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Cognitive and affective risk perceptions toward food safety outbreaks: mediating the relation between news use and food consumption intention

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Much research on risk perception and health behavior has examined cognitive dimensions of risk but not affective dimensions. To address this gap, this study examines both cognitive risk perception (perceived risk of susceptibility and severity) and affective risk perception (worry) in the context of food safety risks in East Asia. We investigate their roles in independently and jointly predicting intention to consume outbreak-associated food products, as well as mediating the influences of news exposure and attention on intention. Data from a nationwide survey in South Korea (N = 1500) lent overall support for our hypotheses in both cases of processed food from China and seafood from Japan. Our findings show: (1) both perceived risk and worry were negatively associated with food consumption intention, and the association between perceived risk and intention was stronger among those higher in worry; (2) news attention had stronger associations with perceived risk and worry than news exposure, and attention moderated the relationship between news exposure and perceived risk; and (3) perceived risk and worry mediated the associations between news use and food consumption intention. Implications and limitations of the findings are discussed.

Keywords: perceived risk; worry; news attention; news exposure; food safety outbreaks; imported food consumption

As more value is placed on quality of life and well-being, public concerns about food safety are becoming more prominent (Fleming, Thorson, & Zhang, 2006). Imported food products are not exempt because the stages of food production, processing, and consumption are no longer confined to the same locality (Anderson, 2000; Jun, Lee, & Park, 2009). This issue may be particularly pertinent to countries with similarities in food consumption, such as those in East Asia. For example, China, Japan, and South Korea share similar food traditions and culture and heavily import food products from each other. Therefore, food safety outbreaks occurring in one country can have significant impacts on risk perceptions of lay public in the other countries.

Many scholars have studied how the public perceive risks regarding food safety hazards (e.g., Krystallis et al., 2007) and the role of media in forming public risk perceptions (e.g., Bakir, 2010; Wällberg & Sjöberg, 2000). However, it is not clear how news media use in specific is associated with public risk perceptions of imported food...
safety and how risk perceptions in turn lead to behavioral intentions to cope with the risk. In order to better understand these associations, a more careful examination of the constructs is needed. This study thus aims to elaborate on the conceptualization of risk perceptions and news media use. First, we extend the concept of risk perceptions to include not only its commonly studied, cognitive dimension (i.e., perceived risk) but also its affective dimension (i.e., worry) (Ferrer, Portnoy, & Klein, 2013; McCaul & Mullens, 2003). Also, we examine news media use with a particular interest in the relationship between its two primary components – news exposure and attention – in predicting risk perceptions (Slater, Hayes, & Ford, 2007).

In this study, we present data from a nationwide survey in South Korea (N = 1500). We examine the relationships among news media use, perceived risk and worry, and intention to consume outbreak-associated food, in the context of two recent major outbreaks in East Asia: the melamine scandals in China and the Fukushima Daiichi nuclear plant accident in Japan. Two different contexts are concerned for the purpose of generalization of our research model. Specifically, this study investigates the role of perceived risk and worry with respect to independently and jointly predicting food consumption intention, as well as their role in mediating the impact of news exposure and attention.

Cognitive and affective dimensions of risk perceptions
Risk perception is one of the most important components in many health behavior theories, including the health belief model (Janz & Becker, 1984; Rosenstock, 1974). A general assumption is that high levels of risk perceptions will lead individuals to engage more in health protective behaviors to stave off the risk. Despite the theoretical justification of this assumption, there has been mixed empirical support for the proposed role of risk perceptions in predicting health behavior engagement (Ferrer, Portnoy, & Klein, 2013; Rimal & Juon, 2010). While some studies (e.g., Weinstein, 1984) present a positive relationship between risk perceptions and health behaviors, others (e.g., Svenson, Fischhoff, & MacGregor, 1985) report no significant relationship, and still others (e.g., Weinstein, Grubb, & Vautier, 1986) present a negative association. Such lack of a robust relationship between risk perceptions and health behavior warrants further research to identify potential moderators of the relationship (Rimal & Real, 2003).

