How risk messages influence tourist processing and sharing: The role of emojis

ABSTRACT

Understanding how tourists process and share risk messages during a crisis is critical for tourism risk communication. This research develops and tests a theoretical framework of tourist risk information processing and sharing in the context COVID-19 pandemic. A mixed-method design was employed, consisting of three separate studies conducted in different case contexts, involving different experimental subjects. The results showed that: a) risk message framing significantly impacted information sharing; b) heuristic and systematic processing and perceived value of information sharing were critical mediators that underpin the tourists' role shift from "receiver" to "sharer"; c) emojis strengthened tourists' processing of risk message, and improved their perceived value and information sharing in the risk amplifying frame, compared with the risk attenuating frame. This research advances the risk communication literature and provides implications for destinations to set effective risk communication strategies in times of crisis.

Keywords: Risk amplifying; Risk Attenuating; Heuristic-systematic model; Perceived value; emoji; Information sharing

1. Introduction

Tourists are highly sensitive and susceptible to risk messages (Kapuściński & Richards, 2016). Effective risk communications in crisis situations are becoming increasingly important for tourism destinations to facilitate the resilience and recovery of the tourism market (Xie, Zhang, & Huang, 2023; Xie, Zhang, Morrison, & Coca-Stefaniak, 2021). In the current social media era, the use of internet technology and social media platforms has significantly transformed the creation and dissemination of tourism risk messages. Tourists and the general public are now more empowered than ever to participate in risk message communication, leading to a shift of tourists from passive "information receivers" to active "information communicators" (Schultz, Utz, & Göritz, 2011; Xie, Zhang, Huang, Chen, & Morrison, 2022). To mitigate the potential ambiguity of discourse, accurately convey meaning, and express emotions (Kaye, Wall, & Malone, 2016), the use of emojis has become increasingly popular in risk message communication. According to Adobe's Global Emoji Trend Report in 2021, 90% of people believe that emoji make it easier to express themselves, 89% of people find that emoji simplifies cross-language communication barriers, and over half of the people reported being more comfortable expressing their emotions through emoji than through phone or in-person conversations (Adobe, 2021). Compared to pure text messages, emojis, as pictograms, are more vivid, concise, rich, easily conveyed, and expressive (Pavalanathan & Eisenstein, 2016). Messages and comments that incorporate emojis during a crisis appear to have greater impacts on tourists' attitudes and behaviors (Al-Rawi et al., 2020; Chen, Zhang, & Wang, 2022; Wang, Cheng, Li, & Jiang, 2023), such as encouraging them to adopt preventive behaviors (Lin & Luo, 2023) and leading to online public opinion and group

conflicts (Luo & Zhai, 2017; Ke, 2020). Within this context, developing an effective risk communication strategy that incorporates emojis has become a critical task for tourism destinations.

The field of tourism crisis and risk communication has shifted its focus from organization-dominated approaches to interactive communication that centers around tourists and involves all stakeholders (Sano & Sano, 2019; Schultz et al., 2011). This shift is driven by the high credibility of tourist-driven crisis and risk communication, which spreads quickly and has the potential to enhance tourists' perception of safety, restore the image of destinations, and aid in the recovery of the tourism market following a crisis (Sano & Sano, 2019; Zhang et al., 2023). Consequently, it is important to guide tourists in transitioning from passive recipients of risk messages to active communicators, as this can facilitate crisis mitigation and the revival of the tourism market. This transition requires tourists to assume the role of "communicators" by sharing and disseminating the risk messages they receive (Luo & Zhai, 2017; Schultz et al., 2011; Utz, Schultz, & Glocka, 2013). The process involves assessing various aspects of the risk messages, including their content, quality, and source (Ryu & Kim, 2015; Zhang et al., 2023), as well as evaluating the usefulness and value of the messages (Bordia, Irmer, & Abusah, 2006; Li & Wang, 2006), which subsequently influence their sharing behavior. Therefore, information processing and perceived value play vital roles in supporting the transition of tourists from being mere message receivers to active message sharers. Moreover, the accuracy, vividness, and richness of the disseminated risk messages, including the use of emojis, can enhance tourists' processing and judgment of value, thereby reducing decision-making obstacles caused by message ambiguity and uncertainty (Boutet,

LeBlanc, Chamberland, & Collin, 2021; Ryu & Kim, 2015; Wu, Chen, Wang, & Zhou, 2022). However, limited research has been conducted to explore the impact of risk messages on tourists' information processing and sharing behavior.

Specifically, two important gaps in the existing literature have been identified. First, there is a lack of attention and empirical investigation into how tourists transition from being passive recipients of risk messages to actively sharing them during crisis situations. Previous studies have focused on the cognitive and emotional states evoked by risk messages in tourists, such as perceived risk and travel fear, and their impact on travel-related behaviors like travel intention, information-seeking, and vaccination intention (Gursoy, Ekinci, Can, & Murray, 2022; Liu-Lastres, Schroeder, & Penningtongray, 2019; Xie et al., 2023). It is generally assumed that tourists employ specific information processing modes, such as intuition-based heuristic processing or rationality-based systematic processing, to evaluate risks before taking action (Aliperti & Cruz, 2019; Zhang, Xie, Chen, Dai, & Wang, 2023). Moreover, tourists are more likely to share information when they perceive a high value in doing so (Li & Wang, 2020). Therefore, understanding the role of information processing and perceived value in information sharing is essential to determine whether tourists are willing to share risk messages after receiving them. However, the underlying mediation mechanism requires further empirical examination.

