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# Rumor Acceptance during Public Health Crises: Testing the Emotional Congruence Hypothesis

KILHOE NA, R. KELLY GARRETT, and MICHAEL D. SLATER

*School of Communication, The Ohio State University, Columbus, OH, USA*

Rumors pose a significant challenge to officials combatting a public health crisis. The flow of unsubstantiated and often inaccurate information can dilute the effects of more accurate messaging. Understanding why rumors thrive in this context is a crucial first step to constraining them. We propose a novel mechanism for explaining rumor acceptance during a health crisis, arguing that the congruence between one's emotional state and the emotion induced by a rumor leads people to believe the rumor. Data collected using a novel experimental design provide preliminary evidence for our emotional congruence hypothesis. Participants who felt *angry* were more likely to accept *anger-inducing* rumors than those who were not angry. We discuss the implications of this insight for public health officials combatting rumors during a health crisis.

Rumors pose a serious threat to public welfare in the face of health-related crises (Center for Disease Control and Prevention, 2014; Xiaoxia, Jiajia, & Haiju, 2016). False claims that are accepted or shared without evidence can lead to poor decisions, and they can undermine public health officials' efforts to control a crisis (Garnett & Kouzmin, 2007; Robinson & Newstetter, 2003). Emotions, which run high in times of crisis, contribute to this problem. Crises by definition create high levels of uncertainty (Sellnow & Seeger, 2013) and anxiety (Rosnow, 1980, 1991). In the absence of information, individuals may believe, or even construct, rumors in order to manage uncertainty and anxiety (G. W. Allport & Postman, [1947] 1965; Martin, Abend, Sedikides, & Green, 1997; Shibutani, 1966). Research has further shown that individuals who are anxious are more likely to transmit a rumor to others because it gives vent to or expresses their affective state (e.g., Anthony, 1973; Pezzo & Beckstead, 2006).

We suggest that emotion contributes to the acceptance and sharing of rumors in another way. We argue that the *congruence* between one's emotional state and the emotion evoked by a rumor leads people to believe the rumor. From this point of view, angry people are more likely to believe anger-inducing rumors, fearful people are more likely to believe fear-inducing rumors, etc.

In order to test this prediction, we introduce a novel approach to studying the flow of health information during a health crisis. We use an information board design, more common in studies of political communication (e.g., Redlawsk, 2002), to test the effect of emotional congruence on rumor belief. "Rumor is an ephemeral transaction," as Shibutani (1966) pointed out (p. 148), making it hard to study in the field. At the same time, however, the artificial nature of a typical lab experiment can reduce emotional engagement associated with rumors. We attempt to resolve these issues by constructing a game-like environment where participants were challenged to make the best decisions possible based on information presented during a hypothetical health crisis, including rumors, statements from public health organizations, and news coverage.

## Theoretical Framework

Rumors refer to unverified information that does not have "secure standards of evidence" (G. W. Allport & Postman, [1947] 1965; p. ix; DiFonzo & Bordia, 2007). They thrive in uncertain or ambiguous environments, where people struggle to make effective decisions despite an absence of reliable information. If formal news channels, such as the news media, fail to provide a coherent explanation of events, people will often construct their own explanation based on whatever information they have available. Rumors are the result (Shibutani, 1966).

According to DiFonzo, Bordia, and Rosnow (1994), there are three stages of rumoring: generation, evaluation, and dissemination. While emotions, especially anxiety, have been of scholarly interest in both the generation and dissemination stages of rumoring (e.g., Rosnow, 1991; Walker & Beckerle, 1987), relatively little is known about the role of emotion in the rumor *evaluation* stage.

