Why people spread rumors on social media: developing and validating a multi-attribute model of online rumor dissemination

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Abstract
Purpose – Dealing with online rumors or fake information on social media is growing in importance. Most academic research on online rumors has approached the issue from a quantitative modeling perspective. Less attention has been paid to the psychological mechanisms accounting for online rumor transmission behavior on the individual level. Drawing from the theory of stimulus–organism–response, this study aims to explore the nature of online rumors and investigate how the informational characteristics of online rumors are processed through the mediation of psychological variables to promote online rumor forwarding.
Design/methodology/approach – An experimental approach to this issue was taken; the researchers investigated how the informational characteristics of online rumors and the psychological mediators promote online rumor transmission.
Findings – Four information characteristics (sense-making, funniness, dreadfulness and personal relevance) and three psychological motivators (fact-finding, relationship enhancement and self-enhancement) promote online rumor-forwarding behavior.
Originality/value – Because any online rumor transmitted on social media can go viral, companies may eventually encounter social media-driven crises. Thus, understanding what drives rumor-forwarding behavior can help marketers mitigate and counter online rumors.
Keywords Online rumor, Social media, Rumor transmission behavior, Information characteristics
Paper type Research paper

1. Introduction
The outbreak of the pandemic COVID-19 has made social media an important channel for people to discuss and exchange information about the pandemic. The term “infodemic” (information and pandemic) is coined to describe the rapid and far-reaching spread of both accurate and inaccurate information (Apuke and Omar, 2021). Rumors pertaining to the...
pandemic are frequently found on the internet during this time of global panicking. For example:

1. “Bill Gates is planning to use a microchip in the vaccine to track people’s movements and to identify people who have been tested for COVID-19.”

2. “Only 1% of COVID-19 patients will die from the disease, but the vaccine has a fatality rate higher than that.”

3. “The big pharmaceutical companies that develop these vaccines are just trying to make money by paying doctors to proclaim their products are safe.”

4. “People who have already contracted the COVID-19 virus do not need the vaccine” (County of Los Angeles Public Health, 2020).

These pandemic rumors would not only mislead users, hinder pandemic prevention and control, but also may endanger lives.

Because anyone can be an author on social media, information from unverified sources can be created and disseminated easily (Liang and Yang, 2015; Sharma et al., 2020). Social networking services (SNSs) have become a main source of political news, dramas, crime stories and celebrity news and gossip, with just under half (45%) of Americans obtaining news on Facebook (Shearer and Gottfried, 2017). Research suggests that users are concerned about the rumors that infiltrate the online environment, with one survey reporting that 73% of users think that social media is most responsible for rumor dissemination (eMarketer, 2018). In another survey, 49% of social media users reported that they had shared news online that they later found was made up. However, 10% of surveyed adults admitted that they have deliberately published hoaxes and misleading information online (Watson, 2020).

A number of terms have been used to describe this more or less overlapping concept of online rumors, including internet rumors, netlore and fake news. As a specific form of online rumor, fake news on the internet has become a focus of attention in recent years. Fake news and hoax stories may cause an existential crisis for social media, such as public criticism, reduced stock prices and volatility in companies’ profit margins and reputations (Shinal, 2017). Controversies surrounding fake news are still much debated today. Thus, understanding what drives rumor-forwarding behavior can help marketers take actions against harmful online rumors (Pal et al., 2017, 2020).

The present study investigated the phenomenon of rumor-forwarding behavior on social media. Academic research on rumors has mostly employed a quantitative modeling approach to the issue. From this perspective, researchers have studied issues such as online rumor spreading patterns in social network structures (Borge-Holthoefer et al., 2013; Dong et al., 2018; Xu et al., 2019; Zhu et al., 2019); analyses of specific rumors on social media (Chua and Banerjee, 2018; Zhang et al., 2015); individual differences in the intention to spread rumors (Al-Garadi et al., 2016; Qian et al., 2015); and rumor detection, control and debunking strategies (Pal et al., 2017, 2020; Wen et al., 2014; Zhang et al., 2019).

