Effects of risk messages on tourists' travel intention: Does distance matter?

ABSTRACT

This study aims to examine how distance to risk center in the COVID-19 context moderates the effects of two contrasting risk message frames (amplifying vs. attenuating) on tourists' post-pandemic travel intention via the mediation of ontological security threat and perceived coping efficacy. Two experiments were designed to test the proposed conceptual model. Results of experiment 1 showed that risk messages predicted tourists' ontological security threat, perceived coping efficacy, and travel intention. Results of experiment 2 showed that ontological security threat and perceived coping efficacy partially mediated the effects of risk messages on travel intention. Moreover, distance to risk center moderated the relationships between risk message frames and travel intention via ontological security threat and perceived coping efficacy, demonstrating different patterns (i.e., "ripple effect", "psychological typhoon eye effect", "marginal zone effect"). This study contributes to an enhanced understanding of the effect of risk message framing in the COVID-19 context by clarifying the role of geographic distance, which is beneficial for destinations to adopt differentiated risk communication strategies for different pandemic areas and levels of pandemic severity.

Keywords: Risk message frame; ontological security threat; perceived coping efficacy; risk distance; COVID-19 pandemic; protection motivation theory

1. Introduction

The COVID-19 pandemic, as a global health crisis spread to more than 200 countries and regions, has severely affected tourists' travel intentions and behavioral decisions and caused an unprecedented impact on the tourism industry around the world (Zenker and Kock, 2020). Although crises and disasters like COVID-19 are not fully predictable, their damage on destination image and tourist travel confidence can be alleviated by effective communication strategies (Ritchie, 2009), so as to recover the tourism market in an orderly manner. Accordingly, several scholars explored how the framing of pandemic risk messages in tourist destinations can improve tourists' perceived safety and travel intentions from a risk communication perspective (Gursoy et al., 2022; Kim et al., 2021; Savadori et al., 2023; Xie et al., 2021; Xie, Zhang, and Huang, 2022; Zhang et al., 2022). Although the COVID-19 pandemic continues to develop and new waves of break-out have been repeatedly seen around the world, increasing rates of vaccination and improvement in response measures have presented different situations among regions. Specifically, some regions have been in a high-risk situation due to repeated outbreaks, while other regions have been in a low-risk situation due to good response strategies. Therefore, questions arise regarding how potential tourists in COVID-19 risk center and non-COVID-19 risk center regions respond to COVID-19 risk messages differently, and what their psychological responses and coping mechanisms to COVID-19 risk messages in different risk regions could be. These two questions have not yet received attention and empirical investigation. Addressing these two questions is theoretically beneficial to enrich and expand the empirical investigation on tourism risk communication from a perspective of geographic distance. Moreover, destinations can

establish differentiated risk communication agendas and marketing strategies based on different pandemic regions and the severity levels of the pandemic, so as to facilitate the orderly recovery of the tourism market.

Currently, tourists' response to risk messages under crisis situations has attracted much attention. Previous studies found that risk messages positively affected tourists' perceived risk, travel fear, worry, and information search behavior (Liu-Lastres, Schroeder, and Penningtongray, 2019; Zheng, Luo, and Ritchie, 2020; Wang et al., 2019a), while on the other hand negatively predicted tourists' perceived safety, travel motivation, and travel intention (Sano and Sano, 2019; Xie et al., 2021). In addition, loss-framed risk message changed tourists' COVID-19 vaccination intention by reducing their perceived risk (Gursoy et al., 2022). Moreover, previous studies have explored the outcome effects of risk messages in two framing contexts, risk amplification and risk reduction, based on framing theory (Kahneman and Tversky, 1984). Specifically, the risk amplifying frame refers to the presentation of risk messages that amplifies individuals' perceived risk, such as the severity of risk nature, unfair impact distribution, man-made causes, catastrophic effects, and uncontrollability. By contrast, the risk attenuating frame refers to the presentation of risk messages that attenuate individuals' perceived risk, such as clear benefits of risk, fair impact distribution, natural causes, limited effects, and controllability (Kapuściński and Richards, 2016; Renn, 2004). Kapuściński and Richards (2016) indicated that tourists' perception of safety in the risk amplifying framework was significantly lower than that in the risk attenuating framework in the context of political unrest and terrorist attacks. Xie et al. (2021) and Xie et al. (2022) found that tourists' responses to risk messages, such as willingness to travel, perceived risk,

perceived safety, and travel fear, differed significantly between risk amplifying and risk attenuating frames. Therefore, risk message frame is an important factor in determining tourists' travel decisions and destination market recovery.

Two key gaps exist in this line of research. First, the underlying psychological mediation mechanisms in the relationship between risk message frame and travel intention require more empirical investigation. Several cognitive variables (e.g., perceived safety, perceived risk) and emotional variables (e.g., worry and travel fear) were identified to mediate the impact of risk message on tourists' behavioral decisions (Gursoy et al., 2022; Liu-Lastres et al., 2019; Sano and Sano, 2019; Xie et al., 2022). The mediation effect of perceived safety and worry between risk and self-protective behavior has been confirmed (Wang et al., 2019a). However, limited research has examined the underlying psychological mediation mechanism between risk framing and travel intention from a protection motivation perspective. The protection motivation theory (PMT) clarifies the psychological mediating process in which individuals initiate protective behaviors in threat situations, and posits that individuals' responses to risk information sources involved two mediating processes: threat and coping appraisal (Rogers, 1975). Accordingly, there may be two possible mediation mechanisms of threat and response appraisal in tourists' responses to risk message frames.

The first mediation process deals with threat appraisal involve the concept of ontological security. Ontological security is a security concept that is more related to individual development, derived from the individual's psychological feelings and needs in the interaction between oneself and the environment (Giddens, 1990). It emphasizes the long-term, stable, orderly, and predictable continuous interaction between people and the external

environment of daily life (Dupuis and Thorns, 2010). The drastic changes of external environment may destroy the routine life order and psychological security that people have established in a stable environment for a long time, thereby generating the ontological security threat (Hawkins and Maurer, 2011; Skey, 2010). Ontological security threat reflects individuals' assessment of the threat to their own existence and stable development caused by the external risk environment.

The second mediation process deals with coping appraisal, involving the concept of perceived coping efficacy. Perceived coping efficacy refers to the estimation of one's capability of taking actions to control, avoid, and eliminate potential threats, reflecting an individual's ability to cope with risks (Huang et al., 2020; Zheng et al., 2020). Thus, perceived coping efficacy represents tourists' coping assessment of risk factors, which is also a decisive factor influencing tourists' safety-related attitudes and behaviors in risk and crisis situations (Liu-Lastres et al., 2019; Zheng et al., 2020). Taken together, ontological security threat and perceived coping efficacy represent the threat-appraisal and coping-appraisal paths of tourists' response to risk messages, and may serve as important mediation mechanisms linking risk message frames and travel decisions. Nevertheless, these possible mediation effects have not been empirically investigated.

Second and more importantly, there is a void of research on tourists' responses to risk messages in different spatial scales. In general, individuals' responses to risk in different spatial scales show two contradictory effects: the "ripple effect" and the "psychological typhoon eye effect". The "ripple effect" refers to the way people interpret risks and crisis events as a signal (Slovic, 1987), with individuals close to the signal center having high risk

perceptions and negative emotions, and individuals far away from the signal center having weak perception and judgment of risk (Kasperson et al., 1988; Xie et al., 2003). This phenomenon is like the ripples caused by a stone thrown into the water. By contrast, the "psychological typhoon eye effect" refers to the phenomenon that individuals who are closer to disasters and crisis events have lower risk concerns (Lindell and Earle, 1983; Maderthaner et al., 1978; Zhang, Huang, and Wei, 2020; Zheng et al., 2015). Such a psychological response pattern resembles the pattern of violent rotation of the surrounding air and weak wind flow in the center of a typhoon. Tourists are highly sensitive to risks and crises in tourism activities, and risk signals fundamentally affect tourists' travel decisions, experiences, and satisfaction (Huang, Dai, and Xu, 2020; Liu-Lastres et al., 2019; Sano and Sano, 2019). Thus, there may be a difference in tourists' psychological response, coping mechanism, and behavioral reaction in risk centers comparing to those in risk periphery. In other words, tourists' responses to risk message and threat signals in different geographical distances may conform to the "ripple effect" or/and the "psychological typhoon eye effect". Several factors, such as Plog's psychographic characteristics, resilience, impulsivity, empathy, perceived waiting time, and travel experience, have been confirmed as moderators and boundary conditions of risk message affecting tourists' behavioral decisions (Kapuściński and Richards, 2016; Xie et al., 2021; Xie et al., 2022). Unfortunately, prior literature has neglected the geographical distance to the risk center as a boundary condition when examining the behavioral impact of risk message in major crisis situations.

This research aims to fill the above gaps by exploring the mechanism of risk message frame on tourists' post-pandemic travel intentions through two experiments in the context of

the COVID-19 pandemic. The contributions of this research are threefold. First, this research explores the effects of risk message on tourists' ontological security threat, perceived coping efficacy, and travel intentions under the risk amplifying and risk attenuating frames, which expands the outcome variables of risk message, and advances the understanding of ontological security threat and tourist behavior during a global crisis. Second, based on PMT, the mediation effects of ontological security threat and perceived coping efficacy between risk messages and travel intention were confirmed, revealing the threat-appraisal and coping-appraisal mediation mechanism of tourists' behavioral response in major crisis situations. Third, based on the "ripple effect" and "psychological typhoon eye effect", this research explores the moderation effect of risk distance for risk messages' influences on tourists' attitudes and behaviors, which reveals the response differences of tourists' to risk messages in regions with different pandemic severity in a high-risk situation.