### *Emotion and Judgment*

Affect or feelings have long been recognized as an important factor in judgment and decision-making. People use *affect as a heuristic* to assess the risk associated with an object (Slovic, 2016; Slovic, Finucane, Peters, & MacGregor, 2007). Affect,

Address correspondence to Kilhoe Na, School of Communication, The Ohio State University, Derby Hall 3016, 154 North Oval Mall, Columbus, OH 43210, USA, E-mail: na.81@osu.edu

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the "quality of goodness or badness of" an object or issue, guides perceptions of risk and benefit of the object or issue (Slovic et al., p. 1333). Specifically, if the overall affective evaluation is positive, the risk perception is reduced; if negative, the risk perception is increased. *Feelings-as-information theory* (Schwarz, 2012) addresses the role of feelings in judgment. It postulates that people use feelings as a source of information when they make a judgment. However, people do not rely on feelings when other information is available and perceived as more valuable. During crises, which are often characterized by a lack of reliable information, emotion may be especially influential.

Clearly, people's emotions influence their judgments, but our argument goes farther. Much like the Message Convergence Framework (MCF; Anthony & Sellnow, 2016; Anthony, Sellnow, & Millner, 2013), we emphasize the importance of consistency when predicting message acceptance. Where the MCF focuses on content consistency across multiple messages, however, our model is concerned with congruence between situational and rumor-induced emotions. Next, we consider two mechanisms that lead us to expect this relationship: processing fluency and misattribution.

### *Processing Fluency and Judgment*

Processing fluency has important implications for how people decide what is true. The feeling-as-information theory posits that *processing fluency*, the ease or difficulty of processing new information, affects judgments of truth (Schwarz, 2012). Specifically, when people can easily process a new piece of information, they are more likely to accept the information as true than when they have difficulty processing the information. For example, the Illusory Truth Effect, in which repeated exposure to rumors leads people to believe they are true, is mediated by processing fluency (DiFonzo, Beckstead, Stupak, & Walders, 2016).

Congruence between an individual's emotional state and the emotions induced by stimuli also influences perceptual fluency (Niedenthal & Setterlund, 1994). For example, one study found that when participants feel happy, their performance on a lexical decision task was better when the words were related to happiness than they were related to other emotions. We infer from these findings that congruence of emotions and the judgment task will increase perceptual fluency.

If congruence between an individual's emotion about a crisis and the emotion induced by a rumor about the crisis increases processing fluency—if it helps people process the rumor more easily—then individuals are more likely to accept rumors when the two emotions are congruent. For example, when facing a health crisis related to a pandemic virus, a woman who feels fearful is more likely to believe a rumor suggesting that women are uniquely susceptible to the virus than a rumor suggesting that women are immune to it.

### *Misattribution and Judgment*

People use emotions to assess truth status, sometimes interpreting incidental emotion as judgment-relevant evidence. Research has shown that people often misattribute affective states (i.e., mood and discrete emotions) to their judgments (see Damasio, 2005; Schwarz, 2012; Schwarz & Clore, 2007). For example, individuals tend to be more trusting when they are induced to be happy than when induced to be angry (Dunn & Schweitzer, 2005). Facing complex judgment tasks, individuals will sometimes rely on their affective state as an indicator of what is true. For example, faced with a rumor that would be frightening if true, the individual might ask himself, "Do I feel frightened?" Regardless of what actually caused the emotion, if the answer is yes, the individual is more likely to accept the rumor as true.

In sum, when one evaluates a rumor, if the emotion induced by the rumor is congruent with his or her existing emotion, it can be easily processed, making it more likely to be accepted. Moreover, rumor evaluations might result from misattribution of mood or discrete emotions, so that congruence between the emotions evoked by a rumor and existing emotions render the rumor more believable. Assessment of these mediating mechanisms is beyond the scope of this paper; instead, the present study provides an initial test of the congruence hypothesis. As the first step in testing this argument, we use anger as the target emotion. Specifically, we hypothesize that *angry people will be more likely to accept anger-inducing rumors than those who are not angry (H1)*.

