

Protection Motivation Theory and Rabies Protective Behaviors Among School Students in Chonburi Province, Thailand

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Objectives: The aim of this study was to predict rabies protective behaviors (RPB) based on protection motivation theory (PMT) among fourth-grade students at schools in Chonburi Province, Thailand.

Methods: This cross-sectional study was conducted from December 2020 to February 2021. A multistage sampling technique was used for sample selection. The questionnaire was divided into socio-demographic data and questions related to PMT and RPB. Descriptive statistical analysis was conducted using the EpiData program and inferential statistics, and the results were tested using the partial least squares model with a significance level of less than 5%.

Results: In total, 287 subjects were included, of whom 62.4% were girls and 40.4% reported that YouTube was their favorite media platform. Most participants had good perceived vulnerability, response efficacy, and self efficacy levels related to rabies (43.9, 68.6, and 73.2%, respectively). However, 54.5% had only fair perceived severity levels related to rabies. Significant positive correlations were found between RPB and the PMT constructs related to rabies (β , 0.298; $p < 0.001$), and the school variable (S4) was also a predictor of RPB (β , -0.228; $p < 0.001$). Among the PMT constructs, self efficacy was the strongest predictor of RPB (β , 0.741; $p < 0.001$).

Conclusions: PMT is a useful framework for predicting RPB. Future RPB or prevention/protection intervention studies based on PMT should focus on improving self efficacy and response efficacy, with a particular focus on teaching students not to intervene with fighting animals. The most influential PMT constructs can be used for designing tools and implementing and evaluating future educational interventions to prevent rabies in children.

Key words: Rabies, Protective behaviors, Protection motivation theory, Students, Thailand

INTRODUCTION

Rabies is a zoonotic viral disease that affects mammals. Throughout the world, approximately 59 000 people are reported to

die from rabies every year [1]. Rabies is present on all continents except Antarctica, and over 95% of human deaths from rabies occur in Asia and Africa [2]. Once clinical symptoms begin to appear, rabies is almost always fatal [1]. Among zoonotic diseases, the significance of rabies as a public health issue is often neglected [2]. In Thailand, rabies is endemic, and, in most cases (93%), dogs are the main reservoir [3]. It is estimated that half a million incursions with mammals that could potentially transmit the disease occur annually [4]. The most vulnerable population is children under 15 years of age [4]. From 2011 to 2020, Thailand's eastern region reported the highest incidence of rabies, contributing 36% of total rabies-related

Received: August 17, 2021 **Accepted:** October 1, 2021

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deaths in Thailand [3]. In addition, none of the deceased had received any form of treatment [4].

The reason that the most affected group is children under 15 years of age is likely their natural affinity for animals, particularly cats and dogs. Moreover, children generally do not know when they are at risk of rabies. Sometimes children may provoke animals to bite them as a consequence of stone-throwing, beating, chasing, or running at the sight of the animals [5]. In addition, in some cases, children do not pursue any further treatment after the initial treatment of the wound. In contrast, adults are generally more aware of the risk of rabies and tend to seek medical care [6]. A review of the literature [7-10] found that few children were aware that rabies was a potentially fatal disease and understood that they were vulnerable to the disease. Therefore, awareness and education are key. In addition, the cognitive process plays a key role in decision-making and influencing behavioral changes [11], the factors of which correspond to protection motivation theory (PMT).

PMT has been widely adopted as a framework for predicting and influencing health-related behaviors [12]. PMT is based on 2 cognitive processes. The first is threat appraisal (TA), which consists of 2 cognitive aspects—perceived severity (PS) and perceived vulnerability (PV)—and can influence changes in attitudes and behaviors. The second cognitive process is coping appraisal (CA), which also consists of 2 cognitive aspects—response efficacy (RE) and self-efficacy (SE)—and can influence individuals to successfully avoid danger, which is an important factor for making positive behavioral changes. These factors are influenced by fear-inducing media rather than more standard methods of persuasion such as external stimuli, environmental organization, persuasion, observational learning, personality, and experience [13].

