.) (MM)

6/88

Risk-Taking Tendencies and Radon Messages: A Field Experiment Testing An Information Processing Model for Risk Communication

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Abstract

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This research examines the effects of different risk message presentation strategies for low and high risk takers. In a field experimental design, 317 randomly selected homeowners responded to messages varying: the source of the message (newspaper or government agency brochure), the target of the health hazard (children or a general "self"), the specificity of information about actions to take to reduce the health risk (a detailed step-by-step plan or simply an address to write to for further information) and the complexity of the risks of comparison (X-rays and smoking or nuclear power). Subjects were pretested to gather baseline measures of risk-taking tendencies. Following receipt of the message, subjects are tested for their reactions to the messages.

Three dimensions of risk taking emerged in this study: adventurousness, impulsiveness and rebelliousness. These risk-taking tendencies interact with the source, risk schema complexity and target to affect estimates of likelihood that the risk is a threat and self-reported fear resulting from the risk. Finally, there is a main effect for complexity of the knowledge structure triggered by the message and for the gender of the receiver.

CONTENTS

INTRODUCTION

The way in which risk-taking tendencies interact with different health-risk message strategies is the major concern of this paper.[1] That some individuals are high risk takers and others low risk takers is apparent to most observers. (See Lamm, et al., 1969; Pruitt, 1971a, 1971b; and Vlek & Stallen, 1980, for reviews and summaries of risk-taking behavior.)

So, why do people respond to risk in different ways? Social scientists have pursued both psychological and sociological models to explain differences in responses to risks (Slovic et al., 1980; Slovic, 1987; Tversky and Kahneman, 1974; and Mazur, 1987).

Social influences such as media can have an impact on general responses to a risk; an individual must be made aware of risk in order to respond to it and must believe a risk is real before he/she will respond to it. Slovic (1969), for example, found that subjects treat hypothetical and real bets differently. The credibility of the source--media or expert--also can affect

1 This research was supported in part by a Florida Phosphate Council contribution to the Department of Public Relations and by the Communication Research Center, College of Journalism and Communications. We gratefully acknowledge the assistance of Elaine Wagner, University of Florida Department of Advertising, in designing and producing the experimental stimuli; 80 students in public opinion theory and research courses in the data collection; Research Assistant Barry Hollander in project management; and Mike Singeltary, College of Communications, University of Tennessee/Knoxville, and Mary Lou Klotz, University of Florida Department of Psychology, in reviewing this article.

responses to risks and whether or not the risk taker acts to reduce the risk.

Individual differences such as risk perception biases will account for some of the variation in response to risk and for the variation in the knowledge structures or schemas individuals have of risks. With a complex risk schema or knowledge structure, responses to risk messages may be quite different than when a simple risk schema is activated.

Other individual-level variables may also affect how we respond to messages about risk. These include: risk taking predisposition, threat target, willingness to think or elaborate (need for cognition about the risk) and attributions we make about the causes of our behavior (external and internal locus of control).

THEORETICAL BACKGROUND

Individuals assess risks differently; some make logical evaluations of risk while others do not seem to assess the negative consequence of impending behaviors. Also, what is judged as a low risk activity by one individual is perceived as a high risk activity by yet another. Individuals engage in different types of risk taking; an individual who is comfortable takin; financial or economic risks may find health risks completely unacceptable.

The reasons some individuals engage in risk taking and others avoid it are complex. Some decision theorists postulate a

rational, conscious decision process based on computation of probabilities of consequences while others see risk taking as having an affective component of impulsiveness (Eysenck & Eysenck, 1977), or sensation seeking (Zuckerman, 1979).

Janis (1962, 1982) conducted several early researches into how people react to fearful situations. Some become vigilant or feel vulnerable. Others take precautions to control or avoid the situation, while yet others develop feelings of invulnerability. The more people believe they are directly exposed to the risk, the more likely they are to adopt one of these strategies. Those who narrowly escape disaster become excessively vigilant and frightened, while those who are not exposed to the disaster become skeptical of warnings.

Rogers (1983) and Leventhal (1970) varied fear by varying the vividness of the information and the personal relevance of the risk consequences. Those exposed to the high fear messages report feeling more vulnerable, more negative towards fear-arousing stimuli, and more positive toward the behaviors they could take to reduce the risk.

> However, despite these encouraging findings the consequences of fear arousal aren't as simple and straightforward as you might expect. If you look at how the subjects act, the people in the high-fear condition usually aren't much more likely to do what the communicator recommended than those in the low-fear condition. (Leventhal, 1986, p. 458)

The theoretical framework guiding our choice of variables is the Elaboration Likelihood Model (Petty and Cacioppo, 1981). Because ELM specifies when attitude change is likely to be

enduring, it is very appealing for risk-related communication. ELM begins with an individual's motivation and ability, then examines the nature of the arguments posed in a message and the nature of the advocacy. There are two routes to persuasion in this model. Messages using the central route are targeted directly to the information a person has about an issue or risk (the person's risk schema) and these messages lead to more permanent changes. A central route is an active, thinking route. Messages which persuade from a peripheral route do not trigger schema-related information, but rather elicit cues for other variables salient to the individual.

For us to understand how the central route is triggered it's important to understand how people think about risk. That there are judgmental biases in risk perception is nearly a truism. (See Slovic, et al., 1982, for a review of these biases.) The availability heuristic is one such bias. The easier it is to imagine or recall an event, the more likely people are to believe the event occurs often. Following well-publicized disasters more people are likely to report that they believe they could be a victim of that disaster than prior to the disaster. Publicity about a low likelihood event or hazard will increase its memorability and imaginability and therefore individual judgments of perceived risk. Other commonly recognized biases include: "It won't happen to me"--discounting personal vulnerability--and overconfidence--basing judgments on incomplete information.

In our research we argue that the complexity of the risk-related knowledge structures or schema (Brewer & Nakamura, 1984; Fiske & Linville, 1980; Fiske and Taylor, 1982; Hastie, Park & Weber, 1984; Taylor & Gordon, 1984) held by the individual also affects how he/she thinks about the risk and the response to the risk message. If the knowledge structure is a complex one, which we define as highly integrated and differentiated, then it should be much easier for the individual to process information about the risk. On the other hand when the risk schema is a simple one--neither integrated nor differentiated--we expect that it will be much more difficult to process risk messages. Under those conditions it seems likely that peripheral cues which cause affective responses by the receiver may be important in the response to messages about risk.

In a visual-motor task which assessed both risky behavior and physiological arousal, Streufert, et al. (1983) found that those with the greater diastolic arousal engaged in more risk taking, and an increase in the task load increased risk taking. They concluded this was evidence of a cognitive basis for risk taking, but with individual differences as mediators of risk taking; risk taking is more cognitive than arousal driven and education programs based on the individual's stylistic characteristics may affect the likelihood of risk taking.

Isen, et al., (1982) also present a strong argument for the influence of affect on risk taking. They have found that positive affect influences the strategies people use in making

risky decisions. In low risk situations those who have positive affect are more likely to engage in risky behaviors, while those in high risk situations who have positive affect are less likely to engage in risky behaviors.

Hypotheses

By risk taking we mean the tendency to engage in activities in which the individual involved perceives some likelihood of negative consequences. In our definition, all people are risk takers, but some perceive the likelihood of negative consequences from a risk differently than others. Covello (1987) in a report to the National Science Foundation summarizes some of these perception-affecting factors. These include: familiarity, understanding, uncertainty, controllability, volition, effects on children, dread, trust in institutions, media attention, equity, reversibility, personal stake, evidence and origin.

We assume that some individuals are generally risk aversive because they dislike the arousal state associated with risks and thus behave differently from those who like the stimulation. For example, we expect low health risk takers to respond to risky health situations with greater fear arousal, they are more likely to overestimate the amount of risk, and they will be more likely to act to reduce the arousal than will high risk takers. High risk takers, on the other hand, will have a higher tolerance for risky situations, find moderate and even high levels of arousal stimulating, underestimate the likelihood the risk will affect

them and be less likely to act to avert the risk. In this study we hypothesize:

H1: Low risk takers will report a greater likelihood that a health risk will affect them than will high risk takers.

H2: Low risk takers will report a greater fear of health risks than will high risk takers.

According to Sandman (1985), in a consideration of how people react to the siting of hazardous waste facilities, those who are "risk-aversive" are unsure of what they are doing and therefore don't do anything. Risk-aversives believe that "meddling" usually makes things worse. On the other hand, risk-tolerant people believe they can solve problems and any new problems created by their "tinkering." Health threats such as hazardous waste siting pose less reason for fear among those who are risk-tolerant, yet present an understandable cause for fear and concern among the risk-aversives.