Second, there is an ongoing debate regarding the use of emojis in message communication and sharing. Emojis are unique symbols and visual language in the era of social media (Derks, Bos, & Grumbkow, 2008; Luangrath, Peck, & Barger, 2017). Their inclusion in message communication provides contextual information that reduces message

ambiguity, enhances social presence, and bridges social distance (Boutet et al., 2021; Puce, 2013; Song, Zhu, & Zhao, 2019). As a result, emojis can enhance individuals' processing fluency and perceived usefulness of received messages (Wu et al., 2022), leading to increased interactions such as liking, replying, forwarding, and sharing (Hsieh & Tseng, 2017; McShane, Pancer, Poole, & Deng, 2021). However, there is a "dark side" to emoji usage, as it may negatively affect perceived competence and subsequently hinder information sharing (Glikson, Cheshin, & Kleef, 2018). Huang, Chang, Bilgihan, and Okumus (2020) confirmed that the presence of positive emojis in a list-based review increased cognitive burden and reduced processing fluency and perceived helpfulness of information. In addition, the influence of emojis is contingent upon factors such as their position, symmetry (or asymmetry), multiple meanings, user expertise, valence, and congruence with text (Boutet et al., 2021; Wu et al., 2022; Hewage, Liu, Wang, & Mao, 2021; McShane et al., 2021). Furthermore, previous research has predominantly focused on tourists' responses to risk messages presented in a textual format, such as through message framing (Kim, Kim, Choi, Shi, & Morrison, 2022; Xie et al., 2023), numerical formats (Savadori, Tokarchuk, Pizzato, & Pighin, 2023), information precision, comparison standards (Kim et al., 2020), and emotional attributes (Gursoy et al., 2022). In contrast, the impact of visual cues, like emojis, on tourists' responses to risk messages has received relatively less attention. Therefore, it remains unclear how emojis influence tourists' processing of risk messages, perception of value, and information sharing.

Therefore, the objective of this research is to investigate the underlying process by which risk messages influence tourists' information sharing. This will be accomplished

through three studies, with the following specific objectives and theoretical contributions: a) To examine the impact of risk messages on tourists' intentions to share information, taking into account different risk message framings. This will identify new outcome variables for risk messages and enhance the empirical understanding of risk message framing. b) To explore the mediating role of information processing (systematic and heuristic) and the perceived value of information sharing. This will reveal tourists' dual processing modes when encountering risk messages during crisis situations, as well as shed light on the process through which tourists transition from passive recipients of risk messages to responsible communicators. c) To investigate the potential moderating effects of emojis on the relationship between message framing, information processing, and subsequent sharing behavior. This not only identifies a new boundary condition and moderator for the impact of risk messages but also expands the application of emojis in the domain of tourism risk communication. The findings from this research will provide valuable insights for tourism risk communication. Moreover, they will assist destinations in developing and implementing effective communication strategies with tourists, ultimately enhancing market resilience and facilitating recovery during crises.

2. Theoretical background and hypotheses

2.1. The Social Amplification of Risk Framework and risk message framing

The Social Amplification of Risk Framework (SARF) highlights the importance of social interactions in shaping the public's perception of risk and their subsequent responses to it (Kasperson, Webler, Ram, & Sutton, 2022). According to this framework, risks or risk

signals can be transmitted and exchanged through various channels, including media, institutions, social groups, and individuals, all of which act as "social stations" that can amplify or mitigate the public's perception of risk and influence their behavior (Binder, Scheufele, Brossard, & Gunther, 2011). Furthermore, communicators, such as individuals and destinations, have the power to enhance or diminish specific risks by categorizing and interpreting risk signals (Kapuściński & Richards, 2016). By emphasizing certain aspects of the risk signal while downplaying others, communicators can shape the public's perception and response (Xie et al., 2021; Xie et al., 2023). For example, highlighting the uncontrollability of a risk while disregarding its likelihood of occurrence can intensify the public's perceived risk. Despite the significant discussion surrounding SARF and its implications for risk amplification or attenuation, its application in the context of tourism risk communication has been limited due to its vagueness and the lack of verifiable hypotheses (Wirz et al., 2018). One notable exception is the research conducted by Cahyanto and Liu-Lasteres (2020), which explored the relationship between media exposure, visitors' risk perception, and behavioral response in the context of natural disasters, specifically the Florida Red Tide.

In accordance with the SARF, tourism destinations facing crisis situations possess the ability to influence tourists' behavior by strategically framing and presenting specific elements of risk messages. This process can involve either amplifying or attenuating tourists' perception of risk. Risk message framing pertains to the deliberate emphasis or presentation of the content, attributes, and components of risk messages by communicators, such as destinations (Gursoy et al., 2022; Xie et al., 2023). Risk framing can be classified into two

categories: risk-amplifying frames, which aim to heighten recipients' perceived risk, and risk-attenuating frames, which aim to diminish recipients' perceived risk (Kapuściński & Richards, 2016; Xie et al., 2021). The former focuses on the impact of high-risk messages on recipients' attitudes and behaviors, while the latter focuses on the impact of low-risk messages. In comparison to risk-amplifying frames, destinations can utilize risk-attenuating frames to disseminate risk messages that enhance tourists' perceived safety, reduce travel anxiety, and foster higher intentions to travel (Xie et al., 2023). Likewise, high-risk messages, as opposed to low-risk messages, evoke greater perceived risk among tourists, dampen their willingness to travel, and encourage the adoption of safety information-seeking behavior in high-risk situations (Liu-Lastres et al., 2017; Sano & Sano, 2019).

