Understanding How Tourists Perceive and Respond to Risk: A Focus on Health Risk

Jie Wang and Marion Karl

Abstract With the COVID-19 pandemic, safety and hygiene are becoming key criteria for travel decision-making; therefore, understanding tourists' perception of and response to risk, particularly health risk, becomes more prominent when the tourism industry is one of the hardest hit by the COVID-19 pandemic. After a comprehensive literature review on tourists' risk perception, this chapter develops a risk perception model in the "tourist-destination relationship" context. Going from a more general discussion on tourists' risk perception, this chapter reviews the literature on tourists' health risk perception as a sub-field and illustrates it using a case study. This case study discusses Australian tourists' risk perception of diseases or illnesses using pre-COVID-19 survey data. Based on the results of the case study, this chapter outlines an interdisciplinary research agenda to understand tourists' perception of and response to risk in the context of tourist health and safety in the post-COVID-19 era. This chapter concludes with urgent research themes and topics, disciplinary insights, methodology and future opportunities.

Keywords Tourism · Risk perception · Health risk · COVID-19 · Health · Safety

Introduction

Safety and security are basic human needs and essential to tourism and travel (Wang et al., 2019c). Reducing risk in tourism has therefore become the key for successful tourism development in destinations and risk perception is now a decisive element in travel decision-making for individuals (Fuchs & Pizam, 2011). Understanding

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how tourists perceive and respond to risk has been an important research field in the past decades, resulting in more than 880 journal publications in Scopus (based on a keyword search using *risk* and *tourism* in November 2020). This chapter focuses on risk perception because tourists' response to risk is driven by their subjective risk assessment rather than the objective risk level (Karl & Schmude, 2017; Wolff et al., 2019). Risk perception is an important concept for tourism academia and the industry because it can explain why people choose to act in particular ways, and can thus contribute to effective risk management.

Studies on risk in tourism are often driven by tourism crises, such as a natural disaster or global crisis events (e.g., COVID-19 pandemic) (Ritchie & Jiang, 2019). In particular, the terror attacks of 9/11 in New York have triggered ample research on this topic, which led to a more theoretically deepened understanding of the underlying mechanisms of risk perception and travel behaviour. The COVID-19 pandemic has already inspired numerous new studies on this topic and will further enhance our understanding of risk in tourism. Past reviews of the literature revealed that tourism research on risk tends to apply a case study approach and focuses on a specific disaster or risk type (e.g., terrorism risk), destination or tourist type (e.g., backpacker, cruise tourist) (Ritchie & Jiang, 2019). Studies that compare multiple types of risk (Gray & Wilson, 2009) and/or a range of destinations are rare (Karl et al., 2020).

The COVID-19 pandemic has triggered ample research investigating the impact of health risk on travel behaviour (e.g., Zhang et al., 2020). *Health risk* can be defined as a factor that raises the probability of adverse health outcomes (WHO, 2009). The threat of infectious diseases can lead to a crisis in tourism, because it increases the perception of health risk, leading to reduced travel activities and consequently negative impact on tourism development (Haque & Haque, 2018). While the COVID-19 pandemic is still unfolding, tourism researchers are debating about the future of tourism in the post-pandemic phase. It is yet unclear whether COVID-19 will lead to a *new normal* with changed tourist behaviour as a legacy of the pandemic, such as short-haul travel instead of long-distance (Zenker & Kock, 2020) or if tourist behaviour will return to "business-as-usual" once the imminent health threat of COVID-19 has been eliminated (Lew et al., 2020).

Tourism researchers and industry practitioners can learn from case studies of past epidemics in certain countries or regions to understand how health risk impacts tourists' decision-making and tourism development in the short and long term. Examples of past epidemics are the foot-and-mouth-disease (FMD) outbreak in the UK in 2001 (Blake et al., 2003), the severe acute respiratory syndrome (SARS) outbreak in Asia in 2003 (Kuo et al., 2008; McKercher & Chon, 2004), and the Ebola virus disease (EVD) outbreak in Africa in 2014 (Novelli et al., 2018).

The first objective of this chapter is to develop a risk perception model after we review the current knowledge on risk perception and its impact on travel decision-making and tourist behaviour in general. The second objective is to explain health risk in the context of travel and tourism in particular, which has so far been one of the most important topics in tourism risk studies. This chapter also reports a case study on how Australian tourists perceive health risks and which measures they

undertake to protect themselves against a range of travel-related health risks. This case study is based on a national survey conducted in the pre-COVID-19 period. Going beyond the case study, this chapter concludes with thoughts about current and future changes in risk perception and how this may impact travel decision-making in the post-COVID-19 era. Finally, a research agenda for future studies to enhance the understanding of how tourists perceive and respond to risk is outlined.

Understanding Tourists' Perception of and Response to Risk

This section offers an overview of risk literature in tourism research. It discusses the general knowledge on travel risk, tourists' risk perception, and cognitive as well as affective determinants of risk perception. An overarching framework is proposed to illustrate the role of tourism risk perception in the tourist-destination relationship context. This section also provides a review of the current literature on health risks of travelling.

Tourists' Perception of Risk

Expected utility theories in economics and psychology base their definition of perceived or subjective risk on the commonly accepted objective risk definition (Wolff et al., 2019). They understand perceived risk as an assessment of the severity and probability of possible outcomes in the future. In tourism research, risk perception has been defined, conceptualised and measured in various ways, leading to bias in the results and contrasting conclusions due to inconsistencies (Wolff et al., 2019). In this chapter, we follow the suggestion outlined in the review of past tourism literature on risk by Wolff et al. (2019) and understand *risk perception* as a cognitive evaluation and judgement of risk levels, which might be influenced by affect, but is not a feeling or attitude per se.