People are more concerned when children are specifically at risk (Covelló, 1987). Threats aimed at a "loved other" are more arousing than threats to a more general "self." The threat target for example, has been an important factor in cases involving adult smoking and exposures to toxic chemicals by pregnant women. Risks that are perceived to be threats to "society" are ignored because such risks are seen as lacking personal relevance (Sandman, 1986; Sharlin, 1987). Risk information is often ignored because of unrealistic optimism and overconfidence--people consider themselves immune personally and

ada, . a posture of "it can't happen to me" (Fischhoff et al., 1981; Weinstein, 1980; 1984). Threatening children clearly establishes a personal stake for families and creates more concern, thus we expect,

H3: Low risk takers who have children who could be threatened by the health hazard will report a greater likelihood that a health risk will affect them when exposed to messages about how the health hazard could affect their children than when exposed to messages about thre. s to adults generally.

H4: Low risk takers who have children who could be threatened by the health hazard will report a greater amoun' of fear when exposed to messages about how the health hazard could affect their children than when exposed to messages about threats to adults generally.

H5: Low risk takers who have children who could be threatened by the health hazard will report a greater likelihood that a health risk will affect them when exposed to messages about how the health hazard could affect their children than will high risk takers with children.

H6: Low risk takers who have children who could be threatened by the health hazard will report a great amount of fear when exposed to messages about how the health hazard could affect their children than will high risk takers with children.

Successful persuasion relies on providing explicit recommendations. It is better to tell people exactly what behavior is desired than to allow people to determine behaviors for themselves when a particular action is the goal. Having a plan of action is an important factor in influencing people to act (Leventhal, Singer & Jones, 1965; Leventhal, Jones & Trembly, 1966).

People are also highly sensitive to the way information is presented; this seems to be especially true of risk information

(McNeil et al., 1982). A sense of efficacy, a feeling of ability to "do something" and an impression of understanding "what is to be done" contribute to less anxiety and enhance calm. Having no clear idea of actions that are doable arouses greater fear, particularly for those who seek to avoid any sort of risk. Knowing precisely how to resolve a problem or avoid risk, on the other hand, establishes a sense of control and lessened threat. Studies have shown that a feeling of control makes risk far more acceptable (Starr, 1969), thus we expect,

H7: Low sk takers will report a greater likelihood that a he· h risk will affect them when given a message that does not present specific steps to take to reduce the threat than will low risk takers when given a message that presents specific steps.

H8: Low risk takers will report a greater amount of fear that a health risk will affect them when given a message that does not present specific steps to take to reduce the threat than will low risk takers when given a message that presents specific steps.

Risk comparisons are advocated by many as a way of improving public perceptions and understanding of risk (Ames, 1983; Ames, et al., 1987; Wilson, 1979; 1987; Crouch and Wilson, 1982). . vic and Fischhoff (1982) suggest that comparisons put risk int· erspective, provide a conceptual yardstick, and offer more intuitive meaning than absolutes. The difficulties in communicating about health, safety and environmental risks have, in fact, increased the interest in using comparisons (Sandman, 1986; Covello et al., 1987). Risk comparison offers a means for determining which risks to avoid, which risks to ignore and how much risk reduction to seek (Lawless et al., 1984; Covello,

1987). Lave (1981), however, points out that comparisons can be misleading, and some activists (Regna, 1986) raise ethical questions about "making risk assessment acceptable." Mass media rely heavily on presenting risk in charts and narrative comparing one risk to another to help people "judge for themselves" how they will respond or react to reported health hazards.

In determining which risks to use in such comparisons, research has been conducted to evaluate what people fear (Slovik, 1987). Allman (1985) reported that lay people and experts alike rank nuclear power at the top when considering technologies and activities that cause fatalities. On the other hand, risks associated with X-rays are often underestimated. The explicit information and general amount of detail known provide the knowledge structure of an issue for an individual. Where knowledge is lacking or incomplete, schemas are less rich and therefore play a lesser role in directing or assessing new information, thus we expect,

H9: Low risk takers will report a greater likelihood that a health risk will affect them when exposed to messages that trigger a simple, but fear-arousing schema unrelated to the health threat than will low risk takers when exposed to messages that trigger a complex schema for other threats related to the health hazard.

H10: Low risk takers will report a greater amount of fear that a health risk will affect them when exposed to messages that trigger a simple, but fear-arousing schema unrelated to the health threat than will low risk takers when exposed to messages that trigger a complex schema for other threats related to the health hazard.

METHOD

The health hazard selected for the study is radon, a naturally-occurring radioactive gas linked to lung cancer. According to the Centers for Disease Control and the U.S. Environmental Protection Agency, people are dying from radon-caused lung cancer at a rate of 5,000 to 20,000 or more each year. Yet controversy over the seriousness of the problem has delayed communication efforts in some states and added confusion to campaigns underway in others (see Weinstein, et al., 1987; and Smith et al., 1987). Experts are asking, "What do you make of the radon problem?" (Tolan, 1987), while consumers are being told "all homes should be screened for radon" (Consumer Reports, 1987). The researchers chose this issue because it is a well publicized health threat to homeowners and an emerging issue in Florida.

The Subjects

The research design is a 2 X 2 X 2 X 2 factorial design field experiment conducted with a random sample of homeowners. The study is ongoing in the three Florida counties (Alachua, Hillsborough and Polk) with the highest levels of radon as identified by a recent state study.[2]

2 The experiment includes only homeowners because they are more likely to be longer-term residents (therefore experiencing greater risk) and to have the resources to test and remediate if necessary. For our sampling frame, the Florida State Department of Revenue provided a computer tape of all taxed and tax-exempt parcels in each county with the name of the owner and the owner's mailing address; only residential dwellings with an assessed value greater than $25,000 were included. A random sampling program (SPSSX) selected residences that met the above requirements.

A total of 4000 residences were randomly selected. The homeowners' names and addresses were then cross-referenced with local phone books from the three counties in order to secure a phone number.

The Procedure

A phone survey pretested 837 subjects.[3] At the end of the phone survey, subjects were asked whether or not they were interested in receiving any more information and whether or not they would like to continue helping with the study.

The 706 (89.1%) homeowners who agreed to become members of the radon panel were randomly assigned to one of the 16 message conditions. About two weeks after the pretest, the subjects were mailed a 9-page booklet with one of the 16 manipulations of the message. Instructions asked subjects to work through the booklet in order and not to look forward or backward. Questions at the beginning of the booklet assessed the media dependencies of the subjects. Next, personality attributes related to other aspects of this study were assessed. Subjects then responded to

3 They responded to questions about their knowledge of radon, estimates of the likelihood they were in a risky situation in their county and their home, assignment of responsibility for radon, the likelihood they would test for radon if they faced economic risks, their concern about and fear of radon, risk-taking tendencies and demographic attributes. Interviewers conducted the survey from Oct. 9th to Oct. 13th, 1987.

Some 81 students enrolled in two sections (taught by the co-authors) of an undergraduate course in public opinion theory and research methods were trained as interviewers. Each student conducted approximately 10 interviews in a supervised phone bank. Telephoning began on a Friday evening, continued over the weekend and was concluded on Tuesday evening.

questions about the construction of their homes. They were instructed to read the radon message that followed and told they would be asked how to improve it to help others. Several manipulation check questions follow the message. Subjects were asked how likely it is that radon levels higher than the acceptable standard would be found in their home and how afraid they are of radon. Finally, several demographic attributes were measured.

The Experimental Messages[4]

Four message factors are varied. (See appendix for examples of the stimuli.)

Source--Newspaper Article Versus Government Brochure

The first factor varied the message source. Under one condition the message was typeset to resemble a photocopy from a newspaper; it was set in four columns, had a dateline and a newspaper (confederate) name, and a headline. In the second condition, typeset to look like a brochure, the source was identified as a state brochure with a tagline: "Source: The State of Florida Program for Radon Information." Our assumption is that for some individuals a newspaper article may have credibility, while for others a government brochure may be more credible.

To test whether subjects observed the source of the message, they were asked, "Was the article you read from a newspaper or a

4 Because this is in part an applied study, some of the message factors varied are not included in the theoretical discussion, but are reviewed here for the benefit of the reader.

government agency brochure?" Of those in the newspaper condition, 84.0% correctly answered the question, while of those in the brochure condition, 60.1% correctly answered the question and 21.7% checked "other."

Threat Target

The second factor varies whether or not the message discusses the effects of radon on children or on adults. In the first condition the copy is subheaded with "CHILDREN AT RISK" and explains that according to experts children are more at risk than adults. In the second condition the copy does not mention children, has a subheading that says, "RISK INCREASES OVER TIME" and explains that exposure over time increases risk.