## Method

### *Participants*

We conducted an online experiment to test our prediction. Participants were recruited with support from Qualtrics Panels using an online panels managed by Federated/Lucid. The sample consisted of 303 adults living in the United States (154 females, 50.8%) with the mean age of 51.74 ($SD = 15.38$). The racial/ethnic distribution was 69.6% Caucasian, 11.2% African-American, 4.3% Asian-American, 11.6% Hispanic, and 3.3% others. Participants were randomly assigned to one of two experimental conditions: anger ($n = 153$) or no anger ($n = 150$).

### *Design and Procedure*

How individuals respond to rumors is powerfully influenced by the rumors' topical importance and the individuals' outcome-relevant involvement (G. W. Allport & Postman, [1947] 1965; Rosnow, 1988b, 1991). Individuals pay little attention to rumors that have no bearing on them. It was critical that the study simulates the rumors' topical importance. In order to increase participants' engagement with the rumor assessment task, we used a novel experimental design. We created a "game" in which participants were exposed to several waves of information about a fictional pandemic called New Respiratory Syndrome (NRS).

We told participants, whom we referred to as "players", that the choices they made during the game would be used to assess their performance, expressed as their likelihood of surviving the pandemic had it been real. When introducing the game, we asked participants to name three people who were important to them. We then told them that their in-game decisions would influence both their own well-being and that of the three people named. This was intended to make participants take the game more seriously, which should in turn increase their outcome-relevant involvement.

The game consisted of three rounds. In each round, participants read at least two different types of information: a news

article and a Facebook post. Each news article provided information about the federal government's response to the disease, and was used to manipulate emotion. In the control condition, the federal response was characterized as cautious and appropriate, while in the anger condition the response was characterized as inept. The Facebook posts included an unverified claim —a rumor—which participants were then asked to evaluate. In the first two rounds, participants were also presented with an announcement from the CDC describing the status of the disease and of the medical system's response to it.

In each round, after reading all the information including the rumor, participants were asked to evaluate the rumor. At the end of each round, participants were also asked to rate their level of trust in the medical system. Figure 1 illustrates the overall flow of the game.

### *Stimuli*

#### *Emotion Manipulation*

We manipulated emotion in two ways. First, before beginning the game we asked participants to read one of two news articles about Ebola. Both articles concerned the death of the first Ebola victim in the U.S., but they differed in how they described it. In the anger condition, the article accused the hospital in which he was treated of mishandling his case, while in the control condition, the article characterized his treatment as exemplary. During gameplay, we reinforced the induction by presenting "breaking news" articles related to the game scenario. In the anger condition, these messages emphasized ways in which the response to the disease was being mismanaged (see Figure 2 for an example and the Supporting Online Material for others).

We pretested all stimuli using Amazon's Mechanical Turk ($n$ = 102 and 100 respectively), asking participants to indicate the extent to which each article made them feel angry and resentful (among other emotions) using a slider that ranged from 0 to 100, following the approach recommended by Marcus, Neuman, and MacKuen (2015). The measure of anger was created by averaging the two items. In pretesting the levels of anger induced by the news articles for the anger condition were significantly higher than those by the news articles for the no-anger condition (see Table 1).

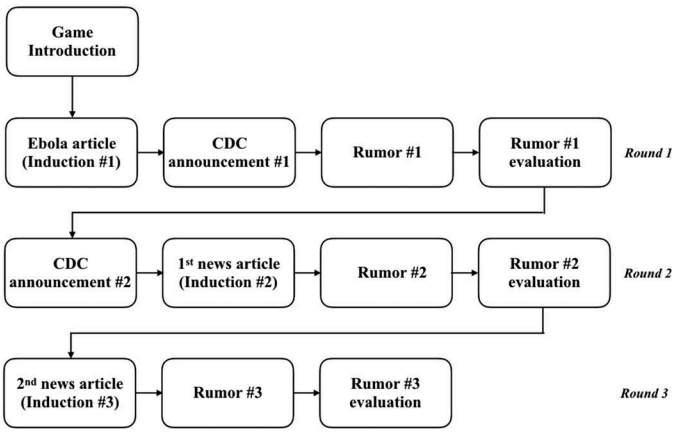


**Figure. 1.** The game flow.

#### *Rumors*

Over the course of the game, three rumors were presented as Facebook posts (see Figure 3 for an example and the Supporting Online Material for other rumors). Pretesting confirmed that these rumors were associated with anger, which was measured using the same 101-point slider used to assess the emotion manipulation. All three rumors were associated with significantly more anger than the alternative low-anger versions (see Table 1).