One notable explanation for the lack of reliable evidence for this relationship may be that most research focuses only on the cognitive dimension of risk perceptions and ignore its affective dimension in shaping health behavior (Ferrer, Portnoy, & Klein, 2013; Freimuth & Hovick, 2012; So, 2013). Relatively few efforts have been made to differentiate between cognitive appraisals of risk and affective responses to risk. Cognitive risk perceptions refer to perceptions of how susceptible individuals are to a particular risk (namely, perceived susceptibility) and how severe the consequences of the risk are (namely, perceived severity; Rosenstock, 1974). By contrast, affective risk perceptions pertain to how worried or anxious individuals are about their exposure to a risk (Sjöberg, 1998). As shown in meta-analysis (e.g., Brewer et al., 2007) and review articles (e.g., Leppin & Aro, 2009), cognitive risk perceptions are the most frequent and dominant form of risk perceptions in the literature.

More recently, however, attempts have been made to incorporate affective dimensions into the risk perception as well. The risk-as-feelings theory (Loewenstein, Weber, Hsee,
Welch, 2001) and the affect heuristic (Slovic et al., 2004) offer a theoretical framework for the role of affect, independent from cognitive assessments, in decision-making and behaviors. There are parallel processes of risk as analysis and risk as feelings that individuals act on in making judgments and decisions (Slovic et al., 2004). Affective reactions to risks, such as fear, anxiety, and worry, rather than cognitive assessments, often lead to behaviors when affective and cognitive evaluations are divergent from each other (Loewenstein et al., 2001). This impact of affective risk perceptions becomes stronger especially when the risk type is categorized as high dread risk (Peters & Slovic, 1996), defined by the extent of perceived lack of control (Loewenstein et al., 2001).

**Perceived risk and worry about food safety in behavioral decision**

Risk perceptions toward food safety have been studied in numerous countries, including USA (e.g., Anderson, Verrill, & Sahyoun, 2011), UK (Yeung, Yee, & Morris, 2010), Brazil (e.g., Behrens et al., 2010), and China (e.g., Wang, Mao, & Gale, 2008). Typically, risk perceptions of food safety are determined not so much by the nature of food hazard per se as by the social and psychological characteristics surrounding the hazard and risk (Slovic, 1993). This is why consumer behaviors during food outbreaks are often judged by experts to be irrational or ignorant of objective facts (Löfstedt & Frewer, 1998).

Particular behaviors of interest in regard to food risk perceptions include food purchase or consumption behavior (Telešiienė, Balžekienė, & Butkevičienė, 2014). In the context of food safety, the goal is to obtain food products which contain desired consumption attributes, are free of any contamination, and therefore safe to eat (Yeung & Morris, 2001). When consumers perceive a safety risk in food, they often develop strategies in purchase to reduce risk, including stopping or reducing the purchase of offending product. Past research has offered empirical evidence that cognitive perceived risk is a significant predictor of food consumption behavior. For example, in a study of residue-free produce, consumers were more likely to avoid food products when the products were thought to be potentially contaminated (Huang, 1993). Similarly, perceived risk regarding chicken meat had a strong negative association with purchase likelihood (Yeung & Morris, 2006). Based on past research, we posited a hypothesis, in the context of South Korean people’s risks from eating processed food products imported from China (associated with the melamine scandals) and seafood products from Japan (associated with the nuclear plant accident):

H1a: Perceived risk of consuming imported food products associated with an outbreak will be negatively related to intention for consumption.

In addition to addressing the role of cognitive risk perception, we examine the role of affective risk perception in the intention to consume imported food products associated with an outbreak. We examine specifically one affective dimension of risk perception, that is, worry. Worry is defined as an unpleasant, negative emotional state of mind accompanied by cognitions that guide behaviors to cope with danger (Klein, Zajac, & Monin, 2009; Sjöberg, 1998) and is only moderately correlated with cognitive risk perception (Klein et al., 2009). Worry is a kind of anticipatory emotion, similar to fear, representing an immediate reaction to the possibility of harm (Loewenstein et al., 2001). The idea on the role of worry in response to risk is indirectly supported as well by the
studies that address the influence of fear appeals on motivating behavioral responses in a way to alleviate a threat (e.g., Green & Witte, 2006; Ruiter, Abraham, & Kok, 2001).

