Risk and ambiguity of COVID-19 inhibit intentions for post-pandemic travel via reduced valuation of tourism

Baojuan Ye, Shunying Zhao, Hohjin Im, Liluo Gan, Mingfan Liu, Xinqiang Wang and Qiang Yang

(Information about the authors can be found at the end of this article.)

Abstract

Purpose – *This study aims to examine how the initial ambiguity of COVID-19 contributed to tourists' intentions for visiting a once-viral outbreak site in the future.*

Design/methodology/approach – *The present study (N = 248) used partial least-squares structural equation modeling (PLS-SEM) to examine whether perceptions of ambiguity and mismanagement of COVID-19 are indirectly related to intentions to travel to Wuhan in a post-pandemic world through perceptions of risk and tourism value. Further, whether the model effects differed as a function of individual safety orientation was examined.*

Findings – *Perceptions of COVID-19 risk and tourism value serially mediated the effects of perceived COVID-19 ambiguity on post-pandemic travel intentions. Safety orientation did not moderate any paths. Perceived risk was a negative direct correlate of post-pandemic travel intentions.*

Originality/value – *The current study's strength is rooted in its specific targeting of post-pandemic travel intentions to Wuhan—the first city to experience a widescale outbreak of COVID-19 and subsequent international stigma—compared to general travel inclinations.*

Keywords *Risk, Ambiguity, Travel intention, Tourism value, Tourist safety orientation, COVID-19*

Paper type *Research paper*

Introduction

The COVID-19 pandemic brought about an unprecedented level of new concerns about the risks of domestic and international travel (Bae and Chang, 2021; Bhati *et al.*, 2021; Neuburger and Egger, 2021; Rather, 2021; Sánchez-Cañizares *et al.*, 2021). Compared to studies of general travel intentions, however, relatively few have documented the effects of COVID-19's initial ambiguity on travel intentions to sites that were once hotspots for viral outbreaks (Li and Ito, 2021), particularly, in a post-COVID-19 world (e.g. Rather, 2021). Although travel intentions naturally fluctuate over a pandemic's lifespan, early perceptions of risk and tourism value establish impressions that impact future travel considerations (Çetinsöz and Ege, 2013; Chew and Jahari, 2014; Fuchs and Reichel, 2011; Matiza, 2022).

Key empirical studies of COVID-19 and tourism were largely conducted during the middle of 2020 (Bae and Chang, 2021; Neuburger and Egger, 2021; Sánchez-Cañizares *et al.*, 2021), months after the first outbreak in Wuhan in December 2019. The novel and sudden introduction of the virus offered little time for psychological preparation, particularly, for Chinese residents as local and central governments were delayed in their responses (Liu and Saltman, 2020). In other words, studies conducted after this "*ambiguity period*" may not accurately reflect the perceptions travelers had for their social-ecological surroundings. In turn, whether travelers' early subjective appraisals

Received 22 February 2022
Revised 8 September 2022
31 January 2023
Accepted 12 June 2023

of the said social surroundings factored into their evaluation of Wuhan's tourism scene and future intentions to visit post-pandemic remains understudied. Wuhan served as a unique destination to investigate these associations based on its simultaneous status as a stigmatized epicenter of COVID-19 and a popular domestic tourism site during otherwise normative times.

Ambiguity, mismanagement and risk assessment

We first consult the economic sciences to derive a systematic operationalization of *ambiguity* and *uncertainty*—two concepts we hereafter refer to interchangeably. Ambiguity pertains to the psychological state of facing unknown outcomes (Platt and Huettel, 2008) and lacking proper frames of reference (Rabin, 1998) to estimate future tangible gains (Bernoulli, 1954; Machina, 2009). In contrast to known and quantifiable risks, people generally show greater discomfort and anxiety with ambiguity (i.e. *ambiguity aversion*) as it inhibits one's ability to avoid or properly prepare for potentially negative outcomes (Gao and Gudykunst, 1990; Grupe and Nitschke, 2013). The aversion to ambiguity is so strong that people often opt to favor lower —but certain—gains over potentially higher gains—but at uncertain odds—across both simulated experiments (Ellsberg, 1961; Machina, 2009; Platt and Huettel, 2008; Rabin, 1998) and real-world administrative situations (Im and Chen, 2020; Li *et al.*, 2013).

Related to tourism, *travel ambiguity* pertains to unknown chances of events occurring on the way to or at the destination, and the decisions that must be made under imperfect information (Williams *et al.*, 2022; Williams and Baláž, 2015). Familiar travel risks, such as pickpocketing rates against tourists/visitors or the presence of crime organizations, afford tourists the ability to make informed decisions about their travels. In contrast, the expected potential for—but unknown likelihood or forms of—negative outcomes induces travel anxiety and reservations about the safety of destinations (Williams and Baláž, 2015). For instance, COVID-19 in early 2020 imposed ambiguity for travelers due to the dearth of information on the disease's contagiousness, modes of transmission and extent of viral containment to the localized outbreak sites. Tourists cope with ambiguity by seeking more information (Quintal *et al.*, 2010a) or reevaluating the desirability of destinations altogether (Quintal *et al.*, 2010b). The impact of ambiguity on travel behavior has remained consistent during the COVID-19 pandemic (Chua *et al.*, 2021; Golets *et al.*, 2023; Williams *et al.*, 2022), and echoes a recent push for integrating ambiguity into traditional models of tourism behavior (Karl, 2018; Quintal *et al.*, 2010a, b; Williams and Baláž, 2015).

In the absence of viable pharmaceutical interventions (e.g. vaccines) early in the pandemic, one of the key sources of public control for the tourism industry was effective administrative action (Liu and Saltman, 2020; Yang *et al.*, 2022). Effective government actions were critical to mitigating public panic and rapid changes in consumer attitudes (Neuburger and Egger, 2021). However, local and central government actions in response to the first outbreak of COVID-19 in Wuhan, China, were met with several faults attributed to both administrative inefficiencies and insufficient medical supplies (Liu and Saltman, 2020). Further, the Chinese central government issued a strict Zero-COVID-19 policy, marked by a 76-day lockdown order on January 23, 2020, just two days before the 2020 Chinese New Year Spring Festival that effectively shuttered the country's social and economic growth (Austermann *et al.*, 2020). Thus, Chinese citizens during the infant stages of the pandemic may have used perceptions of ambiguity and inefficacy of disease containment to guide their assessments of risk, tourism value and intentions to visit Wuhan in a post-COVID-19 world. Taking these into consideration, we posit the following hypotheses:

H1. People who perceive a) ambiguity and b) mismanagement of COVID-19 also perceive a greater risk of COVID-19 in Wuhan.