### *Measures*

#### *Anger*

Anger was measured once during the study, immediately following the first anger induction.[1] Participants described how well four different emotions described their current emotional state: scared, angry, resentful, and afraid. Each emotion was measured on an 11-point scale (0 = *not at all*, 10 = *very much*), and the scores for angry and resentful were averaged.

#### *Belief in Rumor*

Belief in each of the three rumors was measured with one item ("How likely do you think is that the message posted on the Facebook group is accurate?") on a 7-point scale (1 = *extremely unlikely*, 7 = *extremely likely*).

#### *Covariates*

We manipulated anger by showing news articles about Ebola and NRS. They were anger-inducing because they emphasized how mismanagement in the health care system contributed to the spread the diseases (i.e., Ebola and NRS). Similarly, the rumors used in this study also induced anger by referring to medical system shortcomings. As a consequence, it is likely that manipulation influenced both anger and trust in the health care system. In other words, the induction could have influenced reduced participants' trust in the health care system, increasing rumor belief regardless of whether the individual was angry. To test our congruence hypothesis independent of the effect of trust on belief in rumor, we control for trust in the health care system. This was measured with four items selected from Armstrong et al. (2008), including "the health care system makes too many mistakes," "the health care system covers up its mistakes," "the health care system makes too many mistakes," and "the health care system give excellent medical care." It was measured four times: before the study ($\alpha$ = .71), after the first ($\alpha$ = .77), second ($\alpha$ = .81), and third round ($\alpha$ = .83).

## Results

### *Manipulation Check*

Participants in the anger condition ($M$ = 6.80, $SD$ = 2.67) were significantly angrier than those in the no-anger condition ($M$ = 4.49, $SD$ = 2.78), $p < .001$.

### *Pre-Existing Trust in the Health Care System*

In addition to including trust in the health care system as a time-varying covariate, it was important to make sure pre-existing trust in the health care system did not influence belief in the rumors. Although we randomly assigned participants to one of the two


**Figure. 2.** Sample news articles for emotion manipulation. The article about the mutation (left) was presented to participants in the no-anger condition and the one about the cover-up was to those in the anger condition.

groups, those in one group might have a significantly higher or lower level of trust in the health care system. If it had been the case, participants' belief in rumor could have been affected not only by the emotion manipulation, but also their trust in the health care system. To guard against this possibility, we compared the levels of pre-existing trust in the health care system of the two conditions. We found that the anger condition ($M = 3.10$, $SD = 0.76$) and the no-anger condition ($M = 3.15$, $SD = 0.70$) were not statistically different from each other ($p = .36$) in terms of pre-existing trust in the health care system.

### *Hypothesis Testing*

Table 2 presents the means, standard deviations, and intercorrelations of the measured variables. Overall, anger, trust in the health care system, and belief in rumor were higher than the scale midpoints. We also observe that anger was positively related to belief in rumor and negatively to trust, and that pre-existing trust and in-game trust were strongly correlated with one another. Finally, we see that belief in each rumor was moderately correlated with belief in the others, which suggests to us that some individuals might be more prone than others to accept statements without evidence (i.e., rumors).

