

Exploring Risk Perception and Intention to Engage in Social and Economic Activities During the South Korean MERS Outbreak

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Analyzing data from a nationally representative online survey, this study explores the influence of individuals' media exposure, information-gathering ability, and trust in institutions on their risk perceptions and behavioral intentions to engage in social and economic activities during the Middle East respiratory syndrome (MERS) outbreak in South Korea. We find that media exposure, information-gathering ability, trust in the government, and trust in news media are significant factors in shaping the public's risk perceptions of the virus, which in turn influenced their intentions to engage in social and economic activities. The results demonstrate that the MERS outbreak was not only a public health issue but also an economic one. The study findings have important implications for effective risk and health communication and for the roles of government and news media during future national risk events affecting public health.

Keywords: MERS, trust, information-gathering ability, news media, risk perceptions, behavioral intentions

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Date submitted: 2017-12-28

¹ This work was supported by grants from the National Cancer Center in South Korea (grant no. 1310260-2).

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On July 27, 2015, the South Korean government declared a “de facto end” to the outbreak of the Middle East respiratory syndrome (MERS) coronavirus in South Korea (BBC, 2015). In all, 38 people had died, 186 people had been infected, and more than 16,000 people had been quarantined since the first MERS patient was identified in the country on May 26, 2015 (BBC, 2015). In South Korea, MERS was considered an emerging infectious disease outbreak—that is, a disease not normally expected to occur in a particular geographical area or time period (Kim, 2015; Oh, Paek, & Hove, 2015). After the outbreak, many schools were temporarily closed, and consumer spending declined in public venues such as stores, restaurants, and movie theaters, negatively impacting the South Korean economy (Vox, 2015).

In a public health risk situation, risk perception is important in health and risk communication because it determines which hazards people care about and how they deal with them. Some theoretical models have been developed to explain how people perceive risks, how they process risk information, and how they take action to minimize or prevent risks. For example, the heuristic-systematic processing model (HSM) explains how individuals form their perceptions of risk as they obtain information. When individuals do not have firsthand experience of a health issue, such as MERS, they tend to rely on heuristics, such as trust in institutions (e.g., Siegrist, 2000). On the other hand, people also scrutinize information systematically to shape their risk perceptions. The HSM identifies news media—including television, newspapers, and the Internet—as factors that can significantly influence people’s risk perceptions (Oh et al., 2015). In situations of widespread societal public health issues such as the MERS outbreak, media produce a considerable amount of news and information on the issues, which are primary sources of information for the public (You & Ju, 2015). Trust in institutions such as the news media or the government can also influence the extent to which the public perceives the risk (Bratanova, Morrison, Fife-Schaw, Chenoweth, & Mangold, 2013). For example, citizens’ trust in the government’s ability to manage public health problems, such as H1N1 influenza, can influence the public’s judgments of risks and benefits, which in turn lead to acceptance of the government-recommended actions (van der Weerd, Timmermans, Beaujean, Oudhoff, & van Steenbergen, 2011). Moreover, risky social situations create uncertain environments where information about social events is relatively sparse. People need to seek information to make informed decisions and behave in ways that will best help them avoid risks and uncertainty (Yang, Aloe, & Feeley, 2014). Individuals’ ability to seek the information that is necessary for the outcome they desire (Griffin et al., 2008) motivates them to shape their risk perception (Trumbo, 2002).

Furthermore, people’s risk perception can influence their subsequent behavior. During the MERS outbreak, South Korea’s domestic economy was relatively inactive. The Bank of Korea, which is the central bank of South Korea, reported that the gross domestic product decreased by between 0.2 and 0.3 percentage points during the outbreak period (Lee, 2015). The negative economic impact seen in South Korea may have occurred because people’s perceptions of the risk posed by MERS influenced their social and economic activities. To avoid risky situations, people might have been reluctant to engage in social or economic activities such as socializing with friends, sightseeing, and shopping. However, few studies have examined the potential relationship between risk perception and social and economic activities during infectious disease outbreaks.

This study applies the HSM framework to examine the potential antecedents (i.e., news media exposure, trust in institutions, including the government and news media, and information-gathering ability)

on people's perceptions of risk, which in turn, influence their intentions to engage in social and economic activities during the MERS outbreak in South Korea. This framework can provide a comprehensive understanding of how people shape their perceptions of risk that lead to behavioral intentions in situations of public health risk. Previous studies have examined how people form risk perceptions by conducting surveys at the end of a disease outbreak (e.g., Oh et al., 2015; Shim & You, 2015). Thus, people responding to the surveys may report their risk perception at the time of a survey, retrieving information from their stored memory (Kim & Garrett, 2012). In contrast, this study examines the factors that influence risk perceptions *during* the MERS outbreak. In this study, individuals shape their risk perceptions in real time, at the moment of information exposure during the MERS outbreak (Kim & Garrett, 2012). This perspective enables this study to offer practical and realistic implications for effective risk and health communication in future national public health issues.

