Annals of Tourism Research 79 (2019) 102759

Contents lists available at ScienceDirect

Annals of Tourism Research

journal homepage: www.elsevier.com/locate/annals

How to define and measure risk perceptions

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ARTICLE INFO

Associate editor: Scott McCabe

Keywords:
Perceived risk
Item wording
Standardization of measurement
Tourism risk research
Psychometric risk research

ABSTRACT

Research on risk perceptions within the tourism domain suffers from two closely related problems: diverging conceptual and measurement definitions. The lack of precision and standardization is hindering comparisons of findings across studies as well as systematic accumulation of knowledge. The present paper gives some examples of how diverging definitions of risk may constitute a serious problem. It also shows how measures of perceived risk are influenced by various heuristics and biases via item wording. Lacking awareness of the effects of these biases may lead to erroneous conclusions regarding the relative risk of various hazards. The paper concludes with specific suggestions for how some of these problems can be tackled, and should be of practical use for tourism scholars researching risk perceptions.

Introduction

Research on the perception of risk among lay people is vast both in generic and applied fields. Within the tourism domain, research has focused on for example perceived risk for man-made and natural disasters like terrorism (Wolff & Larsen, 2014) or tsunamis (Chew & Jahari, 2014) on financial (Quintal, Lee, & Soutar, 2010), physical (Roehl & Fesenmaier, 1992), and (social-) psychological risks (Reichel, Fuchs, & Uriely, 2007), and on risks regarding equipment (Sönmez & Graefe, 1998a), food (Larsen et al., 2011) and health (Lepp & Gibson, 2003).

Objective risk is commonly defined by experts as the probability of negative outcomes weighted by their severity (e.g. ISO 31000, 2018). The same holds true for the definition of subjective or perceived risk in expected utility theories in economics and psychology. They all assume that people assess severity and probability of possible outcomes, albeit subjectively and with error, and integrate this information into an estimate of perceived risk (Loewenstein, Weber, Hsee, & Welch, 2001; Slovic, 2016). The present paper does not consider the measurement of objective risk. It exclusively discusses the measurement of perceived or subjective risk.

In the applied area of tourism risk research the concept of perceived risk has been defined in many different ways. Priest (1990), defined it as the potential to lose something of value. Mowen and Minor (1998) described risk as "consumer's perception of the overall negativity of a course of action based upon an assessment of the possible negative outcomes and the likelihood that those outcomes will occur". Reisinger and Mavondo (2006) described risk as "a possibility of danger, harm or loss; and a chance or hazard". Tsaur, Tzeng, and Wang (1997) defined risk as "the possibility of various misfortunes which might befall a group package tourist in the process of traveling or at its destination". And Le and Arcodia (2018) even proposed that risk should be defined as the *sum* of negative outcomes and the probability of their occurrence. The fuzziness of the concept has also been pointed at by various scholars within the field (Larsen, Doran, & Wolff, 2017; Quintal et al., 2010; Reichel et al., 2007; Reisinger & Mavondo, 2006; Yang & Nair, 2014).

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https://doi.org/10.1016/j.annals.2019.102759
Received 7 March 2019; Received in revised form 20 July 2019; Accepted 24 July 2019
Available online 19 August 2019

Along with great diversity in conceptual definitions of perceived risk comes great variety in operational or measurement definitions of the concept. Assessments span from measures of emotions to measures of cognitive calculations. Some studies ask participants to rate their worries (Reichel et al., 2007) others assess participants' fear (Fuchs, Uriely, Reichel, & Maoz, 2013) or feelings of nervousness (Sönmez & Graefe, 1998b). Some measure the perceived probability of events (Kozak, Crotts, & Law, 2007; Ritchie, Chien, & Sharifpour, 2017) while others ask about their riskiness (Wolff & Larsen, 2016a, 2016b). Still others do not report in detail how perceived risk was measured (Lepp & Gibson, 2003; Reisinger & Mavondo, 2005). However, how risk perceptions are measured is not inconsequential. In fact, a great deal is known about how phrasing items and framing questions will influence participants' ratings. The great variety in conceptual and measurement definitions of risk in the tourism domain renders much research on risk perceptions incommensurable.

