Travellers' self-protections against health risks: An application of the full protection motivation theory

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ABSTRACT

Ensuring travellers' health and well-being is an important issue in tourism management and public health. By applying and testing the Protection Motivation Theory (PMT), this study serves as one of the early attempts in tourism to explore travellers' self-protective behavior against health risks. This study conducted semi-structured interviews and an online survey. Consistent with the PMT, this study found that both threat and coping appraisals can enhance travellers' protection motivations, which in turn affect their actual behaviors. Intentions play a mediation role between appraisals and actual behavior. Notably, maladaptive perception was adapted to fit tourism and was found negatively associated with the coping appraisal. This study also provides implications on how to encourage travellers to protect themselves against health risks.

KEYWORDS

Travel; health risk; Protection Motivation Theory; coping appraisal; threat appraisal; maladaptive perceptions

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29 INTRODUCTION

30 International tourist arrivals have increased from 25 million globally in 1950 to 1,235 million
31 in 2016 (UNWTO, 2017). The continued growth in international tourism, however, has caused
32 global health consequences (Richter, 2003). These might arise from the effects of sudden and
33 significant changes in altitude, humidity, microbes, and temperature on individual travellers
34 (World Health Organization [WHO], 2018). Conservative estimates show that 30 to 50% of
35 travellers become ill or are injured during their trip indicating that raising awareness of these
36 problems is urgent (Briggs & Habib, 2004). At destinations, serious health risks may arise
37 where accommodation is of poor quality, hygiene and sanitation are inadequate, medical
38 services are not well-developed, and clean water is unavailable (WHO, 2017). Additionally,
39 constant outbreaks of health-related crises at destinations can threaten the health and well-being
40 of tourists. For instance, recent events such as the Ebola (Novelli, Burgess, Jones, & Ritchie,
41 2018) and other infectious diseases (Rack et al., 2005) have negatively impacted both travellers'
42 health and the tourism industry within the destination. Spill-over effects may occur on some
43 occasions, where not only the destination, but also the surrounding region may suffer from the
44 negative impacts generated by health-related crises (Novelli et al., 2018).

45 *1.1 Research problem and research aim*

46 Although both what the tourism industry supplies and what tourists demand at destinations of
47 certain countries may be affected by health-related crises, operators are expected to take some
48 responsibility for protecting travellers' health and safety (Atherton & Atherton, 1998). Self-
49 servingly, tourism practitioners tend to keep the "bad news" away from the public as it may
50 negatively impact holiday sales (Wilks, Stephen, & Moore, 2013). Nevertheless, the increasing
51 recognition given to tourists' health and safety issues motivates operators and tourism
52 practitioners to realize that good health and safety practices can benefits their turnover, prevent
53 litigations, and produce customer satisfaction and loyalty (Wilks et al., 2013). However,
54 although how the tourism industry responds to and manages health-related issues is well
55 covered (e.g., Frisby, 2003; Henderson, 2004; Liu, Kim, & Pennington-Gray, 2015), the
56 demand side related to the risk and health of individuals when they travel is less well addressed
57 (Chien, Sharifpour, Ritchie, & Watson, 2016; Novelli et al., 2018).

58 Nowadays, because of the amount of health information available, travellers are starting to
59 manage their health risks individually (Wilks et al., 2013). This shows that consumer

60 independence has increased since the previous decade (Caruana, Crane, & Fitchett, 2008;
61 Ourahmoune, 2016; Tsaur, Yen, & Chen, 2010). Similar to other individuals, rational tourists
62 tend to be risk-averse and avoid dangerous situations. Once their maximum tolerance level to
63 risk is reached, travellers may change their original travel plans so they include risk reduction
64 and thus decrease their uncertainty and perceived risk (Mitchell, Davies, & Moutinho, 1999).
65 This approach can become manifest as information, procedures, and actions (Lo, Cheung, &
66 Law, 2011). Although some tourism studies have been carried out to examine travellers' health
67 risk perceptions (Jonas, Mansfeld, Paz, & Potasman, 2011), few explore how individuals adopt
68 risk reduction (Lo et al., 2011). Similarly, very few studies examine how travellers behave to
69 protect health when they travel (Chien et al., 2016).

70 Regarding public health, protection motivation theory (PMT) is useful to explain how and why
71 people behave to protect their health (Floyd, Prentice-Dunn, & Rogers, 2000). While PMT has
72 been applied to tourism and travel (e.g., Law, 2006; Slevitch & Sharma, 2008), it occupies only
73 a minor part of health science because these researchers only used part of it. Because tourism
74 studies are interdisciplinary, developing them requires two outcomes: first, to show what the
75 disciplines involved achieve; and second, to combine the tools used in each discipline to
76 provide a method that enables tourism to be studied many-sidedly (Darbellay & Stock, 2012).
77 Thus, the purpose of this study is more than simply applying the PMT model to understand
78 travellers' health protective behavior. Using the PMT model, this study aims to
79 comprehensively understand individuals' health behavior during travel. It is expected that the
80 findings of this study could expand the present understanding of travellers' individual health
81 protective behaviors and contribute to both the tourism and the public health literature.