Theoretical Framework

Risk perception indicates one's subjective judgment of the likelihood that negative incidents or results, such as an infectious disease, will occur (Choi, Yoo, Noh, & Park, 2017; Slovic, 1992). When a public health issue, such as MERS, arises, individuals perceive risks toward the health issue. The HSM may be useful for explaining how people perceive such risks. The HSM proposes that individuals shape their perceptions of risk by engaging in heuristic or systematic information processing (Chaiken, 1980; Trumbo, 2002).

People with low levels of direct experience of or knowledge about certain health issues often use heuristics, such as trust in institutions, to shape their risk perception about the issue (Scheufele & Lewenstein, 2005). This information-processing strategy assumes that individuals are satisfiers who minimize their efforts at collecting information and engaging in active processing as they form risk perceptions about an issue (Scheufele & Lewenstein, 2005). Heuristics, such as trust, are used especially when an issue is relatively new. On the other hand, systematic processing involves careful information processing in which people analyze and scan information to make their risk judgments (Choi et al., 2017). Systematic processing requires more cognitive effort and capabilities to process information than heuristic processing does (Trumbo, 2002). For example, information-gathering requires individuals to seek information actively and process it systematically to form risk perceptions about given issues (Yang, 2012). We turn now to a discussion of the relationship between people's news media exposure, trust in institutions, and information-gathering ability and their perceptions of risk regarding MERS.

News Media as a Predictor of Risk Perception

News media play an important role in risk communication: they inform the public of risk issues, shape public acceptability of risks, and motivate the public to perform certain behaviors (Bakir, 2010; Shim & You, 2015). For infectious disease outbreaks, news media are the primary information source for the general public (Oh et al., 2015).

In the beginning stage of a disease outbreak, at the individual level, people tend to rely on news media as a source of available information in order to assess risk, and the media influence how people

construct their initial perception of the disease (Shih, Wijaya, & Brossard, 2008; Wahlberg & Sjoberg, 2000). As news reports of certain risks related to the disease are released, individuals may recognize disease risk (Fung et al., 2011). At the societal level, news media would stimulate the social amplification of risk regarding MERS. According to the social amplification of risk framework, risk events, such as infectious disease outbreaks, are socially spread by the dissemination of information through media (Kasperson et al., 1988). An unknown or unfamiliar risk, such as MERS, is more readily amplified by news media's information flow, generating social or economic impacts on society (Chung & Yun, 2013). Thus, intensive media coverage about MERS would contribute to amplifying MERS risks in South Korea, increasing the public's perception of the risk.

This phenomenon is particularly important to this study because we examine how news media exposure influenced the formation of people's risk perceptions during the MERS outbreak in real time. Previous studies have investigated the impact of news media on people's perceptions of risk after the end of a disease outbreak (e.g., Lin & Lagoe, 2013; Oh et al., 2015), when their risk perceptions are based on what they recall. This timing can produce a distorted or biased memory. In contrast, this study provides a better understanding of the influence of news media on risk perception in a real-time situation.

News media provide detailed explanations about potential risks to the public (Fung et al., 2011). News media identify significant characteristics of risks about infectious diseases. Previous studies have demonstrated that news media cover the severity, risk magnitude information related to infection, and uncertainty during infectious disease outbreaks, such as swine flu (Abeyasinghe & White, 2011; Shih et al., 2008). Media coverage about risks can affect people's perceptions of the risk (Fung et al., 2011). For example, during the MERS outbreak, news media, such as newspapers, largely reported the severity and uncertainty of the disease, including the spread of the epidemic, the number of infections, and the potential fatalities (Lee & Paik, 2017); thus, news media exposure helps people perceive the risks involved in the disease.

From a psychological perspective, many studies have shown that news media affect people's risk perception during infectious disease outbreaks (e.g., Chang, 2012; Oh et al., 2015). Two explanations exist for the influence of media on people's perceptions of risk. First, the overall amount of news stories on a specific issue is associated with risk perceptions (Wahlberg & Sjoberg, 2000). As the agenda-setting effect (McCombs & Shaw, 1972) explains, news media increase public awareness of particular risk issues by emphasizing their importance over others (Shim & You, 2015). With greater news coverage of a disease, individuals are more likely to perceive the disease as serious or significant (Chang, 2012; Fung et al., 2011). Second, how the disease is framed in the media influences people's perception of the risk (Wahlberg & Sjoberg, 2000). In their coverage, news media tend to portray some aspects of a particular issue or event as more salient than others (Entman, 1993). From this perspective, we expect greater exposure to news media about the MERS outbreak to increase the public's perception of the risk. As a result, this study proposes the following research hypothesis:

H1: News media exposure is positively related to risk perception.