To recap, there seem to be two closely related potential problems in the research on risk perceptions within the tourism domain: a great diversity in conceptual and in operational definitions (i.e. measurement) of perceived risk. Greater precision and standardization of conceptualizations and measures will allow for a much-needed cumulative tourism risk research. The present paper starts out by giving some examples of how conceptual definitions of perceived risk in the tourism domain deviate from the standard definition employed in psychometric risk research. Some possible problems associated with the lacking consensus will be pointed at. This is followed by a presentation of psychometric findings that illustrate how measures of risk are influenced by various heuristics and biases via item wording, and how lacking awareness of these biases may lead to erroneous conclusions regarding the relative risk of various hazards. The paper concludes with specific suggestions for how some of these problems can be tackled, how perceived risk should be defined and measured. It advocates the view that care should be taken when constructing items and comparing results across studies, and should be of practical use for tourism scholars researching risk perceptions.

Although recent years have seen many indeed very interesting reviews and discourses on how risk and related concepts have been defined and measured within the tourism domain, the present paper will not discuss those (see e.g. Cui, Liu, Chang, Duan, & Li, 2016; Fennell, 2017; Holm, Lugosi, Croes, & Torres, 2017; Williams & Baláž, 2015). The aim of the current endeavor is to lift the discussion out of the tourism domain and to show the relevance of generic psychometric risk research for tourism scholars. We therefore review the psychometric literature, and only use examples from tourism risk research in order to highlight the relevance of the generic findings.

While many point at the uniqueness of the “tourism product” we firmly believe that tourists are humans and that the same psychological mechanisms are at work. It therefore does not matter whether someone judges the risk of going to the dentist or going to Mallorca, they will still be influenced by the same heuristics and biases. Tourist risk perception is not different from risk perception, and therefore all findings from generic risk research are directly relevant for tourism risk research. Increased awareness of these findings will increase the accumulation of scientific knowledge within tourism risk research.

On the conceptual definition of perceived risk

As stated above expected utility theories in economics and psychology define risk as the product of people's assessment of the severity and probability of negative outcomes (Loewenstein et al., 2001; Slovic, 2016). In tourism risk research, perceived risk is sometimes defined in alternative ways. Some commonly found examples include equating perceived risk to feelings of anxiety, fear, nervousness or worry (e. g. Reichel et al., 2007; Fuchs et al., 2013; Sönmez & Graefe, 1998b) or equating perceived risk to perceived probability (e.g. Kozak et al., 2007; Ritchie et al., 2017). In the former, the experience of strong feelings of anxiety or nervousness correspond to high risk perceptions, and in the later high perceived probability parallels high perceived risk. Another example of an alternative definition of perceived risk is Le and Arcodia's (2018) suggestion to define risk as the *sum* of outcome severity and outcome probability instead of the *product* of these two factors. Pros and cons of these alternative definitions are discussed in the following.

Perceived risk vs feelings of fear, anxiety, nervousness or worry

The concept of worry is clearly related to that of perceived risk, however the concepts are far from synonymous (Rundmo, 2002; Sjöberg, 1998; Wolff & Larsen, 2014). Perceived or subjective risk is a cognitive evaluation, which might be heavily influenced or guided by affect; however perceived risk is not normally categorized as a feeling (Loewenstein et al., 2001). Worry on the other hand is a key component of anxiety, and is characterized by a tendency to view ambiguous or uncertain situations as threatening (Craske et al., 2017; Butler & Matthews, 1987; Freeston, Rhéaume, Letarte, Dugas & Ladeouceur, 1994). Fear and anxiety are intense feelings accompanied by somatic responses to immanent threat (Craske et al., 2017; Spielberger, 1972).