Understanding the factors that influence risk perception is essential for tourism research as well as the tourism industry to explain tourists' responses to different risk types. McCabe et al. (2016) proposed a holistic model of travel decision-making, which involves two psychological choice systems depending on the level of involvement and cognitive load (e.g., information, time availability). They argued that tourists' travel decision-making can be either affect-driven, automatic, intuitive, rapid, and less effort oriented (i.e., heuristic choices), or rational, complex reasoning and more effort required (i.e., systematic choices) (McCabe et al., 2016). For example, tourists use information search as a risk reduction strategy (Lo et al., 2011) which is part of the rational choice system. As well, travel decision-making in the context of risk can include both types of choice systems. In many cases, tourists use mental shortcuts—so-called heuristics—to judge risk levels and rely on their emotional responses to threats to inform their decisions. Both cognitive and

affective factors need to be considered to better understand risk perception and associated travel decision-making and tourist behaviour.

Factors That Influence Tourists' Risk Perception

Risk perception cannot be reduced to any simple subjective correlate of an estimate of risk based on the production of probability and consequences (Breakwell, 2014). Risk perception is not an entirely rational process (Slovic, 1987), but rather a subjective evaluation influenced by partial or lay knowledge (Sharifpour et al., 2014) or personality (Nordfjærn & Rundmo, 2015). Interestingly, tourists often over- or under-estimate travel risk, but still base their decisions on these biased risk perception (Fuchs & Reichel, 2006). Prior studies have identified several factors that influence tourism risk perception.

Trust

Tourists tend to perceive a lower level of risk if they trust the information source and the process used to assess the risk (Walters et al., 2017). Since tourists generally have limited knowledge about all risks that might occur at a destination they have to rely on information from different sources (e.g., government officials, friends and relatives, mass or social media) to evaluate the risk level and make decisions about whether or not they feel it is safe to visit a destination.

Control

Tourists who feel control over the future consequences of a risk perceive lower levels of risk. Perceived control depends on the type of risk (e.g., risky street conditions or driving habits at a destination can be controlled by safe driving whereas tourists will likely perceive less control over terrorism risk) as well as personality traits. Two core self-evaluation traits are essential in the context of risk and control: Locus of Control and Self-efficacy. The concept of *Locus of Control* (Rotter, 1966) suggests that whether tourists attribute control over a situation to themselves (i.e., internal locus of control) or to outside factors or chance (i.e., external locus of control) depends on a psychological trait. For example, adventurous tourists who are motivated to travel by sensations and less anxious about travelling have an internal locus of control (Griffith & Albanese, 1996). The concept of *Self-efficacy* (Bandura, 1977) implies that tourists' decision-making in the context of risk depends on how much they believe in having skills and abilities to deal with a risky situation while travelling rather than their actual capabilities. Self-efficacy can be enhanced through successfully experiencing a challenging situation or by learning from the social environment, which explains the strong impact of own travel experience and

word-of-mouth information on risk perception and travel decision-making in the context of risk (Karl, 2018; Sönmez & Graefe, 1998).

Type of Risk

Mixed evidence exists regarding the impact of different risk types on travel behaviour (Karl et al., 2020). Tourists perceive risks of natural cause (e.g., natural disaster) as less risky than man-made risk types (e.g., terrorism). Consequently, they are more likely to change their travel plans to avoid man-made compared to natural risk types (Karl et al., 2020). Other studies indicate that health risk was perceived as one of the major risk categories influencing travel decision-making (Kozak et al., 2007; Law, 2006), and even more influential than terrorism risk (Rittichainuwat & Chakraborty, 2009). However, in some macro-level studies, political instability and terrorism were perceived as the major risk categories disrupting tourist flows between source market and destination over time (Jin et al., 2019; Lanouar & Goaied, 2019), while health risk is only the secondary (Jin et al., 2019). Hence, how people self-evaluate the severity and impact of different risk types on their travel behaviour and how these different risk types affect their actual travel behaviour may differ substantially (Karl, 2018).

Scope and Frequency

Tourists perceive cataclysmic events, where many people may die at the same time as particularly risky. For instance, large-scale terrorism with a high number of fatalities was found to have a stronger (direct) impact on tourism than minor events with no fatalities (Thompson, 2011). They may perceive such risk as more severe because the consequences are much more impactful (e.g., large numbers of deaths). Moreover, frequently occurring hazardous events, such as numerous terrorism attacks at a destination, can create long-term tourism decline (Pizam & Fleischer, 2002). Frequently occurring events may create a permanent change in risk perceptions of a destination and a negative destination image. This tendency to perceive frequent events as riskier directly refers to the second dimension of risk perception—the probability of occurrence. If an event (such as terror attacks) frequently happens in a destination, tourists will perceive a higher likelihood of such an event happening again than in the case of a one-time natural disaster.

Awareness and Imagination

Tourists make judgements about the likelihood of a dangerous event based on how easily they come to mind. This psychological short-cut of availability heuristic (Tversky & Kahneman, 1973) explains why risks that are frequently portrayed in the media are perceived as riskier. For example, the risk of shark attacks is often

overestimated because of intense media coverage of rare attacks and vivid portrayals of shark attacks in movies. In addition to the increased awareness, tourists also overestimate risks that are more fearsome or scary (Sunstein & Zeckhauser, 2011), such as a shark attack, even if the probability of something happening is low (i.e., probability neglect). Psychologists argue that this bias in risk perception is due to the vividness of imaginations of such events. However, if a risk is invisible or difficult to understand, hence, difficult to imagine, people also overestimate the risk (Slovic, 1987). Tourists may, therefore, be reluctant to visit destinations that are affected by risk types that do not occur in their home country because they perceive them as riskier (Reisinger & Mavondo, 2006).

Familiarity

Tourists have heightened risk perceptions if a risk is less known (or information is difficult to access). Hence, risks that tourists are not familiar with, such as COVID-19 or new technologies in tourism, are perceived as riskier. Karl (2018) operationalised the concept of familiarity to investigate tourists' destination choice in the context of risk. Tourists differ in their ability to deal with this uncertainty and to avoid uncertainty while travelling tourists adopt different strategies, such as travelling with a tour group or visiting fewer destinations on holiday (Money & Crotts, 2003).