82 ***1.2 Research context***

83 Australia is important in the global tourism market producing, in 2016, 8.3 million short-term
84 international departures with 3 million (36%) of them being to Asia. Despite this popularity,
85 many Australian travellers are not aware of the potential health risks in Asian destinations and
86 what they should do to protect themselves. This may be because many of the fatal diseases in
87 Asian destinations do not affect Australia. Rabies is a prime example, a viral disease that affects
88 humans and other mammals. Both bites and licks by an infected animal (dog, cat, monkey, bat,
89 etc.) can lead to rabies. Over 59,000 people die of rabies worldwide each year, with 59.6% of
90 these rabies deaths occurring in Asia (Hampson et al., 2015). While countries like Indonesia,
91 Thailand and Vietnam may be top tourism destinations for Australian travellers, they are

significantly at risk suffering rabies there (Piyaphanee et al., 2012). Furthermore, tourists cannot rely on being adequately treated for rabies if they are bitten overseas (Mills, Lau, & Weinstein, 2011). Consequently, rabies has become a significant health issue for Australian travellers (Wilson & Rohde, 2015).

Despite being a fatal disease, death from rabies is preventable if treated before symptoms develop. Such risk reduction information and how to prevent it can be obtained from health professionals prior to leaving, although few travellers inexplicably choose to do so (Heywood, Watkins, Iamsirithaworn, Nilvarangkul, & MacIntyre, 2012). As well, avoiding wild animal contacts has been listed by officials as one of the major risk reduction strategies against rabies (Australian Department of Foreign Affairs and Trade, 2018) (See Graph 1).

Graph 1: Australian Government brochure about rabies (Dec 2013)

Because of the threat of being severely unwell and that tourists can benefit if they protect their health, the risk of rabies in Southeast Asia is especially important to Australians. This provides an ideal research topic. Particularly, this study aims to explore the application of PMT to understand how Australian travellers protect themselves against rabies to ensure they stay healthy when traveling to Southeast Asia.

THEORETICAL FOUNDATION

2.1 Protection Motivation Theory

As an important topic in public health, a wide variety of models have been developed and applied to investigate individuals' health behavior; these models are the health belief model, social cognition theory, and the theory of planned behavior (Conner & Norman, 2005). Among

114 them, protection motivation theory (PMT) appears to be one of the most comprehensive models
115 used empirically (Floyd et al., 2000). In being adapted from expectancy-value theory and the
116 components of reward and self-efficacy, PMT provides the means of explaining why people
117 engage in health protective behaviors. Under the influence of environmental and intrapersonal
118 factors, people go through one of the two mediating processes (i.e., threat-appraisal and coping-
119 appraisal), which normally result in one of the two coping modes (i.e., adaptive coping and
120 maladaptive coping) (Milne, Sheeran, & Orbell, 2000). Adaptive coping normally leads to
121 people's engagement and/or continual engagement in corresponding health protective
122 behaviors, while maladaptive coping usually causes individuals' decisions to inhibit the
123 corresponding health protective behavior (Floyd et al., 2000).

124 When it comes to the relationships among the constructs, the results of two early meta-analyses
125 of PMT studies (Floyd et al., 2000; Milne et al., 2000) report that an increase in severity,
126 susceptibility, response and self-efficacy significantly affect coping appraisal, which result in
127 stronger probability of adapting responses. Meanwhile, Floyd et al. (2000) noted that
128 decreasing maladaptive response rewards and adaptive response costs would generally increase
129 adaptive responses. Additionally, Milne et al., (2000) notice that variables in coping appraisal
130 tend to have stronger associations with the outcome variables (i.e., intentions and actual
131 behaviors) than those outlined in threat appraisal. Additionally, variables in threat appraisal
132 (e.g., perceived severity and vulnerability) are poorly linked to people's motivations to engage
133 in health protection (Milne et al., 2000). The findings of 10 years of research also support the
134 validity of the abovementioned relationships (e.g., Bockarjova & Steg, 2014; Pechmann, Zhao,
135 Goldberg, & Reibling, 2003; Plotnikoff & Trinh, 2010; Raineart & Christensen, 2017).
136 However, most research using PMT pays attention only to adaptive coping rather than the
137 whole model, and ignores the effect of maladaptive responses (Conner & Norman, 1996;
138 Marett, McNab, & Harris, 2011).

139 Undeniably, PMT remains one of the most widely used models in public health to examine
140 individual health behaviors (Conner & Norman, 2005), for example, being used to test cancer
141 prevention, healthy lifestyle, and pro-environmental behavior (Floyd et al., 2000; Milne et al.,
142 2000). While these authors support to applying PMT, rabies, as an important health challenge,
143 has not been featured within research based on PMT.

144 2.2 PMT in tourism

145 While the PMT model is applied to tourism and travel (e.g., Law, 2006; Slevitch & Sharma,
146 2008; Sönmez & Graefe, 1998), it remains underexplored among the PMT literature. Table 1
147 summarises the examples of such studies. A closer examination of this body of literature has
148 revealed some notable perspectives.

