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Communicating Risks: Examining Hazard and Outrage in Multiple Contexts

Kenneth Lachlan^{1,*} and Patric R. Spence²

This article examines the heuristic value of a model of risk communication outlined by Peter Sandman. It tests and expands the proposed constructs and seeks to establish a measurement model. Results in the first laboratory study indicated congruence between the model and data, while the second demonstrated the capacity for manipulation of the constructs. A field study then extended the measurement model in both scope and usefulness by demonstrating its utility in an applied setting. Descriptive analyses indicate differences in perceptions of risk on the basis of sex and race. Implications for the use of the model are discussed.

KEY WORDS: Hazard; measurement; outrage; psychometrics; risk communication

1. INTRODUCTION

How people understand and react to risk messages has become an increasing area of research interest over the past decade. Several theories and models have been developed to better explain the public's reaction to such messages.^(1–4) Fischhoff⁽⁵⁾ outlines seven stages of the evolution of the risk communication along with common problems newcomers to the field encounter. He argues that the first two developmental states of communicating a risk revolve around calculating the probability of a risk and providing the public with the calculations. This approach has several shortcomings, most notably in that a public that is continually exposed to a risk may become resilient to messages concerning that risk. Additionally, affected publics are not uniform in several areas such as needs, ability to comprehend,

media dependencies, and willingness to trust. Therefore, risk communication must go beyond identifying a risk and alerting the public with a single announcement. Often, the product of a calculated risk is delivered to the public in a numerical form close to that in which they were originally produced. Effective risk communication must take those numbers and transform them for the use of different publics with different needs and comprehensions. A risk by itself has a measure of uncertainty and uncertainty is natural; however, risk communication is an uncertainty reducing device and targeted messages must not add to the uncertainty experienced by the public.

The third developmental stage of risk communication identified by Fischhoff⁽⁵⁾ argues that risk communication focused on explaining what is meant by the numbers. Similar shortcomings manifest with such approaches because of demographic, psychographic, and personological features of a heterogeneous public. Thus in communicating a risk, the communication must move past simply focusing on the cognitive aspects of the risk. Once the numbers are crunched, *and* those numbers are communicated to the public, *and* the public has received them, *and* understands them, the communication must then

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outline appropriate actions for the targeted public. This involves taking the unfamiliar and comparing it to the familiar. The public needs information about both the risks and the benefits of any activity that might affect them both positively and negatively. The fourth and fifth developmental stages focused on making comparisons between risks and outlining the cost and benefits of actions. Cognitively assessing a risk and the benefits of alternative actions raises issues analogous to those confronted when estimating risks. A shelter in place message may be more effective if it presents how easy the action is and the benefits to one's immediate family compared to the risks of attempting to evacuate. Explicitly outlining the cumulative benefits of a protective measure may enhance its attractiveness, even though they can be inferred directly from its short-term benefits.

The sixth and seventh developmental stages presented by Fischhoff continue to be audience focused. The need for a suitable demeanor is increasingly being recognized in risk communication. Communicating with clarity and concern for the public is essential. This continues with explaining the benefits of the actions to be taken but also involves placing the messages in trusted media, using opinion leaders and trusted communication networks to disseminate messages. Furthermore, making the selected audience partners in the process can aid in the communication of risk. This can be done in the development stage through gathering information about demographic factors and even geographic norms, but possibly partnership is better after a message has been designed and before its communicated. As Fischhoff⁽⁵⁾ notes, partnerships are essential to creating the human relations needed to damp the social amplification of minor risks—as well as to generate concern where it is warranted. Such collaborative partnerships allow for more targeted and coordinated messages and activities.

One widely cited perspective proposed by Peter Sandman⁽⁶⁾ is consistent with Fischhoff's notions of contemporary thought on crisis communication, as it suggests that crisis and risk communication should ideally attempt to create levels of knowledge acquisition and affective response that are appropriate for the situation. This assertion is stated through the formula $\text{Risk} = \text{Hazard} + \text{Outrage}$. If an affected public does not understand the nature of a risk, then it needs to be educated. If it understands the hazard, then an appropriate degree of negative affect must be induced; enough to motivate action, but not lead to antisocial behavior.

Sandman further explicates hazard as the technical assessment of a risk, while outrage is the cultural assessment.⁽⁷⁾ The correlation between hazard and outrage in a given circumstance may actually be quite low. In this article the conceptualization of outrage is extended to include reactions to risk information; outrage is therefore action that is specific and nonroutine. This may include both remedial actions and emotional factors such as need for control, trust, and responsiveness.

From this explanation four potential categories of crisis or risk emerge. First, it is possible a risk may present great potential for harm but fail to upset many; this is described as high hazard/low outrage risk. Second, there are risks that upset people when in actuality, the risk of harm is quite low, which may lead affected public to take unnecessary precautions, and is qualified as a low hazard/high outrage risk. Ideally, risk messages should induce enough fear that the audience will take appropriate actions, but not so much as to induce unnecessary panic or the avoidance of low risk actions. Third, risks may be serious, high in potential harm, and create outrage among those affected; Sandman characterizes this as high hazard/high outrage. While a strong outrage response to a very real threat is often ideal, care still must be taken in message preparation to prevent overreactions. Finally, there are low hazard/low outrage risks; these risks pose little actual threat, and fail to upset many.

While Sandman's model of risk, hazard, and outrage provides a useful heuristic tool to understand message design and effectiveness, previous research utilizing this model has relied largely on the assumption of these factors, rather than providing an accurate measurement model. It is the goal, therefore, of this study to develop and validate instrumentation measuring the constructs of hazard and outrage, with the hope that these tools could be used in future research to assess audience characteristics and inform crisis and risk message design. A scale that is both valid and reliable will provide useful information for both practitioners and scholars regarding a variety of crisis situations.