Uncertainty

Although often used interchangeably, risk and uncertainty are two distinct concepts about "the limits of knowledge that are inherent in tourism as in any activity" (Williams & Baláž, 2015, p. 271). In contrast to risk, which assumes knowledge of the situation to assess the risk level, uncertainty arises from partial knowledge. Sharifpour et al. (2014) explored the relationships between risk perception and two types of knowledge. They found that only people who feel familiar with a destination (i.e., subjective knowledge) will perceive the destination as less risky. How much people actually know about a destination was not related to the level of risk perception, however.

Personal Impact

Tourists perceive risks that affect them personally as more threatening than those that affect strangers. Ritchie et al. (2014) propose a theoretical framework to explain this observation. They propose tourists who tend to believe that bad things are less likely to happen to them than to the average person (i.e., self-positivity bias) have lower risk perceptions, at least considering the risk of being personally affected by the risk.

Voluntary and Personality Traits

Tourists who voluntarily engage in risky behaviour tend to perceive the situation as less risky. Several studies have confirmed this assumption by applying the psychological constructs of risk-taking propensity (Jonas et al. 2011; Pizam et al., 2004; Yang et al., 2018), risk affinity (Hajibaba et al., 2015) and sensation-seeking (Lepp & Gibson, 2008; Meng & Han, 2018).

Other Determinants

Some other factors can also influence tourism risk perception, for example, individuals' experience of risk, expertise, personal belief and value (Breakwell, 2014). However, there has been relatively little research on the relationship between these factors and tourists' risk perception. Socio-demographic differences (such as gender, age, tourist type) are also important factors in understanding and reducing perceived risk in tourism (Wang et al., 2019b).

The long list of factors that are discussed in this section has demonstrated the complexity of developing a comprehensive understanding of travel-related risk and related reactions.

The Role of Emotions in Tourists' Risk Perception

Traditionally, emotions have been ignored when theories of risk perception were first developed. The traditional dominance of cognitive models in explaining risk estimates and risk-taking behaviour has been challenged, since emotional responses to risk highly impact decision-making, such as the *risk-as-feelings* hypothesis (Loewenstein et al., 2001), as well as the interaction of feeling and cognition in the perception of risk (Slovic, 2010). From an evolutionary psychology perspective, two affective constructs related to risk need to be considered. *Fear* and *anxiety* are both associated with emotional responses to threat and can cause potential harm to social, psychological or physical wellbeing. Fear is defined as the emotional response to immediate perceptible or manifest threats, while anxiety refers to emotional responses to potential threats (Bulley et al., 2017). Even if no visual or sensory cues exist, such as the case of the COVID-19 threat, people still feel threatened or anxious because they create their own mental representation of the imminent or potential threat. Several studies in tourism have investigated the perceived threat and the emotional or behavioural responses (e.g., Dolnicar, 2005), but interest in this topic is likely to grow with the COVID-19 health risk and the threat it poses to tourists' wellbeing. Studies show that perceived threats of an infectious disease are associated with negative emotions, and can make tourists behave risk-averse (Zhang et al., 2020).

The second main affective construct related to risk perception was introduced into tourism research by Larsen et al. (2009, p. 263), who defined and operationalised *tourist worry* as "individual's attempts to engage in mental problem solving regarding tourist trip-related issues where outcomes are thought to be uncertain and contain possibilities for negative results". In contrast to locus of control or self-efficacy, tourist worry is not a personality trait, but a momentary state that depends on situational factors and tourists' expectations (Larsen et al., 2009). Wang et al. (2019b) found that situation-specific worry varied by segments and significantly influenced decision-making related to safety behaviours in tourism.

Tourists' Response to Risk: A Tourist-Destination Relationship Framework

Behavioural geography (closely related to environmental psychology) is a field of human geography that combines psychological and geographical concepts and theories of decision-making and environmental perception to explain people's behaviour as a result of the context in which it takes place. Behavioural geography emphasises the role of cognitive processes in shaping decision-making and behaviour (Gold, 2019). It assumes that people's behaviour is based on their perception and subjective images of the real world rather than objective knowledge.

Behavioural geography provides an overarching conceptual framework for the study of risk perception and travel decision-making for two main reasons. First, behavioural geography emphasises the context in which perception takes place (Gold, 2019). It understands perception as part of an interrelated system where behaviour results from the perceived reality as the "mediating link between environment and man" (Bunting & Guelke, 1979, p. 449). Travel decision-making in the context of perceived risk depends on who is making a decision, and which destination the decision is made about (Karl, 2018). From a behavioural geography perspective, the definition of travel risk perception needs amendment to include place and the spatial context that tourists are assessing.

Second, behavioural geography assumes that behaviour is a result of perceived reality rather than an objective environment (Argent & Walmsley, 2009; Gold, 2019; Kirk, 1952). Early studies on risk in tourism have emphasised that travel behaviour is shaped by individual risk perception rather than objective risk levels (Mansfeld, 2006; Reichel et al., 2007). Since people see the world through their perceptual lens (Argent & Walmsley, 2009), the same environment can be perceived differently—resulting in different behaviours. In tourism research, clear evidence shows that risk perception and travel behaviour depend on the tourists' personality traits (Pizam et al., 2004; Sharifpour et al., 2013), their past experiences (Kozak et al., 2007), and socio-demographics (Karl, 2018; Lepp & Gibson, 2008; Sönmez & Graefe, 1998).