Information Gathering Ability as a Predictor of Risk Perception

According to the risk information seeking and processing model, information-gathering ability refers to "one's ability to access and understand risk information" (Yang & Kahlor, 2013, p. 193). This capability helps people conduct the information seeking necessary to form their perception of risk on a health issue (Griffin et al., 2008). When public health issues occur, people with higher information-gathering ability are more likely to systematically seek information from media or other sources to mitigate their uncertainty (Sommerfeldt, 2015).

Information-gathering capability would be particularly important to South Koreans during the MERS outbreak because the disease was unfamiliar to them, generating excessive public concern and uncertainty. Because people want to seek information about risk issues to reduce their uncertainty or anxiety (Yang, 2012), their ability to acquire information is likely to influence their decision making about risks (Trumbo, 2002). Thus, an individual's information-gathering ability can increase his or her confidence in processing risk-related information more systematically, which reduces the perception of risk (Griffin et al., 2008; Trumbo, 2002). Individuals with greater information-gathering ability are more likely to have lower levels of risk perception regarding the MERS outbreak. Given this suggestion of how information processing might affect risk perceptions, we propose the following hypothesis:

H2: Information gathering ability is negatively related to risk perception.

Trust as a Predictor of Risk Perception

Trust plays a role in heuristics, or cognitive shortcuts, in shaping the public's perception of risk about a particular issue, such as the MERS outbreak (Peters, Covello, & McCallum, 1997). People tend to quickly calculate potential consequences (such as risk) based on heuristics (such as trust) toward an issue (Slovic, 1992). According to Peters et al. (1997), trust arises from a sense of expertise, openness, and concern, especially from institutions or actors such as governments or universities. In particular, trust enables individuals to make judgments about risk in the absence of complete knowledge or understanding (Siegrist, 2000). Because trust in institutions, such as the government or media organizations, helps reduce the complexity of and uncertainty about a particular issue, people are likely to turn to endorsements and information provided by authorities that they trust to guide their perceptions (Brossard & Nisbet, 2006; Siegrist, 2000).

In the field of risk perception, trust has been examined as social trust in specific objects rather than general trust such as a personality trait. A majority of relevant research has demonstrated a relationship between social trust and risk perception when an individual lacks knowledge about a hazard (Siegrist & Cvetkovich, 2000). For example, trust in government could shape the public's risk perception. As an institution, trust in government includes a belief in the government's ability to prevent individuals from encountering potential risks (Griffin, Neuwirth, Dunwoody, & Giese, 2004). This trust also involves the public's judgment about how much responsibility the government bears for a particular issue (Griffin et al., 2004). Because the government is responsible for informing the public about societal risks and for responding to the threat (Ju, Lim, Shim, & You, 2015), citizens trust the government's ability to handle the hazard.

Public trust in the government is especially important in a serious public health crisis such as an infectious disease outbreak. During the early phase of the MERS outbreak in South Korea, most Koreans did not possess exact and sufficient information about MERS. One way people cope with this lack of information is to rely on public trust to reduce the risk they encounter (Siegrist & Cvetkovich, 2000). Given the lack of knowledge about MERS, Koreans might have trusted the government as a credible actor responding to the pandemic risk, and that trust might exert a significant influence on the public's risk perception. In other words, individuals with high trust in government are likely to perceive that the government has sufficient ability and knowledge to deal with the crisis. Thus, higher trust in government can significantly lead to lower perceived risk. The following hypothesis is posited to examine this theoretical assumption:

H3: Trust in the government is negatively related to risk perception.

Similarly, trust in news media can also influence the public's perception of risk. Media trust refers to people's perceptions of the credibility of media content (Hopmann, Shehata, & Strömbäck, 2015). According to the salient value similarity model (Earle & Cvetkovich, 1995), people build their trust based on the perception that they share the same values with the organization in a particular situation. The judgment of salient value is a heuristic process that is rapid, implicit, unarticulated, and automatically elicited. Because people encounter a vast amount of information, they are not able to pay attention to all information in the media during a public health crisis; they tend to select and use the information they believe offers them benefits, from trustworthy sources (Williams, 2012). People consume news media as a dominant source because they are generally thought to provide credible, valuable, and timely information (Heath, Liao, & Douglas, 1995; Tsfaty & Cappella, 2003). Given that people tend to perceive news media as being more trustworthy than other sources, trust in news media likely has a vital impact on news consumers' risk perceptions during a public health crisis. In the case of an infectious disease outbreak, when there is much uncertainty about the situation, intensive media reporting about the pandemic socially amplifies public awareness and concern about the risk (Fang, Fang, Tsai, Lan, & Hsu, 2012). In this type of situation, trust has been found to reduce perceptions of risk among the public by simplifying the risky situation (Luhmann, 1979). When people trust the risk information published by the media, their uncertainty toward the risk decreases. According to a survey conducted during South Korea's MERS outbreak, news media such as television news and print newspapers served as the primary information channels for most Koreans, and the information from news media was perceived as the most trustworthy (Kim & Yang, 2015). Thus, we expect a negative association between trust in news media and risk perception in the context of the MERS outbreak and propose the following hypothesis:

H4: Trust in news media is negatively related to risk perception.

