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Original Article

The Adoption of Protective Health Behaviors During the COVID-19 Pandemic in Thailand

Kedwadee Sombultawee[1*], Sakun Boon-itt[2], and Vipa Bussanit[3]

Author Affiliation

[1] Assistant Professor, Department of Marketing, Thammasat Business School, Thailand

[2] Professor, Department of Operations Management, Thammasat Business School, Thailand

[3] Peri Formwork & Scaffolding (Thailand) Company Limited

[*]Corresponding author e-mail: kedwadee@tbs.tu.ac.th

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Abstract

The objective of the research was to investigate acceptance of public health recommendations regarding COVID-19 in Thailand. The hypothesized framework included COVID-19 knowledge, communication, perceived risk, and perceived government response as predictors, with protective health behavior adoption as the outcome variable. A sample of Thai residents selected from across the country ($n = 322$) completed an online survey, which was analyzed using a structural equation modelling technique. Findings showed that COVID-19 knowledge influenced perceived risk ($\beta = .20$, $p < .001$), communication behavior ($\beta = .16$, $p < .001$), and government response ($\beta = .17$, $p < .001$), perceived risk ($\beta = .47$, $p < .001$), communication behavior ($\beta = .54$, $p < .001$), and government response ($\beta = .52$, $p < .001$), influenced adoption of protective health behaviors; and that the effect of knowledge on protective health behaviors was partially mediated by perceived risk, communication behavior and government response. These findings illustrated that protective health behavior of Thai residents against COVID-19 was influenced by perceived risk, communication surrounding COVID-19, and perceptions of government response. The main implication is that simply providing more knowledge about COVID-19 is insufficient to improve public health response. Instead, individuals need to understand their risk, through accurate communication and a strong government response to encourage adoption of protective health behavior. Academically, the research provided insight into protective health behavior, especially in relation to government response. However, more research is needed, especially regarding adoption of new and changed behavioral recommendations and the potential for resistance.

This research was undertaken in response to the unprecedented event of the COVID-19 pandemic, which has caused widespread and sudden change in Thailand and elsewhere. COVID-19 (a coronavirus, or single-stranded RNA virus) is a viral respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (or SARS CoV-2) (Velavan & Meyer, 2021). SARS CoV-2 follows on two previous pandemic diseases, Middle East respiratory syndrome coronavirus (MERS-CoV) and severe acute respiratory syndrome coronavirus (SARS-CoV), both of which caused disease outbreaks earlier in the 21st century (Prasetyo et al., 2020). Although the first outbreak of SARS CoV-2 is traceable to a small number of unusual pneumonia cases in Wuhan, China in early 2020, its origins are still somewhat obscure (Ciotti et al., 2020; Prasetyo et al., 2020).

COVID-19 has had a devastating global effect. Despite efforts to contain the disease in Wuhan, the disease began to spread in late January and early February 2020, and by early spring there was a global pandemic (Ciotti et al., 2020). At the time of writing, there have been an estimated 220.9 million confirmed COVID-19 cases and 4.57 million deaths (World Health Organization, 2021). This figure may be an underestimate because many cases are mild or asymptomatic, and are not reflected in official figures (Velavan & Meyer, 2021).

Thailand, like all countries, was affected by the COVID-19 pandemic, with an estimated 1.28 million cases and 13,042 deaths reported as of September 2021 (World Health Organization, 2021). At least in part, this can be attributed to Thailand's excellent and overprovisioned medical system, which ordinarily forms the basis for its medical tourism sector (Abuza, 2020). Public health measures, including international and domestic travel restrictions, local quarantines and a national lockdown, also created a protective effect (Osterrieder et al., 2021). These aspects of pandemic control are obvious because they are visible and matters of government policy. What is less visible is the role played by ordinary residents of Thailand through personal adherence to protective health behaviors, such as handwashing, mask wearing, social distancing and other recommendations (Osterrieder et al., 2021).