H2. People who perceive a) ambiguity and b) mismanagement of COVID-19 also devalue traveling to Wuhan.

H3. People who perceive a) ambiguity and b) mismanagement of COVID-19 also have lower intentions to travel to Wuhan post-COVID-19.

Risk assessment on travel intention

Past studies have well documented that risk perceptions are obstacles to one's intentions to travel (Artuğer, 2015; Baker, 2014; Çetinsöz and Ege, 2013; Rittichainuwat and Chakraborty, 2009). For example, travelers routinely avoid destinations at risk of man-made (e.g. terrorism) or natural disasters (e.g. earthquakes, diseases) (Pizam and Fleischer, 2002; Rittichainuwat and Chakraborty, 2009; Williams and Baláž, 2015). Risk perceptions for destinations can range widely in severity, such as being victims of petty theft to more serious ones like human trafficking, while more recent concerns have commonly centered around viral infection (Williams *et al.*, 2022). Both the *Health Belief Model* (Champion and Skinner, 2008) and the *Theory of Planned Behavior* (Ajzen, 1991) propose that perceived dangers motivate risk-mitigating and safeguarding practices, such as handwashing when exposed to harmful pathogens or canceling travel plans when exogenous sources of risk are beyond one's scope of control. Accordingly, those who report perceiving a greater risk of COVID-19 also state lower intentions to travel (Bae and Chang, 2021; Bhati *et al.*, 2021; Golets *et al.*, 2023; Neuburger and Egger, 2021; Sánchez-Cañizares *et al.*, 2021).

In a similar vein, risk also poses obstacles to revisitation intentions after a disaster (Çetinsöz and Ege, 2013; Chew and Jahari, 2014; Fuchs and Reichel, 2011), particularly, for pandemics as large a scale as COVID-19 (Matiza, 2022). Current impressions of travel risks psychologically ground one's frame of reference for inferring the future social ecology (i.e. "*COVID-19 world*"), leading to the overestimation of coming threats even in the presence of new information (Matiza, 2022; Rabin and Schrag, 1999; Wolff *et al.*, 2019). For example, a recent study conducted in April 2020 found that Sapporo (Japan) residents were less willing to travel to Wuhan (or China broadly) within the next 12 months, the more they perceived it to be currently risky (Li and Ito, 2021). However, as there were no indications of the COVID-19 pandemic being contained within such a short timeframe at the time of their data collection—and uncertainty surrounding the future trajectory of the pandemic—there remains a need to further investigate intentions to visit sites of COVID-19 outbreaks in an adequately distal and abstract post COVID-19 world (Matiza, 2022).

Tourists consider multiple dimensions of risks (e.g. physical, financial, etc.) when determining whether revisiting allegedly volatile destinations is worthwhile and vary in its distal relation to behavior (Çetinsöz and Ege, 2013; Fuchs and Reichel, 2011). For example, concerns about physical risk (e.g. theft) can directly deter revisitation intentions, while socio-psychological risks first deteriorate the image of destinations that subsequently influences one's revisitation considerations (Chew and Jahari, 2014). In other words, a destination's tourism imagery can be highly sensitive to perceptions of volatility and instances of crises (Li *et al.*, 2018). Such future concerns have been a staple component of the COVID-19 pandemic (Rather, 2021; Zhan *et al.*, 2022). Based on prior studies, we conjecture that the perception of Wuhan's volatility would likely have negatively impacted its destination image (Chew and Jahari, 2014; Li *et al.*, 2018) and deterred people's intentions to travel there even after the pandemic subsides (Çetinsöz and Ege, 2013; Fuchs and Reichel, 2011). Further, if perceptions of uncertainty and mismanagement of COVID-19 factor into one's risk assessments of a destination, then perceived risk ought to play a mediating role. Thus, we posit the following hypotheses:

H4a-b. People who perceived the risk of COVID-19 also a) devalue tourism to Wuhan and b) show lower intention to travel to Wuhan post-COVID-19.

H4c. Perceived risk of COVID-19 mediates the effect of perceived ambiguity and mismanagement.

Tourism value perception as a mediator

It is crucial for tourism service departments to properly maintain and manage the interplay between the value of tourism and travel intentions (Baker, 2014; Prebensen *et al.*, 2018). The *perceived value of tourism* refers to the subjective weighting of the benefits of travel (e.g. scenery, culture, entertainment) against the possible costs (e.g. money, danger) (Cheng and Lu, 2013; Petrick and

Backman, 2002) and is one of the fundamental building blocks of a tourist's customer experience (Andrades and Dimanche, 2018). Exogenous threats and risks serve to deteriorate the subjective value of anticipated trips and work against one's higher-order abstractions of expected satisfaction (Cham *et al.*, 2021; Chen and Petrick, 2016; Chen and Chen, 2010; Gallarza and Gil Saura, 2006; Prebensen *et al.*, 2018). Thus, the risk of COVID-19 infection and the unclear—but real—possibility of sudden government-sanctioned quarantines against visitors served to counteract the value added by Wuhan's domestic tourism scene. We conjecture that travelers' early perceptions of uncertainty and risk have conceptual downstream effects by lowering the value of Wuhan's tourism image (Li *et al.*, 2018) which, in turn, discourages one from traveling there (Bae and Chang, 2021; Sánchez-Cañizares *et al.*, 2021). We posit the following to reflect this:

H5. People who value Wuhan's tourism scene also show a) more intention to travel to Wuhan and this mediates the effects of people's perceived b) risk, c) novelty and d) mismanagement of COVID-19.

Tourist safety orientation as a moderator

It remains important to also consider individual variability in reactance to risk and ambiguity. Specifically, *Protection Motivation Theory* (PMT) posits that when faced with impending threats, people engage in more behaviors that minimize and mitigate the said threats (Floyd *et al.*, 2000; Rogers, 1975). For those with a high inherent tendency to engage in precautionary behaviors in anticipation of perceived risks and hazards (i.e. *personal safety orientation*; Curcuruto, 2016), the cognitive saliency of losses (e.g. risks) is exaggerated over gains (e.g. benefits) (Machina, 2009; Rabin, 1998). Thus, tourists with a high personal safety orientation are more concerned about conceivable dangers and accordingly readjust the expected value of going on a trip (Bernoulli, 1954; Machina, 2009; Wang, 2009).