As a manipulation check, homeowners were asked, "Was the article you read primarily about health risks affecting adults or primarily about health risks affecting children?" They responded on a 10-point scale ranging from "Mostly about Adult's Health" to "Mostly about Children's Health." Of those in the adult condition, only 3.9% said the article was about children, while for those in the child condition, only 1.8% said the risk was about adults. It should be noted that most responses were grouped in the center of the scale with 60.8% of those in the adult condition saying the article was about both children and adults and 71.4% of those in the child condition saying the article was about both.

Complexity of Schema Triggered

The first level of this factor presents the risk of lung cancer from radon in comparison with risk from smoking and from X-rays: "Exposure to 4 picocuries is the equivalent of smoking about eight cigarettes a day. Indoor radon at a level of 4 picocuries presents a greater health risk than getting 200 chest X-rays in one year." In addition, the copy has a breakout quote that says, "People worry about the dangers of smoking or having too many X-rays, but we didn't think about radon gas inside our own home." The second condition, in the copy and in a breakout quote, mentions nuclear power as a shared fear, "People worry about radiation coming from nuclear power plants, but we didn't think about radon gas in our own home." This manipulation is based on an assumption that a nuclear power radiation schema is less complex (integrated and differentiated) than a smoking/X-ray cancer schema. The cause and effect relationship between smoking and cancer is well defined and provides a rich information set from which to form beliefs, whereas, less specific knowledge and a lesser quantity of knowledge is generally available for nuclear power.

To determine whether subjects in the schema complexity conditions made linkages between the manipulation and the targeted schema we asked, "How similar or dissimilar is the threat of radon gas in your home to the threat of living near a nuclear power plant?" Some 34.7% of those in the nuclear power

condition, said it was very similar to radon, while only 25.6% of those in the smoking/X-ray condition said it was very similar.

Subjects were asked to respond to the following questions: "I would guess that the risk associated with living in a home with radon levels above the EPA "safe" standards is equivalent to smoking . . . cigarettes a day."and "equivalent to getting . . . chest X-rays a year." Some 68.9% of those in the smoking/X-ray condition correctly answered eight cigarettes, while only 2.1% of those in the nuclear power condition guessed correctly. Of those in the smoking/X-ray condition, 72.8% correctly answered 200 chest X-rays, while only 1.8% of those in the nuclear power condition guessed correctly.

Specificity of Action Desired

The fourth factor varies the ease with which readers can obtain additional information about radon. In the first condition the message presents a check-off list of things to do to test for radon along with a list of other sources, while in the low specificity condition subjects receive only the mailing address of the state organization charged with educating the public about radon. Our assumption here is that messages which provide specific steps to take give the receiver a greater feeling of having control and will be more likely to be acted upon than messages with low levels of specificity.

To test whether the specificity of the message was related to subject estimates of how easy or difficult it might be to get information, subjects were asked, "How difficult will it be to

get more information about radon?" Of those in the high specificity condition, 95.7% said it would be somewhat easy or very easy, while in the low specificity condition 91.1% said it would be somewhat easy or very easy. Apparently those in this study do not see radon as a topic for which finding information will be difficult and the specificity of the message does not appear to affect these perceptions.

FINDINGS

Subject Demographics

Some 317 (44.9%) of those sent the test booklets returned them. Of these, 56.9% (134) were females. The median age is 47 years old, with 5.5% under 30, 27.4% from 30 to 39, 21.6% from 40 to 49, 16.0% from 50 to 59, 18.5% from 60 to 69 and 11% 70 or older.

Some 19.5% of the subjects have a high school degree or less, 19.5% have some college, 16.0% have a two-year degree, 21.2% have a four-year degree and 23.9% have more than a four-year degree.

The assessed values of the subjects' homes range from $26,000 to $622,000 with a median value of $56,000.

The subjects have lived in their homes a median length of 8 years and they say they plan to live in the home another 15 years. There are an average of 1.7 people living in each residence.

The Dependent Variables

Two dependent variables were measured at this second stage of the study: fear of radon and estimates of the likelihood that the risk would affect their own home. Fear is measured by asking: "Would you say you are very afraid, somewhat afraid, somewhat unafraid or very unafraid of radon?"

Risk likelihood is measured by asking: "Would you say it is very likely, somewhat likely, somewhat unlikely or very unlikely that radon levels higher than the acceptable standard would be found in your home?"

Risk-taking Tendencies

Risk-taking tendencies are measured by asking the subjects to respond to questions (adapted from the Farley Fisc-Risk Scale) designed to tap different aspects of risk taking, such as: personal freedom, independence, sense of control, sensation seeking, activity, time perspective and general risk

Subjects were read an item and asked to indicate whether it described them or not. These eight binomial measures were submitted to a factor analysis. Based on a scree plot of the eigen values a three-factor solution appears to be a reasonable one. The total variance explained by the three-factor solution is 48.6%. A varimax rotation and an oblique rotation were compared to determine whether the type of rotation suggested different interpretations of the measures. Basically they replicated one another, and there is no correlation between the factors.

These items were then summed into simple indices to represent the three factors. Although we have named these factors, the labels are offered tentatively based upon the items loading on the factor and the correlation of the factor with other variables in our study. Figure 1 presents these factors and the correlations. The factors are labeled: adventurousness, rebelliousness and impulsiveness.

We find that those high in adventurousness are less likely to attribute control to the environment, and they are generally higher in need for cognition (i.e., tend to be thoughtful and enjoy thinking and problem solving than those low in adverntourousness.) Their education levels are higher, and we find significantly more males than females scoring high on this type of risk taking.

High levels of rebelliousness are associated with a low need for cognition. Those high in rebelliousness have low levels of confidence in expert sources, and females score higher on rebelliousness than do males.

Those who are high in impulsive risk-taking tend to have low levels of confidence in official government sources. Also, they tend to score low in external locus of control. Finally, females score higher on impulsiveness than men.

FIGURE 1

Factor Analysis of Risk-taking Measures
(Principle components solution - Varimax rotation)

	Factor Loadings 1	2	3	
Adventurous/Risk-taking:				
1. To broaden my horizons I'd be willing to take risks.	+.81	.03	-.03	
2. I avoid taking risks.	-.76	.25	.10	
3. I'd take a job that requires lots of traveling.	+.40	.06	.09	
Impulsive/Risk-taking:				
4. I'd never give up my job before I was certain I had another.	-.10	.74	-.13	
5. I never buy anything without thinking about it.	.03	.65	-.10	
Rebellious/Risk-taking:				
6. I plan for the future.	.18	.12	-.71	
7. I don't like rules.	.07	-.08	+.58	
8. If I were to gamble, I'd make big bets.	+.37	+.32	+.52	
Percent of Variance Explained:	19.8	14.1	14.6	48.6%
Correlates of the factors:				
External locus of control	-.13[a]	-.13[a]		
Need for cognition	.35[c]		-.13[a]	
Education	.20[c]			
Confidence in experts	-.13[a]		-.13[a]	
Confidence in government		-.13[a]		
Gender: Male	+	-	-	
Female	-	+	+	

[a] $p \leq .05$
[b] $p \leq .01$
[c] $p \leq .001$

Tests of Hypotheses

First we present each of our hypotheses with tests for our three factors of risk taking: adventurousness, rebelliousness and impulsiveness.

H1 & H2: Low risk takers will report a greater likelihood that a health risk will affect them and a greater fear of health risks than will high risk takers.

There are no main effects for either the likelihood estimate or the fear report with the three risk-taking dimensions.

H3 & H4: Low risk takers who have children who could be threatened by the health hazard will report a greater likelihood that a health risk will affect them and a greater amount of fear when exposed to messages about how the health hazard could affect their children than when exposed to messages about threats to adults generally.

H5 & H6: Low risk takers who have children who could be threatened by the health hazard will report a greater likelihood that a health risk will affect them and a greater amount of fear when exposed to messages about how the health hazard could affect their children than will high risk takers with children.

These hypotheses predict a three-way interaction of risk-taking tendencies with the message target and having children who could be affected by the risk. We find a significant three-way interaction for the rebelliousness risk-taking tendencies with the target of the message and having children for likelihood estimates ($F = 4.61$, $df = 1,281$, $P < .03$), but not for fear. Figure 2 presents these results.