Factors including health knowledge (Chaoguang et al., 2018; Chu & Liu, 2021; Hoffmann & Lutz, 2019; Lee et al., 2021; Sylvester, 2021; Taghrir et al., 2020; Zhong et al., 2020) and perceived risk (Chu & Liu, 2021; Faasse & Newby, 2020; Lee et al., 2021; Mohd Hanafiah & Wan, 2020; Prasetyo et al., 2020; Rosi et al., 2021; Taghrir et al., 2020; Zhong et al., 2020) are known to play a role in the adoption of protective health behavior. However, this relationship is complicated by two factors. The first is that there is an exceptionally high level of misinformation on COVID-19 circulating both globally (Basol et al., 2021; Brennen et al., 2020, 2021; Loomba et al., 2021; Pennycook et al., 2020; Roozenbeek et al., 2020, 2021) and in Thailand (Chookajorn, 2020; Dang, 2021; Namwat et al., 2020; Pan-ngum et al., 2021), raising the possibility of an interaction between health knowledge and communication that could affect response negatively. However, this has not yet been investigated in Thailand, so it is poorly understood. A second notable gap in the literature is how Thai people have responded to government recommendations on protective health behaviors. While perceptions of government response to the pandemic have been identified as possible influences on individual behavior (Basol et al., 2021; Roozenbeek et al., 2020), much of this research has been done in countries that are both culturally different from and more affected by COVID-19 than Thailand. Therefore, to build a more rounded understanding of how government response influences individual adoption of protective health behaviors is a useful contribution to the literature. This research does not only focus on government response, that individual knowledge and perceived risk will drive most of the individual response based on prior studies.

The main objective of this research is to determine the influence of health knowledge, perceived risk, and government communication on adoption of public health recommendations among Thai residents. The research uses a conceptual framework incorporating components of knowledge about COVID-19, perceived risk of COVID-19, communication about COVID-19 and government response to COVID-19, which is explained in the following section.

Literature Review

Protective Health Behavior

This research is concerned with individual adoption of protective health behavior. Protective health behaviors, also sometimes called prevention behaviors, are the specific individual actions that can be taken to reduce chances of infection and, if infected, reduce the chance of spread (Kowalski & Black, 2021; Prasetyo et al., 2020). These factors include, for example, proper handwashing technique and use of hand sanitizer, handwashing after going outside, social distancing, wearing face masks, and working or studying from home if possible (Prasetyo et al., 2020). It can also include intended behaviors, such as intended adoption of the COVID-19 behavior when available (Faasse & Newby, 2020). Adoption of protective health behavior does vary widely from person to person, a difference which has been attributed to everything from locus of control and self-efficacy beliefs (Berg & Lin, 2020) to threat perception (Ranjit et al., 2021) to personality traits like narcissism (Nowak et al., 2020). This research is concerned with far more common concerns: knowledge about the disease, perceived risk, and perception of communication and government response to COVID-19. Then the figure 1 shows the conceptual framework of this study.

COVID-19 Knowledge

Knowledge about COVID-19 has been identified as a factor in the adoption of protective health behavior, both directly and indirectly. One study, conducted in Philippines, found that understanding of COVID-19 had multiple indirect effects on intention to follow behavioral recommendations and adapted and actual protective health behaviors (Prasetyo et al., 2020). Knowledge was found to have an effect on communication behavior and risk perception, but not directly on behavior, in a Malaysian study (Mohd Hanafiah & Wan, 2020).