Researchers have used PMT to investigate and understand a wide range of health-related behaviors and preventive/protective behaviors [14-16]. In addition, PMT has been used in etiological studies to investigate various risk behaviors in children, including tobacco or drug use [17-19], sexual initiation perceptions [20-22], and cybersecurity behavior [23]. Historically, few studies have been conducted examining PMT in the context of rabies prevention, which is one of this study's main objectives. Moreover, the age of 9 years to 10 years old is a good starting point for providing education related to self-care behaviors [24]. At this age, children are able to develop a thorough understanding of these issues due to their developmental stage. Through knowledge and reasoning, children can

develop greater healthcare awareness [25].

Partial least squares structural equation modeling (PLS-SEM) is one of the most widely used multivariate data analysis methods in the business and social science fields, including in education, psychology, health, and nursing. It is primarily used to examine models with latent variables [26]. Standard PLS-SEM analyses provide information on the relative importance of constructs for explaining other constructs in a structural model. Information on the importance of constructs is relevant for drawing conclusions. Importance-performance map analysis (IPMA) extends the results of PLS-SEM by also examining the performance of each construct. As a result, conclusions can be drawn across 2 dimensions (both importance and performance), which is particularly important for understanding which managerial actions to prioritize [27], and the analysis can be expanded to the indicator level to facilitate identification of the most important aspects of specific actions [28]. Due to its simplicity and practicality, importance-performance analysis has been popular among researchers and professionals involved in customer satisfaction and quality management for promoting efficient resource utilization in various fields, including health [28-30].

This study was conducted to predict the rabies protective behaviors (RPB) of fourth-grade students by applying PMT and using PLS-SEM and IPMA to close an existing gap in the research, with the ultimate aim of improving children's RPB. Upon the successful completion of PMT analysis, the data can be used to devise targeted rabies prevention programs for elementary school children.

METHODS

Participants and Sampling

This cross-sectional study analyzing RPB among fourth-grade students was conducted from December 2020 to February 2021. It was conducted with the permission of the children and their guardians. The number of participants in this study was calculated with G*Power 3.1 [31] by selecting the *F*-test with linear multiple regression, a fixed model, and the R^2 deviation from zero option. The sample size was calculated using a 95% confidence interval (CI) and a 5% error rate. As a result, the sample size was determined to be 270 participants, and we planned for a possible 5% non-response rate. In total, 287 subjects were included. A multistage sampling technique was used for selecting the sample units. The 11 districts in Chon-

Chonburi Province were divided into 2 strata, with the first consisting of 4 districts with a recent history of dogs infected with rabies being found in 2020 and the second consisting of 7 districts with no such history. Three sub-districts were randomly selected from each stratum, for a total of 6 sub-districts. In the second step, 1 school was randomly selected from each sub-district, except for in Nong Samsak, where there were only very small schools. Thus, 2 schools were selected from Nong Samsak, for a total of 7 schools. In the third step, fourth-grade students were randomly sampled using the lottery method. After the data were organized and verified, a total of 287 fourth-grade students were selected from 7 primary schools across 6 sub-districts of Chonburi Province.

Research Instruments

A rabies questionnaire was developed based on academically reviewed information on rabies, PMT, and prevention or protective behaviors among children. The research instrument was a closed-ended questionnaire divided into 3 sections on (1) socio-demographic data, (2) PMT covering 4 areas (PS, PV, RE, and SE), and (3) RPB.

The final version of the questionnaire had an average content validity of more than 0.6, which was calculated using item-objective congruence and indicated adequate content validity. The reliability was measured using Cronbach's alpha coefficient, which was 0.806 for PMT and 0.773 for RPB in this study.

Statistical Analysis

The data collected from the surveys were organized and verified for completeness and entered into EpiData Analysis version 2.1 (<https://www.epidata.dk/>). Descriptive statistics were calculated for (1) socio-demographic data, (2) the variables related to PMT, and (3) RPB. The PMT constructs were categorized according to Bloom's cut-off points (<60 indicating poor, 60-80 indicating fair, and >80% indicating good) [32]. Inferential statistics were tested using PLS-SEM with a significance level of less than 5%.

Ethics Statement

This study was conducted under the highest ethical standards as outlined by the Burapha University-Institutional Review Board for Protection of Human Subject in Research (BUU-IRB), Thailand (#079/2563). The participants' identifying information remained confidential throughout.