While likelihood estimates appear to be higher with an adult threat target than with a child target, for those in our high

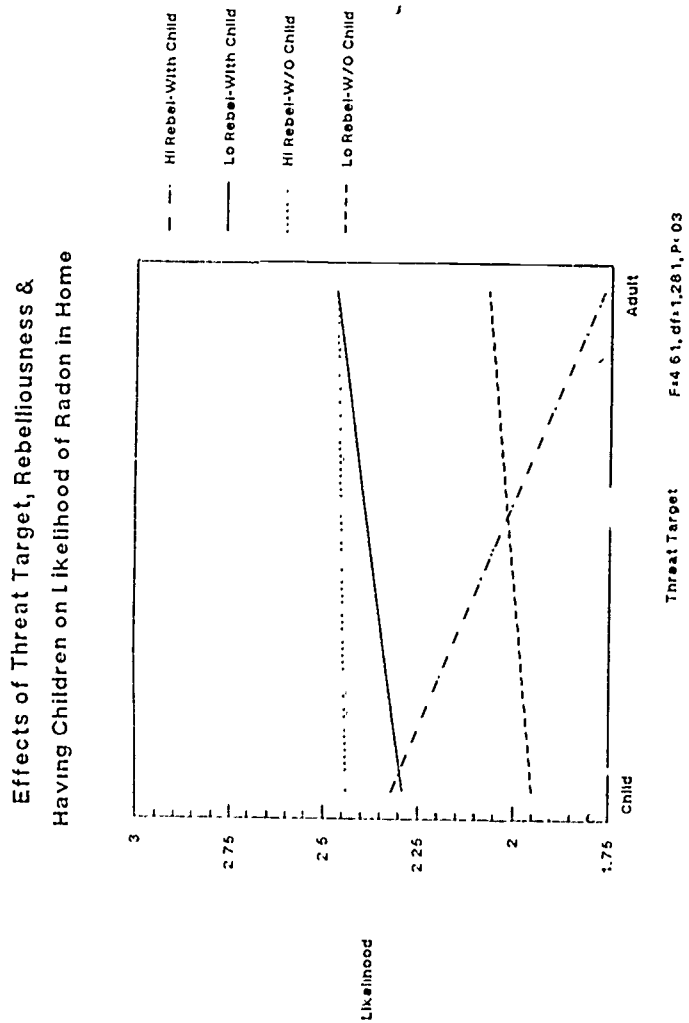


Figure 2

rebelliousness condition with children, the use of an adult target greatly reduces the likelihood estimate.

H7 & H8: Low risk takers will report a greater likelihood that a health risk will affect them and a greater fear when given a message that does not present specific steps to take to reduce the threat than will low risk takers when given a message that presents specific steps.

These hypotheses predict a two-way interaction of risk taking with specificity of the message. We find no significant interactions for the risk taking dimensions nor are there main effects for specificity.

H9 & H10: Low risk takers will report a greater likelihood that a health risk will affect them and a greater fear when exposed to messages that trigger a simple, but fear-arousing schema unrelated to the health threat than will low risk takers when exposed to messages that trigger a complex schema for other threats related to the health hazard.

These hypotheses predict a two-way interaction between risk-taking tendencies and the complexity of the schema triggered. Although we did not find significant two-way interactions of risk-taking tendencies with schema complexity, there are three 3-way interactions involving these variables. First, source, schema complexity and adventurousness significantly interact to predict both likelihood estimates ($F = 6.19$, $df = 1,281$, $P < .02$) and fear ($F = 5.92$, $df = 1,281$, $P < .02$). Second, source, schema complexity and rebelliousness interact to predict likelihood estimates ($F = 4.36$, $df = 1,281$, $P < .04$).

The high adventurous-brochure condition with a simple schema triggered produced the lowest levels of estimates of the

likelihood of risk in the home, while the low adventurous-brochure condition with a simple schema produced estimates of risk as high as the complex schema condition (Figure 3). The same basic pattern emerges for fear reports, but with greater magnitude. Here the highest fear report occurred under the high adventurous-brochure-complex schema condition, with the lowest report for this same condition but with a simple schema (Figure 4).

The interactions for rebelliousness indicate the highest estimates of likelihood for the newspaper-high rebelliousness-high complexity schema (Figure 5).

Other Findings

In addition to the hypotheses tested the ANOVA produced several other significant interactions which help us to understand these relationships. First, the data indicate a main effect for schema complexity on fear of radon. Those in the high complexity condition (smoking/X-ray comparisons) overall indicated significantly higher levels of fear than those in the low complexity condition. But, recall that this effect is mediated by other variables. We observe that the threat target and schema complexity interact at near significance ($F = 3.54$, $df = 1,288$, $P < .06$) to predict fear. With a low complexity schema triggered and a child target we find relatively low levels of fear reported (Figure 6).

Source, threat target and schema complexity interact to predict likelihood estimates ($F = 5.21$, $df = 1,288$, $P < .02$).

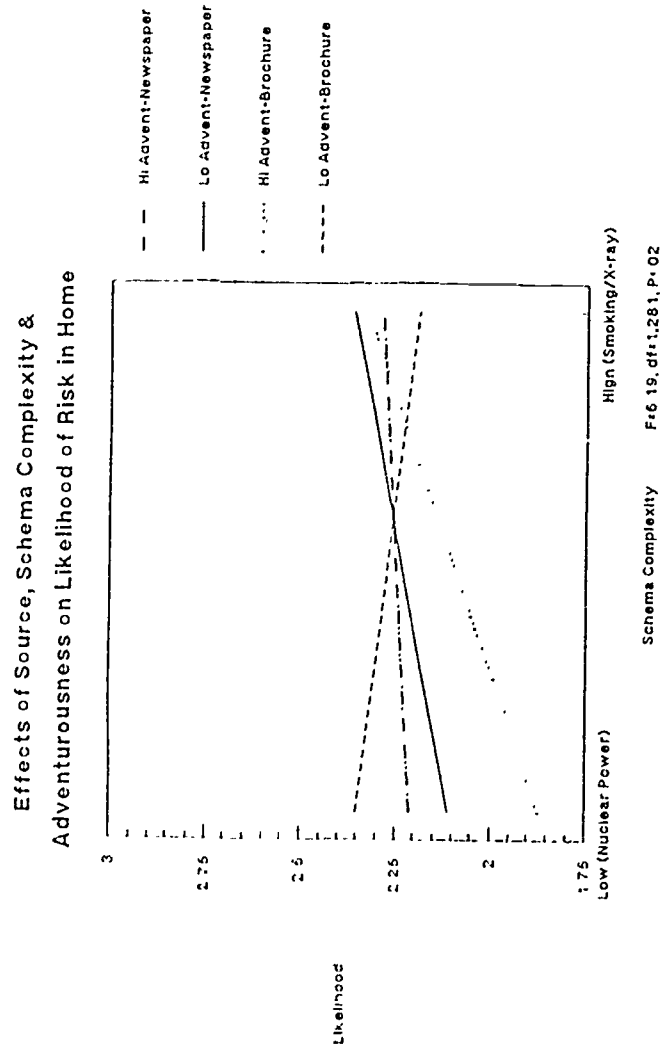


Figure 3

Figure 4

Effects of Source, Schema Complexity & Adventurousness on Fear

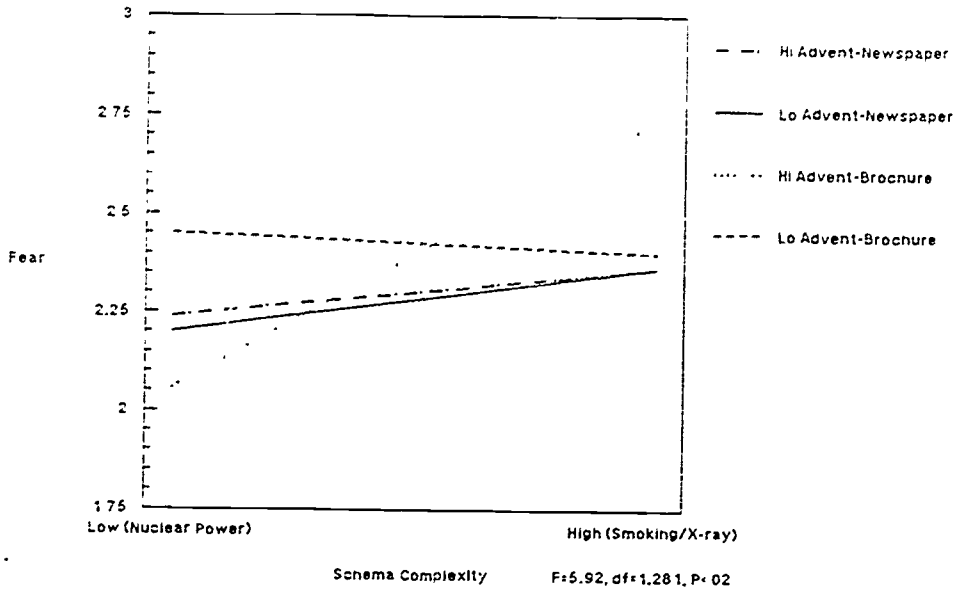
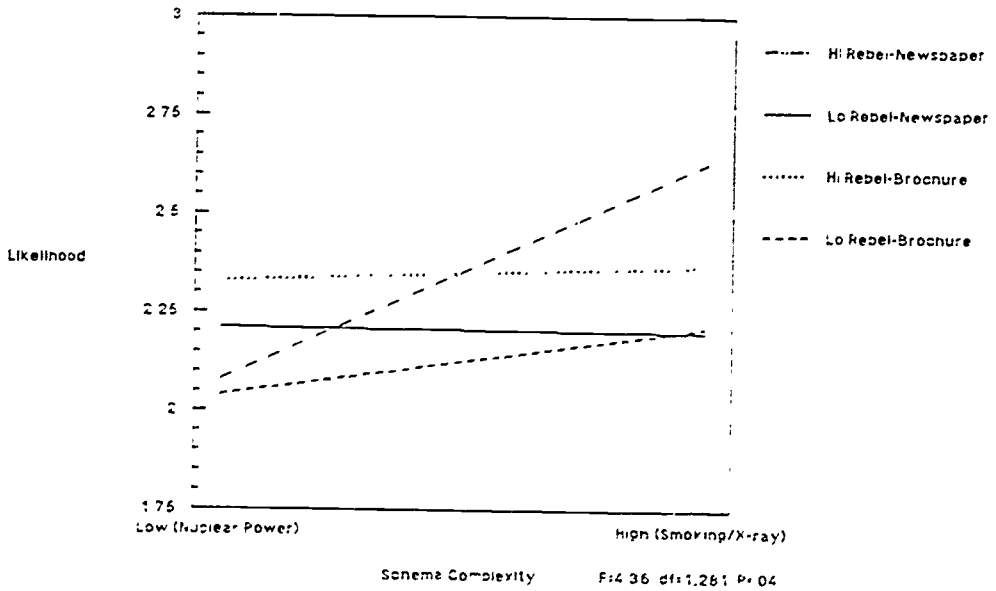