149 Table 1: Tourism and travel articles using PMT

	Author	Title	Theoretical Models	Major Constructs	Major Findings
1	(Sönmez & Graefe, 1998)	Determining Future Travel Behavior from Past Travel Experience and Perceptions of Risk and Safety	Information integration theory + PMT	IV: Risk (single measurement on perceived vulnerability) DV: avoidance of visiting certain regions	Perceived risks were stronger predictors of avoiding regions than of planning to visit them. PMT can be used to explain the participants' behavioral intentions.
2	(Law, 2006)	The Perceived Impact of Risks on Travel Decisions	PMT	IV: Risk (single measurement on perceived vulnerability) IV: Efficacy of official media DV: Travel Intentions	Perceived risk affected individuals' visiting intentions
3	(Slevitch & Sharma, 2008)	Management of Perceived Risk in the Context of Destination Choice	PMT	IV: Risk (single measurement on perceived severity) DV: Travel intentions and Behavioral Intentions	Perceived risks were decreased by information quality but various patterns were identified for different types of perceived risk. Travelers were willing to pay extra for products and services if more safety and security are provided.
4	(Qi, Gibson, & Zhang, 2009)	Perceptions of risk and travel intentions: The case of China and the Beijing Olympic Games	PMT	IV: Risk (single measurement on perceived severity) DV: Intentions to visit Beijing to attend the Olympic Games	Risk Perception affects individuals' visiting intentions Efficacy beliefs varied by tourists from different regions
5	(Schroeder, Pennington-Gray, Kaplanidou, & Zhan, 2013)	Destination risk perceptions among U.S. residents for London as the host city of the 2012 Summer Olympic Games	Information integration theory + PMT	IV: Risk (single measurement on perceived vulnerability) DV: Visiting Intentions	Three destination risk perception items were the drivers of the intention to travel to a host city.
6	(Horng, Hu, Teng, & Lin, 2014)	Energy Saving and Carbon Reduction (ESCR) Behaviors in Tourism – A Perception Study of Asian Visitors from a Protection Motivation Theory Perspective	PMT	IV: PMT constructs (Risk was measured in terms of the vulnerability to environmental risk and the severity of environmental risk using multiple items) DV: ESCR behavior	Obvious differences between tourists' ESCR behavior intention and actual behavior are found

7	(Defranco & Morosan, 2017)	Coping with the risk of internet connectivity in hotels: Perspectives from American consumers traveling internationally	Social Cognitive Theory + PMT	IV: Benefit IV: Risk (Measured in terms of perceived vulnerability and perceived severity using multiple items) DV: Coping Intentions	Both benefit and risk were relatively equal magnitude predictors of coping intentions, while benefit had a slightly stronger effect on coping intentions than risk.
8	(Wang, Lin, Lu, & Lee, 2018)	When destination attractiveness shifts in response to climate change: tourists' adaptation intention in Taiwan's Kenting National Park	PMT	IV: climate change related threat appraisal (Risk was measured using multiple items in terms of vulnerability and severity) IV: Coping Appraisal DV: Tourists' Adaption Intentions	The results support the relationships between threat appraisal and adaptation intention, and coping appraisal and adaptation intention
9	(Lu & Wei, 2018)	Public's perceived overcrowding risk and their adoption of precautionary actions: a study of holiday travel in China	protective action decision model and PMT	IV: Risk was measured in terms of perceived severity using multiple items. DV: Behavioral intentions	Efficacy-related attributes of precautionary actions were positively correlated with the intention to take precautionary measures. Risk perception also significantly influenced the adoption intention
10	(Fisher, Almanza, Behnke, Nelson, & Neal, 2018)	Norovirus on cruise ships: Motivation for handwashing?	PMT	IV: Threat Appraisal (Risk was measured using multiple items in terms of vulnerability and severity) IV: Coping Appraisal DV: Behavioral Intentions	Threat appraisal not related Coping Appraisal related

150 First, one of the most notable focuses shared by travel risk studies and PMT deals with tourists'
 151 risk perception. Although risk perception varies in PMT and other health and psychological
 152 studies (Maddux & Rogers, 1983; Rogers, 1975), it basically involves two dimensions:
 153 perceived severity and perceived vulnerability (Conner & Norman, 2005). Early tourism risk
 154 research, however, tended to focus only on one aspect. Some focus only on perceived
 155 vulnerability, which considers the likelihood of the occurrence of a risky event (e.g., Schroeder,
 156 Pennington-Gray, Donohoe, & Kiouisis, 2013; Sönmez & Graefe, 1998), while others measure
 157 travellers' perceived severity only, which deals with risk's severe consequence (Law, 2006).
 158 The inconsistency in travel risk studies has nonetheless been superficial and thus struggled to
 159 put theory into practice (Yang & Nair, 2014).

160 Second, some travel risk research has recently added two variables to PMT: self-efficacy (e.g.,
 161 Law, 2006) and benefits (Defranco & Morosan, 2017). Some tests the relationships among the
 162 PMT constructs (e.g., Fisher et al., 2018; Horng et al., 2014), although their findings appear
 163 inconsistent with original PMT assumptions. For example, while Fishers et al. (2018) find that
 164 only coping appraisal relates to cruise passengers' intention of behaving to self-protect during

travel, threat-appraisal seems to be irrelevant. These inconsistencies call to be further validated regarding applying PMT to tourism and travel.

Third, most tourism risk studies using PMT make people's travel intentions as the outcome variable (e.g., Law, 2006; Slevitch & Sharma, 2008; Sönmez & Graefe, 1998). It is not until recently that tourism studies have focused on travellers' intentions to undertake preventive behaviors (e.g., Fisher et al., 2018; Lu & Wei, 2018; Wang et al., 2018). Although behavioral intentions can indicate one's actual behaviors, it may not always be accurate as expected (Stacks & Michaelson, 2010). Also, the PMT model suggests a transition between intention and behavior. As such, measuring travellers' behavior should be important to travel risk research.

