

The Role of Trust in Rumor Suppression on Social Media:
A Multi-Method Approach Applying the Trust Scores in Social Media (TSM) Algorithm

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Abstract

Commercial rumor about an organization or brand, especially on social media, presents a special challenge for marketers and communication practitioners because of the fast flow and exchange of information among peers. Despite the importance of refuting rumors quickly and effectively, research on the effects and effectiveness of refuting rumor messages has been limited. To advance the literature in this emerging research area, the current project examines the impact of an interpersonal relational factor on the dissemination and effectiveness of rumor-refutation communication. The role of interpersonal relational factors is particularly important given that rumors spread through word-of-mouth (WOM) communication. Rumor-refutation communication should also utilize the same communication conduit for rapid and effective refutation.

To advance rumor-refutation research and address the rising problem of commercial rumors, this dissertation project aimed to examine 1) how interpersonal influence among peers affects the belief and retransmission of rumors and rumor-refutation messages, and 2) potentially influential message characteristics that could help enhance interpersonal influence on readers' belief of the rumors and rumor refutation messages, and the retransmission of rumor-refutation messages.

To achieve these research goals, this study adopted a multi-method approach. Study 1 is a between-subjects repeated-measures experiment with a 2 (high-trustworthy vs. low-trustworthy source) x 2 (presence vs. absence of a trust cue) design that examines how the trustworthiness of the message source and a trust cue designed to induce message trustworthiness affect the belief and retransmission intention of rumors and

rumor-refutation messages. Study 2 utilizes a computational research approach using the Trust Scores in Social Media (TSM) algorithm to test how mathematically captured trustworthiness scores of the sources of rumor-refutation messages influence actual message retransmission and how such an effect is moderated by the presence of trust cues included in the messages.

The key findings in Study 1 revealed that a high-trustworthy source compared to a low-trustworthy source led to higher levels of rumor-refutation message belief and retransmission intention, but source trustworthiness did not affect the extent of reduction in the rumor belief and retransmission intention. Inclusion of a trust cue also did not moderate the impact of source trustworthiness on the belief and retransmission intention for both the rumor and rumor-refutation messages. Instead, it showed main effects in increasing the rumor-refutation message belief and retransmission intention, and a decreasing rumor belief and retransmission intention. The findings in Study 2 further confirmed the effects of the trustworthiness of the source on rumor-refutation message retransmission. However, inclusion of trust cues did not augment the source trustworthiness effects. The results indicated that the influence of source trustworthiness was stronger when the rumor-refutation message had no embedded trust cue.

This study advances the rumor and electronic word-of-mouth research field by revealing how interpersonal influence among peer social media users can contribute to the effects and effectiveness of rumor-suppression communication. The findings also offer useful practical implications for identifying effective rumor-refutation

dissemination hubs and refutation message-crafting strategies for a successful rumor-suppression campaign.

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CHAPTER 1

INTRODUCTION

Social media platforms have become one of the most convenient and powerful conduits for information exchange via peer-to-peer interaction among individual users. Easy-to-share functions of social media are constantly evolving, which accelerates the information exchange process. Marketers and communication practitioners have enjoyed these aspects of social media to propagate their promotional messages. However, the voluntary nature of peer-to-peer interactions on social media allows any ideas to emerge and spread regardless of whether they are beneficial or detrimental, or true or false. Therefore, the dynamic, fast and free flow of information makes social media an uncontrollable outlet for unverified or deceptive information about products or organizations. These messages present a special challenge for brands and organizations.

Since social media empowers consumers to freely and easily communicate and exchange information with one another, it has become commonplace for consumers to pass along unverified information about a brand, product, or business practice, known as commercial rumors (Kimmel and Audrain-Pontevia 2010). Once commercial rumors emerge and dominate the information flow on social media, the fast flow of information on social media can quickly and significantly damage the organization's reputation (Veil et al. 2012) and consumers' perceptions of the brand or organization (Renkema and Hoeken 1998). It can also deteriorate the organization's internal relationship with its employees (Kimmel and Audrain-Pontevia 2010).

McDonald's "Black Tax" rumor is a particularly salacious example of the negative impact of a commercial rumor outbreak. The rumor was that McDonald's new company policy established an extra fee for African-American consumers due to the recent string of robberies. Although the rumor turned out to be false, it quickly dominated Twitter along with the hashtag of #SeriouslyMcDonalds, which contributed to huge consumer backlash and a boycott of McDonald's.

What makes commercial rumors particularly challenging for brand managers and communication practitioners is that it is almost impossible to predict what kind of rumors will emerge from which sources. Instead, organizations and brands can only implement well-designed rumor response strategies. Thus, practitioners and scholars have invested considerable efforts in attempting to understand the contributing factors of rumor belief about how they spread (e.g. DiFonzo and Bordia 2002; Einwiller and Kamins 2008) and the influencing factors of effective rumor-controlling strategies (Bordia et al. 2000; Bordia et al. 2005).

Once a rumor is identified, brand managers and communication practitioners can respond to the rumor by ignoring, confirming, or refuting it using rumor-refutation messages (Difonzo, Bordia, and Rosnow 1994). Messages that disaffirm and correct the rumor have been effective in reducing the belief and anxiety associated with the rumor (Bordia et al. 2000; Bordia et al. 2005). Therefore, researchers have recommended that brand managers and communication practitioners should act immediately to suppress the spread of rumors by accelerating the dissemination process of the messages and maximizing the effects of rumor-refutation messages to correct consumers'

misperceptions and deter further dissemination of the rumors. Timely and effective rumor-refutation communication is critically important, especially on social media, with the fast exchange of information.

Despite the importance of rumor-refutation messages, research on the effects and effectiveness of rumor-refutation messages has been quite underdeveloped. Only a handful of research exists, and those studies provide limited understanding about the effects of rumor-refutation communication and the message source and content factors that have a potential impact on the rumor-refutation effects. Given the thin research literature and limited knowledge accumulated about the rumor-refutation communication effects, more research is needed. To advance this emerging research area, the current project investigates the impact of the interpersonal relational factor operating in the relationships and interactions among people sharing rumors and rumor-refutation messages. This factor is likely to play a particularly important role in the dissemination and outcome of rumor-refutation communication.

Rumors are unverified word-of-mouth (WOM) communication messages, which spread via peer-to-peer interactions (Bordia et al. 2005; Kamins et al. 1997; Rosnow and Kimmel 2000). Thus, rumor-refutation communication in response to rumors would also rely on WOM communication and should utilize the same communication conduit as the original rumors to deliver rapid and effective refutation. Therefore, the role of peer-to-peer interpersonal relational factors, such as interpersonal trust between message sharers and recipients, in the effects and effectiveness of rumor-refutation communication is a compelling question to explore. Based on this investigation, we can systematically

identify influential information hubs that may have interpersonal influence on peer-to-peer rumor-refutation message diffusion. For example, some research evidence outside the rumor research field has demonstrated that selecting the right targets as the starting point of initial dissemination of information could have a significant impact on the rest of the message diffusion process (Bampo et al. 2008; Watts, Peretti, and Frumin 2007).

Research Purpose

To address the rising problem of commercial rumors damaging brands and organizations and to advance the research on rumor-refutation communication effects, this dissertation project has two main purposes. It aims to examine 1) how interpersonal influence among peers affects the belief and retransmission of rumor and rumor-refutation messages, and 2) what potentially influential message characteristics could contribute to enhancing the interpersonal influence on belief and retransmission of rumor-refutation messages.

In pursuing these research goals, this study adopts the theory of trust as the theoretical framework because trust is an important relational factor influencing communication effects, especially when uncertainties and risks are involved (e.g. Moorman, Rohit, and Zaltman 1993). Trust helps individuals engage with or rely on one another by mitigating feelings of uncertainty, risk, and fear of being exploited (Luhmann 1979; McKnight, Choudhury, and Kacmar 2002; Okazaki, Li, and Hirose 2009). Therefore, the theory of trust fits well with the rumor-refutation communication context, because the nature of rumors inherently involves high levels of risk in that spreading false rumors may harm interpersonal relationships and cause considerable damage to the rumor

object as well as the entire society (Kamins, Folkes, and Perner 1997). Rumor-refuting communication also tends to challenge people's existing beliefs (Qi, Banerjee, and Chua 2017).

Methodologically, this study adopts a multi-method approach. Study 1 is an online experiment that examines the effects of the trustworthiness of rumor-refutation message sources and a potential moderating effect of message trust cues. These cues would induce message trustworthiness on the belief and retransmission intention of the rumor and rumor-refutation messages. Study 2 utilizes a computational trust research approach to further test the effects of rumor-refutation message sources' trustworthiness, which is mathematically captured with the aid of a computational trust algorithm on actual rumor-refutation message retransmission using a real-world rumor-refutation case. I further explore how such an effect is moderated by the presence of trust cues in the rumor-refutation messages.

This study is expected to make important contributions to the research literature on rumors and electronic word-of-mouth communication (eWOM) in general by focusing on how interpersonal influence among peers can contribute to effects and effectiveness of rumor-suppression communication. The findings of this study will also offer practical implications to practitioners to identify influential message dissemination hubs that can be utilized for effective and efficient rumor-fighting and to craft more effective rumor-refutation messages.

Dissertation Chapters and Organization

This dissertation is composed of seven chapters. Following the current introduction chapter, Chapter 2 provides an overview of the conceptual definition and characteristics of rumors and a review of existing research literature on rumors and rumor refutation to build an empirical foundation for this study. Chapter 3 presents a theoretical discussion about the construct of trust and a review of the relevant empirical research that guided this investigation regarding the effects of source trust on information acceptance and dissemination. In Chapter 4, the hypotheses are presented based on the theoretical and empirical justifications derived from the literature review in previous chapters. Chapter 5 describes the details of the research methods, and Chapter 6 presents data analysis results. Chapter 7 summarizes and discusses the key findings, and offers theoretical and practical implications, followed by a discussion of the limitations and suggestions for future research directions.

CHAPTER 2

LITERATURE REVIEW ON RUMORS AND RUMOR REFUTATION

This literature review chapter has two sections. The first section discusses the definitions and characteristics of rumor and rumor-refutation messages, and the second section reviews previous research on rumor spread and rumor-refutation effects, and influencing factors.

Definitions and Characteristics of Rumors

The rumor spread phenomenon has received much attention from scholars in various fields including psychology, political science, marketing, management and information science, computer science, and communication fields, even before the emergence of the Internet (e.g., Allport and Postman 1947; DiFonzo and Bordia 2007; Kamins, et al. 1997; Oh, Agrawal, and Rao 2013; Rosnow and Kimmel 2000; Shah and Zaman 2011). The earliest rumor research by psychologists began in the context of examining how rumors influenced the morale of the military and public opinions during World War II (Allport and Postman 1947; Knapp 1944). In this research context, Knapp (1944) defined a rumor as “a proposition for belief of topical reference disseminated without official verification” (p. 22). In another seminal study, Allport and Postman (1947) defined a rumor as a topical proposition passed along from person to person without evidence.

From a communication perspective, Rosnow (1974; 1988) defined a rumor as public communication of unauthenticated information about certain topics. Later, the definition of a rumor was extended to include personal relevance and informational

aspects. For example, a rumor was defined as an unverified belief in which the topic is relevant to the rumor disseminators (Rosnow and Kimmel 2000) or as an unverified informational claim that is in circulation to understand and manage the situation (DiFonzo and Bordia 2007a). Overall, the common thread in the definitions of a rumor emphasizes that rumors are uncertain and unverified word-of-mouth (WOM) communication about current issues that carry personal relevance and useful information for the individuals who are actively involved in the rumor dissemination (Allport and Postman 1947; Bordia et al. 2005; DiFonzo and Bordia 2007; Kamins et al. 1997; Rosnow 1974; Rosnow and Kimmel 2000).

In general, WOM refers to any informal, interpersonal communication among people (Buttle 1998). While rumors are a type of WOM communication, rumors have distinctive characteristics. Rumors involve unverified secondary information without evidence and their origin is unknown. That is, communicators of rumors have heard about the unverified information from others without knowing whether it is true or not and where the information came from. These characteristics distinguish rumors from other types of primary WOM messages that share individuals' own first-person evaluations, recommendations, or experiences about the subject (Hornik et al. 2015; Van Hoye and Lievens 2007b; Westbrook 1987). They could also be secondary WOM messages whose origin can be traced back to certain sources, such as advertisements, news articles, or other WOM messages (Hornik et al. 2015).

Rumors can be positive or negative (Bordia et al. 2006). Broadly, rumors regarding desired consequences are categorized as wish or pipe-dream rumors, and

rumors involving harmful or disliked consequences are categorized as dread rumors (Knapp 1944; Rosnow, Yost, and Esposito 1986; Rosnow, Esposito, and Gibney 1988). For the recipients of wish rumors, the uncertain nature of the rumors is perceived as positive and pleasing (Whitney 1971). In contrast, dread rumors, proposing disturbing and feared consequences, increase recipients' anxiety (Rosnow 1980).

Rumors can also be categorized based on the topic. Some frequent rumor topics include health-related rumors (e.g. vaccines causing autism), social crisis-related rumors (e.g. a terrorist attack warning or death of a public figure), political issues and election-related rumors (e.g. election candidate scandals). There are also commercial rumors that deal with product- or brand-related issues, which is the focus of this study and are discussed below in detail.

Commercial Rumors and Characteristics

Commercial rumors (also known as marketplace rumors) are broadly defined as a form of consumer communication reflecting consumers' assumptions or suspicions about a marketplace based on circumstantial, unverified evidence (Kimmel and Audrain-Pontevia 2010). Typically, commercial rumor messages involve conjecture/uncertainty expressions (e.g. "I'm not sure whether this is true ..." or "I heard that...") or include a label that signals lack of verification and evidence (e.g. "There is a rumor warning that...") (DiFonzo et al. 2012; Kim 2018; Oh et al. 2013). However, commercial rumors can also be written as definite statements without any conjectural expressions or cautionary signals, which makes these rumors indistinguishable from other consumer

communications substantiated by supporting evidence or the communicator's first-person experience.

Some commercial rumors become a fact when they are officially confirmed by the involved companies. However, until recipients are informed about the verification of a rumor, a commercial rumor remains unfounded and uncertain. Considering the definitions and characteristics of general rumors and commercial rumors, this study extends the previous definition of a commercial rumor and conceptualizes it as WOM communication among consumers reflecting their assumptions or suspicions about a brand/product/business practice, in which the statement is secondary information with unknown origin and is unverified and unsubstantiated at the moment of exposure.

Although little scholarly attention has been given to the commercial rumor phenomenon, two survey studies with both regular consumers and marketing practitioners found that commercial rumors were more likely to have negative versus positive content (Kamins et al. 1997; Kimmel and Audrain-Pontevia 2010). Kamins et al.'s (1997) survey with a panel of 560 representative households in Arkansas identified several characteristics of commercial rumors. The survey respondents perceived commercial rumors as less important and less credible and had a negative attitude toward commercial rumors compared to other alternative sources (e.g. advertising, WOM, published sources, product trial), and commercial rumors were more likely to be believed as false. They also found that the vast majority of the rumor cases that the respondents identified were negative (Kamins et al. 1997). Another survey with a purposive sample of American and French marketing practitioners also found a prevalence of negative

commercial rumors (Kimmel and Audrain-Pontevia 2010). In their study, 50% of the rumors the participants reported were of a negative nature, but 44.6% of the rumors predicted neither positive nor negative consequences (e.g. merger or buyout rumors), and only 5.6% had positive themes.

Negative commercial rumors can significantly damage consumers' perceptions of the involved companies (Renkema and Hoeken 1998). These rumors threaten the brand's reputation (Veil et al. 2012), and, internally they increase employee stress, lower morale, and erode trust among coworkers and consumers (Kimmel and Audrain-Pontevia 2010). The possibility and strength of negative consequences caused by a commercial rumor increases if the involved company fails to promptly address the rumor and lets the rumor spread among consumers and be amplified by the media (Veil et al. 2012). Thus, prompt identification and timely extinction of rumors is important for internal and external relationships of an organization (Kimmel and Audrain-Pontevia 2010).

Since it is almost impossible to predict the emergence of a rumor, an organization should be equipped with rumor response strategies to manage internal and external relationships with its stakeholders (Kimmel and Audrain-Pontevia 2010). Brand managers and communication practitioners can respond to rumors by ignoring, confirming, or refuting them (Difonzo, Bordia, and Rosnow 1994). Rumor refutation refers to making statements that disaffirm and refute a rumor. Rumor refutation messages have been generally found to be an effective strategy in reducing the probability of people believing the rumor and in lowering the level of anxiety associated with the rumor (Bordia, DiFonzo, and Shculz 2000; Bordia et al. 2005).

The importance of rumor-refutation communication is even greater in this era of social media. Online communication platforms and social media offer unprecedented opportunities for diverse information sharing and diffusion. Especially on social media, information sharing is just one click away, and, predictably, unverified or false information is much easier to spread at a faster pace (Chua et al. 2017; Katz 1998). Thus, the vast and fast dissemination of information on social media could be problematic for brands (Boyd 2014). This is a major concern for marketers and communication practitioners as they attempt to identify rumors and develop counter-rumor strategies once undesirable rumors start to influence public opinion (Kimmel and Audrain-Pontevia 2010).

Given the importance of timely rumor-refutation communication, such messages should be strategically crafted and expeditiously disseminated to quickly suppress the rumor and minimize harm/loss. Thus, considerable scholarly attention has been given to understanding the dynamics of rumor dissemination and developing effective rumor suppression strategies. The following section reviews the research on these topics.

Research on Rumors and Rumor-Refutation Communication

Scholarly attention across many disciplines has been devoted to understanding, controlling, and suppressing rumors. A number of studies have investigated the influencing factors of rumor belief and retransmission, but only an emerging number of studies have identified factors that can enhance the effects and effectiveness of rumor-refutation communication and reduce rumor belief and sharing. The research on rumors and rumor-refutation messages can be divided into three streams: 1) research on the

influence of the recipient factors on message belief and dissemination, 2) research on the influence of the message factors (i.e. the message source and message content) on message belief and dissemination, and 3) research on the influence of the social context factors on message belief and dissemination. In this section, the previous research on rumors and rumor-refutation is reviewed for these distinctive research streams.

Influence of the Recipient Factors on Rumor Belief and Retransmission

A number of studies on rumors have identified and demonstrated the importance of the rumor recipient characteristics that influence rumor belief and retransmission. The recipient factors that have been found to exert significant influence on rumor belief and retransmission include perceived uncertainty, perceived anxiety, personal importance, personal identification with the rumor object, and accordance with rumor-related biases (DiFonzo and Bordia 2002; Einwiller and Kamins 2008; Jaeger, Anthony, and Rosnow 1980; Kimmel and Audrain-Pontevia 2010; Schachter and Burdick 1955; Walker and Beckerle 1987). Among these factors, perceived uncertainty and anxiety are the two most frequently examined factors and consistently found to exert influence on rumor belief and retransmission irrespective of the rumor type (DiFonzo and Bordia 2002; Jaeger et al. 1980; Kimmel and Audrain-Pontevia 2010; Schachter and Burdick 1955; Walker and Beckerle 1987).

Schachter and Burdick (1955), for example, found a significant effect of perceived uncertainty about the rumored situation on rumor retransmission in a field experiment. Their experiment showed that participants who were presented with a rumor with additional information describing the rumor as ambiguous and unclear were more

likely to retransmit the rumor, compared to the other group of participants who were shown the same rumor without the additional information. In a few other studies, the influence of rumor recipients' anxiety was tested and found that individuals with higher levels of anxiety regarding the rumored situations were more likely to pass on the rumors (Jaeger et al. 1980; Walker and Beckerle 1987). Regarding the influence of personal identification with the rumor object, Einwiller and Kamins's (2008) experiment demonstrated that individuals who identified themselves with the political figure who was the object of the rumor were less likely to believe the rumor and less likely to spread the rumor, compared to those who did not identify with the rumor object.

Compared to other types of rumors, commercial rumors have not drawn as much research attention, with only two published studies on the recipient factors influencing commercial rumor belief and retransmission. Interestingly, both studies were surveys with a sample of corporate communication professionals. The first study was a survey regarding corporate rumors with a purposive sample of corporate executives from Fortune 500 corporations and PR firms (DiFonzo and Bordia 2002). The findings revealed that the survey participants' perceived uncertainty and anxiety regarding rumor issues and rumor belief were positively associated with the frequency of rumor retransmission. They also found that participants were more likely to believe rumors when the rumors were consistent with their preexisting biases regarding the rumor topic.

Another survey by Kimmel and Audrain-Pontevia (2010) with a sample of marketing practitioners also found that rumor recipients' perceived uncertainty, anxiety, and importance of the rumor topic were positively associated with the frequency of rumor

retransmission, and the relationships were stronger when the respondents perceived the rumor as highly believable. The findings from the two commercial rumor studies with practitioners are consistent with those from the experimental studies with general consumers in other rumor type contexts, which seems to add more confidence to the accumulating evidence in this research stream emphasizing the importance of perceived uncertainty and anxiety in spreading rumors.

Influence of the Message Factors on Rumor Belief and Retransmission

The scope and volume of research on the message factors are much smaller than that of research on the recipient factors. In addition, research regarding message-related factors influencing rumor belief and retransmission has primarily focused on the message content factors. In this line of research, rumor valence and rumor message features have been investigated and found to be significant influencing factors (Chua et al. 2017; Kamins et al. 1997; Rosnow et al. 1986; Qi et al. 2017).