Although recent investigations into safety orientation in tourism amid COVID-19 have been sparse, related studies have similarly documented people responding to perceptions of COVID-19 risk with greater motivation for appropriate self-protective biosecurity behaviors (Qiao *et al.*, 2022; Yang *et al.*, 2022), such as wearing masks or gloves (Kim *et al.*, 2022). Because the government's containment efforts and others' behaviors are often beyond one's immediate control, those highly disposed toward safety likely opt to conservatively infer greater hazards of ambiguity out of an abundance of caution. In doing so, tourists likely devalue tourism imagery of regions where their safety from COVID-19 cannot be reasonably guaranteed and readjust their travel frequency (Kim *et al.*, 2021). Thus, we posit the following hypothesis:

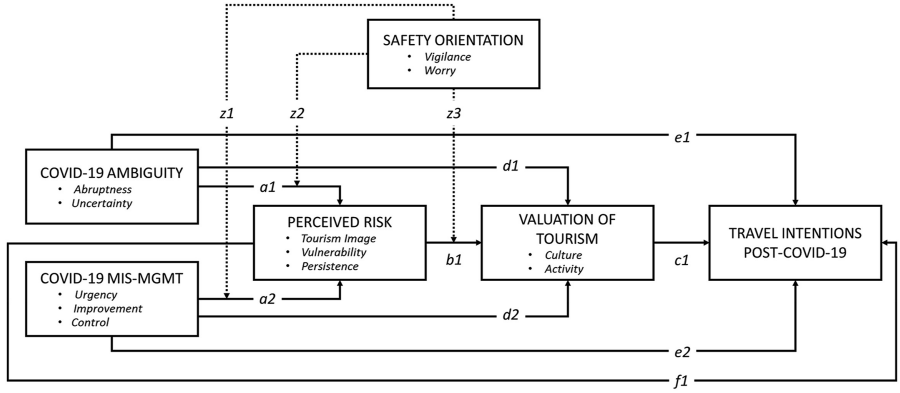
H6. The effects of a) perceived ambiguity and b) mismanagement on perceived risk, and the effect of c) risk on Wuhan's tourism value are exacerbated for people with high personal safety orientation.

Present study

During the current study's data collection period (February 14–24, 2020), more than 70% of daily new confirmed cases in China were clustered in Wuhan. As China's COVID-19 wave hit during otherwise peak travel times, the current study investigated perceptions about travel during a unique window fraught with ambiguity and traveler angst. Further, compared to studies that examined generic travel intentions, the current study investigated intentions to travel to Wuhan—a destination highly stigmatized as a volatile site for the resurgence of outbreaks. Taken together, the current study tested a predictive serial moderated mediation conceptual model (Figure 1). We specifically sampled residents outside of Wuhan to investigate the effects of initial localized public health uncertainty on travel tourism image for potential domestic visitors. We entered gender, age, income and history of visiting Wuhan as controls for financial ability to travel and proxy of familiarity with Wuhan's tourism scene.

To examine the direct, indirect and interaction effects, we utilized the variance-based partial least squares structural equation modeling (PLS-SEM) approach using the R package SEMinR v.2.2.1

Figure 1 Conceptual serial mediation model



Note(s): COVID-19 MIS-MGMT = Mismanagement of COVID-19

Source(s): Figure by authors

(Hair *et al.*, 2021b; Ray *et al.*, 2021**)**. Compared to the more common covariance-based structural equation modeling (CB-SEM) approach, PLS-SEM is more suitable for predictive research (vs. theory confirmation) as it maximizes variance explained between paths with smaller sample sizes (Hair *et al.*, 2017; Hair *et al.*, 2021a). Further, PLS-SEM is a non-parametric approach that relaxes the conservatively strict measurement and structural assumptions imposed by CB-SEM (e.g. normality, number of indicators), making it suitable for modeling applied behavioral and attitudinal data that commonly yield greater measurement errors and variability. Lastly, PLS-SEM differentially weights each measurement indicator's contribution to the composite score and allows for a more organic representation of the overarching construct (Hair *et al.*, 2021a) compared to other path modeling strategies (e.g. GLM mediation) that utilize unweighted sum scores or averages.

Method

Participants and procedures

Three hundred Chinese participants residing outside of Wuhan were recruited for the study electronically [1] through the online survey platform SurveyStar (www.wjx.cn) and Credamo's (www.credamo.com) human participant sample database during February 14–24, 2020 [2]. Participants were free to withdraw from the study at any time. Upon reaching the end of the study, participants were compensated 5 RMB. Thirty-eight participants did not complete the entirety of the study and were removed from further analysis. Fourteen additional participants were ineligible to provide informed consent (i.e. below the age of majority) and removed from analysis for a total of 248 participants in the final analysis (53.1% female, median age between 31 and 40, median monthly income between 2,000 and 5,000 RMB). All remaining participants provided informed consent. The majority of participants (66.1%) reported never having visited Wuhan. The study was approved by the first listed author's University Ethics Committee.

Measures

Perceived risk of COVID-19 in Wuhan. Perceived risk of COVID-19 in Wuhan was measured with nine items adapted from the Tourism Destination Risk Attributes Scale (Feng and Bai, 2016) to fit the context of COVID-19. The new scale consisted of three dimensions: a) tourism image (three items, e.g. "The novel coronavirus will seriously affect Wuhan's tourism image"), b) vulnerability (three items, e.g. "The novel coronavirus may break out again in Wuhan") and c) persistence (three items,

e.g. "The negative impact of the novel coronavirus will continue for some time"), $\omega = 0.771$. All items were measured on a seven-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*).

Perceived ambiguity of COVID-19. Perceived ambiguity of COVID-19 was measured via six items adapted from the Tourism Destination Risk Attributes Scale (Feng and Bai, 2016) to fit the context of COVID-19. The new scale consisted of two dimensions: a) abruptness (3 items, e.g. "The outbreak of the novel coronavirus was surprising") and b) uncertainty (3 items, e.g. "The scale of the impact of the novel coronavirus is uncertain"), $\omega = 0.711$. All items were measured on a seven-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*).

Perceived mismanagement of COVID-19 in Wuhan. Perceived mismanagement of COVID-19 was measured via six items adapted from the Tourism Destination Risk Attributes Scale (Feng and Bai, 2016) to fit the context of COVID-19. The new scale consisted of three dimensions: a) urgency (two items, e.g. "The relevant management personnel in Wuhan faced great time pressure when dealing with the incident"), b) improvement (two items, e.g. "The novel coronavirus will promote the upgrade and improvement of Wuhan's crisis management system"), and c) control (two items, e.g. "The impact of the novel coronavirus can be controlled"), $\omega = 0.799$. All items were measured on a seven-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). The improvement and control dimensions were reverse-coded.