2. CONSTRUCT DEVELOPMENT

As a model, $\text{Risk} = \text{Hazard} + \text{Outrage}$ differs from past audience-based crisis communication models and theories, such as the CERC model,⁽²⁾ the public opinion model,⁽³⁾ and situational crisis communication theory.⁽⁹⁾ It also differs from past research

in risk communication, which has focused largely on fear.⁽²⁾ It attempts to examine both cognitive and affective responses to risks through examining elaboration by the message receiver, rather than depending on fear alone as a motivator. Other audience-based responses that focus primarily on fear are limited by variation across and within subpopulations in terms of what may invoke fear and the responses that are likely associated with fear. Furthermore, much of this literature implicitly rests on the assumption that any manipulation of emotion to a negative or potentially harmful event can be qualified as fear.^(10,11)

Fortunately, more recent research in risk communication has moved beyond the simple induction of fear. Trumbo and McComas⁽¹²⁾ note that a psychometric approach to the conceptualization of risk has produced consistent results in a variety of contexts. Specifically, this body of research has demonstrated that risk responses can be categorized as falling into two dimensions of risk space: knowledge and dread.⁽¹³⁾ Dread can be conceptualized as the likelihood that a risk poses harm to uninvolved individuals, while knowledge is typically used to refer to describe the extent to which a risk is understood by those whom it may affect. Some research has argued for a third dimension of risk, positing that the number of people affected by a risk may constitute an additional component.^(12,14) In any case, Trumbo and others argue that a psychometric approach to identifying risk space can be used to assess audience response, and provide associated instrumentation to estimate this space.^(15,16)

Sandman's Risk = Hazard + Outrage model echoes this research, as it allows for the examination of multifaceted responses, and relies on perceptions that include not only fear, but alarm and perceptions of magnitude and probability. In fact, Sandman has explicitly stated that he built the Risk = Hazard + Outrage model on psychometric research in risk assessment, but worked to conceptually incorporate affective responses to risk along with the cognitive elements germane to the psychometric paradigm. To an extent one could equate hazard with knowledge, and outrage with dread. Sandman, Miller, Johnston, and Weinstein, however, argue that the outrage component of their model may be composed of distinct, multifaceted variables.⁽⁷⁾ These variables may include, but are not limited to, anger, suspicion, fear, distrust, and contempt.

Not only is the consideration of affective factors a critical component of Sandman's work, but more recent research in risk assessment suggests that af-

fect is an essential component of the experience of risk. Finucane, Alhakami, Slovic, and Johnson argue for the omnipresence of an *affective heuristic*, that to an extent all representations of objects and events are tagged with affective components that will affect decision making.⁽¹⁷⁾ This stems from earlier research suggesting that we tag images with affective assessments, which may drive subsequent behavior.^(18,19) Generally speaking, the affective heuristic argument posits that when objects or events are "liked" they are judged as being lower in risk and higher in reward, while "disliked" objects and events are seen as higher risk and lower in reward.⁽²⁰⁾ It is not difficult to see how the components of outrage identified by Sandman, Miller, Johnston, and Weinstein, if tagged onto a potential risk, would moderate risk perceptions and would likely lead individuals to overestimate risk.

The argument for an affective heuristic is consistent with other research programs in cognitive psychology that has indicated that affective responses may be critical in risk or threat assessment. Johnson and Tversky, for example, found that people in negative moods were likely to report greater perceived risks associated with certain potential causes of death.⁽²¹⁾ Lerner and Keltner⁽²²⁾ add that different negative emotions may moderate threat assessments in different ways, particularly if those negative emotions stem from different perspectives of perceived control; this "appraisal tendency" perspective argues that negative emotions may be indicative of different levels of perceived control, and that lower levels of perceived control may lead to increased perceptions of risk.⁽²³⁾

If the arguments of Sandman and colleagues are valid—that the elements, such as anger, fear, and distrust will affect the extent to which risk is perceived—then it is critical that a psychometric approach to the measurement of risk tap into negative affect in order to understand the interplay of the two. Moreover, the inclusion of outrage allows for the consideration of both emotional and behavioral responses, which may provide more information for evaluating message effectiveness. This may allow for the specification of cultural and demographic audience characteristics that will influence these responses, and inform the tailoring of specific crisis messages for specific audiences.

2.1. Managing Negative Audience Responses

Furthermore, the consideration of negative affective responses on the part of the general public

is consistent with past scholarship in the communication literature. In fact, a long history of communication scholarship has examined the processes of image restoration and the negation of negative affect or hostility among affected audience members during times of crisis.⁽²⁴⁾

Drawing on earlier research in crisis management,^(25,26) Benoit and colleagues have over the years developed image restoration theory, in which a number of expected responses on the part of the general public can be expected when organizational blame is involved. These responses can be counteracted with any one of a number of message strategies.^(24,27) Essentially, this program of research argues that following a crisis or emergency, perceptions become more important than reality in anticipating and managing negative responses by the public; in other words, an organization may or may not be responsible, but if the public perceives responsibility then any associated negative affect must be addressed.

Image restoration theory has offered a number of strategies for dealing with audience outrage, which can be broadly lumped under one of five categories.⁽²⁸⁾ The first of these is denial, in which an organization may either claim that it is not responsible or shift blame, and argue that someone else is responsible. A second broad category is evasion of responsibility, in which organizations or individuals may make any one of a number of arguments in which they admit committing an act but not fault. They may also make any one of a number of arguments in an attempt to reduce the perceived offensiveness of the incident. Finally, they may neutralize hostile audience responses through corrective action or simply by issuing an apology (called *mortification* in IRT terms).

While this scholarship has proven valuable to crisis practitioners, it has been developed entirely through the use of case studies and rhetorical analyses, thus making generalizations across crises or events difficult at best.⁽²⁸⁾ This disconnect between theorizing and observation in the social world is also evident in Sandman's work on hazard and outrage.

While the framework provided by Sandman may be a useful heuristic tool to understand message design and effectiveness, previous research utilizing this model has relied largely on the assumption of these factors, which is problematic for the social scientist. Furthermore, developing an empirical system of measuring hazard and outrage may help crisis practitioners know when to focus their efforts on informing audiences of the nature of risks, and when to

enact image restoration strategies in an attempt to diffuse outrage on the part of the public. This research takes the model of risk messages proposed by Sandman and attempts to validate it through empirical methods. Sandman's model has strong face validity, meaning that it intuitively reflects the constructs as defined. Its consideration of affective components is consistent both with contemporary thinking on crisis management and with a long nonempirical tradition of communication scholarship. This article aims to determine if the model (and by default the developed scale) measures the proposed attributes (a form of content validity). Furthermore, it aims to examine the predictive validity of the model.