While hazards that are evaluated as risky might cause worries and anxiety, they do not necessarily do so. On the one hand, tourist may engage in activities they know to be risky without fearing or worrying about them. Examples of such behaviors include base-jumping, white water rafting and other sensation seeking activities. On the other hand, people may experience intense fear while realizing that the “hazard” does not propose a real risk or danger. Actually earlier editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) required phobia patients to realize that their fear was out of proportion with regard to the imposed risk (American Psychiatric Association, 2000). Thus, a para-jumper and an acrophobic may display similar levels of perceived risk of heights but widely diverging levels of fear and worry. As the example clearly illustrates worry has been shown to be a better predictor of behavior than risk perceptions (Cameron & Reeve, 2006; Peters, Slovic, Hibbard, & Tusler, 2006).

The differential denotation of risk and worry has also been demonstrated by Larsen, Brun, and Øgaard (2009) who found tourists' risk judgments to be only weakly related to tourist's worries. While measuring worry about various hazards is clearly worthwhile,

conceptualizing perceived risk as worry or fear, or even tangling both concepts into one item (e.g. "I worry about the risk of…") (Fuchs et al., 2013; Reichel et al., 2007) must be avoided.

Perceived risk vs perceived probability: probability neglect

As discussed above, risk is commonly understood as a cognitive evaluation of outcome probability and outcome severity (Loewenstein et al., 2001; Slovic, 2016). It is however well known that people largely ignore probability and mainly rely on outcome severity when judging risk. This is a bias known as probability neglect (Slovic & Peters, 2006; Sunstein, 2002). Probability neglect leads people to overestimate the risk of dreadful events with small probabilities, like terror or shark attacks, and to underestimate the risk of mundane events with higher probabilities, like the flue or sunburn (Fischhoff, Lichtenstein, Slovic, Derby, & Keeney, 1981; Gaissmaier & Gigerenzer, 2012; Gigerenzer, 2006). Still, quite a lot of researchers have measured probability but claimed to be measuring risk (e.g. Chien, Sharifpour, Ritchie, & Watson, 2017; Quintal et al., 2010; Ritchie et al., 2017).

In the real world, probability and severity are negatively related. Major catastrophes happen less often than minor nuisances, partly because we take measures to reduce the likelihood of catastrophes. Therefore asking participants to estimate the *risk* of something (meaning mostly severity in lay peoples' minds) may yield opposite results compared to asking someone to rate the *probability* of something (i.e. shark attacks are risky but unlikely; sunburn is not very risky but highly likely). Two researchers claiming to study the relative importance of various perceived risk factors among beachgoers might end up with contradictory results. The one measuring probability will find that beachgoers are mostly concerned with sunburn while the one measuring risk will find that shark attacks are of more concern. Researchers measuring probability instead of risk (e.g. Quintal et al., 2010; Ritchie et al., 2017) may derive at findings which diverge quite a lot from others who are measuring risk by asking about riskiness (e.g. Lepp & Gibson, 2008; Wolff & Larsen, 2016a, 2016b). Perceived risk should therefore not be conceptualized as perceived probability.

The composition of perceived risk: multiplying vs summing outcome severity and outcome probability

In a late conceptual paper on risk perceptions on cruise ships, Le and Arcodia (2018) criticize the most widespread way to define risk as the *product* of outcome severity and outcome probability. Specifically they claim that it is a disadvantage of the multiplicative model that risk perceptions will equal zero as one of the components (either outcome severity or outcome probability) equal zero. The authors instead suggest a summative model, i.e. risk is to be defined as the *sum* of outcome severity and outcome probability. In that way risk ratings will not equal zero just because one of the components equals zero.

This summative model seems to clash with logic. It implies that events that have negative consequences but zero probability of happening constitute risks. Outcomes like falling off the globe, or being poisoned by moon dust, which have detrimental consequences, but zero probability, may than receive similar risk ratings as moderately likely and moderately severe outcomes like falling off your bike or being infected by salmonella. The same holds true for events that are very likely but without negative consequences, like breathing or sleeping. In fact, everything that can or cannot happen, and everything that has or hasn't consequences constitutes a risk according to this model.