Beyond these individual characteristics, tourists' risk perception is also impacted by the social and cultural background (Reisinger & Mavondo, 2006), where the

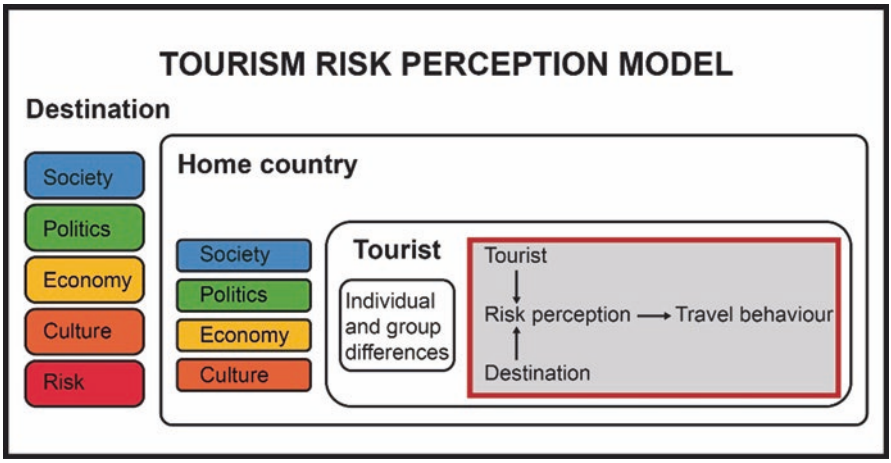

Fig. 1 A tourism risk perception model from the behavioural geographic perspective

decision takes place. In a tourism context, this social and cultural background may include the social, economic and political context (Bunting & Guelke, 1979) of the tourists' home country as well as the destination where the tourist travels to. In summary, we propose behavioural geography as an overarching theoretical framework for studying risk perception in tourism. Our developed tourism risk perception model (see Fig. 1) suggests that tourists' behavioural change in reaction to risk depends on how tourists perceive the risk level at a destination based on their personal characteristics (e.g., gender, experience, risk affinity) and from their home country (e.g., familiarity with certain risk categories).

Factors That Influence Tourists' Health Risk Perception and Decision-Making

Amidst all the fun and benefits that travel can bring, travel can pose various risks to health, depending on many factors, including the tourist and the destination (Leggat & Franklin, 2013). Following the tourism risk perception model, tourists may encounter different types of health risks which vary depending on the tourists (e.g., underlying health of the tourist, behaviour of the tourist), and their destination (e.g., animal and insect bites, inadequate medical services, foodborne and waterborne diseases, injuries from road traffic accidents or recreational activities) (WHO, 2020).

Tourists may encounter sudden and significant changes in altitude, humidity, microbes, and temperature, which can result in ill-health (Richter, 2003). Serious health risks may also arise in destinations where accommodation is of low quality, hygiene and sanitation are inadequate, medical services are not well-developed, and clean water is unavailable (WHO, 2020). Although 30–50% of tourists get ill or are

injured during their trip (Briggs & Habib, 2004), less than half of tourists obtain pre-travel health consultations, receive pre-travel vaccinations, or purchase travel insurance to reduce health risk in tourism (Wang et al., 2019a).

The World Health Organization (2020) recommends tourists to seek health advice before any form of travel, in particular before international trips. To determine the health risks of international travel, tourists and health professionals (e.g., travel doctors) need to consider many factors for their health risk assessment, generally focusing on the probability of occurrence of a health risk and the severity of possible consequences for the tourists' wellbeing during or after travel (see also *Part I Health: Pre and Post-Travel Medical Consultations*).

Tourists' health risk perceptions are shaped by pre-existing knowledge and beliefs about diseases, as well as their sociocultural contexts (Leggat & Franklin, 2013). Experience and confidence in their health are also the main reasons why travellers perceive a certain level of health risks (Wang et al., 2019a). For example, health risk related to infectious diseases (e.g., COVID-19) is relatively new to most tourists, people will likely perceive high levels of risk which can cause the public "travel fear" and affect their travel decision-making (Zheng et al., 2021) (see Fig. 2).

Searching for information about a destination and the potential risks that may occur during a holiday is one of the most efficient strategies to reduce the level of perceived risk when it comes to travelling (Lo et al., 2011). In the context of health risk, travellers can seek information to help estimate the risk at their future travel destination, facilitate their destination choice, and support their preparation and

Fig. 2 The COVID-19 checkpoint at Guangzhou Tourist Information Centre. (Image courtesy of Ms. Xueting Zhai)

planning process to reduce risk levels. The health information sources include home countries travel advisories of the government (e.g., smartraveller.gov.au), third party risk assessment tools (e.g., International SOS Travel Risk Map), and media communication from destinations. In addition, travel medicine professionals can play an important role in presenting updated and accurate health information and advising necessary action plans to protect tourists when they are travelling (see Fig. 3).

In the tourism literature, the antecedents and consequences of health-related risk perceptions have been discussed mainly from a consumer psychology perspective (Menon et al., 2008). The antecedents of health risk perceptions can be classified into five major types of psychological factors: motivational (e.g., *Self-Positivity*, *Social Desirability*, *Self-Control*), cognitive (e.g., *Information Accessibility*, *Information Diagnosticity*), affective (*Positive vs Negative Affective States, Discrete Emotions*), contextual (*Response Alternatives*, *Proxy Information*, *Alternative Information*, *Framing*), and individual differences (*Depressive Tendency*, *Gender*, *Personality*, *Culture*, *Priors*) (Menon et al., 2008). The consequences of health-related risk perceptions can include people's awareness and adoption for medical treatment, as well as many healthy behaviours promoted by the authorities or medical doctors.

It is noted that travel-related health risk perceptions and decisions have a lot in common with other mainstream consumer decisions that are well-studied. Tourists' likelihood of taking actions to protect themselves is determined by their appraisal of threats (i.e., the susceptibility to and severity of the threat, the rewards of not taking action) and coping and preventative strategies (i.e., the costs of taking preventive action, their own ability to successfully undertake the action) (Wang et al.,

Fig. 3 Public notice reminder for social distancing. (Image courtesy of Dr. Marion Karl)

2019a). Factors such as *performance* of a test or treatment or health products (e.g., the effectiveness of sunscreens in reducing skin cancer risk), as well as external financial, physiological or psycho-social risks can further moderate the health risk perceptions-behaviour relationship, leading to different behavioural outcomes (Menon et al., 2008). To illustrate travel-related health risks, a case study is introduced in the next section, which examines health risks perceived by Australian outbound tourists.