Perceived valuation of tourism. Tourists' perceived value of tourism was measured via a shortened COVID-19 adaptation of the Tourists' Perceived Value Scale (Huang and Huang, 2007). The scale consisted of two dimensions: a) valuation of culture (five items, e.g. "I can experience the unique cultural and folk customs of Wuhan") and b) activities (five items, e.g. "I can participate in adventurous and exciting activities in Wuhan"), $\omega = 0.862$. All items were measured on a seven-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*).

Tourist safety orientation. Safety orientation was measured using a shortened COVID-19 adaptation of the Destination Tourist Safety Scale (Zou, 2015). The adapted scale consisted of two dimensions: a) vigilance (three items, e.g. "When dealing with strangers, I will be vigilant and worry about being scammed") and b) worry (three items, e.g. "Due to lack of preventive measures, I am worried that I cannot cope with the spread of local diseases"), $\omega = 0.713$. All items were measured on a five-point Likert (1 = *Strongly disagree* to 5 = *Strongly agree*).

Post-COVID-19 travel intention. Participants' intention to travel to Wuhan post-COVID-19 was measured with a four-item scale. The scale asked participants to what extent they agreed with the given statements under the context of when the COVID-19 pandemic was over (e.g. "I am willing to travel to Wuhan"). Items were rated on a seven-point Likert scale (1 = *Strongly disagree* to 7 = *Strongly agree*), $\omega = 0.708$.

Results

Descriptive statistics, diagnostics and correlations

The structural validity of the COVID-19 adapted scale items is given in Table 1. Because measurements for perceived risk, ambiguity and mismanagement were adapted and derived from a single source, a higher-order structural model inclusive of all three measurements—representing broad perceived risk—was tested against models of each construct in their separate lower-order models. Although the higher-order model of broad risk perceptions yielded acceptable to good metrics for RMSEA and SRMR, CFI was far lower than acceptable conventions and thus indicated model misspecification. Across all comparisons of the higher-order model against individual lower-order models, the individual lower-order models yielded lower (i.e. better) AIC and EVCI metrics. Thus, our subsequent analyses treated the three constructs as related but independent. The measures of tourism value, safety orientation and travel intention all yielded good structural validity.

A diagnostic examination of the relevant study variables revealed no distributional problems (skew from −0.738 to 0.265, kurtosis from −0.366 to 0.983). Descriptive statistics and bivariate correlations are given in Table 2.

PLS-SEM path analyses

Direct and indirect path coefficients from a PLS-SEM are given in Table 3. Post-hoc power analyses of regression paths indicated sufficient statistical power at each path (Intent, $R^2_{adj} = 0.232$, $1 - \beta = 1.000$; Value, $R^2_{adj} = 0.110$, $1 - \beta = 0.996$; Risk, $R^2_{adj} = 0.472$, $1 - \beta = 1.000$). Multicollinearity checks also indicated VIF values ranged from 1.032 to 2.076 at all paths. Perceived risk of COVID-19 was negatively associated with both travel intentions ($p = 0.005$) and tourism valuation ($p = 0.001$). Perceived ambiguity ($p < 0.001$) and mismanagement of COVID-19 were positively related to perceived risk ($p = 0.001$) but neither interacted with safety orientation (p from 0.520 to 0.606). Tourism value was negatively associated with perceived risk ($p < 0.001$) but not ambiguity or mismanagement (p from 0.280 to 0.675). Safety orientation was not associated with tourism value or perceived risk (p from 0.053 to 0.305). Lastly, travel intention was negatively related to perceived risk ($p = 0.005$) but not associated with either ambiguity or mismanagement (p from 0.092 to 0.177). Perceived risk and tourism value serially mediated the effects of perceived ambiguity, but not mismanagement, on travel intentions. Perceived risk mediated the effects of ambiguity and mismanagement on both tourism value and travel intentions.

Table 1 Confirmatory factor analyses of adapted scales

Model	χ^2	*df*	*CFI*	*RMSEA*	*90% CI*		*SRMR*	*AIC*	*ECVI*
					Lower	*Upper*			
Higher Order Model of Broad Risk	465.815	178	0.813	0.081	0.072	0.090	0.067	17,396.940	2.306
Perceived Risk	54.153	24	0.932	0.071	0.046	0.097	0.046	7571.764	0.388
Perceived Ambiguity	22.589	8	0.938	0.086	0.045	0.128	0.047	5129.842	0.196
Perceived Mismanagement	34.140	6	0.933	0.138	0.095	0.184	0.045	4917.935	0.259
Travel Value	62.926	34	0.964	0.059	0.035	0.081	0.041	8340.033	0.423
Safety Orientation	16.896	8	0.962	0.067	0.019	0.112	0.044	3879.377	0.173
Post-Pandemic Travel Intention	1.375	2	1.000	0.000	0.000	0.113	0.014	3333.841	0.070

Note(s): χ^2 = chi-square statistic, df = degrees of freedom, CFI = Comparative Fit Index, RMSEA = Root Mean Square Error of Approximation, 90% CI = 90% Confidence Interval, SRMR = Standardized Root Mean Square Residual, AIC = Akaike Information Criterion, ECVI = Expected Cross Validation Index
Source(s): Authors' own elaboration

Table 2 Descriptive statistics and bivariate correlations

Variable	M	*SD*	*1*	*2*	*3*	*4*	*5*	*6*
1. Risk	4.542	0.850	–					
2. Ambiguity	4.742	0.925	0.565***	–				
3. Mismanagement	4.755	1.011	0.541***	0.603***	–			
4. Tourism Value	4.217	1.013	−0.206**	−0.044	−0.074	–		
5. Safety Orientation	3.386	0.612	0.408***	0.439***	0.455***	0.015	–	
6. Travel Intention	4.025	1.023	−0.358***	−0.281***	−0.164**	0.352***	−0.129*	–

Note(s): *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$
Source(s): Authors' own elaboration