Despite this abundance of literature, little research has examined the psychological issues of how the information characteristics of online rumors interact with psychological factors to influence rumor-forwarding behavior. Different from previous studies, the present study takes an experimental approach of information processing to address how online rumors are spread as a function of their information characteristics. This information processing approach can complement the literature and provide a more complete understanding of online rumors. Drawing from the stimulus–organism–response (S-O-R) model (Mehrabian and Russell, 1974), this study proposes an integrated model of rumor spreading on SNSs. We examined the effects of a set of empirically determined information characteristics of the online rumors (stimuli) that affect the rumor receivers’ motivations (organism) and the rumor dissemination behavior (response).
2. Literature review and research hypotheses

2.1 Online rumors
Rumors are “unverified and instrumentally relevant information statements in circulation that arise in contexts of ambiguity, danger, or potential threat, and that function to help people make sense and manage risk” (DiFonzo and Bordia, 2007, p. 23). Empirical semantic network analyses of online rumor transmissions and corrections have been the focus of these studies. Other research has attempted to identify features of online rumors and propose systems to detect, correct and analyze the impact of online rumors (Kwon et al., 2013; Resnick et al., 2014; Zhao et al., 2015). A growing body of research relates to rumors on the internet in general and on social media in particular (Allcott and Gentzkow, 2017; Kwon et al., 2016; Oh et al., 2016; Starbird et al., 2014; Zubiaga et al., 2018). Some of this research has involved empirical analysis of rumor transmissions related to specific incidents, such as fake news during the 2016 US Presidential Election (Allcott and Gentzkow, 2017), North Korean saber rattling (Kwon et al., 2016), the Boston marathon bombing (Starbird et al., 2014), the 2010 Haiti earthquake (Oh et al., 2010) and COVID-19 (Apuke and Omar, 2021).

A review of the relevant literature reveals that most studies have approached the issue by analyzing the semantic networks of online rumor transmission at the group level (Chua and Banerjee, 2017; Goh et al., 2017; Kim and Bock, 2011; Liu et al., 2014; Oh et al., 2016), revealing that although numerous topics related to online rumors have been addressed, relatively little attention has been directed toward the specific informational characteristics of online rumors themselves that influence recipients’ rumor-forwarding behavior. The present study attempts to fill this gap by providing a model of online rumors that relates to the informational characteristics of online rumors and recipients’ motivational characteristics to explain online rumor-forwarding behavior.

2.2 Stimulus–organism–response theory
In the S-O-R theory, the stimulus represents environmental or situational variables, the organism represents internal cognition and emotions, and the response represents behavioral or psychological outcomes (Mehrabian and Russell, 1974). The theory has been widely adopted in research of online information and social media. For example, Bigne et al. (2020) proposed a revised the S-O-R model to provide a comprehensive understanding of pictorial content in online reviews. They observed online review credibility, informativeness, persuasiveness and helpfulness as stimuli, empathy, pleasure, arousal and trust as organisms, and intention to visit the restaurant as responses. Another study proposed that the emotions of pleasure, arousal and control (organism) that are triggered by online advertorial attributes (stimuli, i.e. perceived informativeness, credibility, irritation and entertainment) play a mediating role in affecting user acceptance and purchase intentions toward products promoted in online advertisements (response; see Chang et al., 2018). On the basis of the S-O-R process, the communication quality of virtual travel communities as stimuli (accurate, up-to-date, useful and understandable) affected online commitment and trust (organisms) and online stickiness (response; see El-Manstrly et al., 2020). Another recent study investigated online rumor rebuttals that used perceived message properties of rebuttal (informativeness, credibility and persuasiveness) as stimuli and perceived hedonic and utilitarian value as organisms, both of which affected intention to believe and share rumor rebuttals as response (Pal et al., 2020).

According to the S-O-R theory, it is postulated that information characteristics (as stimuli) would influence online rumor-forwarding (as responses) through the mediation of psychological factors (as organism). The actual information characteristics in the present study were determined empirically through a qualitative pilot study in which participants classified online rumors based on their perceived commonalities. The result of the pilot study
concluded with four major information characteristics: sense-making, funniness, dreadfulness and personal relevance. Then, the key research hypotheses were developed accordingly to describe how these informational characteristics affect psychological mediators, which in turn affect the rumor-forwarding behavior. The following sections provide a detailed description of the rationale of the research hypotheses.

2.3 Stimuli: information characteristics of online rumors

2.3.1 Sense-making. Sense-making refers to the degree to which online rumors are perceived to be truthful or believable. To believe that specific information is true implies that the information receivers must find facts to verify that information. That is, rumor information that varies in its degree of sense-making would motivate online rumor receivers to find factual information about the online rumors. This relationship is particularly salient, given DiFonzo and Bordia’s (2007) description of rumors as “unverified and instrumentally relevant information statements in circulation that arise in contexts of ambiguity, danger, or potential threat, and that function to help people make sense and manage risks.”