Tourists' Health Risk Perception: An Australian Perspective

Study Context

Australians undertook 11.2 million outbound international trips in 2018–2019 (year ending 30 June) (Australian Bureau of Statistics [ABS], 2019). As the number of Australians departing on international trips increases, Australian travellers are more likely to acquire or import infectious diseases (WHO, 2020). The South-East Asian sub-region, particularly Indonesia, Thailand and Vietnam are the top tourism destinations for Australian tourists; however, measles, rabies, and mosquito-borne diseases (e.g., Japanese Encephalitis) are still common in the local population in these three countries (DFAT, 2019). For example, as one of the most ancient diseases with one of the highest fatality rates of all infectious diseases, rabies is 99.9% fatal. Indonesia has been the number one leisure destination for Australians since 2010 (ABS, 2017); unfortunately, it is not free of rabies. It is therefore important to understand Australian tourists' awareness of travel-related risks (e.g., diseases or illnesses that raise the probability of adverse health outcomes) when they travel abroad in these popular destinations (Wang et al., 2019a). To achieve this objective, a survey was conducted to examine Australian tourists' health risk perception.

Survey Method and Sampling

A self-administrated survey was conducted in November 2017, through an online panel provided by a research company. A pilot test ($N = 51$) was conducted, together with consultations with travel doctors to enhance the reliability of the study. A total of 565 completed survey responses were included in the study. The sample consists of Australian tourists who had been to Indonesia, Thailand, or Vietnam in the preceding 3 years ($N = 279$, named the *past group*), and those who were planning to visit any of these three countries in the next 6 months ($N = 286$, named the *intention group*). A total of 47% of participants were male. Regarding the highest education level, 24% had a high school certificate, 38% a diploma, 26% an undergraduate degree, and 12% a postgraduate degree. More than half (52%) of respondents were married, and 64% had one or more children.

Results and Discussion

The survey first examined participants' past experience of travel-related diseases or illnesses, because past experience can affect tourists' risk perception (Kozak et al., 2007). Findings indicate that half of the respondents (50%) had not experienced any diseases or illnesses in the list during or as a result of travelling in the past (see Table 1). The most commonly encountered medical issues while or resulting from travelling were gastrointestinal problems (25%), such as diarrhoea, followed by

Table 1 Past experience of travel-related diseases or illnesses

Have you experienced any of these diseases/ illnesses during or as a result of any of your previous trips? (PE)	Total	%	Past group	%	Intention group	%	Pearson Correlation coefficients: PE with RP	*P* value
None of these above	283	50.1	133	47.7	150	52.4	–	–
Gastrointestinal problems (e.g., Travellers' diarrhoea)	142	25.1	75	26.9	67	23.4	0.069	0.103
Pain (e.g., Headache, muscle pain)	137	24.2	66	23.7	71	24.8	0.147**	.000
Respiratory problems (e.g., Influenza/flu, Cold, Bronchitis, Sinusitis)	83	14.7	37	13.3	46	16.1	0.064	0.127
Wounds	47	8.3	21	7.5	26	9.1	0.076	0.07
Psychological discomforts/ Mental discomforts (e.g., Anxiety/ Mood disorders, Disorder due to psychoactive substance use)	34	6.0	12	4.3	22	7.7	0.192**	.000
Mosquito-borne diseases (e.g., Dengue, Chikungunya, Zika, Malaria, Japanese Encephalitis)	31	5.5	21	7.5	10	3.5	0.085*	0.045
Deep Vein Thrombosis	18	3.2	14	5	4	1.4	0.074	0.079
Measles	16	2.8	10	3.6	6	2.1	0.156**	.000
Rabies	12	2.1	9	3.2	3	1	−0.037	0.381
HIV/AIDS	10	1.8	10	3.6	0	0	0.040	0.344
Typhoid	7	1.2	7	2.5	0	0	0.003	0.940
Hepatitis	5	0.9	3	1.1	2	0.7	0.038	0.367
Total	**565**	**100**	**279**	**100**	**286**	**100**	**–**	**–**

Note: RP (Risk perception) = Risk likelihood × Risk severity, PE = Past experience of each disease or illness

Risk likelihood was measured on a scale: 1 = *Extremely unlikely*, 2 = *Unlikely*, 3 = *Neutral*, 4 = *Likely*, 5 = *Extremely likely*. Risk severity was measured on a scale1 = *Definitely not serious*, 2 = *Not serious*, 3 = *Hard to tell*, 4 = *Serious*, 5 = *Extremely serious*. Past experience was measured on a scale: 0 = *No*, 1 = *Yes*

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

pains (24%), such as headaches or muscle pains. Only 1% of respondents had experienced hepatitis.

Looking further into the relationship between past experience and risk perception using Pearson Correlation, respondents who had experienced psychological or mental discomfort [$r(563)_{psych} = 0.19$, $p < 0.001$], measles [$r(563)_{measles} = 0.16$, $p < 0.001$], pain [$r(563)_{pain} = 0.15$, $p < 0.001$], and mosquito-borne diseases [$r(563)_{mosquito} = 0.09$, $p < 0.05$] while travelling perceived significantly higher levels of risk regarding these specific medical issues.