Regarding the rumor message valence variable, studies have demonstrated that negative rumors are perceived as more trustworthy and spreadable compared to positive rumors (Rosnow et al. 1986; Qi et al. 2017). In Rosnow et al.'s (1986) survey study with a convenience sample of adults, respondents perceived negative rumors as more compelling and trustworthy than positive rumors. An experimental study by Qi et al. (2017) also revealed consistent findings that the study participants were more likely to trust and share negative rumors than positive rumors.

In terms of the rumor message features, a message labeled as a rumor (i.e. a message mentioned the word "rumor") was found to decrease retransmission intention as

opposed to a message without such a label (Kamins et al. 1997). A machine-coded content analysis of Twitter data also found that rumor tweets including hashtags, images, and mentions were more likely to be retweeted than tweets without such elements (Chua et al. 2017).

Research regarding the influence of the rumor source factor is scarce, with only one study examining this factor. With Twitter data, Chua et al. (2017) tested source credibility as an influencing factor of rumor dissemination. Based on the two-step flow theory and diffusion of innovation theory, the study posited that source credibility of rumor tweets would be associated with tweet retransmission. Source credibility was conceptualized and operationalized in two sub-dimensions: user experience (i.e. the age of the rumor sources' Twitter accounts and the number of tweets they had posted) and user connectivity (i.e. number of followers and following in their connection). Retransmission of rumor tweets was operationalized as the retweet count each rumor tweet generated. To test the hypotheses, the study collected tweets related to the rumored death of a public figure, and found that user connectivity (i.e. number of followers and following of rumor tweet sources) positively influenced rumor dissemination while the number of tweets the sources had posted was negatively associated with rumor dissemination (Chua et al. 2017). The results indicated that the rumor tweets posted by well-connected Twitter users were more likely to be retweeted, while the rumor tweets posted by users who frequently, (i.e. indiscriminately) post tweets were less likely to be shared.

While research on rumor message factors is limited, key insights taken from this review of the research on rumor content factors and source factors indicate that the message features that would likely undermine the validity of the information (i.e. a rumor label) tend to deter rumor sharing. In contrast, the message features that offer information completeness (i.e. hashtags, images, and mentions) tend to contribute to more active rumor sharing. A single study that examined the rumor source factor also suggests that highly connected individuals who tend to share information more discreetly and selectively would likely exert stronger influence on rumor sharing.

Influence of the Social Context Factors on Rumor Belief and Retransmission

Research on social context factors has recently emerged. While the number of prior studies in this line of research is still very limited, they provide promising new insights. Two experimental studies examined whether normative influences stemming from the social virality indicators (e.g. the number of retweets, likes, and replies) affected rumor belief and retransmission in the Twitter setting (Kim 2018; Lee and Oh 2017). These studies found that rumor tweets with higher virality metric numbers tended to generate higher levels of message believability and retransmission intention (Kim 2018; Lee and Oh 2017). Similar to the insights from the research on the message content factors, these findings suggest that the rumor context factors that indicate individuals' subjective validation of a rumor would likely influence rumor belief and retransmission intention.

Along with the expansion of the research on rumors and influencing factors, an emerging body of research literature has begun to explore effective rumor-refutation

strategies to increase the effects and effectiveness of rumor-refutation communication and to reduce rumor effects. In the following subsection, this line of research is reviewed.

Influencing Factors of Rumor-Refutation Belief and Retransmission

In this research stream, the influence of rumor-refutation message factors has been the primary focus. Several studies have found argument quality, message features, and message valence as having significant influence on rumor-refutation effects (Bordia et al. 2005; Chua et al. 2017; Qi et al. 2017). For example, Bordia et al.'s (2005) experimental study found that a rumor-refutation message with high-quality arguments was more effective in reducing rumor belief and anxiety than one with low-quality arguments. This effect was even greater among individuals with a higher level of perceived relevance with the rumor. Another study also examined the influence of argument quality, which was expected to interact with personal identification with the rumor object, on reducing rumor belief (Einwiller and Kamins 2008). Their study found a significant interaction effect in that the rumor-refutation message with strong arguments generated significantly lower rumor belief than a message with weak arguments only among individuals with lower levels of identification with the rumor object. In contrast, among individuals with higher identification levels, their rumor belief did not change regardless of the argument quality conditions.

Besides the argument quality factor, message valence and features have also been tested. For example, Qi et al. (2017) found a significant influence of message valence such that the effect of rumor-refutation messages in reducing rumor belief and intention to share was greater for negative rumors than for positive rumors. In addition, in a

Twitter context, Chua et al. (2017) found that the rumor-refutation tweets with hashtags, images, and mentions were more likely to be retweeted than those without such content features.

In terms of the message source factors, two studies examined the influences and effect of source credibility on rumor-refutation message retransmission. Bordia et al. (2005) conducted a series of experiments with college students to test how the effectiveness of rumor-refutation messages about a computer virus would differ by source characteristics. The study manipulated source credibility by differentiating two sources of the rumor-refutation message: A government agency overseeing computer security as a high-credible source and a fellow student as a low-credible source. The findings showed that a high-credible source, as opposed to a low-credible source, did not effectively decrease rumor belief, but it successfully reduced rumor-related anxiety. This study also tested a moderating effect of personal relevance, expecting a stronger source effect for low-relevance participants compared to high-relevance participants. However, unlike their prediction, personal relevance increased the effect of source credibility. That means, the difference in rumor belief and anxiety reduction between the high-credible and low-credible source conditions was greater among participants with a higher level of personal relevance with the rumor topic than those with lower personal relevance.

In the same study that was reviewed earlier on the influence of the message factors on rumor belief and retransmission (Chua et al. 2017), they also tested the influence of source credibility on disseminating rumor-refutation tweets using different operationalization. They hypothesized that source credibility (i.e. experience and

connectivity of rumor-refutation tweet posters) of rumor-refutation posters would be associated with rumor-refutation tweet dissemination. The study results revealed that the number of followers of rumor-refutation tweet sources was positively related to the number of retweets they generated, while the number of tweets the sources had posted was negatively associated with the retweet count.

In addition to source credibility, Bordia et al. (2000) examined the perceived honesty and appropriateness of the rumor-refutation message source. In particular, they examined whether or not the rumor-refutation message source's position within the organization's hierarchy matched the scope of the rumor being refuted. Rather than examining manipulating, they measured the perceived honesty and appropriateness of the rumor-refutation message source and conducted a median split to create high and low groups for each source type condition. The experimental study findings revealed a significant main effect of perceived source honesty in reducing rumor belief and anxiety. That is, the high-honest source was more effective in reducing rumor belief and anxiety than the low-honest source. The study also revealed a significant interaction effect of perceived source honesty and appropriateness on reducing rumor belief, indicating that the high-honest and high-appropriate source generated the greatest extent of rumor belief reduction while the low-honest and low-appropriate source generated the least rumor belief reduction.

In sum, although the research on rumor-refutation effects and influencing factors is quite limited, prior studies provide useful insights to guide future research on the topic, including the current study. In addition to the influence of some message content

features, the research suggests a potentially important role of rumor-refutation message sources—whether it was an organizational source who created a rumor-refutation message or social media users who served as a WOM communication channel disseminating a rumor-refutation message.

Unexplored, however, is the question of whether and how the interpersonal relationship factors, such as interpersonal trust, which operate among individuals who carry rumor-refutation messages through WOM, would influence rumor-refutation message belief and dissemination. This question is particularly important, especially in the social media environment where users are connected to one another and peer-to-peer interpersonal influences facilitate the dynamics of information flow. Given that trust has been examined and proven as an important facilitator of interpersonal interactions despite risk and uncertainty, this study focuses on the influence of interpersonal trust on the effects of rumor-refutation messages. The next chapter discusses the theoretical construct of trust and reviews the related research on trust and the antecedents and consequences.

CHAPTER 3

LITERATURE REVIEW ON TRUST

This literature review chapter has three sections. The first section discusses the theoretical construct of trust and different types of trust based on various research stream development. The second and third sections review relevant empirical research about the antecedents and consequences of interpersonal trust, which will serve as a theoretical foundation for hypothesis development.

Overview of the Trust Construct and Trust Types

The trust construct has received extensive attention from scholars in various disciplines such as psychology (e.g. Rotter 1971; Rempel, Holmes, and Zanna 1985), sociology (e.g. Lewis and Weigert 2012), management and information science (e.g. Marsh and Dibben 2003), marketing (e.g. Ganesan 1994), economics (e.g. Williamson 1993), and computer science (e.g. Zhan and Fang 2010). It is an important factor influencing personal or professional relationships, commercial transactions, online communication, and information exchange, especially when risk and uncertainty exist (McKnight and Chervany 2002; Moorman et al. 1993). Trust helps an individual engage with and rely on another party (person or organization) by mitigating feelings of uncertainty, risk, and fear of being exploited (Luhmann 1979; McKnight, Choudhury, and Kacmar 2002; Okazaki, Li, and Hirose 2009).

Trust has been defined in various ways, and the definitions can be categorized into two groups depending on their focus: 1) on one's positive belief/expectation of another and 2) on one's intention to depend on another. The first group of definitions

conceptualizes trust as one's positive expectation regarding the future behavior of the trust object in a situation that involves risks (Marsh and Dibben 2003; Rempel, Holmes, and Zanna 1985; Rotter 1967). For example, Marsh and Dibben (2003) defined trust as "a positive expectation regarding the behavior of somebody or something in a situation that entails risk to the trusting party" (p. 470). Similarly, other studies defined trust as people's belief that they will not be taken advantage of or exploited by another party (Gefen 2002b; Moorman et al. 1992). Expanding on these definitions, Cho et al.'s (2014) definition of trust addressed both belief and expectation aspects in the domain of viral advertising source trust. Viral ad source trust was conceptualized as "a person's belief that the viral ad sender or the advertiser has attributes that are beneficial to him or her, such as benevolence, competence, and integrity, and the expectation of future behaviors of the source based on this belief" (p. 102).

The second group of trust definitions focuses on individuals' behavioral intention or willingness to rely on another party, based on their confidence and expectations of the other (Mayer et al. 1995; McKnight et al. 1998; Mishra 1996; Rousseau et al. 1998). In this approach, Mayer et al. (1995) defined trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (p. 712). Similarly, Rousseau et al. (1998) defined trust as "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (p. 395). While these two definitions primarily focus on the intention to be vulnerable, another related definition

conceptualizes trust as the trustor's willingness to cooperate with others based on individuals' estimation of the probability that the other party will perform a beneficial action (Gambetta 1988).

Types of Trust

The construct of trust can be categorized into different types based on 1) the nature of trust formation or 2) the research origin, trusting object, and contextual orientation. The first typology of trust based on the nature of trust formation classifies trust into experience-based trust and initial trust. Experience-based trust gradually develops over time through repeated interactions and experiences with another party (Ferrin, Dirks, and Shah 2006; Lewicki and Bunker 1995; Shapiro et al. 1992). Therefore, the trustor can predict the outcomes of interactions and others' likely behaviors based on the knowledge accumulated through past interactions (McKnight and Chervany 2001).

Initial trust is the kind of trust that is quickly formed in an unfamiliar situation without previous experience, interaction or affective bond with the other party, based on some types of trust cues or available information received from an initial encounter with the other (McKnight et al. 1998; Menon et al. 1999; Meyerson et al. 1996; Wang, Beatty, and Foxx 2004). In this context, trust cues refer to explicit, representative symbols that indicate the trustworthiness of an object (Warrington et al. 2000), which are designed to lead to formation of cue-based trust. Trust cues are provided by or associated with the entity that wishes to be trusted (Sabel 1993; Wang et al. 2004) in order to induce trustworthiness (Warrington et al. 2000). Compared to experience-based trust built upon repeated interactions over time (Gefen et al. 2003; Lewicki and Bunker 1995), cue-based

initial trust is considered a weaker form of trust because it is based on the expectation of reliable and honest behaviors of the trustee founded on short-term interactions with limited available cues (Urban, Amyx, and Lorenzon 2009).

Another typology of trust is based on the research origin, trusting object, and contextual orientation. Based on a thorough review of prior trust definitions and conceptualizations across various disciplines, McKnight and Chervany (2001) proposed this trust typology, which includes interpersonal trust, trust disposition (dispositional trust), and institutional trust.

Originally social psychology and economics, interpersonal trust represents the relationship between two trusting parties (McKnight and Chervany 2001). The trusting relationship can be applied to different settings depending on the discipline and characteristics of the trustee, such as another person, an institution, or a message. This means, interpersonal trust is object-specific, yet cross-situational (McKnight and Chervany 2001). For example, in psychology, interpersonal trust is applied to person-to-person relationship settings, such as a friendship, family, or romantic relationship (e.g. Couch and Jones 1997; Rempel, Holmes, and Zanna 1985) or professional relationships (e.g. Payne 2014). In the marketing and MIS fields, interpersonal trust is frequently applied to the buyer-seller relationship in both offline (e.g. Doney and Cannon 1997) and online commercial relationships (e.g. McKinght et al. 2002). In the advertising field, the concept is applied to a relationship between the ad message sender and recipient (Cho et al. 2014) or a relationship between an ad message and the ad recipient (Soh, Reid, and King 2009).

McKnight and Chervany (2001) proposed two sub-dimensions of interpersonal trust: trusting belief and trusting intention. Trusting belief refers to the idea that the trustee has beneficial characteristics toward the trustor (McKnight and Chervany 2001; McKnight et al. 2002). Trusting beliefs consist of competence, benevolence, and integrity (Abrams et al. 2003; Gefen, Karahanna, and Straub 2003; McAllister 1995). Competence is a belief that the trustee is proficient and able to perform certain tasks (Mayer, Davis, and Schoorman 1995), and thus it is related to the trustee's expertise in a certain area (Wu, Chen, and Chung 2010). Benevolence refers to a belief that the trustee is willing to act in the best interest of the trustor without rewards (Mayer et al. 1995; McKnight and Chervany 2001). Integrity is a belief that the trustee is honest and reliable and will follow acceptable standards of values, norms, and principles (Mayer et al. 1995).

Trusting intention is individuals' willingness to depend on another party, even though they have no control or power over the other party (McKnight and Chervany 2001; McKnight et al. 2002). Trusting intention also has two-sub dimensions: willingness to depend on the other and subjective probability of depending on the other (Currall and Judge 1995; McKnight and Chervany 2001). Willingness to depend means one's voluntary will or desire to be vulnerable with the other party by relying on the party (Mayer et al. 1995). Subjective probability of depending is the extent to which people forecast their intention or commitment to depend on the other party in the future (Currall and Judge 1995).

Unlike the interpersonal trust that represents a relationship, trust disposition is one's personality trait that influences one's consistent propensity to be willing to depend

on others across persons and situations (Davis, Sajtos, and Chaudhri 2011; Mayer et al. 1995; McKnight and Chervany 2002). Derived primarily from trait psychology, an individual's trust disposition reflects two sub-dimensions: 1) one's general faith in humanity and 2) a trusting stance toward others (Davis et al. 2011; McKnight and Chervany 2001; Gefen 2000). Faith in humanity denotes the extent to which an individual believes others are usually reliable, competent, benevolent, honest and predictable, in general (McKnight et al. 1998). Trusting stance represents one's belief that the outcome will be desirable when interacting with another, regardless of the person's trustworthiness (McKnight and Chervany 2002). Thus, regardless of how much a trustor believes others to be trustworthy, a person with a higher level of faith in humanity would be less critical and more tolerant in dealing with others (Davis et al. 2011). Individuals with a higher trusting stance would be more likely to take a normal level of risk until they have an adverse experience that influences them negatively so they no longer are willing to take a risk (McKnight and Chervany 2001).

Trust disposition is formed based on life experiences and socialization (Hofstede 1980; Kim, Ferrin, and Rao 2008; Rotter 1971; McKnight et al. 1998), not based on one's experience or previous knowledge of a specific trust object. Trust disposition is also developed based on personality types, cultural backgrounds, or developmental experiences (Hofstede 1980; Kim, Ferrin, and Rao 2008). Unlike the interpersonal trust concept that has a specific trust object, trust disposition is cross-situational and cross-contextual because it is the general tendency to depend on others regardless of the object or situation (McKnight and Chervany 2001).

Trust disposition has been examined as a foundation or background to form trusting relationships (Rotter 1971) and is considered particularly influential in early stages of a relationship or in novel situations when individuals have little or no information to evaluate the trust object or situation (Johnson-George and Swap 1982; McKnight et al. 1998). For these reasons, trust disposition has been frequently tested and found to be a significant antecedent of interpersonal trust formation (Davis, Sajtos, and Chaudhri 2011; Gefen 2000; Kim et al. 2008), especially in unfamiliar situations.

Institutional trust refers to one's positive perceptions toward the structural characteristics of a certain institutional environment (McKnight et al. 2002) based on one's sense of guarantees, safety nets, or other performance structures that lead to successful outcomes (Shapiro 1987). Institutional trust focuses on situations and structures that provide people with a sense of assurance that the outcome of their interaction will be positive and is grounded on the sociology tradition that one's behavior is situationally constructed and determined by the environment, (Luhmann 1979; Shapiro 1987). Institutional trust is composed of two sub-dimensions: structural assurance and situational normality (McKnight and Chervany 2001). Structural assurance is the belief that a protective structure, such as legal, governmental, regulatory, is in place leading to successful outcomes (Shapiro 1987). Situational normality refers to the belief that the situation involved is normal or positive for the situational success (McKinight and Chervany 2001).

Like trust disposition, institutional trust has often been considered and found to be a significant antecedent of interpersonal trust formation, with a different

operationalization depending on the research context. In the domain of e-commerce, for example, McKnight et al. (2002) identified structural assurance of the web (i.e. protective legal and technological structure) and perceived web risk (i.e. the extent to which a user perceives the web is unsafe and risky to use) as reflections of institutional trust. They also found a positive influence on consumers' trusting belief and intention toward a web vendor. In the context of permission-based mobile marketing, Jayawardhena et al. (2009) identified the media presence of a mobile communication company (i.e. publicity gained from continuous advertising and media coverage) and institutional regulation against the misuse of consumer information as a reflection of institutional trust, and found positive influences on consumers' trusting behavior (i.e. giving permission to the mobile marketing provider).

Among these three trust concepts, interpersonal trust is the main focus of the current study. Thus, in the following section, an in-depth review of prior research on interpersonal trust is presented. First, a general overview of the research development on interpersonal trust and different research approaches is presented. Then, research on the antecedents and consequences of interpersonal trust is reviewed.

Development of Interpersonal Trust Research

Interpersonal trust has been examined extensively across various disciplines, and the research can be divided into three different approaches: (1) psychological approach, (2) behavioral approach, and (3) computational approach. The psychological approach of interpersonal trust research attempts to understand one's complex psychological states associated with interpersonal trust (i.e. one's beliefs/expectations of another and one's

willingness to depend on another person) (Lewicki et al. 2006; Mayer et al. 1995; Rousseau et al. 1998). The behavioral approach of interpersonal trust research captures the trust construct based on observable actions of the trustor (i.e. trusting behaviors) that demonstrate his/her intention to engage in interpersonal interaction with another (McKnight and Chervany 2001; Lewicki et al. 2006). Computational trust research, which is a variant form of behavioral trust research, attempts to mathematically capture computer-mediated interpersonal trust formation and deterioration between human actors based on trusting behaviors (e.g. Ahmad et al. 2011; Mishra and Bhattacharya 2011; Zhan and Fang 2010).

Psychological Approach of Interpersonal Trust Research

In the psychological approach, the conceptualization of interpersonal trust focuses on the trustor's belief /expectation of and willingness to depend on the trustee. That is, trust is conceptualized as the extent to which the trustor believes that the trustee has beneficial attributes toward him/her and has positive expectations of the trustee's future behaviors (Doney and Cannon 1997; Larzelere and Huston 1980; McKnight and Chervany 2001; Moorman et al.1993) or the extent to which the trustor relies on the trustee (Mayer et al. 1995; Rousseau et al. 1998).

In this psychological research approach, interpersonal trust has been mainly studied using surveys or experimental methods based on self-administrated questionnaires (i.e. scale items) to capture the construct (e.g. Chu and Kim 2011; Cho et al. 2014; Soh, Reid, and King 2009; Xu 2014). The trust scale items consider trust and distrust as bipolar opposites where the high end represents strong trust for another, and

the low end represents strong distrust. For example, one of the most widely used measurement scales for trusting belief and intention was developed by McKnight et al. (2002) to measure the relationship between a user and a web vendor. Their trusting belief scale includes three sub-dimensions of trusting belief: benevolence, integrity, and competence of a web vendor. The trusting intention scale reflects four sub-dimensions of trusting intention, including willingness to depend, and three aspects of subjective probability of depending (i.e. follow advice, give information, and make purchases). Other studies have adopted measurement scales in different interpersonal relationship settings, such as a trusting relationship between a viral ad sender and the recipient (Cho et al. 2014).

Behavioral Approach of Interpersonal Trust Research

Unlike the psychological approach that focuses on one's belief and intention in capturing interpersonal trust with survey or experimental studies using self-reported measurements, the behavioral approach captures the trust construct based on observable actions of individuals that manifest their trust (i.e. trusting behaviors) (Lewicki et al. 2006). That is, interpersonal trust is conceptualized and measured in terms of one's behavioral choices based on his/her willingness to depend on another (McKnight and Chervany 2001).