RESULTS

Socio-demographic Characteristics of the Students

Table 1 shows that a total of 287 fourth-grade students participated in the study from 7 primary schools across 6 sub-districts of Chonburi Province. The majority of the participants were girls (62.4%). The proportion of subjects from schools 1 through 7 were 17.8%, 9.4%, 5.2%, 18.5%, 19.9%, 15.3%, and 13.9%, respectively. Among the participants, 50.9% lived in areas where infected dogs were found, and 47.3% of their fathers and 38.3% of their mothers reported being self-employed. The most popular media platforms were YouTube (40.4%) and TikTok (36.9%), and 26.5% of the participants reported that they spent between 1 hour and 2 hours per day consuming content on their preferred media platform. A total of 60.3% of the participants had a pet, of which the majority were dogs (42.9%), with an average number of 1.26 ± 2.30 dogs. More than half (53.3%) of the participants had no history of being bitten, scratched, or licked at a wound site by a mammal. Of the participants who reported being injured by a mammal, 34.5% were scratched, 21.3% were bitten, and 3.8% were licked at the wound.

Protection Motivation Theory Constructs and Rabies Protective Behaviors

The PMT construct scores were classified using Bloom's cut-off points. The data showed that 61.3% of participants had a good level of PMT constructs. When considering each of the aspects of PMT, it was found that the participants had good PV, RE, and SE related to rabies (43.9, 68.6, and 73.2%, respectively). Only PS had a fair level, at 54.5%. As shown in Table 2, most of the respondents were unsure that rabies is a fatal disease (60.6%), causes brain damage (65.9%), and typically kills infected animals within 10 days (65.9%). A total of 52.3% of the participants had a good level of RPB; however, 51.9% answered that they would not encourage local individuals to annually vaccinate their pets (PB1).

Figure 1 and Table 3 present the results of PLS-SEM. Significant positive correlations were found between RPB and the PMT constructs related to rabies (β , 0.298; standard error [SE], 0.053; $p < 0.001$), and the school, particularly school No. 4 (S4), was a predictor of RPB (β , -0.228; SE, 0.058; $p < 0.001$). Students in S4 had lower RPB scores than students in other schools.

The present study showed that the students perceived that

Table 1. Demographic information

Characteristics	n (%) or mean \pm SD	Characteristics	n (%) or mean \pm SD
Gender		Dog and cat	50 (17.4)
Boys	108 (37.6)	Dog and other mammals	3 (1.0)
Girls	179 (62.4)	Dog and cat and other mammals	3 (1.0)
School		Cat ownership	95 (33.1)
No. 1 in area 1	51 (17.8)	Cat only	42 (14.6)
No. 2 in area 2	27 (9.4)	Cat and dog	50 (17.4)
No. 3 in area 2	15 (5.2)	Cat and other mammals	0 (0.0)
No. 4 in area 3	53 (18.5)	Cat and dog and other mammals	3 (1.0)
No. 5 in area 4	57 (19.9)	Other mammal ownership	14 (4.9)
No. 6 in area 5	44 (15.3)	Other mammals only	8 (2.8)
No. 7 in area 6	40 (13.9)	Other mammals and dog	3 (1.0)
Residence in an area with rabid dogs		Other mammals and cat	0 (0.0)
No	141 (49.1)	Other mammals and dog and cat	3 (1.0)
Yes	146 (50.9)	No. of dogs	1.26 \pm 2.30
Father's occupation		0	164 (57.1)
Unemployed / stay-at-home father / deceased	21 (7.7)	1	46 (16.0)
Employed	70 (25.6)	2	29 (10.1)
Self-employed	129 (47.3)	≥ 3	48 (16.7)
Other	67 (19.4)	No. of cats	0.89 \pm 2.00
Mother's occupation		0	192 (66.9)
Unemployed / stay-at-home mother / deceased	49 (17.1)	1	40 (13.9)
Employed	61 (21.3)	2	25 (8.7)
Self-employed	110 (38.3)	≥ 3	30 (10.5)
Other	67 (23.3)	No. of other mammals	0.14 \pm 1.50
Favorite media platform		0	273 (95.1)
None	3 (1.1)	1	10 (3.5)
YouTube	114 (40.4)	≥ 2	4 (1.4)
TikTok	104 (36.9)	History of animal bites, scratches, or licks at a wound site within the past year	
Other	66 (21.6)	No	153 (53.3)
Daily time spent consuming favorite media (hr)		Yes	134 (46.7)
<1	65 (22.6)	History of animal bites within the past year	
≥ 1 to <2	76 (26.5)	No	226 (78.7)
≥ 2 to <3	60 (20.9)	Yes	61 (21.3)
≥ 3 to <4	32 (11.1)	History of animal scratches within the past year	
≥ 4	54 (18.8)	No	188 (65.5)
Pet ownership (mammal)		Yes	99 (34.5)
No	114 (39.7)	History of animal licks at a wound site within the past year	
Yes	173 (60.3)	No	276 (96.2)
Dog ownership	123 (42.9)	Yes	11 (3.8)
Dog only	67 (23.3)		