Lastly, according to PMT, maladaptive perception is an important construct that affects people's personal health behaviors. Maladaptive coping response refers to individuals' attempt to reduce their level of fear without engaging in actions to reduce the risk and/or danger (Rippetoe & Rogers, 1987). Maladaptive responses have been found as one of the major reasons why the most at-risk group would not be convinced to appropriately reduce risk (Tanner, Hunt, & Eppright, 1991). Despite its influence, we believe that no studies in tourism have included this construct and tested the effects. This is somehow consistent with the major trend of the PMT studies (see Floyd et al., 2000; Milne et al., 2000), but should be corrected with an attempt to develop a comprehensive but innovative approach.

2.3 The conceptual model

This study aims to fill these three knowledge gaps. The first is to focus on how individual tourists behave to prevent the risk to their health, particularly pertaining to Australian travellers' health and the risk of rabies infections in popular Southeast Asian destinations. Second, instead of measuring only how Australian travellers intend to behave, this study considers how this behavior manifests itself as seen in how they act on their intentions. Third, this study contributes to the literature by testing a full PMT model in tourism and travel research. The results not only expand PMT research, but also importantly shows how tourism risk studies contribute when they are modified and revised accordingly. A conceptual model was developed based on the PMT and the research context of the study (See Figure 1). The *threat appraisal* represents the differences between perceived rewards and perceived threat, while the *coping*

appraisal represents the differences between perceived efficacy and perceived cost (Yan et al., 2014). The measurement of each construct is discussed in the Method session.

Figure 1: A conceptual model of key factors influencing protective behaviours with hypotheses

The hypotheses include:

- Hypothesis 1: Australian travellers' intentions of engaging in protective behaviors are positively associated with the threat appraisal process.
- Hypothesis 2: Australian travellers' engagement in protective behaviors are positively associated with the threat appraisal process.
- Hypothesis 3: Australian travellers' intentions of engaging in protective behaviors are positively associated with the coping appraisal process.
- Hypothesis 4: Australian travellers' engagement in protective behaviors are positively associated with the coping appraisal process.
- Hypothesis 5: Australian travellers' intentions of engaging in protective behaviors are negatively associated with maladaptive perception.
- Hypothesis 6: Australian travellers' engagement in protective behaviors are negatively associated with maladaptive perception.
- Hypothesis 7: Australian travellers' intentions of engagement in protective behaviors are positively associated with their actual behaviors.
- Hypothesis 8: Australian travellers' intentions to protect themselves mediate the relationship between the threat appraisals and their actual behaviors.
- Hypothesis 9: Australian travellers' intentions to protect themselves mediate the relationship between the coping appraisals and their actual behaviors.
- Hypothesis 10: Australian travellers' intentions to protect themselves mediate the relationship between maladaptive perception and their actual behaviors.

METHOD

3.1 Data collection

This study was conducted over two phases. First, semi-structured interviews were undertaken with sixteen Australian travellers from 5 to 29 June 2017 to understand their attitudes and perceptions toward travel health risks, actual or planned behaviors of rabies risk-reduction strategies for their past or intended trips to Southeast Asia. Second, based on the interview results and the literature, a questionnaire was developed, and an online survey was conducted in November 2017. The participants were recruited through an online panel provided by a market research company.

In the first phase, purposive sampling was used to recruit interview participants. A pilot test was performed before the interview to test the feasibility and relevance of the questions. An interview guide was developed to ascertain tourists' attitudes and perceptions, including their travel health perceptions of destinations in Southeast Asia, self-protective behaviors and related benefits and disadvantages, and travellers' knowledge of rabies. After the interview guide was developed, two academic experts and one travel medicine practitioner reviewed the pilot-test results. The interview was then conducted in English using either by telephone or face-to-face, depending on participants' preferences, the 16 of which involved Australian tourists who had visited Indonesia, Thailand, and Vietnam in the preceding three years or intend to travel there in the next three. Including intended participants was to understand people's attitudes, and what motivates them to protect themselves. To maintain confidentiality, the participants were assigned codes (see Table 2 for their profiles). All interviews were transcribed, and notes were taken during and immediately after each interview.

Table 2: Profile of interview participants (Nationality: Australia; age >18)

Code	Age	Gender	Past travel history		Travel Intention	
			Time	Destination	Time	Destination
P1	45	Male	2011	Vietnam Thailand	Over the next 3 years	Vietnam
P2	65	Female	-	-	Over the next 3 years	Vietnam
P3	38	Male	2014 2015	Thailand Indonesia	-	-
P4	31	Male	-	-	Over the next 3 years	Thailand
P5	28	Male	2016 & 2017	Thailand	-	-
P6	61	Female	2014 & 2015	Thailand	Over the next 1 year	Thailand
P7	19	Female	2016	Thailand	-	-
P8	29	Female	2015	Thailand	-	-
P9	57	Female	2015	Thailand	-	-
P10	57	Female	2017	Indonesia	-	-

P11	35	Female	2016	Indonesia	-	-
P12	21	Female	2016	Thailand	-	-
P13	49	Female	2014	Thailand	-	-
P14	26	Male	2017	Indonesia	-	-
P15	20	Male	2016	Indonesia	-	-
P16	21	Female	-	-	Over the next 1 year	Indonesia

The second stage involved a self-administrated online survey. A total of 51 Australians travellers who had travelled to Indonesia, Thailand or Vietnam in the preceding three years were invited to pilot test the online survey. After improving and revising the formal survey, it was distributed among the online panel and a total of 279 completed survey responses were included for the subsequent quantitative analyses. The panel consists of Australian travellers who had also been to Indonesia, Thailand, and Vietnam in the preceding three years.

