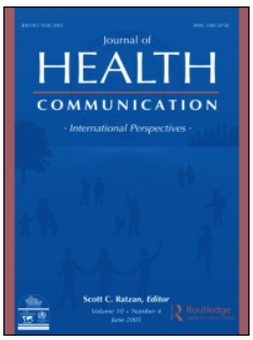

Taylor & Francis
Taylor & Francis Group

Journal of Health Communication
International Perspectives

ISSN: 1081-0730 (Print) 1087-0415 (Online) Journal homepage: http://www.tandfonline.com/loi/uhcm20

Predicting Intention to Take Protective Measures During Haze: The Roles of Efficacy, Threat, Media Trust, and Affective Attitude

Trisha T. C. Lin & John Robert Bautista

To cite this article: Trisha T. C. Lin & John Robert Bautista (2016) Predicting Intention to Take Protective Measures During Haze: The Roles of Efficacy, Threat, Media Trust, and Affective Attitude, Journal of Health Communication, 21:7, 790-799, DOI: 10.1080/10810730.2016.1157657

To link to this article: http://dx.doi.org/10.1080/10810730.2016.1157657

Journal of Health Communication, 21: 790–799, 2016

ISSN: 1081-0730 print/1087-0415 online
DOI: 10.1080/10810730.2016.1157657

Routledge
Taylor & Francis Group

Predicting Intention to Take Protective Measures During Haze: The Roles of Efficacy, Threat, Media Trust, and Affective Attitude

TRISHA T. C. LIN and JOHN ROBERT BAUTISTA

Wee Kim Wee School of Communication and Information, Nanyang Technological University, Singapore

The annual Southeast Asian haze pollution raises public health concerns in this region. Based on a modified extended parallel process model, this study examines efficacy (self-efficacy and response efficacy) and perceived threat (susceptibility and severity) and incorporates new constructs of media trust and affective attitude. Results from a Web survey of 410 undergraduate students in Singapore show that response efficacy to seek haze-related information mediates the association between perceived self-efficacy and intention to take protective measures during haze. Moreover, self-efficacy is negatively associated with affective attitude (e.g., fear and worry) toward haze-related health problems. Next, perceived severity and perceived susceptibility are positively associated with response efficacy and affective attitude. Affective attitude toward haze is a stronger predictor than response efficacy for behavioral intention. Finally, trust in new media is positively associated with young Singaporeans' affective attitude, which positively affects their behavioral intention to take protective measures.

Haze is a form of transboundary air pollution that is considered a health hazard by Southeast Asian countries such as Indonesia, Malaysia, and Singapore (Forsyth, 2014; Shadbolt, 2013). Since the 1980s, illegal slash-and-burn farming in Indonesia has resulted in the annual occurrence of haze in these countries, especially during the dry season (Stratieva, 2014). The June 2013 haze crisis was the worst in Singapore's history, resulting in potentially life-threatening health problems among its residents (Kapoor & Taylor, 2013). Although there were no reported deaths due to haze during that period, hospitals attended to more patients with asthma and other breathing problems than usual (Khalik, 2013).

In response to the Southeast Asian haze crises in 2013 and 2015, several government agencies in Singapore used various media channels to communicate health messages to the public. Traditional mass media outlets such as TV, radio, and newspapers were used to disseminate haze-relevant news. In view of Singapore's technologically savvy society, new media outlets like social media were utilized to speed up information dissemination of health messages and haze updates. For example, Singapore's National Environmental Agency (NEA) used Twitter to provide real-time updates on haze, and their tweets were among the most mentioned and most retweeted by Singaporeans during the Southeast Asian haze crisis (Prasetyo, Gao, Lim, & Scollon, 2013). According to Lin and Tan (2013), traditional media in Singapore primarily provided informative news related to the Southeast Asian haze pollution with positive story angles that centered on the efforts of local authorities, whereas new media tended to have diverse topics and alternative viewpoints with critical tones and negative sentiment. The differences in media messages may lead to variations in audiences' levels of trust in old and new media content related to haze issues and in their attitudes and reactions to taking protective measures during such a public health crisis, indicating a need for further scholarly investigation.

Given the health impact of haze pollution in recent years, this study examines factors that may be associated with young Singaporeans' behavioral intention to take protective measures during haze crises. In this study, we adopt and modify key constructs from Witte's (1992) extended parallel process model (EPPM), a framework widely used in health communication to predict how individuals respond to fear-induced messages. Following recent studies that have suggested new approaches for considering the relationship among EPPM constructs (e.g., Krieger & Sarge, 2013), this research treats response efficacy and affective attitude (e.g., fear and worry) as mediating factors between self-efficacy, perceived threat (i.e., severity and susceptibility), and media trust (i.e., traditional media and new media) of behavioral intention for haze protective measures.

Theoretically speaking, the findings of this study will help identify relevant predictors of young people's intention to take protective measures during a public health crisis like haze. Next, they can elucidate how trust in old and new media tends to influence affective attitudes such as fear and worry, which is crucial to selecting suitable distribution channels for public health messages when traditional media outlets are no longer the dominant platforms for health or crisis communication nowadays (Neuhauser & Kreps, 2003). Practically speaking, this study on the relationships between users' sociopsychological predictors and protective behavioral intention

Address correspondence to John Robert Bautista, Wee Kim Wee School of Communication and Information, Nanyang Technological University, 31 Nanyang Link, 637718, Singapore. E-mail: john0028@e.ntu.edu.sg

can guide health authorities to develop effective communication campaigns for haze and other public health crises.