Also, as probability increases, relative increases in risk grow logarithmically in the multiplicative model. This implies a much steeper growth in risk for small probabilities, than for large ones. For example: an increase in probability from 1% to 2% to 3% implies increase in risk by 100, 50, and 33.33% respectively. The rate at which increases in risk diminish is independent of outcome size in the multiplicative model (as long as the outcome is constant).

In the summative model increases in risk also diminish as probability increases, however at a much lesser rate then in the multiplicative model. Furthermore, the rate at which increases in risk diminish, decreases as the size of the outcome increases. For example if outcome size is 10 and probability increases from 1% to 2% to 3%, then risk increases by 10, 9.09, and 8,33% respectively. If outcome size were 100, the same increases in probability would lead to increases in risk by 1, 0.99, and 0.98%.

The multiplicative model is therefore much more in accordance with the psychophysical principle of diminishing sensitivity, which is a central feature of prospect theory (Kahneman & Tversky, 1979) and has been demonstrated consistently across many domains (e.g. Fechner, 1860; Rottenstreich & Hse, 2001; Winter & Parker, 2007). According to this principle it is the relative increase in probability that is important, not the absolute one. Therefore an increase in probability from 1% to 2% looms larger than an increase from 11% to 12%. This holds true only in the multiplicative (logarithmic), but not in the summative model. Adhering to a summative model of risk would therefore imply to disregard well-established scientific knowledge as well as common sense.

As the discussion reveals it is important to arrive at a standard definition of perceived risk in order to make studies commensurable. It is our view that the definition that should be adopted is the one that is employed in the generic risk literature in economics and psychology, i.e. defining perceived risk as the subjective understanding of outcome severity weighted by outcome probability.

On the operational definition of perceived risk: how measures may be influenced by heuristics and biases

Psychometric risk research and the heuristics and biases tradition have identified many ways in which subjective risk judgements diverge systematically from objective or expert assessments of risk and from expected utility models. These heuristics and biases do affect ratings of perceived risk. When constructing questionnaires awareness of these biases is of great importance, otherwise methodological artifacts resulting from item wording might be misinterpreted as substantial findings. Table 1 gives an overview over the heuristics and biases where item wording may influence ratings in systematic and predictable ways. Each of these heuristics will be examined in more detail in the following sections.

Table 1
Effects of item wording on risk ratings.

	Decreased risk ratings	Increased risk ratings
Probability neglect	***Probability* of dreadful things** How high is the probability of being attacked by a shark attack?	***Risk* of dreadful things** How high is the risk of being attacked by a shark?
	***Risk* of mundane things** How high is the risk of being sunburned?	***Probability* of mundane things** How high is the probability of being sunburned?
Affect heuristic	**Asking users/participants** Asking hikers about the risk of hiking/surfers about the risk of surfing.	**Asking abstainers/non-participants** Asking non-hikers about the risk of hiking/landlubbers about the risk of surfing.
Impact bias	**Asking while people are engaged in the risky activity** Asking people while they are at the beach about the risks at the beach.	**Asking while people are NOT engaged in the risky activity** Asking (the same) people while they are not at the beach about the risk at the beach.
Rosy retrospection Impact bias	**Risk in the past** How risky was your last visit to the beach/your last vacation?	**Risk in the future** How risky is your next visit to the beach/your next vacation?
Optimistic bias	**Risk for you** How risky is swimming for you?	**Risk for others** How risky is swimming for a typical tourist?
Unpacking effect	**Global/general risk** How high is the risk for unwanted events at the beach?	**Specific risk** How high is the risk of unwanted events like sunburn at the beach?
"Home-is-safer-than-abroad-bias"	**Risk at home** How high is the risk of terrorism in your home country?	**Risk abroad** How high is the risk of terrorism in XX?