Cavazza and Guidetti (2014) observed that in both positive and negative online reviews, false information that does not make sense can induce suspicion, thereby reducing the global attitudinal evaluation of the attitudinal object (restaurants in this case). Criss et al. (2015) found that pregnant women used the internet to retrieve pregnancy-related information and considered it reliable. If the information appeared to make sense and was considered reliable but was rarely discussed with their clinician, pregnant women would search online to help validate the information. Finally, in an effort to measure rumor transmission during the Great Japan Earthquake (the Fukushima earthquake and tsunami) in 2011, Tanaka et al. (2012) found that the accuracy rate was higher in the rumor criticism condition than in the rumor condition, and the difference in the accuracy rate between the rumor condition and the criticism condition was greater in the self-accuracy condition (participants’ self-assessment of the accuracy of the rumor) than in the others’ accuracy condition (participants’ predictions of other people’s assessment of the accuracy of the rumor). Rumor criticism behavior can be viewed as the act of finding facts about the rumor (Tanaka et al., 2012). Therefore, it is predicted that the sense-making of online rumor information may positively influence fact-finding:

\[ H1. \text{ Sense-making is positively associated with fact-finding.} \]

Information that appears to make sense or sounds truthful or believable may also be related to self-enhancement. Telling truthful or sense-making information that appears to make sense may help boost people’s self-image. Research has suggested that people may prefer to tell truth in part because they want to maintain a positive self-image (Bénabou and Tirole, 2002; Fischbacher and Föllmi-Heusi, 2013). Self-enhancement is positively correlated with many positive personality traits, including prosocial behavior, generosity and truth-telling (Ellingsen and Johannesson, 2004; Gneezy et al., 2012). Therefore, it is hypothesized that online rumor information that makes sense may help enhance people’s self-image:

\[ H2. \text{ Sense-making is positively associated with self-enhancement.} \]

2.3.2 Funniness. Funny or humorous messages influence self-enhancement. Individuals’ perceptions of humorous and funny messages are a reflection of who they are, how they perceive themselves and how other people see them. In studying the role of self-enhancement in sharing online messages, Taylor et al. (2012) obtained evidence to support the hypothesis that the entertainment value of electronic word-of-mouth (eWOM) messages positively influences self-enhancement. Evidence from additional studies also supports the idea that disparaging humor functions to enhance one’s social identity (Meyer, 2000; Ruscher, 2001).
Finally, the meaning approach of information processing suggests that the interpretation and construction of “the meanings of messages entail[s] the concepts of the self, of the family, of status, of the nation, and of the world” (McCracken, 1987, p. 121). The construction of humorous or funny meanings of messages may accordingly reflect one’s self identity. Based on the relevant literature, a hypothesis is proposed regarding the relationship between the funny characteristics of online rumors and the self-enhancement motivation:

**H3.** Funniness is positively associated with self-enhancement.

Abundant literature has established the positive relationship between humor and interpersonal relationships (Robert et al., 2016; Zhao et al., 2014). For example, humor or funny information can facilitate liking and closeness in interpersonal relations (Cann and Matson, 2014; Treger et al., 2013). A sense of humor enables people to socially connect with others (Mireault and Reddy, 2016; Wisse and Rietzschel, 2014). Humor is also thought to contribute to sexual attraction (Mireault and Reddy, 2016; Wilbur and Campbell, 2011). Cann and Matson (2014) also found that different humor styles are related to social desirability or undesirability. Therefore:

**H4.** Funniness is positively associated with relationship enhancement.

### 2.3.3 Dreadfulness.

Research showed that the fear emotions out of the dreadful rumors would drive people to look for additional information or factual knowledge. Dedeoglu and Ventura (2017) showed that in response to the fear of the swine flu news, people would collect information from scientific sources to alleviate the fear emotion and to improve rational responses. Moreover, dreadful rumors associated with the fear emotion imply possible risks or uncertainties that would drive people to seek factual knowledge of information to help with their coping strategies (Keller et al., 2020; Chowdhury et al., 2011). Past research has shown that the fear appeal would elicit appraisals of uncertainty and situational controls (Lerner et al., 2003; Roskos-Ewoldsen et al., 2004). Lerner et al. (2003) showed that the fear emotion aroused as a result of the terrorist attack would induce risk perception. The fear-arousing stimuli can lead people to perceive threat (Roskos-Ewoldsen et al., 2004) and uncertainty (Lerner et al., 2003). The risk and/or uncertainty perception, in turn, would drive people to seek information or factual knowledge to help reduce the risky or uncertain perception and to make decisions (Keller et al., 2020; Chowdhury et al., 2011) and/or to engage in the danger control process (Roskos-Ewoldsen et al., 2004) by collecting factual knowledge to improve rational responses (Dedeoglu and Ventura, 2017). In sum, upon facing risks or uncertainties, people would seek information that would help with their decisions. Therefore, it is hypothesized that dreadful rumors would bring in risk or uncertainty perception that would prompt people to find factual knowledge or information to reduce the risk perception and improve decision-making:

**H5.** Dreadfulness is positively associated with fact-finding.

Dreadfulness is also predicted to enhance an individual’s social relationships for several reasons. DiFonzo and Bordia (2007) suggested that people may disseminate rumors of a horrific nature as a warning to others to be aware of potentially unfortunate events. In addition, scholars suggested that people disseminate rumors not to reduce anxiety but to attract attention and thus enhance their social relationships, and dreadful or horrific information tends to generate strong feedback in the form of attention (Guerin et al., 2004; Guerin and Miyazaki, 2006). Thus:

**H6.** Dreadfulness is positively associated with relationship enhancement.

### 2.3.4 Personal relevance.

It is a natural human tendency to process personally relevant or important information with scrutiny. The elaboration likelihood model asserts that
consumers with high involvement take the central route to process product-relevant information with significant cognitive effort (Petty et al., 1983). A similar conceptualization of customer involvement can also be found in the systematic-heuristic processing model (Chaiken and Eagly, 1989). To make important or personally relevant choices, individuals often collect factual information, knowledge or evidence to support their decisions (Beverland and Farrelly, 2009; Hung and Li, 2007). Thus, it follows that personally relevant online rumor information may prompt people to find relevant facts about that information as the basis for their subsequent decisions. Therefore:

**H7.** Personal relevance is positively associated with fact-finding.

Finally, research has established that people pay attention to personally relevant information that may influence their self-enhancement (Reed and Aspinwall, 1998; Sedikides, 1993). Other studies have revealed cultural differences, in which people in individualistic cultures tend to pay more attention to positive self-relevant information that positively influences their self-enhancement, whereas people in collective cultures tend to pay more attention to negative self-relevant information that may negatively influence their self-enhancement (Heine et al., 2001). Other researchers have disagreed, arguing instead that self-enhancement is a universal phenomenon, but its manifestation is strategically sensitive to cultural context (Gaertner et al., 2008; Sedikides et al., 2007). In either case, the personal relevance of information is related to self-enhancement motivation. Thus:

**H8.** Personal relevance is positively associated with self-enhancement.

### 2.4 Organism: psychological motivations for rumor dissemination

#### 2.4.1 Fact-finding

Research has indicated that factual information promotes information sharing and dissemination (Ashford and Black, 1996; Berger, 1987; Berger and Bradac, 1982; DiFonzo and Bordia, 2007). Huang et al. (2011) observed that word-of-mouth information perceived to be authentic positively influenced acceptance and resending of the WOM information. Hautz et al. (2014) determined that user-generated online videos have a positive impact on the perception of expertise, which in turn may positively influence the intention to share such videos with others. Moreover, DiFonzo and Bordia (2007) argued that several variables may influence fact-finding motivation, such as uncertainty, anxiety, lack of control and importance. Individuals are motivated to search for knowledge to reduce uncertainty and the resulting anxiety of the situation (Ashford and Black, 1996; Berger, 1987; Berger and Bradac, 1982; DiFonzo and Bordia, 2007). On the internet, engaging in fact-finding activities to resolve uncertainty and restore control of a situation requires people to exchange information with each other, which promotes online rumor transmission behavior. Therefore:

**H9.** Fact-finding is positively associated with online rumor forwarding.

#### 2.4.2 Self-enhancement

Self-enhancement as a motivational factor in the transmission of rumors to achieve the self-serving goal is another motivational factor that was less noticed and has received relatively little attention in the literature (DiFonzo and Bordia, 2007). In one study, self-enhancement was observed to positively influence eWOM participation through the mediation of intrinsic motives (Yoo et al., 2013). In addition, rumors may be transmitted to attain outcomes that are favorable to an individual’s self-interest (Mihanovic et al., 1994). This could be achieved by spreading malicious rumors to obtain tangible gains (Kapferer, 1987; Rosnow et al., 1988; Turner, 1993). Transmitting rumors to boost one’s self esteem by boosting one’s social identity is another approach to self-enhancement that motivates rumor transmission (DiFonzo and Bordia, 2007). Alternatively, rumors can also be transmitted to
rationalize one’s self-enhancing attitude, providing aid to the process of justification construction (DiFonzo and Bordia, 2007; Kunda, 1999). Thus:

**H10.** Self-enhancement is positively associated with online rumor forwarding.

### 2.4.3 Relationship enhancement

Relationship enhancement is the third motivational factor promoting online rumor transmission (DiFonzo and Bordia, 2007). Huang et al. (2011) observed that relational commitment positively influenced intentions of passing-along emails through the mediation of social interaction ties. Individuals who felt obliged to maintain the social relationship would often forward emails containing useful information to others. Additionally, people were more likely to transmit positive than negative rumors, fearing that negative rumors may have a negative effect on the rumor recipient and thus hurt the relationship (Kamins et al., 1997). Although research has revealed that negative rumors were more likely to be transmitted in the context of a close relationship if the negative information was believed to avert the negative consequences for a close friend (Weenig et al., 2001), relationship enhancement is the motivational factor behind the rumor transmission behavior in both cases. Thus:

**H11.** Relationship enhancement is positively associated with online rumor forwarding.

### 3. Method

#### 3.1 Pilot study

Two pilot studies were first conducted to construct materials for experiment stimuli. The first pilot study was a focus group discussion in which eight participants were assembled to discuss the phenomenon of online rumors. They were given the definition of online rumors and were asked to recall and write down as many online rumors as they could recall encountering in the past. They were then instructed to classify the rumors based on the similarities of major attributes among these online rumor stories. Four major characteristics emerged: sense-making, funniness, dreadfulness and relevance.

The purpose of the second pilot study was to select online rumor materials for use in the main study, based on the result of the first pilot study. Online stories were selected from four websites concerning online rumors, including (1) Urban Legends (http://www.urbanlegends.about.com), (2) Snopes.com (http://www.snopes.com), (3) the internet rumors encyclopedia (http://www.liuyanbaike.com) and (4) Eastern News online rumor tracking page (http://www.ettoday.com.tw/etrumour/index.htm). A factorial combination of four factors with two levels in each factor (i.e. high vs low) yielded 16 versions of online rumor stories. An initial selection produced 32 online rumor stories with two replications for each of the 16 conditions. These online rumor stories were then given to 30 participants for further screening. Participants were asked to rate each story in terms of four information characteristics (sense-making, funniness, dreadfulness and personal relevance).

The results were analyzed to select qualified online rumor stories for the main study. Statistical analyses supported the choices, in that the designated high/low mean value was significantly higher/lower than the low/high mean value on a given characteristic. The range of mean values was 4.10–5.80 for high sense-making, and 1.60–2.73 for low sense-making (with p-values testing the differences between high and low sense-making all < 0.001). The range of mean values was 4.50–5.73 for a high level of funniness, and 1.50–2.80 for a low level of funniness (with p-values all < 0.001). The range of mean values is 4.27–5.90 for high dreadfulness, and 1.57–3.00 for low dreadfulness (with p-values all < 0.001). The range of mean values is 3.45–5.60 for high personal relevance, and 1.53–2.58 for low personal relevance (with p-values all < 0.001). The factorial combinations of the four information characteristics with two levels of values (high vs low) for each characteristic yielded 16
conditions of online rumor stories. Sixteen online rumor stories were chosen accordingly for use in the main studies.

3.2 Participants
A total of 461 participants were recruited from the website MTurks (http://www.mturks.com/) and participated in the experiment, among them were 182 males and 279 females. In terms of age, 51.8% of participants were aged 21–30 years, and 28.4% of participants were aged 31–40 years.

3.3 Procedure and measures
The study employed a 2 (sense-making: high vs low) × 2 (funniness: high vs low) × 2 (dreadfulness: high vs low) × 2 (personal relevance: high vs low) full between-subject design, in which each participant read only one of the 16 online rumor stories. They were given a story randomly chosen from the pool of 16 articles. The questionnaire was uploaded to the website. Participants were required to register and log in to enter the survey pages. The survey started with the instructions, describing the project as a study concerning people’s perception of online articles. They were then instructed to read the article at their own pace. After reading the online rumor story, they proceeded to answer questions measuring the dependent, independent and mediating variables. The dependent variable of the intention to forward online rumors was measured with questions adapted from Harrison-Walker (2001) and Sun et al. (2006).