Faasse and Newby (2020) found that knowledge about the illness was a significant predictor of behavior in the past month, but not on projected behavior in the event of an extended outbreak. It is also possible knowledge has a direct effect on health behaviors, according to studies in Iran, China, South Korea and the United States, as well as globally (Chu & Liu, 2021; Lee et al., 2021; Sylvester, 2021; Taghrir et al., 2020; Zhong et al., 2020). Furthermore, people exposed to more misinformation (therefore having less accurate knowledge) are less likely to engage in protective health behaviors (Basol et al., 2021; Roozenbeek et al., 2020, 2021; Sylvester, 2021). However, these direct relationships do not encompass the full range of possible relationships. In this research, knowledge about COVID-19 is proposed as an indirect factor on protective health behavior, working through perceived risk, communication, and perception of government response rather than directly. The first three hypotheses state:

H1: Knowledge about COVID-19 will have a positive effect on perceived risk.
H2: Knowledge about COVID-19 will have a positive effect on communication.
H3: Knowledge about COVID-19 will have a positive effect on government response perceptions.

Knowledge about COVID-19 is also expected to have an indirect effect on preventative health behavior through the three determining factors, based on prior studies which have shown that health knowledge can play a role in the relationship between receipt of information and adoption of health behavior (Chaoguang et al., 2018; Hoffmann & Lutz, 2019). As these studies have shown, health knowledge is an intervening variable between attitudes and beliefs and health behaviors. This study argues that it will be the same here, acting an intervening variable between the predictive factors and protective health behavior. The final hypothesis of the research follows the same assumption of indirect effects, to test whether knowledge is mediated by the three factors:

H7a: The relationship of perceived risk and protective health behavior will be mediated by knowledge about COVID-19.
H7b: The relationship of communication and protective health behavior will be mediated by knowledge about COVID-19.
H7c: The relationship of government response perceptions and protective health behavior will be mediated by knowledge about COVID-19.

Perceived Risk

The perceived risk of COVID-19 is individual beliefs about their chances of catching COVID-19 and how sick they would be if this occurred (Mohd Hanafiah & Wan, 2020). This can be decomposed into perceived vulnerability and perceived severity (Prasetyo et al., 2020; Rosi et al., 2021). The perceived risk of COVID-19 has been identified in several studies as a direct influence on the adoption or intended adoption of protective health behavior (Chu & Liu, 2021; Faasse & Newby, 2020; Lee et al., 2021; Mohd Hanafiah & Wan, 2020; Prasetyo et al., 2020; Rosi et al., 2021; Taghrir et al., 2020; Zhong et al., 2020). Therefore, the proposal that perceived risks of COVID-19 would influence protective health behavior adoption is the straightforward relationship expected in Hypothesis 4:

H4: Perceived risk of COVID-19 will have a positive effect on protective health behavior.

Communication

The extent of individual communication surrounding COVID-19 can also influence the adoption of protective health behavior, although the evidence is mixed. Communication about COVID-19 through the media, especially communication that accurately presents the risks and the effectiveness of preventative health behaviors, has been associated with increased adoption (Berg & Lin, 2020). Furthermore, receipt of high levels of misinformation can inhibit adoption of protective health behavior (Basol et al., 2021; Roozenbeek et al., 2020, 2021). In Malaysia, it was shown that communication between individuals, including talking about COVID-19 and receiving information through the media, was an important aspect of how individuals understood and coped with the pandemic, although it was not directly tested for relationship to health behavior (Mohd Hanafiah &

Wan, 2020). In Australia, this link was tested, with findings showing that communication about COVID-19 was associated with adoption of protective health behavior both in the last month and in the case of a major outbreak (Faasse & Newby, 2020). It was also tested in Iranian medical students, showing that higher levels of communication were associated with more use of protective health behaviors (Taghrir et al., 2020). The information and communication environment is therefore complicated, but it is anticipated that communication about COVID-19 will influence the adoption of protective health behavior:

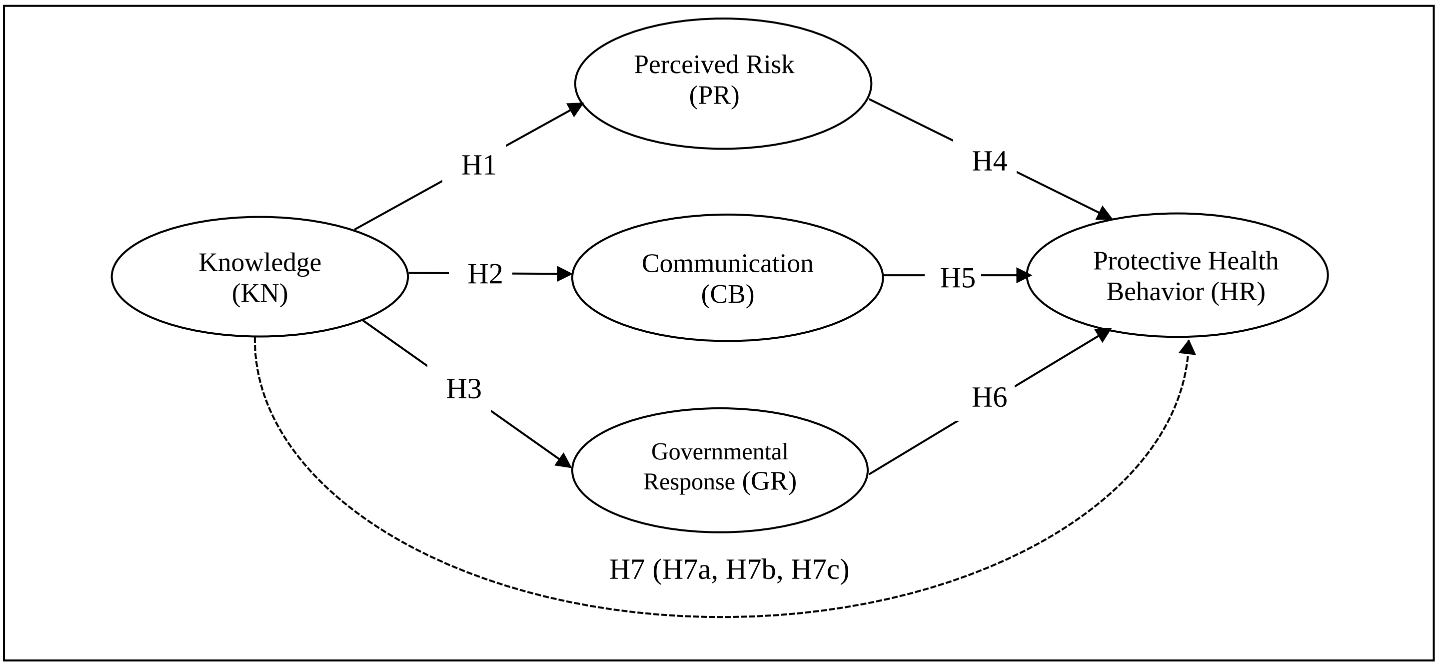
H5: Communication about COVID-19 will have a positive effect on protective health behavior.

Government Response

Another factor that has been identified as possibly significant is confidence in the government response to the COVID-19 crisis. This may be one of the areas which is least studied, In Australia, confidence in government response had a negative relationship to immediate behavior (within the past month) but a positive effect in the event of a widespread outbreak (Faasse & Newby, 2020). Other authors have also suggested (though not proved) that government response can influence behavior. For example, a study on misinformation around the world suggested that trust in the government and especially approval of government response could be a factor in susceptibility to misinformation, though it did not directly influence adoption of protective health behavior (Roozenbeek et al., 2020). Overall, evidence on the government response to COVID-19 and acceptance of information from the government is lacking, as not many studies have investigated it. This research has the opportunity to provide firmer evidence on the role of government response to fill this knowledge gap. Therefore, the sixth hypothesis of this research is that:

H6: Perceived government response to COVID-19 will have a positive effect on protective health behavior.