Affect heuristic

While perceived risk is not normally categorized as a feeling, the subjective evaluation of risk, like any evaluation, is heavily influenced by affect (Damasio, 1994). It has been repeatedly demonstrated that people use their affective reaction to a stimulus to evaluate both risk and benefit of that stimulus. A positive affective reaction (i.e. liking something) will lead to an evaluation of the stimulus or activity as low in risk and high in benefits. A negative affective response (i.e. disliking something) leads to an evaluation of the stimulus as being high in risk and low in benefits (Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic, Finucane, Peters, & MacGregor, 2007). Hence risks and benefits are negatively related in people's minds (Fischhoff, Slovic, & Lichtenstein, 1978; McDaniels, Axelrod, Cavanagh, & Slovic, 1997; Slovic, Kraus, Lappe, & Major, 1991). Yet in the real world, the correlation of risks and benefits is a positive one, i.e. the more risk a hazard imposes the greater its benefits must be for society to accept the hazard. For example nuclear power plants often stir negative affective responses and are hence judged to be high on risk and low on benefits. Nonetheless, society accepts the risk associated with nuclear power plants only because they are highly beneficial.

Deriving one's evaluation of different aspects of a stimulus (e.g. its riskiness and its usefulness) from one single source, i.e. one's affective response to the stimulus, is known as the affect heuristic. This way of evaluating is fast, automatized, requires few cognitive recourses, improves judgmental efficacy, and increases under time pressure (Damasio, 1994; Finucane et al., 2000; Slovic et al., 2007).

The affect heuristic influences risk ratings so that people who like a stimulus or an activity will give lower risk ratings than people who do not like the stimulus or activity. Asking smokers to rate the risk of smoking will lead to lower risk ratings than asking nonsmokers. This is not (only) because those who start smoking are the ones who believe it to be less risky to begin with. It is the fact that smokers enjoy smoking that leads them to underestimate its riskiness (Slovic, 2010). In general asking users or partakers will result in lower risk ratings than asking abstainers or non-participants. One should bear this in mind when designing studies or comparing results.

Impact bias

A different phenomenon with a similar effect on risk ratings is the impact bias. It is widely recognized that people are not precise in predicting their own future emotions, a process known as affective forecasting (Kahneman & Thaler, 2006; Loewenstein & Lerner, 2003). In particular there is a consistent tendency to overestimate both the intensity and durability of ones future feelings. This is known as the impact bias. It holds true both for positive and negative emotions, and has been found over a range of samples and situations (Wilson & Gilbert, 2003, 2005; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). The perception of risk entails affective forecasting in that it amounts to the anticipation of future negative consequences and the evaluation of how painful these consequences would feel (Yates & Stone, 1992). Therefore risk perceptions are influenced by the impact bias. People exaggerate the risk of future hazards compared to present hazards because they overestimate the intensity and durability of their responses to future events.

Suggested causes of the impact bias include the following: A) Immune neglect, i.e. forgetting that the "psychological immune system" copes and adapts quickly to negative events (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998). B) Focalism, i.e. focusing

only on one aspects of an experience and forgetting other factors that will influence feelings (Schkade & Kahneman, 1998). Finally C) Memory misconstruals, i.e. basing predictions on highly memorable but unrepresentative examples from the past (Morewedge, Gilbert, & Wilson, 2005).

The impact bias implies both that hazards that lie in the future are often rated as riskier than hazards experienced in the present, and that people will rate activities as less risky while they are engaged in them than when they are not engaged in them. (Kermer, Driver-Linn, Wilson, & Gilbert, 2006; Wilson & Gilbert, 2003, 2005). Therefore asking subjects to rate the risk of a trip while they are planning it may result in higher risk ratings then asking them while they are on the trip, as has been shown by Larsen et al. (2009). Asking people on the beach about the risks on the beach will result in lower ratings than asking the same people before they are going to the beach.

Rosy retrospection

People are not only poor forecasters of their emotions, they are also quite bad at remembering them. The latter phenomenon is known as rosy retrospection (Mitchell, Thompson, Peterson, & Cronk, 1997; Sutton, 1992). Rosy retrospection is a memory bias and refers to the finding that people in retrospect rate events more positively than they rated them during their occurrence. For example, looking back on a vacation, people often rate the vacation more positively than they did while they were on it (Mitchell et al., 1997; Wirtz, Kruger, Napa Scollon, & Diener, 2003). Hence: *memoria praeteritorum bonorum*; the past is always recalled to be good.