2.2. Previous Item Development

Past research in the psychometric paradigm on which Sandman built the Risk = Hazard + Outrage model have largely attempted to map the cognitive space in which certain risks exist. In other words, they have attempted to develop taxonomies for understanding risk along particular continua.⁽²⁹⁾ These studies have generally placed different risks in multidimensional space, such as dread versus level of knowledge of the risk⁽³⁰⁾ or level of harm versus level of control.⁽³¹⁾ While these studies have proven immensely valuable in categorizing risks along easy to understand taxonomies, the aim of this study is to develop a measurement system whose primary aim is to categorize audience response, as opposed to categorizing the risk itself. By taking a psychometric approach grounded more in personality psychology and assessment,⁽³²⁾ the current measurement system aims to evaluate audience responses along the cognitive and affective responses outlined in the Risk = Hazard + Outrage model.

Lachlan and Spence⁽³³⁾ made an initial attempt at a measurement system of this kind in a survey given to 964 Katrina refugees who had been relocated to shelters in Cape Cod, Massachusetts, Lansing, Michigan, and federal aid distribution centers throughout Texas. In this particular data collection, scale length was a concern given that the instrument was embedded in a larger survey. Therefore, Lachlan and Spence⁽³³⁾ aimed to develop a simple set of situation-specific items, which took the form of a 13-item measure, with 7 hazard items and 6 outrage items. Each item included a five-point semantic differential scale ranging from "not at all" to "very much." An exploratory factor analysis (EFA) with principal components extraction was first performed

to test for the expected two-factor structure, followed by confirmatory factor analysis (CFA) using both centroid and maximum likelihood models. All three analyses supported the two-factor model proposed by Sandman. Reliability analyses produced coefficient alphas of $\alpha = 0.80$ for the outrage factor and $\alpha = 0.88$ for the hazard items. A series of descriptive analyses were then performed to demonstrate the utility of the scale.

Though they argue for evidence that the factors of Sandman's model can be measured in field research, Lachlan and Spence⁽³³⁾ caution that the items they developed were specific to the situation, and were not necessarily adaptable to multiple crisis communication scenarios. Furthermore, they offer that future scale validation efforts should attempt to not only explore the measurability of these constructs in multiple settings, but develop instrumentation that can be easily adapted to multiple settings with the changing of only a few words. This would allow for a multiuse scale that could be adapted to many crisis scenarios, and potentially provide crisis communication practitioners with valuable insight into the responses of those directly affected.

Numerous factors were taken into consideration when developing the initial set of items for these studies (see Table I). In attempting to capture hazard, efforts were made to ensure that items pertaining to different types of threats that might be germane to particular crises were included. These included threats to life, health, assets and property, emotional and psychological harm, quality of life, and social capital. In developing the items for outrage, consideration was taken in ensuring that the components of anger, suspicion, fear, distrust, and contempt (as identified by Sandman, Miller, Johnston, and Weinstein) were represented in the items.

2.3. The Current Studies

To take up this charge, three studies were conducted. The first two studies were conducted in laboratory settings, first to check for the successful measurement of the constructs and to subsequently evaluate the extent to which they can be manipulated by messages. The third study then tested the utility of the scale in a naturalistic setting, using statistical evidence from the first two studies to arrive at a 16-item scale that may be easily adapted to varying crisis situations. Testing the model in both contexts is useful. First, the experimental condition allows for more scientific rigor through the use of experimental control.

Validity threats such as respondent fatigue or testing effects are reduced in an experimental setting.⁽³⁴⁾ Second, the field study offers evidence of ecological validity, examining the extent to which the theoretical assumptions manifest as they would in natural settings.⁽³⁵⁾

3. STUDY 1

Based on the findings by Lachlan and Spence,⁽³³⁾ a definitive attempt was made to produce a balanced scale with an equal number of hazard and outrage items, as well as expand the length of the scale in order to improve the overall assessment of outrage and hazard. To this end, a total of 49 items were developed with the intention of phrasing the items in such a way that one or two words could be changed for the sake of adaptability. From this initial group of 49 items, an EFA was used to reduce the scale, and confirmatory factor analyses were once again performed using both CFA.BAS⁽³⁶⁾ and AMOS 4.0⁽³⁷⁾ in order to verify or refute the factor structure of the EFA.

3.1. Procedure

A total of 271 undergraduate communication majors were recruited from introductory classes at a mid-size university in the northeast. Participants entered a laboratory in groups ranging in size from 15 to 20. After completing consent forms, they were asked to read a short description of a fictitious environmental accident. The description was presented as a newspaper clipping, and described an incident in which an intoxicated oil truck driver overturned and crashed into a highway median, releasing 700 gallons of crude oil into the local water supply. Participants were asked to imagine they lived in the town in which the spill took place, and to respond to the hazard and outrage items accordingly (see Table I for a list of all items).

3.2. Exploratory Factor Analysis

In order to explore the component structure of the 49-item scale and select items for a balanced scale, an EFA using principal components analysis was conducted using SPSS. Surprisingly, the EFA suggested a three-factor solution, as the 16 expected hazard items loaded on the first factor, but the outrage items seemed to fall into two separate eight-item solutions. Upon reexamining the items, outrage