Figure 1
Conceptual Framework of the Research



Method

Population and Sample

The population of interest for the study was residents of Thailand (18 and over). A priori sample size analysis for the research model indicated an ideal minimum sample size of 376 members (Soper, 2020). An absolute lower bound sample size of 200 members was required based on rule of thumb guidelines (Westland, 2010). A sample of 322 participants was selected using online convenience sampling, through recruitment messages posted on local and community groups in Bangkok and general-purpose Facebook groups from around the country. The main exclusion criterion for groups was that those whose primary purpose was sharing information and action on COVID-19 were not included in the survey, as it was thought that this would bias the results due to higher levels of interest in community members. While this sample size is lower than the ideal minimum, it was higher than Westland's (2010) minimum sample size and therefore was considered adequate.

Questionnaire

The questionnaire was developed by adapting several previous instruments that have investigated COVID-19 perceptions (Faasse & Newby, 2020; Lazarus et al., 2020; Mohd Hanafiah & Wan, 2020; Taghrir et al., 2020; Zhong et al., 2020). The questionnaire was developed in Thai to avoid excluding participants due to English competence. This required a process of back-translation (Tyupa, 2011) to assess the translation quality. In addition, the questionnaire collected information about demographics and economic position of the participants. A total of 47 initial attitude items were collected using 5-point Likert scales, accompanied by five demographic items using categorical responses. Table 1 summarizes the scales and sources for each of the variables and sources.

Table 1

Summary of the Questionnaire

Variable	Number of Items	Supporting Reference
Perceived Risk (PR)	6	Mohd Hanafiah and Wan (2020)
Knowledge (KN)	15	Faasse and Newby (2020) Taghrir, et al. (2020) Zhong et al. (2020)
Communication (CB)	8	Mohd Hanafiah and Wan (2020)
Government Response (GR)	5	Lazarus, et al. (2020)
Protective Health Behavior (HB)	13	Faasse and Newby (2020)

Data Collection

Data collection used an online questionnaire, employing the SurveyMonkey platform. The survey link was distributed via social media and other community websites in October 2020, and data was collected for a period of one month. This period was prior to Thailand's main outbreak, which occurred during winter 2021. All incomplete or unsubmitted surveys were discarded to ensure high-quality data analysis. Following completion of data collection, the survey was closed to ensure that no additional responses were submitted. This research was certified by the Human Research Committee of Thammasat University (080/2021).

Results

The final sample size of the study was 322 participants. Demographic statistics are summarized in Table 2. The sample was predominantly female (74.8%). The largest age group was 24 to 34 years (46.3%). It was most common for participants to have a bachelor's degree (61.5%). Most of the sample were employed (63%). Monthly salaries were spread across the range, with the largest group having incomes of under 10,000 baht ($306.65) (24.2%).

Descriptive Analysis

The preliminary analysis included descriptive statistics and reliability measures of proposed scales (Table 3). The descriptive statistics, based on the five-point Likert measures, were calculated using mean and standard deviation for perceived risk (PR), communication (CB), government recommendations (GR) and protective health behaviors (HB).

The measures for knowledge were calculated separately. For this item, participants were asked whether specific facts were true (1) or false (0). The cumulative number of correct items were then used as the score, which is a unitary measure. This measure was not normally distributed (Kolmogorov-Smirnov = .090, $p < .001$). The distribution is right-skewed (skewness = 3.25). Overall, knowledge was high, with 74.2% of the sample correctly identifying 12 or more K items. Therefore, overall knowledge can be considered relatively good.

Consistency and reliability measures were calculated for perceived risk, communication behavior, government response, and protective health behavior. (This was not necessary for KN, which is a unitary measure.) Internal consistency for the measures was measured using Cronbach's alpha,

Table 2
Descriptive Statistics of the Respondents (n=322)