In evaluating the subjective knowledge of travel-related diseases or illnesses, this study revealed that most respondents feel they can explain pain or wounds, but only one-third can explain typhoid (see Table 2). There are not many differences between the past and intention groups. The correlations between knowledge and risk perception indicate that people with increased knowledge on Deep Vein Thrombosis

Table 2 Tourists' subjective knowledge of travel-related diseases or illnesses

Could you explain what these diseases/ illnesses are to your friends or family?	Yes, I can explain	%	Past group	%	Intention group	%	Pearson Correlation coefficients: Knowledge with RP	*P* value
Rabies	349	61.8	173	62	176	61.5	−0.03	0.477
Measles	396	70.1	185	66.3	211	73.8	0.075	0.073
Typhoid	197	34.9	95	34.1	102	35.7	−0.016	0.701
Hepatitis	315	55.8	146	52.3	169	59.1	−0.04	0.34
Deep Vein Thrombosis	346	61.2	172	61.6	174	60.8	−.177**	.000
HIV/AIDS	390	69.0	183	65.6	207	72.4	0.056	0.185
Pain (e.g., headache, muscle pain)	512	90.6	249	89.2	263	92	0.081	0.054
Wounds	513	90.8	249	89.2	264	92.3	0.017	0.693
Mosquito-borne diseases (Dengue, Chikungunya, Zika, Malaria, Japanese Encephalitis)	348	61.6	163	58.4	185	64.7	0.007	0.872
Respiratory problems (e.g., Influenza/flu, Cold, Bronchitis, Sinusitis)	85.3	85.3	229	82.1	253	88.5	−0.022	0.598
Gastrointestinal problems (e.g., Travellers' diarrhoea)	456	80.7	224	80.3	232	81.1	−.088*	0.036
Psychological discomforts/ mental discomforts (Anxiety disorders, mood disorder, disorders due to psychoactive substance use,etc.)	345	61.1	151	54.1	194	67.8	−.084*	0.046
	565	**100**	**279**	**100**	**286**	**100**	**–**	**–**

Note: *Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

[$r(563)_{DVT} = -.18$, $p < 0.001$], Gastrointestinal problems [$r(563)_{Gastrointestinal} = -.09$, $p < 0.05$], or Psychological or mental discomforts [$r(563)_{Psycho} = -.09$, $p < 0.05$] had significantly lower levels of perceived risk of these diseases or illnesses.

Following the definition of risk as the probability of occurrence (i.e., likelihood that an event takes place) and the severity of the consequences (i.e., negative impact of an event for the individuals' wellbeing, infrastructure, etc.), this study measured travel-related health risk perception. T-test results show significant differences between the past group and intention group, indicating that tourists who have visited Indonesia, Thailand, or Vietnam in the last 3 years perceived higher risk of experiencing measles and HIV/AIDS than the intention group (see Table 3). No

Table 3 Tourists' perceived likelihood of travel-related diseases or illnesses

If you are taking a trip to Indonesia/Thailand/Vietnam in the next 6 months, how likely do you think you would experience these diseases/ illnesses?	Mean All (*SD*)	Mean Past group (*SD*)	Mean Intention group (*SD*)	t value (*df* = 563)	*Sig.* (2-tailed)
Rabies	2.45 (−0.996)	2.50 (1.021)	2.4 (−0.971)	1.19	0.235
Measles	2.34 (−0.97)	2.44 (−0.99)	2.25 (−0.943)	2.323*	0.021
Typhoid	2.49 (−1.01)	2.56 (−1.044)	2.42 (−0.972)	1.686	0.092
Hepatitis	2.54 (−1.044)	2.61 (−1.049)	2.47 (−1.035)	1.686	0.092
Deep Vein Thrombosis	2.54 (−0.986)	2.58 (−0.981)	2.49 (−0.99)	1.142	0.254
HIV/AIDS	2.08 (−1.106)	2.18 (−1.156)	1.98 (−1.048)	2.156*	0.032
Pain (e.g., headache, muscle pain)	3.29 (−0.951)	3.24 (−0.965)	3.34 (−0.936)	−1.194	0.233
Wounds	3.02 (−0.921)	3.02 (−0.927)	3.02 (−0.917)	−0.039	0.969
Mosquito-borne diseases (Dengue, Chikungunya, Zika, Malaria, Japanese Encephalitis)	3 (−1.052)	2.95 (−1.045)	3.04 (−1.059)	−1.041	0.298
Respiratory problems (e.g., Influenza/flu, Cold, Bronchitis, Sinusitis)	3.01 (−0.984)	2.96 (−0.988)	3.06 (−0.979)	−1.109	0.268
Gastrointestinal problems (e.g., Travellers' diarrhoea)	3.5 (−0.996)	3.45 (−1.009)	3.55 (−0.982)	−1.163	0.245
Psychological discomforts/mental discomforts (Anxiety disorders, mood disorder, disorders due to psychoactive substance use etc.)	2.45 (−1.085)	2.48 (−1.069)	2.41 (−1.101)	0.741	0.459

Note: Risk likelihood was measured on a scale: 1 = *Extremely unlikely*, 2 = *Unlikely*, 3 = *Neutral*, 4 = *Likely*, 5 = *Extremely likely*

*Correlation is significant at the 0.05 level (2-tailed)

Table 4 Tourists' perceived severity of travel-related diseases or illnesses

How severe do you think the consequences of the following health risks may be regarding your trip to Indonesia/Thailand/Vietnam?	Mean All (*SD*)	Mean Past group (*SD*)	Mean Intention group (*SD*)	t value (*df* = 563)	*Sig.* (2-tailed)
Rabies	3.99 (−0.909)	3.93 (−0.917)	4.05 (−0.899)	−1.486	0.138
Measles	3.62 (−0.924)	3.64 (−0.89)	3.6 (−0.957)	0.562	0.575
Typhoid	3.9 (−0.931)	3.88 (−0.931)	3.91 (−0.932)	−0.349	0.727
Hepatitis	3.99 (−0.905)	3.98 (−0.889)	4.00 (−0.921)	−0.282	0.778
Deep Vein Thrombosis	3.84 (−0.965)	3.86 (−0.96)	3.83 (−0.971)	0.344	0.731
HIV/AIDS	4.13 (−1.019)	4.16 (−0.974)	4.09 (−1.062)	0.82	0.412
Pain (e.g., headache, muscle pain)	3.04 (−0.972)	3.11 (−0.996)	2.98 (−0.946)	1.66	0.097
Wounds	3.27 (−0.848)	3.31 (−0.831)	3.23 (−0.865)	1.087	0.278
Mosquito-borne diseases (Dengue, Chikungunya, Zika, Malaria, Japanese Encephalitis)	3.99 (−0.864)	3.96 (−0.899)	4.01 (−0.829)	−0.734	0.463
Respiratory problems (e.g., Influenza/flu, Cold, Bronchitis, Sinusitis)	3.52 (−0.931)	3.53 (−0.936)	3.5 (−0.928)	0.298	0.766
Gastrointestinal problems (e.g., travellers' diarrhoea)	3.48 (−0.925)	3.46 (−0.924)	3.49 (−0.928)	−0.439	0.661
Psychological discomforts/mental discomforts (Anxiety disorders, mood disorder, disorders due to psychoactive substance use etc.)	3.36 (−1.003)	3.43 (−0.99	3.28 (−1.012)	1.786	0.075