Table 3 PLS-SEM direct and indirect regression paths

Path	Path	β	SD	t	95% CI Lower	95% CI Upper
Direct Effects Paths						
Ambig → Risk	*a1*	0.390***	0.073	5.557	0.247	0.536
Ambig → Value	*d1*	0.102	0.094	1.040	−0.080	0.291
Ambig → Intent	*e1*	−0.166	0.097	−1.692	−0.359	0.027
Mgmt → Risk	*a2*	0.290**	0.087	3.296	0.109	0.461
Mgmt → Value	*d2*	0.040	0.095	0.235	−0.144	0.230
Mgmt → Intent	*e2*	0.109	0.079	1.328	−0.041	0.276
Risk → Value	*b1*	−0.350***	0.105	−3.172	−0.553	−0.145
Risk → Intent	*f1*	−0.256**	0.093	−2.775	−0.421	−0.063
Value → Intent	*c1*	0.309***	0.069	4.428	0.158	0.433
Safety → Risk	–	0.140	0.074	1.602	0.004	0.287
Safety → Value	–	0.107	0.107	0.994	−0.115	0.295
Risk × Safety → Value	*z3*	−0.198	0.109	−1.450	−0.375	0.143
Ambig × Safety → Risk	*z1*	−0.045	0.086	−0.500	−0.211	0.130
Mgmt × Safety → Risk	*z2*	0.067	0.112	0.542	−0.159	0.248
Indirect Effects Paths						
Ambig → Risk → Value → Intent		−0.042*	0.018	−2.347	−0.078	−0.013
Mgmt → Risk → Value → Intent		−0.032	0.017	−1.684	−0.073	−0.005
Risk → Value → Intent		−0.109**	0.041	−2.476	−0.192	−0.034
Ambig → Risk → Intent		−0.100*	0.041	−2.532	−0.187	−0.024
Ambig → Risk → Value		−0.136**	0.047	−2.885	−0.231	−0.052
Mgmt → Risk → Intent		−0.073*	0.033	−2.224	−0.141	−0.015
Mgmt → Risk → Value		−0.104*	0.049	−1.946	−0.209	−0.022

Note(s): *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; Abbreviations: Ambig = Perceived Ambiguity of COVID-19 in Wuhan; Mgmt = Perceived Mismanagement of COVID-19 in Wuhan; Risk = Perceived Risk of COVID-19 in Wuhan; Value = Tourism Value of Wuhan; Intent = Travel Intention to Wuhan post-COVID-19; Safety = Individual Safety Orientation; Path coefficients controlling for age, gender, income and past travel history to Wuhan

Source(s): Authors' own elaboration

Discussion

Consistent with propositions from behavioral economics (Machina, 2009; Platt and Huettel, 2008; Rabin, 1998) and applied behavioral sciences (Im and Chen, 2020; Li *et al.*, 2013; Quintal *et al.*, 2010a, b), tourists perceived more risk of COVID-19, the more they felt the pandemic was ambiguous. In doing so, they devalued the tourism imagery of Wuhan and showed greater aversion to traveling, further evidencing that a destination's macro-environment influences the appraised value of tourism (Chen and Chen, 2010; Cheng and Lu, 2013; e.g. Choi *et al.*, 2018; Gallarza and Gil Saura, 2006). Citizens likely used the government's efficiency, or lack thereof (Liu and Saltman, 2020), as a frame of reference to adjust and update perceptions of the potential dangers associated with COVID-19.

Participants' reported perceived risk of COVID-19 remained a direct deterrent to travel intentions, suggesting that not only do current risk perceptions negatively influence travel intentions in the short term (e.g. Bae and Chang, 2021; Li and Ito, 2021) but also that sites of major outbreaks may be stigmatized even in the abstract future (Matiza, 2022; Quintal *et al.*, 2022; Xie *et al.*, 2020). General perceived health risks in specific destinations, however, may be remedied by greater implementation of formal policies and measures that serve to improve the destination image to travelers (Matiza, 2022). This may have been observed in the case of the Wuhan Tourism Administration, 2020 National Day Golden Week celebration tourism recovery to approximately 83.21% and 73.18% of 2019's attendance and revenue (i.e. pre-pandemic market). After the initial hurdles, efforts by local agencies may have demonstrated Wuhan's commitment to safety (Wuhan Tourism Administration, 2020). Nonetheless, further research is needed to examine whether longitudinal trends corroborate the implications of the current study.

Our results also showed that the effects of ambiguity/mismanagement on COVID-19 risk or risk on tourism valuation did not vary across people with different personal safety orientations, failing to support our hypotheses and past findings (Wang, 2009). Nonetheless, bivariate correlations showed that safety orientation was positively and directly associated with perceptions of ambiguity and mismanagement, consistent with recent propositions that factors conducive to risk increase motivations for self-protection (Kim *et al.*, 2021; 2022; Qiao *et al.*, 2022; Yang *et al.*, 2022). Targeted marketing toward tourists with a high disposition for biosecurity concerns may therefore be necessary to incentivize subsequent travel and maintain a public image.

Practical implications

Based on the findings from the current study, there are several recommendations for policymakers and industry professionals aiming to revive tourism in cities that were once sites of COVID-19 outbreaks. Emphasizing the various systematic steps implemented to ensure health safety in their travel marketing (e.g. mask use, vaccination requirements) with evidence of high standard health compliance is likely to minimize the uncertainty of health hazards and improve trust in administrative competence (Matiza, 2022). For instance, the tourism department of Wuhan dispatched more than 800 law enforcement officers and supervisory groups to their 1,582 tour operators to ensure compliance with COVID-19 prevention ahead of the 2020 National Day Golden Week (Wuhan Tourism Administration, 2020). Failure to prevent the exacerbation of the perception of uncertainty or administrative incompetence has the potential for negative downstream effects.

Second, during times of uncertainty, distrust and risk, emphasizing an increased degree of customization for tourists may be beneficial. Providing "untact" alternatives to traditional services (e.g. food services) and offering customizable tourism programs can attend to tourists' specific safety needs (Bae and Chang, 2021). Although market research commonly employs discrete choice models (i.e. choice-based conjoint, qualitative choice) to identify combinations of bundled travel offerings, the marketability of such packages may diminish should any of the specific options pose new health concerns (Bae and Chang, 2021). Thus, practitioners may explore introducing greater flexibility of alternatives for potential tourists to substitute undesired features during times of health uncertainty. In a similar vein, practitioners are recommended to regularly conduct panel surveys across the lifespan of public health crises to identify travelers' changing feature preferences shift with the changing dynamics of the social ecology.