Haze Pollution in Singapore

Haze is a result of the accumulation of air pollutants such as dust particles and carbon dioxide in dry weather. Toxic smoke caused by slash-and-burn forest clearing techniques in Indonesia is carried by strong monsoonal winds from June to September, spreading annual haze pollution in the region (Forsyth, 2014). Neighboring countries, like Singapore, have experienced several haze crises over the past four decades. The haze in June 2013 reached the highest and most hazardous level of air pollution in its history (Shadbolt, 2013). In October 2015, a haze crisis reoccurred and turned into international problems affecting several neighboring Association of Southeast Asian Nations countries (Sekaran & Shuib, 2015). This time the haze lasted for months at a very unhealthy level in Singapore. The severity of the Southeast Asian haze crisis posed tremendous health risks to Singapore residents, especially vulnerable populations like children and the elderly. During the crisis period, the government (through the NEA) advised the public to engage in protective measures to protect their health, such as wearing N95 masks, limiting outdoor activities, and seeking medical assistance if feeling unwell (Yong, 2013). The Ministry of Health also provided health advisories for the general public recommending specific protective measures depending on their health conditions and levels of haze pollution (National Environmental Agency, 2013) . Protective actions that were recommended by authorities usually took into account people's susceptibility to haze-related health problems and their potential severity.

In previous years, broadcast and print media were essential channels for Singaporeans to obtain haze-related health information. However, since the 2013 Southeast Asian haze crisis, a large number of people have turned to new media to seek information on taking preventive actions. NEA's website attracted about 5 million visitors during the crisis (AsiaOne, 2013). Social media, particularly Twitter, have become a critical platform for haze communication. In order to reach Singaporean netizens, NEA established its Twitter presence through the @NEAsg account to update the public on haze conditions instantaneously (Prasetyo et al., 2013). As Singaporeans were advised to stay indoors during the haze crisis, many used social media, primarily Twitter, to express their latest views and emotions about the pollution (Lin & Tan, 2013; Prasetyo et al., 2013). Overall, it was estimated that haze-related tweets reached 236 million impressions, with more than 290,000 Singaporeans discussing the haze more than 340,000 times on Twitter (Picard, 2013). Based on Web analytics, Lin and Tan (2013) found that Twitter was the most widely used social media in Singapore to communicate issues related to the Southeast Asian haze crisis. Their findings also showed that 75% of the tweets had negative sentiments, and positive tweets were mostly from mass media and government-related websites. According to Prasetyo and colleagues (2013), the majority of tweets posted during the crisis mostly expressed negative sentiments such as fear and worry. Hence, the perceived risk of haze was likely to be amplified when Singaporeans exposed themselves to haze-related social media content to a great degree.

To date, the Southeast Asian haze pollution remains an unresolved public health concern in Singapore. Protective measures such as wearing masks and staying indoors are currently the main effective means of avoiding health problems caused by haze. In response to such crisis, traditional and new media are instrumental communication channels that can influence people's risk perceptions of haze as well as their decision making in taking recommended actions to safeguard their health. This underscores the significance of this study in investigating factors affecting young Singaporeans' intention to take protective measures during haze crises.

Literature Review

Witte's EPPM

Rogers's (1975) protection motivation theory, which focuses on threat and coping appraisal, provides some explanation for why people engage in unhealthy practices and whether possible behavioral changes can occur. It consists of four major constructs: the perceived severity of a threatening event, the perceived probability of the occurrence (vulnerability), perceived self-efficacy, and the efficacy of the recommended protective behavior. Although protection motivation theory explains how danger control processes lead to persuasive message acceptance, Witte (1992) argued that it could not fully define the factors leading to message rejection and further developed the EPPM. Incorporating Leventhal's (1970) parallel process model to make the distinction between cognitive and emotional reactions to fear appeals, Witte developed the EPPM (Witte, 1992, 1994) to predict how individuals react to fear stimuli and provide strategies on how they can effectively accept a health message. The EPPM has been widely applied to public health studies such as studies on influenza (Nan & Kim, 2013; Prati, Pietrantoni, & Zani, 2012) and human papillomavirus (Krieger & Sarge, 2013).

Perceived Efficacy (Self-Efficacy and Response Efficacy)

According to Witte (1992, p. 332), perceived self-efficacy refers to "an individual's belief in his or her ability to perform the recommended response," and perceived response efficacy refers to "an individual's belief as to whether a [recommended] response effectively prevents the threat." However, this study does not regard self-efficacy and response efficacy as parallel predictors for protection motivations but follows Krieger and Sarge's (2013) approach to treat response efficacy as a significant mediator between self-efficacy and behavioral intentions for young Singaporeans to take protective actions in the context of the Southeast Asian haze crisis. For instance, Krieger and Sarge (2013) showed that young women's perceived self-efficacy perceptions increase their intentions to talk to a doctor about the human papillomavirus vaccine (response efficacy) and concluded that response efficacy is a significant mediator of self-efficacy and behavioral intentions. Moreover, other scholars have also supported reconceptualizing efficacy in prevention

research (Cauberghe, De Pelsmacker, Janssens, & Dens, 2009; Choi, Krieger, & Hecht, 2012). Therefore, we hypothesize the following:

Hypothesis 1a: Perceived self-efficacy is positively associated with response efficacy.

According to Witte (1994), fear appeals in message framing can convince individuals that a threat to them is personally relevant and serious. For instance, fear and worry are useful motivations for seeking information in a public health crisis like H1N1 influenza (Ho, 2012). Burns and Slovic (2012) further explained that individuals' perception of the threat in risk situations is highly influenced by affective attitudes or responses (e.g., feelings of fear, dread, or uneasiness), which may have an impact on their rational decision making in taking recommended health actions. Prati and colleagues (2012) also found that perceived coping efficacy, similar to the concept of perceived self-efficacy, lowered the affective responses of Italian elderly persons toward influenza vaccination. Hence, in the context of the Southeast Asian haze crisis, we propose the following:

Hypothesis 1b: Perceived self-efficacy is negatively associated with affective attitude toward haze.