Approximate half the respondents were female (50.2%) and male (49.8%). The average age was 44 years, and half were married (50.5%). A total of 49.1% of respondents had completed either a Bachelor or Postgraduate degree as their highest qualification, while 31.9% of them completed a certificate or diploma from TAFE; 19% of them completed Year 12 or below. The respondents were asked to indicate how many children they have with 39.4% being childless. The main reason for participants' latest trip to Indonesia, Thailand or Vietnam was for holiday or leisure (83.5%), to visit friends or relatives (11.1%), for business (3.2%), and others (2.2%). Our chosen sample was thus those holidaying (80.1% for holiday), which fits with Australia's National Visitor Survey Outbound Trips Results (Tourism Research Australia, 2016) showing that such leisure was the main purpose of these trips to these three countries.

3.2 Measurement of PMT constructs

The measurement scales were developed using the literature and interview results. To measure *perceived vulnerability*, the respondents were asked to rate the likelihood of experiencing rabies while travelling to Indonesia, Thailand and Vietnam using a 5-point Likert-type scale (1= extremely unlikely, 5= extremely likely) adapted from Sharifpour et al. (2014).

To measure *perceived severity*, participants were asked to rate how severe they think the consequences of rabies may be while travelling to Indonesia, Thailand and Vietnam on a 5-point Likert scale (1= not at all serious, 5= extremely serious) (Martin, Bender, & Raish, 2007).

To measure *actual self-protective behaviors*, the participants were asked to indicate if they have undertaken any risk reduction behaviors using a binomial scale (1 = yes, 2 = No), and the

list of risk reduction behaviors (e.g., GP, vaccinations, travel insurance) that were extracted from the findings of interviews.

To measure *self-efficacy*, the respondents were asked to evaluate their confidence in protecting themselves against rabies during their travel to Indonesia, Thailand and Vietnam (1= not confident at all, 5= absolutely confident) (Rimal & Real, 2003).

To measure *response efficacy*, the participants were asked to evaluate the efficacy of how they protect themselves against risk (e.g., GP, vaccinations, travel insurance) (1= not effective at all, 5= extremely effective) (Martin et al., 2007).

To measure *intentions to perform protective behaviors*, the respondents were asked to rate the extent to which they agreed with behaving to protect themselves if they are taking a trip to Indonesia, Thailand and Vietnam in the next 6 months (1= strongly disagree, 5= strongly agree).

To measure *rewards* from behaving to self-protect, the participants were asked to indicate the extent to which they agreed with the list of benefits of protections against rabies (1= strongly disagree, 5= strongly agree) (Floyd et al., 2000).

To measure *costs*, the participants were asked to indicate the extent to which they agreed with the list of disadvantages of protecting themselves against rabies (1= strongly disagree, 5= strongly agree) (Floyd et al., 2000).

To measure *maladaptive perception*, six statements were developed based on interview results and the literature (Rippetoe & Rogers, 1987; Tanner et al., 1991). The respondents were asked to rate the extent to which they agreed with the six statements representing different types of maladaptive perceptions, namely, *holiday spirit*, *avoidance*, *denial*, *wishful thinking*, *religious faith*, and *fatalism*, on a 5-point Likert scale (1= strongly disagree, 5= strongly agree).

RESULTS AND DISCUSSION

4.1 Interview results

Interview questions were related mainly to travel health perceptions and final or planned behaviors of participants who have travelled to the three Southeast Asian countries in the last three years or intended to do so in the next three. Findings of the interview data show that the measurement scales of the PMT constructs need to be modified. More specifically, three main

protective behaviors were identified, namely, ‘consulting health professionals (e.g., local or family doctor)’, ‘obtaining recommended vaccinations prior to travel’, and ‘taking out travel insurance covering me for the trip’. This finding agrees with a study finding that travel insurance and vaccinations are among the top risk reduction strategies for travellers when touring the East context (Lo et al., 2011). The interview also ascertained the advantages and disadvantages of each health risk reduction strategy, and thus used them as survey items within the quantitative phase of this study.

The interview results also told us about maladaptive responses, a concept that has been omitted from tourism research. Our results also showed that individuals chose not to engage in any self-protective behaviors because they have overcome similar risky situations in the past without taking any actions (Tanner et al., 1991). In the interview, participants indicated that ‘*past experience*’, and ‘*confidence in their health*’ are the main reasons why travellers were not concerned with their health. In contrast to the health literature, this study found that “holiday spirit” emerged as a central theme of respondents’ interpretation of maladaptive responses. For example, one participant mentioned, “*maybe because of my holiday spirit, I just want to have fun when travelling and do not want to concern any health issues*”. This is unique to tourism while at the same time, highlights the importance of expanding the application of PMT.

4.2 Model Testing Results

4.2.1 Principal component analysis (PCA) of the PMT constructs

An important step to ensure the suitability of PMT to our research involving its scale reliability. Measuring the PMT constructs in this study are based on both the literature and interview results (e.g., six items for ‘perceived rewards’, seven items for ‘perceived costs’). It is important to reduce a large set of variables so that it still contains most of the information (Yong & Pearce, 2013). Thus, we conducted principal component analysis to assess how suitable the conceptual model was for this study. Six constructs occupy the current study: *vulnerability* to rabies disease, *severity* of experiencing rabies, *self-efficacy* of taking protective actions, *response efficacy* of protective actions, *costs*, and *rewards* of taking actions (See Table 3). The results of the PCA test led us to drop an item: “*Pre-departure rabies vaccine course is only necessary once, then I am covered for future trips also*” from the *Rewards* construct. The revised scale appears to be reliable as the part-whole correlation and R^2 values of all items were greater than 0.4 and the Cronbach’s α values were greater than .7 (Leech, Barrett, & Morgan,

2005). For constructs that include several items, the mean value was computed to develop composite variables for model testing.