Data were analyzed using multilevel modeling (O'Connell & McCoach, 2008), estimated with Hierarchical Linear Modeling (HLM) software. In this study, each participant was asked to read and evaluate three different rumors across three rounds (i.e., one rumor in each round). So, these multiple reports of belief in rumor across the rounds are nested within the individual. As a result, the three rumor belief measures are not

**Table 1.** Anger in response to rumors during pretesting

| Message | Anger | No anger | Difference |
|---|---|---|---|
| Induction #1 | 46.85 (29.40) | 29.08 (27.73) | $t$ (100) = –3.14, $p$ < .01 |
| Induction #2 | 76.62 (18.60) | 47.91 (29.95) | $t$ (100) = –5.83, $p$ < .001 |
| Induction #3 | 62.46 (29.38) | 45.73 (28.28) | $t$ (98) = –2.90, $p$ < .01 |
| Rumor #1 | 51.09 (28.16) | 35.62 (26.27) | $t$ (98) = –2.84, $p$ = .005 |
| Rumor #2 | 63.86 (23.26) | 49.59 (31.06) | $t$ (99) = –2.61, $p$ = .01 |
| Rumor #3 | 55.71 (26.65) | 42.68 (29.52) | $t$ (99) = –2.33, $p$ = .02 |

*Note*: Cell values indicate *M* (*SD*). Higher values correspond to higher anger

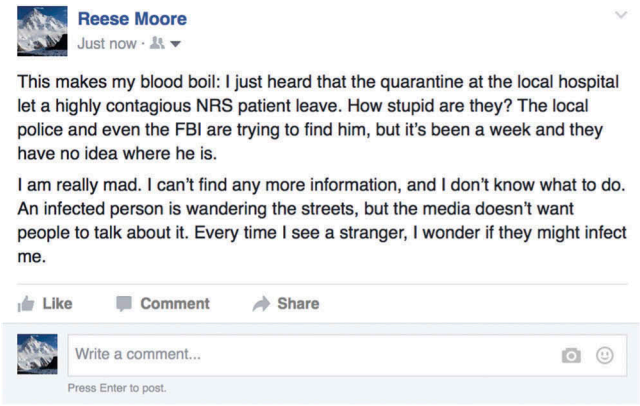


**Figure. 3.** Sample Facebook rumor.

independent. Indeed, as noted earlier, belief in one rumor was correlated with belief in another rumor. Multilevel modeling allows us to test the hypothesis using this type of data without violating the assumption of the independence of observations.

With multi-level modeling, a Level-1 model is used to describe each individual's trajectory in term of the dependent variable. However, as we did not hypothesize participants' belief in rumors would change over time, we did not include *time* or *round* in the Level-1 model.[2] We did, however, control for *trust* in the medical system, including it in the Level-1 model. The purpose of the Level-2 model was to test how belief in rumor differed depending on the level of *anger*. As we were not interested in testing the effect of *time* or *trust* on belief in rumor (i.e., slopes), the Level-2 model has *anger* as a predictor of the intercept (i.e., mean of each participant's belief in rumor).

We next compared the fit of the three different models (see Table 3). In each model, the subscript $t$ refers to the time of measurement (Level 1) and the subscript $i$ refers to the respondent (Level 2).

### *Model 1: baseline model*

The baseline model does not have any predictors (i.e., an empty or unconditional model), and is used to test whether a multi-level model is appropriate. The intraclass correlation coefficient (ICC) was .52, indicating that 52% of variance in belief in rumor was due to individual differences. This means that a significant amount of variations exist between individuals, suggesting multi-level modeling with individual-level predictors is necessary.

Level 1 equation: $Y = \pi_{0i} + e_{ti}$

Level 2 equation: $\pi_{0i} = \beta_{00} + r_{0i}$

### *Model 2: covariate only model*

The second model only has the time-varying covariate (i.e., trust in the health care system). Before we test the final model (i.e., the model with anger as predictor), we construct a covariate-only model. If the anger induction influences rumor belief, adding anger as a predictor to this model should improve the