2. Literature review

2.1. Protection motivation theory

Protection motivation theory (PMT), proposed by Rogers (1975), explains why individuals engage in health-protective behavior in threat situations. Based on this theory, individual behavior decisions in threat situations are affected by risk messages, and protection motivation is formed on the basis of environmental assessment, and behavior changes occur accordingly. Specifically, PMT is composed of three components: information source, cognitive mediating process, and coping model (Rogers, 1975). The cognitive mediating process involves threat appraisal, which refers to the assessment of risk factors, and coping appraisal, which refers to the assessment of the ability to cope with risks or avoid

danger. Coping modes include adaptive response (e.g., adopting health-protective behaviors) and maladaptive response (e.g., maintaining unhealthy behaviors). Therefore, individuals may adopt threat-appraisal and coping-appraisal to external risk information and then engage in health-protective behavior on this basis.

To date, PMT has been widely applied in various subject areas such as medical science, sport health, information system security, and disaster risk (Grothmann and Reusswig, 2006; Ifinedo, 2012; Plotnikoff et al., 2009; Tulloch et al., 2009). It has been adopted in the tourism field to investigate tourists' decisions and healthy behaviors in crisis or risk situations. For example, by applying the PMT, Wang et al. (2019b) confirmed the effects of threat appraisal, coping appraisal, and maladaptive perception of international tourists on tourists' protective intentions and behaviors in high health risk situations; Huang et al. (2020) investigated the relationships underlying tourists' perceived severity, perceived susceptibility, perceived benefit, self-efficacy, and preventative behaviors during trips to high-altitude destination. Accordingly, this research used PMT as its theoretical basis. Risk messages from different destination spatial scales are external information sources, ontological security threat and perceived coping efficacy reflect the cognitive mediating factors of threat appraisal and coping appraisal, respectively, and travel intention is an individual's response action.

2.2. Risk message frame

Risk refers to the possibility of danger, injury or loss (Reisinger and Mavondo, 2005; Rimal and Real, 2003). Risk message refers to an expressible set of information elements related to the risk (Xie et al., 2021). Risk communication refers to the communication and

exchange of information and message among interested parties about nature, magnitude, severity, significance, or control of a risk, aiming to mitigate public threat perception caused by risk through health education and behavior guidance (Covello, 1992; Freimuth, Linnan, and Potter, 2000; Reynolds and Seeger, 2005). In high-risk or crisis situations, tourists often search and seek safety and risk information in the pre-visit stage to reduce uncertainty and ensure safety (Aliperti and Cruz, 2019; Law, Buhalis, and Cobanoglu, 2014). Thus, destinations can reduce tourists' threat perception and improve their perceived safety and travel intention by intentionally framing risk messages (Xie et al., 2021).

Risk message framing aims to control how communicators influence individuals' attitudes and behaviors in risk message communication by selectively presenting risk elements and drawing individuals' attention to specific risk aspects (Sniderman and Theriault, 2004). Message framing can be divided into equivalency and emphasis framing (Druckman, 2001). The former refers to the use of sentences with different expressions but logical equivalency to highlight the positive or negative aspects of the issue, which focuses on the wording effect on individuals' attitudes and behaviors (Kahneman and Tversky, 1984). The latter focuses on the impact of presenting different aspects of a complex issue without assuming that the message content is equivalent. Since the emphasis framing is closer to the real agenda-setting of risk messages in destinations and can be better applied to complex communication situations (Kapuściński and Richards, 2016; Nelson, Lecheler, Schuck, and De Vreese, 2012; Sniderman and Theriault, 2004), this research adopts the emphasis approach to frame and set the pandemic risk messages. Following this approach, based on the differences in individual risk perception levels, risk message frames can be classified into risk

amplifying frame that intends to amplify individual risk perceptions and risk attenuating

frame that intends to reduce individual risk perceptions.

2.3. Ontological security threat

The concept of ontological security originated from Giddens' (1990) observation of

people's being and development in the context of globalization and modernity. Ontology, a

concept from the field of philosophy, is defined as a description of all objectively existing

things in the world (Jacquette, 2002), reflecting the individual's cognition of their own being.

And individuals with ontological security believe that their environment is orderly, stable,

and predictable; ontological security helps people develop confidence in the continuity of

their self-identity (Dupuis and Thorns, 2010). Stated simply, ontological security is a sense of

confidence and trust in the world and environment. And Giddens (1990) explained

ontological security as the confidence that most human beings have in the continuity of their

self-identity and in the constancy of their social and material environments. Usually,

ontological security is not much noticed and perceived in daily life; however, this concept

will be highlighted and magnified when an individual is threatened due to drastic changes in

the external environment (Skey, 2010). When a major disruptive event occurs, the routine life

order and psychological security that people have established in a stable environment for a

long time may be threatened (Hawkins and Maurer, 2011).

Generally, people are often in an insecure state of ontology in the risk society context

(Giddens, 1990). The high-risk situations caused by major crisis events seriously undermine

people's routine life order and psychological security that people have established in a stable

environment (Hawkins and Maurer, 2011; Skey, 2010); in other words, their ontological security has been threatened in high-risk situations. People who feel an ontological security threat may have anxiety and worries about their own being and development state and attempt to re-establish a new order through meaning construction (Phipps and Ozanne, 2017). Phipps and Ozanne (2017) introduced ontological security into consumer and marketing literature, and proposed that consumers who feel an ontological security threat can re-establish a new order through meaning construction. Based on that, Xu et al. (2020a) proposed that since hometowns can provide people with a sense of security by providing routine daily life and building a personal group identity, consumers tended to increase their attachment to their hometowns and prefer their hometown brands when ontological security is threatened. Currently, the COVID-19 pandemic has seriously threatened people's confidence in the continuity of self-identity and the stability of the surrounding social and physical environment; in other words, people are in an insecure state of ontology during COVID-19.

2.4. Perceived coping efficacy

Self-efficacy is the degree of confidence that an individual has in his/her ability to successfully complete a specific task (Bandura, 1986). Self-efficacy represents an individual's subjective beliefs about their own abilities, and similar concepts have also been proposed and generalized in different fields and disciplines, such as social self-efficacy (Smith and Betz, 2000), environment self-efficacy (Huang, 2016). Derived from the concept of self-efficacy, perceived coping efficacy refers to individuals' assessment of their ability to take actions to reduce, control, and eliminate threats. In the tourism risk and crisis field,

perceived coping efficacy reflects tourists' assessment and belief that they take actions to control or eliminate the threats in risky and uncertainty situations (Huang et al., 2020; Zheng et al., 2020), and thus is an important factor in studying tourist attitudes, motivations, and behaviors related to safety and risk (Liu-Lastres et al., 2019; Zheng et al., 2020). Moreover, perceived coping efficacy is an important concept in PMT, which reflects the estimation of one's capability of taking coping appraisal and protective actions (Rogers, 1975). Perceived coping efficacy is found to be important in predicting health prevention behaviors (Stewart et al., 1996). Therefore, perceived coping efficacy shapes tourists' travel confidence and travel decisions in risk or crisis situations, and its influence needs more empirical investigation in the long-term high-risk situations caused by COVID-19.

2.5. *The direct effect of risk message frame on travel intention*

The framing effect reveals the influence of different ways of presenting an issue on individuals' attitudes and behaviors (Kahneman and Tversky, 1984). Communicators may present specific factors to make them more salient in issue statements (Sniderman and Theriault, 2004). Risk amplifying frame refers to the way of presentation that makes the high-risk messages more salient, with the intention to amplify individuals' perceived risk (Kapuściński and Richards, 2016). In contrast, the risk attenuating frame focuses on the low-risk messages, intending to attenuate individuals' perceived risk. The usage of different risk message frames may induce individuals' differentiated behavioral responses (Kim et al., 2022; Song et al., 2021). Compared with the risk attenuating frame, the risk amplifying frame tends to trigger tourists' higher perceived risk and travel fear, and make them travel cautiously and avoid traveling. In addition, previous research confirmed that risk messages

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negatively predicted tourists' travel intention (Liu-Lastres et al., 2019; Sano and Sano, 2019), and under the condition of risk attenuating frame, tourists' basic and destination travel intention was greater than that under the condition of the risk amplifying frame (Xie et al., 2021). Based on the above discussions, it is proposed that:

H1: Tourists' travel intention is higher when messages are presented in risk attenuating frame than in risk amplifying frame.

2.6. The mediation effect of ontological security threat and perceived coping efficacy

Destination risk communication during public health crises is intended to educate the tourists about risk, improve their knowledge and ability to cope with diseases, and reduce the threat perception caused by risks, so as to restore tourists' confidence and intention to visit (Xie et al., 2021). The development and establishment of individual ontological security threat is closely related to one's assessment of external environmental threats and risk factors (Dupuis and Thorns, 2010), and perceived coping efficacy represents the estimation of one's capacity of coping with risk and eliminating threats (Bandura, 1998; Huang et al., 2020; Zheng et al., 2020). Thus, under the risk amplifying frame, high-risk message elements can easily destroy people's psychological security established in a stable environment for a long time. Moreover, in high-risk situations, the public tend to perceive the surrounding environment as disorderly, unstable, and unpredictable, thus disrupting their routine life order as well as their stable interaction with the environment (Xu et al., 2020a). Accordingly, compared with risk attenuating frame, risk amplifying frame may cause tourists to perceive a higher level of ontological security threat . Similarly, tourists' confidence in coping with

threat in high-risk situations is insufficient, and the triggered travel fear may also cause tourists to abandon coping with risks (e.g., disengagement coping) (Zheng et al., 2020). Yin et al. (2021) confirmed that COVID-19 event strength (e.g., novelty, disruption, and criticality) triggered individuals' fear of external threat, thus demonstrating avoidance coping behaviors. Thus, tourists' assessment of their own capacity of coping with risk is low in the risk amplifying frame, meaning that they may demonstrate lower perceived coping efficacy.