Limitations

Several limitations exist for the current study. First, the study relied on cross-sectional self-report measures and causal inferences are limited. Future research may seek to utilize experimental manipulations and longitudinal tracking to infer how changing attitudes correspond with subsequent updates to intentions to visit sites of COVID-19 outbreaks. Second, the research was limited in its scope of only examining tourism to Wuhan, China. As the extent of the pandemic largely differs from place to place, further research is necessary to examine whether the findings remain robust across cultures, regions, and time. Lastly, the current study utilized a strictly quantitative approach to investigate the proposed conceptual correlates that limit the scope of the proposed model. Future research may utilize mixed methods with both qualitative and quantitative approaches to build and confirm the theoretical connections between different constructs.

Conclusion

Although further research is needed, this study is an important step in unpacking how the perceived risk of tourism destination related to travel intention amid the COVID-19 pandemic. In doing so, we repeat the need to integrate uncertainty as a rudimentary variable of interest for modeling travelers' values and behaviors. Uncertainty aversion as a basic behavioral tendency has significant implications for quickly revitalizing damages to the tourism industry as man-made and natural disasters will, no doubt, pose future hurdles for eager travelers.

Acknowledgments

The authors would like to thank the anonymous reviewers as well as two colleagues, who wished to remain uncredited, for helping to proofread the final draft of the paper.

Funding: This work was supported by the Jiangxi Province Department of Education under the Jiangxi's Educational Scientific Planning Project (20YB029), Jiangxi'Key Research Base Project of Humanities and Social Sciences (JD20068) and Science and Technology Research Project of Jiangxi' Department of Education (GJJ200306).

Conflicts of interest: The authors declare no conflict of interest.

Availability of data and material: The data and material used in this study are available from the corresponding author upon reasonable request.

Ethics approval: The current study was approved by the Jiangxi Normal University ethical review board (IRB-JXNU-PSY-2020012).

Baojuan Ye, Shunying Zhao, and Hohjin Im are co-first-authors.

Notes

1. As the study was conducted during China's nationwide lockdown order, all forms of research recruitment and data collection were conducted online to avoid in-person contact.
2. Because the study was disseminated by research and educational data services vendors, there is no participation rate to report. Data from respondents that drop out mid-study are automatically deleted and are not accessible to the researchers.

References

Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211, doi: 10.1016/0749-5978(91)90020-T.

Andrades, L. and Dimanche, F. (2018), "Co-creation of experience value: a tourist behaviour approach", *Creating Experience Value in Tourism*, Vol. 2, pp. 83-97, CABI, Wallingford, Oxfordshire; Boston, MA.

Artuğer, S. (2015), "The effect of risk perceptions on tourists' revisit intentions", *European Journal of Business and Management*, Vol. 7 No. 2, pp. 36-43.

Austermann, F., Shen, W. and Slim, A. (2020), "Governmental responses to COVID-19 and its economic impact: a brief Euro-Asian comparison", *Asia Europe Journal*, Vol. 18 No. 2, pp. 211-216, doi: 10.1007/s10308-020-00577-0.

Bae, S.Y. and Chang, P.-J. (2021), "The effect of coronavirus disease-19 (COVID-19) risk perception on behavioural intention towards 'untact' tourism in South Korea during the first wave of the pandemic (March 2020)", *Current Issues in Tourism*, Vol. 24 No. 7, pp. 1017-1035, doi: 10.1080/13683500.2020.1798895.

Baker, D. (2014), "The effects of terrorism on the travel and tourism industry", *The International Journal of Religious Tourism and Pilgrimage*, Vol. 2 No. 1, p. 58.

Bernoulli, D. (1954), "'Exposition of a new theory on the measurement of risk', *econometrica*", *[Wiley, Econometric Society*, Vol. 22 No. 1, pp. 23-36, doi: 10.2307/1909829.

Bhati, A.S., Mohammadi, Z., Agarwal, M., Kamble, Z. and Donough-Tan, G. (2021), "Motivating or manipulating: the influence of health-protective behaviour and media engagement on post-COVID-19 travel", *Current Issues in Tourism*, Vol. 24 No. 15, pp. 2088-2092, doi: 10.1080/13683500.2020.1819970.

Çetinsöz, B.C. and Ege, Z. (2013), "Impacts of perceived risks on tourists' revisit intentions", *Anatolia*, Vol. 24 No. 2, pp. 173-187, doi: 10.1080/13032917.2012.743921.

Cham, T.-H., Lim, Y.-M., Sia, B.-C., Cheah, J.-H. and Ting, H. (2021), "Medical tourism destination image and its relationship with the intention to revisit: a study of Chinese medical tourists in Malaysia", *Journal of China Tourism Research*, Vol. 17 No. 2, pp. 163-191, doi: 10.1080/19388160.2020.1734514.

Champion, V.L. and Skinner, C.S. (2008), *The Health Belief Model", Health Behavior And Health Education: Theory, Research, and Practice*, 4th ed., Jossey-Bass, San Francisco, CA, pp. 45-65.

Chen, C.-F. and Chen, F.-S. (2010), "Experience quality, perceived value, satisfaction and behavioral intentions for heritage tourists", *Tourism Management*, Vol. 31 No. 1, pp. 29-35, doi: 10.1016/j.tourman.2009.02.008.

Chen, C.-C. and Petrick, J.F. (2016), "The roles of perceived travel benefits, importance, and constraints in predicting travel behavior", *Journal of Travel Research*, Vol. 55 No. 4, pp. 509-522, doi: 10.1177/0047287514563986.

Cheng, T.-M. and Lu, C.-C. (2013), "Destination image, novelty, hedonics, perceived value, and revisiting behavioral intention for island tourism", *Asia Pacific Journal of Tourism Research*, Vol. 18 No. 7, pp. 766-783, doi: 10.1080/10941665.2012.697906.

Chew, E.Y.T. and Jahari, S.A. (2014), "Destination image as a mediator between perceived risks and revisit intention: a case of post-disaster Japan", *Tourism Management*, Vol. 40, pp. 382-393, doi: 10.1016/j.tourman.2013.07.008.

Choi, M., Law, R. and Heo, C.Y. (2018), "An investigation of the perceived value of shopping tourism", *Journal of Travel Research*, Vol. 57 No. 7, pp. 962-980, doi: 10.1177/0047287517726170.

Chua, B.-L., Al-Ansi, A., Lee, M.J. and Han, H. (2021), "Impact of health risk perception on avoidance of international travel in the wake of a pandemic", *Current Issues in Tourism*, Vol. 24 No. 7, pp. 985-1002, doi: 10.1080/13683500.2020.1829570.