Perceived Threat (Perceived Severity and Perceived Susceptibility)

In the EPPM, perceived threat consists of perceived severity (an individual's belief about the seriousness of the threat) and perceived susceptibility (an individual's belief about his or her chances of experiencing the threat; Witte, 1992). Several studies have studied susceptibility and severity in relation to risk contexts. For example, Griffin, Dunwoody, and Neuwirth (1999) and Kahlor (2007) labelled perceived severity and susceptibility as perceived hazard characteristics. In the context of global warming, Kahlor argued that perceived severity and perceived susceptibility play a major role in how individuals seek and process information about relevant health or environmental risks. According to Witte (1994), when levels of perceived threat (susceptibility and severity) are low, individuals are not motivated to protect themselves and thus only superficially process efficacy of the recommended response. In other words, increased perceived threat, which includes severity and susceptibility, has a positive association with response efficacy as individuals enter the process of protection motivation. In addition, Griffin and colleagues (1999) and Kahlor (2007) established a strong correlation between perceived severity and susceptibility and affective attitude. They both have a positive effect on affective attitude toward health or environmental risks. The process of protection motivation in risk situations means that increased severity will increase response efficacy (Rogers, 1975; Witte, 1994). The impact of perceived severity of the risk leading to higher affective attitude is also seen in Kahlor's (2007) research. Moreover, Liao, Cowling, Lam, Ng, and Fielding (2010) found a significant positive relationship between susceptibility and affective attitude of worry in an influenza context. Thus, this study proposes the following hypotheses:

Hypothesis 2a: Perceived severity is positively associated with response efficacy.

Hypothesis 2b: Perceived severity is positively associated with affective attitude toward haze.

Hypothesis 3a: Perceived susceptibility is positively associated with response efficacy.

Hypothesis 3b: Perceived susceptibility is positively associated with affective attitude toward haze.

Media Trust (Traditional Media and New Media)

Past studies have pointed out the importance of mass media use in crisis situations (Ho, 2012). According to Loges (1994) and Lowrey (2004), when people perceive the presence of threat in social crises, they tend to have a higher dependence on mass media (i.e., television, newspapers, and radio). However, new media play an increasingly significant part in disseminating health or environmental information during public health crises, especially in digitally savvy societies.

There are positive correlations between media use and trust (Johnson & Kaye, 1998; Tsfati & Cappella, 2003). Jackob (2010) found that trust in media plays an important role in influencing individuals' uptake of health messages communicated in a public health crisis. This relationship between media dependency and trust was further examined in Bangerter and colleagues' (2012) study, which discussed the significance of public trust in media for inducing eventual behavioral intent and compliance and determining the success of public health campaigns. Early studies of Ball-Rokeach and DeFleur (1976) suggested that media messages have affective effects on receivers. Liao, Cowling, Lam, and Fielding (2011) found that media trust tends to lead to increased worry about influenza. In contrast, Ward, Henderson, Coveney, and Meyer (2011) confirmed that lack of trust in media reports of health risks causes uncertainty and confusion. The uncertainty stemming from low trust in media is likely to increase affective responses such as fear and worry.

The aforementioned studies show that trust in media is generally important in health crises. However, they do not differentiate between trust in traditional and new media. Although there has been a lack of comparisons between trust in old and new media, social media are undoubtedly gaining importance in health crisis situations (McLean & Power, 2013). Reynolds (2010) found that organizational use of social media in the 2009 H1N1 flu pandemic improved people's trust in the Centers for Disease Control and Prevention (CDC). The CDC's social media provided a space for the public to express

their health concerns, which helped reduce their worry during the crisis. Hence, this study proposes the following hypotheses:

Hypothesis 4a: Trust in traditional media is negatively associated with affective attitude toward haze.

Hypothesis 4b: Trust in new media is negatively associated with affective attitude toward haze.

Behavioral Intention

Previous literature has found obvious links between efficacy and behavioral intention. For example, Bandura (1977) stated that perceived efficacy has an influence on the activity of an individual's efforts in the face of threat. Not only does response efficacy have a direct effect on behavioral intention, but Krieger and Sarge (2013) found that increased perceptions of self-efficacy lead to increased response efficacy perceptions and in turn indirectly result in increased behavioral intention. In addition, Witte's (1992, 1994) EPPM already discusses the moderating effect of perceived efficacy on the relationship between perceived threat and behavioral intention, positing that higher response efficacy will have a positive effect on behavioral intention. Hence, we propose the following hypothesis:

Hypothesis 5: Response efficacy is positively associated with behavioral intention to take protective actions during the haze.

The studies of Witte (1992, 1994) and Kahlor (2007) suggest that affective attitudes such as fear and worry toward health problems have a direct effect on behavioral intention to take protective actions. In their study during the H1N1 influenza, Prati and colleagues (2012) showed that affective attitude fully mediated the relationship between cognitive factors (such as perceived threat) and behavioral intention. In other words, affective response to a crisis such as haze can increase behavioral intention in a one-step process or act as a mediating factor between cognitive variables and behavioral intention and increase behavioral intention in a two-step process. Hence, we propose the following hypothesis:

Hypothesis 6: Affective attitude is positively associated with behavioral intention to take protective actions during the haze.

Figure 1 shows the research model that demonstrates the relations between variables in the proposed hypotheses examining the haze context in Singapore.

Method

Data Collection and Respondent Profile

We conducted a Web survey of undergraduate students enrolled in a comprehensive university in Singapore from April to May 2014. The Web survey link was sent via e-mail to a representative sample of 2,000 undergraduate students. To increase response rates, we gave students who completed the survey with valid answers USD $8 as an incentive. About 600 respondents completed the survey, which corresponds to a response rate of 30%. After data cleaning, 410 cases were retained for data analysis. The average age of the respondents was 22.88 years old.

Table 1 shows the profile of the respondents. In a nutshell, most of the respondents were female (59.3%) and ethnic Chinese (90.3%). The majority of respondents were in the third year of study (60.2%), and respondents were studying mostly engineering (33.7%), followed by business (21.7%) and humanities and social sciences (20.2%). This study, which used type of housing to examine family economic status, found that 58.9% lived in four- or five-room public housing flats, which indicated that most of the respondents were from the middle class of society.