Risk message framing can serve as an important trigger for tourist information sharing, which involves the act of forwarding, sharing, and disseminating received messages among individuals (Hur et al., 2017). The antecedents of information sharing can be grouped into four distinct categories: information factors (e.g., information quality and source credibility), media factors (e.g., mass and social media), individual factors (e.g., traits and entertainment motives), and environmental factors (e.g., crisis and public opinion) (Hur et al., 2017; Li & Wang, 2020; Luo & Zhai, 2017; Utz, Schultz, & Glocka, 2013). When processing information, people often have a negativity bias, meaning they assign greater significance to negative elements (e.g., negative information) in their attention, memory, and decision-making processes (Rozin & Royzman, 2001). This bias implies that individuals have a stronger memory effect, discrimination ability, and response level towards negative words, as well as a tendency to selectively process, communicate, and share negative messages in risk

communication (Zhang et al., 2021). Importantly, the risk amplifying frame predominantly presents negative information elements, such as the severity of the risk, the unfairness of its impact, the uncontrollability of its management and causes, and the disastrous consequences it entails. Conversely, the risk attenuating frame emphasizes positive information elements, such as the value of the risk, the fairness of its impact, the effectiveness of its management, the identifiability of its causes, and the controllability of its consequences (Kapuściński & Richards, 2016). Thus, due to the negativity bias, tourists are more inclined to share risk messages conveyed through the risk amplifying frame rather than the risk attenuating frame. Accordingly, it was hypothesized that:

H1: Risk amplifying frame triggers higher levels of tourists' information sharing than risk attenuating frame.

2.2. Heuristic and systematic processing

The heuristic-systematic model is a dual-process model of information processing that encompasses heuristic and systematic processing (Chaiken, 1980; Chaiken & Ledgerwood, 2012; Li, Ma, & Wu, 2023). In the heuristic mode, tourists rely on experience, intuition, and insight to reduce cognitive effort when evaluating information validity. On the other hand, in the systematic mode, tourists engage in comprehensive evaluation and judgment of risk messages, considering factors such as content, arguments, value, and validity (Aliperti & Cruz, 2019; Zhang et al., 2023). Individuals with high cognitive motivation and ability are more likely to engage in systematic processing, while those lacking such motivation and ability tend to rely on heuristic processing (Chaiken & Ledgerwood, 2012).

Typically, messages perceived as highly relevant to individuals undergo stricter evaluation and are processed systematically (Chaiken & Ledgerwood, 2012). Given tourists' concerns and sensitivity to risks and crises, high-risk messages that highlight severity, uncontrollability, and catastrophic consequences may pose a greater threat to tourists' safety and experiences compared to low-risk messages. Consequently, tourists are more inclined to engage in the systematic processing of high-risk messages to accurately assess the level of risk and mitigate potential threats. Moreover, negative words and descriptions directly associated with high-risk messages serve as heuristic cues that influence tourists' information processing, aligning with the negativity bias in risk communication (Zhang et al., 2021). The additivity hypothesis proposes that if heuristic cues are not overwhelmed by systematic processing and individuals' cognitive motivation and ability are not high, heuristic processing can independently influence their behavioral decisions (Li et al., 2023; Tan, Geng, Katsumata, & Xiong, 2021). In other words, both heuristic and systematic processing can impact individuals' attitudes and behaviors. Building on these insights, this study suggests that tourists' systematic processing of high-risk messages may not be overridden by heuristic cues such as negative information and words. In summary, tourists engage in both heuristic and systematic processing when it comes to high-risk messages.

The response of tourists to risk messages depends on how they receive and process such messages. In crisis situations, tourists' information sharing behavior can be influenced by both rational and irrational factors. For instance, the emergence of negative public opinion storms during a crisis often stems from tourists relying on intuition-based heuristic processing when dealing with received risk messages. Under the influence of opinion leaders or the

prevailing public opinion climate, it becomes easier for them to share messages that escalate conflict and irresponsibility (Luo & Zhai, 2017). However, there are also tourists who engage in rational and systematic processing of risk messages, sharing responsible information to help destinations mitigate the impact of the crisis, prevent the spread of misinformation, and assist other tourists in reducing uncertainty (Sano & Sano, 2019; Zhang et al., 2023). Similarly, according to the elaboration likelihood model, Hur et al. (2017) demonstrated that tourists' information sharing decisions involve central (systematic mode) and peripheral (heuristic mode) processing routes, both of which influence their information sharing behaviors. Drawing from the Stimuli-Organism-Response model, the stimuli received by individuals, such as risk messages, activate their internal state, including heuristic and systematic processing, which subsequently influences their approach and avoidance behavioral response, such as information sharing (Bigne, Chatzipanagiotou, & Ruiz, 2020). Accordingly, it was hypothesized:

H2a: Heuristic processing mediates the effect of risk messages on information sharing.

H2b: Systematic processing mediates the effect of risk messages on information sharing.

2.3. Perceived value of information sharing

Perceived value refers to individuals' overall assessment of the usefulness of objects or services based on the perceived benefits and costs associated with them (Caber, Albayrak, & Crawford, 2020; Pang & Liu, 2023). In the context of information sharing, perceived value refers to individuals' overall assessment of the potential benefits of forwarding, sharing, and

disseminating information to themselves or others, as well as the level of satisfaction recipients derive from it (Li & Wang, 2020). The evaluation of the value of information sharing is mainly composed of emotional value, such as entertainment, enhanced social connection and emotional relationships, and functional value, such as information usefulness (Berger & Milkman, 2012; Hur et al., 2017; Jin, Feng, & Zhou, 2017). From the perspective of beneficiaries, the perceived value of information sharing also includes the perceived value of self-interest and the perceived value of altruism (Li & Wang, 2020). A higher perceived value of information sharing corresponds to a stronger willingness to share the information (Bordia et al., 2006; He & Wei, 2009; Laato, Islam, Islam, & Whelan, 2020; Li & Zhou, 2011).