Figure 5

Effects of Source, Schema Complexity & Rebelliousness on Likelihood of Radon Risk



The highest levels of fear occur with the newspaper source-child target-complex schema and the lowest for the simple schema (Figure 7).

We find that there are several interactions significant or approaching significance with rebelliousness and our experimental variables. First, rebelliousness interacts with the threat target to predict the likelihood estimate ($F = 4.12$, $df=1,281$, $P < .05$). When the child is the target and the condition is high rebelliousness, the likelihood estimate is highest, while it is lowest for the low rebelliousness-child condition (Figure 8). Threat target also interacts with rebelliousness to predict fear ($F = 4.62$, $df = 1,281$, $P < .04$). An adult target produces the highest fear in the low rebelliousness condition while a child target produces the highest fear in the high rebelliousness condition (Figure 9). Also, having children has a near significant interaction with the rebelliousness condition ($F = 3.70$, $df = 1,281$, $P < .07$). For those in the high rebelliousness condition having children does not affect their fear level reported while those in the low rebelliousness condition with child are more likely to report high levels of fear (Figure 10).

Finally, because of the relationship we observed earlier between the risk-taking tendencies and gender we conducted an ANOVA with gender as a factor in the models. Gender predicts a significant main effect for both likelihood and fear; females express greater likelihood estimates and report greater fear, and gender interacts with are source and impulsiveness ($F = 4.53$, df

Figure 6

Effects of Threat Target & Schema Complexity on Fear of Radon Risk

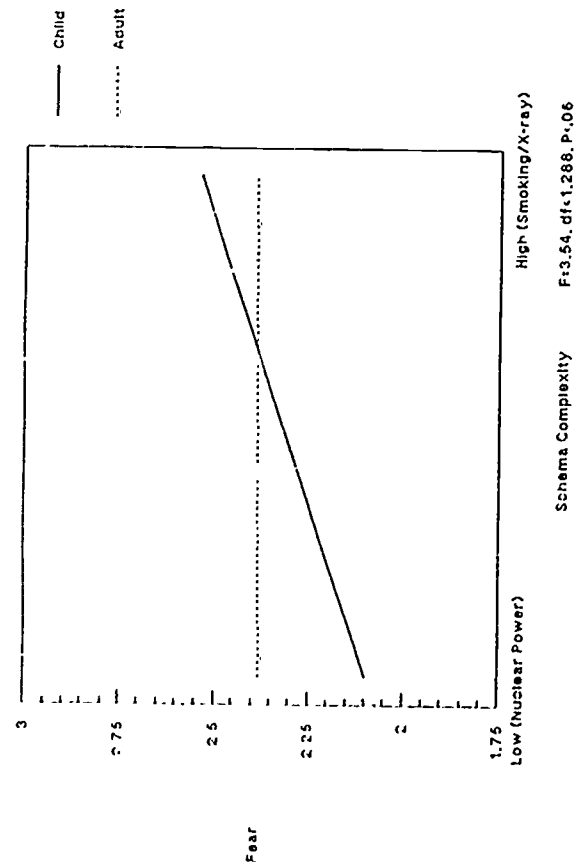
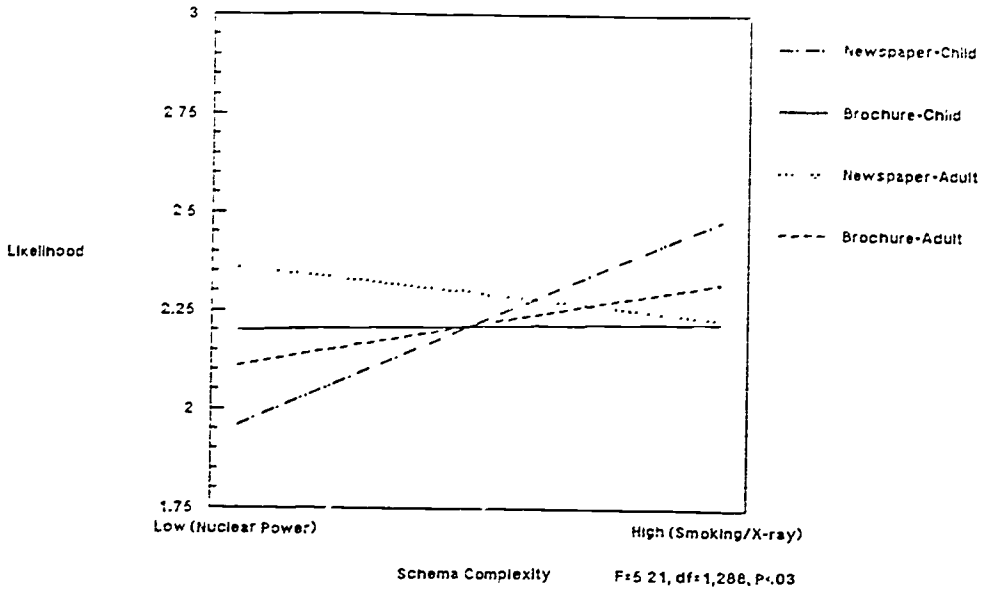


Figure 7

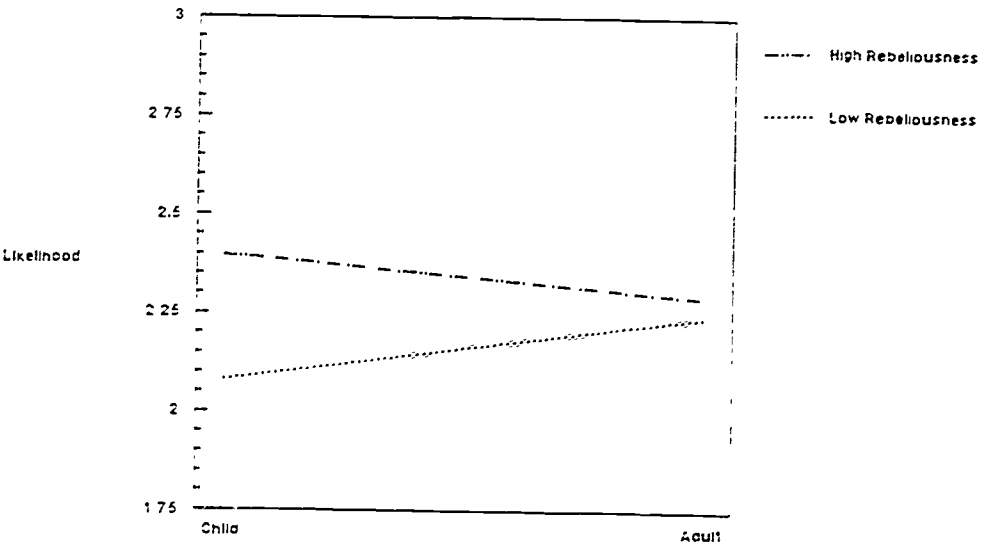
Effects of Source, Threat Target & Schema Complexity on Likelihood of Radon Risk in Home