wash the wound with running water and soap several times for at least 15 minutes could mitigate the risk of contracting rabies (PV3), with the PV3 indicator significantly correlating with PMT constructs (β , 0.098; SE, 0.024; $p < 0.001$). In addition,

the media (β , 0.160; SE, 0.061; $p = 0.009$) and gender indicators (β , -0.160; SE, 0.066; $p = 0.015$) were found to be significantly associated with PV, meaning that a preference for YouTube affected the PV score more than other media platforms and that

Table 2. Questions related to protection motivation theory and rabies and rabies preventive behaviors

Variables	Agree	Unsure	Disagree
Perceived severity (PS)			
PS1: If you have a rabies infection, you will die	65 (22.6)	174 (60.6)	48 (16.7)
PS2: The rabies virus primarily damages the brain	65 (22.6)	189 (65.9)	33 (11.5)
PS3: Dogs and cats who are infected with rabies will perish within 10 d	46 (16.0)	189 (65.9)	52 (18.1)
PS4: If you get bitten and infected by a rabid dog and are not medically treated, you will die	154 (53.7)	104 (36.2)	29 (10.1)
Perceived vulnerability (PV)			
PV1: You can get rabies if you play with an unknown dog or cat	95 (33.1)	139 (48.4)	53 (18.5)
PV2: If you get scratched by a cat and immediately tell your parents or teachers, you will have a greater chance of avoiding rabies infection	160 (55.7)	65 (22.6)	62 (21.6)
PV3: If after being bitten you wash the wound with clean water and soap several times for at least 15 min, you will have a greater chance of not contracting a rabies infection	195 (67.9)	61 (21.3)	31 (10.8)
Response efficacy (RE)			
RE1: I think that telling a parent or teacher immediately after being scratched by a cat will help to prevent a rabies infection	162 (56.4)	79 (27.5)	46 (16.0)
RE2: I think that informing parents or people about the annual rabies animal vaccination will help to prevent rabies infection	193 (67.2)	75 (26.1)	19 (6.6)
RE3: I think avoiding ownerless cats and dogs is a good method to prevent rabies infection	194 (67.6)	53 (18.5)	40 (13.9)
RE4: I think not intervening with animals when they are fighting will help to prevent rabies infection	200 (69.7)	53 (18.5)	34 (11.8)
Self-efficacy (SE)			
SE1: I am confident that if I do not interfere with unknown animals, I will reduce my risk of contracting rabies	208 (72.5)	59 (20.6)	20 (7.0)
SE2: I am confident that I can reduce my risk of contracting rabies by informing local individuals to vaccinate their pets	204 (71.1)	68 (23.7)	15 (5.2)
SE3: I am confident that if I immediately inform my teachers/parents after being bitten, scratched, or licked by a mammal, I can reduce my risk of contracting rabies	237 (82.6)	33 (11.5)	17 (5.90)
SE4: I am confident that if I can identify an animal that scratched me, I can reduce my risk of contracting rabies	70 (24.4)	149 (51.9)	68 (23.7)
SE5: I am confident that if I wash a wound with soap and water for 15 min (WASH15) after being bitten, scratched, or licked by an unknown animal, I can reduce my risk of contracting rabies	171 (59.6)	94 (32.7)	22 (7.7)
SE6: I am confident that if I do not intervene with fighting dogs, I can reduce my risk of contracting rabies	248 (86.4)	21 (7.3)	18 (6.3)
Rabies protective behaviors (PB)			
PB1: I will inform local individuals to annually vaccinate their pets	33 (11.5)	105 (36.6)	149 (51.9)
PB2: I will immediately inform teachers/parents if I am bitten or scratched by a mammal even if the wound does not bleed	114 (39.7)	115 (40.1)	58 (20.2)
PB3: I will immediately inform teachers/parents if I witness a friend getting bitten, scratched, or licked at a wound site by a mammal	91 (31.7)	130 (45.3)	66 (23.0)
PB4: I will wash the wound with soap and water (15 min) if I am bitten, scratched, or licked at a wound site by a mammal	87 (30.3)	139 (48.4)	61 (21.3)