Curcuruto, M. (2016), "Safety participation in the workplace: an assessment tool of proactive safety orientations by individuals (pro-safe)", *Chemical Engineering Transactions*, Vol. 53, pp. 181-186, doi: 10.3303/CET1653031.

Ellsberg, D. (1961), "Risk, ambiguity, and the savage axioms", *The Quarterly Journal of Economics*, Vol. 75 No. 4, pp. 643-669, Oxford University Press, doi: 10.2307/1884324.

Feng, S. and Bai, K. (2016), "The constitution of man-made tourism destination crisis attributes: a perspective of scale development", *Tourism Tribune*, Vol. 31 No. 8, pp. 90-101.

Floyd, D.L., Prentice-Dunn, S. and Rogers, R.W. (2000), "A meta-analysis of research on protection motivation theory", *Journal of Applied Social Psychology*, Vol. 30 No. 2, pp. 407-429, doi: 10.1111/j.1559-1816.2000.tb02323.x.

Fuchs, G. and Reichel, A. (2011), "An exploratory inquiry into destination risk perceptions and risk reduction strategies of first time vs. repeat visitors to a highly volatile destination", *Tourism Management*, Vol. 32 No. 2, pp. 266-276, doi: 10.1016/j.tourman.2010.01.012.

Gallarza, M.G. and Gil Saura, I. (2006), "Value dimensions, perceived value, satisfaction and loyalty: an investigation of university students' travel behaviour", *Tourism Management*, Vol. 27 No. 3, pp. 437-452, doi: 10.1016/j.tourman.2004.12.002.

Gao, G. and Gudykunst, W.B. (1990), "Uncertainty, anxiety, and adaptation", *International Journal of Intercultural Relations*, Vol. 14 No. 3, pp. 301-317, doi: 10.1016/0147-1767(90)90017-Q.

Golets, A., Farias, J., Pilati, R. and Costa, H. (2023), "COVID-19 pandemic and tourism: the impact of health risk perception and intolerance of uncertainty on travel intentions", *Current Psychology*, Vol. 42, pp. 2500-2513, doi: 10.1007/s12144-021-02282-6.

Grupe, D.W. and Nitschke, J.B. (2013), "Uncertainty and anticipation in anxiety", *Nature Reviews. Neuroscience*, Vol. 14 No. 7, pp. 488-501, doi: 10.1038/nrn3524.

Hair, J.F. Jr., Matthews, L.M., Matthews, R.L. and Sarstedt, M. (2017), "PLS-SEM or CB-SEM: updated guidelines on which method to use", *International Journal of Multivariate Data Analysis*, Vol. 1 No. 2, pp. 107-123, doi: 10.1504/IJMDA.2017.10008574.

Hair, J.F. Jr., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2021a), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 3rd ed., SAGE Publications, Thousand Oaks, CA.

Hair, J.F. Jr., Hult, G.T.M., Ringle, C.M., Sarstedt, M., Danks, N.P. and Ray, S. (2021b), *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*, Springer Nature, Cham, doi: 10.1007/978-3-030-80519-7.

Huang, Y. and Huang, F. (2007), "Tourists' perceived value model and its measurement: an empirical study", *Tourism Tribune*, Vol. 22 No. 8, pp. 42-47.

Im, H. and Chen, C. (2020), "Cultural dimensions as correlates of favoritism and the mediating role of trust", *Cross Cultural and Strategic Management*, Vol. 27 No. 3, pp. 417-445, doi: 10.1108/CCSM-09-2019-0165.

Karl, M. (2018), "Risk and uncertainty in travel decision-making: tourist and destination perspective", *Journal of Travel Research*, Vol. 57 No. 1, pp. 129-146, doi: 10.1177/0047287516678337.

Kim, M.J., Bonn, M. and Hall, C.M. (2022), "What influences COVID-19 biosecurity behaviour for tourism?", *Current Issues in Tourism*, Vol. 25 No. 1, pp. 21–27, doi: 10.1080/13683500.2021.1883558.

Kim, M.J., Hall, C.M. and Bonn, M. (2021), "Does International Travel Frequency Affect COVID-19 Biosecurity Behavior in the United States?", *International Journal of Environmental Research and Public Health*, Vol. 18 No. 8, p. 4111, doi: 10.3390/ijerph18084111.

Li, S.R. and Ito, N. (2021), "Nothing can stop me!' Perceived risk and travel intention amid the COVID-19 pandemic: a comparative study of wuhan and Sapporo", in Wörndl, W., Koo, C. and Stienmetz, J.L. (Eds), *Information and Communication Technologies in Tourism 2021*, Springer International Publishing, Cham, pp. 490-503, doi: 10.1007/978-3-030-65785-7_47.

Li, K., Griffin, D., Yue, H. and Zhao, L. (2013), "How does culture influence corporate risk-taking?", *Journal of Corporate Finance*, Vol. 23, pp. 1-22, doi: 10.1016/j.jcorpfin.2013.07.008.

Li, F., Wen, J. and Ying, T. (2018), "The influence of crisis on tourists' perceived destination image and revisit intention: an exploratory study of Chinese tourists to North Korea", *Journal of Destination Marketing and Management*, Vol. 9, pp. 104-111, doi: 10.1016/j.jdmm.2017.11.006.

Liu, Y. and Saltman, R.B. (2020), "Policy lessons from early reactions to the COVID-19 virus in China", *American Journal of Public Health*, Vol. 110 No. 8, pp. 1145-1148, doi: 10.2105/AJPH.2020.305732.

Machina, M.J. (2009), "Risk, ambiguity, and the rank-dependence axioms", *American Economic Review*, Vol. 99 No. 1, pp. 385-392, doi: 10.1257/aer.99.1.385.

Matiza, T. (2022), "Post-COVID-19 crisis travel behaviour: towards mitigating the effects of perceived risk", *Journal of Tourism Futures*, Vol. 8 No. 1, pp. 99-108, doi: 10.1108/JTF-04-2020-0063.

Neuburger, L. and Egger, R. (2021), "Travel risk perception and travel behaviour during the COVID-19 pandemic 2020: a case study of the DACH region", *Current Issues in Tourism*, Vol. 24 No. 7, pp. 1003-1016, doi: 10.1080/13683500.2020.1803807.

Petrick, J.F. and Backman, S.J. (2002), "An examination of the construct of perceived value for the prediction of golf travelers' intentions to revisit", *Journal of Travel Research*, Vol. 41 No. 1, pp. 38-45, doi: 10.1177/004728750204100106.