The behavioral choices are measured with some behavioral proxies that indicate interpersonal trust. Therefore, the behavioral approach complements the psychological approach by 1) overcoming the limitations of self-report measurements and 2) going beyond the psychological understanding of trust and further exploring trust behaviors.

Within the behavioral research tradition, some studies have measured interpersonal trust as represented in the behavior of making a choice to cooperate or not (Axelrod 1984; Deutsch 1958; Flores and Solomon 1998). In the economic setting, for example, Axelrod (1984) measured cooperative behavior as a manifestation of trust. That is, trust is measured by capturing how frequently and how much a person decides to cooperate with another person based on the trustor's rational inferences about the trustee's intention, motives, and trustworthiness (Axelrod 1984). The level is measured as the level of cooperative choice with absolute trust on one end with the person always cooperating with another and defiance on the other end with the person always betraying another (Axelrod 1984). Thus, the strength of interpersonal trust among actors can be manifested by the number or proportion of cooperative choices or long-term patterns of such choice behaviors. Similarly, in game situations, interpersonal trust can be represented by cooperative moves by the game players, and distrust is manifested as competitive moves (Deutsch 1958).

With the recent emergence of the Internet, the proxies of interpersonal trust have evolved and diversified, relying on measurements obtained from online data that capture the behavioral choices of individual users. For example, one study used the number of followers in Yelp data, a popular consumer review platform, to indicate each reviewer's trustworthiness level (Banerjee et al. 2017). McKnight and Chervany (2001) also proposed that information sharing, agreement, risk taking, involvement, and purchase could be considered trusting behaviors.

Computational Approach of Interpersonal Trust Research

Computational trust attempts to mathematically capture interpersonal trust formation and deterioration between human actors (Ahmad et al. 2011; Mishra and Bhattacharya 2011; Zhan and Fang 2010). When defining interpersonal trust, this research approach focuses on expected future actions of others based on their behavioral patterns and history of past interactions (Grandison and Sloman 2000; Mui, Mohtashemi, and Halberstadt 2002; Olmedilla et al. 2006). In this sense, a computational research approach can be considered a variant form of behavioral trust research.

The computational trust approach has been mainly developed in the computer science field (Sabater and Sierra 2005; Schillo et al. 2000) to aid decision-making processes in unknown, uncontrollable, and possibly harmful contexts. Some examples of such contexts are open network or ubiquitous computing (Sassone, Krukow, and Nielsen 2006), access control or authentication decisions (Moyano, Fernandez-Gago, and Lopez 2012), e-commerce (Hübner et al. 2009), and P2P networks (Kamvar et al. 2003).

The computational trust research approach relies on mathematical models to quantify the interactions between human actors based on certain behavioral proxies representing the interpersonal trust construct (Adali et al. 2010; Ahmad et al. 2010; Zhan & Fang 2010). Such models are derived from various mathematical theories, such as game theory, probability theory, logics, statistics, and algorithmics (Sassone, Krukow, and Nielsen 2006) to capture how trust is quantitatively perceived, computed, and transmitted. The mathematical models generate trust values that indicate to what extent an actor trusts another person, or trust probability that predicts how likely an entity performs a certain expected action, which is represented within a certain numerical range

(Liu et al. 2013). The mathematical models can be implemented in a form of an iterative matrix algorithm (i.e. computational trust algorithm) that enables researchers to approximate trust behaviors and make predictions of trust behaviors in a network setting.

Computational trust algorithms. A computational trust algorithm is an iterative matrix representation of trust values, which is used to infer trust relationships and predict trust behaviors in a network. There are two key advantages of using computational trust algorithms over conducting psychological or behavioral trust research methods. First, a computational trust algorithm can address network-level trust formation. In the psychological or behavioral approach, trust is captured in a dyadic relationship between the trustor and the trustee. However, a computational trust algorithm allows researchers to calculate the trust values of a massive number of actors in a network at the same time (Roy et al. 2017). A series of algorithm iterations is performed to assign a single or a set of trust scores to each actor in a network and adjust the scores to generate relative trust values for the actors in the network (Golbeck and Hendler 2006; Mishra and Bhattacharya 2011; Rath et al. 2017). Second, a computational trust algorithm can address trust propagation among multitude individuals in a network and the chains of transitive trust relationships, showing how the trust scores of each actor influence (i.e. increase or decrease) others' trust values in the network (Liu, Datta, and Rzedca 2013; Moyano et al. 2012). Thus, the outcomes of computational trust algorithms can capture both dyadic-relationship-based trust formation between two actors and network-level trust formation among multiple individuals in the network (Sabater and Sierra 2005).

Computational trust proxies. Like the behavioral trust research approach, direct experiences or observable interactions among individuals, such as dependence, trade, competition, and collaboration, are traditional inputs for the computational trust metrics (Abdul-Rahman and Hailes 2000; Sabater and Sierra 2005). With availability of social media data showing users' interactions in virtual environments, computer-mediated trust proxies have received considerable scholarly attention to represent interpersonal trust levels in a network setting. (Roy et al. 2017). For example, data from some massively multiplayer online games (MMOs) that involve intensive group formation or communication in a virtual setting (i.e. cooperative behaviors) provide a viable trust proxy (Roy 2015). Additionally, users' communication patterns on websites or social media can also serve as a trust proxy. For example, on StackOverflow, a question-and-answer website regarding computer programming issues, receiving many "favorites" from other users can indicate the user's trustworthiness level (Roy 2015). Retweeting on Twitter is another proxy for the retweeter's trust in the original tweet source (Adali et al. 2010). Other examples of trust proxies include the patterns of following/follower network formation, liking, or replying on Twitter (Rath et al. 2017).

These three research approaches of interpersonal trust and proxies of trust suggest that different operationalization approaches of interpersonal trust can capture trusting beliefs and intentions as well as trusting behaviors. In addition, adopting multiple trust operationalization approaches can counteract the weaknesses of each research approach and provide a more comprehensive understanding of interpersonal trust. In the next section, research on antecedents of interpersonal trust is reviewed to understand what

factors can contribute to forming interpersonal trust and how the role of different factors vary depending on the type of trust.

Research on Antecedents of Interpersonal Trust

Various interpersonal trust antecedents have been proposed and tested across different trusting relationships. In this section, prior research on the antecedents of trust is grouped into two categories, depending on whether the research focus was antecedents of experience-based trust or initial trust. The research volume of the initial trust antecedents is much greater than that of the experience-based trust antecedents.

Antecedents of Experience-Based Trust

The antecedents of experience-based trust have been mainly examined in professional relationship settings, such as the buyer and supplier relationship, intra-firm network, or virtual collaboration team building. The studies have commonly focused on the frequency, willingness, and extent of interactions between the trustor and trustee as the antecedents as well as the characteristics of the trustee, social influence, and the trustor's personality trait (e.g. Doney and Cannon 1997; Jarvenpaa et al. 1998; Ridings et al. 2002; Tsai and Ghoshal 1998). For example, Doney and Cannon (1997) conducted a survey with buyers in industrial manufacturing to examine what influences their trust formation toward the supplier firm and their counterpart salespersons working in the supplier firm. Their survey found that the size of the supplier firm and the supplier firm's willingness to customize investments were positively associated with the buyer's trust in the supplier firm. In a salesperson context, several factors have been shown to have a positive impact on the formation of the buyer's trust in the salesperson including trust,

expertise, and likability of the salesperson, similarity between the buyer and the salesperson, and frequency of business contacts.

In another study, in the context of an intrafirm network, Tsai and Ghoshal (1998) conducted a survey with employees in all business units of a large multinational company. With each business unit as the unit of analysis, the survey results revealed that the extent to which a unit occupying a central role in an inter-unit interaction network was positively associated with the unit's perceived trustworthiness. The extent to which a business unit shares a vision with other units was also positively associated with perceived trustworthiness of the unit. Jarvenpaa et al.'s (1998) field study with a virtual collaboration team also demonstrated that other team members' perceived integrity and individuals' propensity to trust others were associated with team trust.

The antecedents of experience-based trust have also been tested in a non-professional relationship setting, and similar findings were revealed. For example, a survey with virtual community members found that perceived responsiveness of others, the degree to which others reveal their personal information, and a trustor's dispositional trust were positively associated with trust in other members' ability, benevolence, and integrity (Ridings et al. 2002).

In sum, previous research investigating the antecedents of experience-based trust suggests that, irrespective of the relational settings, both relational factors (e.g. interactions or social influence) and one's personality traits (e.g. trust disposition) have significant influence on experience-based trust.

Antecedents of Initial Trust

A great deal of research has identified and tested the antecedents of initial trust in an online environment. A majority of the studies tested the effects of various trust cues as antecedents of trust (e.g. Lee and Huh 2010; Lim et al. 2006; McKnight et al. 2002; Wang et al. 2004; Xu 2014), while other studies found trustors' characteristics (e.g. institutional trust and trust disposition) are significant antecedents (e.g. Gefen 2000; McKnight et al. 2002).

Trust cues are known to form cue-based trust through trust transference or intentionality processes (Doney and Cannon 1997; Wang et al. 2004). Trust transference comes from trust cues in connection to well-trusted entities, to the object that wishes to be trusted (Doney and Cannon 1997). Intentionality processes refer to the trustor's interpretation about the trust cues in that the cues are given with benevolent intentions to help or reward the trustee (Doney and Cannon 1997).

The effects of various trust cues as antecedents of cue-based initial trust were mainly demonstrated in e-commerce environments (Lee and Huh 2010; McKnight et al. 2002; Lim et al. 2006; Wang et al. 2004). In the e-commerce context, a trust cue refers to a website content feature in the form of a cue or signal that helps consumers heuristically determine whether or not to trust the website without prior experience or knowledge (Mayer, Huh, and Cude 2005). Various website trust cues have been found to influence the formation of initial website trust, including third-party approval (e.g. Shakar et al. 2002), privacy policy (e.g. Chen et al. 2010), perceived website quality (e.g. McKnight et al. 2002), correct and helpful website information (e.g. Chang and Fang 2013), affiliation

with a well-known website (e.g. Lim et al. 2006), and listing awards (e.g. Wang et al. 2004).

Among those cues, the ones that embody some type of reputation have been frequently found to be effective in building initial trust. Examples of such trust cues include affiliation with a well-known website (Lim et al. 2006) and listing awards (Wang et al. 2004). Testing the effect of such trust cues, Lim and colleagues' (2006) experimental study found that affiliation with a reputable portal site improved customer trust toward an unfamiliar online store. Wang et al. (2004) also found that listing awards from reputable sources was effective in generating consumer trust toward an online store and higher intention of providing personal information. The influence of reputation cues on initial trust was also demonstrated outside of the website cue context. In the online review platform context, showing how many users trusted the reviewer (i.e. reviewer's reputation) was found to be effective in generating reviewer trust (Xu 2014).

Besides the trust cues, some trustor factors have been identified and found to be effective for building initial trust in the e-commerce domain, including one's understanding about the website's procedures and technology, institutional trust, and trust disposition (e.g. Gefen 2000; McKnight et al. 2002). For example, structural assurance of the web (i.e. institutional trust about the safety of the web environment) was found to be positively related to trusting beliefs and willingness to depend on the e-vendor (McKnight et al. 2002). In another study, one's trust disposition and people's understanding about the website's procedures and technology were found to be positively associated with trust in an e-commerce vendor (Gefen 2000).

The insights emerging from the review of research on antecedents of initial trust indicate that the effects of reputation cues in building cue-based trust, not only found in the e-commerce setting but also in the online review platform, have a potential for wider application in various trusting contexts. In addition, as mentioned in the previous section reviewing the antecedents of experience-based trust, trust disposition was again found to be one of the most consistent antecedents of initial trust, which further confirms its significant influence on trust. The next section reviews the consequences of trust to understand how interpersonal trust influences information acceptance and exchange, which is the focus of this study.

Research on Consequences of Interpersonal Trust

Numerous studies have investigated the consequences of interpersonal trust in different contexts where risks and uncertainties are involved, such as virtual team building, exchange of resources and knowledge, and e-commerce transactions. These studies have revealed that interpersonal trust influence one's positive perceptions or attitudes toward the trusting object (Chen et al. 2010; Chiu, Hsu, and Wang 2006; Cho et al. 2014), and one's willingness to engage in some interpersonal interactions with the trusting object (i.e. exchange of information, resource, and knowledge, relationship commitment, cooperation, or transaction) (e.g. Hsiao et al. 2010; Jarvenpaa and Leidner 1998; Morgan and Hunt 1994; Ridings et al. 2002).

One of the outcomes of interpersonal trust that has been frequently examined in the research is information acceptance and exchange. Previous studies have found that when trust exists, individuals are more likely to be attentive to information and have

positive perceptions of information (Cho et al. 2014), and are more likely to exchange information and resources with others (Chu and Kim 2011; Jarvenpaa and Leidner 1998; Ridings et al. 2002; Tsai and Ghoshal 1998) or retransmit information to others (Hu and Yang 2015).

In particular, Cho et al.'s (2014) field experiment focusing on viral ad dissemination through email-forwarding found that participants who received the viral ad message from a trustworthy sender were more likely to pay attention to the ad message, and perceive the viral ad as more informative, more entertaining, less irritating, and less risky. Other survey studies have also found a significant influence of interpersonal trust on information exchange. Ridings et al. (2002) conducted a survey with a convenience sample of online virtual community members and found that individuals' trusting belief regarding other community members (i.e. perceived competence, benevolence, and integrity of other members) increased their desire to give information to and get information from others in virtual communities (Ridings et al. 2002).

Two more survey studies conducted in a social media eWOM context also revealed similar findings. Chu and Kim (2011) found that college students' trust in others in their SNS contacts positively influenced their eWOM behaviors, such as opinion-seeking, opinion-giving, and opinion-passing. Hu and Yang (2015) found a positive relationship between interpersonal trust among mobile SNS users and their willingness to retransmit negative eWOM messages.

In sum, research on interpersonal trust and its consequences suggests a positive influence of interpersonal trust between information sources and recipients on

information acceptance and exchange. This insight can be applied to a variety of message-sharing contexts in an online environment, such as rumor spreading and rumor-refutation message sharing. Based on the research review presented in Chapters 2 and 3, the next chapter poses several hypotheses regarding the potential influence of interpersonal trust and message trust cues on the dissemination and effects of rumor-refutation communication.

CHAPTER 4

HYPOTHESES

The review of prior research on rumors and rumor-refutation effects and the theoretical framework of trust and related empirical research guided this study to develop four hypotheses predicting: 1) the effects of source trustworthiness and 2) moderating effects of message trust cues on increasing rumor-refutation message belief and retransmission and decreasing rumor belief and retransmission.

Effects of Source Trustworthiness on Rumor-Refutation Message Belief and Retransmission

Trust represents one's positive beliefs/expectations regarding others' motives and future behaviors, and one's willingness to depend on others, especially when uncertainty and risk are involved (Marsh and Dibben 2003; Mayer et al. 1995; Gefen 2002; Moorman et al. 1992; Rousseau et al. 1998). Given that trust influences interpersonal relationships and interactions when uncertainty and risk are present, the role of trust in communication dissemination and effects has been examined extensively in the online communication context, where perceived uncertainty and risk tend to be higher than in an offline, face-to-face communication context (Lee and Turban 2001).

Previous research findings provide evidence that trust in the communication counterpart, or the trustworthiness of the communication source, influences the recipient's attention to and perceptions of the communicated message. It also enhances the message effects, and increases the likelihood of information exchange between individuals (Cho et al. 2014; Chu and Kim 2011; Hu and Yang 2015; Ridings et al.

2002). Specifically, a high-trustworthy source forwarding a viral ad via email was more effective in inducing ad attention and positive perceptions toward the ad than a low-trustworthy source (Cho et al. 2014). Trust among virtual community members or SNS contacts was also found to be positively associated with willingness to give and get information (Chu and Kim 2011; Hu and Yang 2015; Ridings et al. 2002).

These findings suggest a significantly important role of trust in information acceptance and exchange, especially in high-risk situations, which can be well applied to the rumor-refutation context. The nature of rumors inherently involves high levels of uncertainty and risk (Bordia et al. 2005; Kimmel and Audrain-Pontevia 2010; Rosnow 1991). Rumor transmission is a highly risky behavior that involves potential negative interpersonal consequences if the rumor is proven false (Kamins et al. 1997). Likewise, spreading rumor-refutation messages also involves risk because correcting behavior tends to entrench existing beliefs (Qi et al. 2017). In addition, providing a false correction could damage individuals' reputations and status among peers, and result in rejection by their social group (Kimmel and Audrain-Pontevia 2010).

Based on the literature on trust and its influence on communication processes and effects, this study posits that source trustworthiness of a rumor-refutation message will influence recipients' belief and retransmission of the rumor-refutation message in a social media environment. Specifically, the following hypotheses are posed:

H1: As a rumor-refutation message source, a high-trustworthy social media user, compared to a low-trustworthy user, will generate a greater extent of a) belief and b) retransmission of a rumor-refutation message.

H2: A high-trustworthy social media user, compared to a low-trustworthy user, will generate a greater extent of decrease in a) rumor belief and b) rumor retransmission after exposure to a rumor-refutation message.

Moderating Effects of Trust Cues on the Impact of Source Trustworthiness on Rumor-Refutation Message Effects

In addition to the role of source trustworthiness influencing the effects of a rumor-refutation message, a trust cue included in a rumor-refutation message is expected to play a role as a moderator affecting the influence of source trustworthiness on the rumor-refutation message effects. Trust cues are explicit forms of information associated with the entity that wishes to be trusted and designed to induce cue-based trust (Doney and Cannon 1997; Sabel 1993; Wang et al. 2004; Warrington et al. 2000).

Various trust cues have been identified and tested in the literature, especially in risky or unfamiliar situations (e.g. Chen et al. 2010; Shakar et al. 2002; Lim et al. 2006; Wang et al. 2014; Xu 2014). Among such cues, those that signal reputation have been frequently found to be effective in building cue-based trust in various online settings (Stewart 2003; Swan and Nolan 1985). Examples of such cues are affiliation with a reputable portal site (Lim et al. 2006), awards from reputable sources (Wang et al. 2014), and online reviewer ratings numbers (Xu 2014).

Based on the theoretical premise of trust cues and cue-based trust, and previous empirical findings, this study expects that a trust cue included in a rumor-refutation message would likely facilitate cue-based trust formation toward the message, and in turn, enhance the impact of source trustworthiness on the rumor-refutation message effects. Given that cue-based trust is a weaker form of trust based on short-term

interactions with the trusting object (Urban et al. 2009) than experience-based trust that develops through repeated interactions over time (Gefen et al. 2003; Lewicky and Bunker 1995), this study predicts a moderating effect of message trust cues rather than a main effect equivalent to the effect of source trustworthiness. Therefore, the following hypotheses are posed for the role of trust cues in a rumor-refutation message:

H3: The impact of source trustworthiness on one's a) belief and b) retransmission of a rumor-refutation message will be moderated by the message trust cue factor. Specifically, the impact of source trustworthiness will be greater in the presence of a trust cue in a rumor-refutation message than in the absence of a trust cue.

H4: The impact of source trustworthiness on rumor-refutation message effects reducing a) rumor belief and b) retransmission will be moderated by the message trust cue factor. Specifically, the impact of source trustworthiness will be greater in the presence of a trust cue in a rumor-refutation message than in the absence of a trust cue.

To test the four hypotheses, a multi-method approach is adopted: Study 1 tests all four hypotheses with an online experiment, and Study 2 retests H1b and H3b with a computational research approach using Twitter data. The following chapter presents the research method.

CHAPTER 5

METHODS

Two separate studies were conducted to test the hypotheses using a multi-method approach. First, an online experiment was conducted to test all four hypotheses examining the role of source trustworthiness and trust cues in minimizing the rumor influence and maximizing the effects of rumor-refutation messages. The second study used a computational research approach to further test H1b and H3b in a natural real-life setting. It examines the influence of source trustworthiness and trust cues on social media users' actual retransmission of rumor-refutation messages.

The benefit of using a multi-method approach is twofold. First, the computational research approach complements the experimental approach as it could capture the pattern of a behavioral indicator of trust formation online and actual transmission of rumor-refutation messages. The self-report measures used in the experiment assessed consumers' psychological responses and behavioral intention. Second, the computational research approach addresses some of the limitations of the experiments, such as the artificial nature of experimental stimuli and exposure as well as participants' social desirability bias (i.e. research subjects' tendency to give answers that they consider socially desirable instead of their true feelings (Nunnally 1978)).

Both studies were conducted in a Twitter setting. Twitter, a popular micro-blogging site, was chosen because it is one of the most popular social media platforms, and it has played a critical role in propagating information, messages, opinions, and WOM communication (Jansen et al. 2009; McStay 2009; Pfeffer et al. 2014). Twitter is

also recognized as the fastest social media platform in terms of a high turnover of random information due to the limitation of only typing 140 characters (Pfeffer et al. 2014). The methodological approach used in each study is described below.