Values are presented as number (%).

scores for PV were higher among girls than boys.

There were 2 statistically significant indicators of RE: RE2 ('I think that informing parents or people about the annual rabies animal vaccination will help to prevent rabies infection') and RE4 ('I think not intervening with animals when they are fighting will help to prevent rabies infection'), that the students believed could prevent rabies. These showed significant relationships with the other PMT constructs (β , 0.477; SE, 0.019; $p < 0.001$).

Three SE indicators had a statistically significant relationship to PMT constructs (β , 0.741; SE, 0.023; $p < 0.001$), indicating

that students believed they were able to perform those behaviors to prevent rabies. They were SE2 ('I am confident that I can reduce my risk of contracting rabies by informing local individuals to vaccinate their pets'), SE3 ('I am confident that if I immediately inform my teachers/parents after being bitten, scratched, or licked by a mammal, I can reduce my risk of contracting rabies'), and SE6 ('I am confident that if I do not intervene with fighting dogs, I can reduce my risk of contracting rabies'). Non-significant relationships were found between PS and the other PMT constructs.

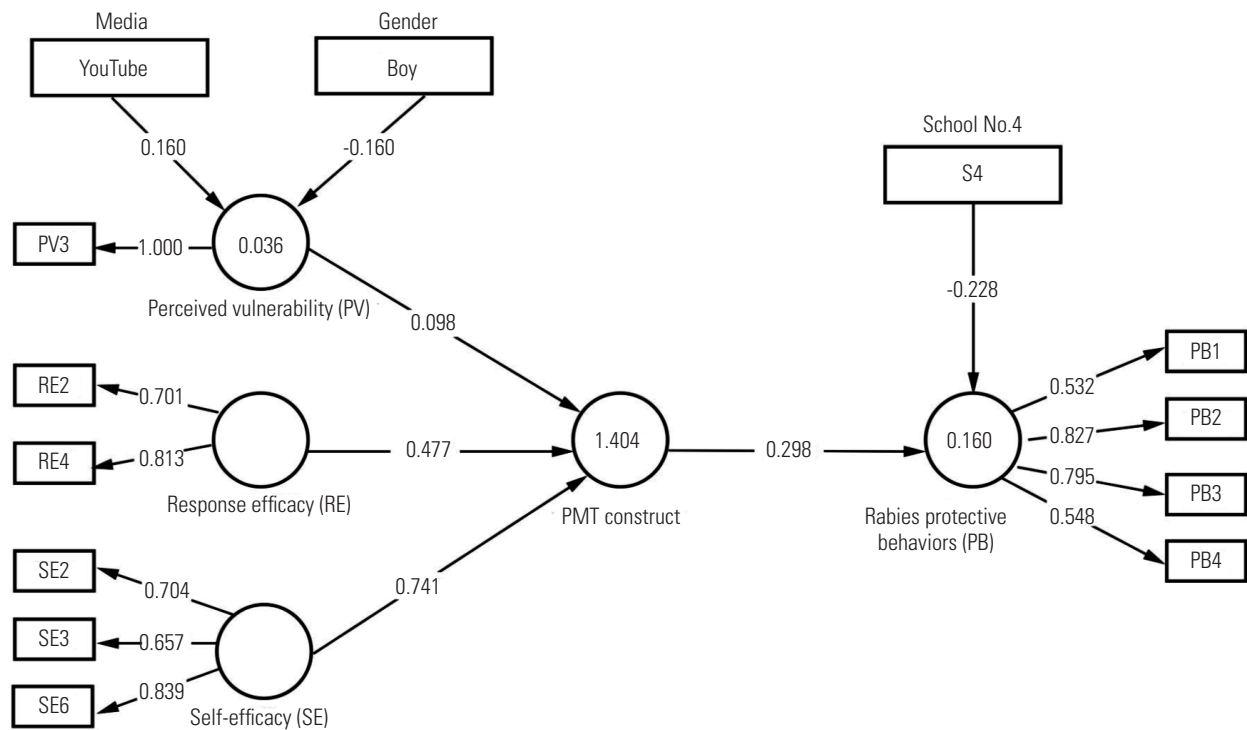


Figure 1. Path diagram of the structural equation model. PMT, protection motivation theory.

Table 3. Detailed measurement and regression results of the structural equation modeling shown in Figure 1

Variables	Coefficient	SE	p-value
Perceived vulnerability			
Media	0.160	0.061	0.009
Gender	-0.160	0.066	0.015
PMT constructs			
Perceived vulnerability	0.098	0.024	0.000
Response efficacy	0.477	0.019	0.000
Self efficacy	0.741	0.023	0.000
Rabies protective behaviors			
PMT constructs	0.298	0.053	0.000
School No. 4	-0.228	0.058	0.000

SE, standard error; PMT, protection motivation theory.

Importance Performance Map Analysis