Tourists' coping efficacy and threat perception play important roles in motivating their travel intention in the risk communication context. Based on PMT, under the influence of information, individuals' behavioral decisions involve two mediation processes, i.e., the threat appraisal and coping appraisal, which subsequently influence the behaviors (Rogers, 1975). Ontological security threat comes from drastic changes in the external environment, and it is the result of the disruption of an individual's routine life order and the psychological security. It represents the individuals' assessment and judgment of the threats to their own being and development caused by the external uncertain environment and risk factors (Giddens, 1990; Xu et al., 2020a). Thus, following PMT, ontological security threat reflects the mediation process of threat-appraisal in the relationship between risk message and tourists' travel decisions. Coping-appraisal involves individuals' judgment of the capacity to cope with and avoid dangers (Rogers, 1975; Zheng et al., 2020), representing the differences between perceived efficacy (e.g., response efficacy and self-efficacy) and perceived cost (Yan et al., 2014). Perceived coping efficacy is the core component of coping-appraisal, which can reflect the mediation process of coping-appraisal in which risk messages influence tourists' travel decisions. Accordingly, when tourists receive destination risk communication

messages, their threat and coping assessment related to risk will be triggered, which in turn influences their travel intention. Thus, we develop the following hypotheses.

H2: Ontological security threat mediates the impact of risk message frame on tourists' travel intention

H3: Perceived coping efficacy mediates the impact of risk message frame on tourists' travel intention

2.7. The moderation effect of risk distance

Geographical distance is used to express the relative position of objects in geographic space (Cao et al., 2018). In this research, risk distance refers to the relative position of risk sources and risk perceiver (tourist) in geographical space (Maderthaner et al., 1978). Risk distance has two possible types of effects: the "ripple effect" and the "psychological typhoon eye effect" (Wen et al., 2020; Zhang et al., 2020). The term "ripple effect" was used to describe the psychological convergence between risk distance and individuals' perceived risk; under such an effect, the closer an individual is to the central area of the crisis or risk event, the higher his or her perceived risk and worries (Kasperson et al., 1988; Slovic, 1987; Xie et al., 2003). The term "psychological typhoon eye effect" describes the psychological divergence between risk distance and individual perceived risk; under such an effect, the closer one is to the central area of the crisis or risk event, the lower one's perceived risk (Lindell and Earle, 1983; Zhang et al., 2020; Zheng et al., 2015). This effect has been discussed and confirmed in many fields such as environmental risks, earthquake, Severe Acute Respiratory Syndrome (SARS), and COVID-19 pandemic.

Currently, four viewpoints were proposed to explain the "psychological typhoon eye effect". The first is based on the cognitive dissonance theory perspective (Festinger, 1957). Holding this perspective, residents in the hardest-hit area have risk perceptions which may not be consistent to the risk perception that "the place of residence is unsafe". Since it is relatively easier to change the perception of risk situations than to change the place of residence, individuals in the risk-center tend to lower their perceived risk to balance cognitive dissonance. The second refers to the mere exposure effect (Melber et al., 1977). Compared with residents in the risk-peripheral area, residents in the risk center gradually adapt to and show psychological immunity due to long-term exposure to high-risk situations. The third refers to the difference in individual risk experience (Wen et al., 2020). Specifically, residents in the risk-peripheral areas mainly obtain disaster-related information through the media, whilst residents in the risk center have direct experience of disaster events. Disaster-related information may have an "amplifying" effect after being communicated through the media or other information channels (Kasperson et al., 1988). Residents in the risk center can correct this "amplifying" information due to their own direct experience, thus forming a relatively objective risk judgment (Wen et al., 2020). Finally, individuals who directly experience disasters have a comprehensive understanding of its nature, causes, intensity, and response, and learn from it to enhance their coping capabilities, so as to form low risk perception.

The "ripple effect" and "psychological typhoon eye effect" explain how individuals respond to different spatial risks and disaster elements, respectively. Moreover, Wen et al. (2020) confirmed that there was a "ripple effect" in the psychological state of residents in different pandemic areas; however, there was a "psychological typhoon eye effect" with

regards to the anxiety level of residents in the COVID-19 center and their need for medical assistance. Thus, risk distance (distance to risk center) may be an important boundary condition that affects the individuals' response to risks and crises. The tourism literature showed some effects resembling the "ripple effect" and "psychological typhoon eye effect". Regarding "ripple effect", Ruan and Li (2019) showed that the closer an individual is to the disaster center, the stronger the negative impact of natural disasters on his or her travel intentions. On the other hand, Tong et al. (2021) revealed that there is a psychological typhoon eye effect in customers' prepayment purchase intention response to hotel corporate social responsibility in severe and non-severe areas of COVID-19. Also, Li et al. (2009) confirmed that the closer a resident is to the earthquake center, the less concerned about health and safety he or she is.

In this research, risk distance may moderate tourists' response to risk message. In other words, tourists' psychological response and coping mechanism to risk message frames from different distance scales may conform to "ripple effect" and/or "psychological typhoon eye effect". Since individuals' response to risk may follow some psychological controllable thresholds (Kasperson et al., 1988; Wen et al., 2020), tourists' psychological and behavioral responses to risk amplifying frame derived from risk center and non-center areas may differ. Specifically, in the risk amplifying frame, risk messages and signals about the severity and nature of the COVID-19, such as high infectivity, extreme uncontrollability, high uncertainty, and wide-ranging impacts, would exceed the psychological tolerance threshold for tourists. Accordingly, risk messages may fundamentally affect tourists' safety expectations and travel decisions (Liu-Lastres et al., 2019; Mizrachi and Fuchs, 2016). The closer one is to the

COVID-19 risk center, the higher one's negative responses perceived threat severity may be. Thus, in high-risk situations, tourists of the COVID-19 center have higher threat perception and lower coping efficacy and travel intention. By contrast, in the risk attenuating frame, risk messages and signals about the severity and nature of the COVID-19 did not exceed the psychological tolerance threshold of tourists, so they can resist the negative impact of risk through proactive actions and effective responses. In addition, compared with those in COVID-19 periphery regions, tourists of the risk center have a comprehensive understanding of the nature, cause, spread, and response of the COVID-19 during its development from high-risk situations to low-risk situations, which can reduce their threat perception as well as enhance their coping ability and travel decisions (Xu et al., 2020b). Moreover, tourists' evaluation of low-risk messages is often dominated by emotion-driven, intuition-based, and less effort-oriented heuristic processing (Xie et al., 2022; Zhang et al., 2022), and tourists of the risk center will be psychologically immune to those low-risk situations due to long-term exposure (Melber et al., 1977; Xu et al., 2020b), thus presenting lower threat assessment and higher coping efficacy than those in non-risk-center regions. Thus, in the low-risk situations, tourists of the COVID-19 center have lower threat perception and higher coping efficacy and travel intention. Based on that, we posited that:

H4a: Risk distance has a moderating effect on the relationship between risk message frame and ontological security threat. Specifically, in the risk amplifying frame, tourists' ontological security threat response to risk message conforms to the "ripple effect", but in the risk attenuating frame, it conforms to the "psychological typhoon eye effect".

H4b: Risk distance has a moderating effect on the relationship between risk message

frame and perceived coping efficacy. Specifically, in the risk amplifying frame, tourists' self-efficacy response to risk message conforms to the "ripple effect", but in the risk attenuating frame, it conforms to the "psychological typhoon eye effect".

H4c: Risk distance has a moderating effect on the relationship between risk message frame and travel intention. Specifically, in the risk amplifying frame, tourists' travel intention response to risk message conforms to the "ripple effect", but in the risk attenuating frame, it conforms to the "psychological typhoon eye effect".

The conceptual model of this research was presented in Figure 1, and the proposed hypotheses were tested through two studies. Specifically, in Study 1, a situational experiment was designed to examine the direct effects of risk message framing on tourists' travel intention, as well as the mediation effects of ontological security threat and perceived coping efficacy, testing H1, H2 and H3. In Study 2, the results of Study 1 were examined for robustness, and the matching and moderation effects of risk distance were further investigated, testing H4.

[Insert Figure 1 here]

3. Study 1

3.1. Research background

Currently, many countries have gradually relaxed pandemic prevention measures and lifted the travel bans. Constant messages about the pandemic risk on both traditional and social media in China may portrait a high-risk situation of the pandemic threat, as well as a low-risk situation for the mitigation of the pandemic in some regions. This has greatly

affected the psychological state of the Chinese tourists and their decision-making. Therefore, the experimental design of risk message frame was conducted with the background of pandemic prevention in China. The purpose of Study 1 is to investigate the impact of risk messages on tourists' travel intention under the risk amplifying and risk attenuating frames, as well as the mediation effects of ontological security threat and perceived coping efficacy.

3.2. Research design

A between-subjects factorial design experiment was developed to investigate the effects of risk messages using the two message frames. The design of the stimuli materials has followed the recommendations of Kapuściński and Richards (2016) and Xie et al. (2021), combined with the latest news of COVID-19 from local, domestic and international media. Specifically, the risk amplifying frame is operationalized as the high-risk messages such as confirmed COVID-19 cases, medium- and high-risk infection areas, virus mutations, and its new propagation characteristics, whilst the risk attenuating frame is operationalized as the low-risk messages such as the effectiveness of pandemic prevention, COVID-19 cure rate, vaccine development, and vaccination. Accordingly, this experiment selected perceived safety as the manipulation check variable of participants' perception of different risk message frames (Xie et al., 2021). Stimuli materials in risk amplifying and attenuating frames contained similar message elements and used the same presentation format (e.g., size, font, color, and linewidth). The stimuli materials were designed in Chinese, and they are basically the same in Chinese style and Chinese sentence structure. Moreover, the materials were improved by an expert group composed of two professors in tourism management and six PhD students to avoid misunderstanding and ensure its content validity.

The measurement scales were based on previous studies, with certain items slightly modified with the help of an expert group according to the research context (Appendix 1). Four items based on Liu-Lastres et al. (2019) and Xie et al. (2021) were chosen to measure perceived safety (Experiment 1: Cronbach's $\alpha = 0.91$; Experiment 2: Cronbach's $\alpha = 0.92$. A four-item scale for ontological security threat (Experiment 1: Cronbach's $\alpha = 0.79$; Experiment 2: Cronbach's $\alpha = 0.74$) was adapted from Phipps and Ozanne (2017) and Xu et al. (2020a), to assess the continuity of self-identity and the stability of the surrounding environment. A four-item scale for perceived coping efficacy was adapted from Zheng et al. (2020) (Experiment 1: Cronbach's $\alpha = 0.81$; Experiment 2: Cronbach's $\alpha = 0.84$), reflecting individuals' confidence and ability to cope with pandemic threats. One item based on Li et al. (2020) was adopted to measure post-pandemic travel intention, and participants were asked to indicate how likely they would travel after the pandemic from 1 (very unlikely) to 7 (very likely). The use of one item in crisis situations to measure tourists' attitude and travel intention is considered to have acceptable reliability and validity (Li et al., 2020; Liu-Lastres et al., 2019; Utz, Schultz, and Glocka, 2013), while ensuring the convenience of research design and the accuracy of data (Postmes, Haslam, & Jans, 2013). An expert panel translated the English scale into Chinese and then back-translated it into English to ensure its translation validity. All items were measured using a seven-point Likert scale.