Social exchange theory proposes that individuals strive to achieve mutual benefits by balancing the benefits received and costs incurred in social exchanges (Xia, Wu, & Zhou, 2021). Information sharing can be seen as a form of social exchange (Kumar, Shankar, Behl, Arya, & Gupta, 2023; Li & Wang, 2020). When it comes to risk message sharing decisions, tourists often weigh the costs and benefits involved. Tourists are more likely to share risk messages when they perceive them to have high exchange value. According to Ryu and Kim (2015), the information processing mode is closely linked to recipients' perception of the information, evaluation of its validity, and changes in their cognitive attitudes, which serve as precursors for forming value judgments about risk messages. The processing of easily accessible information, such as assessing information source credibility (heuristic processing), satisfies tourists' entertainment and relationship maintenance needs, while the comprehensive evaluation of information argument quality (systematic processing) caters to

their utility needs (Hur et al., 2017). In terms of cognitive cost, heuristic processing requires less cognitive effort and resources, while systematic processing demands more cognitive effort (Chaiken & Ledgerwood, 2012). Therefore, after tourists engage in heuristic and systematic processing of risk messages, they form an assessment of the value of sharing the messages, which then triggers their information-sharing action. In other words, the perceived value of information sharing is the proximal antecedent of information sharing, heuristic and systematic processing are the distal antecedents of information sharing, and the potential impact of risk messages on information sharing may be sequentially mediated by information processing and perceived value. Prior research has demonstrated the sequential mediation effect of heuristic processing and perceived safety on the relationship between crisis communication sources and travel intentions (Zhang et al., 2023). Accordingly, it was hypothesized:

H3a: The effect of risk messages on information sharing is mediated through heuristic processing and the perceived value of information sharing.

H3b: The effect of risk messages on information sharing is mediated through systematic processing and the perceived value of information sharing.

2.4. The moderation effect of emoji

Emojis are symbols and visual language used to express emotions, attitudes, and various concepts. They can represent human facial expressions, body postures, animals, plants, and other things, using keyboard symbols, images, or animations (Boutet et al., 2021; Derks et al., 2008; Wu et al., 2022). Emoji is also considered a form of textual paralanguage, providing

nonverbal cues in written communication, such as auditory, tactile, and visual cues (Luangrath et al., 2017). In the era of social media, emojis have gained popularity worldwide. They enable people to convey subtle facial expressions, objects, and real-life experiences through simple and vivid icons, transforming online communication and information dissemination patterns (Novak, Smailović, Sluban, & Mozetič, 2015). Emojis have become a universal language, with approximately 90% of online users frequently using them, and around 6 billion emojis being sent and shared daily (Yang & Husain, 2018).

Emojis also create a sense of social presence, facilitating information processing and online communication (Song et al., 2019). The presence of emojis enhances consumers' processing fluency when interpreting messages, thereby improving the perceived usefulness of the information (Huang et al., 2020). Specifically, the use of negative emojis intensifies the perceived negativity of negative sentences, while positive emojis increase the perceived warmth of the communicator. Emojis that match the textual content enhance processing speed and understanding (Boutet et al., 2021). Emojis can reinforce recipients' behavioral responses, such as purchase intention or information sharing. For example, Das, Wiener, & Kareklas (2019) demonstrated that the presence of emojis directly affects consumers' decision-making, increasing their willingness to purchase. In addtion, various studies have shown the interaction effect between emojis and text on individual behaviors. Manganari, Mourelatos, and Dimara (2020) confirmed that the interaction between the valence of online reviews (positive vs. negative) and emoji presence affected customers' hotel booking intentions. Wang et al. (2023) investigated the impact of the interaction between social media content (aesthetic experience vs. promotion) and emoji (emotional vs. semantic) on tourist

engagement in tourism brand's digital communication. McShane et al. (2021) and Hsieh and Tseng (2017) proposed that the usage of emojis in social media posts can boost consumer engagement, including likes, forwards, shares, and comments. Ko, Kim, and Kim (2022) found that emojis increased the number of comments by 70% and likes by 72%.

Furthermore, the impact of emojis in risk communication can be explained by Defleur's model and media richness theory. In Defleur's model, noise acts as a barrier to effective communication between the source and the recipient, potentially interfering with any stage of information transmission, processing, and feedback (Derks et al., 2008; Luangrath et al., 2017; Zhang, Li, & Ruan, 2021). Emojis are used to express emotions, reduce message ambiguity, and align with the communication context (Kaye et al., 2016). By incorporating emojis, information exchange becomes more dynamic and interesting, fostering social closeness and enhancing recipients' understanding. Therefore, it can be expected that, compared to the absence of emojis, using relevant emojis in risk communication can increase tourists' processing fluency of risk messages, improve their perceived value of information, and subsequently lead to more information sharing. Accordingly, it was hypothesized:

H4: Emoji moderates the impacts of risk messages on heuristic processing (H4a), systematic processing (H4b), perceived value of information sharing (H4c), and information sharing (H4d), such that, compared with no emoji, the presence of emoji in risk message communication triggers a higher level of tourists' information processing (heuristic and systematic processing), information value perception, and information sharing.

Figure 1 summarises the conceptual model.