Worry has overall a positive association with health protective behaviors, although there is still a possibility that it may instead work as a barrier for health behavior engagement (McCaul & Mullens, 2003). Several research has reported positive associations between worry and a variety of health behaviors, including nutrition behaviors (Ferrer, Bergman, & Klein, 2013), disease screening (e.g., Bowen, Alfano, McGregor, & Andersen, 2004), and vaccination (e.g., Chapman & Coups, 2006). We expect that worry will also have a positive impact on health protective behavior in response to imported food risks. Imported food risks are uncontrollable, i.e., dread risks, and are thus very likely to accompany worry. To the extent that individuals are worried about imported food risks and to the extent they have devised proper coping strategies, they are likely to behave in ways to lower personal risk (De Vocht, Cauberghe, Uyttendaele, & Sas, 2015; Klein et al., 2009). We therefore posited the following hypothesis:

H1b: Worry about consuming imported food products associated with an outbreak will be negatively related to intention for consumption.

It is noteworthy that perceived risk and worry not only work independently of one another but they may also interact in determining health protective behaviors (Ferrer, Portnoy, & Klein, 2013; Klein, Zajac, & Monin, 2009). Such interaction needs further examination in various contexts, including food risks. Furthermore, the pattern of the interaction is unclear, awaiting more research. On the one hand, it is possible that worry may attenuate the relationship between cognitive perceived risk and outbreak-associated food consumption intention. A study in other domains of risk (Ferrer, Portnoy, & Klein, 2013) found that those higher in both perceived risk and worry about getting cancer reported lower levels of nutrition and physical activity behaviors. On the other hand, it is also possible that worry may strengthen the association between cognitive perceived risk and food consumption intention. Perceived risk can be a stronger predictor of health behaviors among those high in worry as opposed to low, because affect may help to motivate people to actively process risk information (Loewenstein et al., 2001; Slovic et al., 2004). For example, inducing worry about flu in an experimental context was found to enhance processing of a risk message (Zajac & Klein, 2007). Given these alternative possibilities, we posited a hypothesis about the interaction between worry and perceived risk in predicting intention to consume outbreak-associated food, with the pattern of the interaction being unspecified:

H1c: Perceived risk and worry will interact in predicting intention to consume outbreak-associated food.

**News exposure and attention as predictors of food risk perceptions**

News media are thought to play an important role in risk communication. In a recent review of the field of media and risk, Bakir (2010) outlines four routes of media’s role: informing the public of risk issues, determining public acceptability of various risks, motivating the public to take actions, and offering schemata for voluntary risk taking. For food risks and safety, news media are the main sources of information for most general
public (Anderson, 2000). Although public may easily attend to news stories about food safety because of their increased personal concern on well-being and health, they rarely have statistical evidence on hand to assess risks themselves, and thus are likely to infer from media coverage of risks in question (Fleming et al., 2006; Slovic, Fischhoff, & Lichtenstein, 1980).

Numerous studies have shown that news media influence people’s risk perception in the context of food risks and safety (e.g., Brady, Li, & Brown, 2009; Chang, 2012; Fleming et al., 2006; Jun et al., 2009). Specifically, both the overall amount of news media coverage in general and news content or frames in particular have been linked to risk perceptions (Wåhlberg & Sjöberg, 2000). As the agenda setting theory (McCombs & Shaw, 1972) suggests, the news media can shape public awareness of risk issues by highlighting the significance of certain issues. The news media can also frame public’s risk perception by selecting some aspects of a given issue and making them more salient (Iyengar, 1991). In this regard, researchers have analyzed the content of news media coverage about food risks, such as trans fat (Jarlenski & Barry, 2013) and fish consumption (Greiner, Clegg Smith, & Guallar, 2010), and linked the types of frames in health news to public perceptions of reported issues (e.g., Chang 2012).

Another way to examine news media in food risk perceptions is to assess individual use of news media. For example, Fleming et al. (2006) found that exposure to local newspaper and attention to local television had significant associations with public concerns about food safety. Also, there was a significant increase in the rank of foodborne illnesses as a risk after the E. Coli outbreak among those who listen to news on TV or on the radio daily; there was no change in those who do not listen to news as often (Brady et al., 2009).