**Table 2.** Means, standard deviations, and intercorrelations among measured variables

| Variable | *M* (*SD*) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.66 (3.00) | 1 | –.17** | –.24** | –.22** | –.22** | .28** | .25** | .26** |
| 2 | 3.11 (0.73) | | 1 | .77** | .70** | .65** | –.13* | –.05 | –.09 |
| 3 | 3.14 (0.74) | | | 1 | .87** | .82** | –.23** | –.17** | –.24** |
| 4 | 3.07 (0.79) | | | | 1 | .91** | –.25** | –.25** | –.31** |
| 5 | 3.08 (0.81) | | | | | 1 | –.28** | –.23** | –.32** |
| 6 | 4.36 (1.75) | | | | | | 1 | .47** | .46** |
| 7 | 4.34 (1.78) | | | | | | | 1 | .63** |
| 8 | 4.33 (1.88) | | | | | | | | 1 |

*Note*: Variable 1 = anger; 2 = pre-existing trust; 3 = trust after Round 1; 4 = trust after Round 2; 5 = trust after Round 3; 6 = belief in Rumor 1; 7 = belief in Rumor 2; 8 = belief in Rumor 3.

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

**Table 3.** HLM results for the models for belief in rumor

| Variable | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Level 1 | | | |
| Intercept | 4.343*** | 4.350*** | 4.346*** |
| Trust | | –0.589*** | –0.496*** |
| Level 2 | | | |
| Anger | | | 0.125*** |
| Variance components | | | |
| Intercept | 1.690*** | 1.331*** | 1.236*** |
| Trust slope | | 0.306** | 0.220 |
| Level 1 residual | 1.557 | 1.516 | 1.523 |
| Deviance (number of parameters) | 3419.558 (3) | 3380.606 (6) | 3359.818 (7) |

*Note*: Entries corresponding to the predicting variables are estimates of the fixed effects. Entries under "Variance components" are component estimates.
*$p < .05$. ** $p < 0.01$. *** $p < .001$.

model fit. In other words, if our hypothesis is supported, the final model should be better than this model.

Level 1 equation: $Y_{ti} = \pi_{0i} + \pi_{1i} * (trust_{ti} - \overline{trust}_{ti}) + e_{ti}$

Level 2 equation: $\pi_{0i} = \beta_{00} + r_{0i}$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

*Model 3: hypothesized models*

We hypothesized that participants in the anger condition will believe the anger-inducing rumors more than those in the no-anger condition. That means that we expected the treatment condition to influence the rumor beliefs both directly and indirectly, via the anger a participant experienced. Although a manipulation check confirmed that participants in the anger condition were in fact angrier than those in the control, we suspected that there would be considerable variation in how participants responded to the induction. Furthermore, our theoretical model suggests that it is the anger experienced that matters most when predicting rumor acceptance. In other words, the effect of the experimental condition may indirectly influence belief in rumor through the measured anger.

Testing the direct effect of the experimental condition on rumor beliefs, we find no evidence of a significant relationship ($\beta = 0.06$, $t(301) = 0.37$, $p = .71$). This is not particularly surprising, given the variability in responses to our manipulation and the expectation that the anger induction will only be influential among those who actually experience anger. In other words, the manipulation induces anger in some participants, but not others, and only those who are angry will be more likely to believe the anger-inducing rumors. A significant indirect path of this sort is still possible even if the direct path is non-significant.

We test the indirect relationship in two ways. First, we use a multilevel mediation test implemented in Stata, called ml_mediation, finding a significant indirect effect ($b = .31$, 95% CI: .24, .38). However, the analytic approach used in the procedure is still considered to be experimental (UCLA Institue for Digital Research and Education, n.d.). Of particular concerns, scholars have noted that the methods currently used for mediation analysis with multilevel data can *overestimate* true mediation effects (Zhang, Zyphur, & Preacher, 2009). Thus, we need a more robust test of these relationships.

Second, we test the two steps of the mediation independently. We have already shown that the manipulation was associated with higher levels of anger on average. Next, we return to using HLM to test a model in which anger, the mediator in the indirect model, predicts of belief in the anger-inducing rumors (Model 3).[3]

Level 1 equation: $Y_{ti} = \pi_{0i} + \pi_{1i} * (trust_{ti} - \overline{trust}_{ti}) + e_{ti}$

Level 2 equation: $\pi_{0i} = \beta_{00} + \beta_{01} * (anger_i - \overline{anger}_i) + r_{0i}$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

As shown in Table 3, anger was indeed a significant predictor of belief in the anger-inducing rumors after controlling for trust in the health care system ($\beta = 0.13$, $t(301) = 4.65$, $p < .001$). For example, the predicted rumor beliefs of someone with the average anger and trust was 4.34 out of 7, and this increased by 0.13 for each one unit increase in anger. In other words, those who got angrier were more likely to accept the anger-inducing rumors as true.