IPMA analysis was conducted for the variables that affected RPB in the initial analysis. IPMA uses a 2-dimensional grid to plot the mean ratings for performance and importance. The x-axis is used to map a variable’s importance, measured by the total effect (0-1), and the y-axis is used to map a variable’s performance, based on an adjusted raw score ranging from 0-100 that corresponds to the percentage value. The resulting 4-quadrant matrix, classified as quadrants A through D (Figure 2), can

be used both to identify opportunities for improvement and to guide strategic planning schemes [33]. Three indicators (RE2: ‘I think that informing parents or people about the annual rabies animal vaccination will help to prevent rabies infection,’ SE2: ‘I am confident that I can reduce my risk of contracting rabies by informing local individuals to vaccinate their pets,’ and SE6: ‘I am confident that if I do not intervene with fighting dogs, I can reduce my risk of contracting rabies’) were in quadrant A, meaning that RE2, SE2, and SE6 had above-average importance and above-average performance.

There were 2 indicators in quadrant B (PV3: ‘If after being bitten you wash the wound with clean water and soap several times for at least 15 minutes, you will have a greater chance of not contracting a rabies infection,’ and SE3: ‘I am confident that if I immediately inform my teachers/parents after being bitten, scratched, or licked by a mammal, I can reduce my risk of contracting rabies’), meaning that the PV3 and SE3 indicators had below-average importance but above-average performance. The gender and media indicators were in quadrant C, meaning that they had below-average importance and performance. Lastly, RE4 (‘I think not intervening with animals when they are fighting will help to prevent rabies infection’) and S4 were in quadrant D, which had high importance but below-average performance.