In this line of research, it is important to consider how to conceptualize news media use. Whereas news media is a fairly simple term to understand, it is quite challenging to define use (Hollander, 2007). In the majority of early research on media effects, media use simply means exposure to media. However, a growing number of research has recognized that exposure may not be a sufficient condition for media to influence individual beliefs (Zhao, Leiserowitz, Maibach, & Roser-Renouf, 2011). Consequently, media attention has been studied extensively as an alternative, complementary way to define media use (Drew & Weaver, 1990; Eveland, 2001). McGuire’s (2001) information-processing model notes the difference between the effects of media exposure and attention and argues that both are necessary in changing individual beliefs. In fact, much research shows that attention to news is a stronger predictor of attitude change and learning than simple exposure (e.g., Chaffee & Schleuder, 1986; Eveland, 2001; Slater et al., 2007). We therefore posited hypotheses, respectively for the role of news attention (H2a) and exposure (H2b) in risk perceptions. We expected them to increase one’s cognitive assessment of the risk as well as affective worry, and given past findings, we hypothesized the impact of attention with more confidence than for exposure:

H2a: Attention to news about food risks will have positive associations with perceived risk and worry.

H2b: Exposure to news about food risks will have positive associations with perceived risk and worry.
Furthermore, we examine the contingent relation between news exposure and attention for a more comprehensive understanding of news media use. News exposure and attention are not independent of each other (Slater et al., 2007) in predicting risk perceptions. Clearly, they occur in sequential stages of news consumption, as suggested by McGuire (2001), and individuals cannot attend to news they are not exposed to. More importantly, news exposure may have limited effect if it is not followed by high enough levels of attention (Slater et al., 2007; Zhao et al., 2011). Especially in situation in which there is much information about food risks in varying media outlets, the effects of news exposure on risk perceptions may be moderated by the amount of attention paid to news. We thus posited the following hypothesis:

H2c: News attention and exposure will interact in predicting perceived risk and worry, such that the effect of news exposure increases with greater attention.

The mediating role of risk perceptions in the association between news media use and food consumption intention

In the previous sections, we have reviewed cognitive and affective risk perceptions, with respect to their predictors (news media use) and outcome (health protective behaviors). Taking together what we have reviewed, news media use will be associated with risk perceptions, which in turn lead to protective health behaviors. In other words, news media use about risks may ultimately influence health behaviors and intention, possibly mediated through risk perceptions (Finnegan & Viswanath, 2002; Marks et al., 2003; Wåhlberg & Sjöberg, 2000). By viewing and attending to news about food risks, people may learn the risk of consuming food products that might threaten one’s health, which may consequently decrease their likelihood of consuming outbreak-related products. For example, media exposure about the risk of made-in-China products was positively associated with risk perceptions, which were negatively associated with country-of-origin attitudes and purchase intentions (Jun et al., 2009). Given our elaborated conceptualization of risk perceptions (i.e., cognitive and affective) and news media use (exposure and attention), we examine the mediating role of risk perceptions in a more comprehensive manner. To our knowledge, no research has yet examined the mediation via perceived risk and worry simultaneously, in the context of food risks. Therefore, we posited hypotheses, respectively for the mediating role of perceived risk (H3a) and worry (H3b):

H3a: Perceived risk will mediate the associations of news attention and exposure with intention to consume outbreak-associated food.

H3b: Worry will mediate the associations of news attention and exposure with intention to consume outbreak-associated food.

In sum, this study investigates the process involving both antecedents and consequence of food risk perceptions, in the context of Korean people’s exposure to food safety incidents originated in neighboring countries. Two different contexts are concerned, for the purpose of generalization of our research model. Figure 1 presents the predictive model of this study.
Method

Data

Data \((N = 1500)\) were collected through a nationwide survey in South Korea during September–October 2012, administered by a professional survey agent Gallup Korea (affiliated with Gallup International). The permission for survey was acquired from the Institutional Review Board of Seoul National University in Korea. Preliminary survey was conducted for testing measurement validity in June 2012, with 150 adults residing in Seoul and Gyeonggi areas. For the main survey, a total of 1500 adults aged 20–69 were recruited nationwide through a proportionate quota sampling with their age, gender, and region taken into account. Surveys were conducted face-to-face. Respondents were compensated with household items worth around two dollars for their participation.