Table 1. Study 1: All Items in EFA Analysis**Hazard Items**

1. I believed that the oil spill could have killed me
2. I was afraid that the oil spill might lead me to lose my home
3. It looked as though people were going to get hurt by the oil spill
4. I didn't think the oil spill was going to kill anyone
5. I was afraid people would be emotionally devastated by the oil spill
6. Losing my assets was a big concern during the oil spill
7. I felt that the oil spill could have resulted in a reduced quality of life for others
8. I was worried about what people would think about our community after the oil spill
9. I felt that the oil spill could cause emotional harm to a friend or loved one
10. I figured the oil spill wasn't likely to hurt anyone
11. I feared that the oil spill had the potential to damage my property
12. I feared that a loved one might die as a result of the oil spill
13. I saw no reason why the oil spill would destroy anything that belonged to me
14. I felt as though my safety was in jeopardy during the oil spill
15. I felt that the oil spill threatened the lives of others
16. I didn't think I could cope with the oil spill personally
17. I feared a lot of people would lose money during the oil spill
18. I did not feel that the oil spill placed my life in danger
19. I figured the oil spill wasn't anything I couldn't handle
20. I was worried that the oil spill could damage the property of others
21. I felt that the oil spill could cause me emotional harm
22. It looked like a lot of people would get shaken up by the oil spill
23. The oil spill looked like it was going to disrupt the community as a whole
24. I felt that the oil spill could have resulted in a reduction in my quality of life
25. I was concerned that a lot of people might suffer from the oil spill
26. I felt that the oil spill was likely to cause personal monetary loss
27. Before yesterday's oil spill I didn't think an oil spill would change things much
28. The oil spill looked as though it was going to destroy the community
29. I felt that the oil spill was likely to cause monetary loss for others

Outrage Items

30. I didn't think people would look at Anytown any differently after the oil spill
31. The oil spill caused me to lose faith in other people
32. It looked as though a lot of people became very cynical because of the oil spill
33. I am angry about the oil spill
34. There is no need to bring anyone to justice for the oil spill
35. I would be unlikely to take any action in response to the oil spill
36. Other people are going to take the law into their own hands when it comes to responding to the oil spill
37. The oil spill has rightly destroyed the reputation of KAL Oil and Energy
38. In spite of the oil spill my faith in humanity has not weakened
39. I do not feel angry about the oil spill
40. Someone has to pay for the oil spill
41. I feel as though I need to do something myself about the oil spill
42. Things like this oil spill bring out the best in people
43. Outrage at the oil spill is an irrational response
44. My faith in people was shaken by the oil spill
45. Others will exact revenge for the oil spill
46. I feel compelled to take action in the wake of the oil spill
47. The oil spill made me look at people in a more negative way
48. The oil spill demonstrates that humanity had taken a turn for the worse
49. I think KAL Oil and Energy are looked at no differently than they were before the oil spill

items that described personal emotional responses loaded on one factor (blame outrage), while outrage items tapping responses to events loaded on another (event outrage). Eigenvalues of 12.48 were detected for the hazard items, 3.80 for the event outrage items, and 2.88 at the blame outrage items. The hazard fac-

tor accounted for 25.4% of the total variance in the model, event outrage accounted for 7.76%, and personal outrage accounted for 5.89%. Scale reliability analyses indicated $\alpha = 0.91$ for the hazard factor items, $\alpha = 0.78$ for the event outrage factor, and $\alpha = 0.77$ for factor tapping outrage at people.

Table II. Study 1: Item Factor Loadings and Alpha Reliabilities in Centroid Analysis

	Factor 1	Factor 2	Factor 3
Hazard Items			
3. It looked as though people were going to get hurt by the oil spill	0.55	0.22	0.28
5. I was afraid people would be emotionally devastated by the oil spill	0.58	0.32	0.31
6. Losing my assets was a big concern during the oil spill	0.57	0.16	0.25
9. I felt that the oil spill could cause emotional harm to a friend or loved one	0.59	0.24	0.33
10. I figured the oil spill wasn't likely to hurt anyone	0.61	0.42	0.19
12. I feared that a loved one might die as a result of the oil spill	0.61	0.11	0.29
13. I saw no reason why the oil spill would destroy anything that belonged to me	0.58	0.39	0.14
14. I felt as though my safety was in jeopardy during the oil spill	0.70	0.24	0.37
15. I felt that the oil spill threatened the lives of others	0.64	0.25	0.22
21. I felt that the oil spill could cause me emotional harm	0.70	0.35	0.43
22. It looked like a lot of people would get shaken up by the oil spill	0.68	0.41	0.27
23. The oil spill looked like it was going to disrupt the community as a whole	0.59	0.45	0.25
24. I felt that the oil spill could have resulted in a reduction in my quality of life	0.63	0.48	0.36
25. I was concerned that a lot of people might suffer from the oil spill	0.79	0.56	0.36
26. I felt that the oil spill was likely to cause personal monetary loss	0.63	0.35	0.33
28. The oil spill looked as though it was going to destroy the community	0.66	0.31	0.49
Event Outrage Items			
30. I didn't think people would look at Anytown any differently after the oil spill	0.43	0.47	0.21
33. I am angry about the oil spill	0.51	0.66	0.45
34. There is no need to bring anyone to justice for the oil spill	0.12	0.50	0.03
37. The oil spill has rightly destroyed the reputation of KAL Oil and Energy	0.27	0.47	0.31
39. I do not feel angry about the oil spill	0.52	0.79	0.42
40. Someone has to pay for the oil spill	0.12	0.49	0.02
43. Outrage at the oil spill is an irrational response	0.22	0.58	0.14
49. I think KAL Oil and Energy are looked at no differently than they were before the oil spill	0.19	0.56	0.10
Blame Outrage Items			
31. The oil spill caused me to lose faith in other people	0.29	0.20	0.58
32. It looked as though a lot of people became very cynical because of the oil spill	0.23	0.25	0.43
36. Other people are going to take the law into their own hands when it comes to responding to the oil spill	0.21	0.06	0.48
38. In spite of the oil spill my faith in humanity has not weakened	0.32	0.26	0.54
44. My faith in people was shaken by the oil spill	0.31	0.30	0.71
45. Others will exact revenge for the oil spill	0.17	0.12	0.46
47. The oil spill made me look at people in a more negative way	0.30	0.31	0.81
48. The oil spill demonstrates that humanity had taken a turn for the worse	0.35	0.16	0.64

3.3. Confirmatory Factor Analyses

3.3.1. Centroid Analysis

Given the rather unexpected EFA finding that the items produced a three-factor solution, further confirmatory analyses attempted to confirm both the originally proposed two-factor solution and the detected three-item solution, using the 32 items that were suggested by the EFA. In this case, the CFA produced some evidence that the three-factor solution may be a better fit for the data. While both solutions produced fairly acceptable factor loadings and reliability scores, the error terms in the two-factor solution appeared problematic, as did negative interitem correlations within the singular outrage fac-

tor. The three-factor solution produced acceptable reliability scores for hazard, $\alpha = 0.90$, event outrage, $\alpha = 0.76$, and outrage at people, $\alpha = 0.75$ (labeled blame outrage), as well as error terms and within-factor correlations that were fairly acceptable (see Table II). Factor loadings for the three-factor solution were also generally higher, ranging from 0.43 to 0.81. This was interpreted as initial evidence that the three-factor model was a better representation of the factor structure within the data.