3.3. Research procedure

A pilot experiment was carried out to assess the validity of the stimuli materials and experimental design. A total of 50 university students participated in the pilot experiment and were evenly assigned into two groups (risk amplifying frame vs. risk attenuating frame).

After reading their assigned stimuli materials, they answered a series of questions related to perceived safety, ontological security threat, perceived coping efficacy, and travel intention. The results showed that participants assigned to the risk amplifying frame rated ontological security threat (M $_{Amplifying}$ = 4.52, M $_{Attenuating}$ = 3.85, t = 4.03, p < 0.001) significantly higher than those assigned to the risk attenuating frame. In contrast, participants assigned to the risk amplifying frame rated perceived safety (M $_{Amplifying}$ = 2.92, M $_{Attenuating}$ = 4.04, t = -4.43, p < 0.001), perceived coping efficacy (M $_{Amplifying}$ = 3.82, M $_{Attenuating}$ = 4.35, t = -3.05, p < 0.001) and travel intention (M $_{Amplifying}$ = 3.56, M $_{Attenuating}$ = 5.04, t = -5.52, p < 0.001) significantly lower than those assigned to the risk attenuating frame. Therefore, the designed frames were adopted for the formal experiment.

A quasi-experiment design involving situational experiment and an online questionnaire survey (www.wjx.cn) was used in the formal experiment. A hyperlink to this survey was published on several popular social media platforms (e.g., WeChat, QQ) in China in January 2021, and the data was collected through snowball and convenience sampling for nearly a month. This research assigned the participants to one of the two frames randomly, and asked them to answer questions related to perceived safety, ontological security threat, perceived coping efficacy, and travel intention after reading the stimuli materials, followed by questions on demographic variables. The research team informed the research purpose, ensured anonymity, and highlighted that there is no wrong or right answer for each item. A total of 230 questionnaires were collected with 202 valid ones. The profiles of the participants are presented in Table 1.

[Insert Table 1 here]

3.4. Data analysis

In Experiment 1, SPSS was used for data analysis, including four steps: (1) descriptive analysis was performed to determine the mean, standard error (S.D.), skewness, and kurtosis of each item; (2) a reliability analysis of multi-item variables (e.g., perceived safety, ontological security threat, and perceived coping efficacy) was conducted; (3) ANOVAs and LSD were employed to analyze participants' responses to different risk message frames; (4) PROCESS macro (model 4 with 2 mediators) was conducted to investigate two mediation effects of ontological security threat and perceived coping efficacy.

3.5. Results

3.5.1. Manipulation check and descriptive analysis

For the manipulation check, we performed an independent sample t-test. As expected, perceived safety by participants assigned to the risk amplifying frame was significantly lower than that by those assigned to the risk attenuating frame (M $_{Amplifying}$ = 2.81, M $_{Attenuating}$ = 3.79, t = -5.93, p < 0.001). Moreover, as presented in Table 2, the dataset was examined for normality, and the results showed that all items' skewness (< 3) and kurtosis (< 8) values met the suggested level by Kline (2011).

[Insert Table 2 here]

3.5.2. Direct effect tests

A series of ANOVAs were performed with the LSD test used for post hoc comparison. As presented in Table 3 and Figure 2a, participants' ontological security threat, perceived

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coping efficacy, and travel intention differ significantly under different risk frames. The post hoc analysis showed that those assigned to the risk amplifying frame rated ontological security threat (M $_{Amplifying}$ = 4.79, M $_{Attenuating}$ = 4.28, t = 3.48, p < 0.001) significantly higher than those assigned to the risk attenuating frame. In contrast, participants assigned to the risk amplifying frame rated perceived coping efficacy (M $_{Amplifying}$ = 4.59, M $_{Attenuating}$ = 5.20, t = -4.48, p < 0.001) and travel intention (M $_{Amplifying}$ = 4.02, M $_{Attenuating}$ = 5.15, t = -5.50, p < 0.001) significantly lower than those assigned to the risk attenuating frame. Therefore, H1 received support.

[Insert Table 3 here]

[Insert Figure 2 here]

3.5.3. Mediation effect tests

Based on the suggestions from Hayes and Preacher (2014), the SPSS PROCESS macro (model 4) was adopted to perform bootstrapping for the mediation effects of ontological security threat and perceived coping efficacy. In the model, the independent variable was risk message frame, the mediation variables were ontological security threat and perceived coping efficacy, respectively, and the dependent variable was travel intention. In addition, the risk amplifying frame group was taken as the reference group, and a dummy code was created for the risk attenuating frame group.

After including demographic variables as covariates, the results showed (Table 4) that ontological security threat was negatively related to travel intention (β=-0.27, p<0.01), and perceived coping efficacy was positively related to travel intention (β=0.46, p<0.001). In

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terms of between-group differences, the risk attenuating frame group tended to demonstrate lower ontological security threat (β=-0.53, p<0.001) than the risk amplifying frame group, and higher perceived coping efficacy (β=0.62, p<0.001) and travel intention (β=0.78, p<0.001) than the risk amplifying frame. The results also showed that ontological security threat partially mediated the impact of risk message frame on travel intention (β=0.14, 95% CI: 0.04, 0.31), and perceived coping efficacy partially mediated the impact of risk message frame on travel intention (β=0.29, 95% CI: 0.13, 0.50). Therefore, H2 and H3 received support.

[Insert Table 4 here]

4. Study 2

4.1. Research design

This research designs three different spatial scales of risk messages, including local, domestic, international, to investigate the impact differences of risk message frame in different risk geographical distances on tourists' ontological security threat, perceived coping efficacy, and travel intention. The design of stimulus materials follows two principles: theoretical correspondence and authenticity of news reports. The former emphasizes that the design of message elements is consistent with the theoretical connotation of the risk message framing, while the latter refers to the design of COVID-19 stimulus materials that needs to be based on real news reports. Therefore, in combination with the news reports of COVID-19 conditions in local, domestic and international media, the designed risk message in different situations contains the same message elements such as basic pandemic situation, newly

confirmed cases, pandemic spread, pandemic management and control, and medical

treatment (Appendix 2).

Specifically, local risk messages refer to the description of the pandemic condition and

pandemic prevention strategies in and around the respondent's place of residence. In the risk

amplifying frame, participants are placed in a high-risk situation where there are continuously

new confirmed cases, COVID-19 virus mutations, new virus propagation characteristics, and

where the pandemic is uncontrollable in and around their residential area. While in the risk

attenuating frame, participants are placed in a low-risk situation where there are strict

pandemic prevention measures, confirmed COVID-19 cases are well treated, pandemic

diffusion is weak, and pandemic is controllable. Domestic risk messages mainly present high-

risk message elements such as newly confirmed COVID-19 cases, medium- and high-risk

areas, COVID-19 coronavirus and its transmission characteristics in China, as well as the

low-risk message elements such as controllable transmission of COVID-19, COVID-19 cure

rate, vaccine development, and the fact that the pandemic has not broken out in the place of

residence. International risk messages are mainly about COVID-19 conditions and responses

in overseas countries. For example, the risk amplifying frame mainly describes that the

COVID-19 pandemic is spreading exponentially in the United States, Europe, India and

Russia, and the mutated COVID-19 virus is more likely to cause severe cases and death. And

the risk attenuating frame mainly presents the strict pandemic prevention policies of these

countries, and message that these countries are actively developing COVID-19 vaccines.

4.2. Procedure

A quasi-experiment design involved a 2 (risk message frames: risk amplifying vs. risk attenuating) × 3 (risk distance: local vs. domestic vs. international) between-subjects factorial design. Data were collected through an online survey in China in February 2021. Similar to Study 1, a hyperlink to this survey was published on social media platforms, and participants were recruited through snowball and convenience sampling. During the investigation period of this research, the COVID-19 pandemic in China has shown differentiated conditions, including pandemic mitigation in local regions, the overall controllability in most provinces, and the increase of COVID cases in overseas countries. Meanwhile, China was still implementing strict restrictions on outbound and inbound tourism; the government advised its citizens not to leave the country unless necessary. However, domestic tourism activities in low-risk areas were allowed, and residents were encouraged to choose short trips. In addition, some countries as popular outbound destinations for Chinese tourists, such as Thailand and the United States, were gradually easing the travel restrictions to their inbound visitors. The recruited participants were assigned randomly to one of the six matched groups (group 1: local-risk amplifying; group 2: local-risk attenuating; group 3: domestic-risk amplifying; group 4: domestic-risk attenuating; group 5: international-risk amplifying; group 6: international-risk attenuating). Participants were shown their assigned stimuli materials and then answer questions related to perceived safety, ontological security threat, perceived coping efficacy, and travel intention. Eventually, a total of 650 questionnaires were collected with 584 valid ones. The profiles of the participants are presented in Table 5.

[Insert Table 5 here]

4.3. Data analysis

In Experiment 2, SPSS was used for data analysis, including four steps. The first three steps were similar to Experiment 1, including descriptive analysis, reliability analysis, and ANOVA. Moreover, multivariate analysis of variance (MANOVA) was employed to examine the moderation effect of risk distance.