About 50.9% of respondents were males. The average age was 42.7 \((SD = 12.8)\), with the percentage of respondents in their 20s, 30s, 40s, 50s, and 60s being 18.7%, 23.0%, 25.0%, 21.4%, and 11.9%, respectively. About 47.6% of respondents had a college degree or higher, 41% were high school graduates, and 11.4% received middle school education or less. The median monthly household income level was 3.00–3.99 million Korean won \($3250–4325\). About 3.9% of respondents reported self/family history of diseases from imported food in the past year, and 73.8% were married or living with someone. In general, these sample characteristics closely matched the population or nationally representative data, in terms of gender, age, education level, and household income (Korean Statistical Information Service, 2010; 2012).¹

Measurements

This study tested hypotheses in the context of two major food safety incidents in East Asia: the melamine scandals in China and the nuclear plant accident in Japan. We developed the same set of measures respectively for ‘processed food (e.g., milk powder, cookie, and coffee) imported from China’ and ‘seafood imported from Japan.’ All measures were assessed on a 7-point scale.

News media use

News exposure and attention were measured to examine news media use. Exposure to news coverage was assessed by asking ‘How often were you exposed to news about
[processed food from China / seafood from Japan]?’ (1 = never to 7 = very frequently). Respondents’ attention to news was assessed with ‘How much attention did you pay to news about [processed food from China / seafood from Japan]?’ (1 = not at all to 7 = very much)

Risk perceptions
We measured both cognitive risk perception (i.e., perceived risk) and emotional risk perception (i.e., worry) of getting foodborne illness by consuming imported food. Perceived risk was assessed multiplying perceived susceptibility (‘How likely do you think you would become sick after eating [processed food from China/seafood from Japan]?’ 1 = not at all likely – 7 = very likely) and perceived severity (‘How severe do you think the disease that you may get after eating [processed food from China / seafood from Japan]?’ 1 = not at all – 7 = very severe). Worry was measured with ‘I am worry that I get sick by eating [processed food from China / seafood from Japan]’ (1 = not at all to 7 = very much).

Intention to consume outbreak-associated food
Intention to consume imported food products associated with food safety outbreaks was measured asking ‘How likely is it that you are willing to eat [processed food from China/seafood from Japan]?’ (1 = not at all likely – 7 = very likely).

Control variables
This study included demographic variables, e.g., gender, age, education (1 = elementary school or lower to 5 = graduate school or higher), and monthly household income (1 = 990,000 won or below to 11 = 10 million won or above) as control variables in the analyses. Additionally, self/family history of diseases from imported food (1 = yes, 0 = no) and involvement with food safety in general (1 = not at all to 7 = very much) were assessed as control variables.

Analysis scheme
The hypothesized research model was tested with structural equation modeling (SEM). The statistical package was MPlus version 5.21 and the method used was maximum likelihood estimation. Because most variables were measured with a single item, we tested a model containing structural relationships as a whole without considering measurement models. Model fit was assessed primarily with comparative fit index (CFI) and root mean square error of approximation (RMSEA). The chi-square statistic ($\chi^2$) is reported, but its significance level was not taken as reliable because of its overrejection tendency with large samples (Hu & Bentler, 1999).
Results

Descriptive analyses

Table 1 presents the means and standard deviations of key variables for the two cases of interest, respectively. In the case of processed food from China, respondents reported higher levels of news exposure and attention, greater perceived risk and worry, and lower intention to consume outbreak-associated food, in comparison to the case of seafood from Japan.

Model estimation

We tested the hypothesized model using structural equation modeling (SEM) with maximum likelihood estimation. To test whether perceived risk and worry fully or partially mediate the relationships of news exposure and attention with food consumption intention, direct paths from the exogenous variables to intention were specified in addition to the indirect paths through news use. Control variables were also included. We tested the same model twice, respectively for two cases of interest: outbreaks relevant to processed food from China and seafood from Japan. The models evidenced an acceptable fit.

Table 1. Descriptive statistics of primary variables: means and standard deviations.