The three motivational variables, namely, fact-finding, relationship enhancement and self-enhancement, were measured with items adapted from DiFonzo and Bordia (2007) and Sudhir and Unnithan (2013). Furthermore, a set of manipulation check questions was administered following the measurements of the dependent and mediating variables. Participants were asked to rate the level of the four information characteristics for the online rumor story they received. The measurement of sense-making was adopted from Carrington and Tayles (2011). Funniness was measured with items adapted from Igbaria et al. (1995) and Teo et al. (1999). Dreadfulness was measured with items adapted from Dahl et al. (2003). Personal relevance was measured with items adapted from Cline and Kellaris (2007). Finally, participants filled out demographic questions, including those on gender, age level, education and occupation. Then, they were given due credit, thanked and dismissed.

4. Result
4.1 Manipulation check
The manipulation check examines whether the perceived characteristics of online rumors matches the designated experimental design. Statistical analyses reveal that the designated high/low mean value is significantly higher/lower than the low/high mean value on a given characteristic. The range of mean values is 4.03–5.47 for high sense-making, and 1.59–3.31 for low sense-making (with p-values testing the differences between high and low sense-making ranging between < 0.004 and < 0.001). The range of mean values is 4.07–5.24 for high funniness, and 1.55–3.37 for low funniness (with p-values ranging between < 0.006 and < 0.001). The range of mean values is 4.08–5.36 for high dreadfulness, and 1.61–3.28 for low dreadfulness (with p-values ranging between < 0.003 and < 0.001). The range of mean values is 3.88–5.27 for high personal relevance, and 1.41–3.37 for low personal relevance (with p-values ranging between < 0.02 and < 0.001). Thus, the manipulation check confirms the validity of the data.

4.2 Common method bias
Harman’s one-factor test (Podsakoff et al., 2003) shows that the first factor explains about 12.065% of the total variance. Because a single factor does not account for most of the
variance, these results suggest that common method bias does not seem to be a significant issue for the data.

4.3 Model validation
The first step of analyzing the data of the main study is to establish the reliability and validity indices of the theoretical model. The Cronbach $\alpha$ values for constructs of the model were calculated. All Cronbach $\alpha$ values are between 0.75 and 0.95, well above the criterion value of 0.7. The composite reliability (CR) values are between 0.84 and 0.95. The range of factor loadings is between 0.70 and 0.95, well above the 0.5 criterion value. All factor loadings are highly significant. The square roots of the average variance explained (AVE) are all greater than the respective inter-correlations among constructs (Fornell and Larcker, 1981). Also, all heterotrait-monotrait (HTMT) ratios are lower than 0.9, as suggested by Henseler et al. (2015). Thus, the discriminant validity of the measurement model is also satisfactory for further analyses. The Cronbach $\alpha$, CR, AVE and $R^2$ are presented in Table 1, while the square roots of the AVE values along with the inter-correlations among constructs and HTMT ratio are presented in Table 2.

4.4 Hypotheses testing
A partial least squares structural equation modeling (PLS-SEM) analysis is applied to the dataset. The standardized root mean residual (SRMR) for the PLS analysis is 0.08, indicating an appropriate model fit (Hair et al., 2017). This study uses age, gender and education as control variables. The four informational characteristics have impacts on the three psychological motivational variables. Sense-making positively impacts on fact-finding ($\beta = 0.22, p < 0.01$), supporting H1. Sense-making also positively influences self-enhancement ($\beta = 0.34, p < 0.001$). Therefore, H2 is also supported. Funniness also positively impacts on self-enhancement ($\beta = 0.23, p < 0.001$), supporting H3. Funniness also has a positive effect on relationship enhancement ($\beta = 0.34, p < 0.05$), supporting H4 as well.

Dreadfulness has a significant positive effect on fact-finding ($\beta = 0.28, p < 0.001$), therefore supporting H5. Similarly, dreadfulness also has a positive impact on relationship enhancement ($\beta = 0.27, p < 0.001$). Thus, H6 is also supported. Finally, personal relevance also has a positive impact on fact-finding ($\beta = 0.23, p < 0.01$), supporting H7. Personal relevance also positively impacts on self-enhancement ($\beta = 0.17, p < 0.01$). Therefore, H8 is also supported by the empirical data.