Characteristics	Category	*n*	%
Gender	Female	241	74.84%
	Male	74	22.98%
	Prefer not to say	7	2.17%
Age	Under 18	17	5.28%
	18 – 24	59	18.32%
	25 – 34	149	46.27%
	35 – 44	39	12.11%
	45 – 54	51	15.84%
	More than 55	7	2.17%
Education Background	Bachelor	198	61.49%
	Master	56	17.39%
	PhD	2	0.62%
	Under Bachelor	66	20.50%
Occupation	Employee	203	63.04%
	Employer	10	3.11%
	Housewife	11	3.42%
	Retire	3	0.93%
	Student	70	21.74%
	Unemployed	25	7.76%
Monthly Salary (Baht)	< 10,000	78	24.22%
	10,001 – 20,000	78	24.22%
	20,001 – 30,000	72	22.36%
	30,001 – 40,000	56	17.39%
	40,001 – 60,000	25	7.76%
	> 60,001	13	4.04%

with a target range of .70 to .95 (Hair et al., 2016). All items fell within this range (α = 0.746 to 0.907). Therefore, initial assessment shows the items have adequate internal consistency

Reliability was tested using the composite reliability (CR) measure, using a minimum value of ≥ .70 (Hair et al., 2016). All items passed this range, with communication behavior (CR = 0.79) having the lowest value. Convergent validity was tested using the additional threshold AVE ≥ .50 (Hair et al., 2016). Not all items initially passed this threshold, with communication behavior (AVE = .44) and protective health behavior (AVE = .41) falling below it. Therefore, these dimensions were of particular concern during the model adjustment phase.

Model Reduction

The initial model was poorly fitted (RMSEA = .15). To improve the model fit, a model reduction process was used, eliminating items with an initial factor loading of below 0.40 (Brown, 2015). This resulted in the removal of several items (PR2, PR6, CB2, CB3, CB5, CB8, GR2, HB1, HB7, HB8, HB9).

Structural Equation Model Analysis

Following the model fitting process, the final structural model was prepared as in Figure 3. The model fit was better for this model than for the initial model. RMSEA (0.024) was below the threshold for a well-fitted model (0.06) (Kenny et al., 2015). The chi-square test (χ^2 = 145.13, *df* = 123, *p* = .084) also met the criteria for an absolutely well-fitted model (*p* > .05) (Hu & Bentler, 1999). Relative fit measures including CFI (.95), GFI (.94), AGFI (.95) and IFI (.95) were also adequately fitted. Therefore, the model fit was appropriate for the research questions.

Model effects, including direct and indirect effects, are presented in Table 4. The significance of the relationships is based on the t-test. The critical value for the t-distribution at confidence level 95% ($p < .05$) for $df = 123$ is 1.65 (Lindley & Scott, 1984). At confidence level 99% ($p < .01$) the critical value is 2.33, while at confidence level 99.9% ($p < .001$) it is 3.09. These critical values are identified in the table.

Table 3

Summary of Descriptive Statistics, Factor Loadings and Reliability Measures

Variable	Components	Mean	SD	Factor Loading (Initial Model)	Factor Loading (Final Model)	AVE	CR	Alpha
PR	PR1	3.98	0.86	0.59	0.81	0.52	0.81	0.75
	PR3	3.64	0.94	0.78	0.57			
	PR4	3.93	0.91	0.75	0.66			
	PR5	4.02	0.82	0.51	0.81			
CB	CB1	4.06	0.85	0.71	0.80	0.44	0.79	0.82
	CB4	3.85	0.86	0.79	0.76			
	CB6	3.38	0.88	0.61	0.50			
	CB7	3.40	1.05	0.63	0.44			
	CB8	3.86	0.90	0.70	0.72			
GR	GR1	3.89	0.87	0.77	0.76	0.59	0.85	0.82
	GR3	3.34	1.24	0.75	0.57			
	GR4	3.54	1.00	0.69	0.86			
	GR5	3.95	0.96	0.77	0.85			
HB	HB2	3.66	0.86	0.56	0.47	0.41	0.86	0.91
	HB3	3.52	0.92	0.62	0.52			
	HB4	4.08	0.91	0.73	0.74			
	HB5	3.94	0.84	0.69	0.62			
	HB6	3.63	0.95	0.57	0.47			
	HB10	3.91	0.89	0.74	0.68			
	HB11	4.00	0.86	0.76	0.70			
	HB12	4.08	0.86	0.80	0.72			
	HB13	4.31	0.82	0.75	0.74			