<table>
<thead>
<tr>
<th></th>
<th>Processed food imported from China</th>
<th>Seafood imported from Japan</th>
<th>( t )-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>News exposure</td>
<td>4.64 (1.08)</td>
<td>3.99 (1.09)</td>
<td>22.53*</td>
</tr>
<tr>
<td>News attention</td>
<td>4.88 (1.09)</td>
<td>4.52 (1.10)</td>
<td>14.29*</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>27.16 (10.05)</td>
<td>24.99 (10.13)</td>
<td>7.17*</td>
</tr>
<tr>
<td>Worry</td>
<td>5.34 (1.04)</td>
<td>4.91 (1.21)</td>
<td>12.56*</td>
</tr>
<tr>
<td>Food consumption intention</td>
<td>2.79 (1.24)</td>
<td>3.08 (1.25)</td>
<td>−7.44*</td>
</tr>
</tbody>
</table>

Note: Values in the last column were obtained from paired sample \( t \)-test.

\(* p < .001.\)

Figure 2. Predicting the intention to consume processed food from China.

Note: \( \chi^2(33) = 1229.79, p < .001; \) CFI = 1.000; RMSEA = .000, 90% CI of RMSEA = .000–.055. Path coefficients are standardized regression weight. Non-significant paths are indicated as dotted lines. Control variables included in the analysis are not presented.
Risk perceptions and intention to consume outbreak-associated food

Our first set of hypotheses (H1a through H1c) concerned the role of risk perceptions in predicting intention to consume imported food associated with food outbreaks. Specifically, H1a proposed a negative association between perceived risk and intention to consume outbreak-associated food. This hypothesis was supported in both cases of food products from China ($\beta = -0.24, p < .001$, see Figure 2) and Japan ($\beta = -0.37, p < .001$, Figure 3), although the strength of the association was stronger with respect to food from Japan. Similarly, there was a negative association between worry and food consumption intention (China: $\beta = -0.20, p < .001$; Japan: $\beta = -0.24, p < .001$), thereby supporting H1b.

Furthermore, we examined whether perceived risk and worry would interact in predicting food consumption intention (H1c). Data lent support for their interaction (China: $\beta = -0.07, p = .003$; Japan: $\beta = -0.05, p = .049$). Notably, given the negative coefficients of the interaction paths, our data suggest that perceived risk became a stronger negative predictor of food consumption intention among those high in worry as opposed to low.

News media use and risk perceptions

The second set of hypotheses (H2a through H2c) proposed to test the role of news media use in developing risk perceptions of food outbreaks originating in neighboring countries. As for the role of news attention (H2a), data supported our hypothesis. Attention to news about food risks was positively related to perceived risk (China: $\beta = .12, p < .001$; Japan: $\beta = .25, p < .049$). News attention also had a significant, positive association with worry...
(China: $\beta = .15, p < .001$; Japan: $\beta = .21, p < .049$). By contrast, H2b about the role of news exposure was partially supported. News exposure had a significant association with perceived risk with respect to processed food from China ($\beta = .09, p < .001$), but not in regard to seafood from Japan ($\beta = .03, ns$); news exposure was associated with worry in both cases (China: $\beta = .06, p = .05$; Japan: $\beta = .06, p = .046$). Taken together the findings, news attention had stronger associations with perceived risk and worry than news exposure, as we expected.

H2c further concerned the contingent relationship between news exposure and attention in predicting risk perceptions. In both contexts of food outbreaks, there was an interaction between news exposure and attention in predicting perceived risk (China: $\beta = .09, p < .001$; Japan: $\beta = .06, p = .022$). This interaction effect with a positive coefficient value indicates that news exposure had a stronger association with perceived risk as lay people paid more attention to news about imported food risks. However, news exposure and attention had no such interaction effect on worry (China: $\beta = .04, ns$; Japan: $\beta = .03, ns$). H2c was thus partially supported.

The mediating role of risk perceptions in news use and food consumption intention