3.3.2. Maximum Likelihood Analysis

The data were once again subject to CFA in AMOS 4.0⁽³⁷⁾ using a maximum likelihood solution,

Table III. Study 1: Standardized Regression Weights in ML Model

	Regression Weight
Hazard Items	
3. It looked as though people were going to get hurt by the oil spill	0.59
5. I was afraid people would be emotionally devastated by the oil spill	0.56
6. Losing my assets was a big concern during the oil spill	0.55
9. I felt that the oil spill could cause emotional harm to a friend or loved one	0.58
10. I figured the oil spill wasn't likely to hurt anyone	0.63
12. I feared that a loved one might die as a result of the oil spill	0.60
13. I saw no reason why the oil spill would destroy anything that belonged to me	0.57
14. I felt as though my safety was in jeopardy during the oil spill	0.71
15. I felt that the oil spill threatened the lives of others	0.65
21. I felt that the oil spill could cause me emotional harm	0.70
22. It looked like a lot of people would get shaken up by the oil spill	0.64
23. The oil spill looked like it was going to disrupt the community as a whole	0.58
24. I felt that the oil spill could have resulted in a reduction in my quality of life	0.67
25. I was concerned that a lot of people might suffer from the oil spill	0.81
26. I felt that the oil spill was likely to cause personal monetary loss	0.61
28. The oil spill looked as though it was going to destroy the community	0.67
Event Outrage Items	
30. I didn't think people would look at Anytown any differently after the oil spill	0.37
33. I am angry about the oil spill	0.49
34. There is no need to bring anyone to justice for the oil spill	0.36
37. The oil spill has rightly destroyed the reputation of KAL Oil and Energy	0.78
39. I do not feel angry about the oil spill	0.87
40. Someone has to pay for the oil spill	0.32
43. Outrage at the oil spill is an irrational response	0.51
49. I think KAL Oil and Energy are looked at no differently than they were before the oil spill	0.42
Blame Outrage Items	
31. The oil spill caused me to lose faith in other people	0.61
32. It looked as though a lot of people became very cynical because of the oil spill	0.45
36. Other people are going to take the law into their own hands when it comes to responding to the oil spill	0.44
38. In spite of the oil spill my faith in humanity has not weakened	0.59
44. My faith in people was shaken by the oil spill	0.71
45. Others will exact revenge for the oil spill	0.43
47. The oil spill made me look at people in a more negative way	0.81
48. The oil spill demonstrates that humanity had taken a turn for the worse	0.66

in this case to produce comparable diagnostic statistics between the two proposed models. Once again, the analyses indicate that the three-factor solution is a slightly better fit for the data (see Table III). This determination can be made by observing the individual factor loadings and goodness-of-fit tests. Goodness-of-fit measures for the two-factor model produced $\chi^2/df = 3.55$, RMSEA = 0.10. Goodness-of-fit statistics for the three-factor solution were slightly better, $\chi^2/df = 2.93$, RMSEA = 0.08. Furthermore, there were a substantial number of unacceptably low factor loadings in the two-factor solution.

3.4. Descriptive Analyses

A set of descriptive analyses were then performed to illustrate the utility of the measurement

model. In this case the improved three-factor model including hazard and separate factors for outrage related to event and blame outrage. In the hypothetical scenario administered in a laboratory setting (oil spill), several observations can be made. Differences were detected between men and women for all three factors, as women expressed greater perception of hazard, $t(260) = 2.29$, $p < 0.02$, event outrage, $t(260) = 2.24$, $p < 0.03$, and marginally significant results were detected for blame outrage, $t(260) = 1.87$, $p < 0.06$. One-way ANOVA analyses across race on the three-factor model revealed no differences for perceptions of hazard, but differences emerged for both event outrage, $F(2, 259) = 3.50$, $p < .03$, and blame outrage, $F(2, 259) = 3.31$, $p < 0.007$. Bonferroni *post hoc* tests suggested that under these circumstances, African Americans expressed less event outrage than Caucasians, $p < 0.009$, and less blame

outrage than either Caucasians, $p < 0.005$, or those of other ethnicities, $p < 0.03$.

4. STUDY 2: RESPONSES TO HIV MESSAGES

Based on the results of Study 1, it was decided that a second study was necessary for three reasons. First, to replicate the 32-item measurement model suggested by Study 1. Second, to conduct a second test of the three-factor model to see if the outrage items would once again fall into separate factors for people and events. Third, the study was conducted to see if the factor structure would hold in a laboratory procedure in which the intended constructs were manipulated.

4.1. Procedure

Four different written HIV prevention messages were developed for use in the study. Each was designed to induce hazard and outrage, consistent with the four potential conditions described above (high hazard/high outrage, high hazard/low outrage, low hazard/high outrage, low hazard/low outrage). Written manipulations have proven effective in past research in inducing these varying levels of hazard and outrage.⁽³⁸⁾

A total of 360 undergraduates were recruited from a small college in the Midwest and a medium-size university in the Northeast. Participants were asked to fill out a survey that began with the HIV risk message,³ intended to induce hazard and outrage regarding HIV prevention. After reading the written HIV prevention message, participants were asked to complete a series of 32 items from the hazard/outrage scale.⁴ CFA was conducted on the hazard/outrage scale using AMOS 4.0.⁽³⁷⁾ Support was found for the two-factor model of hazard and outrage originally reported in Lachlan and Spence,⁽³³⁾ $\chi^2/df = 3.78$, RMSEA = 0.08. However, CFA diagnostics seemed to suggest that the three-factor model might be a slightly better fit for the data, $\chi^2/df = 3.22$, RMSEA = 0.07. Examination of the factor loadings for the two models also seems to lend support to the three-factor model (see Table IV). Reliability analyses indicated $\alpha = 0.82$ for the hazard factor items,

$\alpha = 0.71$ for the event outrage factor, and $\alpha = 0.76$ for blame outrage.