Risk Perception and Behavior

Risk perceptions can influence individuals' public health behavior and behavioral intention. In the area of health communication, high levels of risk perception cause individuals to engage more in health-protective behavioral intentions to avoid risk (Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Shim & You, 2015). Some previous studies have examined the relationship between risk perception and preventive health behaviors, such as vaccination, condom use, hand washing, and breast self-examination (Bish & Michie, 2010; Pask & Rawlins, 2016). Because risk perception can motivate behavior (Witte & Allen, 2000), these studies focus on

the importance of increasing risk perception to encourage people's preventive behaviors. According to the protective motivation theory (Rogers, 1975), when individuals perceive risk, they activate protection motivation to prevent negative outcomes. In a risky environment, they are more likely to take action to reduce the threat or avoid the danger. For example, when an infectious disease outbreak occurs, people exhibit social distancing behavior (Williams, Rasmussen, Kleczkowski, Maharaj, & Cairns, 2015)—that is, they decrease their amount of social contact to protect their health.

During the MERS outbreak, risk perception may have influenced individuals' social and economic activities, such as socializing with friends, sightseeing, and shopping. Indeed, sales in local businesses, such as coffee shops and restaurants, dropped (Gale, 2015) because people were reluctant to engage in social and economic activities during the outbreak. Because individuals tend to avoid risk, increased perceptions of risk can discourage people from engaging in social and economic activities. Little research has empirically examined the influence of risk perception on social and economic activities in the context of health communication. Thus, this study examines the role of risk perception in prohibiting or promoting citizens' intention to engage in social and economic activities during the MERS outbreak in South Korea. The results provide important implications for effective risk and health communication regarding the relationship between risk perception and social and economic activities during future national risk issues. Thus, we posit this final research hypothesis:

H5: Risk perception is negatively related to the intention to engage in social and economic activities.

Beyond the direct relationships proposed in the hypothesized model, this study also examines the mediating path by which news media exposure—including mass media and the Internet—information-gathering ability, trust in the government, and trust in news media influence the intention to engage in social and economic activities through risk perception. This analysis estimates the significance of the mediating role of risk perception in the relationship between the antecedent variables and the dependent variable. To explore this issue, we propose the following research question:

RQ1: Does an individual's risk perception mediate the relationship between news media exposure, information-gathering ability, trust in the government, and trust in news media and his or her intention to engage in social and economic activities?

Method

Data

The data for this study were derived from a nationally representative online panel survey of South Korean adults age 19 or older. The data were collected July 6–13, 2015. The online sample was obtained from proportionate quota sampling methods on the basis of age, gender, and area of residence. From this online panel, a random sample was asked to participate in the survey. A total of 1,000 respondents agreed to participate, resulting in a completion rate of 35%.

Measurement

Behavioral Intention

The intention to engage in social and economic activities was measured on a 5-point scale ranging from 1 (*least likely*) to 5 (*most likely*) in which respondents were asked how likely they were to engage in the following social and economic activities in the next few days: (1) socialize with others, (2) go shopping, (3) visit entertainment venues, and (4) go sightseeing or travel. The four items were averaged to create an index of behavioral intention ($M = 3.34$, $SD = 0.91$, Cronbach's $\alpha = .87$).

Risk Perception

Risk perception was measured using a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) by asking how much respondents agreed with two risk statements directly related to MERS: (1) "I have felt risk from MERS" and (2) "It is likely that South Koreans will be affected by MERS." Responses were averaged to create an index of risk perception ($M = 3.48$, $SD = 0.82$, Cronbach's $\alpha = .76$). These items were adapted and modified from previous research (e.g., Oh et al., 2015).

News Media Exposure

The study measured two groups of news media exposure variables. Traditional mass media was measured with a 5-point scale ranging from 1 (*never*) to 5 (*very often*) by asking how often during the past month respondents were exposed to news and information about MERS in the mass media ($M = 4.22$, $SD = 0.76$). Internet exposure was also measured with a 5-point scale ranging from 1 (*never*) to 5 (*very often*) by asking how often respondents during the past month were exposed to news and information about MERS on the Internet ($M = 4.06$, $SD = 0.81$).