Study 1: Online Experiment

Research Design

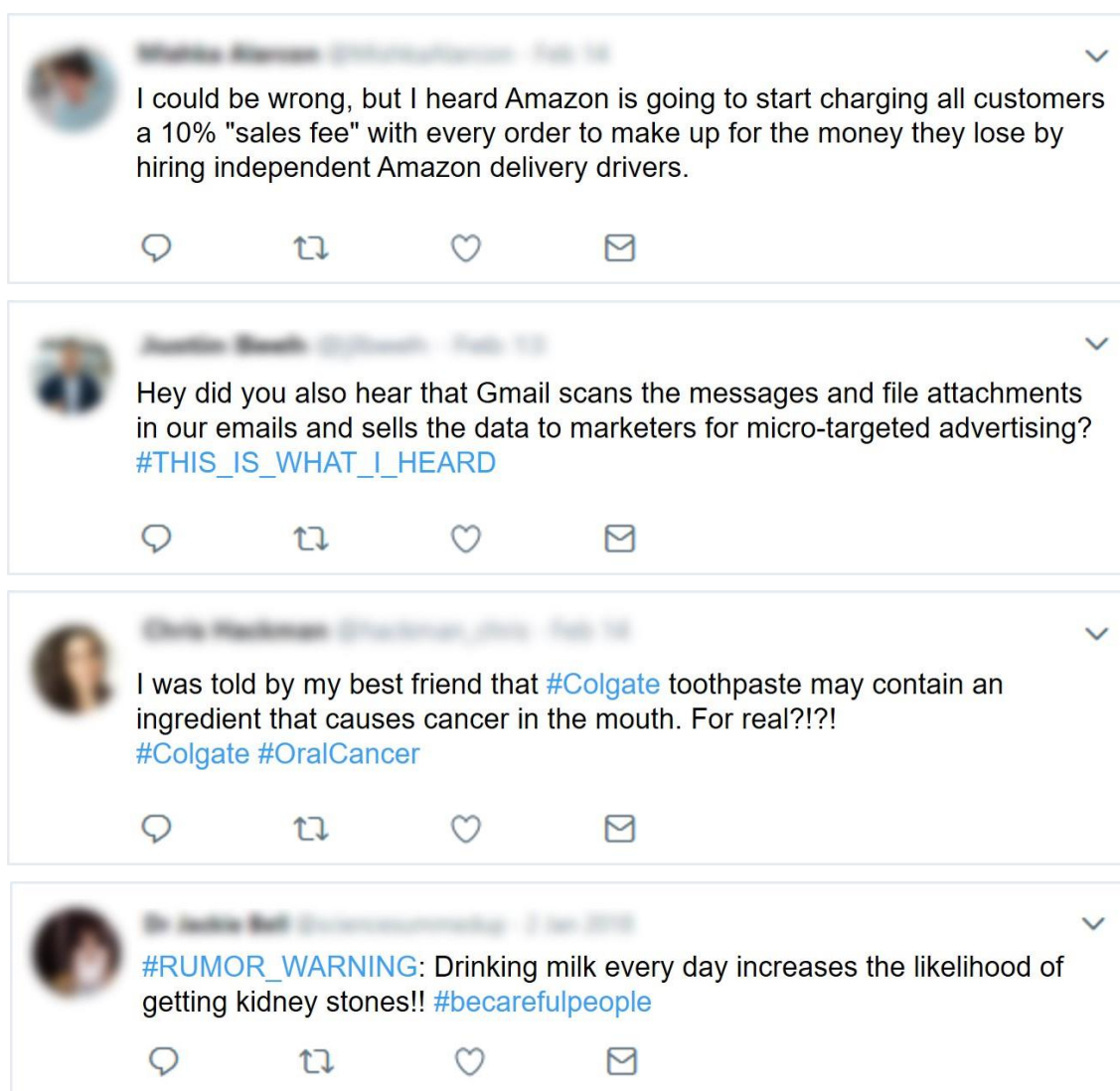
This study used a 2 (high-trustworthy vs. low-trustworthy source) x 2 (presence vs. absence of a trust cue) between-subject, repeated-measures design. Participants were randomly assigned to one of four experimental conditions. Source trustworthiness was manipulated by randomly giving participants one of the two scenarios describing the characteristics of high-trustworthy or low-trustworthy Twitter users. The presence or absence of a trust cue condition was manipulated by including or excluding a trust cue in the fictitious rumor-refutation message. Two rumor messages, which contained the same rumor issue with slightly different wording, were given to all participants, one before exposure to a rumor-refutation message and the other afterward, to measure any changes in belief and retransmission intention toward the rumor after exposure to the rumor-refutation message. The following section presents detailed description of the experimental stimuli development process.

Rumor Case Development

To develop a commercial rumor to be used in the experimental stimuli, several fictitious but highly plausible rumors were created with real brands rather than fictitious ones to ensure plausibility and relevance of the rumor. The criteria for good fictitious commercial rumor examples were: (1) the brand (and product) should be sufficiently

familiar to the participants; (2) the rumored information should be personally relevant, important, and useful; and (3) the information should be perceived by the participants as having a low evidentiary basis (Bordia et al. 2005; DiFonzo and Bordia 2007; Kim 2018; Lee and Oh 2017; Rosnow and Kimmel 2000). Based on these criteria, four fictitious commercial rumor tweets were created about Gmail, Amazon, Colgate and the milk product category in general. Figure 1 shows the four rumor tweets.

Figure 1. Images of the Four Rumor Tweets



The four fictitious commercial rumor tweets were tested in an online pilot study with a sample of 52 adult participants in order to select the most suitable commercial rumor to be used for the experimental stimuli development. The pilot study participants were recruited from the Qualtrics panel service with inclusion criteria of being a social media user who has a Twitter account and having used Twitter in the past six months. The sample included 20 men (38.5%) and 32 women (61.5%) with an average age of 41.5. Participants were told that they were going to be shown a group of messages posted on Twitter and would be asked to evaluate each of the messages in terms of 1) evidentiary basis, 2) personal relevance, 3) information importance, and 4) information usefulness. Participants were shown the four example rumor messages in a random order to avoid any order bias.

The evidentiary basis of the rumor message was measured by a three-item seven-point Likert scale developed by DiFonzo and Bordia (2007). Participants were asked to indicate the extent to which they agreed or disagreed with each of the following statements (1=Strongly disagree, 7=Strongly agree): 1) “It appears that information in this tweet has been verified,” 2) “It appears that information in this tweet is true,” and 3) “It appears that information in this tweet is based on strong evidence.”

Participants’ perceived personal relevance was measured using the following item on a seven-point Likert-type scale developed by Bordia et al. (2005): “How relevant is this tweet to you personally?” (1=Not at all relevant, 7=Very relevant). Importance of the rumor information was measured by a three-item seven-point Likert scale developed by DiFonzo and Bordia (2007): 1) “Information in this tweet is important to me,” 2)

“Information in this tweet is significant,” and 3) “Information in this tweet will be talked about seriously.”

Information usefulness of the rumor message was measured by a three-item seven-point Likert scale developed by DiFonzo and Bordia (2007): 1) “Information in this tweet is useful to me,” 2) “Information in this tweet is beneficial to know,” and 3) “Information in this tweet is helpful to know.”

For the measurement scales composed of multiple items, summated scores were computed by averaging the scores of multiple measurement items. The Cronbach’s alpha coefficient for each variable is reported in Table 1. The Cronbach’s alpha test results showed acceptable measurement reliability for all variables.

Table 1. Cronbach’s Alpha Coefficients for the Pilot Study 1 Measurements

Rumor Case	Evidentiary Basis	Importance	Usefulness
Gmail	0.92	0.97	0.94
Amazon	0.95	0.95	0.93
Colgate	0.96	0.97	0.94
Milk Product	0.96	0.96	0.93

Table 2 shows the descriptive statistics for these four measured variables for each of the four tested rumor tweets. The mean score for each of the four variables was tested against the measurement scale middle point of 4 using a t-test to determine whether each tweet was rated significantly higher or lower than the middle point on the measured concepts. According to the criteria of a suitable commercial rumor for this experiment, a rumor tweet should be rated high on personal relevance, importance, and usefulness, but low on perceived evidentiary basis.

In general, participants found the four rumor tweets to be somewhat strongly lacking an evidentiary basis, and their mean scores were significantly lower than the middle point of 4, which satisfies one of the selection criteria. However, the importance and usefulness of the rumor tweets were rated neutral to slightly low range, and the mean scores of the Gmail and Amazon cases were significantly lower than the middle point of 4. In terms of the personal relevance with the rumored topics, the mean scores also ranged between neutral and slightly low range, but none of the mean scores were significantly higher than the middle point of 4. While none of the cases showed perceived importance, usefulness, and personal relevance mean scores significantly higher than the scale middle point, it was not surprising given the nature of fictitious rumors, and selection of a rumor for the experimental stimuli development was made based on the descriptive data that were closest to satisfying the rumor selection criteria.

Table 2. Descriptive Statistics (Mean) for the Four Fictitious Rumor Tweets

Rumor Tweet	Evidentiary Basis	Importance	Usefulness	Personal Relevance
“Hey did you also hear that Gmail scans the messages and file attachments in our emails and sells that data to marketers for micro-targeted advertising?”	2.85**	3.71	3.65	4.13
“I could be wrong, but I heard Amazon is going to start charging all customers a 10% "sales fee" with every order to make up for the money they lose by hiring independent Amazon delivery drivers.”	2.40**	3.62	3.63	4.15

“I was told by my best friend that Colgate toothpaste may contain an ingredient that causes cancer in the mouth. For real?!?!”	2.04**	3.29*	3.26*	3.67
“RUMOR_WARNING: Drinking milk every day increases the likelihood of getting kidney stones!”	2.31**	3.44*	3.32*	3.54

Note. One-sample t-test results with the test value of 4: * $p < .05$; ** $p < .01$

Based on the pilot study results, the Gmail example was selected because it showed the highest level of information importance and usefulness and the second highest level of personal relevance, and it was rated low on evidentiary basis. However, while developing the experimental stimuli using this case, it was discovered that an actual, very similar Gmail rumor already existed, and Gmail had officially admitted it in 2017. Given that it is possible that some participants might have already been exposed to the similar Gmail rumor, the Gmail rumor example was replaced by the Amazon rumor example. That example showed the second highest level of information importance and usefulness, the highest level of personal relevance, and a low level of evidentiary basis. Using this fictitious Amazon rumor example, experimental stimuli sets were created including an initial commercial rumor about Amazon, a rumor-refutation message correcting the rumor, and the second variation rumor containing the same rumor information. The following sections present a description of the rumor-refutation message manipulation.

Source Trustworthiness Manipulation

To manipulate the source trustworthiness of the rumor-refutation message, two different fictitious scenarios describing a Twitter user's characteristics were developed, one supposedly inducing high source trust and the other low trust. The scenarios were developed based on the previous relevant literature. First, guided by the conceptualization of the advertising message source trust in Cho et al. (2014), the scenarios were designed to induce message recipients' belief that the high-trustworthy message source had beneficial attributes (i.e. benevolence, competence, and integrity) and a positive expectation of future behaviors, whereas the low-trustworthy source lacked such attributes. Second, inspired by Xu's (2014) operationalization of online reviewers' trustworthiness relying on a profile picture and the number of followers, the scenarios included similar information that could indicate Twitter users' trustworthiness. Third, additional descriptive wording was adopted from the advertising endorser trustworthiness scale developed by Feick and Higie (1992). Table 3 presents the two source trustworthiness scenarios.

Table 3. The Scenarios for Twitter User Trustworthiness Manipulation

High Trustworthy User
This Twitter user is transparent about who they are. For example, they use a real name for their Twitter handle, and their profile picture shows their full face. The user has more than 300 followers, tends to share useful and helpful tweets with others, and is always responsive to others' comments on their own tweets. Based on your previous encounters with this user and your observations on Twitter, you know that this user is always willing to give honest and useful information and genuinely try to help others. This user is concerned about what is important to others and provides thoughtful advice in their tweets. The user appears to be generally well-informed about various things.
Low Trustworthy User

This Twitter user is not transparent about who they are. For example, they use an unclear nickname for their Twitter handle, and their profile picture does not show their face. The user has about 10 followers and is usually unresponsive to others' comments on their own tweets.

Based on your previous encounters with the user and your observations on Twitter, you know that this user does not usually give honest and useful information and is not interested in helping others. This user does not seem to care what is important to others or provide any thoughtful advice in their tweets. The user does not appear to be well-informed about anything.

The two scenarios were tested with a sample of 79 adults recruited from Amazon Mechanical Turk, with inclusion criteria of being a social media user who has a Twitter account and having used Twitter in the past six months (male=75%; female=25%; mean age=36.3). Participants were randomly shown one of the two scenarios and asked to rate the trustworthiness of the described Twitter user. To overcome the potential limitations of the scenario method, before rating the fictitious Twitter user, participants were prompted to think of one of their own Twitter connections who had the most similar characteristics as described in the scenario. The trustworthiness of the described Twitter user was measured by a nine-item, seven-point Likert scale developed by McKnight et al. (2002). Statements in the scale include: 1) "I believe that this Twitter user would act in my best interest," 2) "If I needed help, this user would do his/her best to help me," 3) "The user is interested in my well-being, not just his/her own," 4) "This user is truthful in his/her dealing with me," 5) "I would characterize the user as honest," 6) "This user would keep his/her commitments," 7) "This user is sincere and genuine," 8) "This user is competent and effective in providing product/service-related information in general," and 9) "In general, this user is very knowledgeable about product/service-related information" (Cronbach's alpha = .97)

To compare the mean scores of perceived user trustworthiness between the two Twitter user scenarios, an independent t-test was conducted. The result showed a statistically significant difference between the high-trustworthy ($M=5.51$; $SD=.95$) and low-trustworthy user scenarios ($M=3.24$; $SD=1.64$), which indicated that the source trust manipulation was successful ($t(77)=7.48$, $p<.001$).

Trust Cue Manipulation

Four different versions of the rumor-refutation tweet were created with three tweets: 1) ones that included a news article from three different news media outlets (i.e. The Wall Street Journal, NPR, and ABC) and associated images; and 2) one without any link (no trust cue). The three chosen news media outlets were considered some of the most trustworthy and unbiased news organizations in the U.S. according to various survey reports (Benton 2018; Relman 2018; Ruddick 2017). The tweet examples were made to closely resemble other general tweets that include news articles. Figures 2, 3, 4 and 5 show the rumor-refutation tweet examples.

Figure 2. Rumor-Refutation Tweet with a *Wall Street Journal* Article as a Trust Cue



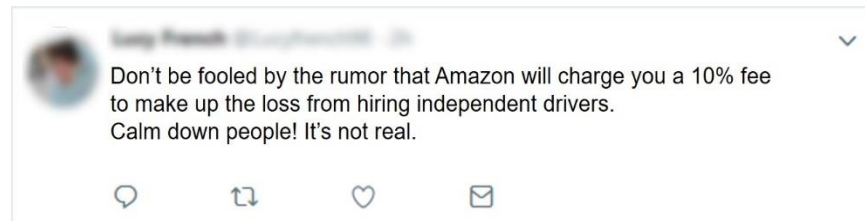
Figure 3. Rumor-Refutation Tweet with an ABC News Article as a Trust Cue



Figure 4. Rumor-Refutation Tweet with an NPR Article as a Trust Cue



Figure 5. Rumor-Refutation Tweet without a Trust Cue



A manipulation check of the trust cue variable was conducted to test if the participants noticed the trust cue imbedded in the tweets and to determine which of the three news organizations would be evaluated most trustworthy and thus serve as the best trust cue. A total of 195 adults who were social media users with a Twitter account and had used Twitter in the past six months were recruited from Amazon Mechanical Turk (male = 67%; female=33%; mean age=35.1). The participants were randomly assigned to one of the four conditions and asked to rate the trustworthiness of the tweet based on a six-item, seven-point Likert scale, which was modified from the measurement by

McKnight et al. (2002). The measurement items included: 1) “I feel that this tweet provides excellent information correcting the Amazon rumor,” 2) “I feel that this tweet refutes the Amazon rumor very effectively,” 3) “This tweets does a good job at providing information about the Amazon rumor,” 4) “This tweet seems to be honest,” 5) “This tweet seems to be truthful,” and 6) “This tweet seems to provide factual information.” The Cronbach’s alpha coefficient was .95.

The manipulation test was conducted using a one-way ANOVA. The result showed a statistically significant difference among the four conditions ($F(3,191) = 20.54$, $p < .001$). A post-hoc pairwise comparison test using Tukey indicated no significant difference among the three trust cue conditions ($M_{WSJ}=5.71$; $M_{NPR}=5.18$; $M_{ABC}=5.51$), but the no trust cue condition ($M_{No\ Cue}=3.96$) yielded a significantly lower message trustworthiness than the three trust cue conditions (all significant at $p < .001$ level). Therefore, the trust cue manipulation was deemed successful, and the rumor-refutation tweet with the *Wall Street Journal* as the trust cue was selected for the experimental stimuli, because it yielded the highest level of message trustworthiness.

Main Experiment Sample and Procedure

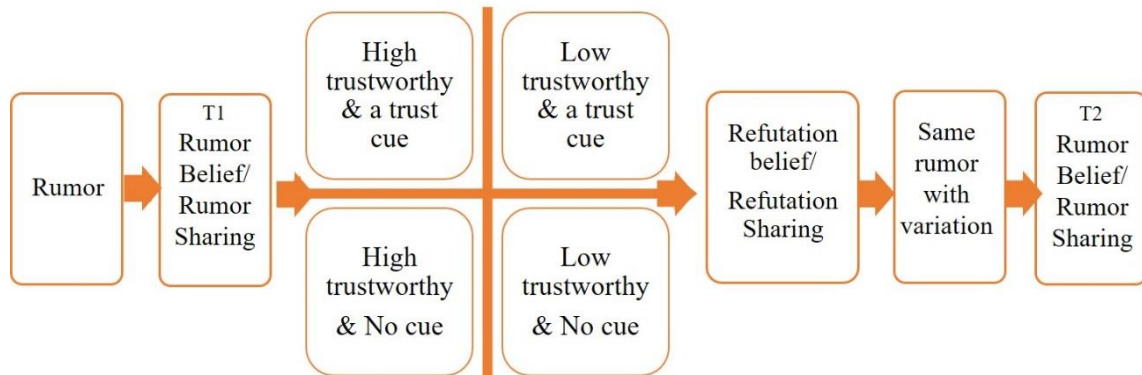
The main experiment was conducted with a volunteer sample of 669 adults recruited from the Qualtrics panel service. After removing incomplete and straight-lining responses and responses of those who wished to withdraw from the study, a total of 637 responses remained in the final data set. The number of participants in each experiment cell is as follows: 164 for the high-trustworthy source and inclusion of the trust cue condition; 158 for the high-trustworthy source and no cue condition; 160 for the low-

trustworthy source and inclusion of the trust cue condition; and 155 for the low-trustworthy source and no cue condition. The inclusion criteria were the same as the pilot studies: 1) social media users who had a Twitter account and 2) those who had used Twitter in the past six months.

The experimental instrument was created on Qualtrics, and the study link was distributed through the Qualtrics panel system. The experiment was conducted online allowing the participants to individually answer the questionnaire using their own computers anywhere with internet connection. Once signed up, participants were given a consent form that was presented on the first page of the online experiment site. For those who agreed to participate, two screening questions were presented to exclude inactive Twitter users and non-users. Participants who passed the screening questions were asked to answer confounding variable questions, including trust disposition, perceived altruistic benefits, and brand trust, which were selected based on the relevant research literature (Chaudhuri and Holbrook 2001; Ridings et al. 2002; Zhao, Stylianou, and Zheng 2013). Then, they moved on to the experimental stimuli exposure part.

As graphically illustrated in Figure 6, the experimental procedure included three stages of stimuli exposure and measurements: (1) exposure to the initial commercial rumor tweet and answering questions about the rumor; (2) exposure to the rumor-refutation tweet correcting the rumor and answering questions about the rumor-refutation tweet; and (3) exposure to the second variation commercial rumor tweet containing the same rumor information as the initial rumor tweet and answering questions about the rumor.

Figure 6. Main Experiment Procedure



The participants were first presented with the fictitious Amazon rumor tweet (disguised as simply a “brand-related tweet” rather than mentioning the word “rumor” to avoid a potential priming effect). They were asked to rate their belief and retransmission intention as well as the personal relevance of the rumor tweet. The personal relevance of the rumor tweet was measured as another confounding variable based on the relevant research literature (Bordia et al. 2005). This initial rumor tweet is presented in Figure 7.

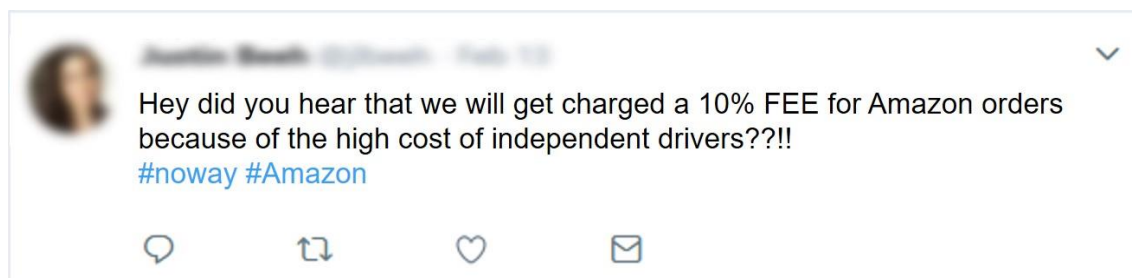
Figure 7. The Initial Amazon Rumor Tweet



Next, they were randomly assigned to one of the four rumor-refutation message conditions: (1) high-trustworthy source with a trust cue; (2) low-trustworthy source with a trust cue; (3) high-trustworthy source without a trust cue; and (4) low-trustworthy source without a trust cue. Those assigned to the high-trustworthy source condition were given the description of a high-trustworthy Twitter user, and the low-trustworthy source condition was given the description of a low-trustworthy Twitter user. After reading the given Twitter user description, the participants were prompted to recall a real Twitter user in their own connections/contacts who had similar characteristics with the scenario they were given. They were asked to imagine that this user in their connections had posted the brand-related tweet. They were then asked to rate their belief and retransmission intention of the tweet.