Retrospective risk judgements therefore often diverge from prospective ones. People tend to believe that the world was safer in the past (Brun, Wolff, & Larsen, 2011; Wolff & Larsen, 2014). Asking participants to rate the risk of a vacation they went on in the past is therefore likely to result in lower risk ratings than one would have obtained by asking them while they were on that vacation. Together with findings regarding the impact bias this implies that vacations in the past are likely to be the safest, vacations in the present are in an intermediate position, and vacations in the future are the riskiest. This does not imply that people go on increasingly risky vacations; it is only an artifact of people's inability to forecast and remember their emotions (Loewenstein, 2005).

Optimistic bias

As discussed above, when it comes to predicting future events people overestimate the intensity and durability of their emotional reaction to it (the impact bias). People also overestimate their chances of experiencing positive events and underestimate their likelihood of experiencing negative events compared to others. This is known as the optimistic bias (Weinstein, 1980, 1983, 1989). It is one of the most consistent, prevalent, and robust biases documented in psychology and behavioral economics and has been demonstrated across numerous methods and domains (Klein & Helweg-Larsen, 2002; Sharot, 2011). Optimistic errors have been observed across gender, race, nationality, age and even species (Matheson, Asher, & Bateson, 2008). For example smokers think they are less likely to contract lung cancer than the average smoker (Weinstein, Marcus, & Moser, 2005), stock traders believe they will do better than others (De Bondt & Thaler, 1990), and people generally expect to live longer and be healthier than the average person, they underestimate their chances of being divorced and overestimate their chances of success (Weinstein, 1980).

In a tourism context Larsen and Brun (2011) found that tourists judged risk for themselves to be lower than the risk for both “typical-” and “average tourists” on a variety of hazards including infections, traffic accidents and crime. Larsen et al. (2009) demonstrated that tourists also think that other tourists worry more about various travel related issues.

Reasons suggested for the optimistic bias are manifold and are sometimes grouped as follows (Shepperd, Carroll, Grace, & Terry, 2002): A) Self-enhancement: unrealistic optimism increases positive feelings. B) Cognitive processes, e.g. the representative heuristic may lead people to compare themselves to the prototypical accident-prone person thereby overestimating other peoples' risk. C) Imbalanced information: the fact that people have more information about themselves than about others, leads by itself to a more positive evaluation of themselves. And D) Underlying affect: people in a negative mood and depressed people show less comparative optimism.

The optimistic bias is stronger for negative events than for positive ones, i.e. people underestimate their own risks more than they overestimate their chances of successes. This is called the valence effect (Gouveia & Clarke, 2001; Shepperd et al., 2002). The consequences that result from these two types of misjudgments are quite different: overrating the chances of positive events may lead to feelings of well-being and self-esteem, while underestimating the probability of negative events may lead to risk taking or neglect of precautionary safety measures (Shepperd et al., 2002).

When it comes to measuring risk, results will differ depending on whether subjects are asked to rate their own risk or the risk for someone else, e.g. a typical tourist. Participants will rate their own risk lower than that of others; people will think that others are at greater risk and that others worry more about various risks (Larsen et al., 2009). When comparing results across studies one should therefore make sure that risk was measured the same way.

Some researchers have measured perceived risk by asking the participants to estimate how others evaluate a hazard, or how much others would worry about the participant if s/he were exposed to the hazard (e.g. Fuchs et al., 2013; Fuchs & Reichel, 2006). This approach to measuring subjective risk is problematic for many reasons. First, the participant does not know how others evaluate various risks, or how much they worry. Second, participants are influenced by the optimistic bias, and will assume that others evaluate the risk to be higher than they do themselves. Fuchs and Reichel's (2006) data showed this clearly. Their informants thought that others evaluated Israel as markedly more risky than they did themselves. Nonetheless, the participants' guesses about how someone else is evaluating a risk is taken as a measure of the participants own risk perception. These items are then lumped together with other items, which more directly assess perceived risk, or which assess worry to constitute a scale. Unfortunately, it becomes

very unclear what the scale is actually measuring: The participant's perceived risk? The perceived risk of others? The participant's beliefs about other peoples' worries about the participant's exposure to risk?