4.2. Manipulating Hazard and Outrage

The impact of the hazard and outrage manipulation was tested using a series of ANOVA analyses. First, a 2×2 ANOVA was conducted examining the impact of message hazard and outrage on perceived hazard on the part of the participants. Statistically significant effects were detected for both message hazard, $F(1,355) = 15.09$, $p < 0.001$, $\eta^2 = 0.04$, and message outrage, $F(1,355) = 5.86$, $p < 0.02$, $\eta^2 = 0.02$. An examination of the marginal means indicates that the hazard induction was effective, as the means for the high hazard ($M = 4.97$) and low hazard ($M = 4.65$) fell in the expected direction.

The 2×2 analysis was then repeated for both event outrage and outrage at people as the dependent variables. The results of these analyses were also rather unexpected. For both outrage factors, the high outrage conditions did not produce mean scores that were significantly higher for audience outrage than did the low outrage message, though the means fell in the expected direction. However, main effects were detected for hazard. High hazard messages ($M = 4.56$) produced higher levels of event outrage than did low hazard messages ($M = 4.40$), $F(1,355) = 4.22$, $p < 0.04$, $\eta^2 = 0.02$. They also produced higher levels ($M = 3.39$) of blame outrage than did low hazard messages ($M = 3.19$), $F(1,355) = 6.20$, $p < 0.01$, $\eta^2 = 0.02$. The results present at least preliminary evidence that hazard and outrage can not only be measured in an experimental setting, but that message construction may be able to manipulate hazard and outrage reactions. Furthermore, it should be noted that these inductions were successful using only very simple written messages, and that they were effective regarding a topic toward which people tend to have longstanding opinions and dispositions.

5. STUDY 3: URBAN BRIDGE COLLAPSE

Finally, it was determined that the 32-item scale was ready for testing in a naturalistic environment. An initial attempt was made to test the scale by recruiting participants from a community threatened by a potential dam breach in Western Kentucky. In January 2007, the Army Corps of Engineers began lowering the water level on Lake Cumberland, fearing that the Wolf Creek Dam could break and cause major flooding throughout a large

³The message scripts have been omitted from this section due to space considerations, but are available by request from the authors.

⁴Additional data were also collected for use in another study.

Table IV. Study 2: Standardized Regression Weights in ML Model

	Regression Weight
Hazard Items	
1. It looked as though people were going to get hurt by HIV	0.43
2. I was afraid people would be emotionally devastated by HIV	0.67
3. Losing my assets as a result of HIV was a big concern	0.36
4. I felt that HIV could cause emotional harm to a friend or loved one	0.68
5. I figured HIV wasn't likely to hurt anyone	0.31
6. I feared that a loved one might die as a result of HIV	0.40
7. I saw no reason why HIV would destroy anything that belonged to me	0.30
8. I felt as though my safety was in jeopardy from HIV	0.29
9. I felt that HIV threatened the lives of others	0.52
10. I felt that HIV could cause me emotional harm	0.68
11. It looked like a lot of people would get shaken up by HIV	0.73
12. HIV looked like it was going to disrupt the community as a whole	0.64
13. I felt that HIV could have resulted in a reduction in my quality of life	0.46
14. I was concerned that a lot of people might suffer from HIV	0.59
15. I felt that HIV was likely to cause personal monetary loss	0.37
16. HIV looked as though it was going to destroy the community	0.54
Event Outrage Items	
17. I didn't think people would look at others with HIV any differently	0.30
20. I am angry about HIV	0.77
21. There is no need to bring anyone to justice for HIV	0.30
23. Having HIV can destroy someone's reputation	0.32
25. I do not feel angry about HIV	0.79
26. Someone has to pay for HIV	0.30
27. Outrage at HIV is an irrational response	0.40
32. I think people with HIV are looked at no differently than they were before they became infected	0.37
Blame Outrage Items	
18. The threat of HIV caused me to lose faith in other people	0.56
19. It looked as though a lot of people became very cynical because of HIV	0.39
22. Other people are going to take the law into their own hands when it comes to responding to HIV	0.32
24. In spite of the threat of HIV my faith in humanity has not weakened	0.50
28. My faith in people was shaken by the threat of HIV	0.64
29. Others will exact revenge if infected with HIV	0.41
30. HIV made me look at people in a more negative way	0.70
31. HIV demonstrates that humanity has taken a turn for the worse	0.67

portion of Southern Kentucky and Tennessee. Engineers had detected that water was seeping slowly under the base of the dam, and estimated that a failure of the dam would flood communities downstream along the Cumberland River, including major urban centers in and around Nashville, Tennessee. The resultant damage of such a break has been estimated at \$3.4 billion, to say nothing of the loss of life, interruption to infrastructure, and water-borne illnesses that would also likely accompany such an incident. To examine hazard and outrage responses to related to emergency messages about the dam break, an electronic version of the survey was created and distributed to students from a large public university in the area. Participants were selected from the subject pool based on their home addresses; those whose home address fell into one of the five counties potentially affected by a dam breach were deemed eligible.

However, in the face of this impending crisis, the challenges to data collection originally aired by Lachlan and Spence⁽³³⁾ became apparent once again: subject fatigue was a major problem. Even though over 100 participants responded to the survey, less than half completed the entire 32-item questionnaire, which was placed toward the end of the instrument. Thus, it was determined that the scale should be reduced by an equal and proportionate degree in order to reduce subject fatigue in field settings. To do this, the factor loadings from Study 1 were examined. Based on this information, the scale was reduced in half. A total of eight hazard items were selected, along with four "event" outrage items and four "blame" outrage items. These items were selected based on their factor loadings in the original three-factor model. This then allowed the implementation of a new, reduced 16-item scale.