F=5.21, df=1,288, P<.03

Figure 8

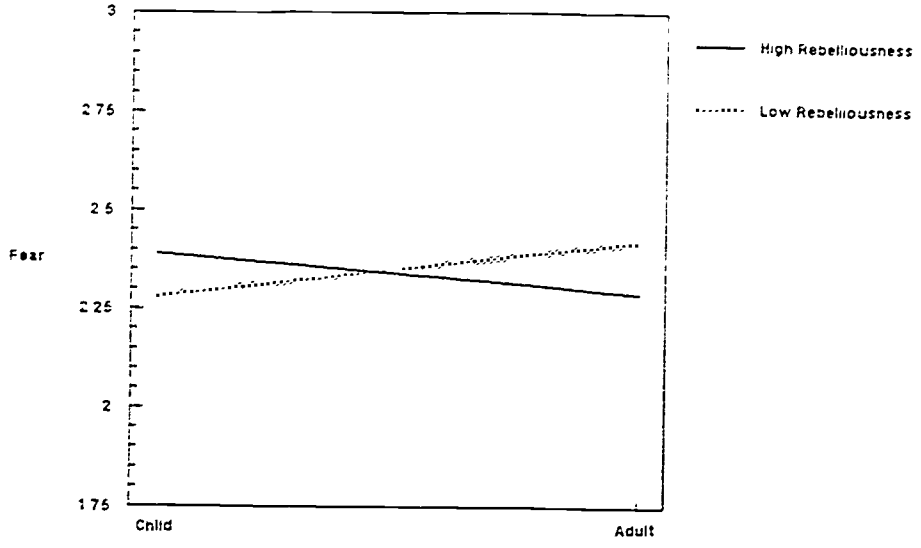
Effects of Threat Target & Rebelliousness on Likelihood of Radon Risk in Home



F=4.12 df=1,281, P<.05

Figure 9

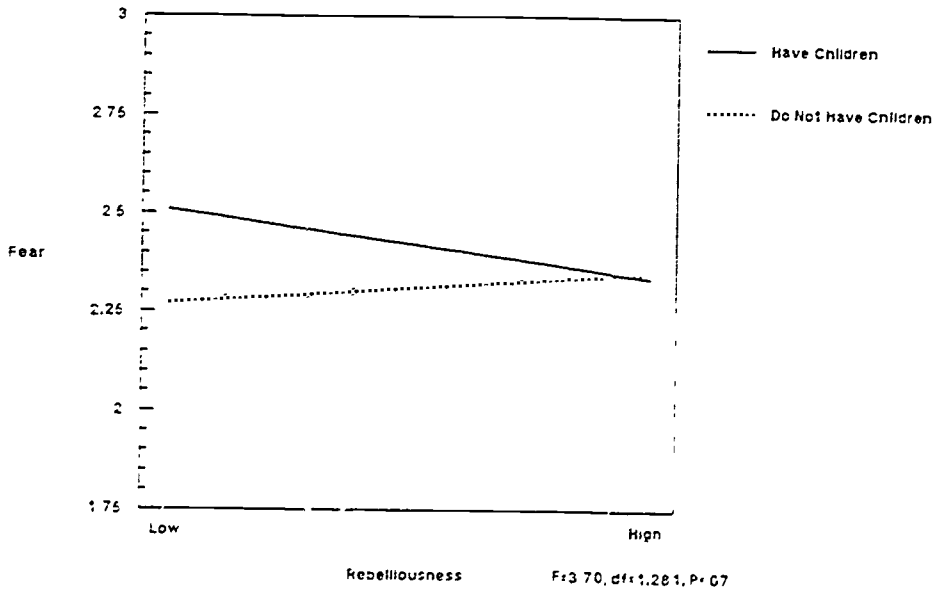
Effects of Threat Target & Rebelliousness on Fear of Radon Risk



F=4.62, df=1,281, P<.04

Figure 10

Effects of Rebelliousness and Having Children on Fear of Radon Risk



F=3.70, df=1,281, P<.07

= 2,280, P < .02) to predict likelihood. Low impulsive females in the newspaper condition present the highest likelihood estimates, while high impulsive males in the brochure condition present the lowest likelihood estimates. The males with the highest likelihood estimates were in the brochure-low impulsiveness condition (Figure 11).

DISCUSSION

Under some conditions we observe that risk-taking tendencies do not affect estimates of likelihood of risk or fear of that risk. In this study when the message is delivered in a newspaper and children are targeted, we observe relatively high estimates of likelihood, but only with the smoking/X-Ray schema triggered. Under these conditions the risk-taking tendencies of the message receiver are not relevant. We observe a similar effect with fear of risk; here the source is not relevant. It seems that when we make estimates of probability of risk, a credible source such as a newspaper affects those estimates, but the source does not affect the fear level. Targeting a child and triggering a complex schema is enough to increase fear. Also, there are main effects for the complexity of the schema triggered and for gender, but again, these are not simple effects to be interpreted irrespective of other variables.

Limitations

Some of the limitations the reader needs to consider include the relationship of the operationalizations to the concepts

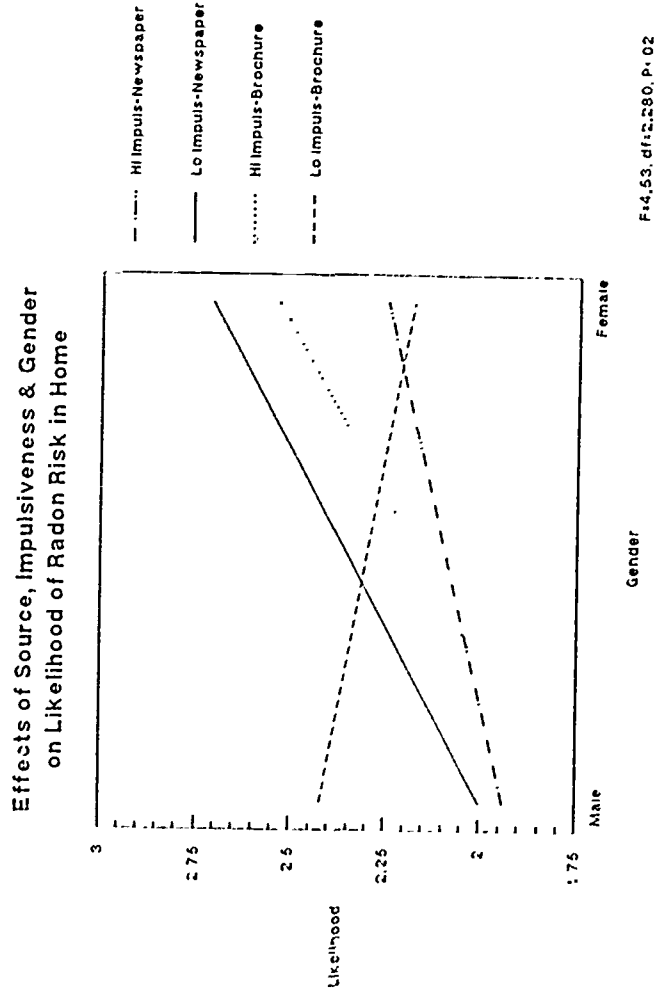


Figure 11

themselves. The risk-taking concepts, for example, are from a newly developed scale that needs further validation. Other validation studies are also in order. For example, with the schema complexity variables, we cannot be sure whether or not we truly triggered a complex schema or instead a risk which is believable, until we have evaluated that factor more closely in future validation studies.

The nature of the experimental design appears to rule out most threats to the internal validity of the study, and the fact that the study is a field experiment greatly enhances the external validity.

Future Research

Although we urge caution in the interpretations of the findings, there are some interesting trends for the different risk-taking tendencies. For example, adventurousness interacts with the source and schema complexity for both likelihood estimates and fear. We expect, given the strong relationship of adventurousness to enjoyment of thinking (need for cognition), that when these individuals have a low complexity schema triggered, they think or elaborate a great deal about the message and respond with lower levels of likelihood and fear when the message is presented in a government brochure rather than a newspaper because the brochure will not carry the same credibility as the newspaper for them.

The interaction of rebelliousness with many of these variables provides some of the most interesting findings in the

study. The threat target does not interact with having children and rebelliousness with one dramatic exception; targeting the adult for those who are high in rebelliousness and who have a child leads to very low estimates of the likelihood of the risk. Rebels with children respond to threats to their children, and rebels without children respond as those with children. The rebel can be most effectively targeted through newspaper messages triggering complex schemas.

The relationship between rebelliousness and fear is a much simpler one. Those low in rebelliousness who have children report more fear than those who do not have children. When the threat target is a child, those low in rebelliousness report lower levels of fear than when the target is an adult. Low rebellious individuals with children do not react fearfully when their children are targeted, but rather when they themselves are targeted.