Unpacking effect

The unpacking effect, also known as subadditivity, is the tendency to judge the probability of the whole as lower than the sum of its parts (Rottenstreich & Tversky, 1997; Tversky & Koehler, 1994; Van Boven & Epley, 2003). "Unpacking" a general event into its components increases the perceived probability of the event. Specific or detailed descriptions of an event are often judged more likely than general, less specific descriptions of the same event. Such judgements are clearly in violation of normative probability, but have been demonstrated over various domains and in experts as well as in lay people (Redelmeier, Koehler, Liberman, & Tversky, 1995; Van Boven & Epley, 2003).

For example, car mechanics judge a general explanation for failure ("something other than the battery") as half as likely as a specific one ("something other than the battery, e.g. the ignition system") (Fischhoff et al., 1978). Subjects are willing to pay more for health insurance that covers "hospitalization for any disease or accident" than for insurance that covers "hospitalization for any reason" (Johnson, Hershey, Meszaros, & Kunreuther, 1993). Subjects judge the probability of dying from specific causes ("cancer, heart attack or other natural causes"), as much higher than the probability of dying from general causes ("natural causes") (Tversky & Koehler, 1994). In a tourism context Larsen and Brun (2011) found that tourists rated specific risks like traffic accidents, petty crime or infections as more risky than the overall risk of the trip, and Larsen et al. (2011) showed specific food risks to be rated higher than the overall evaluation.

Tversky and Koehler (1994) suggest two possible reasons for the unpacking effect, memory limitations (descriptions of specific instances help subjects to remember otherwise forgotten possible outcomes and hence increase the perceived likelihood of these events) and availability (specific descriptions increase the availability of possible outcomes and thereby their perceived probability).

With regard to risk judgments the unpacking effect implies that specifically described events are rated as more risky than generally described ones. Tourists will rate the risk of "unwanted events at the beach" as lower than the risk of "unwanted events like sunburn at the beach". Unpacking a general risk into its components will increase subjective risk ratings. Needless to say, this must be considered when designing questionnaires and comparing ratings from various studies. In order to compare the relative perceived risk of various hazards one needs to make sure that all items are on the same level of specificity.

Home-is-safer-than-abroad bias

This bias is in fact an original excavation of tourism risk research. It implies that people rate their own home country as less risky than foreign countries, regardless of where "home" is. It has been demonstrated in several studies. Larsen et al., 2007), and Larsen et al., 2011 showed that tourists perceived risks linked to food such as salmonella or chicken flue to be greater abroad than at home, no matter where "home" was. Wolff and Larsen (2016b) demonstrated the same effect in a sample of over 10.000 tourists from 89 different countries who rated the risk of various travel destinations. Findings revealed that tourists from all over the world tended to agree on the riskiness of all destinations, with one exception: Tourists tended to regard their own home country as a very safe destination, sometimes in stark contrast to what all other tourists believed. In other words, tourists tended to agree that "home" is safe, no matter where "home" is.

Possible explanations forwarded by these authors include the following: A) Increased perceived control: believing that one is better in avoiding risks at home than in a foreign country (Klein & Helweg-Larsen, 2002; Shepperd et al., 2002). B) The availability heuristic: with limited information from abroad dramatic and catastrophic events are the likeliest to be recalled (Tversky & Kahneman, 1973). C) Biased sampling of information: it is not memory that is biased as implied by the availability heuristic, but the information that enters memory is biased; i.e. most information from abroad is about negative events, most information about home is neutral or positive (Fiedler, 2000; Sedlmeier, Hertwig, & Gigerenzer, 1998). And D) The impact bias: since risks "abroad" are not experienced in the present, they may be overrated (Wilson & Gilbert, 2003). More research is needed however to explore possible explanations for the home-is-safer-than-abroad bias.