Information-Gathering Ability

Information gathering ability was measured with two items on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) in which respondents were asked how much they agreed with the following statements: (1) "It is hard for me to get information about MERS (reverse-coded)" and (2) "I don't know where to find information about MERS" (reverse-coded). These items were averaged to create an index of information-gathering ability ($M = 3.59$, $SD = 0.87$, Cronbach's $\alpha = .85$). These items were adapted and modified from earlier research (e.g., Yang, 2012; Yang et al., 2014).

Trust in the Government

Trust in the government was measured with a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) by asking how much respondents agreed with the following two statements: (1) "I am confident that the government protected South Koreans from the MERS infection" (2) "The government put forth their best efforts to minimize MERS infection." Responses were averaged to create an index of trust in the government response ($M = 2.40$, $SD = 1.11$, Cronbach's $\alpha = .89$).

Trust in News Media

Trust in news media was measured with a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) by asking how much respondents agreed with the following three statements: (1) "News media provided accurate information about MERS," (2) "News media provided sufficient information about MERS,

and (3) "I trust news stories reported by news media about MERS." The three items were averaged to construct an index of media trust ($M = 2.94$, $SD = 0.88$, Cronbach's $\alpha = .90$).

Control Variables

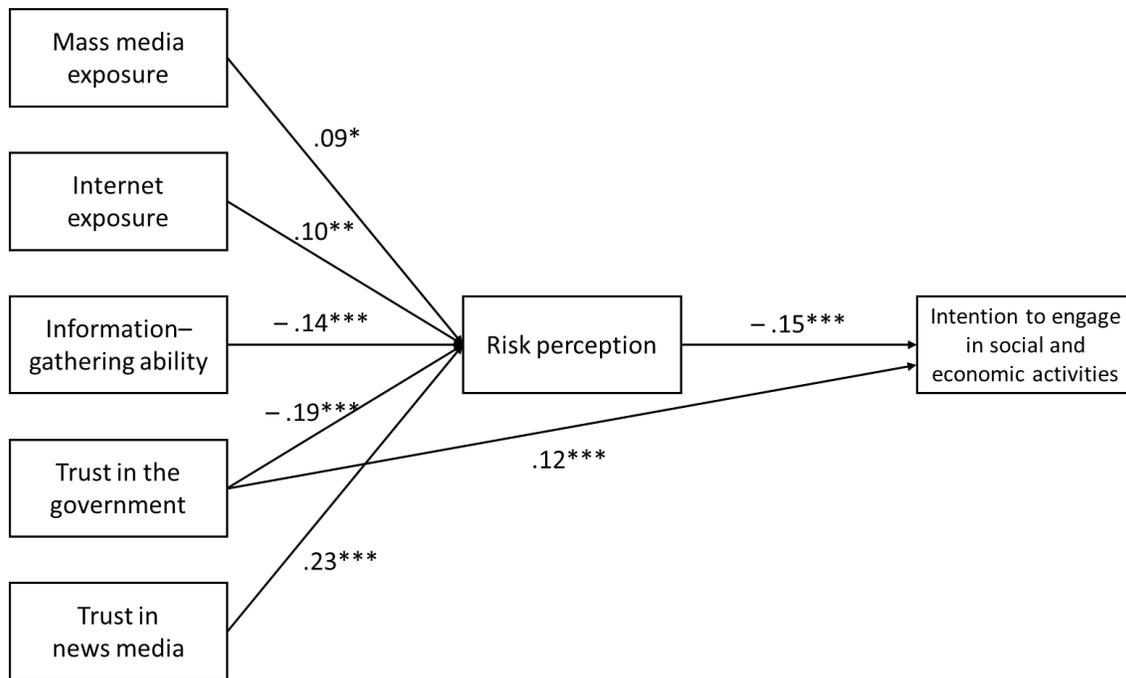
For control purposes, we included demographic variables and self-reported health status variables. Demographic variables included age ($M = 45.24$, $SD = 13.46$), gender (1 = male, 2 = female, 49.8% female), education (the highest degree completed, median: college graduate) ranging from 1 (*no education*) to 7 (*advanced degree, including graduate school*), and monthly household income (median: KRW 4,000,000–5,000,000; approximately U.S.\$4,000–5,000) ranging from 1 (*none or less than KRW 2,000,000*; approximately U.S.\$2,000) to 5 (*more than KRW 5,000,000*; approximately U.S.\$5,000). Additionally, self-reported health status variables of subjective health perception (how healthy respondents think they are in general on a 5-point scale ranging from 1 = *poor* to 5 = *excellent*, $M = 3.56$, $SD = 0.78$) and history of respiratory diseases (1 = yes, 0 = no) were assessed to control the effects of these variables.