Table 3: Principal component analysis of PMT constructs and means of composite variables

PMT constructs and items	Mean	SD	Loading	Eigen value	% of Variance	Reliability α
Construct #1: Vulnerability (1 item)	2.50	1.021				
Construct #2: Severity (1 item)	3.93	.917				
Construct #3: Self-efficacy (3 item)	3.95	.765	-	2.141	71.354	.799
Consulting regular health professionals (local GP/family doctor)	3.87	.957	.864			
Obtaining recommended vaccinations prior to travel	3.92	.904	.858			
Taking out travel insurance covering me for the trip	4.05	.853	.812			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .701, Bartlett's test of Sphericity: $\chi^2 = 262.439$, $p < .000$						
Construct #4: Response-efficacy	3.91	.770	-	2.080	69.348	.779
Consulting regular health professionals (local GP/family doctor)	3.76	.928	.830			
Obtaining recommended vaccinations prior to travel	3.99	.952	.837			
Taking out travel insurance covering me for the trip	3.98	.893	.831			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .703, Bartlett's test of Sphericity: $\chi^2 = 226.945$, $p < .000$						
Construct #5: Costs (7 items)	3.19	.680	-	3.478	49.684	.825
Obtaining rabies vaccination is expensive	3.24	.947	.754			
Obtaining pre-exposure rabies vaccine (multiple intake) is time consuming.	3.14	.926	.788			
Receiving the rabies vaccine may cause side effects	3.37	.866	.706			
If I don't get bitten by an animal with rabies, the pre-exposure vaccine will have been a waste of money	2.85	1.091	.683			
GP service only provides generic health consultations, not specific for travel-related health consultation.	3.08	.969	.729			
Not all GP clinics have rabies vaccination	3.46	.863	.658			
Travel insurance only covers the money, does not protect health	3.17	1.128	.599			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .853, Bartlett's test of Sphericity: $\chi^2 = 612.988$, $p < .000$						
Construct #6: Perceived Rewards (5 items)	3.82	.689	-	2.876	57.341	.807
Pre-departure rabies vaccine gives peace of mind in the event of a rabies risk exposure.	3.88	.909	.836			
Obtaining rabies vaccine can save money for medical treatment in case I am bitten by animals.	3.80	.923	.788			
Consulting GP can increase my knowledge of the travel related risks including rabies.	3.87	.899	.719			
Consulting GP is bulk billed so there is no out of pocket costs	3.67	1.007	.610			
Travel insurance can cover costs in case I am bitten by animals	3.89	.840	.710			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .802, Bartlett's test of Sphericity: $\chi^2 = 467.454$, $p < .000$						
MV: Intentions to take protective actions	3.83	.862	-	2.104	70.123	.786
Consult GP	3.65	1.028	.862			
Take vaccinations prior to travel	3.77	1.057	.871			
Take insurance covering me for the trip	4.06	1.002	.776			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .679, Bartlett's test of Sphericity: $\chi^2 = 254.922$, $p < .000$						
DV: Actual Protective Behaviors (Yes/No)*			-	1.591	53.046	
Consulting GP	41% (115/279)		.719			
Take vaccinations prior to travel	34% (95/279)		.757			
Take insurance covering me for the trip	43% (120/279)		.708			

4.2.2 Principal component analysis (PCA) of the maladaptive perceptions

Maladaptive response is another important construct in PMT and is one of the coping modes. PCA was conducted to explore the underlying dimensions (see Table 4), which shows that only two components were extracted, the first was titled 'internal locus of control', which concerns mainly travellers and covers statements about holiday spirit, avoidance, and wishful thinking; the second component was titled 'external locus of control', which deals with external influences and covers statements about religious faith and fatalism. Regarding maladaptive perceptions, the participants scored relatively higher on items related to internal locus of control.

Table 4: Principal component analysis of maladaptive perceptions

	Mean	SD	Loading	Eigen value	% of Variance	Reliability α
Maladaptive perceptions*	2.75	.827				.829
Component 1-internal locus of control	3.00	.851		1.881	31.355	.733
- I try not to think too much about health risks every time I travel, and the trip to Thailand/ Indonesia/ Vietnam is no exception.	2.99	1.124	.795			
- I won't feed, pat or play with animals so don't have to worry about rabies.	3.19	1.027	.826			
- I have always been healthy and have a strong immune system, so will be fine for rabies when I travel to Indonesia or Thailand.	2.82	1.008	.667			
Component 2-external locus of control	2.49	1.054		2.514	41.900	.858
- I believe a miracle cure will occur in the future for any health issues I may encounter during my trips to Indonesia or Thailand.	2.46	1.124	.833			
- God will protect me from any potential harm.	2.42	1.250	.903			
- If you are destined to die from health incidents during your trip, you will; there is really very little you can do about it.	2.59	1.204	.835			

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .781, Bartlett's test of Sphericity: $\chi^2 = 715.195$, $p < .000$

* Developed based on interview results and literature, 1= strongly disagree... 5= strongly agree