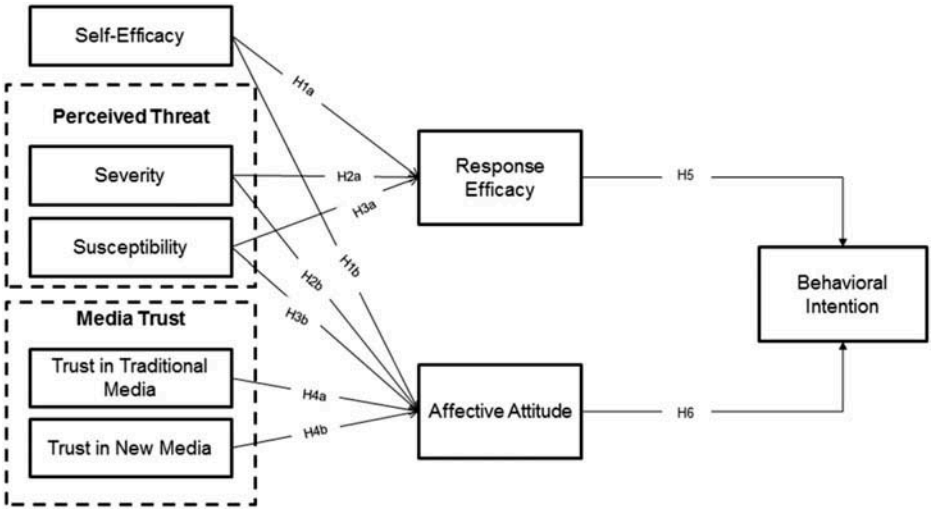

Fig. 1. Research model. H = hypothesis.

Table 1. Respondents' demographic profile ($N = 410$)

Characteristic	*n*	%
Gender		
Male	167	40.7
Female	243	59.3
Ethnicity		
Chinese	370	90.3
Malay	16	3.9
Indian	12	2.9
Other	12	2.9
Type of housing		
One- or two-room flat	10	2.4
Three-room flat	44	10.7
Four- or five-room flat	241	58.9
Executive apartment	32	7.8
Private condominium	33	8.0
Landed property	50	12.2
College		
Business	89	21.7
Engineering	138	33.7
Humanities and social sciences	83	20.2
Medicine	2	0.5
Science	93	22.7
Sport science	5	1.2
Year		
First year	29	7.1
Second year	13	3.2
Third year	247	60.2
Fourth year	121	29.5

Data Analysis

This study utilized partial least squares (PLS) as the main statistical method to test the proposed research model. PLS is a form of structural equation modelling that can be used to test multiple variables in a complex research model (Hair, Sarstedt, Ringle, & Mena, 2012). Although popularly used in marketing and business research (Hair et al., 2012), PLS has become a tool of choice for multivariate analysis of nonexperimental social science data (Abdi, 2010). PLS was suitable for this study because it adequately handles nonnormal data distributions caused by survey items that are measured on 7–10 point scales (Bontis, Booker, & Serenko, 2007). To perform PLS, we analyzed the data using SmartPLS 2.0 M3 (Ringle, Wende, & Will, 2005).

Measures and Item Analysis

Measures for each construct were adapted from previous research and subsequently modified to fit the context of haze (see the Appendix). The items used for susceptibility (three items), severity (three items), and response efficacy (two items) were measured using a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*) adopted from Krieger and Sarge (2013). Next, the four items for self-efficacy were adopted from Schwarzer, Boehmer, Luszczynska, Mohamed, and Knoll (2005) and were measured using a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). Moreover, trust in traditional media (four items) and trust in new media (four items) were adopted from Bangerter and colleagues (2012) and were measured using 5-point Likert scales (1 = *strongly disagree*, 5 = *strongly agree*). We adopted items for affective attitude (two items) from Prati and colleagues (2012) and measured responses using a 10-point Likert scale (1 = *not at all*, 10 = *extremely*). Finally, items for behavioral intention (three items) adapted from Kahlor (2007) were measured with a 10-point Likert scale (1 = *least likely*, 10 = *most likely*). The Appendix shows the complete list of items along with their respective factor loadings. To ensure the fitness of items in the proposed research model, we removed items with a factor loading less than 0.70 (Chin, 1998). Consequently, Items 1 and 4 for both trust in traditional media and trust in new media were removed.

Henseler, Ringle, and Sinkovics (2009) suggested that when using PLS for statistical analysis, researchers should assess several validity and reliability criteria to determine whether the items and constructs used in the study fit the proposed research model. These reference criteria include composite reliability (>0.70), average variance extracted (>0.50), and discriminant validity. In addition to showing mean values, Table 2 shows that all constructs satisfied recommended values for composite reliability and average variance extracted, thus indicating internal consistency and convergent validity, respectively. Moreover, the constructs possessed discriminant validity as it fulfilled the Fornell–Larcker criterion in that the square root of the average variance extracted of each construct was higher than the inter-construct correlations (Hair et al., 2012). Based on the assessment results, the items and constructs fit the proposed model for hypothesis testing.