Lastly, we tested whether the association between news use and food consumption intention would be mediated by perceived risk (H3a) and worry (H3b), respectively. Considering significant paths between variables in Figures 2 and 3, perceived risk mediated the association between news attention and food consumption intention in both cases of food risks, whereas it did so only for the effect of news exposure about food from China. H3a was thus partially supported. By contrast, H3b on the mediating role of worry was fully supported. Significant paths existed from news attention/exposure to food consumption intention via worry, in both food risks. Interestingly, after the mediation via perceived risk and worry being taken into account, there were still direct paths from news attention to intention to consume food from China, and from news exposure to intention to consume seafood from Japan. For further details, the total and specific indirect effects of news use on food consumption intention through risk perceptions are presented in Table 2.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Mediators</th>
<th>Specific indirect effect</th>
<th>Total indirect effect</th>
<th>Specific indirect effect</th>
<th>Total indirect effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Processed food from China</td>
<td>Seafood from Japan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>News attention</td>
<td>Perceived risk</td>
<td>$-.03, p &lt; .001$</td>
<td>$-.06, p &lt; .001$</td>
<td>$-.10, p &lt; .001$</td>
<td>$-.14, p &lt; .001$</td>
</tr>
<tr>
<td></td>
<td>Worry</td>
<td>$-.03, p &lt; .001$</td>
<td>$-.06, p &lt; .001$</td>
<td>$-.06, p &lt; .001$</td>
<td>$-.02, p = .11$</td>
</tr>
<tr>
<td>News exposure</td>
<td>Perceived risk</td>
<td>$-.03, p = .001$</td>
<td>$-.04, p = .001$</td>
<td>$-.01, p = .298$</td>
<td>$-.02, p = .11$</td>
</tr>
<tr>
<td></td>
<td>Worry</td>
<td>$-.01, p = .064$</td>
<td>$-.01, p = .053$</td>
<td>$-.01, p = .053$</td>
<td>$-.01, p = .053$</td>
</tr>
</tbody>
</table>

Note: Values are standardized coefficients.
Discussion

The goal of this research was to investigate the role of perceived risk and worry with respect to independently and jointly predicting intention to consume food associated with major food outbreaks in neighbor countries. This study further examined their mediating role in the associations between news media use and food consumption intention. To summarize, we found that: (1) both perceived risk and worry were negatively associated with intention to consume outbreak-associated food (H1a & H1b); (2) there was an interaction effect between perceived risk and worry, such that perceived risk became a stronger negative predictor of intention among those higher in worry (H1c); (3) news attention and exposure were positively associated with perceived risk and worry (H2a & H2b, with one exception being found with exposure and perceived risk in the case of seafood from Japan); (4) news attention and exposure had an interaction effect on worry, but not on perceived risk, such that news exposure had a stronger association with worry as people paid greater attention to news (H2c); (5) perceived risk and worry mediated the associations between news media use and food consumption intention (H3a & H3b), with one exception (there was no indirect path from news exposure to intention through perceived risk in the case of seafood from Japan). In total, overall findings supported our hypothesized relationships among news use, risk perceptions, and food consumption, among Korean consumers in response to food outbreaks originating in China and Japan.

The present research has several theoretical implications. First, our results show that affective risk perception as well as cognitive risk perception had a significant association with food consumption intention to reduce a likelihood of getting foodborne illness. We specifically examined the role of worry as affective risk perception and expanded past findings (e.g., Ferrer, Bergman, & Klein, 2013; Klein, Zajac, & Monin, 2009) in the context of food safety outbreaks. Because of the nature of imported food risks as uncontrollable, dread risk, lay people are likely to have worry about consuming imported food products. Our findings were consistent with the literature suggesting that there are parallel processes of risk as analysis and risk as feelings that individuals act on in making judgments (Slovic et al., 2004). More important, worry not only worked independently of perceived risk but also had an interaction with it in predicting food consumption intention. Of the two possible patterns of the interaction we explained previously, our finding supported the pattern that worry may strengthen the association between cognitive perceived risk and health behavioral intention. Affective response like worry about food outbreaks may have motivated people to actively process risk information (Loewenstein et al., 2001). This interaction pattern awaits future research for replication and further elaboration of its mechanism.

Our findings also contribute to the literature regarding the conceptualization and operationalization of news media use at an individual level. We examined both news exposure and attention and found that, consistent with past literature (Chaffee & Schleuder, 1986; Eveland, 2001; McGuire, 2001; Slater et al., 2007), news attention was a stronger predictor of risk perceptions than simple news exposure. Interestingly, the association between news exposure and perceived risk was moderated by news attention. That is, news exposure had a weaker association with perceived risk if people paid little attention to news. These results suggest that exposure, though effective, may not be a sufficient condition for news media to influence risk perceptions of food safety outbreaks and needs to accompany high enough levels of attention. Note that we have to be careful in interpreting the results based on individual-level measures of news uses. Despite the
positive role of news use in learning risk information, there is also a possibility that sometimes news media may lead to exaggerated perceptions of risk, or outrage (Sandman, 1989). In order to understand such possibly two-sided impacts of news use on risk perceptions, it is necessary to conduct content analysis of actual news coverage and link it to individual-level survey data, awaiting future research.