Note: Risk severity was measured on a scale: 1 = *Definitely not serious*, 2 = *Not serious*, 3 = *Hard to tell*, 4 = *Serious*, 5 = *Extremely serious*

significant differences between the past group and intention group in their perceived severity of travel-related diseases or illnesses was found (see Table 4).

Overall, respondents felt that they were most likely to experience gastrointestinal problems when travelling in South-East Asia (M = 3.50, SD = 0.10) but did not perceive these to have a severe consequence (M = 3.48, SD = 0.93). In contrast, HIV/AIDS was perceived as a least likely disease to be experienced during a trip to Indonesia/Thailand/Vietnam (M = 2.08, SD = 1.11), but it would have severe consequences for the traveller (M = 4.13, SD = 1.02). Surprisingly, many Australians are lacking awareness of the severity of many fatal diseases when they travel to some popular destinations in South-East Asia. This is especially true in case of fatal diseases which are not endemic in Australia, such as rabies.

A further investigation of the affective constructs related to risk perception showed that Australian tourists were most worried about gastrointestinal problems (M = 3.36, SD = 1.01) and mosquito-borne diseases such as Dengue Fever or Malaria (M = 3.30, SD = 1.06); while they were least worried about HIV/AIDS (M = 2.58, SD = 1.22). The past group had a significantly higher level of worry towards measles than the intention group (see Table 5). However, overall Australian tourists indicate very low level of worry towards many diseases and illnesses.

Table 5 Tourists' level of worry about travel-related diseases or illnesses

How worried are you regarding the following health issues regarding your trip to Indonesia/ Thailand/ Vietnam?	Mean $_{All}$ (SD)	Mean $_{Past\ group}$ (SD)	Mean $_{Intention\ group}$ (SD)	t value (df = 563)	$Sig.$(2-tailded)	Pearson Correlation coefficients: Worry with RP (P value)	Pearson Correlation coefficients: Worry with PE (P value)
Rabies	2.79 (1.062)	2.85 (1.075)	2.74 (1.049)	1.291	.197	.375** (.000)	.005 (.899)
Measles	2.65 (1.068)	2.76 (1.098)	2.53 (1.028)	2.512*	.012	.462** (.000)	.147** (.000)
Typhoid	2.78 (1.075)	2.85 (1.072)	2.71 (1.075)	1.585	.114	.443** (.000)	.068 (.107)
Hepatitis	2.87 (1.103)	2.95 (1.108)	2.79 (1.095)	1.723	.086	.418** (.000)	.080 (.058)
Deep Vein Thrombosis	2.80 (1.040)	2.86 (1.015)	2.74 (1.062)	1.360	.174	.452** (.000)	.065 (.125)
HIV/AIDS	2.58 (1.217)	2.68 (1.176)	2.48 (1.250)	1.943	.053	.477** (.000)	.113** (.007)
Pain (e.g., headache, muscle pain)	2.86 (.982)	2.94 (1.012)	2.79 (.948)	1.804	.072	.503** (.000)	.211** (.000)
Wounds	2.89 (.978)	2.96 (1.006)	2.83 (.946)	1.604	.109	.410** (.000)	.126** (.003)
Mosquito-borne diseases (Dengue, Chikungunya, Zika, Malaria, Japanese Encephalitis)	3.30 (1.063)	3.26 (1.045)	3.35 (1.080)	−.985	.325	.474** (.000)	.048 (.250)
Respiratory problems (e.g., Influenza/flu, Cold, Bronchitis, Sinusitis)	3.01 (1.029)	3.04 (1.052)	2.98 (1.007)	.696	.486	.419** (.000)	.090* (.032)
Gastrointestinal problems (e.g., Travellers' diarrhoea)	3.36 (1.011)	3.34 (1.016)	3.38 (1.007)	−.394	.694	.445** (.000)	.084* (.047)

(continued)

Table 5 (continued)

How worried are you regarding the following health issues regarding your trip to Indonesia/ Thailand/ Vietnam?	Mean $_{All}$ (SD)	Mean $_{Past\ group}$ (SD)	Mean $_{Intention\ group}$ (SD)	t value (df = 563)	*Sig.*(2-tailded)	Pearson Correlation coefficients: Worry with RP (*P* value)	Pearson Correlation coefficients: Worry with PE (*P* value)
Psychological discomforts/ mental discomforts (Anxiety disorders, mood disorder, disorders due to psychoactive substance use, etc.)	2.66 (1.127)	2.74 (1.109)	2.58 (1.142)	1.630	.104	.529** (.000)	.195** (.000)

Note: Worry was measured on a scale: 1 = *Not worried at all*, 2 = *Not worried*, 3 = *Neutral*, 4 = *Worried*, 5 = *Extremely worried*
RP (Risk perception) = Risk likelihood × Risk severity
PE = Past experience of each disease or illness
*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Correlations between worry and past experience indicate that respondents with past experience of specific health issues (such as measles, HIV, pain, wounds, as well as respiratory, gastrointestinal, and psychological problems) perceived higher levels of worry regarding these specific medical issues. Correlations between worry and risk perception indicate that the worry level of all the listed diseases and illnesses strongly correlated with the risk perception of each medical issue. Worry can be seen as a route to risk reduction by preparing the tourist for potential risk at the destination. Hence, it can change behaviour and thereby remove the individual from the path of risk (Breakwell, 2014). For example, tourists might worry about the possibility of *Travellers' Diarrhoea*, and as a result they do not consume street food and avoid raw or undercooked seafood during travel.