Although gender has a simple main effect, with women giving higher likelihood estimates and higher fear reports than men, these differences are even more dramatic when the women are impulsive risk takers and receive the message from a brochure or are low in impulsiveness and receive the message in a newspaper. For men, impulsiveness interacts with their response to brochure messages; low impulsive males, who receive a brochure message, give higher likelihood estimates than high impulsives.

Risk and The Communicator

Journalists and other professional communicators who attempt to tell others about risk have to make many decisions about the structure and form of that communication. What follows are some tentative generalizations for risk communicators.

1. ' ssages that appear in newspapers will create the highest risk likelihood estimates when: a) the receiver is high in rebelliousness and the schema triggered is a complex one, b) the threat target is a child and the schema triggered is a complex one, or c) when the receiver is a female and low in impulsiveness.

2. Messages that appear in brochures will create the highest risk likelihood estimates when the receiver is a: a) male low in impulsiveness or b) female high in impulsiveness.

3) Messages that appear in brochures create the greatest fear when the receiver is: a) high in adventurousness and the schema triggered is a complex one, or b) low in adventurousness and the schema triggered is a simple one.

4) Targeting the child creates the highest risk likelihood estimates when: a) the receiver is high in rebelliousness without children, or b) when the source is a newspaper and the schema triggered is complex one.

5) Targeting the child creates the greatest fear when: a) the schema triggered is a complex one, or b) rebelliousness is high.

6) Targeting the adult creates the highest likelihood estimates when the receiver is: a) generally a low risk taker with children, b) low in rebelliousness with children, or, c) high in rebelliousness without children, and d) targeting the adult creates the highest fear when the receiver is low in rebelliousness.

7. Generally, messages that make risk comparisons triggering a highly complex risk schema will generate higher estimates of risk likelihood and fear than will those that trigger schemas of low complexity. Also, women will respond with higher fear and likelihood reports than will men.

8. Risk-taking tendencies interact with complexity of the schema triggered, the message source, the threat target, the receiver's gender and whether or not there are children who can be threatened by the risk. It is essential to understand these interactions in order to develop effective messages for those who vary in these risk-taking tendencies.

Generalizations about risk communication usually do not take into account individual differences for different publics. Attempts at such general guidelines about how to communicate risk have understandably lead to complaints about conflicting directives and contradictory perspectives. We realize that the findings presented here are also inconclusive and need further validation, but we believe that what these findings give risk communicators a better understanding of individual traits that directly affect how risk messages are received

References

Allman, W. F. (1985, October). Staying alive in the 20th century. Science 85, pp. 31-41.

Ames, B. N. (1983). Dietary carcinogens and anticarcinogens. Science, 221, 1256.

Ames, B. N., Magaw, R. & Gold, L. S. (1987). Ranking possible carcinogenic hazards. Science, 236, 267-270.

Brewer, W. R. & Nakamura, G. V. (1984). The nature and function of schemas. In R. S. Wyer & T. K. Srull (Eds.) Handbook of social cognition. Hillsdale, N. J. Lawrence Erlbaum Associates.

Covello, V. T. (1987). Risk comparisons, risk communication, and public perceptions of risk: Issues and approaches. Draft of unpublished manuscript, Risk Assessment Program, National Science Foundation, Washington, D.C.

Covello, V. T., vonWinterfeldt, D. & Slovic, P. (1987). Communicating scientific information about health and environmental risks: problems and opportunities from a social and behavioral perspective. In V. Covello, A. Moghissi, & V. R. R. Uppuluri (Eds.), Uncertainties in risk assessment and risk management. New York: Plenum Press.

Crouch, E. & Wilson, R. (1982), Risk/benefit analysis. Cambridge, Mass.: Ballinger.

Eysenck, S. B., & Eysenck, H. J. (1977). The place of impulsiveness in the dimensional system of personality description. British Journal of Social and Clinical psychology, 16, 57-68.

Fischhoff, B., Lichtenstein, S., Slovic, P., Derby, S. & Keeney, R. (1981), Acceptable risk. New York: Cambridge University Press.

Fiske, S. T., & Linville, P. W. (1980). What does the concept schema buy us? Personality and Social Psychology Bulletin, 6, 543-557.

Fiske, S. T., & Taylor, S. E. (1984). Social cognition. Reading, MA: Addison-Wesley Publishing Co.

Hastie, R., Park, B. & Weber, R. (1984). Social memory. In R. S. Wyer & T. K. Srull (Eds.), Handbook of social cognition, (pp. 151-212). Hillsdale, NJ: Lawrence Erlbaum Associates.

Holyoak, K. J. & Gordon, P. D. (1984). Information processing and social cognition. In R. S. Wyer & T. K. Srull (Eds.), Handbook of social cognition, (pp. 39-70). Hillsdale, NJ: Lawrence Erlbaum Associates.

Isen, A. M., Means, B., Patrick, R. & Nowicki, G. (1982) Some factors influencing decision-making strategy and risk taking. In M. S. Clark & S. T. Fiske (Eds.), Affect and cognition (pp.243-261). Hillsdale, NJ: Lawrence Erlbaum Associates.

Janis, I. L. (1962). Psychological effects of warnings. In G. W. Baker & E./ W. Chapman (Eds.). Man and society in disaster. New York: Basic Books.

Janis, I. L. (1982). Stress, attitudes, and decisions. New York: Praeger Prints.

Johnson, F. R. & Luken, R. A. (1987). Radon risk information and voluntary protection: Evidence from a natural experiment. Risk analysis, 7, 97-107.

Lamm, H., Myers, D. C. & Ochsmann, R. (1976). On predicting induced shifts toward risk or caution: A second look at some experiments. Psychologische Beitrage, 18, 288-296.

Lave, L. (1981). The strategy of social regulation. Washington: The Brookings Institution.

Lawless, E. W., Jones, M. V., & Jones, R. M. (1984). Comparative risk assessment: Towards an analytical framework. Unpublished manuscript, Kansas City: Midwest Research Institute.

Leventhal, H. (1970). Findings and theory in the study of fear communications. In L. Berkowitz (Ed.) Advances in experimental social psychology, Vol. 5. New York: Academic Press.

Leventhal, H. (1986). Health psychology: A social psychological perspective. In L. Berkowitz (Ed.) A survey of social psychology (3rd ed.), (pp. 448-476). New York: Holt, Rinehart & Winston.

Mazur, A. and Hall, G. (1987). Effects of Social Influence and Objective Risk on Response to Radon. Unpublished manuscript, Onondaga County (NY): Syracuse University.

McNeil, B. J., Pauker, S. G., Sox, H. C., & Tversky, A. (1982). On the elicitation of preferences for alternative therapies. New England Journal of Medicine, 306, 1259-1262.

Petty, R. E. & Cacioppo, J . T. (1986) The elaboration likelihood model of persuasion, in L. Berkowitz (Ed.), Advances in experimental social psychology, (Vol. 19). New York: Academic Press.

Petty, R. E. and Cacioppo, J. T. (1981). Attitudes and Persuasion: Classic and Contemporary Approaches. Dubuque, Iowa: Wm. C. Brown Co.

Pruitt, D. G. (1971a). Choice shifts in group discussion : An introductory review. Journal of Personality and Social Psychology, 20, 339-360.

Pruitt, D. G. (1971b). Conclusions: Toward an understand of choice styles in group discussions. Journal of Personality and Social Psychology, 26, 495-510.

Radon detectors: How to find out if your house has a radon problem. (1987, July). Consumer Reports, pp. 440-447.

Pegna. J. (1986, May/June). Assessing risk: Making toxics acceptable. Science for the People, pp. 12-27.

Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitudes changes: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.). Social psychophysiology. New York: Guilford Press.

Sandman, P. M. (1985). Getting to maybe: Some communications aspects of siting hazardous waste facilities. Seton Hall Legislative Journal, 2, 437-465.

Sandman, P. M. (1986). Explaining environmental risk. Office of Toxic Substances, U. S. Environmental Protection Agency, Washington, D. C.

Sharlin, H. I. (1987). EDB: A case study in the communication of health risk. In B. B. Johnson & V. Covello (Eds.), The social and cultural construction of risk. Boston: Reidel.

Slovic, P. (1969). Differential effects of real versus hypothetical payoffs on choices among gambles. Journal of Experimental Psychology, 80, 434-437

Slovic, P. (1987) Perception of risk. Science, 236, 280-285.

Slovic, P. and Fischhoff, B. (1982). How safe is safe enough? Determinants of perceived and acceptable risk. In Gould & Walker (Eds.), Too hot to handle. New Haven: Yale University Press.

Slovic, P., Fischhoff, B. & Lichtenstein, S. (1980). Facts and Fears: Understanding Perceived Risk. In R. Schwing & W. Albers, Jrs., Societal Risk Assessment (pp. 181-216). New York: Plenum.