For the measurement of perceived risk, this implies that domestic tourists will have lower risk ratings than international tourists regarding many different hazards. Germans will probably rate their chances of being eaten by a shark in Australia as higher than Australians will, and while international tourist to Israel may feel they are risk-takers, Israeli domestic tourists will feel safe in their country (Wolff & Larsen, 2016b).

Implications and conclusions

The above discussion of the various definitions of risk as well as the overview of the heuristics and biases have some important implications for how perceived risk should be defined and measured. The following needs to be considered when constructing questionnaires, and when comparing results between studies:

- **Ask about risk.** If you are interested in perceived risk, ask about risk, not worries or feelings of anxiety or nervousness, nor about probability or likelihood, nor about anything else (see section On the conceptual definition of perceived risk).
- **Rating scale items should be construed as follows:**
  - *Hazard X is …* anchored by for example: *not risky – very risky* or

- *The risk of hazard X is…* anchored by for example: *very low – very high*

- **Keep in mind the heuristics and biases that may influence your ratings** when describing the hazard (see Table 1):
  - **Think about who your respondents are.** Asking participants and partakers will result in lower ratings then asking abstainers and non-participants (affect heuristic/impact bias).
  - **Beware the tense you are using.** Risks in the past are evaluated lowest, risks in the present are evaluated intermediately and risks in the future are evaluated highest (impact bias/rosy retrospection).
  - **Consider whose risk respondents are evaluating.** Participants will evaluate their own risk as lower than that of others (affect heuristic/impact bias).
  - **Consider the specificity with which you are describing the hazard.** Specifically described hazards will (illogically) result in higher ratings than generally described hazards (unpacking).
  - **Think about where the hazard is evaluated.** Participants will judge hazards in their home country as less risky than hazards abroad (home-is-safer-than-abroad-bias).

The present paper looked at findings from psychometric risk research and gave an overview of how perceived risk is conceptualized and measured. These generic findings regarding perceived risk are of high relevance for tourism risk research. The present paper therefore hopes to contribute to the field by increasing awareness and accessibility of findings from generic risk research for tourism scholars.

For future research it is important that perceived risk is *not* conceptualized as the *sum* of probability and severity of consequences, nor should it be conceptualized or measured as worry or anxiety, nor as probability. Future tourism risk research should conceptualize subjective risk as the "severity of negative outcomes weighted by their probability" in accordance with the most widespread and accepted definition of perceived risk in the generic psychometric and economic research literature (Loewenstein et al., 2001; Slovic, 2016). Perceived risk should be measured as described above by asking directly about the *risk or riskiness* of a hazard.

Given the fact that small changes in item wording can have substantial effects on the ratings of perceived risk, great care must be taken when constructing questionnaires, when comparing results from different studies, and even when comparing scores on different items. One needs to make sure that the observed differences are indeed differences in perceived risk and not merely measurement artifacts. It is therefore extremely important that researchers are aware of the heuristics and biases revealed in the generic risk research literature discussed above. The effect of heuristics and biases on risk ratings is unavoidable, however knowing about these effects makes it possible to decide whether observed differences in perceived risk are due to differences in item wording or due to genuine differences in perceived risk.

The presented discourse also implies that an absolute assessment of perceived risk is difficult to achieve. This is because whether a hazard is rated as very risky or not very risky, at least partly, depends on how the question is framed. However, a relative assessment of perceived risk is a doable and valuable undertaking. In other words, it is difficult to measure the exact perceived risk of hazard A, however it is possible to assess whether hazard A is believed to be more or less risky than hazard B. This can only be done by ensuring that A and B are assessed in exactly the same way, for example asked about in the same tense and at the same level of specificity. It also requires knowledge of the various heuristics and biases that may influence risk ratings via item wording.

In the future we should also aim for more detailed and precise descriptions of how perceived risk, and for that matter other concepts, are measured. Increased methodological precision and standardization in the definition and assessment of perceived risk may increase the accumulation of knowledge, and even allow for the discovery of new cognitive biases like the home-is-safer-than-abroad-bias in the field of tourism risk research.

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