Table 4

Summary of Model Effects

Relationship	Direct effect	*t*-value	Indirect effect	*t*-value	Overall effect	*t*-value
1.KN → PR	0.20		-	-	0.20	3.77***
2.KN → CB	0.16		-	-	0.16	2.88**
3.KN → GR	0.17		-	-	0.17	3.26***
4.PR → HB	0.47		-	-	0.47	4.44***
5.CB → HB	0.54		-	-	0.54	5.75***
6.GR → HB	0.52		-	-	0.52	5.95***
7.KN → HB	-	-	0.27	4.25	0.27	4.25***

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; KN = Knowledge; PR = Perceived Risk; CB = Communication Behavior; GR = Government Response; HB = Protective Health Behavior

The study hypotheses were assessed in two stages. For hypothesis 1 to Hypothesis 6, the direct effects and significance of the t-value ($p < .05$) were determinants of support for the hypotheses (Table 4). All six of the main hypotheses were supported.

The Hypothesis 7, which tested mediation, was assessed using the proportion of effects approach (Mackinnon et al., 2007). In this approach, the significance of both relationships (for example knowledge to perceived risk and perceived risk to protective health behavior) is established, using the first two steps of the causal steps procedure (Baron & Kenny, 1986). Next, the proportion of indirect effects to total effects (IE/TE) is calculated to establish the degree of mediation (Mackinnon et al., 2007). While none of the three relationships showed that knowledge's effect was fully mediated, there was partial mediation observed in all three cases, including knowledge to perceived risk to protective health behavior (IE/TE = 0.57), knowledge to communication behavior to protective health behavior (IE/TE = 0.50) and knowledge to government response to protective health behavior (IE/TE = 0.52). Therefore, Hypothesis 7 can also be supported, since there is evidence of a mediation effect of perceived risk, communication behavior and government response on the knowledge to protective health behavior relationship. The table 6 shows the summary of hypothesis outcomes.

Discussion and Conclusion

This research demonstrated that knowledge has a direct effect on the perceived risk, communication, and perceived government response to COVID-19, and through this an indirect effect on adoption of protective health behaviors among Thai people. The results indicated that knowledge of COVID-19 had a positive effect on perceived risk ($\beta = .20$, $p < .001$), communication behavior ($\beta = .16$, $p < .01$) and government response ($\beta = .17$, $p < .001$). Thus, COVID-19 knowledge was, as speculated in the first three hypotheses, a significant factor in the formation of attitudes and behaviors that could influence the individual's choice of health behavior. Furthermore, there was evidence that perceived risk ($\beta = .47$, $p < .001$), communication behavior ($\beta = .54$, $p < .001$) and government response ($\beta = .52$, $p < .001$) had a direct effect on health behavior. Thus, these three factors were shown to be factors in health behavior. Finally, partial mediation was shown for the effects of knowledge on the relationships of perceived risk to protective health behavior, communication behavior to protective health behavior and government response to protective health behavior. These findings were consistent with what was expected given the literature.

The research investigated the situation in Thailand, which has had a relatively light effect from COVID-19 at the time of data collection in part due to high levels of compliance with recommended protective health behaviors. Since then, a second and third wave have significantly increased the impact on Thailand, with infections rising from approximately 12,600 cases and 70 deaths to 1.28 million cases and 13,048 deaths (World Health Organization, 2021). Thus, the research has contributed to explaining how these health behaviors may be adopted. The findings showed that overall, the Thai public appears to have a high level of accurate knowledge about the COVID-19 pandemic and its effects, which may be one reason for compliance with recommended protective health behaviors. This did not have a strong direct effect, but instead influenced the perceived risk, communication behaviors and perceptions of the government response to the pandemic. Thus, a high level of knowledge about COVID-19 and its effects could help improve the adoption of recommended health behaviors.