4.4. Results

4.4.1. Manipulation check

The manipulation check on risk message frame showed significant differences in perceived safety between the two risk message frames. The post hoc results indicated that under the risk amplifying frame, perceived safety was significantly lower than that under the risk attenuating frame (M $_{Amplifying}$ = 3.09, M $_{Attenuating}$ = 3.66, t = -5.61, p < 0.001). And participants' perceived safety differed significantly in different risk geographical distance situations (M $_{Local}$ = 3.36, M $_{Domestic}$ = 3.57, M $_{International}$ = 3.23, F(2, 581) = 3.69, p < 0.05). Participants exposed to local and domestic risk situations have higher perceived safety, and those exposed to international risk situations have the lowest perceived safety. These results indicated the usefulness of the manipulation. In addition, as presented in Table 2, the dataset was examined for normality, and all items' skewness (< 3) and kurtosis (< 8) value met the suggested level by Kline (2011).

4.4.2. Robustness check

Before examining the moderation effect of risk distance, Experiment 2 again tested the reliability of the direct effect results of Experiment 1. As shown in Table 6 and Figure 2b, participants' ontological security threat, perceived coping efficacy, and travel intention differ

significantly under different risk frames. The post hoc results showed that participants assigned to the risk amplifying frame rated ontological security threat (M *Amplifying* = 4.48, M *Attenuating* = 4.13, t = 4.19, p < 0.001) significantly higher than those assigned to the risk attenuating frame. On the other hand, participants assigned to the risk amplifying frame rated perceived coping efficacy (M *Amplifying* = 4.39, M *Attenuating* = 4.72, t = -3.96, p < 0.001) and travel intention (M *Amplifying* = 4.64, M *Attenuating* = 5.31, t = -5.20, p < 0.001) significantly lower than those assigned to the risk attenuating frame. These results are essentially consistent with those of Experiment 1, and H1 received support again.

[Insert Table 6 here]

4.4.3. The matching analysis of risk distance and risk message frame

As presented in Table 7 and Figure 3, in the local risk situation, significant differences were identified between risk message frames for ontological security threat, perceived coping efficacy, and travel intention. The post hoc results showed that participants assigned to the risk amplifying frame rated ontological security threat (M *Amplifying* = 4.67, M *Attenuating* = 4.06, t = 4.46, p < 0.001) significantly higher than those assigned to the risk attenuating frame. On the other hand, participants assigned to the risk amplifying frame rated perceived coping efficacy (M *Amplifying* = 4.15, M *Attenuating* = 4.87, t = -4.73, p < 0.001) and travel intention (M *Amplifying* = 4.18, M *Attenuating* = 5.51, t = -6.11, p < 0.001) significantly lower than those assigned to the risk attenuating frame.

In the domestic risk situation, significant differences were identified between risk message frames in terms of travel intention, and no significant differences were found

between risk message frames for ontological security threat and perceived coping efficacy. The post hoc results showed that participants assigned to the risk amplifying frame rated travel intention (M $_{Amplifying}$ = 4.70, M $_{Attenuating}$ = 5.38, t = -3.21, p < 0.01) significantly lower than those assigned to the risk attenuating frame. In the international risk situation, significant differences were identified between risk message frames in terms of ontological security threat, and no significant differences were found between risk message frames for travel intention and perceived coping efficacy. The post hoc analysis showed that participants assigned to the risk amplifying frame rated ontological security threat (M $_{Amplifying}$ = 4.40, M $_{Attenuating}$ = 4.08, t = 2.11, p < 0.05) significantly higher than those assigned to the risk attenuating frame. These results indicated that there are differences in the response of participants to the risk message frame in different risk distance situations. In other words, the response of tourists' ontological security threat, perceived coping efficacy, and travel intention to risk message frame may be intervened and moderated by risk distance.

[Insert Table 7 here]

[Insert Figure 3 here]

4.4.4. The moderation effect test

The moderation effect of risk distance was presented in Table 8. After including demographic variables as covariates, the results indicated that risk message frame significantly predicted ontological security threat (F[1,584] = 17.63, p < 0.001), perceived coping efficacy (F[1,584] = 17.47, p < 0.001), and travel intention (F[1,584] = 33.80, p < 0.001). Moreover, the interaction term of risk message frame and risk distance significantly

predicted ontological security threat ($F[2,583] = 3.82$, $p < 0.05$), perceived coping efficacy ($F[2,583] = 5.87$, $p < 0.01$), and travel intention ($F[2,583] = 8.12$, $p < 0.001$). Therefore, risk distance significantly moderated the effects of risk message frame on ontological security threat, perceived coping efficacy, and travel intention.

As displayed in Figure 4a, when exposed to the message in risk amplifying frame, participants scored highest on ontological security threat in local risk situations, and scores on ontological security threat were not much different in domestic and international risk situations. When exposed to the message in risk attenuating frame, participants scored highest on ontological security threat in domestic risk situations, but basically the same in local and international risk situations. As presented in Figure 4b, when exposed to the message in risk amplifying frame, participants scored highest on perceived coping efficacy in international risk situations, followed by that in domestic risk situations, and score on perceived coping efficacy was lowest in local risk situations. When exposed to the message in the risk attenuating frame, participants scored highest on perceived coping efficacy in local risk situations, followed by that in domestic risk situation, and the score on perceived coping efficacy was lowest in international risk situations. As shown in Figure 4c, when exposed to the message in risk amplifying frame, participants scored highest on travel intention in international risk situations, followed by that in domestic risk situation, and the score on travel intention was lowest in local risk situations. When exposed to the message in risk attenuating frame, participants scored highest on travel intention in local risk situations, followed by that in domestic risk situation, and the score on travel intention was lowest in international risk situations. Based on that, H4a, H4b, and H4c received support.

[Insert Table 8 here]

[Insert Figure 4 here]

5. Conclusions and discussion

5.1. Conclusions

This research examined the impact of pandemic risk message frame on tourists'
ontological security threat, perceived coping efficacy, and travel intention, as well as the
moderation effect of risk distance on the above relationships. This research reveals the
following findings.

First, risk message frame significantly predicted tourists' ontological security threat,
perceived coping efficacy, and travel intention. Specifically, under the condition of the risk
attenuating frame, perceived coping efficacy and travel intention responses were greater than
those under the condition of the risk amplifying frame, and ontological security threat under
the risk attenuating frame was lower than that under the risk amplifying frame. These
findings suggested that tourists have differentiated responses to risk message frame, and risk
message frame is a critical factor determining tourists' ontological security threat, perceived
coping efficacy, and travel intention during a major global health crisis such as the COVID-
19 pandemic. This conclusion is logically consistent with the previous research findings of
Kapuscinski and Richards (2016), Liu-Lastres et al. (2019), and Xie et al. (2021). In addition,
this research is the first to examine the impact of the risk message frame on tourists'
ontological security threat and perceived coping efficacy, which are pertinent mediators
between risk messages and travel intention following the protection motivation theory but not

tested in previous research.

Second, tourists' ontological security threat and perceived coping efficacy mediated the impact of risk messages on travel intention. Specifically, ontological security threat and perceived coping efficacy partially mediated the impact of risk messages on travel intention, which implied that they are important psychological mediation variable for predicting tourists' travel decisions in crisis situations. Previous research has confirmed the mediation of perceived safety and travel fear between risk message and travel intention (Liu-Lastres et al., 2019; Sano and Sano, 2019; Xie et al., 2022), as well as the mediation of worry between perceived risk and self-protective behavior (Wang et al., 2019a). On this basis, this research demonstrated both threat-appraisal and coping-appraisal mediation processes of risk messages affecting travel intention from a protection motivation perspective. In addition, the impact of threat-appraisal and coping-appraisal on tourists' behavioral decisions (e.g., protective behaviors, travel avoidance, and cautious travel) in risk situations has been empirically confirmed (Huang et al., 2020; Zheng et al., 2020). As an extension of existing research, our research examined the leading effect of risk message frame on threat-appraisal and coping-appraisal, which is an important finding not confirmed by previous research.

Third, risk distance significantly moderated the impact of risk message frame on tourists' ontological threat, perceived coping efficacy, and travel intention. Due to the psychological controllable thresholds of tourists' response to risks, tourists' psychological and behavioral responses to risk message frames in different levels of pandemic areas conform to both the "ripple effect" and "psychological typhoon eye effect". Under the risk amplifying frame that exceeds the psychological tolerance threshold of tourists, tourists had the highest

ontological security threat in local risk situations, but in domestic and international risk situations, their ontological security threat levels were not different. This finding was partially consistent with the "ripple effect"; that is, the closer to the risk and crisis, the higher the threat assessment. Under the risk attenuating frame that does not exceed the psychological tolerance threshold of tourists, tourists had the highest ontological security threat in domestic risk situations, but their ontological security threat levels in local and international risk situations are not significantly different. These suggested that individuals' response to risk during pandemic had a "marginal zone effect" (Wen et al., 2020; Xie et al., 2003) in which their risk judgement was higher in the middle-risk area than at either end of the risk severity spectrum. The possible reason is that the individual has become accustomed to the pandemic and even mastered the knowledge and skills to prevent infection in local low-risk situations, thus having a low ontological security threat. Meanwhile, under the high-pressure policy of the Chinese government to control the import of overseas pandemic, individuals also have a low threat assessment in international low-risk situations. However, since the COVID-19 is highly contagious and most regions of China have previously seen confirmed COVID-19 cases, individuals may still worry about whether the pandemic will spread or worsen in domestic low-risk situations. Such concerns about the future may make individuals have a high threat assessment.

In addition, under the risk amplifying frame, tourists had the highest perceived coping efficacy and travel intention in international risk situations, followed by that in domestic risk situations, and had the lowest perceived coping efficacy and travel intention in local risk situations. This result was reversed under the risk attenuating frame. Overall, tourists'

response to risk messages conforms to the "ripple effect" in the high-risk situations, but conforms to the "psychological typhoon eye effect" in the low-risk situations. Tourists' ontological security threat response to risk message showed a "marginal zone effect".