Analysis

To test the five hypotheses and the research question, we performed structural equation modeling with observed variables in Mplus 6.1. The maximum likelihood mean adjusted estimator was used to resolve the problem of nonnormally distributed data. Before fitting the hypothesized model, we controlled for age, gender, education, income, subjective health perception, and history of respiratory diseases. Then we fitted our hypothesized model using standard modification approaches for the refinement of structural equation models (Kline, 1998; Shah et al., 2007). To identify the best fitting model, we removed nonsignificant relationships in the model. These procedures generate parsimonious and better fitting models without substantially modifying the hypothesized associations (Shah et al., 2007).

Results

The goodness of fit of our model was evaluated using chi-square statistics, root mean square error of approximation (RMSEA) of less than 0.08, standardized root mean square residual (SRMR) of less than 0.08, Tucker-Lewis index (TLI) of 0.90 or greater, and comparative fit index (CFI) of 0.90 or greater (Bentler, 1990; Worthington & Whittaker, 2006). Relying on the rule of thumb suggested above, the structural equation modeling analysis exhibited the following fit indices of our proposed model, $\chi^2(4) = 10.702$ ($p < .01$), RMSEA = 0.04, SRMR = 0.01, TLI = 0.89, and CFI = 0.99, which is a reasonably acceptable outcome.



Note. Path coefficients are estimated using the standardized solution.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 1. Structural equation modeling on risk perception and intention to engage in social and economic activities.

Figure 1 displays the path coefficients and their statistical significance in the hypothesized direction. Exposure to mass media was positively related to risk perception ($\beta = .09$, $p < .05$). This finding indicates that the more respondents were exposed to news and information about MERS in the mass media, the higher they perceived the risk of the infectious disease. Moreover, exposure to the Internet was found to be positively related to the dependent variable ($\beta = .10$, $p < .01$). This finding suggests that respondents who were exposed to more news and information about MERS on the Internet were likely to perceive higher risk about the infectious disease. Thus, H1 was supported.

Information-gathering ability was negatively associated with risk perception ($\beta = -.14$, $p < .001$). This finding indicates that respondents who had lower levels of information-gathering ability were more likely to perceive higher risk with the virus. Thus, H2 was supported.

Trust in the government was negatively associated with risk perceptions of MERS ($\beta = -.19$, $p < .001$). This finding suggests that respondents who believed that the government did a poor job in responding to the outbreak were likely to perceive higher risk of MERS. Therefore, H3 was supported. Additionally, trust in the government had a positive direct relationship with people's intentions to engage

in social and economic activities ($\beta = .12, p < .001$), indicating that respondents who believed that the government did a good job in responding to the outbreak were more likely to engage in social and economic activities. In contrast, trust in news media was found to be positively related to risk perception ($\beta = .23, p < .001$). This finding indicates that respondents with more trust in news media were likely to perceive greater risk regarding MERS. Thus, contrary to our prediction, H4 was not supported.

Supporting H5, risk perception was negatively associated with the intention to engage in social and economic activities ($\beta = -.15, p < .001$). This finding suggests that respondents who perceived less risk about the disease were more likely to engage in social and economic activities.

In response to RQ1, Table 1 presents the significance of indirect effects through five mediating paths. To examine the indirect effects, we employed the bootstrapping procedure, one of the most useful methods to address statistical issues regarding nonnormal distributions of indirect effects (Preacher & Hayes, 2008). The number of replications was set to 2,000, generating 95% bias-corrected confidence intervals, which did not include zero.

Table 1. Indirect Pathways of Exogenous Variables on Intention to Engage in Social and Economic Activities Through Risk Perception.

Significant path	Estimate	SE
Mass media exposure → Risk perception → Intention	-.01*	.01
Internet exposure → Risk perception → Intention	-.02*	.01
Information-gathering ability → Risk perception → Intention	.02**	.01
Trust in the government → Risk perception → Intention	.03**	.01
Trust in news media → Risk perception → Intention	-.03**	.01

Note. Estimates are standardized coefficients.

* $p < .05$. ** $p < .01$.

Risk perception mediated the relationship between mass media exposure and the intention to engage in social and economic activities (standardized coefficient = $-.01, p < .05$, 95% CI $[-.02, -.003]$). Risk perception also played a role in mediating the relationship between Internet exposure and the dependent variable (standardized coefficient = $-.02, p < .05$, 95% CI $[-.03, -.01]$). Next, risk perception mediated the relationship between information-gathering ability and intention to engage in social and economic activities (standardized coefficient = $.02, p < .01$, 95% CI $[.01, .03]$). A significant indirect effect was found between trust in the government and intention to engage in social and economic activities through risk perception (standardized coefficient = $.03, p < .01$, 95% CI $[.01, .04]$). Finally, risk perception mediated the relationship between trust in news media and the dependent variable (standardized coefficient = $-.03, p < .01$, 95% CI $[-.05, -.02]$).