Furthermore, a deviance test indicates that Model 3 ($\chi^2(1) = 20.8$, $p < .05$) should be favored over Model 2. Other fit indices based on deviance, including AIC, BIC, and CAIC, also favor Model 3 (see Table 4).

## Discussion

During a health crisis, people often lack the information they need in order to fully understand the situation. To compensate, many individuals depend on their emotion as a source of information. This study aimed to test whether or not congruence between an individual's emotional state and the emotions evoked by a rumor make the individual more likely to believe the rumor. We use a novel experimental design to test this idea.

**Table 4.** Model fit indices

| | Deviance | # of parameters | AIC | BIC | CAIC |
|---|---|---|---|---|---|
| Model 1 | 3419.558 | 3 | 3425.558 | 3439.988 | 3439.988 |
| Model 2 | 3380.606 | 6 | 3392.606 | 3421.466 | 3421.466 |
| Model 3 | 3359.818 | 7 | 3373.818 | 3407.488 | 3407.488 |

Results are generally consistent with the emotional congruence hypothesis. In this test, participants who felt angry more readily accepted anger-inducing rumors than those who were not angry. We know from prior research that emotions, such as anxiety, can promote rumoring (Rosnow, 1988a, 1991), but pattern shown here is distinct. When there is congruence between an individual's current emotion and the emotion induced by a rumor, he or she is more likely accept the rumor as true, perhaps because the rumor explains the current emotion (i.e., misattribution) and/or because the rumor is easier to process (i.e., processing fluency).

People experience a wide range of emotions in the face of a crisis, notably including anxiety and fear (CDC, 2014). The current study suggests that these emotions may exacerbate crisis-related rumoring, but it also lays the groundwork for novel approaches to combatting such rumors. First, it may help to have public health officials warn people about their susceptibility to fear and anger-inducing rumors during times of crisis. This is similar to the idea of inoculation. Inoculation theory is grounded on the idea of refutational preemption, which means making people aware of flaws in arguments they might encounter before they encounter them (McGuire & Papageorgis, 1961). Inoculation has been shown to be an effective way to address both risky health behaviors and misinformation (e.g., Cook, Lewandowsky, & Ecker, 2017; Parker, Ivanov, & Compton, 2012). It remains to be seen if warning people of their biases will be as effective as providing them with counterarguments, but there is some encouraging evidence that it might work. For example, researchers have found that warning people of their emotional biases can sometimes result in less biased decision-making (Schwarz, 2012; Sinclair, Mark, & Clore, 1994).

Second, these results may also help public health officials identify which rumors are most likely to be accepted and shared. Public health organizations' resources are limited, and correcting every rumor in circulation during a crisis is impossible. Our results suggest that these organizations may want to target emotionally evocative rumors, as these rumors are more readily accepted by the public. For example, during periods of high uncertainty and fear, the public may be especially vulnerable to fear-inducing rumors.

Although these data are compatible with the congruence hypothesis, there are other possible explanations for the results. One possible alternative explanation has to do with how people experiencing a negative emotional state, such as anger, process messages. However, research has shown that negative emotions typically cause individuals to search for meaning and try to understand (Rimé, 2009), or to process persuasive information more systematically (Petty, DeSteno, & Rucker, 2001; Schwarz, Bless, & Bohner, 1991). That means that if someone is angry, he or she should be more likely to scrutinize a rumor carefully, and less likely to accept it, which is the opposite of what we find.