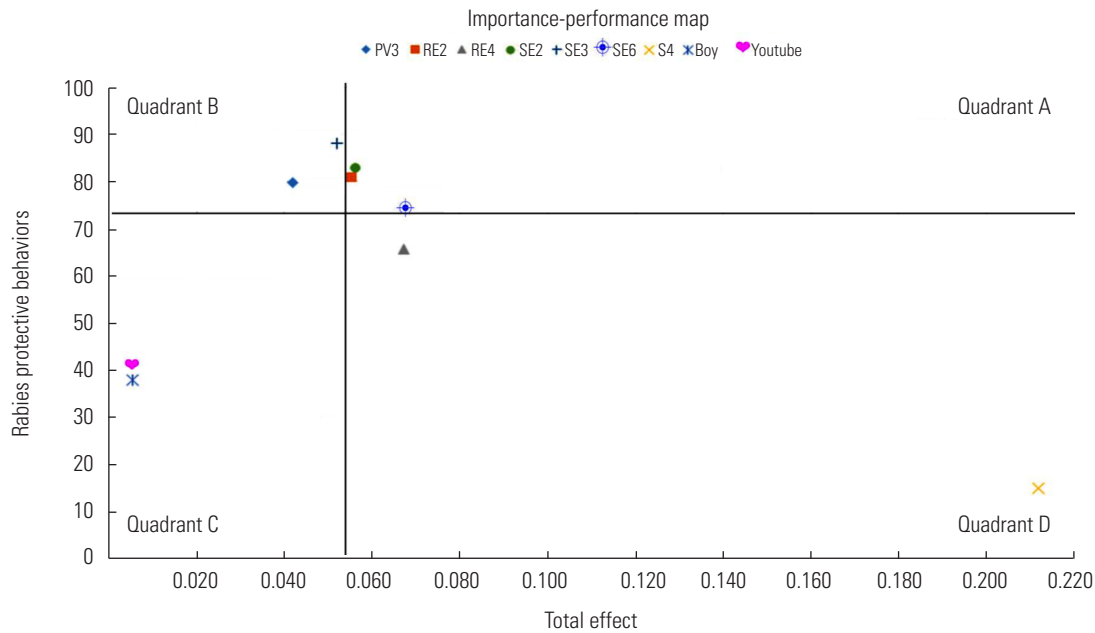


Figure 2. Importance performance map analysis. PV, perceived vulnerability; RE, response efficacy; SE, self-efficacy.

DISCUSSION

This study used PLS-SEM to predict structural relationships in our model based on PMT and to determine the key factors related to RPB among primary school students. PMT consists of a combination of 4 constructs (PS, PV, RE, and SE). The students were found to have good levels of PV, RE, and SE (43.9, 68.6, and 73.2%, respectively). The students' overall scores were only fair for PS, at 54.5%. This finding is consistent with the results of a study by Kumsri [34] but inconsistent with 2 other previous studies [14,35]. The reason why most fourth-grade students achieved only a moderate level for PS may have been that PS, more than the other constructs, is age-dependent [15], and children and adults are at different stages of cognitive development [23].

According to the results of the path analysis, the PMT constructs (β , 0.298; SE, 0.053; $p < 0.001$) and the S4 school indicator (β , -0.228; SE, 0.058; $p < 0.001$) had significant relationships with RPB. The students in S4 had the lowest rate of RPB of the participants. Accordingly, S4 was located in an area with fewer reported rabies outbreaks than in the other areas where schools were located, and teachers and parents may not have been focused on rabies prevention [36].

The study findings also showed that, of the PMT constructs, SE was the strongest predictor (β , 0.741; SE, 0.023; $p < 0.001$), which is consistent with the findings of previous studies [15,

18,19,23]. This positive correlation indicates that individuals with a high SE score can consistently act against rabies, reduce their own risk of rabies, protect their health, and prevent the negative consequences of poor RPB. Therefore, when designing educational interventions, it is essential to emphasize SE to mitigate the threat of rabies [18]. PS, however, was not a significant predictor of PMT constructs and RPB in this study, which is a similar finding to those of some previous studies [14,17,20,22,37] and an inconsistent finding with others [11,15,16,34]. The PS scores of the participants in this study were not high. The mean value was 8.59 ± 1.57 , and most students were unsure as to the severity of rabies. Nevertheless, PS can be decisive as it relates to PMT constructs since, if students are aware of the consequences and harms of rabies, protection motivation will in turn increase [18]. Therefore, when designing educational programs, it is essential to pay special attention to PS by incorporating anecdotes from children who experienced dog attacks [38].

Notably, media platform preferences and gender were found to be significantly associated with PV. According to the findings of a study by Rogers and Prentice-Dunn [39], a higher quantity of information can increase respondents' PV scores, and Chambers et al. [21] found that low vulnerability may be tied to a lack of knowledge about rabies risks factors and the inability to recognize one's personal risk of rabies. Since YouTube is a popular media platform among students, it can be used to

disseminate targeted informative videos according to their level of risk. Another study also found that females had a higher degree of PV than males regarding health beliefs and health behaviors [19].