As for the effects of the three psychological motivational variables on rumor-forwarding behavior, fact-finding is found to have a positive impact on the forwarding behavior ($\beta = 0.23, p < 0.001$), supporting H9. Self enhancement also has a positive effect on the forwarding behavior ($\beta = 0.31, p < 0.001$). Hence H10 is also supported. Finally, relationship enhancement also positively impacts on the forwarding behavior ($\beta = 0.39, p < 0.001$), supporting H11. The result of the analyses is presented in Figure 1.

4.5 Mediational analysis
Following the procedure by Nitzl et al. (2016), a mediation analysis was conducted. The results show that fact-finding and self-enhancement partially mediated the relationship between sense-making and forwarding. For funniness, self-enhancement and relationship enhancement are full mediators. For dreadfulness, fact-finding and relationship enhancement are full mediators. Last, fact-finding and self-enhancement are complementary mediators for personal relevance. The results of the mediation analysis are shown in Table 3.
5. Discussion

5.1 Summary of findings

An empirical study was conducted to investigate the effects of four online rumor characteristics and three motivational mediators on online rumor-forwarding behavior. The results support the hypotheses that the set of informational characteristics of online rumors affect forwarding behavior through the mediation of three psychological variables.
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<td>1. Sense-making</td>
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<td>2. Funniness</td>
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<td>3. Dreadfulness</td>
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<td>4. Personal relevance</td>
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<td>5. Fact-finding</td>
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<td>6. Self-enhancement</td>
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<td>7. Relationship enhancement</td>
<td>0.58 (0.63)</td>
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<td>8. Forwarding</td>
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<td>0.55 (0.57)</td>
<td>0.66 (0.68)</td>
<td>0.68 (0.75)</td>
<td>0.9</td>
</tr>
</tbody>
</table>

**Note(s):** The values on the diagonal (in italic) are the square root of AVE for each construct; The value in parentheses is HTMT ratio.
5.2 Academic implications

The contributions of the current study are multifaceted. First, the majority of academic research on online rumors has focused on mathematical modeling of rumor transmission. Relatively little attention has been paid to the psychological information processing of rumor dissemination behavior. The current study addresses this gap by providing experimental evidence that informational characteristics of online rumors can trigger rumor forwarding behavior through the psychological mediators under the S-O-R framework (Mehrabian and Russell, 1974), which provides an overarching paradigm linking the information characteristics of online rumors (stimuli), psychological motivations (organism) and rumor dissemination (response). The results of the current study complement the extant literature of
mathematical modeling (Chua and Banerjee, 2017; Goh et al., 2017; Kim and Bock, 2011; Liu et al., 2014; Oh et al., 2016) by improving our understanding of people’s behavior of transmitting online rumors.

Second, most research on rumors in general and intent rumors in particular tends to focus on either the study of individual rumor cases or contextual factors that influence rumor transmission. Relatively little attention has been paid to the a more systematic and general theoretical framework (as opposed to individual rumor cases) of how informational characteristics of the rumor can facilitate the online rumor-spreading behavior. Research in other non-rumor contexts has explored this possibility. For instance, McKnight et al. (2002) revealed that perceived message credibility is positively related to the message receivers’ willingness to accept information from a website. Cheung et al. (2009) demonstrated that the perceived message credibility of eWOM has a positive effect on the eWOM review adoption. In terms of the online rumor context, the current study is among the first to provide analogous insights into how informational characteristics affect rumor transmissions.

Last, the mediational roles of the three psychological motivations in online rumor transmissions also contribute to the extant literature. The mediational analysis revealed the full mediation of self-enhancement and relationship enhancement for funny and dreadful