Another possible explanation concerns the effect of anger on risk assessment. According to the appraisal-tendency framework (Lerner & Keltner, 2001), angry people make optimistic risk assessments because they have high levels of certainty and control over a situation. As all the rumors presented to the participants in the present study could potentially affect their safety, evaluating these rumors could be closely related to risk assessments. If an individual makes an optimistic risk assessment about the health crisis used in this simulation, he or she would be less likely to believe the rumors as true. For example, one of the rumors presented in the study was that there were not enough doctors and nurses to treat the NRS patient. If anger itself, and not emotional congruence, had affected participants rumor acceptance, those in the no-anger condition should have accepted the rumors more than those in the anger condition because believing the rumor was more pessimistic. However, this is not consistent with our study result.

A final challenge to our interpretation of the results is that there might be factors other than emotion that influenced rumor beliefs. Another important predictor of rumor beliefs is attitudes toward the topic of the rumor (DiFonzo & Bordia, 2007; Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012). For example, Allport and Lepkin (1945) found that belief in rumors claiming that a rationing program for soldiers was wasteful and unfair was strongly associated with negative attitudes toward the government. Although trust in the U.S. health system influenced rumor acceptance in our study, but we still found a significant effect of the anger on rumor belief after controlling for trust in the medical system.

Our use of a simulation for this preliminary test of the emotional congruence hypothesis is another limitation. Although the experience is obviously artificial, we do not think that this undermines our results. A defining characteristic of the rumors used in the study is the same as that of real-life rumors: a lack of secure standards of evidence. Unlike other information used in the study, such as the CDC announcements and news headlines, the rumors had neither a reputable source nor corroborating evidence, meaning that participants had to form beliefs based solely on an unverified statement by an unknown speaker. We also note that participants raised no objections to assessing rumor credibility, suggesting that they were engaged in the simulation in ways that recreated some of the processing that takes place in a real-world situation. Moreover, the emotions elicited during the study are likely much weaker than those evoked by a real health crisis. Relying on the relatively modest levels of anger evoked by

our manipulation makes this a conservative test of our hypothesis. We cannot, however, exclude the possibility of some kind of unexpected curvilinear relationship in which very strong emotion no longer operates in the same way as an affective cue. We believe this is unlikely, but it is only testable in the context of a real-world breaking health crisis.

A pretest confirmed that the rumors presented in this study were anger inducing. However, a follow-up study should test the hypothesis with non anger-inducing rumors. Another limitation is that this study tested the congruence hypothesis using one specific emotion: anger. Future studies also need to test it with different emotions other than anger. For example, if the emotional congruence hypothesis holds up with other emotions, sad people will be more likely accept a sad rumor as true. Finally, it would be useful and important to test the two proposed mechanisms (i.e., misattribution and processing fluency). For example, we could test misattribution by warning people about using their emotions to evaluate given rumors. If misattribution is at play, this should reduce the congruence effect.

This study takes a new theoretical approach to understanding how emotion affects belief in rumor during health-related crises. It demonstrates that people tend to believe a rumor when their emotional state is congruent with the emotion induced by the rumor. This is an important advance over prior research examining the role emotion in rumoring. The emotional congruence hypothesis provides a novel explanation for rumor acceptance: that in the absence of hard information, rumors that are congruent with recipients' emotional states are more readily believed. It makes a substantive contribution as well; if this is indeed the case, public health officials may have a new tool for combatting rumors during a health crisis. By pointing out this bias, we may be able to limit its effect.

## Supplemental data

Supplemental data for this paper can be accessed here.

### Notes

1. Repeatedly assessing anger would draw attention to these emotions, which has been shown to undermine their influence on judgment (Schwarz, 2012).
2. Although we did not expect belief in rumor to change over time, we did test a model including *time* and found that this factor did not affect belief in rumor ($\beta = -0.01$, $t(302) = -0.24$, $p = .81$).
3. HLM software provides no test of indirect effects in multi-level models.

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## ORCID

R. Kelly Garrett http://orcid.org/0000-0001-7022-7452

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