Discussion

Analyzing data from a national online survey, this study explores the impact of news media exposure, information-gathering ability, and trust in institutions, including the government and news media, on people's perceptions of risk, which, in turn, influenced their intentions to engage in social and economic

activities during the MERS outbreak in South Korea. In light of the fact that public health risks affect people's intentions to engage in social and economic activities, the study produced several important findings. Exposure to news media, such as mass media and the Internet, influenced the public's risk perception of the virus. Trust in institutions, such as the government and news media, also exerted a strong influence on the public's perception of risk. The study found that information-gathering ability has an effect on the shaping of citizens' risk perception. During the MERS outbreak, the heuristic-systematic processing model played a significant role in the formation of people's risk perceptions. This finding supports the additivity effect that the two modes together contribute to risk perception formation (Kim & Paek, 2009) in unfamiliar or uncertain situations. Our analysis also showed that higher risk perception decreased individuals' intentions to engage in social and economic activities. When individuals perceive a higher level of risk toward the infectious disease, they are more likely to avoid the threat by engaging less in social and economic activities.

Several specific findings merit discussion. First—and consistent with previous studies (e.g., Chang, 2012; Han, Zhang, Chu, & Shen, 2014; Shim & You, 2015)—we found that news media exposure, including mass media and the Internet, was positively related to higher risk perceptions about the infectious disease. The role of news media is particularly important when an issue is relatively new and people do not yet have enough information to understand it (Dudo, Dunwoody, & Scheufele, 2011). In the initial stage of the MERS outbreak, this finding suggests that news media played a role in raising awareness and creating people's risk perceptions of the issue. When people lack information, they often rely on media as an easily available information source in forming their perceptions. Moreover, because news media tend to focus on reporting negative information in their coverage of public health issues, such as SARS or avian influenza (e.g., Dudo, Dahlstrom, & Brossard, 2007; Oh & Zhou, 2012), people are likely to be influenced by this negativity bias (Meffert, Chung, Joiner, Waks, & Garst, 2006). The nature of media coverage on public health issues and its cognitive effects on audiences might affect how citizens develop their risk perceptions of a disease.

Second, information-gathering ability was negatively correlated with risk perception. Individuals with lower levels of information-gathering ability were more likely to perceive greater risk about the infectious disease. In an uncertain situation, such as the MERS outbreak, people often actively seek information to make informed judgments to avoid risks (Yang, 2012), and those with the ability to obtain information on MERS tend to have lower risk perceptions of the disease. Moreover, because information-gathering ability is positively related to self-efficacy (Griffin et al., 2008), it might contribute to lower individual risk perception of the disease. However, this finding may not be generalizable because a previous study suggested that self-efficacy increases risk perception in the issue of climate change (Mead et al., 2012). Nevertheless, our finding is consistent with prior research that self-efficacy serves to decrease risk perception of H1N1 flu (e.g., Han et al., 2014). People who feel efficacious are likely to perceive potential risks to overcome, whereas those lacking in efficacy generally interpret their vulnerability in a fatalistic manner (Maibach & Murphy, 1995). Given the mixed findings, future research should explore in more detail, and in various health issue contexts, the association between information-gathering ability and risk perception.

Third, trust in institutions played a major role in shaping the public's risk perceptions during the outbreak. When an infectious disease is unfamiliar and unknown, citizens largely rely on their trust in the

government and trust in news media as heuristics as they form their perceptions of the risk. Specifically, trust in the government was negatively related to risk perception. Citizens want their government to take responsibility for public health risks, such as by providing information and resources and responding to the outbreak, and they believe that the government has the legitimate power to perform these functions (Markon, Crowe, & Lemyre, 2013). This finding suggests that governments should focus on establishing a relationship of trust with the public so that they can draw on that trust to reduce uncertainty and perceptions of risk during an outbreak period. Thus, risk and health communication practitioners and scholars should focus on developing effective communication strategies for maintaining and building trust in the government during an ongoing outbreak. In the case of South Korea's MERS outbreak, overall confidence in the government response was 15.6%—significantly lower than the 24% response during the 2009 H1N1 flu epidemic (S. Y. Lee, Yang, Kim, Cheong, & Choi, 2015). One of the causes of this drop in public trust was that the government withheld important information such as the names of MERS-affected hospitals early in the outbreak (Yoo et al., 2017). In a public risk situation, lack of information leads to the spread of inaccurate information and rumors, thereby causing a collapse of public trust in the government. Therefore, sufficient and accurate information must be shared in a timely manner with the public during a public health crisis.