| Paths                                      | Effect size | t-statistics (|O/STDEV|) | p-values | 95% biased-corrected confidence intervals (CI) | Type of mediation |
|--------------------------------------------|-------------|----------------|----------|----------|-----------------------------------------------|------------------|
| Direct effect ($P_3$)                      |             |                |          |          |                                               |                  |
| Sense-making - > Forwarding                | 0.23        | 4.56           | 0.00     | 0.13     | 0.33                                          |                  |
| Fun - > Forwarding                         | 0.06        | 1.75           | 0.08     | −0.01    | 0.13                                          |                  |
| Dreadfulness - > Forwarding                | 0.01        | 0.25           | 0.72     | −0.05    | 0.07                                          |                  |
| Personal relevance - > Forwarding          | 0.24        | 4.75           | 0.00     | 0.14     | 0.34                                          |                  |
| Indirect effect ($P_1P_2$)                 |             |                |          |          |                                               |                  |
| Sense-making - > Fact-finding              | 0.03        | 2.69           | 0.01     | 0.01     | 0.07                                          | Partial mediation |
| - > Forwarding                             |             |                |          |          |                                               |                  |
| Sense-making - > Self-enhancement - > Forwarding | 0.06        | 3.40           | 0.00     | 0.03     | 0.09                                          | Partial mediation |
| Fun - > Self-enhancement - > Forwarding    | 0.04        | 2.97           | 0.00     | 0.02     | 0.07                                          | Full mediation    |
| - > Relationship enhancement - > Forwarding| 0.07        | 4.04           | 0.00     | 0.04     | 0.11                                          | Full mediation    |
| Dreadfulness - > Fact-finding              | 0.04        | 3.83           | 0.00     | 0.03     | 0.07                                          | Full mediation    |
| - > Forwarding                             |             |                |          |          |                                               |                  |
| Dreadfulness - > Relationship enhancement - > Forwarding | 0.06        | 3.69           | 0.00     | 0.03     | 0.09                                          | Full mediation    |
| Personal relevance - > Fact-finding - > Forwarding | 0.04        | 2.56           | 0.01     | 0.01     | 0.07                                          | Partial mediation |
| Personal relevance - > Self-enhancement - > Forwarding | 0.03        | 2.15           | 0.03     | 0.01     | 0.06                                          | Partial mediation |

Table 3. Significance analysis of the direct and indirect effect of online rumor dissemination.
rumors. One possible insight of these findings is that disseminating online rumors could serve the psychological functions of self-presentation and impression management. Additionally, research has indicated that forwarding messages considered personally relevant to others is considered an altruistically motivated behavior (Ho and Dempsey, 2010). The present finding that personally relevant rumors can trigger fact-finding and self-enhancement motivations seems to indicate that, in addition to altruism, a self-image management or personal growth motivation may be involved in the rumor dissemination behavior.

5.3 Managerial implications
Our findings also bear significant implications for brand/product managers of social media. First, the present results could be used to develop a social listening system that allows companies to monitor social conversations to understand areas of vulnerability and potential triggers of rumors, as well as take pre-emptive actions when necessary. Given the likelihood of information with the four informational characteristics being rumors, conversation contents with the four informational characteristics as key themes may be flagged for further inspections of their rumor nature. Companies can, thus, conduct social listening strategies, incorporate network analytics and sentiment analysis to analyze consumers' comments, and thus identify rumors, rumor participants as well as influencers. Our framework can help build an early detection system for potential brand product related rumor crises. Companies can detect vulnerabilities and take pre-emptive actions to debunk rumors by providing fact-checking information in a timely manner to help deter people from sharing rumors on social media.

Second, our research identifies fact-finding, relationship enhancement and self-enhancement as three important psychological motivations for rumor sharing. Companies can make use of this finding to encourage consumers to debunk rumors. On the one hand, companies can use the data collected by machine learning algorithms to build a collaborative platform (similar to Wikipedia). In this way, every consumer can be encouraged to become a rumor buster or a debunking helper, thereby enhancing their fact-checking, self-enhancement and relationship-enhancement motivations. On the other hand, consumers usually spread rumors without knowing the false nature of the information. Companies or public policy makers can, thus, educate consumers to verify the validity of the information before disseminating, because only disseminating verified authentic information would reinforce their self-image, social relationships and fact-finding motivations, whereas disseminating rumors would only hurt these motivations.

5.4 Limitations and future directions
Despite its potential contributions to academia and industries, the present study is not free of limitations. One possible limitation is the completeness of the informational characteristics. Although four characteristics were studied in the present research, these do not represent an exhaustive list of the informational characteristics that online rumors could have. Other characteristics not included in the present research may be important to online rumor-forwarding behavior. For instance, the information management literature focuses on the role of informational characteristics such as credibility, argument strength and issue relevance (Kim and Bock, 2011; Liang and Yang, 2015; Pal et al., 2017). Future research might examine this possibility and search for these and/or other viable informational characteristics that bear implications for online rumor-forwarding behavior. In addition, the theoretical framework employed in the current study does not exclude the possibilities of other mediators at work. Other motivational variables, such as altruism and reputation (Chang and Chuang, 2011), or socializing and status seeking (Lee and Ma, 2012) might also mediate the
relationship between the informational characteristics of online rumor-forwarding behavior. Future research should also explore this possibility. The final limitation is that our study recruited participants from the USA. Future research can extend the proposed relationship in our model across cultures.

References


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