Pizam, A. and Fleischer, A. (2002), "Severity versus frequency of acts of terrorism: which has a larger impact on tourism demand?", *Journal of Travel Research*, Vol. 40 No. 3, pp. 337-339, doi: 10.1177/004728750204003011.

Platt, M.L. and Huettel, S.A. (2008), "Risky business: the neuroeconomics of decision making under uncertainty", *Nature Neuroscience*, Vol. 11 No. 4, pp. 398-403, doi: 10.1038/nn2062.

Prebensen, N.K., Chen, J.S. and Uysal, M.S. (2018), "Co-creation of tourist experience: scope, definition and structure", *Creating Experience Value in Tourism*, Vol. 2, pp. 1-10, CABI, Wallingford, Oxfordshire; Boston, MA.

Qiao, G., Ruan, W.J. and Pabel, A. (2022), "Understanding tourists' protection motivations when faced with overseas travel after COVID-19: the case of South Koreans travelling to China", *Current Issues in Tourism*, Vol. 25 No. 10, pp. 1588-1606, doi: 10.1080/13683500.2021.1928011.

Quintal, V.A., Lee, J.A. and Soutar, G.N. (2010a), "Tourists' information search: the differential impact of risk and uncertainty avoidance", *International Journal of Tourism Research*, Vol. 12 No. 4, pp. 321-333, doi: 10.1002/jtr.753.

Quintal, V.A., Lee, J.A. and Soutar, G.N. (2010b), "Risk, uncertainty and the theory of planned behavior: a tourism example", *Tourism Management*, Vol. 31 No. 6, pp. 797-805, doi: 10.1016/j.tourman.2009.08.006.

Quintal, V.A., Sung, B. and Lee, S. (2022), "Is the coast clear? Trust, risk-reducing behaviours and anxiety toward cruise travel in the wake of COVID-19", *Current Issues in Tourism*, Vol. 25 No. 2, pp. 206-218, doi: 10.1080/13683500.2021.1880377.

Rabin, M. (1998), "Psychology and Economics", *Journal of Economic Literature, American Economic Association*, Vol. 36 No. 1, pp. 11-46.

Rabin, M. and Schrag, J.L. (1999), "First impressions matter: a model of confirmatory bias", *The Quarterly Journal of Economics*, Vol. 114 No. 1, pp. 37-82, doi: 10.1162/003355399555945.

Rather, R.A. (2021), "Monitoring the impacts of tourism-based social media, risk perception and fear on tourist's attitude and revisiting behaviour in the wake of COVID-19 pandemic", *Current Issues in Tourism*, Vol. 24 No. 23, pp. 3275-3283, doi: 10.1080/13683500.2021.1884666.

Ray, S., Danks, N.P. and Valdez, A.C. (2021), "Seminr: building and estimating structural equation models".

Rittichainuwat, B.N. and Chakraborty, G. (2009), "Perceived travel risks regarding terrorism and disease: the case of Thailand", *Tourism Management*, Vol. 30 No. 3, pp. 410-418, doi: 10.1016/j.tourman.2008.08.001.

Rogers, R.W. (1975), "A protection motivation theory of fear appeals and attitude change", *The Journal of Psychology*, Vol. 91 No. 1, pp. 93-114, doi: 10.1080/00223980.1975.9915803.

Sánchez-Cañizares, S.M., Cabeza-Ramírez, L.J., Muñoz-Fernández, G. and Fuentes-García, F.J. (2021), "Impact of the perceived risk from Covid-19 on intention to travel", *Current Issues in Tourism*, Vol. 24 No. 7, pp. 970-984, doi: 10.1080/13683500.2020.1829571.

Wang, X.Q. (2009), "Review on the effect of travelers' perception of safety on destination choosing", *Tourism Forum*, Vol. 2 No. 4, pp. 485-489, doi: CNKI:SUN:GLGZ.0.2009-04-002.

Williams, A.M. and Baláž, V. (2015), "Tourism risk and uncertainty: theoretical reflections", *Journal of Travel Research*, Vol. 54 No. 3, pp. 271-287, doi: 10.1177/0047287514523334.

Williams, A.M., Chen, J.L., Li, G. and Baláž, V. (2022), "Risk, uncertainty and ambiguity amid Covid-19: a multi-national analysis of international travel intentions", *Annals of Tourism Research*, Vol. 92, 103346, doi: 10.1016/j.annals.2021.103346.

Wolff, K., Larsen, S. and Øgaard, T. (2019), "How to define and measure risk perceptions", *Annals of Tourism Research*, Vol. 79, 102759, doi: 10.1016/j.annals.2019.102759.

Wuhan Tourism Administration (2020), *Summary of the Cultural and Tourism Market in Wuhan during the National Day Golden Week*, Wuhan Tourism Administration.

Xie, C., Huang, Q., Lin, Z. and Chen, Y. (2020), "Destination risk perception, image and satisfaction: the moderating effects of public opinion climate of risk", *Journal of Hospitality and Tourism Management*, Vol. 44, pp. 122-130, doi: 10.1016/j.jhtm.2020.03.007.

Yang, Y., Huang, S., Li, W., Zhong, F. and Lan, T. (2022), "Does government efficiency mitigate the effect of natural disasters on tourist arrivals?", *Current Issues in Tourism*, Vol. 25 No. 13, pp. 2177-2191, doi: 10.1080/13683500.2021.1951181.

Zhan, L., Zeng, X., Morrison, A.M., Liang, H. and Coca-Stefaniak, J.A. (2022), "A risk perception scale for travel to a crisis epicentre: visiting Wuhan after COVID-19", *Current Issues in Tourism*, Routledge, Vol. 25 No. 1, pp. 150-167, doi: 10.1080/13683500.2020.1857712.

Zou, Y.G. (2015), *Study on Tourism Safety and Security Assessment in Tourism Destination*, Huaqiao University, Dissertation.

Supplemental materials

The supplementary material for this article can be found online.

Author affiliations

Baojuan Ye and
Shunying Zhao are both based at the School of Psychology, Jiangxi Normal University, Nanchang, China.

Hohjin Im is based at the Department of Psychological Science, University of California Irvine, Irvine, California, USA.

Liluo Gan is based at the School of History Culture and Tourism, Jiangxi Normal University, Nanchang, China.

Mingfan Liu and
Xinqiang Wang are both based at the School of Psychology, Jiangxi Normal University, Nanchang, China.

Qiang Yang is based at the School of Education, Jiangxi Normal University, Nanchang, China.

Corresponding author

Hohjin Im can be contacted at: hohjini@uci.edu