[Insert Figure 1 here]

3. Overview of the research design

We employed a mixed-method design to address the limitations inherent in using a single method or data source (Su, Jia, & Huang, 2022). Before examining the mediation and moderation effects, it is essential to confirm the existence and significance of the direct effects. This step ensures that the proposed explanations of mediation and moderation are built on a reliable foundation. To achieve this, three separate studies were conducted, sequentially examining the direct, mediation, and moderation effects. This approach allows to accurately identify the relationships between variables and enhances the reliability and robustness of our research findings. Specifically, Study 1 collected data on the volume of risk message-related searches and communications from Baidu, China's largest internet search engine. A non-parametric test was conducted to compare the volume of searching, sharing, and communication of high-risk and low-risk messages, thus testing H1. In Study 2, we designed an experiment involving college students to confirm H1. Additionally, we investigated the mediating effects of information processing (heuristic and systematic) and the perceived value of information sharing, thereby examining H2 and H3. Study 3 involved another experiment, retesting H1, H2, and H3, while also exploring the moderating effects of emojis on the impacts of risk message on information processing, perceived value of information and information sharing, thus testing H4.

4. Study 1: Testing the direct effect

4.1. Data collection

Study 1 utilized data from the Baidu Index, a reliable and valid tool for measuring the search and communication volume of keywords on the Baidu search engine. This index has been widely used by scholars in the field of tourism to uncover, model, and predict tourists' behavioral decisions and movement patterns (Liu et al., 2019; Ruan et al., 2019). To ensure the comprehensiveness, representativeness, and accuracy of the data, Study 1 collected information from the Baidu Index regarding pandemic risk messages and tourists' decisions during the Xi'an pandemic outbreak in December 2021.

The choice of Xi'an as the study location was based on several factors. Firstly, in terms of data availability, the most popular keywords related to the COVID-19 pandemic were included in the Baidu Index system after 2021, allowing for a more comprehensive measurement of the search and communication volume of pandemic risk messages. Secondly, Xi'an is a well-known historical and cultural city in China, attracting over 300 million tourists in 2019 and ranking among the top 10 tourism destinations in the country. This high level of tourist activity resulted in a significant volume of online searches and communications, reaching approximately 5.4 million. Thirdly, prior to the pandemic outbreak, the Xi'an tourism market had experienced a recovery, with tourists displaying a low search and communication volume regarding pandemic information. However, following the outbreak, the number of tourists rapidly declined, and there was a significant increase in the search and communication volume related to various pandemic information, such as Xi'an lockdown measures and COVID-19-specific medicine. This provided an accurate assessment of the differences in tourists' search and communication patterns concerning different types of risk messages.

The selection of keywords for the search engine followed three guiding principles, as outlined by Ruan et al. (2019). These principles encompassed the considerations of representativeness, operability, and high network attention. First, representativeness entailed the selection of keywords that accurately represented both high- and low-risk messages and encompassed tourists' decisions. Second, operability ensured that the chosen keywords were already included in the Baidu index database, thereby ensuring their practicality and availability for analysis. Lastly, high network attention dictated that the selected keywords possessed a substantial search and communication volume, indicating their prominence and significance within the online sphere.

Applying these principles, a set of keywords was identified to represent high-risk and low-risk messages. For high-risk messages, examples included terms such as "Xi'an lockdown," "virus mutation," "medium- and high-risk area," "pandemic isolation," "asymptomatic infection," "close contact," and "healthy red code." Conversely, low-risk messages were represented by keywords such as "Xi'an unblock," "COVID-19 vaccination," "low-risk area," "COVID-19 specific medicine," "resumption of work," "pandemic turning point," and "healthy green code." These specific keywords underwent a rigorous selection process, involving comprehensive discussions and meticulous examination by an expert panel comprising two professors and six doctoral students specializing in tourism. The panel's collective expertise and insight were instrumental in ensuring the validity and appropriateness of the chosen keywords. All the collected data pertaining to pandemic risk messages were meticulously tagged with Xi'an geotags. This meticulous tagging ensured that the data was accurately associated with the specific context of the Xi'an pandemic outbreak, enabling more

precise analyses and interpretations within the designated geographic region.

4.2. Data processing

On December 9, 2021, a confirmed case of COVID-19 was reported in Xi'an. By March 2022, the city had successfully restored normalcy in its industrial and daily operations. Consequently, data pertaining to pandemic risk messages and Internet users' decisions were collected in a time-series format from December 1, 2021, to March 1, 2022. The search and communication volume of relevant keywords were recorded on a daily basis, generating time-series data for each variable. For instance, on December 1, 2021, the search and communication volume for keywords such as "Xi'an lockdown," "virus mutation," "medium- and high-risk area," "pandemic isolation," "asymptomatic infection," "close contact," and "healthy red code" were denoted as X1 to X7, respectively. The cumulative search and communication volume for high-risk messages on that particular day was calculated as X1+X2+X3+X4+X5+X6+X7.

4.3. Results

As depicted in Figure 2, following the identification of the first COVID-19 case in Xi'an, there was a rapid surge in tourists' search and communication activity regarding high-risk messages related to the pandemic. This activity reached its peak at the end of December 2021. Subsequently, as the level of pandemic control intensified and the number of confirmed cases peaked, the search and communication of high-risk messages gradually declined, eventually forming a long-tail pattern. Conversely, the volume of tourists' searches and communication regarding low-risk messages exhibited a slower initial increase upon the

detection of the first confirmed case. However, after a rapid reduction in the communication of high-risk messages, the search and communication for low-risk messages showed a fluctuating upward trend. Eventually, it decreased and approached a value of zero.