5.2. Theoretical implications

First, based on frame theory and PMT, this research revealed the psychological mediation mechanism for risk messages affecting tourists' travel decisions, which provided new insights and theoretical basis for investigating the frame effect of risk messages. To date, the direct and mediation effect of risk message on tourists' travel decisions in crises has attracted considerable attention (Liu-Lastres et al., 2019; Sano and Sano, 2019; Xie et al., 2021; Zheng et al., 2019); for example, Xie et al. (2022) revealed the cognitive and emotional mediation mechanism of risk message framing on travel intention. Nevertheless, there is still little research on the possible psychological mediation mechanisms between risk message frame and travel intention, particularly from a protection motivation perspective. As an extension of Xie et al.'s (2022) research, based on PMT, this research confirmed the mediation roles of ontological security threat and perceived coping efficacy between risk messages and travel intention, revealing the threat-appraisal and coping-appraisal mediation mechanisms of tourists' behavioral response in major crisis situation. As such, the theoretical contribution of this research lies in the introduction of ontological security threat and perceived coping efficacy into the tourism risk communication field, identifying the new outcome variables of risk message frame, and expanding the research on the effectiveness of frame effect. In addition, this research integrated the frame theory and PMT, which helped to explain the mediation mechanism of risk message affecting behavior.

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Second, this research reveals the moderation effect of risk distance in tourists' response to risk messages, which provides empirical cases for the "ripple effect" and "psychological typhoon eye effect" of individual responses to risk signals, thus uncovering a new boundary condition of the effect of risk message frame. The "ripple effect" and "psychological typhoon eye effect" reveal individuals' response patterns to risk signals from different geographic and spatial scales respectively (Slovic, 1987; Wen et al., 2020; Zheng et al., 2015). Accordingly, this research identifies the specific conditions for the two opposite effects, i.e., "ripple effect" and "psychological typhoon eye effect", as well as a further type of "marginal zone effect", representing different response strategies to risks at different spatial scales. Previous studies have identified the moderation effects of tourists' traits or individual factors, including resilience, impulsivity, empathy and psychographic characteristics (Kapuściński and Richards, 2016; Xie et al., 2021; Xie et al., 2022), but little research has explored the boundary conditions from a risk distance perspective. By revealing the new boundary condition and moderation variables on the effects of risk messages, the research thus extends the knowledge base of risk communication in the field of tourism from a risk distance perspective. Specifically, the identification of the distance effect of tourists' response to risk message can provide a theoretical basis for destinations to set a differentiated risk message agenda and improve the effectiveness of risk communication.

5.3. Managerial implications

First, destination management organizations (DMOs) should focus on the agenda-setting of risk messages, and adopt risk attenuating frame to communication messages, thus improving the effectiveness of destination risk communication and reducing the negative

impact of crisis events on destination image and the tourism industry. Specifically, DMOs should present messages that can attenuate individuals' perceived risk in risk communication, such as the controllability of the crisis, the positive impact of the crisis, the effectiveness of organizational crisis response, and the safety status of the destination, so as to restore destination safety image and tourists' confidence to travel after the crisis. In addition, DMOs should provide tourists with risk guidance and risk advice in risk communication, help tourists understand the crisis correctly, and encourage tourists to take actions to deal with it.

Second, DMOs should adopt differentiated risk communication strategies for different pandemic areas and pandemic severity. Similarly, DMOs should adopt differentiated marketing strategies based on the distance between the tourism market and the risk center, so as to promote the recovery of the post-crisis tourism market. In high-risk situations, people closer to the crisis center area have higher ontological security threat, lower perceived coping efficacy and lower travel intention. Therefore, DMOs should strictly require tourist sites, such as scenic spots, hotels, parks, to adopt pandemic prevention policies in local high-risk situations, and even require them to close down to avoid clustered infection and large-scale spread of the pandemic. DMOs should restrict cross-regional tourism activities in domestic high-risk situations. However, in international high-risk situations, marketing measures such as free tickets and product discounts can be appropriately adopted to gradually restore the local tourism market. In low-risk situations, people closer to the crisis center area have higher perceived coping efficacy and travel intention, and those in the middle-risk area possess highest ontological security threat assessment. DMOs should enhance the public's crisis awareness in local low-risk situations, and restore surrounding tourism activities and the local

tourism market in an orderly manner. In domestic low-risk situations, DMOs should pay attention to reducing the public's concerns about the possible spread of the pandemic in the future. DMOs should increase the transparency of risk communication in international low-risk situations, disclose the latest conditions about the pandemic, and provide risk guidance for tourists when making decisions.

5.4. Limitations and future research

This research has several limitations. First, this research selects Chinese tourists in the pandemic as the study subjects to investigate the effect of risk messages on tourists' travel intention. And the data was collected through social media platforms using a convenience sampling approach. Future research may extend this research in different crisis situations and other cultural contexts. The experimental design can be further optimized, and other sample collection methods such as stratified sampling, quota sampling, random sampling can be adopted to verify our study findings. Second, this research reveals the mediation effect of risk message affecting tourists' travel intention based on PMT. In a crisis context, tourists' reception and processing of crisis and risk messages may be an important mediation condition for the impact of risk communication on tourists' behaviors. Future research may investigate this mediation effect based on the information processing model. In addition, future research could conceptualize and operationalize tourists' travel intention into three dimensions: local, domestic and international, and examine the impact of risk message on tourists' travel intention across these dimensions. Third, as for the moderation effect of risk distance, this research only focuses on the geographical distance between tourists and risk sources. Future research should explore the moderation effect of other risk distances, such as

psychological distance, social distance, and cultural distance.

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Table 1. Sample profiles (Experiment 1)

Risk message frames		Risk amplifying frame (n=101)		Risk attenuating frame (n=101)		Total (n=202)	
	Category	n	%	n	%	n	%
Gender	Male	39	38.61	46	45.54	85	42.08
	Female	62	61.39	55	54.46	117	57.92
Marital status	Married	50	49.50	52	51.49	102	50.50
	Unmarried	51	50.50	49	48.51	100	49.50
Age (years)	≤ 18	1	0.99	1	0.99	2	0.99
	18-25	43	42.57	35	34.65	78	38.61
	26-35	32	31.68	43	42.57	75	37.13
	36-45	17	16.83	16	15.84	33	16.34
	46-55	7	6.93	5	4.95	12	5.94
	≥ 56	1	0.99	1	0.99	2	0.99
Education	Junior high college or below	0	0	1	0.99	1	0.50
	Senior high school	4	3.96	7	6.93	11	5.45
	Junior college	19	18.81	19	18.81	38	18.81
	Bachelor's degree	69	68.32	70	69.31	139	68.81
	Master degree	9	8.91	4	3.96	13	6.44
Monthly income (CNY)	≤ 2,500 元	34	33.66	24	23.76	58	28.71
	2,501-5,000	21	20.79	30	29.70	51	25.25
	5,001-10,000	43	42.57	37	36.63	80	39.60
	10,001-20,000	3	2.97	9	8.91	12	5.94
	≥ 20,001	0	0	1	0.99	1	0.50
Travel frequency since the pandemic outbreak	0	58	57.43	60	59.41	118	58.42
	1	24	23.76	20	19.80	44	21.78
	2-3	18	17.82	20	19.80	38	18.81
	4-5	1	0.99	1	0.99	1	0.50
	6 or more	0	0	60	59.41	1	0.50

Table 2. Descriptive statistic and normality test

Variables	Items	Experiment 1 (N=202)				Experiment 2 (N=584)			
		Mean	S.D.	Skewness	Kurtosis	Mean	S.D.	Skewness	Kurtosis
Travel intention	TI01	4.58	1.56	-0.29	-0.52	4.98	1.57	-0.62	0.08
Perceived safety	PS01	3.28	1.36	0.15	-0.78	3.50	1.39	-0.04	-0.50
	PS02	3.57	1.43	0.07	-0.79	3.73	1.37	-0.25	-0.45
	PS03	3.30	1.51	0.29	-0.76	3.30	1.39	-0.04	-0.67
	PS04	3.04	1.47	0.62	-0.33	2.99	1.42	0.28	-0.44
Ontological security threat	OST01	4.43	1.39	-0.16	-0.51	4.37	1.36	-0.06	0.15
	OST02	4.60	1.44	-0.32	-0.30	4.26	1.42	-0.08	0.01
	OST03	4.18	1.45	0.02	-0.74	3.74	1.36	0.11	0.18
	OST04	4.92	1.29	-0.55	-0.06	4.83	1.22	-0.20	0.33
Perceived coping efficacy	PCE01	4.54	1.31	-0.44	0.03	4.29	1.30	-0.41	0.54
	PCE02	4.96	1.23	-0.67	0.29	4.63	1.21	-0.24	0.52
	PCE03	4.90	1.33	-0.62	0.52	4.46	1.22	-0.27	0.69
	PCE04	5.17	1.24	-0.66	0.79	4.85	1.21	-0.36	0.78

Table 3. Independent sample *t*-test of Experiment 1

	Risk amplifying frame (n=101)		Risk attenuating frame (n=101)		Total (N=202)
Outcome variable	Mean	S.D.	Mean	S.D.	*t* vale
Ontological security threat	4.79	1.03	4.28	1.09	3.48***
Perceived coping efficacy	4.59	1.13	5.20	0.77	-4.48***
Travel intention	4.02	1.50	5.15	1.41	-5.50***

Table 4. The mediation effect of ontological security threat and perceived coping efficacy