The Change of Tourists' Risk Perception in the Post-COVID-19 Era: A Future Interdisciplinary Research Agenda

In this chapter we have reviewed current knowledge in tourists' risk perception, and developed a risk perception model from a behavioural geographic perspective to illustrate the crucial elements—*people* and *destination*—for risk assessment. We

also reviewed tourists' health risk perception and its antecedent factors and consequences, followed by a case study to illustrate health risk perceptions of Australian tourists. In the following, the change of tourists' risk perception in the post-COVID-19 era is discussed, together with a future research agenda for tourist health, safety and wellbeing calling for interdisciplinary research in the *new normal*.

The scope of the COVID-19 pandemic as a global health crisis had unprecedented consequences for tourism. In the first 5 months of 2020 alone, AU$450 billion in exports from tourism were lost (UNWTO, 2020). In comparison, the economic loss due to the Global Economic Crisis of 2009 was only one-third of this. Beyond the economic impact, the COVID-19 pandemic also has changed tourists' thinking and feeling about health risks, and consequently changed how tourists travel (Zenker & Kock, 2020). Safety and hygiene are becoming key criteria to select destinations and tourism activities (OECD, 2020); therefore, understanding tourists' health risk perception is crucial for post-COVID-19 tourism recovery and the development of travel products that make tourists feel safe (again) while travelling.

Tourists will likely become hygiene sensitive and pay more attention to health-related restrictions and safety protections provided by destinations, the accommodation sector or airlines. Such an increased demand for hygiene and safety during the travel process also means increased operating costs for the tourism industry in improving regularly updated health and hygiene protocols and measures, and providing education and communication for staff, tourists, and the community (Queensland Tourism Industry Council [QTIC], 2020). To address the future challenges of health-related risk and in particular tourists' perceptions of such risks, we propose a research agenda, including future research themes and topics.

As Squazzoni et al. (2020) indicate, the complexity of human behaviour and uncertainty of future development in times of COVID-19 is a challenge for researchers which can only be met through interdisciplinary research. For the tourism context, research collaborations between travel medicine, tourism management and health sciences could be particularly beneficial for future studies on health risk and tourism (Wen et al., 2020). For medicine and health sciences, research can be involved to develop effective medical advice for tourists based on the understanding of their psychological and physical needs. Other important issues are how to engage tourists in taking the necessary actions towards protecting them from health-related risk while travelling, even more so in the aftermath of a pandemic. Future opportunities in research methodology can include integrated approaches, multi-destination studies or meta-analysis of different case studies, as well as longitudinal studies to track changes in risk perceptions over time. Integrating theoretical frameworks and methodological approaches from the disciplines psychology, geography and sociology may provide additional insight to fully understand tourists' health risk perception.

Involving *psychology* theory and methods will allow tourism researchers to study the underlying psychological process of travel decision-making, and to examine how motivational, cognitive, affective, contextual and individual differences influence tourists' health risk perception and their response to the risk. Knowledge on

the role of emotions in travel decision-making as a mediator of risk perception can directly flow in the development of marketing strategies in the post-COVID-19 era.

Insight from the *geography* discipline is needed to infuse place and space into tourism risk research. Considering the enormous impact of COVID-19 on tourism, our traditional assumption of mobility has to be questioned, and new mental models are needed to rethink place, travel, and associated risk. For example, the COVID-19 pandemic has triggered a strong demand for domestic travel (Romagosa, 2020), because tourists perceive their home country as particularly safe due to the high level of familiarity. It is unclear if this trend towards domestic travel will be permanent or if/when tourists resume their quest for novelty provided by international and unfamiliar destinations. Future research from a geographic perspective can explore the familiarity of place and its role in risk perception and travel decision-making. The COVID-19 travel restrictions and stigmatisation of tourism hotspots as high-risk centres have changed tourists' preferences for travel destinations (OECD, 2020). For example, tourists switch from travelling to traditional destinations (e.g., cruise ships, city destinations) and tourist activities (e.g., shopping) to low-density destinations and outdoor activities. Camping holidays became a popular—and perceived to be safer—alternative for many tourists, who were suddenly required to spend their holiday in their own country during the COVID-19 pandemic instead of going on an international holiday (Bryant, 2020).

Since travel decision-making is strongly embedded in a certain social context and risk perceptions vary depending on the cultural background (Reisinger & Mavondo, 2006), theories from *sociology* can help to better understand health risk perception in the post-COVID-19 era. In fact, what societies choose to call risky is determined not by nature but by social and cultural factors (Breakwell, 2014). Sociologists, particularly from the field of cultural studies, can support tourism researchers who investigate these contextual factors, and explore how these factors influence tourists' risk perception and travel decision-making in the post-pandemic stage.

From an applied science perspective, future research in the *business* discipline can help the tourism industry to develop COVID-19 management processes which are suitable for different types of organisations in various tourism sectors, such as hotels, restaurants, cruise ships, airline, sports and events. Another research question to be addressed by business researchers is how stakeholders from the tourism industry can work collaboratively and efficiently with the public health sector to review risk management plans, and to operate in compliance with the health management plan. This collaboration between the health sector and tourism can also help address how to implement, monitor and review the risk control measures and performance to ensure health and safety of employees and customers.

It is too early to say what the long-term implications of the COVID-19 pandemic are for tourism, but it is clear that understanding tourists' perceptions and responses to risk (particularly health risk) will become more important than ever, with health and safety considerations more prominent.

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