The cumulative search and communication volume for high-risk messages amounted to 162,678, while the total for low-risk messages reached 105,144. Furthermore, a non-parametric test, specifically the Mann-Whitney test, was employed to examine the disparity in the volume of searching, sharing, and communication between high-risk and low-risk messages. The results of the post hoc analysis indicated that tourists' search and communication volume for high-risk messages was significantly higher than that for low-risk messages. (MWU =1762.5, z=-6.692, Asympt. $p<0.001$). Thus, H1 was supported.

[Insert Figure 2 here]

5. Study 2: Testing the mediation effects

5.1. Experimental design

Following the experimental design employed by Xie et al. (2023), we developed the materials for risk message framing (attenuating vs. amplifying) using the most recent reports from domestic and international media sources concerning tourism and the COVID-19 pandemic (see Appendix 1). The risk amplifying frame primarily consisted of messages highlighting high-level risks, including confirmed COVID-19 cases, virus mutation, novel transmission characteristics, and the spread of the pandemic resulting from tourist activities. On the other hand, the risk attenuating frame primarily comprised messages emphasizing low risks, such as effective preventive measures, cure rates, successful development of COVID-

19 vaccines, vaccination rates, and the gradual recovery of tourism activities during the pandemic. The content validity of the materials was assessed by an expert panel consisting of eight tourism professors and doctoral students.

The measurement scales used in this study were derived from previous research and were rated on a seven-point Likert scale. To ensure the appropriateness of the scales within the context of risk communication and the specific circumstances in China, the original English scales were translated and refined by an expert panel (see Appendix 2). Perceived risk was measured using a single item adapted from Xie et al. (2023). Heuristic processing and systematic processing were measured using the scales proposed by Ryu and Kim (2015), with Cronbach's α coefficients of 0.711 and 0.758, respectively. The perceived value of information sharing was assessed using four items adapted from Li and Wang (2020), with a Cronbach's α coefficient of 0.876. Information sharing intentions were measured using three items based on scales developed by Schultz et al. (2011) and Hur et al. (2017), with a Cronbach's α coefficient of 0.849. In addition, demographic variables such as gender and travel frequency were also collected for further analysis.

5.2. Pilot test and data collection

The study was pre-tested on a sample of 62 tourists, who were assigned to one of two risk frames. The results showed that participants' scores on perceived risk ($M_{attenuating}$=4.194, $M_{amplifying}$=5.839, t=6.422, p<0.001), heuristic processing ($M_{attenuating}$=5.210, $M_{amplifying}$=5.758, t=2.634, p<0.05), systematic processing ($M_{attenuating}$=5.339, $M_{amplifying}$=5.823, t=2.278, p<0.05), perceived value of information sharing ($M_{attenuating}$=5.234, M

$_{amplifying}$=5.823, t=3.673, p<0.001), and information sharing intentions ($M_{attenuating}$=5.247, $M_{amplifying}$=5.839, t=4.082, p<0.001) in the risk amplifying frame were significantly higher than those in the risk attenuating frame. This demonstrated the validity of the designed experimental materials.

The formal experiment was conducted on an online survey platform (www.wjx.cn), and convenience sampling was used to recruit college students to participate the experiment. They were assigned randomly to one message frame (either amplifying or attenuating) by the survey platform, and they completed a questionnaire after reading the assigned materials. A total of 280 responses were received, of which 225 were usable, with a usable rate of 80.4%. The risk amplifying frame group accounted for 50.7%, and the risk attenuating frame group accounted for 49.3%. Some 32.4% of the participants were male, and 67.6% were female. Some 37.8% of the participants traveled 0 times in the last 12 months, and 53.3% of the participants traveled between 1 and 3 times.

The formal experiment was conducted using an online survey platform, specifically www.wjx.cn. Convenience sampling was employed to recruit college students as participants for the study. These participants were randomly assigned to one of two message frames, namely the amplifying or attenuating frame, by the survey platform. Upon reading the assigned materials, the participants completed a questionnaire. A total of 280 responses were received, of which 225 were considered usable, resulting in a usable rate of 80.4%. Among the participants, 50.7% were assigned to the risk amplifying frame group, while 49.3% were assigned to the risk attenuating frame group. In terms of gender distribution, 32.4% of the participants were male and 67.6% were female. In addition, 37.8% of the participants

reported zero travel occurrences in the last 12 months, while 53.3% reported traveling between one and three times.

5.3. Results

5.3.1. Manipulation check and descriptive statistics

The manipulation check results indicated that the level of perceived risk in the risk amplifying frame was significantly higher than that in the risk attenuating frame ($M_{attenuating}$=4.387, $M_{amplifying}$=4.851, t=2.871, p<0.01), confirming that the experiment was successfully manipulated. The normality test results indicated that the skewness and kurtosis of each item (in absolute values) were less than 3 (Table 1), meeting the criteria recommended by Kline (2011).

[Insert Table 1 here]

5.3.2. Reliability and validity test

Confirmatory factor analysis was performed using AMOS 21.0 to evaluate the reliability and validity of each variable. The results indicated satisfactory fit indices: $\chi 2/df$ = 2.260 (1<, < 5), RMSEA= 0.075 (< 0.08), RMR= 0.053 (< 0.08), CFI= 0.963 (> 0.9), GFI= 0.937 (> 0.9), NFI= 0.936 (> 0.9), RFI= 0.908 (> 0.9), TLI= 0.964 (> 0.9). Item loadings ranged from 0.700 to 0.896 (> 0.5), the AVE for each variable ranged from 0.552 to 0.672 (> 0.45), and the composite reliability (CR) of each variable ranged from 0.712 to 0.876 (> 0.6), all exceeding the threshold values, indicating acceptable convergent validity (Table 2).