Results

Figure 2 shows the results of the PLS analysis. Self-efficacy ($\beta = 0.38$, $p < .001$) was positively associated with response efficacy, thus supporting Hypothesis 1a. We also found support for Hypothesis 1b because self-efficacy was negatively associated with affective attitude ($\beta = -0.10$, $p < .05$). Moreover, perceived severity was also positively associated with response efficacy ($\beta = 0.17$, $p < .01$) and affective attitude ($\beta = 0.32$, $p < .001$), thus supporting Hypothesis 2a and Hypothesis 2b. Similarly, Hypothesis 3a and Hypothesis 3b were also supported, as the results showed that susceptibility was positively associated with response efficacy ($\beta = 0.16$, $p < .001$) and affective attitude ($\beta = 0.29$, $p < .001$). Although Hypothesis 4a and Hypothesis 4b were both rejected, it is important to take note that trust in traditional media had no significant association with affective attitude, whereas trust in new media ($\beta = 0.16$, $p < .001$) had a positive association with affective attitude. Further analysis showed that the set of predictors (i.e., self-efficacy, susceptibility, severity, and trust in traditional and new media) was able to explain 21.4% of the variance (R^2) in response efficacy and 35.1% in affective attitude. Finally, the results supported Hypothesis 5 and Hypothesis 6, as response efficacy ($\beta = 0.16$, $p < .001$) and affective attitude ($\beta = 0.57$, $p < .001$) were positively associated with behavioral intention to

Table 2. Means and validity measures

Scale	*M*	CR	AVE	Discriminant validity							
				1	2	3	4	5	6	7	8
1. Self-efficacy	3.36	0.89	0.67	**0.82**							
2. Susceptibility	3.11	0.92	0.80	−0.10	**0.89**						
3. Severity	3.50	0.88	0.72	−0.03	0.49	**0.85**					
4. Trust in traditional media	3.68	0.77	0.64	0.14	0.21	0.23	**0.80**				
5. Trust in new media	3.56	0.81	0.69	0.20	0.21	0.16	0.54	**0.83**			
6. Response efficacy	3.85	0.92	0.85	0.36	0.21	0.24	0.35	0.27	**0.92**		
7. Affective attitude[a]	5.67	0.94	0.88	−0.10	0.49	0.49	0.22	0.26	0.19	**0.94**	
8. Behavioral intention[a]	6.65	0.88	0.71	−0.01	0.26	0.33	0.22	0.23	0.27	0.60	**0.84**

Note. Except where indicated, all items were measured on a 5-point scale. Diagonal elements highlighted in bold are the result of the square root of the AVE and should exceed the interconstruct correlations to establish discriminant validity. CR = composite reliability; AVE = average variance extracted.
[a]Measured on a 10-point scale.

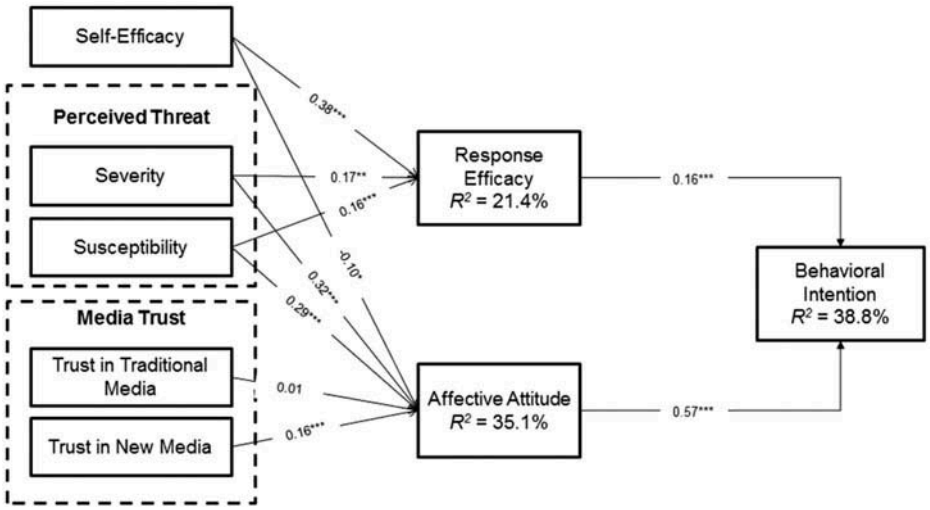

Fig. 2. Results of partial least squares analysis. *$p < .05$. **$p < .01$. ***$p < .001$.

take protective measures during haze. Overall, both factors were able to explain 38.8% of its variance.

Discussion

The Southeast Asian haze pollution is a public health concern that remains an annual health threat to Singaporeans. Given the nature of the haze problem in Singapore, this study aims to identify factors that may influence young people's intention to take protective measures that can reduce haze-related health problems. We developed a research model based on Witte's (1992, 1994) EPPM, as it serves as a good framework for analyzing how individuals may react in health-related crisis situations such as haze.

Based on the results, the positive associations between perceived self-efficacy to cope with haze-related health problems and response efficacy support the findings of previous studies (Cauberghe et al., 2009; Choi et al., 2012; Krieger & Sarge, 2013). To further determine whether response efficacy mediates the relationship between self-efficacy and behavioral intention, we ran an alternative model in which self-efficacy was also a direct predictor of behavioral intention. The results showed that self-efficacy had a nonsignificant association with behavioral intention ($\beta = 0.02$, *ns*), whereas the associations of self-efficacy with response efficacy ($\beta = 0.38$, $p < .001$) and response efficacy with behavioral intention ($\beta = 0.16$, $p < .001$) were positive and significant. The results indicated that though people may believe that they can protect themselves from adverse health effects due to haze (i.e., self-efficacy), it is important that they attain a strong belief in a particular action (i.e., response efficacy to seek health information) to be able to increase their intention to take protective measures during haze. Our results provide additional empirical support for Krieger and Sarge's (2013) proposition that response efficacy is a significant mediator of self-efficacy and behavioral intentions.

However, self-efficacy had a negative association with affective attitudes of fear and worry, which is consistent with previous findings (Burns & Slovic, 2012; Prati et al., 2012). A

possible interpretation here is that belief in one's capacity to take action can reduce feelings of fear and worry of experiencing adverse health effects during haze. This information is important to health authorities, as strategies that increase individuals' self-efficacy during health crises such as haze may reduce fears and prevent unnecessary panic.

In terms of perceived threat, we found that its two dimensions, perceived susceptibility and perceived severity, are positive predictors of response efficacy and affective attitude. However, it is important to consider that both dimensions of perceived threat have a relatively weaker impact on response efficacy than affective attitude. This suggests that perceptions of severity and susceptibility during haze will likely lead to greater affective attitudes of fear or worry than response efficacy. These findings are of great importance to public health professionals because they show that the fear appeal in health messages may result from realizing one's susceptibility to haze and its severity. Our findings confirm the relationship between perceived threat and fear (affective attitude) as proposed by Griffin and colleagues (1999), Kahlor (2007), and Witte (1992, 1994).