		Ontological security threat		Perceived coping efficacy		Travel intention	
		β (S.E.)	95% CI	β (S.E.)	95% CI	β (S.E.)	95% CI
Direct effect	Gender	0.29 (0.16)	-0.02, 0.60	0.21 (0.15)	-0.08, 0.51	0.10 (0.21)	-0.32, 0.51
	Marital status	0.14 (0.20)	-0.25, 0.53	-0.01 (0.19)	-0.38, 0.36	-0.40 (0.26)	-0.92, 0.126
	Age	0.16 (0.11)	-0.060, 0.37	0.12 (0.10)	-0.08, 0.33	-0.11 (0.15)	-0.40, 0.18
	Education	0.12 (0.11)	-0.10, 0.35	0.07 (0.11)	-0.14, 0.28	0.27 (0.15)	-0.03, 0.57
	Monthly income	0.25* (0.10)	0.06, 0.44	0.083 (0.09)	-0.10, 0.26	-0.20 (0.13)	-0.46, 0.06
	Travel frequency	-0.17 (0.09)	-0.34, 0.01	0.02 (0.08)	-0.14, 0.19	0.17 (0.12)	-0.06, 0.41
	Risk message frame	-0.53*** (0.15)	-0.82, -0.24	0.62*** (0.14)	0.34, 0.89	0.78*** (0.21)	0.36, 1.20
	Ontological security threat	-	-	-	-	-0.27** (0.10)	-0.46, -0.08
	perceived coping efficacy	-	-	-	-	0.46*** (0.10)	0.26, 0.67
	Observation	202		202		202	
	R^2	0.15		0.12		0.27	
Mediation effect	Risk message frame→ ontological threat →travel intention	0.14 (0.07)	0.04, 0.31	-	-	-	-
	Risk message frame →perceived coping efficacy→ travel intention	-	-	0.29 (0.09)	0.13, 0.50	-	-
Total effect	Risk message frame →travel intention	-	-	-	-	1.21*** (0.21)	0.80, 1.62

Notes: ***p<0.001; **p<0.01; *p<0.05。

Table 5. Sample profile (Experiment 2)

Risk message frames		Risk amplifying frame (n=289)		Risk attenuating frame (n=295)		Total (n=584)	
	Categories	n	%	n	%	n	%
Gender	Male	85	29.41	91	30.85	176	30.14
	Female	204	70.59	204	69.15	408	69.86
Marital status	Married	76	26.30	81	27.46	157	26.88
	Unmarried	213	73.70	214	72.54	427	73.12
Age (years)	≤ 18	9	3.11	10	3.39	19	3.25
	18-25	167	57.79	175	59.32	342	58.56
	26-35	66	22.84	64	21.69	130	22.26
	36-45	27	9.34	29	9.83	56	9.59
	46-55	15	5.19	11	3.73	26	4.45
	≥ 56	5	1.73	6	2.03	11	1.88
Education	Junior high college or below	2	0.69	4	1.36	6	1.03
	Senior high school	13	4.50	6	2.03	19	3.25
	Junior college	20	6.92	27	9.15	47	8.05
	Bachelor's degree	197	68.17	206	69.83	403	69.01
	Master degree	57	19.72	52	17.63	109	18.66
Monthly income (CNY)	≤ 2,500 元	158	54.67	172	58.31	330	56.51
	2,501-5,000	40	13.84	42	14.24	82	14.04
	5,001-10,000	62	21.45	60	20.34	122	20.89
	10,001-20,000	17	5.88	17	5.76	34	5.82
	≥ 20,001	12	4.15	4	1.36	16	2.74
Travel frequency since the pandemic outbreak	0	116	40.14	124	42.03	240	41.10
	1	63	21.80	71	24.07	134	22.95
	2-3	86	29.76	85	28.81	171	29.28
	4-5	11	3.81	9	3.05	20	3.42
	6 or more	13	4.50	6	2.03	19	3.25
Risk distance	Local risk message	96	33.22	99	33.56	195	33.39
	Domestic risk message	95	32.87	94	31.86	189	32.36
	International risk message	98	33.91	102	34.58	200	34.25

Table 6. Independent sample *t*-test of Experiment 2

Outcome variable	Risk amplifying frame (n=289)		Risk attenuating frame (n=295)		Total (N=584)
	Mean	S.D.	Mean	S.D.	*t* vale
Ontological security threat	4.48	0.98	4.13	1.00	4.19***
Perceived coping efficacy	4.39	1.01	4.72	0.98	-3.96***
Travel intention	4.64	1.70	5.31	1.34	-5.20***

Table 7. The matching analysis of risk distance and risk message frame

Outcomes	Local risk message (N=195)					Domestic risk message (N=189)					International risk message (N=200)				
	Risk amplifying frame		Risk attenuating frame			Risk amplifying frame		Risk attenuating frame			Risk amplifying frame		Risk attenuating frame		
	Mean	S.E.	Mean	S.E.	*t* value	Mean	S.E.	Mean	S.E.	*t* value	Mean	S.E.	Mean	S.E.	*t* value
Ontological security threat	4.67	0.99	4.06	0.92	4.46***	4.35	0.86	4.26	0.97	0.67	4.40	1.05	4.08	1.10	2.11*
Perceived coping efficacy	4.15	1.15	4.87	0.97	-4.73***	4.47	0.91	4.67	1.02	-1.42	4.55	0.93	4.62	0.95	-0.48
Travel intention	4.18	1.88	5.51	1.02	-6.11***	4.70	1.57	5.38	1.38	-3.21**	5.05	1.56	5.04	1.54	0.05

Notes: ***$p<0.001$; **$p<0.01$; *$p<0.05$.

Table 8. The moderation effect of risk distance

| Variables		Ontological security threat		perceived coping efficacy		Travel intention	
		F value		F value		F value	
Covariates	Gender	1.20	1.25	2.22	2.29	6.42	3.07*
	Marital status	0.82	0.85	1.09	1.12	11.29	5.40*
	Age	0.13	0.14	1.07	1.10	5.07	2.42
	Education	6.58	6.85**	1.02	1.05	33.30	15.93***
	Monthly income	0.10	0.11	2.50	2.57	0.01	0.00
	Travel frequency	0.43	0.45	1.45	1.49	52.26	25.00***
Direct effect							
Independent variables	Risk message frame	16.94	17.63***	17.00	17.47***	70.68	33.80***
	Risk distance	0.65	0.68	0.38	0.39	3.33	1.59
Moderation effect							
Interaction term	Risk message frame ✕ risk distance	3.67	3.82*	5.71	5.87**	16.98	8.12***