[Insert Table 2 here]

5.3.3. Direct effect test and robustness check

Sequential analysis of variance (ANOVA) was run to compare the differences in participants' scores on heuristic processing, systematic processing, perceived value, and information sharing intentions under the two risk message frames. The results (Figure 3) presented that participants' scores on information sharing intentions in the risk amplifying frame were significantly greater than those in the risk attenuating frame ($M_{amplifying}$=4.845, $M_{attenuating}$=4.505, t=2.783, p<0.01). Thus, H1 received support again. In addition, participants' scores on heuristic processing ($M_{amplifying}$=4.623, $M_{attenuating}$=4.198, t=3.342, p<0.001), systematic processing ($M_{amplifying}$=5.491, $M_{attenuating}$=5.063, t=3.510, p<0.001), perceived value of information sharing ($M_{amplifying}$=4.961, $M_{attenuating}$=4.583, t=2.783, p<0.01) in the risk amplifying frame were significantly higher than those in the risk attenuating frame.

[Insert Figure 3 here]

5.3.4. Mediation effect test

We used the SPSS PROCESS macro (model 6) to estimate the multiple mediation effects of information processing (heuristic and systematic) and perceived value of information sharing. Demographic variables were entered as control variables.

As shown in Figure 4-1, the group of risk attenuating frame exhibited lower heuristic processing (β=-0.446, p<0.01) and perceived value of information sharing (β=-0.235, p<0.05) than the risk amplifying frame group, and the impact of risk message frame on information sharing intentions was not significant. The results of the mediation effect showed that heuristic processing did not mediate the effect of the risk message frame on information

sharing intentions (β=-0.025, 95% CI: -0.099, 0.037), so H2a was not supported. However, heuristic processing and perceived value of information sharing had a chain mediation effect between risk message frame and information sharing intentions (β=-0.087, 95% CI: -0.175, -0.029), that is, risk message frame first triggered tourists' heuristic processing, then affected their perceived value, and finally shaped their information sharing intentions. Thus, H3a received support.

As shown in Figure 4-2, the risk attenuating frame group tended to exhibit lower systematic processing than the risk amplifying frame group (β=-0.451, $p<0.001$), but the impact of the risk message frame on the perceived value of information sharing (β=-0.013, $p>0.05$) and information sharing intentions (β=-0.043, $p>0.05$) was not significant. And systematic processing mediated the impact of the risk message frame on information sharing intentions (β=-0.067, 95% CI: -0.143, -0.014), supporting H2b. Moreover, systematic processing and perceived value of information sharing had a sequential mediation effect between risk message and information sharing intentions (β=-0.143, 95% CI: -0.247, -0.061), supporting H3b.

[Insert Figure 4 here]

This experiment was conducted using a sample of college students, with the aim of minimizing the influence of irrelevant demographic factors and ensuring good internal validity of the conclusions. However, it is important to note that the sample structure may pose limitations to the external validity of the findings. In order to address this concern and further validate the hypotheses, an additional experiment was designed and executed. This

subsequent experiment aimed not only to retest the hypotheses but also to explore the potential moderation effect of emojis on the observed relationships.

6. Study 3: Testing the moderation effects

6.1. Experimental design

Experiment 1 was designed and performed using college students, which controlled for the influence of demographic irrelevant factors and demonstrated good internal validity of the conclusions. However, the sample structure may limit the external validity of the research findings. To address this limitation, a second experiment was designed and conducted with potential tourists who had traveled since the outbreak of the COVID-19 pandemic. Additionally, the moderation effect of emoji was investigated.

Following Boutet et al.'s (2021) suggestion, we added congruent emojis for risk message text material designed in Experiment 1. Specifically, in the risk amplifying frame, we added negative emoji to each sentence that matched the text meaning; in the risk attenuating frame, we added positive emoji to each sentence that matched the text meaning. The emoji used are popular ones such as [Red Heart ❤️][Thumbs Up 👍][Loudly Crying 😭][Prayers hands 🙏]. These emojis are in the top ten in the 2021 emoji usage list. Of course, we also included some emojis that were specifically designed for the pandemic or were widely used during the pandemic, such as [Microbe 🦠][Wearing mask 😷][Fever 🤒][Fighting wearing mask 😷] (Appendix 1). Accordingly, a between-subject factorial design of 2 (risk message frame: amplifying vs. attenuating) × 2 (emoji: presence vs. absence) was employed to assess whether emoji moderates the impact of risk message frame on tourists' heuristic and

systematic processing, perceived value of information sharing, and information sharing intentions.

6.2. Data collection

Similar to the data collection method of Study 2, Study 3 used a combination of convenience sampling and snowball sampling on social media (i.e., WeChat) to recruit participants. After being assigned to one of the four groups randomly (group 1: risk amplifying frame-emoji absence; group 2: risk attenuating frame-emoji absence; group 3: risk amplifying frame -emoji presence; group 4: risk attenuating frame-emoji presence), participants read the assigned material and answer the questions. The sample included 1,026 usable responses. The participant profiles were presented in Table 3.

[Insert Table 3 here]

6.3. Results

6.3.1. Manipulation check and model validation

The normality test results (presented in Table 2) indicated that the skewness and kurtosis of each item (in absolute values) were less than 3, meeting the criteria (Kline, 2011). In addition, participants' scores on perceived risk in the risk amplifying frame were greater than those in the risk attenuating frame ($M_{attenuating}$ =4.456, $M_{amplifying}$=4.337, t=9.339, p<0.001), suggesting that the experiment was successfully manipulated. Confirmatory factor analysis returned satisfactory fit indices: $\chi 2/df$ = 3.879(1<, < 5), RMSEA= 0.053 (< 0.08), RMR= 0.060 (< 0.08), CFI= 0.980 (> 0.9), GFI= 0.975 (> 0.9), NFI= 0.973 (> 0.9), RFI= 0.961 (> 0.9), TLI= 0.971 (> 0.9). Item factor loadings ranged from 0.657 to 0.859 (> 0.5), and the

AVE for each variable ranged from 0.459 to 0.641 (> 0.45), and the composite reliability (CR) of each variable ranged from 0.629 to 0.877 (> 0.6), confirming convergent validity.