Contrary to our prediction that the relationship between trust in news media and risk perception would be negative, we found trust in news media to be positively related to risk perception. Given that exposure to media is positively related to trust in media (Hopmann et al., 2015), people likely relied on news and information about the disease from news media as trustworthy sources when they had insufficient MERS-related information; therefore, trust in news media could increase the public's risk perception of the disease.

Risk perception also was negatively related to people's intentions to engage in social and economic activities. Because risk perception can motivate people's behavioral response to alleviate or avoid risk (Ju et al., 2015), an elevated perception of risk may decrease the intention to engage in social and economic activities during a disease outbreak. Whereas prior studies in the area of health communication have mainly examined the associations between risk perception and preventive health behaviors, such as hand washing or condom use (Bish & Michie, 2010; Pask & Rawlins, 2016), this study explored the influence of risk perception on social and economic activities. The results suggest that the MERS outbreak in South Korea was not only a public health issue but also an economic issue. Thus, an interesting question arises: Which behaviors should risk and health communicators focus on in their communication strategies to address risk perceptions? Risk perception increases individuals' preventive behaviors, which may include decreasing their social and economic activities, with a subsequent negative impact on the country's economy. Even though many scientists and public health experts on the disease stated that the virus would not circulate widely in South Korea because it typically spreads via close personal contact among people in hospitals (Butler, 2015), citizens became panicked about the virus, and they may have been reluctant to engage in social and economic activities. Thus, the two-sided impacts of risk perception indicate that risk and health communicators may consider multiple stakeholders that are involved in health issues, such as economic impacts, when devising a communication strategy. Policy makers should encourage people to engage in protective behavior by increasing their perceptions of the risk, or encourage people to engage in social and economic activities by decreasing risk perception nationally. This is an interesting point for future research,

which should explore the impact of risk perception on various behaviors to investigate this dilemma in more detail.

We additionally found that trust in the government had a direct relationship with people's intentions to engage in social and economic activities. Because trust in the government is related to protective behavior (Freimuth, Musa, Hilyard, Quinn, & Kim, 2014), during the outbreak, trust in the government may have contributed to increasing people's intentions to engage in social and economic activities. Trust in the government was a crucial influence on people's perception of the risk and their behavioral intentions to participate in social and economic activities during the MERS outbreak in South Korea.

Mass media exposure, Internet exposure, information-gathering ability, and trust can predict citizens' intentions to engage in social and economic activities, at least indirectly, mediated by risk perception (mass media exposure, Internet exposure, information-gathering ability, and trust → risk perceptions → intention to engage in social and economic activities). That is, even if no direct link exists between mass media exposure, Internet exposure, information-gathering ability, and trust in institutions and the intention to engage in social and economic activities, the variables could influence this behavioral intention by shaping perceptions of risk.

Limitations and Suggestions for Future Research

Before concluding, several limitations of this study should be mentioned so that they can be addressed in future research. First, this analysis used cross-sectional survey data; therefore, the observed correlations among the variables in the study are not sufficient to establish causal claims. For example, although news media exposure was associated with risk perception, the analysis cannot establish temporal order; therefore, it cannot conclude that news media exposure always precedes risk perceptions. Nevertheless, the within-regression model was grounded in strong theoretical reasoning, and the interpretation of the findings is in line with previous research. Future research that takes a longitudinal or panel approach may be necessary to make stronger causal claims.

Second, the study examined the single issue of MERS in South Korea, which may limit the generalizability of the findings to other issues or other countries. For example, the impact of trust in the government on risk perceptions and intentions to engage in social and economic activities may differ in other regions and for other issues. Future studies may benefit from examining a broader range of risk and health issues in various countries to better understand the influence of news media exposure, trust, and information-gathering ability on risk perception as well as the impact of risk perceptions on intentions to engage in social and economic activities in different contexts.

Conclusion

With these considerations in mind, the study finds that news media exposure, information-gathering ability, and trust in institutions, such as the government and news media, played significant roles in shaping the public's perceptions of risk during the MERS outbreak in South Korea, which in turn influenced citizens' intentions to engage in social and economic activities. The study highlights the effect of trust in the government on the public's risk perception and behavioral intentions. In environments of uncertainty, such

as the MERS outbreak, in which individuals have little information about conditions, people are likely to produce and share misinformation and rumors (Sugimoto et al., 2013). Thus, governments should provide as much information as possible to the public, even when the information they have may be sparse. Moreover, because news media tend to rely on the government as their news source, the government should use news media to effectively communicate with and build trust among the public. These efforts could protect public health as well as the national economy from the effects of risk and uncertainty during national public health risk problems in the future.

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