On August 1, 2007, sections of a 1,907-foot bridge fell into the Mississippi River and onto roadways below in Minneapolis, Minnesota, killing 11. Though under renovation, the bridge was crowded with rush hour traffic, and dozens of vehicles fell with the bridge, while others nearby scrambled for safety. Located in Hennepin County, the north-south bridge connected the Minneapolis neighborhoods of Downtown East and Marcy-Holmes. The concrete and steel bridge buckled suddenly under the weight of heavy traffic; it is estimated that 100 vehicles were on the bridge at the time of the collapse.⁽³⁹⁾

5.1. Survey and Participants

Over the course of seven days following the bridge collapse, surveys were collected from Minneapolis residents using a convenience sample. Participants were recruited in public venues and were self-selected. The gender split was 42% female and 58% male. Approximately 7% of the respondents were under the age of 20, 56% between the ages of 20 and 29, 17% between 30 and 39, 11% were between 40 and 49, and 9% over 50. A total of 166 usable surveys were collected. The surveys included the reduced 16-item hazard and outrage scale, along with items pertaining to demographic attributes.

As in Study 2, CFA was conducted on the scale using AMOS 4.0.⁽³⁷⁾ The results once again support the notion of a three-factor model of hazard and outrage. Like Study 2, diagnostic statistics and fac-

tor loadings seemed to suggest that the three-factor model is a slightly better fit for the data, $\chi^2/df = 2.42$, RMSEA = 0.09 (see Table V). Reliability analyses indicated $\alpha = 0.71$ for the hazard factor items, $\alpha = 0.74$ for the event outrage factor, and $\alpha = 0.78$ for outrage at people.

Exploratory analyses similar to those in the first study were then conducted. Within the sample, women ($M = 5.05$) expressed higher levels of perceived hazard than did men ($M = 4.46$), $t(163) = 4.97$, $p < 0.001$, while event and blame outrage did not vary between the sexes. One-way ANOVA analyses failed to reveal significant race differences for any of the three factors.

6. GENERAL DISCUSSION

Results in all three studies indicate the presence of the anticipated dimensions of risk manifesting in hazard and outrage. The study extended the notion that these constructs are measurable by loading in an internally consistent and reliable manner in a laboratory setting. The items, now revised for use in multiple situations with a few wording changes, held together fairly well. Furthermore, the exploratory findings from this data set are consistent with the arguments forwarded by Lachlan and Spence⁽³³⁾ that the dimensions of hazard and outrage may vary across subpopulations. In this instance, women were more inclined to express outrage than men, while African Americans were less inclined to express

Table V. Study 3: Standardized Regression Weights in ML Model

	Regression Weight
Hazard Items	
1. I figured the bridge collapse wasn't likely to hurt anyone	0.38
2. I felt as though my safety was in jeopardy during the bridge collapse	0.37
3. I felt that the bridge collapse threatened the lives of others	0.54
4. I felt that the bridge collapse could cause me emotional harm	0.82
5. It looked like a lot of people would get shaken up by the bridge collapse	0.86
6. I felt that the bridge collapse could have resulted in a reduction in my quality of life	0.38
7. I was concerned that a lot of people might suffer from the bridge collapse	0.65
8. The bridge collapse looked as though it was going to damage the community	0.33
Event Outrage Items	
10. I am angry about the bridge collapse	0.88
11. The bridge collapse could destroy our community's reputation	0.50
12. I do not feel angry about the bridge collapse	0.77
13. Outrage at the bridge collapse is an irrational response	0.47
Blame Outrage Items	
9. The bridge collapse caused me to lose faith in other people	0.86
14. My faith in people was shaken by the bridge collapse	0.77
15. The bridge collapse made me look at people in a more negative way	0.75
16. The bridge collapse demonstrates that humanity had taken a turn for the worse	0.46

outrage than were Caucasians. Study 2 provided evidence that the constructs could be manipulated in a laboratory setting, using only written manipulations; this suggests that the measurement system may be successful in evaluating audience responses that will change given the parameters of an incident. Study 3 extended these findings to a field setting, and once again indicated that discrepancies in response across subpopulations may manifest, as women indicated higher levels of perceived hazard and outrage in a field setting.

However, perhaps the most significant finding from this series of studies involves the conceptualization and measurement of outrage. Outrage, which is defined as the cultural seriousness of a risk, appears to be composed of two dimensions. The first is considered to be an event-specific outrage. The conceptualization of outrage was extended in this article from Sandman's⁽⁴⁰⁾ definition to more specifically encompass how people react to the risk information received and can include both specific actions taken and emotional factors such as need for control, trust, and responsiveness. This is event-specific outrage, where people need information to address the cultural seriousness of the risk and look for directions upon how to act.

However, as past studies have shown, many people have the need to place blame for the manifestation of a crisis, inadequate responses to a crisis,^(1,41,42) or the failure to appropriately construct and disseminate risk messages. This may represent what we have labeled blame outrage. Although this distinction between the two manifestations of outrage was not part of the initial model development, it does work well with past literature and does not change the assumptions of the model. Furthermore, across all three studies CFA provided support for two dimensions of outrage.

This is not, however, the first study to entertain the idea that outrage might be composed of multiple components. Sandman, Miller, Johnson, and Weinstein⁽⁷⁾ suggested that outrage may refer to a wide range of variables. In their three-study article, outrage was manipulated using agency courtesy versus contemptuousness, responsiveness versus unresponsiveness, and secretness versus openness. They further argue that communicator behavior, community response, and the interaction between the two may be conceptually distinct.