These findings are important for health communication campaigns, especially those seeking to override the effect of misinformation on protective health behaviors. Previous studies have pointed out the alarming prevalence of misinformation on COVID-19, which is propagated by official sources, high-profile people like politicians and celebrities, and anonymously via social media as well as directly in person-to-person communications both around the world (Basol et al., 2021; Brennen et al., 2020, 2021; Loomba et al., 2021; Pennycook et al., 2020; Roozenbeek et al., 2020, 2021) and in Thailand (Chookajorn, 2020; Dang, 2021; Namwat et al., 2020; Pan-ngum et al., 2021). This is exceptionally problematic for areas where there is a high level of misinformation, since as this study showed, accurate information about COVID-19 is one of the key antecedents to the adoption of protective health behaviors. There is a definite risk, therefore, that if there is a high level of misinformation surrounding COVID-19, there could be an entrenched problem with health behavior noncompliance. This can be seen in one of the other studies on COVID-19 misinformation, which have shown that susceptibility to misinformation reduces both the adoption of currently available protective health behaviors and reluctance to eventually receive the COVID-19 vaccine when available (Basol et al., 2021; Brennen et al., 2020; 2021; Loomba et al., 2021; Roozenbeek et al., 2020).

This research can help formulate policies that overcome significant challenges such as COVID-19 health misinformation. There is growing evidence that health misinformation could still be a major issue in future in Thailand (Chookajorn, 2020; Dang, 2021; Namwat et al., 2020; Pan-ngum et al., 2021). Another possible problem is that entrenched pockets of misinformation, for example that communicated through social media or among specific political or familial groups which are among the more common sources (Brennen et al., 2020), could create small groups with permanent non-adoption of protective health behavior, vaccine hesitancy or rejection, and other problems. Ultimately, this could create a situation in some environments where susceptibility to misinformation, rather than other factors, determined susceptibility to COVID-19. Obviously, the factors identified here are only responsible for a small part of adoption of protective health behavior, and the adoption effect measured here is not entirely due to COVID-19 knowledge. Other factors, like differences in perceived risk, communication and perception of government measures, also had an effect. Factors not included in the study might also influence outcomes. Individual-level psychological differences, for example, are also likely to influence the adoption of protective health behaviors (Berg & Lin, 2020; Chu & Liu, 2021; Nowak et al., 2020; Rosi et al., 2021; Zheng et al., 2020). However, the role of COVID-19 knowledge, and its interaction with COVID-19 misinformation, should not be overlooked.

Conclusion

The study showed that perceived risk, communication about COVID-19, and government recommendations did all play a direct role in adoption of protective health behaviors. Furthermore, these three factors mediated the effect of knowledge about COVID-19 on the adoption of protective health behaviors. Therefore, the conclusion of the research is that all four of these factors do influence the adoption of public health behaviors.

The implication of these findings for communication and policy about COVID-19 is simply that knowledge about the disease is not enough to influence the public to adopt recommended protective health behaviors, such as handwashing or mask wearing. Instead, knowledge has an effect on perceived risk of the disease and acceptance of communication and government recommendations, which is then translated to engagement with protective health behaviors. Therefore, for public health communication in Thailand, it is crucial that not only is correct knowledge is passed on, but that this information establishes the correct level of risk, communicates clearly and explains government recommendations.

Although the research was conducted during a relative lull in COVID-19 cases in Thailand, it is possible that further pandemic waves or uncontrolled community cases (such as the situation currently ongoing) could lead to increased risk perceptions. Growing misinformation about the virus and pandemic (Chookajorn, 2020; Dang, 2021; Namwat et al., 2020; Pan-ngum et al., 2021) could also affect risk perception or protective health behavior adoption, for example by increasing resistance to public health recommendations such as masking or handwashing. These continued changes require ongoing monitoring in the environment, including in the area of protective health behavior adoption and acceptance of communications. Thus, it is highly recommended that additional studies be launched to monitor protective health behavior adoption in countries where such studies are not yet in place.

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