For the final stage, the participants were presented with the same rumor as the first one but with a slight variation (i.e. another tweet talking about the same rumor) and were again asked to rate their rumor belief and retransmission intention. The variation rumor is presented in Figure 8.

Figure 8. The Variation of the Amazon Rumor Tweet



Before the participants proceeded to the demographic measurement section, they were debriefed with information that the rumor and rumor-refutation tweets were fictitious and purposely created for this study. Following the IRB requirement, the participants were asked to express their consent again after being debriefed, and were informed that they could withdraw from the study without losing compensation. Only those who agreed to allow the researcher to use their data proceeded to answer the demographic questions.

Measurements

Belief in the rumor and rumor-refutation tweets. Participants' belief in the presented rumor and rumor-refutation tweets was measured by a nine-item, seven-point semantic differential scale (Beltramini 1982, 1998; Beltramini and Evans 1985). The scale was originally developed for advertisement believability and modified for the study context. The scale started with the following instruction: "I think the information in this tweet is..." and anchored by: 1) "Unbelievable – Believable," 2) "Untrustworthy – Trustworthy," 3) "Not convincing – Convincing," 4) "Not credible – Credible," 5) "Unreasonable – Reasonable," 6) "Dishonest – Honest," 7) "Questionable – Unquestionable," 8) "Inconclusive – Conclusive," and 9) "Unlikely – Likely."

Retransmission intention for the rumor and rumor-refutation tweets.

Participants' retransmission intention for the rumor/rumor-refutation tweets was measured by a three-item, seven-point Likert-type scale developed by Kamins et al. (1997). The items included 1) "How likely would you tell others about the information (1=Not at all, 7=Extremely likely)," 2) "To what extent do you think this information is

the kind of thing you would mention to other people” (1=Not at all, 7=Definitely), and 3) “How likely would you share this information on social media?” (1=Extremely unlikely, 7=Extremely likely).

In addition to the two key dependent variables, based on prior research, this study included four potential confounding variables that might have significant influence on the dependent variables: brand trust, trust disposition, personal relevance of the rumor topic, and perceived altruistic value of one’s social media use.

Brand trust. Participants’ trust toward Amazon was measured by an eleven-item, seven-point Likert scale with the following statements: 1) “I believe that Amazon would act in my best interest,” 2) “If I needed help, Amazon would do its best to help me,” 3) “Amazon is interested in my well-being, not just its own,” 4) “Amazon is truthful in its dealings with me,” 5) “I would characterize Amazon as honest,” 6) “Amazon would keep its commitments,” 7) “Amazon is sincere and genuine,” 8) “Amazon is competent and effective in providing e-commerce services,” 9) “Amazon performs its job as an e-commerce company very well,” 10) “Amazon is a capable and proficient e-commerce company,” and 11) “In general, Amazon is very knowledgeable about the e-commerce business.” (McKnight et al. 2002).

Trust disposition. Participants’ trust disposition was measured by a twelve-item, seven-point Likert scale developed by McKnight et al. (2002). The items included 1) “In general, people really do care about the well-being of others,” 2) “The typical person is sincerely concerned about the problem of others,” 3) “Most of the time, people care enough to try to be helpful, rather than just looking out for themselves,” 4) In general,

most folks keep their promises,” 5) “I think people generally try to back up their words with their actions,” 6) “Most people are honest in their dealings with others,” 7) “I believe that most professional people do a very good job at their work,” 8) “Most professionals are very knowledgeable in their chosen field,” 9) “A large majority of professional people are competent in their area of expertise,” 10) “I usually trust people until they give me a reason not to trust them,” 11) “I generally give people that benefit of the doubt when I first meet them,” and 12) “My typical approach is to trust new acquaintances until they prove I should not trust them.”

Personal relevance of the rumor. Participants’ personal relevance of the rumor was measured using the following item on a seven-point Likert-type scale developed by Bordia et al. (2005): “How relevant is the information described in the tweet to you?” (1=Not at all relevant, 7=Very relevant).

Perceived altruistic value of one’s social media use. Perceived altruistic value particularly in connection to one’s social media activities was measured by a three-item, seven-point Likert scale with the following statements: 1) “I enjoy helping others by answering questions posted by other social media users,” 2) “I am happy that my messages will be valuable to other social media users,” and 3) “Being able to share what I know with other social media users makes me feel happy” (Zhao, Stylianou and Zheng 2013).

Demographics. Demographic information of the participants was also collected, including age, sex, race, education, and household income. Age was measured by an open-ended question asking “What is your age? (___ years old).” Sex was measured by a

binary-choice question, and the options were 1) male and 2) female. Race was measured by a question asking “What is your racial/ethnic background?” with the following options: 1) Asian, 2) Black or African American, 3) Hispanic or Latino, 4) Native American or Alaska Native, 5) Native Hawaiian or other Pacific Islander, 6) White or Caucasian (non-Hispanic), and 7) Other or Mixed Race. Education was measured by a question asking “What is your highest level of education?” with the following options: 1) Less than high school, 2) Completed some high school, 3) High school graduate or equivalent, 4) Business, Technical, or Vocational school after high school, 5) Completed some college, but no 4-year degree, 6) College graduate, 7) Completed some graduate school, but not degree, and 8) Completed a graduate degree. Lastly, household income was measured by asking “Before taxes, which of the following categories did your total family income fall into last year?” with the following options: 1) Less than \$15,000, 2) \$15,000 to \$24,999, 3) \$25,000 to \$34,999, 4) \$35,000 to \$44,999, 5) \$45,000 to \$54,999, 6) \$55,000 to \$64,999, 7) \$65,000 to \$74,999, 8) \$75,000 to \$84,999, 9) \$85,000 to \$94,999, 10) \$95,000 or more, and 11) Prefer not to answer/Don’t know.

Study 2: Computational Research

A computational research approach was employed to further test H1b (i.e. the relationship between source trustworthiness and rumor-refutation retransmission) and H3b (i.e. the moderating role of a trust cue) with real-life data. Tweets of a real rumor and rumor-refutation case and the network connection data of the tweet posters and retweeters were collected. Source trustworthiness scores of Twitter users were computed using the Trust Scores in Social Media (TSM) algorithm (Roy 2015) with a behavioral

proxy of the connection data (i.e. followers/following). Additionally, inclusion of any URL links of rumor-refuting news articles contained in the rumor-refuting tweets were recorded as trust cues. The retweet count of each rumor-refutation tweet represented the extent of the message retransmission.

Case Selection

To select a real-life rumor and rumor-refutation case, the following criteria were applied: 1) the commercial rumor issue had been officially refuted by the associated organization or brand, 2) the rumor-refutation had been covered by major media outlets so the tweets discussing the refutation topic could contain various URL links to news article sources for the trust cue operationalization, 3) the rumor-refutation tweets had generated a considerable amount of buzz on Twitter, and 4) the date when the rumor-refutation articles started appearing in media outlets was clearly known to set up the starting point for data collection. A recent Facebook rumor case was selected as being appropriate because this case met each of the criteria well. Facebook has often been involved in various rumors that harm their reputation and consumer loyalty. One recent rumor said that Facebook's new algorithm was designed to limit users' news feed updates to only 25 or 26 friends. This rumor had been widely shared on various social media platforms, and various media outlets, such as ABC News, *The Washington Post*, *USA Today*, *Forbes*, and *Fortune*. These outlets had covered Facebook's official refutation of the rumor starting on February 6, 2018 (Ohlheiser 2018). Figure 9 shows two examples of the actual rumor-refutation tweets.

Figure 9. Example Rumor-Refutation Tweets



Overview of the Computational Method

This methodological approach is based on the computational trust research that captures a proxy measure of trust using behavioral trust formation indicators. (See Chapter 3 for a review of the computational trust research.) Among the various computational trust research approaches and algorithms, this study adopted Roy's (2015)

Trust Scores in Social Media (TSM) algorithm to compute the trust score for each Twitter user, which serves as a proxy measure of source trustworthiness in testing the hypotheses. As an advanced approach of computational trust, this iterative algorithm assigns a pair of complementary trust scores (i.e. trustingness and trustworthiness) to each user in a network, based on the quality and quantity of incoming and outgoing links an actor forms in a certain behavior (e.g. retweets or connections) in a network. The trustingness score quantitatively shows the extent to which a user is prone to trust other users in a network, and the trustworthiness score indicates the extent to which an actor is perceived as trustworthy by other users in a network.

These two trust scores are designed to negatively reinforce each other in a recursive way showing the trust formation pattern in a network level; an individual's high trustingness score is a result of making out-links to many users with a low trustworthiness score. A high trustworthiness score is a result of receiving in-links by many users with a low trustingness score. For example, if follower/following (i.e. in-links/out-links) connection data are taken as a trust proxy, indiscriminately following many social media users who are perceived as less trustworthy indicates the individual's higher propensity to trust others (i.e. high trustingness score). Conversely, having many social media followers who selectively follow others (i.e. a low trustingness score) indicates the individual's higher level of trustworthiness.

The TSM algorithm was demonstrated to outperform the previous computational trust algorithms by introducing trusting-decision involvement of a network as a key part of the algorithm. Trusting decision involvement of a network shows how important it is

for a user to make the right link in the network, depending on the network characteristics. For example, trusting decision involvement would be greater on LinkedIn than on Instagram because making the wrong connection on LinkedIn would be riskier than that on Instagram (Roy 2015).

Equations 1 and 2 show how the two trust scores are computed. $ti(v)$ denotes trustingness of a user v , and $tw(u)$ denotes trustworthiness of a user u . s denotes the involvement score of the given network. $Out(v)$ is the set of outgoing links from v while $in(u)$ is the set of incoming links to u . $w(v, x)$ and $w(x, u)$ indicate numerical weights assigned to a link connected from v to x and x to u , which is set at 1 (i.e. un-weighted) unless specified. See Roy (2015) for further details regarding the algorithm.

$$ti_i(v) = \sum_{\forall x \in out(v)} \left(\frac{w(v,x)}{1+(tw_{i-1}(x))^s} \right) \quad (1)$$

$$tw_i(u) = \sum_{\forall x \in in(u)} \left(\frac{w(x,u)}{1+(ti_{i-1}(x))^s} \right) \quad (2)$$

Given the superiority of the TSM algorithm in computing social media users' trust levels and demonstrated applicability to social science research like the current study (Roy 2015), this study employed this algorithm to computationally measure user trustworthiness in a social network.

Data Collection and Network Construction

As the first step in data collection, all tweets refuting the Facebook rumor were collected for 30 days, from the date when the official refutation was released online (February 6, 2018 ~ March 7, 2018) along with the number of retweets associated with each refutation tweet. For tweet collection, Python's web crawling packages (i.e. urllib,

PyQuery, lxml) were used to collect the tweets and the number of retweets associated with each rumor-refutation tweet from Twitter's web interface. To exclusively collect the relevant tweets and minimize the number of irrelevant tweets and noise, the tweets containing any of the following four keyword sets were collected: "Facebook, feed, hoax," "Facebook, feed, 25," "Facebook, feed, 26," and "Facebook, feed, limit."

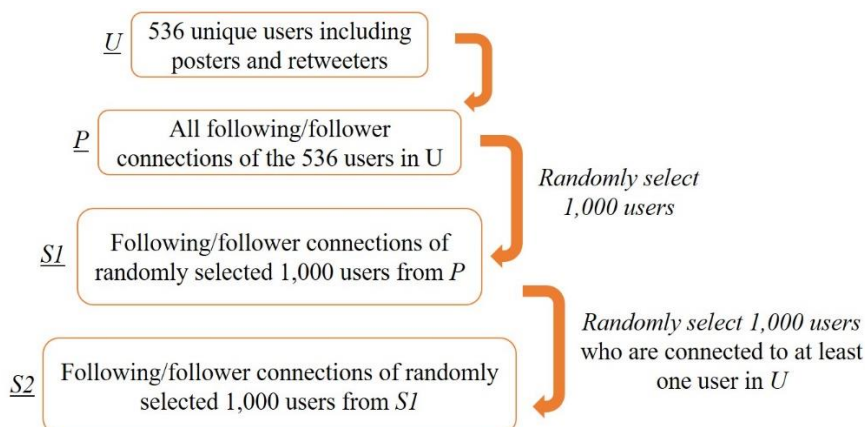
This process yielded 1,005 tweets posted by 657 unique users. Among the tweets, only 80 had generated at least one retweet count. Data cleaning was performed by manually reviewing the collected tweets to remove tweets that met one of the exclusion criteria: 1) irrelevant to the rumor-refutation issue, 2) duplicate tweets, 3) tweets with inaccessible connection data of the tweet posters, and 4) tweets posted by official business' or news media organizations' accounts. Since this study is interested in rumor-refutation messages spread by regular individuals (i.e. informal information distribution hubs), Twitter accounts of official organizations (e.g. brand accounts or media outlets) and their tweets were excluded from the dataset.

After dropping unusable tweets based on the exclusion criteria, the final dataset included 533 tweets posted by 503 unique users discussing the rumor-refutation issue. Thirty-seven retweets with 33 unique users were linked to the 533 rumor-refutation tweets. The connection data (i.e. the list of followers/following) of the users who posted the rumor-refutation tweets and retweeters included in this dataset were collected using Twitter API. The connection data of each user were collected as a trusting behavior proxy. Specifically, these data represent how selectively or indiscriminately the Twitter users make connections with other users.

Based on the collected connection data of the tweet posters and retweeters, a Twitter network was reconstructed to compute the trust scores for the users using the TSM algorithm. Since the TSM algorithm addresses network-level trust formation and deterioration among actors in a network (Roy 2015), the reconstructed Twitter network allows the algorithm to compute more robust and accurate trust scores among the users.

For the Twitter network reconstruction, first, a list of the 536 unique users (i.e. the unique users of tweet posters and retweeters) was prepared (denoted as U). Then, the followers and following of the 536 users were collected, which builds the connection data pool denoted as P . Next, 1,000 Twitter users were randomly selected from P , and their connection data were collected again (a user data subset denoted as $S1$). From the data pool $S1$, we selected another 1,000 users who had a connection relationship (follower or following) with at least one of the users included in U , and their connection data were collected ($S2$). Based on these steps, the final network was built with the users included in U , P , $S1$, and $S2$. Figure 10 shows a graphical illustration of the data collection procedure.

Figure 10. Description of the Connection Data Collection Procedure



When selecting the 1,000 random users, only the Twitter users who had less than 150,000 followers were selected. The threshold number of a maximum of 150,000 followers was chosen because this study is interested in discovering regular Twitter users who have the potential to be a communication hub, but not be established social media influencers or celebrities. Thus, Twitter users who are considered famous public figures or mega influencers were purposely excluded. Previous academic research and business publications tend to determine micro social media influencers as users having about 100,000 or 150,000 followers (e.g. Barker 2017; Dhanesh and Duthler 2019). Further, the random number of 1,000 was chosen to manage the time restriction for collecting the connection data imposed by the Twitter API rate limit.

Variable Preparation

Independent Variable: Trustworthiness Score (Source Trustworthiness)

The Trust Scores in Social Media (TSM) algorithm (Roy et al. 2017) was used to compute the trustworthiness level of the original tweet posters in the dataset. The trustworthiness scores ranged from 0 to 1.

Trust Cues in the Rumor-Refutation Tweet. The trust cues in the rumor-refutation tweets were operationalized at three levels: 1) the whole-length of the URL link in the form of identifiable addresses from recognizable media outlets (e.g. “http://abc7news.com/3047579/”); 2) shortened versions of the URL link from unidentifiable sources (e.g. “http://dlvr.it/QFcR6R”); and 3) no URL link.

The trust cues included in the rumor-refutation tweets were machine-coded into three groups. First, tweets containing the keyword, “http,” were coded as the “trust cue” group, and the rest of the tweets that did not contain the keyword “http” were coded as the “no trust cue” group. Among the tweets in the trust cue group, the tweets containing the keywords of “.com,” and “.net,” were recoded as the “identifiable URL link” group, and the rest of the tweets were recoded as the “unidentifiable URL link” group. The rationale for the coding scheme for the “identifiable URL link” group is that whole-length URL links with identifiable addresses usually accompany a registered domain name (e.g. .com, .net, .org, .gov.). The tweets coded as the “unidentifiable URL link” group contained shortened versions of the URL links from unidentifiable sources.

Dependent Variable: Rumor-Refutation Tweet Retransmission

In the Twitter environment, information retransmission is exercised by retweeting original tweet messages (Chua et al. 2017) and thus, the retweet count has been considered a good indicator of the extent of information dissemination in several previous

studies (Chua et al. 2017; Stieglitz and Dang-Xuan 2013; Sutton et al. 2015). Therefore, in the current study, retweeting was considered the proxy measure of rumor-refutation tweet retransmission, and thus, the number of retweets each rumor-refutation tweet generated formed a retransmission score.

CHAPTER 6. RESULTS

Study 1: Online Experiment

Sample Characteristics

After removing incomplete or straight-lining responses and responses from those who wished to withdraw from the study, a total of 637 responses remained in the final dataset. The characteristics of the sample are summarized in Table 4. Overall, the sample included more women (63.7%) than men, with an average age of 41.86 years old, and most of the sample was White (72.2%). A majority (69.0%) of the participants had some college education or higher. About 31.2% of the participants reported earning more than \$65,000 household income per year, which is slightly higher than the U.S. median household income of \$61,372 (U.S. Census Bureau 2018).

Table 4. Demographic Characteristics of the Sample (N=637)

Variable	M	SD
Age	41.86 min=18 max=84	15.73
	n	%
Sex		
Male	231	36.3
Female	406	63.7
Total	637	100
Race		
Asian	27	4.2
Black or African American	77	12.1
Hispanic or Latino	40	6.3
Native American or Alaska Native	11	1.7
Native Hawaiian or Other Pacific Islander	2	0.3
White or Caucasian (non-Hispanic)	460	72.2
Other or Mixed Race	20	3.1

Total	637	100
Educational Level		
Less than High School	3	0.5
Completed Some High School	18	2.8
High School Graduate or Equivalent	133	20.9
Business, Technical, or Vocational school	43	6.8
Completed Some College, but No 4-year Degree	176	27.6
College Graduate	163	25.6
Completed Graduate School, but No Degree	30	4.7
Completed a Graduate Degree	71	11.1
Total	637	100
Household Income		
Less than \$15,000	61	9.6
\$15,000 to \$24,999	95	14.9
\$25,000 to \$34,999	73	11.5
\$35,000 to \$44,999	66	10.4
\$45,000 to \$54,999	57	8.9
\$55,000 to \$64,999	54	8.5
\$65,000 to \$74,999	31	4.9
\$75,000 to \$84,999	36	5.7
\$85,000 to \$94,999	28	4.4
\$95,000 or more	103	16.2
Prefer Not to Answer/Don't know	33	5.2
Total	637	100

Variable Computation and Reliability Tests

For the measurement scales composed of multiple items, summated scores were computed by averaging the scores of multiple measurement items. The Cronbach's alpha coefficient for each summated variable is as follows: pre-refutation belief in the rumor tweet = .95, post-refutation belief in the rumor tweet = .97, pre-refutation retransmission intention for the rumor tweet = .91, post-refutation retransmission intention for the rumor tweet = .94, belief in the rumor-refutation tweet = .98, retransmission intention for the rumor-refutation tweet = .94, brand trust = .95, trust disposition = .91, and perceived

altruistic value of one's social media use = .90. The Cronbach's alpha test results showed acceptable measurement reliability for all of the summated variables.

Randomization Check

The number of participants assigned to each experiment cell is as follows: 164 for the high-trustworthy source and inclusion of the trust cue condition, 158 for the high-trustworthy source and no cue condition, 160 for the low-trustworthy source and inclusion of the trust cue condition, and 155 for the low-trustworthy source and no cue condition.

The random assignment of the participants was checked using a series of one-way ANOVAs and chi-square tests of covariates and demographic characteristics across the four experimental conditions. Covariates included brand trust, trust disposition, personal rumor relevance, and perceived altruistic value of one's social media use. Demographic variables included age, sex, race, education, and household income. Before running chi-square tests for race, education, and household income, these variables were recoded into fewer categories to avoid having less than five cell counts. The race categories were combined into two groups (White vs. non-White). The categories of the education were reclassified into three groups (high school/vocational school, college, and post-college). The household income categories were combined into three groups (less than \$45,000, \$45,000 to under \$75,000, \$75,000 or more). As shown in Table 5, none of the covariates and demographic variables were significantly different among the four manipulated conditions. Thus, randomization was deemed to be successful.