We would argue that our findings are somewhat consistent with these notions, though our factor structure for outrage indicates negative affect that ei-

ther is (blame outrage) or is not (event outrage) attributable to the communicator. We agree with Sandman and colleagues' argument that outrage may affect risk perception; in fact, the results from Study 2 indicate that the higher levels of both event and blame outrage were associated with higher perceived hazards. While Sandman and colleagues argue for multiple, distinct, and highly varied components of outrage, we would posit that at the very least these outrage components can be clustered into elements that either are or are not attributable to some responsible party. We do, however, agree with their argument that risk communication research needs to go beyond examining the manifestation of the favors in scales and measurement systems to further explore their impact on audience reactions, in both laboratory and field settings.

Blame outrage needs future study, as this may be a response in which outrage can become negative and lead to antisocial responses. In this dimension of outrage, people are not looking for information to aid in their recovery from a risk or crisis, nor are they looking for information about how to prepare for a future occurrence. This outrage is aimed at those responsible for the occurrence, and although this can be prosocial (if it motivates one to take remedial action) it is also potentially negative (if it leads to antisocial behavior).

Crisis communication practitioners and government officials should be especially cognizant of whether or not a risk or emergency event contains components that would lead members of the public to respond with blame outrage. While the distinction between negative affect that is or is not directed at responsible parties is in desperate need of empirical examination, it would follow logically that blame outrage may be more likely to lead to irrational or destructive responses than would event outrage. Thus, in instances in which blame outrage may take place, the model should be interpreted in such a way as to diffuse blame outrage, even at the expense of addressing event outrage. In plain terms, if a group or organization can be held accountable, then communication efforts should prioritize the image restoration of the responsible party in order to reduce the possibility of negative responses on the part of the public.

6.1. Addressing Hazard and Outrage

Results for the descriptive analysis also start to point researchers in directions concerning the

usefulness of the model and the need for more precise risk messages. In their initial attempt at measuring hazard and outrage, Lachlan and Spence⁽³³⁾ noted that African Americans expressed more outrage, but reported lower perception of the hazards posed by Hurricane Katrina. They argue that differences in outrage may be attributable to cultural differences in perceptions and trust of public officials, and thus are important for risk message design. This suggests that crisis and risk messages knowingly should attempt to address cultural differences in communication response in order to make messages more effective in their reduction of outrage.

The current data offer more evidence that audience characteristics may be critical when crafting crisis messages. Gender differences detected in both the first and third studies indicated that women perceived the event as more hazardous, and the results of Study 1 suggest that they expressed more event outrage. Past research has noted that women are more fearful of risks^(43–45) and that after risk messages or crisis events women tend to display prosocial actions such as seeking information for immediately needed supplies, reduction of harm and safety of others;⁽⁴⁶⁾ alternately, men tend to exhibit fewer prosocial actions, looking for information about who is to blame and what was the cause. One component of event outrage is taking the appropriate actions; a careful examination of information needs based on sex reveals that not only do communicators need to appeal to specific perceptions of safety and physical necessities during crisis events, but must tailor these messages to varying audiences in order to obtain the best results. Given the pattern of results from this study and past research from 9/11, messages of preparation and safety precautions may be most effective if they are targeted toward women, and should include messages focusing on family safety.⁽⁴⁶⁾ Current messages (such as Ready.gov) are very general and appear to be undifferentiated in terms of a target audience.

6.2. Message Design

Through examining hazard and outrage manifestations risk and crisis messages can be more effectively tailored for the public. Messages before a crisis or high-risk event must first address that the hazard is real. These messages must also address the individuals need for specific information about the hazard.⁽³⁹⁾ What most people are looking for during a crisis or in risk messages are cues concerning the way to react

and actions to take. Often, after an individual has obtained the desired information he/she will continue to scan the media seeking repetition of that message, additional clarification, or new information. In fact, monitoring the media is typically recommended by emergency management professionals. FEMA encourages the public to include battery operated radios in emergency kits. In a study of the 9/11 attacks, researchers found that respondents watched an average of eight hours of television and reported television as useful for obtaining information coverage the day of the event.⁽⁴⁶⁾ These type of media use behaviors may be explained in at least two ways; first, that repeated exposure to the message works as a calming agent to reduce the high level of uncertainty associated with an atypical event. Second, it might be an attempt to reduce dissonance experienced by the person involved. Therefore, it is important for crisis communication practitioners not only to create messages that address the appropriate level of hazard for the event, but also to repeat that message. Furthermore, the messages must be produced in such a way as to encourage event outrage and to not foster blame outrage.

Hazard, the perception of danger posed by a crisis, appears to be a fairly unidimensional construct and one that can be measured easily. Outrage, on the other hand, is more subtle and complex. In particular, the larger number of outrage items developed in the second study appeared to fall into two separate factors, which were labeled “event outrage” and “blame outrage.” Put another way, negative affective responses to a crisis and negative affective responses to those responsible for or responding to a crisis may not be the same thing. Message practitioners crafting crisis communication messages may do well to consider these separate factors and assess the degree of outrage that must be induced or neutralized for both the disaster itself and associated human elements.

Repeated measurement of the hazard and outrage constructs under varying crisis conditions may also help create a roadmap for crisis communication practitioners in developing response strategies. If the information generated from such field testing can produce replicable results, then crisis managers may be able to better anticipate audience responses across these three factors, and the extent to which each needs to be addressed. In returning to Sandman’s model, there is a time to address hazard and a time to address outrage. Thus, under conditions in which the public can be expected to be underinformed about the dangers presented by a risk,

practitioners can focus on informing the public. If event outrage is paramount, efforts can focus on reducing needless anxiety. If blame outrage presents itself as a critical component, then communication efforts can perhaps focus on the image restoration strategies offered by the work of Benoit and colleagues. Regardless, by taking all the three factors into consideration, or at the very least considering multiple targets of outrage, crisis communication practitioners may be able to operate more effectively.

6.3. Limitations

As with any study, there are important limitations that should be considered in interpreting these results. Although the construct validity of the scale was supported in each study through CFA and reliability estimates, it was not feasible to address other validity concerns such as criterion and discriminant validity. In the first two studies experimental limitations exist. For example, in the first study respondents were asked to react to a hypothetical event. Furthermore, the samples were made up of college students, which in itself raises issues of generalizability. However, this limitation may be somewhat tempered by the support found for the measurement model in the field in Study 3.

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