The results suggest that the most common type of maladaptive perceptions among the participants is *avoidance*. This is consistent with an earlier study, which reveals that avoidant thinking can reduce people's fear of threats and even further weaken their intentions to adopt risk reduction strategies (Rippeto & Rogers, 1987). When it comes to our research, nearly half

(40.2%) of the participants believed that they can avoid being exposed to wild animal contacts (e.g., do not feed, pat or play with animals) during their trips, and thus, there is no need to worry about rabies. Another common type of maladaptive perceptions among the participants involves the good feelings about holidays (also called the *holiday spirit*). Our results suggest that more than one-third (38.7%) of participants try not to think about health risks while travelling. This is unique to tourism and travel because escape and hedonism commonly motivate travel as indicated by two specific behaviors of travellers: first, they tend to emphasize the fun and benefits of travel while intentionally ignoring various health risks; and second, they can sometimes be seen as an at-risk population being normally unfamiliar with the environment of their destination and know little about what resources are available to protect themselves. Rabies risk does not ‘take a holiday’ despite their maladaptive perceptions potentially leading to their lack of self-protective behaviors. This finding also stresses the importance of understanding maladaptive perceptions in travel and tourism.

4.3 Model testing

Following previous application of PMT (Yan et al., 2014; Yarmohammadi, Sharifabad, & Rahaei, 2014), four perceptions items were developed from the six PMT constructs: (1) *perceived threat* of rabies risks, whose score is calculated according to vulnerability and severity items; (2) *perceived efficacy* of taking protective actions, whose score is calculated using self-efficacy and response efficacy; (3) *perceived cost*, and (4) *perceived rewards* of taking protections. Two PMT pathway scores were computed. The threat appraisal score = perceived rewards scores minus the perceived threat score. The coping appraisal scores = the perceived efficacy score minus perceived cost score (Yan et al., 2014). Pearson correlations were calculated to demonstrate the relationships among major constructs (See Figure 2).

The conceptual model was tested by a series of regression analyses using *SPSS 25*. The two PMT pathways (*threat- and coping-appraisal*) and maladaptive perceptions were entered as the independent variables; the protective intention was treated as the mediating variable, and the protective behavior was treated as the dependent variable. The results are reported in Figure 2. The full model was statistically significant (χ^2 (df= 4, $N= 279$) = 37.254, $p < .01$), and explain between 12.5% (Cox & Snell $R^2= .125$) to 17.4% (Nagelkerke $R^2= .174$) of the variance in the response behavior. The protective intentions determine the likelihood of travellers’ engaging in actual protective behaviors ($\beta= .955$, df= 1, $p < .01$), and explain 26.6% of the variance ($R^2= .266$, F (df= 3, $N= 279$) = 33.276, $p < .01$). Both the threat appraisals ($\beta = .135$, $p < .05$)

and coping appraisals ($\beta = .478, p < .01$) significantly influence protective intentions. The results provide support to H1, H3, H7, H8, and H9, but did not support H2, H4, H5, H6 and H10.

Figure 2: Full PMT Model Testing Results

(Note: Key findings. H1) Both threat- and coping appraisal significantly predict intentions. H7) Behavioral intentions significantly predict behaviors. H8 & H9) Intentions mediate the relationships between cognitive appraisals and actions. Additionally, maladaptive perception is negatively associated with coping appraisal.)

Our primary objective was to assess the utility of adapting PMT and applying it to explain travel health risks. The results support this application of the PMT to a tourism and travel context, which contributes theoretically in two ways. First, the results support the main PMT assumptions, that both threat and coping appraisal can influence individuals' intentions to protect themselves. For example, Fisher et al. (2018) examine cruise passengers' handwashing intentions and find that only the constructs related to the coping appraisal (e.g., response-efficacy, self-efficacy, and cost) predict protective intentions. However, the threat appraisal related constructs (severity and susceptibility) did not play a role in the decisions-making process. The findings of our study showed that both PMT appraisal determined individuals' intentions to protective themselves. This may be partly because our study includes the construct *reward*, which is consistent with the PMT model but neglected in Fisher et al's research. Furthermore, this study notes that, compared to the threat appraisal, the coping appraisal more strongly affected the outcome variable. This finding aligns well with other PMT studies in public health, which address a higher predictive power assumed by the coping appraisal (Floyd et al., 2000; Milne et al., 2000). Given the support to our hypotheses, future studies could use PMT to explore different topics and enrich the body of literature.

Second, compared to other variables, this study notes that behavioral intentions do possess the strongest predictive power of the participants' actions although the effect size remains relatively small. Thus, future studies could concentrate on people's behavior rather than simply testing their intentions. We also recommend using other models to explore similar topics related to health risks at travel. Options such as the health belief model could be to explore individuals' health and self-protective behavior while travelling.

Third, the findings support the mediation hypotheses (H8, H9) suggesting that the relationship between appraisals and the action largely depends on protective intentions. Instead of simply measuring the relationships between constructs, this finding furthers our understanding of travellers' health behaviors by clearly demonstrating how the constructs are related and in what way they influence people's protection. Revealing the underling relations is one of the major findings of this study.