Table 5. Randomization Check Results of Covariates and Demographic Variables Using ANOVAs and Chi-square Tests

Variable	<i>df</i>	<i>F/Chi-square</i>	<i>p</i>
Brand trust	3, 633	0.40	0.75
Trust disposition	3, 633	1.19	0.31
Personal rumor relevance	3, 633	0.13	0.94
Perceived altruistic value	3, 633	0.61	0.61
Age	3, 633	0.03	0.99
Sex*	3	6.15	0.11
Race*	3	2.30	0.51
Educational level*	6	7.26	0.30
Household income*	6	5.10	0.53

*Chi-square test

Descriptive Statistics of Key Variables

Descriptive statistics of key variables were examined and are presented in Table 4. The mean scores of pre- and post-refutation rumor beliefs ($M=3.06$; $M=3.01$, respectively) indicate that participants somewhat disbelieved the rumor tweets both before and after exposure to the rumor-refutation communication, almost to the same degree. A similar pattern was observed regarding pre- and post-refutation retransmission intention for the rumor tweet ($M=3.10$; $M=2.93$, respectively). All four mean scores regarding the rumor tweet fell below the mid-point (4) of the seven-point scale. Compared to the four mean scores, belief and retransmission intention for the rumor-refutation tweet were higher with $M = 4.99$ for belief in the rumor-refutation tweet and $M = 4.09$ for the rumor-refutation retransmission intention.

Table 6. Descriptive Statistics of Key Variables (N = 637)

Variable	M	SD
Post-refutation belief in the rumor tweet	3.01	1.62
Pre-refutation belief in the rumor tweet	3.06	1.54
Post-refutation retransmission intention for the rumor tweet	2.93	1.80
Pre-refutation retransmission intention for the rumor tweet	3.10	1.87
Belief in the rumor-refutation tweet	4.99	1.61
Retransmission intention for the rumor-refutation tweet	4.09	1.94

Before moving to the hypothesis testing analysis, rumor belief reduction and rumor retransmission reduction scores were computed by subtracting the pre-rumor-refutation-exposure score from the post-rumor-refutation-exposure score. Regarding the extent of rumor belief reduction, the mean score was -0.05, which indicates that, on average, participants' rumor belief was reduced by 0.05 after receiving the rumor-refutation tweet. The extent of reduction in the participants' rumor retransmission intention was by 0.17 after exposure to the rumor-refutation tweet, which shows a greater level of reduction compared to that of the rumor belief.

Hypothesis Testing

H1: Effects of Source Trustworthiness on Belief and Retransmission of the Rumor-Refutation Message. H1 predicted that a high-trustworthy social media user, compared to a low-trustworthy user, would generate higher levels of a) belief and b) retransmission intention of rumor-refutation messages. To test this hypothesis, t-tests on two separate independent-samples were conducted. The results demonstrated statistically significant effects of source trustworthiness: The high-trustworthy source condition

generated significantly higher levels of rumor-refutation tweet belief ($M_{\text{high-trustworthy user}} = 5.63$, $M_{\text{low-trustworthy user}} = 4.34$, $t(635) = 10.95$, $p < .001$) and retransmission intention ($M_{\text{high-trustworthy user}} = 4.73$, $M_{\text{low-trustworthy user}} = 3.43$, $t(635) = 8.99$, $p < .001$) than did the low-trustworthy source condition. This means that participants who were given the rumor-refutation tweet from the high-trustworthy source rated the tweet as more believable and indicated higher levels of retransmission intention than those who were given the rumor-refutation tweet from the low-trustworthy source. Therefore, H1a and H1b were supported.

H2: Effects of Source Trustworthiness on Reducing Rumor Belief and Retransmission. H2 predicted that the rumor-refutation message from a high-trustworthy social media user, compared to a low-trustworthy user, would be more effective in reducing a) rumor belief and b) rumor retransmission intention. The scores of rumor belief reduction summarized in Table 7 show that the change in participants' rumor belief scores appeared to differ between the two source conditions. For the high-trustworthy source condition, the rumor belief reduction mean scores indicated a small reduction in belief scores after exposure to the rumor-refutation message. In contrast, for the low-trustworthy source condition, the rumor belief scores showed almost no change between the pre- and post-exposure to the rumor-refutation message. To examine whether the changes in rumor belief within each condition were statistically significant, paired-sample t-tests were conducted comparing rumor belief scores between pre- and post-rumor-refutation within each source condition. As presented in Table 7, for both high- and low-trustworthy source conditions, the differences in the rumor belief scores between

pre- and post-rumor-refutation were not significant, indicating no statistically significant rumor belief reduction.

Table 7. Rumor Belief Changes in High- and Low-Trustworthy Source Conditions

Condition		<i>M</i>	<i>SD</i>	Test Statistics
High-trustworthy	Post-refutation belief	2.89	1.59	$t(321)=-1.23, p=.22$
	Pre-refutation belief	2.99	1.58	
	Belief difference	-0.10	1.41	
Low-trustworthy	Post-refutation belief	3.14	1.64	$t(314)=.12, p=.90$
	Pre-refutation belief	3.13	1.49	
	Belief difference	0.01	1.41	

H2a was tested using an independent-sample t-test with the rumor belief reduction variable, which subtracted the pre-refutation belief score from the post-refutation belief score, as the dependent variable. The result showed no significant effect of source trustworthiness on the extent of rumor belief change between the high- and low-trustworthy source conditions ($M_{\text{high-trustworthy user}} = -0.10, M_{\text{low-trustworthy user}} = .01, t(635) = -.95, p=.34$).

Regarding rumor-retransmission reduction, the mean reduction scores presented in Table 8 show that participants' rumor retransmission intention scores changed for both source conditions after receiving the rumor-refutation tweet. To examine whether the changes in rumor retransmission intention within each condition were statistically significant, paired-sample t-tests were conducted comparing rumor retransmission scores between pre- and post-rumor-refutation within each source condition. As presented in Table 8, for both high- and low-trustworthy source conditions, the differences in the

rumor retransmission intention scores between pre- and post-rumor-refutation were significant, indicating a statistically significant reduction in rumor retransmission intention as a result of exposure to the rumor-refutation message.

Table 8. Rumor Retransmission Intention Changes in High- and Low-Trustworthy Source Conditions

Condition		<i>M</i>	<i>SD</i>	Test Statistics
High-trustworthy	Post-refutation retransmission intention	2.92	1.74	$t(321)=-2.02, p=.04$
	Pre-refutation retransmission intention	3.08	1.93	
	Retransmission intention difference	-0.16	1.41	
Low-trustworthy	Post-refutation retransmission intention	2.94	1.87	$t(314)=-2.56, p=.01$
	Pre-refutation retransmission intention	3.13	1.82	
	Retransmission intention difference	-0.19	1.31	

H2b was tested using an independent-samples t-test with the rumor retransmission reduction variable, which subtracted the pre-refutation retransmission intention score from the post-refutation retransmission intention score, as the dependent variable. The result showed no significant effect of source trustworthiness on the extent of rumor retransmission reduction ($M_{\text{high-trustworthy user}} = -.16, M_{\text{low-trustworthy user}} = -.19, t(635)=.28, p=.78$). Taken together, the analysis results suggest that source trustworthiness of a rumor-refutation tweet does not significantly affect the degree of reduction in participants' rumor belief and retransmission intention. Therefore, H2 was not supported.

H3: Moderating Effects of a Trust Cue on the Impact of Source Trustworthiness on Belief and Retransmission of the Rumor-Refutation Message. H3 predicted a moderating role of the trust cue variable on the impact of source trustworthiness on a) belief and b) retransmission of the rumor-refutation tweet. Two-way factorial ANOVAs were conducted separately to test the two-part hypothesis. The first two-way ANOVA tested H3a and the results are summarized in Table 9. No significant interaction between source trustworthiness and trust cue conditions was found on rumor-refutation tweet belief. Thus, H3a was not supported.

However, significant main effects of source trustworthiness and trust cue were found. Consistent with the t-test finding of H1a, the high-trustworthy source condition generated a higher level of rumor-refutation tweet belief than did the low-trustworthy source condition. Additionally, the rumor-refutation tweet with a trust cue generated a higher level of refutation belief than did the tweet without the cue.

Table 9. Two-Way ANOVA Results for the Effects of Source Trustworthiness and a Trust Cue on Rumor-Refutation Message Belief

Factor	M	Model Statistics
Source Trustworthiness		
High-trustworthy source	5.62	$F(1, 633) = 130.88, p < .001,$ partial $\eta^2 = .17$
Low-trustworthy source	4.34	
Trust Cue		
Inclusion of a trust cue	5.39	$F(1, 633) = 54.36, p < .001,$ partial $\eta^2 = .08$
No cue	4.56	
Source Trustworthiness x Trust Cue		
High-trustworthy source x Trust cue	5.93	$F(1, 633) = 3.45, p = .06,$ partial $\eta^2 = .01$
High-trustworthy source x No cue	5.31	
Low-trustworthy source x Trust cue	4.85	
Low-trustworthy source x No cue	3.82	

The second two-way ANOVA tested H3b and also found no significant interaction between source trustworthiness and a trust cue on rumor-refutation tweet retransmission intention. Hence, H3b was not supported. Similar to the H3a test findings, statistically significant main effects were found with regard to source trustworthiness and trust cue conditions. In addition to the significant effect of source trustworthiness found in H1b testing, inclusion of a trust cue in the rumor-refutation tweet generated a higher level of retransmission intention of the refutation tweet than did a tweet without a cue.

Table 10. Two-Way ANOVA Results for the Effects of Source Trustworthiness and a Trust Cue on Rumor-Refutation Message Retransmission Intention

Factor	M	Model Statistics
Source Trustworthiness		
High-trustworthy source	4.73	$F(1, 633) = 84.09, p < .001,$ partial $\eta^2 = .12$
Low-trustworthy source	3.43	
Trust Cue		
Inclusion of a trust cue	4.45	$F(1, 633) = 28.30, p < .001,$ partial $\eta^2 = .04$
No cue	3.70	
Source Trustworthiness x Trust Cue		
High-trustworthy source x Trust cue	5.07	$F(1, 633) = .19, p = .67,$ partial $\eta^2 = .00$
High-trustworthy source x No cue	4.38	
Low-trustworthy source x Trust cue	3.83	
Low-trustworthy source x No cue	3.02	

In sum, the results indicated that, in addition to the main effect of source trustworthiness found in H1 testing, inclusion of a trust cue in a rumor-refutation tweet had a significant positive impact on the refutation message belief and retransmission intention. However, unlike the H3 prediction, the effects of source trustworthiness on rumor-refutation tweet belief and retransmission intention were not moderated by the trust cue variable.

H4: Moderating Effects of a Trust Cue on the Impact of Source Trustworthiness on Reducing Rumor Belief and Retransmission. H4 predicted a moderating effect of a trust cue on the impact of source trustworthiness on reducing a) rumor belief and b) rumor retransmission. Before testing the hypothesis, split-sample, paired-samples t-tests were conducted with the pre-refutation rumor belief and post-refutation rumor belief variables by each experimental condition, to explore whether a statistically significant reduction of rumor belief occurred within each condition. As summarized in Table 11, a statistically significant rumor belief reduction was found only for the high-trustworthy source with the trust cue condition, whereas the other three conditions showed no significant rumor belief difference between before and after receiving the refutation tweet.

Table 11. Split-Sample, Paired-Samples T-Test Results for Testing Rumor Belief Reduction

Condition		<i>M</i>	<i>SD</i>	Model Statistics
High-trustworthy, Trust cue	Post-refutation belief	2.72	1.62	t(163)=-2.32, <i>p</i> =.02
	Pre-refutation belief	2.97	1.57	
	Belief difference	-0.25	1.38	
High-trustworthy, No cue	Post-refutation belief	3.06	1.55	t(157)=.55, <i>p</i> =.58
	Pre-refutation belief	3.00	1.60	
	Belief difference	0.06	1.43	
Low-trustworthy, Trust Cue	Post-refutation belief	2.96	1.60	t(159)=-1.30, <i>p</i> =.19
	Pre-refutation belief	3.09	1.54	
	Belief difference	-0.13	1.28	
Low-trustworthy, No Cue	Post-refutation belief	3.33	1.66	t(154)=1.28, <i>p</i> =.20
	Pre-refutation belief	3.18	1.44	
	Belief difference	0.15	1.51	

H4a testing was conducted using a two-way factorial ANOVA with the rumor belief reduction variable as the dependent variable. The result revealed no significant interaction between source trustworthiness and trust cue conditions on the extent of rumor belief reduction. Thus, H4a was not supported. However, it is worthwhile to note that a significant main effect of a trust cue was found: The rumor-refutation tweet containing a trust cue generated significantly greater rumor belief reduction than did the refutation tweet without a cue. Instead, rumor belief increased after rumor-refutation exposure.

Table 12. Two-Way ANOVA Results for the Effects of Source Trustworthiness and a Trust Cue on a Rumor-Refutation Message Belief Change

Factor	M	Model Statistics
Source Trustworthiness		
High-trustworthy source	-0.09	$F(1, 633) = .90, p = .34,$ partial $\eta^2 = .00$
Low-trustworthy source	0.01	
Trust Cue		
Inclusion of the trust cue	-0.19	$F(1, 633) = 7.30, p < .01,$ partial $\eta^2 = .01$
No cue	0.11	
Source Trustworthiness x Trust Cue		
High-trustworthy source x Trust cue	-0.25	$F(1, 633) = .01, p = .91,$ partial $\eta^2 = .00$
High-trustworthy source x No cue	0.06	
Low-trustworthy source x Trust cue	-0.13	
Low-trustworthy source x No cue	0.16	

A similar analysis was conducted to test H4b. First, split sample, paired-samples t-tests were performed with the pre-refutation rumor retransmission intention and post-refutation rumor retransmission intention variables to examine whether a statistically significant reduction occurred in rumor retransmission intention within each experimental condition. As summarized in Table 13, significant reductions of rumor retransmission

intention were found for the high-trustworthy source with the trust cue condition and the low-trustworthy source with the trust cue condition, but the other two conditions showed no significant change in rumor retransmission intention.

Table 13. Split-Sample, Paired-Samples T-Test Results for Rumor Retransmission Intention Reduction

Condition		<i>M</i>	<i>SD</i>	Model Statistics
High-trustworthy, Trust cue	Post-refutation retransmission intention	2.79	1.80	t(163)=-2.80, <i>p</i> <.01
	Pre-refutation retransmission intention	3.09	1.93	
	Retransmission intention difference	-0.30	1.39	
High-trustworthy, No cue	Post-refutation retransmission intention	3.05	1.67	t(157)=-.08, <i>p</i> =.94
	Pre-refutation retransmission intention	3.06	1.93	
	Retransmission intention difference	-0.01	1.42	
Low-trustworthy, Trust Cue	Post-refutation retransmission intention	2.77	1.85	t(159)=-3.33, <i>p</i> <.01
	Pre-refutation retransmission intention	3.05	1.83	
	Retransmission intention difference	-0.28	1.08	
Low-trustworthy, No Cue	Post-refutation retransmission intention	3.19	1.87	t(154)=-.75, <i>p</i> =.46

Pre-refutation retransmission intention	3.21	1.81
Retransmission intention difference	-0.02	1.50

H4b testing then was conducted with two-way ANOVA with the rumor retransmission intention reduction variable as the dependent variable. Similar to the H4a testing result, the ANOVA analysis showed no significant interaction between source trustworthiness and the trust cue conditions on the change in rumor retransmission intention. Thus, H4b was not supported. However, again, a significant main effect of a trust cue was found. The rumor-refutation tweet containing a trust cue generated significantly greater reduction of retransmission intention than did the refutation tweet without such a cue.

Table 14. Two-Way ANOVA Results for the Effects of Source Trustworthiness and a Trust Cue on a Rumor-Refutation Message Retransmission Intention Change

Factor	M	Model Statistics
Source Trustworthiness		
High-trustworthy source	-0.16	$F(1, 633) = .08, p = .79,$ partial $\eta^2 = .00$
Low-trustworthy source	-0.19	
Trust Cue		
Inclusion of the trust cue	-0.29	$F(1, 633) = 5.16, p < .01,$ partial $\eta^2 = .01$
No cue	-0.05	
Source Trustworthiness x Trust Cue		
High-trustworthy source x Trust cue	-0.30	$F(1, 633) = .22, p = .64,$ partial $\eta^2 = .00$
High-trustworthy source x No cue	-0.01	
Low-trustworthy source x Trust cue	-0.28	
Low-trustworthy source x No cue	-0.09	

Taken together, the effect of source trustworthiness on the extent of rumor retransmission intention reduction was not moderated by the trust cue variable. However, inclusion of a trust cue showed a significant positive impact on reducing rumor retransmission intention.

Study 2: Computational Research

Descriptive Statistics of Tweet Data

After removing unusable tweets through the data cleaning process, the final dataset included 533 tweets posted by 503 unique users discussing the rumor-refutation issue. (See Chapter 5 for a description of the data cleaning process.) Only 24 tweets (4.5%) generated at least one retweet count, and the remaining 95.65% tweets had no retweet count. This shows that only a minuscule number of Twitter users exposed to rumor-refutation tweets tended to engage in retransmitting such tweets. A total of 37 retweets were linked to the 533 rumor-correction tweets, with 33 unique users who retweeted. In terms of the network connection data for the users included in the final dataset (i.e. rumor-refutation tweet posters and retweeters), , the total number of 23,199,163 users were included in the reconstructed network. (See Chapter 5 for details of the reconstruction procedure.)

Descriptive Statistics of Key Variables

Trustworthiness scores, computed by running the TSM algorithm, ranged from 0 to .108, with a mean value of .003 and median of 0. In terms of trust cues, among the 533 tweets in the dataset, 397 tweets (74.5%) contained shortened versions of unidentifiable URL links (e.g. “http:// dlvr.it/QFcR6R”), 117 tweets (21.9%) had the whole URL in an

identifiable address form (e.g. “http:// abc7news.com/3047579/”), and the remaining 19 tweets (3.6%) contained no URL link. The retweet count scores ranged from 0 to 4, with the mean value of .069 and median of 0. Among the 24 tweets that generated at least one retweet, the mean score of the retweet count was 1.54 with a median of 1. A summary of the descriptive statistics of the key variables are presented in Table 15.

Table 15. Descriptive Statistics of Key Variables

Descriptive Statistics of Key Variables	Mean	Median	Variance	Min	Max
Trustworthiness score	0.003	0.000	0.000	0.000	0.108
Retweet count	0.069	0.000	0.147	0.000	4.000
Retweet count excluding the 0 retweet cases	1.540	1.000	1.042	1.000	4.000

Hypotheses Testing

A computational research approach was conducted to retest the source trustworthiness effect on the actual retransmission of the rumor-refutation tweets (H1b) and the moderating effect of a trust cue on the proposed relationship (H3b).

H1b: Effects of Source Trustworthiness on Retransmission of the Rumor-Refutation Message. H1b was retested with the Twitter data by examining how trustworthiness scores of Twitter users would influence the extent of retransmission of the rumor-refutation tweets. A zero-order correlation was conducted with the trustworthiness scores and retweet counts, and the result revealed that trustworthiness scores of the Twitter users who posted the rumor-refutation tweets were positively associated with the number of retweets that their rumor-refutation tweets generated (r

= .38, $p < .001$). This result suggests that rumor-refutation tweets posted by social media users with higher levels of trustworthiness scores were likely to generate higher numbers of retweets.

H3b: Moderating Effects of a Trust Cue on the Impact of Source Trustworthiness on Retransmission of the Rumor-Refutation Message. H3b was retested to examine whether the positive relationship between the trustworthiness scores of the Twitter users and retweet counts would be moderated by inclusion of trust cues in the tweets. A Poisson regression was performed to test this hypothesis because the dependent variable (i.e. retweet count) was true event count data that consisted of positive integer values or zero, which follows a Poisson distribution (Cameron and Trivedi 1998; Skues, Williams, and Wise 2012). Poisson regression is frequently used in the marketing and advertising fields when the dependent variable is count data, such as the number of likes and comments on Facebook (Kim, Kim, and Kim 2019), ad click-through volume (Li, Pan, and Wang 2010), or individual users' daily log-in frequency (Trusov, Bodapati, and Bucklin 2010).

In Poisson regression, the expected value (i.e. mean) of the dependent variable is logged first and modeled as a linear regression (Gardner, Mulvey, and Shaw 1995). In this study, the predictor variables were the user trustworthiness score, the trust cue variable (three levels: No URL link (i.e. reference group), unidentifiable URL source link, and identifiable URL source link), and the interaction term variables (trustworthiness score x unidentifiable URL source link, trustworthiness score x

identifiable URL source link). Retweet count was entered as the dependent variable. The proposed Poisson regression model is as follows:

$$\begin{aligned} \log(\text{retweet}_{count}) = & \beta_0 + \beta_1 tw + \beta_2 I(\text{trustcue} = \text{unidentifiable URL}) + \\ & \beta_3 I(\text{trustcue} = \text{identifiable URL}) + \beta_4 * tw * I(\text{trustcue} = \\ & \text{unidentifiable URL}) + \beta_5 * tw * I(\text{trustcue} = \text{identifiable URL}) \end{aligned}$$

In a Poisson distribution, the variance and mean are expected to be equal. Over-dispersion occurs in Poisson regression when the variance of the dependent variable is larger than the mean. Since the variance of retweet counts (0.147) is larger than the mean (0.069), the Pearson chi-square estimate was adopted to adjust the over-dispersion issue, to obtain more robust levels of standard errors and confidence intervals, as well as to secure a more conservative significance test (McCullagh and Nelder 1989).