When environmental and health crises occur, it is essential to utilize traditional and new media platforms to disseminate information and keep the public informed and calm (Ho, 2012; Jackob, 2010). However, in the context of young adults in Singapore, the results show that trust in traditional media has no significant effect, whereas trust in new media can positively predict a fearful affective attitude toward haze. As mass media in Singapore face constraints of tight content regulation, the majority of young adults may be more trusting of new media than their older counterparts (Lin, 2015). In this study, our respondents might have had little exposure to haze information via traditional media (e.g., newspapers, TV, and radio), which explains why it did not have any association with their affective attitude. However, news and social media content on the Internet and mobile platforms (e.g., Facebook, Twitter, and blogs) are the main sources of young adults' haze-related information. Nonetheless, the most intriguing finding is the inverse relationship between trust in new media and affective attitude. Instead of reducing fear, trusting information over new media creates more fear and worry about haze-related health problems. This may be because of negative haze-related sentiments found online (Lin & Tan, 2013; Prasetyo et al., 2013). Following the framework of social amplification of risk (Kasperson et al., 1988; Renn, Burns, Kasperson, Kasperson, & Slovic, 1992), it can be argued that the majority of negative sentiments found on social media during the 2013 Southeast Asian haze crisis may have intensified people's fear and worry and thus increased their perceived risk of the hazard. However, it is a mixed blessing, as the fearful affective attitude caused by trust in new media can positively affect intentions to take protective measures during haze.

Moreover, when we examined the relationships of response efficacy and affective attitude with behavioral intentions, the results showed that both factors were associated with behavioral intention. However, affective attitude ($\beta = 0.57$) produced a stronger effect than response efficacy ($\beta = 0.16$). According to Burns and Slovic (2012), fear provides a justification for behavioral change. This study also shows that emotional responses (i.e., feeling scared or worried about haze-related health problems) are much more persuasive than cognitive responses in seeking haze-related information to solve problems or make decisions. Hence, if health messages that are framed using emotional appeals result in a fearful attitude toward a hazard (e.g., haze), the public is more likely to take recommended protective measures. The results add to the long list of literature depicting the power of fear, which can effectively trigger protective motivations and behavior changes in the realm of health, risk, and crisis communication (Krieger & Sarge, 2013; Prati et al., 2012; Rogers, 1975; Witte, 1992).

The findings of this study should be balanced with its limitations. First, the results may not reflect other age groups, as the respondents were primarily young adults. It will be interesting to conduct a cross-comparison between age groups within the study's context as a future research endeavor. Next, although affective attitudes of fear and worry can positively predict behavioral intention to take protective measures against haze-related health problems, this study was not able to account for the level of fear required to initiate such action. According to Witte (1994), too little or too much fear may result in adverse effects (i.e., defensive avoidance). Thus, it is crucial to conduct additional research to clarify the amount of fear that can lead to the uptake of protective measures in various crises. In addition, the study was not able to assess the characteristics of the actual messages viewed by our respondents in both new and traditional media. Future research may need to examine whether message framing moderates the association between media trust and affective attitude. Finally, as the Southeast Asian haze is one of many public health concerns in the world, other health crises may produce different results when other scholars utilize our model. Therefore, we suggest that future studies apply and refine this model to various contexts for further improvement.

Conclusion

This study found that response efficacy and affective attitudes of fear or worry mediate the association between self-efficacy and perceived threat (i.e., severity and susceptibility) and behavioral intention to take protective measures during haze. Comparing trust between traditional and new media, we find that trust in new media tends to facilitate a greater affective attitude of fear and worry during haze. The results also point out that affective attitude has a higher association with behavioral intention than response efficacy. This indicates that affective attitudes of fear and worry may likely increase the chances of people taking precautions during haze. Overall, these findings may enhance Witte's (1992, 1994) EPPM model by integrating cognitive and affective variables with media-related ones. Aside from the theoretical implications mentioned previously, the findings can help health and media authorities effectively frame their health messages during public health crises such as haze. Future research may evaluate the effectiveness of media campaigns (in both traditional and new media) in creating awareness to take protective measures during haze in consideration of the factors discussed in this study.

Funding

This study was supported by a research grant from the Wee Kim Wee School of Communication and Information, Nanyang Technological University (M4081244).

References

Abdi, H. (2010). Partial least squares regression and projection on latent structure regression (PLS regression). *Wiley Interdisciplinary Reviews: Computational Statistics*, *2*(1), 97–106. doi:10.1002/wics.51

AsiaOne. (2013). *Minister Ng Eng Hen on haze action plan: Gaps need to be plugged*. Retrieved from http://news.asiaone.com/News/Latest%2BNews/Singapore/Story/A1Story20130708-435667.html

Ball-Rokeach, S. J., & DeFleur, M. L. (1976). A dependency model of mass-media effects. *Communication Research*, *3*(1), 3–21. doi:10.1177/009365027600300101

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 194–215. doi:10.1037/0033-295X.84.2.191

Bangerter, A., Krings, F., Mouton, A., Gilles, I., Green, E. G. T., & Clémence, A. (2012). Longitudinal investigation of public trust in institutions relative to the 2009 H1N1 pandemic in Switzerland. *PLoS ONE*, *7*(11), e49806. doi:10.1371/journal.pone.0049806

Bontis, N., Booker, L. D., & Serenko, A. (2007). The mediating effect of organizational reputation on customer loyalty and service recommendation in the banking industry. *Management Decision*, *45*(9), 1426–1445. doi:10.1108/00251740710828681

Burns, W. J., & Slovic, P. (2012). Risk perception and behaviors: Anticipating and responding to crises. *Risk Analysis*, *32*(4), 579–582. doi:10.1111/risk.2012.32.issue-4

Cauberghe, V., De Pelsmacker, P., Janssens, W., & Dens, N. (2009). Fear, threat and efficacy in threat appeals: Message involvement as a key mediator to message acceptance. *Accidence Analysis & Prevention*, *41*(2), 276–285. doi:10.1016/j.aap.2008.11.006

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, *295*(2), 295–336.