The overall patterns of our findings were consistent across two contexts of food outbreaks originating in China versus Japan, implying the generalizability of our research model to other imported food risks. However, there was one noteworthy difference between the two cases, in terms of the association between news media use and risk perceptions. Specifically, news exposure had no significant association with perceived risk in the case of seafood from Japan. One possible explanation is the different level of availability of news information about either food outbreak in the given period of our data collection. In fact, respondents reported higher exposure to news about risks of taking processed food related to Melamine scandals in China, in comparison to news about seafood risks caused by the nuclear plant accident in Japan. Our additional analysis on the amount of news coverage in a given period also showed that the amount of news coverage of food imported from China was about twice larger than that of food from Japan. With such difference, exposure to news about the latter incident may have had an impact on increasing perceived risk only among those who paid high attention to the news. Future research needs to address this issue by examining additional factors, such as country-of-origin effects (Jun et al., 2009; Pharr, 2005) and the nature of food products, in order to better account for different responses to various food outbreaks originating in foreign countries.

In conclusion, the present study sheds light on the important role of risk perceptions in mediating the association between news use and food consumption behavior in the context of food outbreak risks. The way people make food consumption choices is undergoing changes in regard to what Beck (1992) has named risk society. When making choices, lay people think about the risks they have to be accepted or avoided, mostly based on information obtained from news media. Indeed, addressing contemporary food risks requires new manners of risk management (Beck, 1992). In addition to the traditional elements of risk management (i.e., pre-assessment, appraisal, evaluation, and monitoring), another element is needed, that is, risk communication. The present study demonstrates that considering affective as well as cognitive elements in lay public’s risk perceptions can offer important insights into effective risk communication using media.

The implications of this study should be discussed in light of some limitations. First, data were collected with a cross-sectional survey, and therefore the observed associations among the variables in this study do not justify causal claims. There is a possibility of reverse casual relationships or other unmeasured confounders that may account for the associations. Theorization on this possibility may require testing of alternative models; nevertheless, our research model was grounded in theories and our interpretation of the results is in line with past literature. In order to make a stronger causal claim, it will be important to take a longitudinal approach in future research. Second, most variables in this study were measured with a single item, raising concerns about the validity of measurements. Future research may use composite measures for improved measurement quality and greater model estimation. The present study focuses on elaborating the conceptualization of major constructs, but it is also important to refine their operationalization. Lastly, the unique contexts of each outbreak accident were little concerned
because this study aimed at replication and generalization of findings from two different cases. If a research emphasis is given to comparison between cases, it will be necessary to assess a statistical significance in the difference between the tested models across contexts or take into account other important factors, such as country-of-origin effects. This issue merits future research.

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**Notes**

1. According to the 2010 population census (Korean Statistical Information Service, 2010), about 50.8% of those aged 20–69 were males; the percentage of those in their 20s, 30s, 40s, 50s, and 60s were 18.3%, 21.7%, 24.7%, 22.5%, and 12.7%, respectively. The median monthly household income was 3.04 million Korean won; 50.4% had a college degree or higher, 45.1% were high school graduates, and 4.5% received middle school education or less, as indicated by the nationally representative survey in 2012 (Korean Statistical Information Service, 2012).

2. For reference, we also examined the actual amount of news coverage of imported food in Korea’s major news outlets (including 10 daily newspapers and 3 television broadcasting stations) in the period of January to October 2012. Using the Naver search engine (www.naver.com), we found that the count was 1496 (food from China) versus 782 (food from Japan).

3. As for the relationships between the control variables and risk perceptions, involvement with food safety was the only significant predictor of perceived risk (China: $\beta = .15$, $p < .001$; Japan: $\beta = -.07$, $p = .003$) and worry (China: $\beta = .09$, $p = .001$; Japan: $\beta = .13$, $p < .001$), in both cases of food risks in this study. With respect to food consumption intention, only income had a significant association with the intention to consume processed food from China ($\beta = -.07$, $p = .003$), whereas such association not was found with the intention to consume seafood from Japan.

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