Notes: ***$p<0.001$; **$p<0.01$; *$p<0.05$.
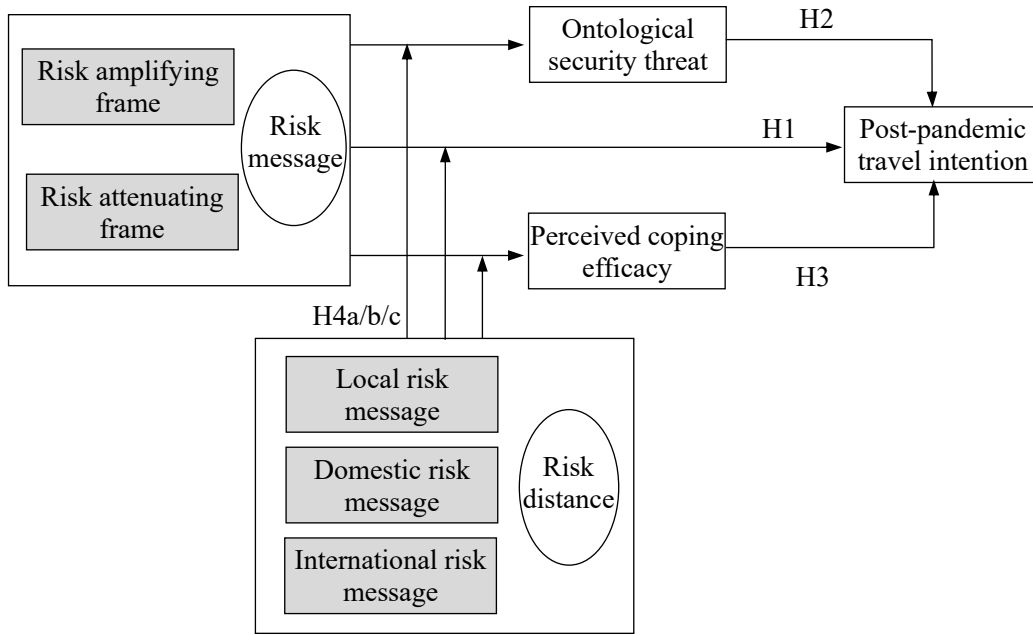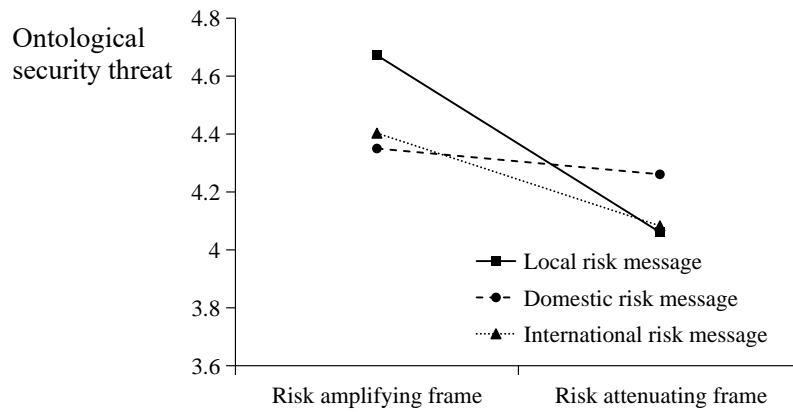
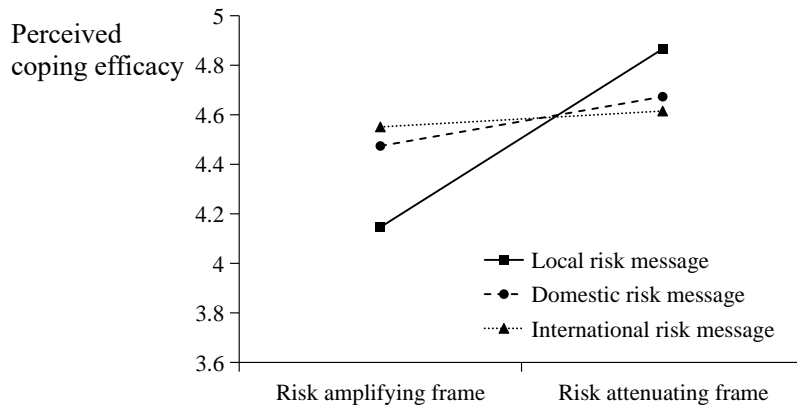**Figure 1**. Conceptual model
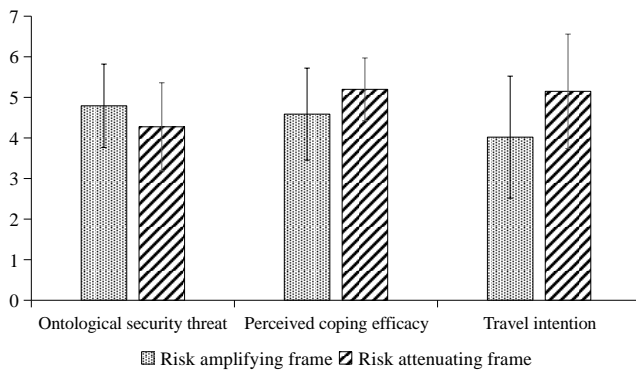
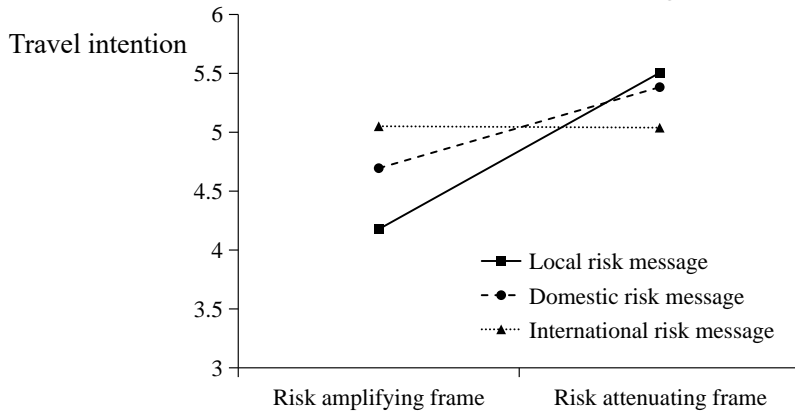**Figure 2a**. Experiment 1
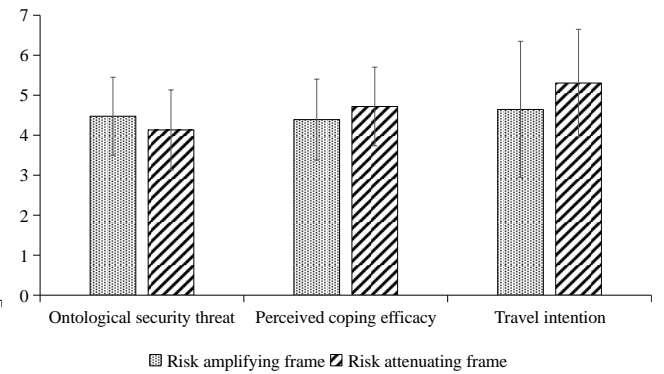
Figure 2b. Experiment 2
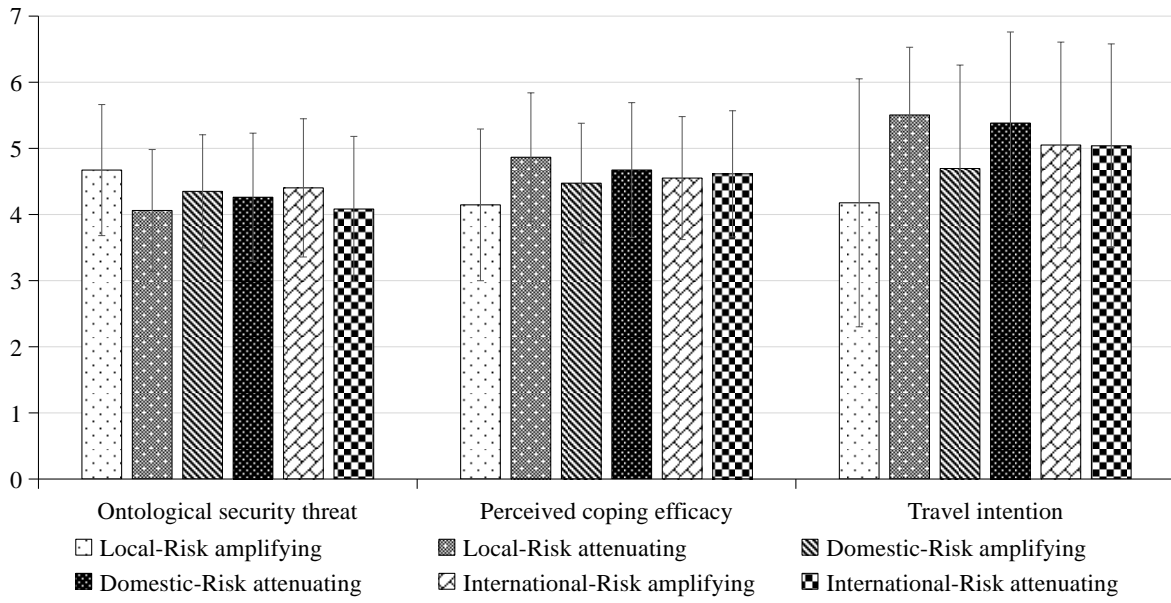
Figure 3. The matching analysis of risk distance and risk message frame

Figure 4a. Moderation effect of risk distance between risk message frame and ontological security threat

Figure 4b. Moderation effect of risk distance between risk message frame and perceived coping efficacy

Figure 4c. Moderation effect of risk distance between risk message frame and travel intention

Appendix 1. Measurement items

Variables	Items	Description
Perceived safety	PS01	The current tourism environment is safe.
	PS02	The current tourism safety situation is acceptable.
	PS03	It is safe to travel now.
	PS04	Now I can travel without worry.
Ontological security threat	OST01	During the pandemic, it is difficult for me to feel that the world around me is reliable and consistent.
	OST02	During the pandemic, the social environment around me is in an unstable state.
	OST03	During the pandemic, I find it difficult to adapt to the surrounding environment.
	OST04	During the pandemic, my daily life and activities are restricted and controlled.
Perceived coping efficacy	SE01	I can easily take measures to prevent COVID-19 infection.
	SE02	I have the necessary skills and equipment to protect myself from being infected by COVID-19
	SE03	My ability to protect myself from being infected by COVID-19 is adequate
	SE04	I can perform preventive measures to protect myself from being infected by COVID-19
Travel intention	TI01	After the pandemic, how likely are you going to travel?

Appendix 2. Stimuli materials

Local risk message

The risk amplifying frame

Recently, there are consecutive newly confirmed COVID-19 cases in your place of residence. And there were 50 newly confirmed COVID-19 cases yesterday. According to media reports, the activity trajectory of the confirmed patients covers the gathering places of local people, such as bookstores, supermarkets, railway stations, airports, hotels, and KTV nightclubs, and has communicated with residents. Presently, 354 close contacts have been investigated, of which 220 remained in the local area and 134 went to other places. In winter, the COVID-19 virus can stay on the surface of objects after being separated from the human body for a significantly longer time (more than 1 month), and even has the characteristics of "environmental transmission".

The risk attenuating frame

Recently, there are newly confirmed COVID-19 pneumonia cases in your place of residence. However, they have been transferred to designated medical institutions for isolation and treatment, and their condition is stable. According to media reports, the activity trajectory of the confirmed patients has been traced, the gathering places of local people have been disinfected, and the local Center for Disease Control (CDC) has been contacted. The residence and the places visited by the confirmed patients have been included in the risk control unit, and closed management and nucleic acid testing have been fully implemented. Presently, more than 5,600 people have completed nucleic acid testing, and the results are all negative.

Domestic risk message

The risk amplifying frame

Recently, the COVID-19 pandemic situation in China is still grim. According to media reports, there are still new locally diagnosed cases and asymptomatic infections in northern, western, central, southern, and eastern China. And there are 1,489 COVID-19 cases and 41 medium-and high-risk areas in China. Experts pointed out that the COVID-19 virus has mutated and is more likely to spread among people, and even cause a higher number of severe cases and deaths. In winter, the COVID-19 pneumonia virus stays on objects' surfaces after being separated from the human body for a significantly longer time (more than 1 month), and even has the characteristics of "environmental transmission".

The risk attenuating frame

Recently, the COVID-19 pandemic situation in China has been well controlled. According to media reports, the newly diagnosed cases in China mainly come from visitors from overseas and overseas imported products. The Chinese government has made various efforts and measures to contain the spread of the pandemic. Experts

pointed out with deepened knowledge of the COVID-19 pneumonia virus, mild cases can be discharged after treating for 13 days, and the success rate of treatment for severe cases has increased significantly. Presently, China has four COVID-19 vaccines that have entered phase III clinical trials, and the vaccination of key populations in some regions has been launched.

International risk message

The risk amplifying frame

Recently, the international COVID-19 pandemic situation is still grim. And there were more than 500,000 newly confirmed COVID-19 cases each day, and the cumulative number of confirmed cases exceeds 80 million. According to media reports, the second wave of the COVID-19 pandemic is spreading exponentially. The US has the highest number of COVID-19 cases in the world, and more than half of European countries have cases increased by more than 10% in the past two weeks. Some countries, such as France, Russia, and Nepal, have reported a record-breaking number of newly confirmed cases in a single day. The cumulative number of confirmed cases in India exceeds 10 million. Experts pointed out that the COVID-19 virus has mutated in many countries, such as South Korea, England, South Africa, and Nigeria, and may have an infection rate of 56% higher than before. It is more likely to spread among people, and even cause a higher number of severe cases and deaths.

The risk attenuating frame

Recently, the international COVID-19 pandemic situation shows a rebound trend. According to media reports, many countries have upgraded the level of COVID-19 pandemic prevention and control, and strictly implemented the "travel restrictions". They also encourage and require people who have recently been to high-risk areas to self-quarantine for 14 days. Experts pointed out there are currently about 250 candidate COVID-19 vaccines in development around the world, and at least 17 of them are in clinical trials. For example, Russia has developed five prototype vaccines for COVID-19 that are expected to begin circulating in 2021, and America is testing an experimental vaccine against COVID-19. The international pandemic situation is expected to be alleviated and controlled in the next period of time.