Finally, yet importantly, this study includes maladaptive perception in the full PMT model testing. The results showed that this construct is neither associated with the participants' intentions nor their actual behaviors. However, the results of the Pearson correlation tests showed that maladaptive perception is negatively associated with the coping appraisal. This is consistent with the original PMT assumptions and some literature (Fardell et al., 2016; Rippetoe & Rogers, 1987), which suggest that, when exposed to a high-risk situation, individuals may be influenced by maladaptive perceptions and fail to engage in preventive actions. Thus, even though maladaptive perception may not determine one's behavioral intentions, it is likely that it may still play an important role in determining the engagement of different appraisal modes. Built on these findings, future studies can explore if there exists a specific chain of order of the decision-making process (Floyd et al., 2000).

CONCLUSION AND IMPLICATIONS

Health, safety, and well-being are important topics in tourism studies. This study applied the Protection Motivation Theory (PMT) to explore travellers' self-protective behaviors against health risk. This study combines the fields of public health and tourism management to encourage travellers to engage in self-protective behavior against health risks. The findings of this study explain how to ensure individuals' health and safety while at travel, which can greatly contribute to their overall well-being.

5.1 Theoretical Implications

From a theoretical perspective, our study marks an early attempt in tourism studies to expand and test the PMT model fully. Firstly, this study confirms the hypotheses by concluding that both the threat and coping appraisal can encourage travellers to protect themselves, and behave accordingly while travelling. The findings not only emphasize the significance of understanding individuals' risk planning and reducing behaviours, but also indicate the importance of turning intentions into actions. Furthermore, our findings provide new perspectives about the construct of 'maladaptive response', which has been mentioned in the PMT literature but has never been tested in tourism and travel research. We find that both *avoidance* and *holiday spirit* are the most common types of travellers' maladaptive perceptions in our study. Although they did not directly determine people's behaviors, they are negatively associated with coping appraisal and may influence decision making. Additionally, the findings of the factor analysis suggest that maladaptive perceptions can be further divided into two types, both of which differed in the locus of control. This meaningful notion is useful for our research and for future studies exploring other travel health issues.

Regarding tourism, our findings further the understanding of tourists' health behaviors. Instead of simply using PMT to explain tourists' tendency to avoid risky situations and decisions, we tested the full PMT model and were able to demonstrate how tourists' perceptions and thoughts may affect their intentions and behaviors. While the major findings were consistent with the PMT, this study did provide new perspectives about the construct of maladaptive perceptions by highlighting the new dimension of holiday spirit and the new perspective involving the locus of control. The findings show the popular preventive measures against health risks among international tourists.

Moving beyond tourism, the major contribution of this study lies in theory testing (De Vaus, 2001). Using deductive reasoning derived from PMT and related literature, this study developed and tested ten hypotheses. Although the results supported five of the hypotheses, it is noted that maladaptive perceptions did not directly affect the participants' intentions or behaviors. Because this is unexpected, it deserves further attention to explore the underlying reasons. Additionally, this study attempted to explain "why" tourists adopt protective behaviors against health risks by using the PMT model to explain. According to Whetten (1989) and De Vaus (2001), this is one of the most challenging yet essential steps in theory building; in

achieving this, we believe that this study has contributed to social science by exploring travel health risks from a social psychology perspective.

5.2 Practical Implications

This paper also has practical implications. Firstly, it contributes to the existing body of knowledge on how to motivate travellers to engage in risk prevention and reduction behaviors. Ensuring travellers' health and safety is obviously beneficial for them and thus assisting with reaching this outcome is essential for both tourism researchers and practitioners and says that practitioners need to make tourists' health and well-being their business.

Secondly, our findings suggest that more attention should be directed to the most influential PMT pathway to achieve desired behavioral change. Given the stronger predictive power assumed by the coping appraisal, future effort should be devoted to increase the perceived efficacy (both self-efficacy and response efficacy) to encourage travellers to self-protect (Yan et al., 2014). To do so, campaigns and communication strategies should specify such preventive measures and ensure they are accessible to the tourist population.

Lastly, this study explored the construct, maladaptive perceptions in tourism and noted that maladaptive perceptions are also related to travellers' sense of control. Also, avoiding wild animal contacts has been communicated by officials as one of the major strategies against rabies risk (as discussed earlier in Section 1.2). The reality, however, is different. Avoiding animals is not enough: 40% of rabies risk exposures occur in travelers who were avoiding contact with animals (Mills et al., 2011). Additionally, to obtain unique and memorable travel experiences, international travellers are oftentimes encouraged to interact with wild animals in popular tourist destinations. This is evident by a recent example where a traveller was reported to face a life-threatening situation after the monkey's bit him during his visit to Monkey Forest in Bali (Cronshaw, 2016). The findings here are alarming in that (1) there are differences between what people believe and how they behave; and (2) policy-makers and practitioners need to come up with concrete, accurate, and practical risk reduction strategies to combat rabies.

When translated this into practical applications, it means that the most effective communication strategy should centre around tourists. The goal is both to educate tourists and increase their sense of control. Strong public education programs and media campaigns are needed to inform the public and to change or correct potential misperceptions. In the long term, this can reduce and even avoid the negative health consequences affecting international travel.

LIMITATIONS AND FUTURE RESEARCH

This study carries several limitations that can offer opportunities for future research. First, the data used in this study were collected from a self-reported online survey, which are confined to people with access to internet. This may bias research findings. We used purposive sampling, which although was important for this study, it may raise some concerns related to generalizability and may challenge the external validity of the findings. In addition, although this study only tested three risk reduction strategies that were identified from the interview results; information-seeking is considered one of the most common risk-reduction strategies for tourists (Lo et al., 2011). Thus, future studies could include this particular behavior or cover a wider variety of risk reduction strategies.

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