Slovic, P., Fischhoff, B. & Lichtenstein S. (1982). Facts versus fears: Understanding perceived risk. In D. Kahneman, P. Slovic and A. Tversky, Judgment under uncertainty: Heuristics and biases (pp. 463-489). Cambridge: Cambridge University Press.

Slovic, P., Fischhoff, B. & Lichtenstein S. (1986). Informing the public about the risks from ionizing radiation. In H. R. Arkes & K. R. Hammonds (Eds.), Judgment and decision making (pp. 114-126). Cambridge: Cambridge University Press.

Smith, V. K., Desvousges, W. D. & Fisher, A. (1987). Communicating radon risk effectively: A mid-course evaluation. Office of Policy Analysis, U. S. Environmental Protection Agency, Washington, D. C.

Stallen, P.J. & Coppock, R. (1987). About Risk Communication and Risky Communication. Risk Analysis, 7, 413-414.

Starr, C. (1969). Social benefit versus technological risk. Science, 165, 1232-1238.

Streufert, S. (1986). Individual differences in risk taking. Journal of Applied Social Psychology, 16, 482-497.

Streufert, S., Streufert, S. C., & Denson, A. L. (1983). Information load stress risk taking and physiological responsivity in a visual-motor task. Journal of Applied Social Psychology, 13, 145-163.

Tolan, J. (1987, September). Editorial comment. Health Physics Society Newsletter, p. 2.

Tversky, A. & Kahneman, D. (1974). Judgment Under Uncertainty: Heuristics and Biases, Science, 175, 1124-31.

Vlek, C., & Stallen, P. (1980). Rational and personal aspects of risk. Acta Psychologica, 45, 273-300.

Weinstein, N. D. (1980). Unrealistic optimism about future life event. Journal of Personality and Social Psychology, 39, 806-820.

Weinstein, N. D. (1984). Why it won't happen to me: Perceptions of risk factors and susceptibility. Health Psychology, 3, 431-457.

Weinstein, N. D., Sandman, P. M. & Klotz, M. L. (1987). Public response to the risk from radon. Division of Environmental Quality, New Jersey Department of Environmental Protection, Trenton, N.J.

Wilson, R. (1979). Analyzing the daily risks of life, Technology Review, 81, 40-46.

Wilson, R. (1987). Risk assessment and comparisons: An introduction, Science, 236, 267-270.

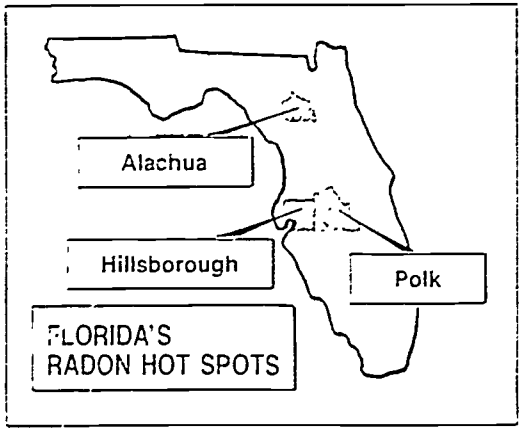
Zuckerman, M. (1979). Sensation seeking: Beyond the optimal level of arousal. New York: Wiley .

RADON: INVISIBLE AND DANGEROUS

TALLAHASSEE—John and Judith Toner discovered something frightening about their home recently. They found out that the air in it could kill them.

A recently completed survey of Florida homes uncovered unsafe levels of radon in 35 counties. Topping the list of areas with radon above the federally recommended safe levels are Polk, Alachua and Hillsborough.

"People worry about radiation coming from nuclear power plants, but we didn't think about radon gas inside our own home."



WHAT IS RADON

Radon is a radioactive gas produced by the natural decay of uranium in rocks and soil. Radon has no color, no odor, no taste. You can't see, smell, taste, feel or in any way sense radon's presence.

The Environmental Protection Agency reports outdoor air contains radon, but the gas only becomes a health threat when it builds up in tightly closed areas such as a home. How and where a home is built determine whether a radon problem potential exists, according to EPA officials.

The most important consideration is the amount of radon in the ground. Radon in the soil can seep through cracks in foundations or settling drains and accumulate to dangerous levels.

The EPA has set a guideline of 4 picocuries per liter as the level at which homeowners should act to reduce radon levels. A picocurie is a measurement of radiation.

RADON CAUSES LUNG CANCER

The EPA and the Centers for Disease Control estimate that 5,000 to 20,000 deaths each year are caused by radon. Radon is the second leading cause of lung cancer and the leading cause of lung cancer among nonsmokers.

Homes in several Florida counties measured above 6 picocuries per liter—more than twice the federal standard. These counties are Alachua, Citrus, Columbia, Hillsborough, Leon, Marion, Polk and Sumter.

Counties were tested for radon and rated based on several factors including residential surveys, soil tests, uranium detection and geological analysis.

Radon results from a natural breakdown (radioactive decay) of uranium in rocks and soil. Since it is a gas, radon can move through small spaces. Radon gets into a home through wet water cracks in the foundation or loops for electrical wiring or pipes.

Reducing the level of radon in a home can be as easy as opening windows, patching up cracks or installing fans to ventilate the crawl space under the home. In some cases, however, reducing radon can be costly.

"Radon problems can vary dramatically from one area to another, even between homes next door to each other," an EPA spokesperson commented. "Testing is recommended for every homeowner in areas where radon is identified as a potential problem."

RISK INCREASES OVER TIME

According to experts, people exposed to 4 picocuries of radon for 70 years would have a lung cancer rate of one out of 50. Lung cancer does not usually show up in people younger than 45.

The Toners, who live in one of the counties at the top of Florida's high radon levels list, are concerned.

"People worry about radiation coming from nuclear power plants, but we didn't think about radon gas inside our own home," John Toner said.

Since you cannot see or smell radon, special equipment is needed to detect it. The two most popular radon detectors are charcoal canisters and alpha track detectors. The air in your home is monitored for a specified time and sent to a laboratory for analysis.

Information about radon is available from the Florida Department of Health and Rehabilitative Services, P.O. Box 1549, Orlando, Florida 32802.

RADON: invisible and dangerous

[illegible] recently [illegible]

[illegible] of radon in 16 [illegible] with radon at [illegible] levels are [illegible]

> "People worry about the dangers of smoking or having too many X-rays, but we didn't think about radon gas inside our own home."

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The Environmental Protection Agency (EPA) has set a guideline of 4 picocuries per liter as the level at which homeowners should act to reduce radon levels. A picocurie is a measurement of radiation.

Exposure to 4 picocuries is the equivalent of smoking about eight cigarettes a day. Indoor radon at a level of 4 picocuries presents a greater health risk than getting 200 chest X-rays in one year.

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Homes in several Florida counties measured above 8 picocuries per liter—more than twice the federal standard. These counties are Alachua, Citrus, Columbia, Hillsborough, Leon, Marion, Polk and Sumter.

[illegible]

[illegible] radon can move through small spaces. Radon gets into a home through [illegible] wall cracks [illegible] the construction [illegible] holes for electrical wiring [illegible] pipes.

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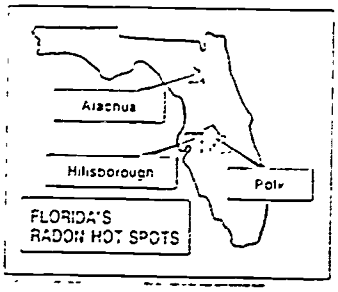

CHILDREN AT RISK

According to experts, children are more at risk from the hazards of radon than adults. Children's metabolism is more rapid. They tend to breathe faster. Children's lungs are in the early stages of physical development. This makes exposure to health threats more potentially harmful.

The Toners, who live with their two children in one of the counties at the top of Florida's high radon levels list, are concerned.

"People worry about the dangers of smoking or having too many X-rays, but we didn't think about radon gas inside our own home," John Toner said.

[illegible] laboratory for analysis.

[illegible] the following steps are recommended:

- ☑ Contact your local County Health Department or the State Department of Health and Rehabilitative Services (HRS) for a list of companies in your area that test for radon.
- ☑ Contact a company to test.
- ☑ Arrange for short term testing in your home.
- ☑ If test results show low measurement levels of radon, you may decide to stop here.
  - ☑ If test results show medium levels of radon, arrange for longer term measurements, or go on to the last step.
  - ☑ If test results show high levels of radon, arrange for longer term measurements or go on to the last step.
- ☑ Arrange to have radon levels reduced in your home and consider continued monitoring.

You can reach HRS at:
Florida Department of Health and Rehabilitative Services
P.O. Box 15490
Orlando, FL 32858
(305) 297-2095

Or, you may contact the Environmental Protection Agency (EPA) at:
US EPA
Radon Action Program
401 M S. SW
Washington, D.C. 20460

Source: The State of Florida Program for Radon Information