Although this study found that only 3 PMT constructs were associated with RPB, it still cannot be concluded that the non-statistically significant constructs had no influence. In addition, our model explained only 1 aspect of the total variance of the outcome variable. This indicates that several influential factors were not included and suggests that further research must be conducted.

Another noteworthy finding of this study was its examination of the importance and performance of factors associated with RPB. Our findings suggest that the RE4 ('I think not intervening with animals when they are fighting will help to prevent rabies infection') and S4 indicators in quadrant D, which had low performance but high importance, urgently require improvement. As such, the RE4 indicator can be considered a key factor related to RPB. Most students, however, were not aware that avoiding fighting animals is an effective rabies prevention behavior. S4, which was also in quadrant D, had a substantial total effect on RPB and a very low performance score. Therefore, S4 and schools in the surrounding area should be the first place where interventions to promote RPB are conducted.

The 3 indicators in quadrant A (RE2: 'I think that informing parents or people about the annual rabies animal vaccination will help to prevent rabies infection,' SE2: 'I am confident that I can reduce my risk of contracting rabies by informing local individuals to vaccinate their pets,' and SE6: 'I am confident that if I do not intervene with fighting dogs, I can reduce my risk of contracting rabies'), which had both high performance and importance, indicate that students already realized that those indicators assisted in rabies prevention. However, because those indicators had very high total effects on the dependent variable, they should still be reinforced in future education programs, particularly RE2 and SE2, in order to encourage students to talk to family and community members about vaccinating their pets against rabies on an annual basis, which they already understood to be effective.

The 2 indicators in quadrant B (PV3: 'If after being bitten you wash the wound with clean water and soap several times for at least 15 minutes, you will have a greater chance of not contracting a rabies infection,' and SE3: 'I am confident that if I immediately inform my teachers/parents after being bitten, scratched, or licked by a mammal, I can reduce my risk of contract-

ing rabies'), which had high performance but low importance, indicate that those indicators were not important for RPB. Students' scores for those indicators were still good, however, especially for SE3, which had the highest performance score out of all of the indicators. This indicator ultimately has little influence on RPB. Nevertheless, it is still important to promote education related to these indicators to students in addition to promoting education related to the RE4, RE2, SE2, and SE6 indicators. Boy and YouTube indicators were in quadrant C and had both low performance and importance. Even though those indicators can be considered low-priority for improving RPB, it may still be useful to use YouTube as a tool for the dissemination of rabies education in future prevention and control programs.

This study has some limitations. First, the data for this study were collected using a cross-sectional survey. Therefore, the relationship that was observed between the PMT sub-constructs and other variables needs to be verified in future longitudinal studies. Second, since the participants in this study were fourth-grade students, some PMT constructs, such as perceived rewards and perceived response cost, were not investigated. In future studies of families, these constructs should be added since perceived rewards are known to influence threat appraisal and perceived response cost is known to influence coping appraisal [39].

The results of this study indicate that PMT is a useful framework for predicting behaviors, especially concerning individuals' intentions and motivation related to RPB. Future studies about RPB among school students that are based on PMT should focus on increasing RE, especially for the RE4 indicator and RE2 indicators. In addition, the improvement of SE should also be emphasized so that students feel encouraged to inform family and townspeople of the benefits of annual vaccination against rabies for their pets (SE2) and avoid animals that are fighting (SE6). The results of the present study showed a highly significant relationship between PMT and RPB. If students have more confidence to act, they would be more likely to adopt rabies prevention tactics in high-risk situations [40]. The PMT concepts that were shown to be most influential can be used when designing tools and implementing and evaluating educational interventions to prevent rabies among children.

CONFLICT OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

FUNDING

This project was supported by the Faculty of Public Health at Burapha University.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the students, families, and teachers for their cooperation. Our great appreciation is also extended to Associate Professor Wathna Soonthorndhai and Lecturer John Daly (USA) for their time, supervision, useful discussion, critical reading, and editing of the manuscript.

AUTHOR CONTRIBUTIONS

Conceptualization: ML, NM, AW, PA. Data curation: ML. Formal analysis: ML. Funding acquisition: ML, NM, AW, PA. Methodology: ML, NM, AW, PA. Project administration: ML. Visualization: ML. Writing – original draft: ML. Writing – review & editing: ML, NM, AW, PA.

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