The analysis result shows significant interaction effects between the source trustworthiness and trust cue variables, but not in the predicted direction (see Table 16). To provide a more meaningful interpretation of the predictors' coefficients, antilogarithmic transformations (i.e. exponential transformation) were performed, because the logged mean of the dependent variable was modeled. Further, this study takes 0.001 as a unit change for the interpretations, given that the user trustworthiness scores ranged from 0 to 1.

Table 16. Poisson Regression Analysis Result Predicting Retweet Count (N=533)

Predictors	B	SE	<i>p</i>
Trustworthiness	1836.782	495.717	<.001
Unidentifiable URL link	-0.003	1.410	0.998
Identifiable URL link	2.119	1.379	0.124
Trustworthiness x Unidentifiable URL link	-1786.458	495.768	<.001
Trustworthiness x Identifiable URL link	-1807.573	495.743	<.001
Likelihood Ratio Chi-Square (df)	100.297(5)		<.001

**Note: No URL link was set as the reference group*

When no URL link was included in the tweets (i.e. the no trust cue condition), a 0.001 increase in the user trustworthiness score was associated with a 1.837 increase in the logged mean of the retweet count. With antilogarithm transformation applied, this means a 0.001 increase in the user trustworthiness score multiplied the expected number of retweets by 6.27 times. When the rumor-refutation tweets included a shortened URL source link in an unidentifiable address form (i.e. lower level of trust-cue condition), an increase in the user trustworthiness score by 0.001 was associated with a 0.05 increase in the logged mean of the retweet count. That is, a 0.001 increase in the user trustworthiness score multiplied the expected number of retweets by 1.05 times. When a URL link in a whole-length, identifiable address form was included in the tweets, a 0.001 increase in the user trustworthiness score was associated with a 0.03 increase in the logged mean of the retweet count, which is equivalent to a 1.03 times increase in the expected retweet count number.

In more tangible terms, the antilogarithm transformed coefficients indicate that, when the rumor-refutation tweets had no trust cue, a 0.1% unit increase in the

trustworthiness score would lead to a 527.77% increase in the expected value of the retweet count. When the refutation tweets contained an unidentifiable URL source, however, a 0.1% unit increase in the trustworthiness score would generate a 5.13% increase in the expected value of the retweet count, and a 2.94% increase in the expected value of the retweet count when the refutation tweets contained identifiable URL sources. This means that a small deviation of the trustworthiness score would lead to a large deviation of the retweet count when no source was included, but the deviation of the trustworthiness score would lead to a much smaller deviation of the retweet count when URL sources are included in the tweets.

Thus, while the moderating effect hypothesis (H3b) was not supported, the regression analysis results suggest an interesting interaction effect between source trustworthiness and message trust cues. In particular, when a rumor-refutation message contains no trust cue, source trustworthiness would likely have a stronger impact on rumor-refutation message retransmission than when a trust cue is included in the message.

CHAPTER 7

DISCUSSION

A commercial rumor outbreak, especially with negative content, is a great concern for marketers and business managers. Once a rumor starts propagating through a connected network on social media, it can rapidly escalate and result in consumer backlash and a firestorm against the associated brand or organization. Since it is almost impossible to predict when and where a rumor will emerge, timely and effective response strategies are crucial to minimize the damage in reputation, sales, and consumer relations (Kimmel and Audrain-Pontevia 2010; Veil et al. 2012).

Issuing rumor-refutation messages has been known to be an effective response strategy to address rumors (Bordia et al. 2000; Bordia et al. 2005). However, the research literature examining the effects and effectiveness of rumor-refutation communication is thin, providing is a very limited understanding about rumor-refutation communication effects and influencing factors. To advance the research and theory building about rumor-refutation communication effects, this study examined how interpersonal influence among peers would impact the effects and effectiveness of a rumor-refutation campaign. Specifically, this study focused on the role of interpersonal trust and trust cues in enhancing the effects and effectiveness of rumor-refutation messages.

To achieve the study objectives, this study adopted a multi-method approach with a combination of online experiment and computational research approaches. In particular, this study tested the impact of interpersonal trust on rumor-refutation message belief and retransmission, and reduction of rumor belief and retransmission intention.

Summary of the Findings

Study 1: Online Experiment Results

The findings of the online experiment revealed a positive influence of source trustworthiness on rumor-refutation message belief and retransmission intention. That is, the high-trustworthy message source compared to the low-trustworthy source led to higher levels of rumor-refutation message belief and retransmission intention. However, source trustworthiness did not affect the expected end outcome of rumor-refutation communication: a decrease in rumor belief and retransmission intention.

Presence of a trust cue in the rumor-refutation message did not significantly moderate the impact of source trustworthiness on rumor-refutation message belief, retransmission intention, or a decrease in rumor belief and retransmission intention. Instead, main effects of a trust cue were found: The presence of a trust cue in the rumor-refutation message compared to the absence of such a cue generated higher levels of rumor-refutation message belief and retransmission intention and a greater reduction in rumor belief and retransmission intention.

Study 2: Computational Research Results

Using a computational research approach, we further tested the influence of source trustworthiness and a moderating role of a trust cue on actual rumor-refutation message retransmission behaviors, using Twitter data of a real rumor case. The main independent variable, source trustworthiness, was computed using the TSM algorithm and each member of the social network was assigned a numeric trustworthiness score, which complemented the self-reported source trust measurement of Study 1. The main

dependent variable, rumor-refutation message retransmission, was captured by measuring retweet counts, which also complemented the self-reported retransmission intention measures of Study 1.

The results revealed a significant positive relationship between the trustworthiness scores of Twitter users who posted rumor-refutation tweets and the number of retweets their tweets generated, which further confirms the experimental findings. Additionally, this study found unexpected moderating effects of trust cues in rumor-refutation tweets on the relationship between source trustworthiness and the number of retweets. The source trustworthiness scores contributed more strongly to the number of retweets when the rumor-refutation tweets contained no trust cue (no URL source link), compared to when the rumor-refutation tweets included trust cues (some forms of URL source links). The hypotheses testing results from both studies are summarized in Table 17.

TABLE 17. Summary of Hypotheses Test Results

	Hypotheses	Results
Study 1		
H1	A high-trustworthy social media user, compared to a low-trustworthy user, will generate a greater extent of a) belief and b) retransmission of a rumor-refutation message.	Supported
H2	A high-trustworthy social media user compared to a low-trustworthy user will generate a greater extent of decrease in a) rumor belief and b) rumor retransmission after exposure to a rumor-refutation message.	Not supported

H3	The impact of source trustworthiness on one's a) belief and b) retransmission of a rumor-refutation message will be moderated by the message trust cue factor. Specifically, the impact of source trustworthiness will be greater in the presence of a trust cue in a rumor-refutation message than in the absence of a trust cue.	Not supported
H4	The impact of source trustworthiness on rumor-refutation message effects reducing a) rumor belief and b) retransmission will be moderated by the message trust cue factor. Specifically, the impact of source trustworthiness will be greater in the presence of a trust cue in a rumor-refutation message than in the absence of a trust cue.	Not supported
<hr/>		
Study 2		
H1	A high-trustworthy social media user compared to a low-trustworthy user will generate a greater extent of b) retransmission of a rumor-refutation message.	Supported
H3	The impact of source trustworthiness on one's b) retransmission of a rumor-refutation message will be moderated by the message trust cue factor. Specifically, the impact of source trustworthiness will be greater in the presence of a trust cue in the rumor-refutation message than in the absence of a trust cue.	Not supported
<hr/>		

Discussion of Findings

The findings of this study provide several important insights regarding rumor-refutation communication effects and the impact of the trust factor. First, the results suggest the importance of interpersonal trust in the dissemination and effects of rumor-refutation messages. Highly trusted sources would likely generate higher levels of rumor-refutation belief and retransmission intention, as well as lead to a higher number of actual retransmissions. These findings are in line with previous studies testing the influence of interpersonal trust on information acceptance and exchange in various contexts including viral advertising, eWOM, virtual team building, or intra-firm networks (Cho et al. 2014;

Chu and Kim 2011; Hu and Yang 2015; Jarvenpaa and Leidner 1998; Ridings et al. 2002; Tsai and Ghoshal 1998). The findings further confirm and extend the research on the influence of interpersonal trust on information acceptance and exchange in the underexplored context of rumor-refutation campaigns.

Second, while the hypothesized moderating effect of trust cues on the impact of source trustworthiness was not found, unexpected and interesting insights about the role of the message trust cue factor emerged from the results. While the moderating effects of trust cues were non-significant in Study 1, trust cues had significant moderating effects in Study 2, revealing that source trustworthiness exerted a stronger influence on rumor-refutation message retransmission when the messages included no trust cue than when a trust cue was included.

The results suggest that the influence of the interpersonal relationship factors might be generally stronger than the message content factors, at least in the rumor-refutation context. This makes sense given that rumors and rumor-refutation messages are disseminated through peer-to-peer WOM channels instead of mass communication channels. At the same time, the computational research result showing a significant moderating effect of trust cues on the effects of source trustworthiness on rumor-refutation message retransmission offers important additional insights. It appears that in real-world rumor-refutation diffusion situations when rumor-refutation messages do not contain any trust cue, message recipients are more likely to rely on the source trustworthiness. These messages may be perceived as more uncertain and riskier than

messages containing trust cues. This finding deserves special attention and further research.

Additionally, mixed findings about main effects of the trust cue factor in the two studies are noteworthy. Study 1 revealed main effects of the trust cue factor with small effect sizes in increasing rumor-refutation message belief and retransmission intention. However, no such effect was found in Study 2 where the dependent variable was retweet counts representing actual message retransmission. Given that behavioral intention could lead to actual behavior (Ajzen 1991), inclusion of a trust cue in a rumor-refutation message might still show potential as an independent influencing factor in the effectiveness and dissemination of rumor-refutation messages. To date, only one previous study has found significant effects of the message content factor in facilitating rumor-refutation message dissemination (Chua et al. 2017). Therefore, more research is needed to further examine the effects of the message trust cue factor and to advance our understanding of influential rumor-refutation message content factors in general.

Third, while source trustworthiness had a significant impact on rumor-refutation message belief and sharing intention, it did not exert significant influence on the end outcome of rumor-refutation, or a reduction in rumor belief and sharing intention. The non-significant finding can be explained by a floor effect (Alexander 2005). Both pre- and post-refutation rumor belief ($M_{\text{pre-refutation rumor belief}} = 3.06$, $M_{\text{post-refutation rumor belief}} = 3.01$) were lower than the scale midpoint of 4, indicating that participants generally disbelieved the rumor stimulus even before exposure to the rumor-refutation message and their belief did not change much after receiving the refutation message. The mean scores of the

rumor retransmission intentions showed a similar pattern ($M_{\text{pre-refutation rumor retransmission}} = 3.10$, $M_{\text{post-refutation rumor retransmission}} = 2.93$), indicating that participants were not likely to retransmit the rumor even before receiving the refutation message. The results of paired-sample t-tests comparing the pre- and post-refutation rumor belief and retransmission intention also indicated that the expected reduction in rumor belief and retransmission intention as a result of refutation message exposure was not robust nor consistent. Thus, a general tendency of rumor skepticism was observed. This could explain why the rumor-refutation message did not effectively reduce rumor belief and retransmission, resulting in the non-significant hypothesis test results.

Fourth, somewhat surprisingly, the experimental study results showed a significant main effect of the trust cue factor on the extent of reduction in rumor belief and retransmission intention after exposure to the rumor-refutation message. The rumor-refutation message containing a trust cue generated a significantly greater reduction in rumor belief and retransmission intention than did the refutation without such a cue. This seems to be in line with a few previous studies offering evidence of a significant impact of the message content factors on reducing rumor belief (Bordia et al. 2005; Einwiller and Kamins 2008). In terms of reducing existing rumor belief and retransmission intention, this could be interpreted as evidence indicating that the message content factors may be more influential than the interpersonal relationship factors. This finding needs to be tested further.

Contributions to Research and Theory

The findings of this study contribute to the literature on rumors and trust in three areas. First, this study fills a significant gap in the rumor research literature where almost no scholarly attention has been given to the role of interpersonal relational factors in the rumor suppression context. Despite the importance of peer-to-peer WOM communication channels through which rumors and rumor-refutation messages are disseminated, none of the previous research on rumor-refutation has investigated how interpersonal relationship factors such as interpersonal trust, would influence the effects and effectiveness of rumor-refutation campaigns. The findings of this study advance our understanding of the influencing factors of rumor-refutation effects and effectiveness.

In addition, this study expands the conceptualization and operationalization of interpersonal trust by adopting both psychological and computational trust research approaches and testing alternative measurements of trust. This study overcomes the limitations of self-report trust measurements used in the extant social science research on trust by adopting both a psychological state of trust and mathematically captured trust with the aid of a computational trust algorithm and demonstrating consistent results.

This study also introduces a new operationalization approach of trust cues that can facilitate message acceptance and sharing. Research on trust cues has been conducted in a very narrow scope of domains including in e-commerce websites or online consumer platform site domains. Thus, the types of trust cues that have been proposed and tested are quite limited. This study advances the operationalization spectrum of trust cue

research by introducing a new type of trust cue, URL links of a news article, and demonstrating the role of these cues in forming cue-based trust,

Practical Implications

The findings of this study offer two practical implications to brand managers and marketing communication practitioners for developing effective rumor-suppression campaign strategies. First, practitioners should consider utilizing trustworthy social media users as intermediary message sources for effectively and widely distributing refutation messages. Utilizing these intermediary sources is particularly important in the social media environment because marketers not only need to manage pre-identified audiences (i.e. followers of the brand accounts or rumor posters) but also penetrate into the intermediary sources' networks for broader exposure. This target identification is considered to be especially important for brands with a relatively small number of followers (e.g. emerging brands, business-to-business corporations, non-consumer goods manufacturers), since they have a limited number of brand account followers.

In this sense, this study provides a new criterion for identifying effective information hubs on social media depending on the information context. Both academic and industry studies have made significant efforts to identify so-called influencers who exert power over information acceptance and exchange on social media. These studies have mostly relied on the extent of social connections and popularity as the primary factors that gauge the influencing power (Cha et al. 2010; Gonzalez-Bailon, Borge-Holthoefer, and Moreno 2013; Kietzmann et al. 2011; Zhang, Zhao, and Xu 2014). The logic of using these factors is based on the premise that a large number of followers

indicates a large number of potential audiences, which, in turn, increases the probability of message dissemination to the secondary target (Zhang et al. 2014). Practitioners often measure the size of a user's network, the popularity of content created, and how often other users interact with that content based on social media data as an indicator of social influence (e.g. the Klout score). However, these approaches have overlooked the idea that the strategic information hubs should be carefully assessed depending on information contexts. By identifying the role of interpersonal trust in the domain of rumor suppression, this study advances the spectrum of dissemination strategies on social media.

Second, practitioners should be aware that for social media users who have been exposed to rumors, providing them with rumor-refutation messages does not always result in reducing rumor belief and retransmission intention. To overcome this challenge, practitioners might want to include a trust cue in their rumor-refutation message to reduce readers' rumor belief and deter them from retweeting or sharing the rumors.

Limitations

This study has several methodological limitations that call for caution in interpreting the findings. During the online experiment, the participants were artificially exposed to similar rumor messages and the refutation message over a short period of time. The short-term, artificial, and forced exposure of rumor messages with a single attempt of rumor-refutation does not reflect common rumor and rumor-refutation exposure situations in the real world. Future research with higher ecological validity should further test these preliminary findings.

Another limitation is that the rumor examples used in this study were negative commercial rumors associated with technology companies (i.e. Amazon and Facebook). Thus, the study findings might not be generalizable to other types of rumors about other types of products or organizations. Future research is encouraged to develop different types of rumor stimuli using diverse industry sectors and types of organizations to re-test our hypotheses.

The computational approach also involves methodological limitations. First, the Twitter setting was purposely chosen because Twitter is the only social media platform that opens their data to public, and thus provides data availability. A few studies have found differences in user characteristics (Blank and Lutz 2017) and motivations across different social media platforms (e.g. Twitter, Instagram, Facebook, Snapchat) (Alhabash and Ma 2017; Phua, Jin, and Kim 2017; Waterloo et al. 2018). Thus, future studies should reexamine the hypotheses with different social media data for generalizability of the findings.

Another limitation related to data availability is that the computational research approach was unable to retest the hypotheses examining the effects of trustworthiness scores and the presence of a trust cue on rumor belief and rumor-sharing behaviors. On social media, some concepts are impossible to capture unless users leave traces that can serve as a proxy measure for the concept. Therefore, it was not possible to be certain which users were exposed to the rumor-refutation tweets, and, if they were indeed exposed, whether the influencing factors were effective in discouraging them from believing the rumor and rumor-sharing.

Suggestions for Future Research

Building upon the current study considering the study limitations, several future research directions are possible. First, the hypotheses should be tested in a more natural setting with higher ecological validity such as a field experiment. A field experiment would have advantages in that: 1) influence of actual experience-based interpersonal trust on message belief and retransmission could be tested, 2) actual rumor/rumor-refutation transmission behavior could be captured, and 3) participants would be naturally exposed to the rumor and refutation messages so response bias could be minimized.

Future studies should also test the hypotheses with different types of rumors (e.g. different topics, valence, and context), because the effects of rumor-refutation messages and influencing factors may be different across different rumor types. For example, replicating this study using positive rumor examples is encouraged.

Identifying and applying different trust proxies is another research avenue to enhance the generalizability of the study findings. This study adopted Twitter users' connection data to capture their relationship-making patterns as the trust proxy. Future studies could utilize other social media features, such as a user's interaction patterns with other users.

Another suggestion for a future research direction involves exploring other influencing factors that could alter the nature or magnitude of the interpersonal trust influence on the effectiveness and dissemination of rumor-refutation messages. It would be worthwhile to examine how these social context factors may also influence rumor-refutation message belief and retransmission intention considering the effect of social

context factors (i.e. virality metrics) that exert normative influences on increasing rumor belief and retransmission intention (Kim 2018; Lee and Oh 2017).

Researchers are also encouraged to further examine the role of social network structures and how it can help augment the influence of the interpersonal relationship factor on rumor-refutation message belief and retransmission. Given this study's findings that demonstrated a significant impact of interpersonal trust on rumor-refutation message belief and retransmission, different network structure factors (e.g. density and connectivity) may also influence and moderate the influence of interpersonal trust among individuals in a network. Scholars outside of the social science fields have recognized the importance of the social network structure in information dissemination and have tested its contribution in developing rumor-detection systems (e.g. Kwon, Cha, and Jung 2017). Further scholarly attention and investigation of the role of social network structures will advance our knowledge of the rumor-refutation effects.

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Appendix A: Questionnaire for the Rumor Case Development Study

Thank you for participating in our study.
We are looking for a social media user as a participant.

Which of the following social media sites do you use?
Please check **all the options that apply**.

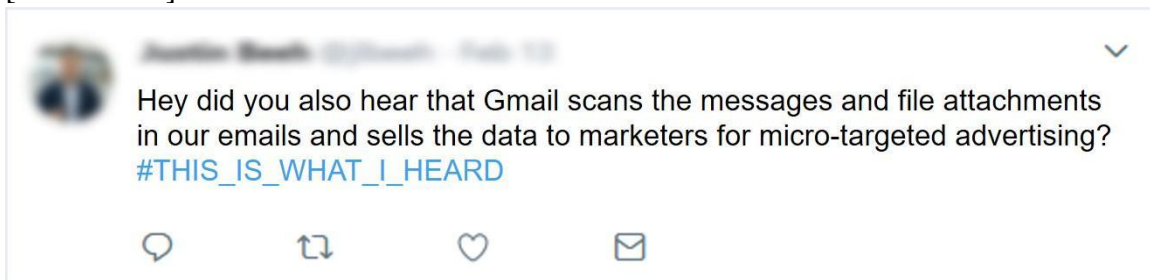
- Twitter
 - Facebook
 - Instagram
 - Pinterest
 - Snapchat
 - Others
-

You just answered that you use Twitter.
When was the last time you used Twitter?

- Within a week
- Within a month
- Within six months
- More than six months ago

You will view a series of tweet messages regarding brand/product-related information posted on Twitter. Please read the tweets carefully and answer each question by clicking an appropriate checkbox.

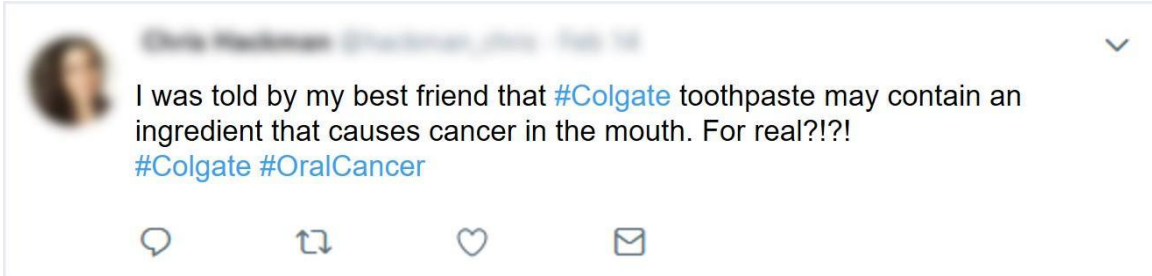
[Gmail Case]



[Amazon Case]



[Colgate Case]



Please indicate how much you agree or disagree with each of the statements by clicking the number.