Choi, H. J., Krieger, J. L., & Hecht, M. (2012). Reconceptualizing efficacy in substance use prevention research: Refusal response efficacy and drug resistant self-efficacy in adolescent substance use. *Health Communication*, *28*(1), 40–52. doi:10.1080/10410236.2012.720245

Forsyth, T. (2014). Public concerns about transboundary haze: A comparison of Indonesia, Singapore, and Malaysia. *Global Environmental Change*, *25*, 76–86. doi:10.1016/j.gloenvcha.2014.01.013

Griffin, R. J., Dunwoody, S., & Neuwirth, K. (1999). Proposed model of the relationship of risk information seeking and processing to the development of preventive behaviors. *Environmental Research*, *80*(2), S230–S245. doi:10.1006/enrs.1998.3940

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, *40*(3), 414–433. doi:10.1007/s11747-011-0261-6

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, *20*, 277–319.

Ho, S. S. (2012). The knowledge gap hypothesis in Singapore: The roles of socioeconomic status, mass media, and interpersonal discussion on public knowledge of the H1N1 flu pandemic. *Mass Communication and Society*, *15*(5), 695–717. doi:10.1080/15205436.2011.616275

Jackob, N. G. E. (2010). No alternatives? The relationship between perceived media dependency, use of alternative information sources, and general trust in mass media. *International Journal of Communication*, *4*(18), 589–606.

Johnson, T. J., & Kaye, B. K. (1998). Cruising is believing: Comparing Internet and traditional sources on media measures. *Journalism and Mass Communication Quarterly*, *75*(2), 325–340. doi:10.1177/107769909807500208

Kahlor, L. A. (2007). An augmented risk information seeking model: The case of global warming. *Media Psychology*, *10*(3), 414–435. doi:10.1080/15213260701532971

Kapoor, K., & Taylor, M. (2013). *Indonesian fires worsen, Singapore smog sets record*. Retrieved from http://uk.reuters.com/article/2013/06/21/uk-southeastasia-haze-idUKBRE95K0UZ20130621

Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., … Ratick, S. (1988). The social amplification of risk: A conceptual framework. *Risk Analysis*, *8*(2), 177–187. doi:10.1111/risk.1988.8.issue-2

Khalik, S. (2013). *Haze update: Hospitals seeing more patients with breathing problems*. Retrieved from http://www.straitstimes.com/the-big-story/the-haze-singapore/story/haze-update-hospitals-seeing-more-patients-breathing-problems

Krieger, J. L., & Sarge, M. A. (2013). A serial mediation model of message framing on intentions to receive the human papillomavirus (HPV) vaccine: Revisiting the role of threat and efficacy perceptions. *Health Communication*, *8*(1), 5–19. doi:10.1080/10410236.2012.734914

Leventhal, H. (1970). Findings and theory in the study of fear communications. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 5, pp. 119–186). New York, NY: Academic Press.

Liao, Q., Cowling, B. J., Lam, W. W. T., & Fielding, R. (2011). The influence of social-cognitive factors on personal hygiene practices to protect against influenzas: Using modelling to compare avian A/H5N1 and 2009 pandemic A/H1N1 influenzas in Hong Kong. *International Journal of Behavioral Medicine*, *18*(2), 93–104. doi:10.1007/s12529-010-9123-8

Liao, Q., Cowling, B., Lam, W. T., Ng, M. W., & Fielding, R. (2010). Situational awareness and health protective responses to pandemic influenza A (H1N1) in Hong Kong: A cross sectional study. *PLoS ONE*, *5*(10), e13350. doi:10.1371/journal.pone.0013350

Lin, T. T. C. (2015). Online political participation and attitudes: Analysing election user-generated videos in Singapore. *Communication Research and Practice*, *1*(2), 131–146. doi:10.1080/22041451.2015.1048034

Lin, T. T. C., & Tan, H. J. S. (2013, November). *Public opinions about haze crisis in Singapore: Traditional media news vs. new media voices*. Paper presented at the International Conference on Media Impact and Public Opinion Representation, Taipei, Taiwan.

Loges, W. E. (1994). Canaries in the coal mine: Perceptions of threat and media system dependency relations. *Communication Research*, *21*(1), 5–23. doi:10.1177/009365094021001002

Lowrey, W. (2004). Media dependency during a large-scale social disruption: The case of September 11. *Mass Communication and Society*, *7*(3), 339–357. doi:10.1207/s15327825mcs0703_5

McLean, H., & Power, M. R. (2013). When minutes count: Tension and trust in the relationship between emergency managers and the media. *Journalism*, *15*(3), 307–325. doi:10.1177/1464884913480873

Nan, X., & Kim, J. (2013). Predicting H1N1 vaccine uptake and H1N1-related health beliefs: The role of individual difference in consideration of future consequences. *Journal of Health Communication*, *19*(3), 376–38. doi:10.1080/10810730.2013.821552

National Environmental Agency. (2013). *Health advisory for haze*. Retrieved from http://www.nea.gov.sg/anti-pollution-radiation-protection/air-pollution-control/haze/health-advisory-for-haze

Neuhauser, L., & Kreps, G. L. (2003). Rethinking communication in the e-health era. *Journal of Health Psychology*, *8*(1), 7–23. doi:10.1177/1359105303008001426

Picard, L. (2013). *Trouble in paradise: Haze craze 2013*. Retrieved from http://wearesocial.sg/blog/2013/06/haze-craze/

Prasetyo, P. K., Gao, M., Lim, E. P., & Scollon, C. N. (2013). Social sensing for urban crisis management: The case of Singapore haze. In A. Jatowt, E.-P. Lin, Y. Ding, A. Miura, T. Tetzuka, G. Dias, … B. T. Dai (Eds.), *Social informatics: 5th international conference, SocInfo 2013, Kyoto, Japan, November 2013, Proceedings* (pp. 478–491). New York, NY: Springer-Verlag.