	Strongly disagree 1	2	3	Neither agree nor disagree 4	5	6	Strongly agree 7
Information in this tweet message is useful to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information in this tweet message is beneficial to know.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information in this tweet message is helpful to know.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate how much you agree or disagree with each of the statements by clicking the number.

	Strongly disagree 1	2	3	Neither agree nor disagree 4	5	6	Strongly agree 7
Information in this tweet message is important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information in this tweet message is significant.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information in this tweet message will be talked about seriously.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Milk Product Case]



Before you proceed to the demographic question section, we would like to inform you that the **tweet messages you have viewed in this study are fictitious** and purposely created by the researcher. The purpose of this study is to select a suitable commercial rumor example that is perceived as unverified, useful, important, and relevant by participants. Your responses have been recorded, but if you wish, you may ask the researcher to delete your responses and withdraw from the study without loss of compensation. Please contact Hyejin Kim at kimx3023@umn.edu if you have any questions or concerns in this process. Please click 'Yes' button below if you would like to allow us to use your data. If you click 'no,' you will exit out of the study and your responses will be deleted and excluded from analysis.

- Yes, I allow the researcher to use my responses.
- No, I don't allow the researcher to use my responses.

You are almost done!

There are just a few more questions we would like to ask you for classification purposes.

Do you use Gmail for work and/or personal purposes?

- Yes
 - No
-

Do you drink milk on a regular basis (at least once a month)?

Yes

No

Have you shopped on Amazon.com in the past 12 months?

Yes

No

Have you used Colgate toothpaste in the past 12 months?

Yes

No

What is your age? (___ years old)

What is your gender? (check one)

- Male
 - Female
-

What is your highest level of education?

- Less than high school
 - Completed some high school
 - High school graduate or equivalent
 - Business, Technical, or Vocational school after high school
 - Completed some college, but no 4-year degree
 - College graduate
 - Completed some graduate school, but not degree
 - Completed a graduate degree
-

What is your racial/ethnic background?

- Asian
 - Black or African American
 - Hispanic or Latino
 - Native American or Alaska Native
 - Native Hawaiian or other Pacific Islander
 - White or Caucasian (non-Hispanic)
 - Other or Mixed Race
-

Before taxes, which of the following categories did your total family income fall into last year?

- Less than \$15,000
- \$15,000 to \$24,999
- \$25,000 to \$34,999
- \$35,000 to \$44,999
- \$45,000 to \$54,999
- \$55,000 or more
- Don't know

Appendix B: Questionnaire for The Source Trustworthiness Manipulation Test

Thank you for participating in our study.
We are looking for a social media user as a participant.

Which of the following social media sites do you use?
Please check all the options that apply.

- Twitter
 - Facebook
 - Instagram
 - Pinterest
 - Snapchat
 - Others
-

You just answered that you use Twitter.
When was the last time you used Twitter?

- Within a week
 - Within a month
 - Within six months
 - More than six months ago
-

[High-Trustworthy Source Condition]

In the next page, you will view a description of a Twitter user's characteristics. Please read the description carefully and think of someone you have a connection with on Twitter who has similar characteristics to the user listed in the description.

This Twitter user is transparent about who they are. For example, they use a real name for their Twitter handle, and their profile picture shows their full face. The user has more than 300 followers, tends to share useful and helpful tweets with others, and is always responsive to others' comments on their own tweets.

Considering your previous encounters with the user and your observations on Twitter, you know that this user is always willing to give honest opinions and do things within their capacity to help others without reward. This user is concerned about what is important to others and provides thoughtful advice in their tweets.

The user appears to be generally well-informed about various things and has especially good knowledge about technology and privacy online.

Please think of someone you follow or interact with on Twitter who has similar characteristics to the user listed in the description you just read.

Does anyone who embodies the description come to mind?

- Yes, I can think of someone.
- No, I can't think of anyone.

[Low-Trustworthy Source Condition]

This Twitter user is not transparent about who they are. For example, they use an unclear nickname for their Twitter handle, and their profile picture does not show their face. The user has about 10 followers and is usually unresponsive to others' comments on their own tweets.

Considering your previous encounters with the user and your observations on Twitter, you know that this user does not usually give their opinions and is not interested in helping others.

This user does not care what is important to others or provide any useful advice in their tweets.

The user does not appear to be well-informed about anything or know much about technology and privacy online.

Please think of someone you follow or interact with on Twitter who has similar characteristics to the user listed in the description you just read.

Does anyone who embodies the description come to mind?

- Yes, I can think of someone.
- No, I can't think of anyone.

[For those who selected "Yes, I can think of someone."]

When was the last time you interacted with the Twitter user you just thought of?

- Within in a week
- Within in a month
- Within six months
- More than six months ago

Recalling the Twitter user description you just read (or recalling the Twitter user you just thought of), please indicate to what extent you agree or disagree with each of the following statements regarding your thoughts about the user.

This user would keep his/her commitments.

This user is sincere and genuine.

Please click 'Strongly agree' for this item.

This user is competent and effective in providing product/service-related information in general.

In general, this user is very knowledgeable about product/service-related information.

You are almost done!

There are just a few more questions we would like to ask you for classification purposes.

What is your age? (___ years old)

What is your gender? (check one)

Male

Female

What is your highest level of education?

- Less than high school
 - Completed some high school
 - High school graduate or equivalent
 - Business, Technical, or Vocational school after high school
 - Completed some college, but no 4-year degree
 - College graduate
 - Completed some graduate school, but not degree
 - Completed a graduate degree
-

What is your racial/ethnic background?

- Asian
 - Black or African American
 - Hispanic or Latino
 - Native American or Alaska Native
 - Native Hawaiian or other Pacific Islander
 - White or Caucasian (non-Hispanic)
 - Other or Mixed Race
-

Before taxes, which of the following categories did your total family income fall into last year?

- Less than \$15,000
 - \$15,000 to \$24,999
 - \$25,000 to \$34,999
 - \$35,000 to \$44,999
 - \$45,000 to \$54,999
 - \$55,000 or more
 - Don't know
-

Appendix C: Questionnaire for the Trust Cue Manipulation Test

Thank you for participating in our study.
We are looking for a social media user as a participant.

Which of the following social media sites do you use?
Please check all the options that apply.

- Twitter
 - Facebook
 - Instagram
 - Pinterest
 - Snapchat
 - Others
-

You just answered that you use Twitter.
When was the last time you used Twitter?

- Within a week
 - Within a month
 - Within six months
 - More than six months ago
-

On the next page, you will view a tweet regarding brand-related information posted on Twitter. Please read the tweet carefully and answer each question by clicking the appropriate checkbox.

[NPR, WSJ, ABC, No Cue, respectively]

The image displays four screenshots of tweets arranged in a 2x2 grid. Each tweet is from the user 'Keep People Unclassified' and features a profile picture of a person with glasses. The tweets are as follows:

- Top Left:** Text: "Don't be fooled by the rumor that Amazon will charge you a 10% fee to make up the loss from hiring independent drivers. Calm down people! It's not real. Check out the article from #NPR". Image: Amazon logo on a building. Text below image: "Amazon: No. We don't charge customers a sales fee. Despite rumors, Amazon assured their customers that they will not impose any extra fees for their orders. npr.org".
- Top Right:** Text: "Don't be fooled by the rumor that Amazon will charge you a 10% fee to make up the loss from hiring independent drivers. Calm down people! It's not real. Check out the article from #TheWallStreetJournal". Image: Amazon logo on a building. Text below image: "Amazon: No. We don't charge customers a sales fee. Despite rumors, Amazon assured their customers that they will not impose any extra fees for their orders. wsj.com".
- Bottom Left:** Text: "Don't be fooled by the rumor that Amazon will charge you a 10% fee to make up the loss from hiring independent drivers. Calm down people! It's not real. Check out the article from #ABCNews". Image: Amazon logo on a building. Text below image: "Amazon: No. We don't charge customers a sales fee. Despite rumors, Amazon assured their customers that they will not impose any extra fees for their orders. abcnews.go.com".
- Bottom Right:** Text: "Don't be fooled by the rumor that Amazon will charge you a 10% fee to make up the loss from hiring independent drivers. Calm down people! It's not real." (No image or link).

Each tweet includes a dropdown arrow in the top right corner and a row of interaction icons (reply, retweet, like, direct message) at the bottom.

Please indicate to what extent you agree or disagree with each of the following statements regarding your thoughts about the information in this tweet.

This tweet seems to be honest.

This tweet seems to be truthful.

This tweet seems to provide factual information.

Before you proceed to the demographic question section, we would like to inform you that the tweet you have viewed in this study is fictitious and purposely created by the researcher. The purpose of this study is to determine which example of a rumor-correction message is perceived as trustworthy. Your responses have been recorded, but if you wish, you may ask the researcher to delete your responses and withdraw from the study without loss of compensation.

Please contact Hyejin Kim at kimx3023@umn.edu if you have any questions or concerns about this process. Please click the 'Yes' button below if you would like to allow us to use your data. If you click the 'no' button, you will exit out of the study and your responses will be deleted and excluded from the analysis.

- Yes, I allow the researcher to use my responses.
- No, I don't allow the researcher to use my responses.

You are almost done!

There are just a few more questions we would like to ask you for classification purposes.

Have you shopped on Amazon.com in the past 12 months?

Yes

No

What is your age? (___ years old)

What is your gender? (check one)

Male

Female

What is your highest level of education?

- Less than high school
 - Completed some high school
 - High school graduate or equivalent
 - Business, Technical, or Vocational school after high school
 - Completed some college, but no 4-year degree
 - College graduate
 - Completed some graduate school, but not degree
 - Completed a graduate degree
-

What is your racial/ethnic background?

- Asian
 - Black or African American
 - Hispanic or Latino
 - Native American or Alaska Native
 - Native Hawaiian or other Pacific Islander
 - White or Caucasian (non-Hispanic)
 - Other or Mixed Race
-

Before taxes, which of the following categories did your total family income fall into last year?

- Less than \$15,000
 - \$15,000 to \$24,999
 - \$25,000 to \$34,999
 - \$35,000 to \$44,999
 - \$45,000 to \$54,999
 - \$55,000 or more
 - Don't know
-

Appendix D: Questionnaire for the Main Experiment

Thank you for participating in our study.
We are looking for a social media user as a participant.

Which of the following social media sites do you use?
Please check all the options that apply.

- Twitter
 - Facebook
 - Instagram
 - Pinterest
 - Snapchat
 - Others
-

You just answered that you use Twitter.
When was the last time you used Twitter?

- Within a week
 - Within a month
 - Within six months
 - More than six months ago
-

Please indicate how much you agree or disagree with each of the following statements that describe yourself by clicking the number.

In general, most folks keep their promises.

I think people generally try to back up their words with their actions.

Most people are honest in their dealings with others.

I believe that most professional people do a very good job at their work.

Most professionals are very knowledgeable in their chosen field.

A large majority of professional people are competent in their area of expertise.



I usually trust people until they give me a reason not to trust them.



I generally give people that benefit of the doubt when I first meet them.



My typical approach is to trust new acquaintances until they prove I should not trust them.





Please indicate to what extent you agree or disagree with each of the following statements regarding your thoughts about Amazon the e-commerce company, by clicking the number.

Amazon would keep its commitments.

Amazon is sincere and genuine.

Amazon is competent and effective in providing e-commerce services.

Amazon performs its job as an e-commerce company very well.

Please click 'Strongly agree' for this item.

Amazon is a capable and proficient e-commerce company.

In general, Amazon is very knowledgeable about the e-commerce business.



On the next page, you will be given a tweet regarding brand-related information posted on Twitter. Please read the tweet and answer each question by clicking the appropriate checkbox.



Please indicate your thoughts about the information in this tweet based on the following attributes.

I think the information in this tweet is:

	1	2	3	4	5	6	7	
Unbelievable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Believable
Untrustworthy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trustworthy
Not convincing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Convincing
Not credible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Credible
Unreasonable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reasonable
Dishonest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Honest
Questionable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unquestionable
Inconclusive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Conclusive
Unlikely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Likely

How likely would you tell others about this information?

- Extremely unlikely
 -
 -
 - Neutral
 -
 -
 - Extremely likely
-

To what extent do you think this information is the kind of thing you would mention to other people?

- Not at all
 -
 -
 - Neutral
 -
 -
 - Definitely
-

How likely would you share this information on social media?

- Extremely unlikely
-
-
- Neutral
-
-
- Extremely likely

Please indicate the degree to which you found the tweet to be relevant to you.
How relevant is the information described in the tweet to you?

- Not at all relevant
-
-
- Neutral
-
-
- Very relevant

You are half way done!

On the next page, you will view a description of a Twitter user's characteristics. Please read the description carefully and think of someone you have a connection with on Twitter who has similar characteristics to the user listed in the description.

[High-Trustworthy Source Condition]

This Twitter user is transparent about who they are. For example, they use a real name for their Twitter handle, and their profile picture shows their full face. The user has more than 300 followers, tends to share useful and helpful tweets with others, and is always responsive to others' comments on their own tweets.

Based on your previous encounters with the user and your observations on Twitter, you know that this user is always willing to give honest and useful information and genuinely try to help others. This user is concerned about what is important to others and provides thoughtful advice in their tweets. The user appears to be generally well-informed about various things.

Please think of someone you follow or interact with on Twitter who has similar characteristics to the user illustrated in the description you just read.

Does anyone who embodies the description come to mind?

- Yes, I can think of someone like that.
 - No, I can't think of anyone like that.
-

[For those who answered “Yes, I can think of someone like that”]

Focusing on the Twitter user you just thought of, when was the last time you saw the user's activity (e.g., posting a tweet, retweeting, commenting, etc.) on Twitter?

- Within in a week
- Within in a month
- Within six months
- More than six months ago

[Low-Trustworthy Source Condition]

This Twitter user is not transparent about who they are. For example, they use an unclear nickname for their Twitter handle, and their profile picture does not show their face. The user has about 10 followers and is usually unresponsive to others' comments on their own tweets.

Based on your previous encounters with the user and your observations on Twitter, you know that this user does not usually give honest and useful information and is not interested in helping others.

This user does not seem to care what is important to others or provide any thoughtful advice in their tweets. The user does not appear to be well-informed about anything.

Please think of someone you follow or interact with on Twitter who has similar characteristics to the user illustrated in the description you just read.

Does anyone who embodies the description come to mind?

- Yes, I can think of someone like that.
 - No, I can't think of anyone like that.
-

[For those who answered “Yes, I can think of someone like that”]

Focusing on the Twitter user you just thought of, when was the last time you saw the user's activity (e.g., posting a tweet, retweeting, commenting, etc.) on Twitter?

- Within in a week
- Within in a month
- Within six months
- More than six months ago

[Presence of Trust Cue Condition]

Recalling the Twitter user you just thought of (OR recalling the Twitter user description you just read if you couldn't think of anyone), Please imagine that you just saw the following tweet **posted by that Twitter user.**



Please indicate your thoughts about the information in this tweet based on the following attributes.

I think the information in this tweet is:

	1	2	3	4	5	6	7	
Unbelievable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Believable
Untrustworthy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trustworthy
Not convincing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Convincing
Not credible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Credible
Unreasonable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reasonable
Dishonest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Honest
Questionable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unquestionable
Inconclusive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Conclusive
Unlikely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Likely

How likely would you tell others about this information?

- Extremely unlikely
 -
 -
 - Neutral
 -
 -
 - Extremely likely
-

To what extent do you think this information is the kind of thing you would mention to other people?

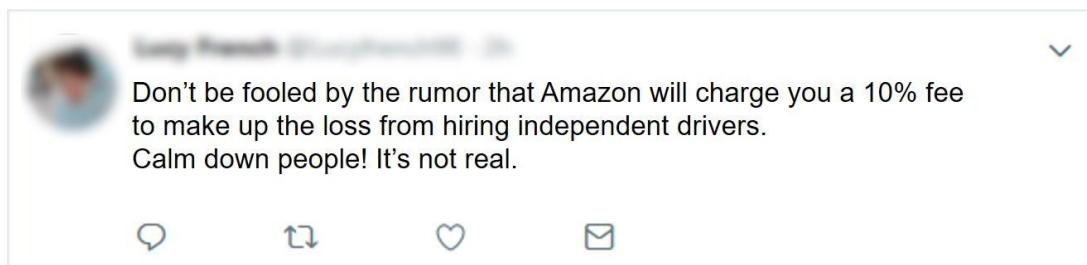
- Not at all
 -
 -
 - Neutral
 -
 -
 - Definitely
-

How likely would you share this information on social media?

- Extremely unlikely
-
-
- Neutral
-
-
- Extremely likely

[Absence of Trust Cue Condition]

Recalling the Twitter user you just thought of, (OR recalling the Twitter user description you just read if you couldn't think of anyone), please imagine that you just saw the following tweet posted by that Twitter user.



Please indicate your thoughts about the information in this tweet based on the following attributes.

I think the information in this tweet is:

	1	2	3	4	5	6	7	
Unbelievable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Believable
Untrustworthy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trustworthy
Not convincing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Convincing
Not credible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Credible
Unreasonable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reasonable
Dishonest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Honest
Questionable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unquestionable
Inconclusive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Conclusive
Unlikely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Likely

How likely would you tell others about this information?

- Extremely unlikely
 -
 -
 - Neutral
 -
 -
 - Extremely likely
-

To what extent do you think this information is the kind of thing you would mention to other people?

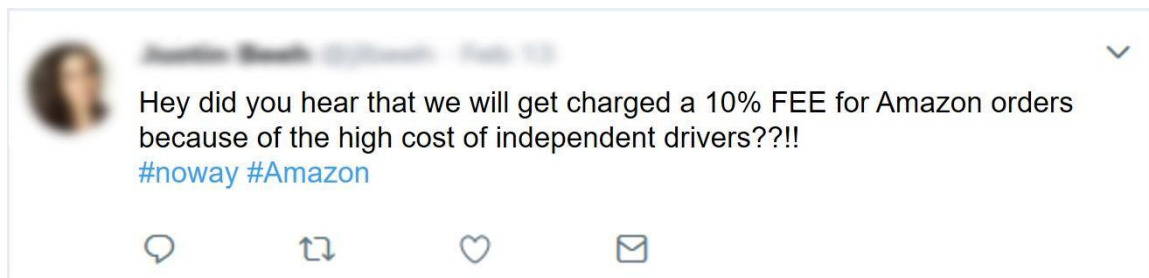
- Not at all
 -
 -
 - Neutral
 -
 -
 - Definitely
-

How likely would you share this information on social media?

- Extremely unlikely
-
-
- Neutral
-
-
- Extremely likely

You are 80% done!

On the next page, you will see another Amazon-related tweet posted by someone. Please read the tweet and answer each question by clicking the appropriate checkbox.



Please indicate your thoughts about the information in this tweet based on the following attributes.

I think the information in this tweet is:

	1	2	3	4	5	6	7	
Unbelievable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Believable
Untrustworthy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Trustworthy
Not convincing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Convincing
Not credible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Credible
Unreasonable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Reasonable
Dishonest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Honest
Questionable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unquestionable
Inconclusive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Conclusive
Unlikely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Likely

How likely would you tell others about this information?

- Extremely unlikely
 -
 -
 - Neutral
 -
 -
 - Extremely likely
-

To what extent do you think this information is the kind of thing you would mention to other people?

- Not at all
 -
 -
 - Neutral
 -
 -
 - Definitely
-

How likely would you share this information on social media?

- Extremely unlikely
-
-
- Neutral
-
-
- Extremely likely

Before you proceed to the last section of this study, we would like to inform you that the tweets you have viewed in this study are fictitious and purposely created by the researcher. The purpose of this study is to determine how effective a rumor-correction message is depending on the source, receiver, and message characteristic. Your responses have been recorded, but if you wish, you may ask the researcher to delete your responses and withdraw from the study without loss of compensation. Please contact Hyejin Kim at kimx3023@umn.edu if you have any questions or concerns about this process. Please click the 'Yes' button below if you would like to allow us to use your data. If you click the 'no' button, your responses will be deleted and excluded from the analysis.

- Yes, I allow the researcher to use my responses.
- No, I don't allow the researcher to use my responses.

You are almost done!

There are just a few more questions we would like to ask you for classification purposes.

Have you shopped on Amazon.com in the past 12 months?

- Yes
- No

What is your age? (___ years old)

What is your gender? (check one)

- Male
 - Female
-

What is your highest level of education?

- Less than high school
 - Completed some high school
 - High school graduate or equivalent
 - Business, Technical, or Vocational school after high school
 - Completed some college, but no 4-year degree
 - College graduate
 - Completed some graduate school, but not degree
 - Completed a graduate degree
-

What is your racial/ethnic background?

- Asian
- Black or African American
- Hispanic or Latino
- Native American or Alaska Native
- Native Hawaiian or other Pacific Islander
- White or Caucasian (non-Hispanic)
- Other or Mixed Race

Before taxes, which of the following categories did your total family income fall into last year?

- Less than \$15,000
- \$15,000 to \$24,999
- \$25,000 to \$34,999
- \$35,000 to \$44,999
- \$45,000 to \$54,999
- \$55,000 to \$64,999
- \$65,000 to \$74,999
- \$75,000 to \$84,999
- \$85,000 to \$94,999
- \$95,000 or more
- Prefer not to answer/Don't know