Prati, G., Pietrantoni, L., & Zani, B. (2012). Influenza vaccination: The persuasiveness of messages among people aged 65 years and older. *Health Communication*, *27*(5), 413–420. doi:10.1080/10410236.2011.606523

Renn, O., Burns, W. J., Kasperson, J. X., Kasperson, R. E., & Slovic, P. (1992). The social amplification of risk: Theoretical foundations and empirical applications. *Journal of Social Issues*, *48*(4), 137–160. doi:10.1111/josi.1992.48.issue-4

Reynolds, B. J. (2010). Building trust through social media: CDC's experience during the H1N1 influenza response. *Marketing Health Services*, *30*(2), 18–21.

Ringle, C. M., Wende, S., & Will, A. (2005). *SmartPLS 2.0 (M3)*. Retrieved from http://www.smartpls.com

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology*, *91*(1), 93–114. doi:10.1080/00223980.1975.9915803

Schwarzer, R., Boehmer, S., Luszczynska, A., Mohamed, N. E., & Knoll, N. (2005). Dispositional self-efficacy as a personal resource factor in coping after surgery. *Personality and Individual Differences*, *39*(4), 807–818. doi:10.1016/j.paid.2004.12.016

Sekaran, K., & Shuib, S. (2015). *Haze: Netizens from four countries share their gripe*. Retrieved from http://english.astroawani.com/malaysia-news/haze-netizens-four-countries-share-their-gripe-73010

Shadbolt, P. (2013). *Singapore in haze over worsening smog*. Retrieved from http://edition.cnn.com/2013/06/21/world/asia/singapore-smoke-haze/

Stratieva, N. (2014). *The "burning" problem of air pollution in South East Asia*. Retrieved from http://www.worldwatch-europe.org/node/232

Tsfati, Y., & Cappella, J. N. (2003). Do people watch what they do not trust? Exploring the association between news media skepticism and exposure. *Communication Research*, *30*(5), 504–529. doi:10.1177/0093650203253371

Ward, P. R., Henderson, J., Coveney, J., & Meyer, S. (2011). How do South Australian consumers negotiate and respond to information in the media about food and nutrition? The importance of risk, trust and uncertainty. *Journal of Sociology*, *48*(1), 23–41. doi:10.1177/1440783311407947

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, *59*(4), 329–349. doi:10.1080/03637759209376276

Witte, K. (1994). Fear control and danger control: A test of the extended parallel process model (EPPM). *Communication Monographs*, *61*(2), 113–134. doi:10.1080/03637759409376328

Yong, C. (2013). *Haze update: PSI 401 at noon; many pharmacies still out of masks*. Retrieved from http://www.straitstimes.com/breaking-news/singapore/story/singapore-haze-update-psi-401-noon-many-pharmacies-still-out-masks-201

Appendix: Survey Items

Item	Factor loading
Susceptibility (Krieger & Sarge, 2013), 1 = *strongly disagree*, 5 = *strongly agree*	
1. I am at high risk for getting health problems from haze.	0.86
2. It is likely that I will get health problems from haze.	0.91
3. There is a high chance that I will get health problems from haze.	0.92
Severity (Krieger & Sarge, 2013), 1 = *strongly disagree*, 5 = *strongly agree*	
1. If I were to get health problems related to the haze, it would be a very serious threat to my quality of life.	0.89
2. If I were to get health problems related to the haze, it would be a very severe threat to my health.	0.89
3. Health problems related to the haze would be harmful to my well-being.	0.76
Affective attitude (Prati et al., 2012), 1 = *not at all*, 10 = *extremely*	
1. To what extent do you currently worry about health problems related to the haze?	0.94
2. Do you feel scared about health problems related to the haze?	0.94
Trust in traditional media (Bangerter et al., 2012), 1 = *strongly disagree*, 5 = *strongly agree*	
1. Traditional media (e.g., newspaper, TV, radio and magazine) have exaggerated the risk posed by haze.	Dropped
2. Information in the traditional media helps avoid an outbreak of health problems caused by haze.	0.78
3. Extensive traditional media reporting is necessary to attract people's attention to the dangers of haze.	0.97
4. One cannot trust what one hears in traditional media about haze.	Dropped
Trust in new media (Bangerter et al., 2012), 1 = *strongly disagree*, 5 = *strongly agree*	
1. New media (e.g., Web and mobile news, blogs, Facebook, Twitter) have exaggerated the risk posed by haze.	Dropped
2. Information in the new media helps avoid an outbreak of health problems caused by haze.	0.71
3. Extensive new media reporting is necessary to attract people's attention to the dangers of haze.	0.94
4. One cannot trust what one hears in new media about haze.	Dropped
Self-efficacy (Schwarzer et al., 2005), 1 = *strongly disagree*, 5 = *strongly agree*	
1. I can prevent myself from getting health problems from haze.	0.79
2. I can easily handle health problems from haze.	0.89
3. I am confident that I could efficiently deal with health problems from haze.	0.85
4. I can usually handle whatever health problems come my way.	0.76
Response efficacy (Krieger & Sarge, 2013), 1 = *strongly disagree*, 5 = *strongly agree*	
1. Seeking health information related to the haze is an effective way to prevent my health problems.	0.92
2. Seeking health information related to the haze will help me make good decisions about my health.	0.93
Behavioral intention (Kahlor, 2007), 1 = *least likely*, 10 = *most likely*	
1. I intend to limit heavy outdoor activities in future during haze.	0.76
2. I intend to wear a face mask outside in future during haze.	0.87
3. I intend to go for clinical body examination in future during haze.	0.88