6.3.2. Robustness check

The direct and the mediation effect between risk message and information sharing intentions were re-examined to ensure the robustness of research conclusion. The results showed that participants' scores on heuristic processing ($M_{amplifying}$=5.267, $M_{attenuating}$=4.952, t=3.121, p<0.01), systematic processing ($M_{amplifying}$=5.628, $M_{attenuating}$=5.250, t=3.802, p<0.001), perceived value of information sharing ($M_{amplifying}$=5.119, $M_{attenuating}$=4.864, t=2.629, p<0.01), and information sharing intentions ($M_{amplifying}$=4.944, $M_{attenuating}$=4.694, t=2.451, p<0.05) in the risk amplifying frame were significantly higher than those in the risk attenuating frame. Regarding the mediation effects, heuristic processing did not mediate the impact of risk message frame on information sharing intentions (β=-0.024, 95% CI: -0.065, 0.001), whilst systematic mediated the impact of risk message frame on information sharing intentions (β=-0.042, 95% CI: -0.089, -0.009). Similarly, heuristic (or systematic) processing and perceived value of information sharing had a sequential mediation effect between risk messages and information sharing intentions. The results are consistent with those in Studies 1 and 2.

6.3.3. Moderation effect test

A multivariate analysis of covariance (MANCOVA) was employed to examine the moderation effect of emoji. The results confirmed the significant impact of risk message frame and emojis on heuristic and systematic processing, perceived value of information

sharing, and information sharing intentions, respectively. Moreover, the interaction term of risk message frame and emoji had a significant effect on heuristic processing, systematic processing, perceived value of information sharing, and information sharing intentions (Table 4), supporting H4.

Specifically, when emojis appeared in tourism risk communication, participants' responses to the risk amplifying and risk attenuating frames varied greatly (Figure 5). In the presence of emojis, compared with in the risk attenuating frame, participants in the risk amplifying frame adopted higher heuristic and systematic processing of the risk message, and perceived higher sharing value for such a risk message, as well as a higher tendency to share such risk messages. In the absence of emojis, compared with in the risk attenuating frame, participants in the risk amplifying frame scored lower on heuristic and systematic processing of the risk message, perceived value, and sharing intentions. In other words, the presence of emojis strengthened participants' processing, value assessment, and sharing of high-risk messages.

[Insert Table 4 here]

[Insert Figure 5 here]

7. Discussion and conclusion

7.1. Conclusions

This research examines the conceptual process of tourists' transition from "receivers" to "sharers" of risk messages through three studies, with consideration of the role played by

emojis. The main findings are as follows:

First, risk message frame is an antecedent of tourists' information sharing. The results showed that the search and communication volume of high-risk messages in crisis situations was significantly higher among tourists than that of low-risk messages, and the probability of tourists' sharing of risk messages was significantly greater in the risk amplifying frame than that in the risk attenuating frame. This is probably due to the negativity bias, in that negative information such as high-risk messages receives more attention and reaction (Zhang et al., 2021). In addition, previous research has investigated the influence of risk message framing on various aspects of tourists' behavior, such as travel intentions, COVID-19 vaccination, and information-seeking behavior (Gursoy et al., 2022; Liu-Lastres et al., 2019; Xie et al., 2023). It has also investigated the impact of information characteristics, such as information quality and source credibility, on individual information-sharing behaviors (Hur et al., 2017; Luo & Zhai, 2017; Utz et al., 2013). Our research confirmed that the presentation frame of risk messages in crises is the determinant of tourists' information sharing intentions, thus it identified a new antecedent variable of tourist information sharing.

Second, the perceived value of information sharing and heuristic and systematic processing are key factors that support tourists in transitioning from receiving risk messages to sharing them, which significantly promotes tourists' intention to share risk messages. The results showed that risk message framing triggers tourists' heuristic and systematic processing, but its further influence on information sharing is based on the systematic processing of risk messages. Although the mediation effect of heuristic processing was not significant, risk messages affected tourists' information sharing through the sequential

mediation of heuristic processing and perceived value of information sharing. Similarly, risk messages affected information sharing intentions through the sequential mediation of systematic processing and perceived value of information sharing. These findings suggest that tourists' sharing of risk messages during crises is a social exchange process based on a rational balance between costs and benefits (Li & Wang, 2020). Previous studies have shown that tourists' responses to risk are based on information processing and safety assessment, and that information processing and perceived safety mediate the impact of risk communication sources on travel intention (Aliperti & Cruz, 2019; Xie et al., 2023). This is logically consistent with the conclusions of our research. Therefore, tourists' roles change from risk message receivers to risk message sharers and may undergo four stages of "receiving-processing-evaluating- sharing".

Third, emojis significantly moderated the impacts of risk messages on tourists' heuristic processing, systematic processing, perceived value of information sharing, and information sharing intentions. Specifically, in the risk amplifying frame, emoji strengthened tourists' heuristic processing, systematic processing, perceived value, and sharing of risk messages, but in the risk attenuating frame, there is no obvious difference in tourists' responses to the presence or absence of emoji. The valence of the emojis may be a reason. Previous studies have identified that emoji valence plays a role in affecting individual information processing and communication (Huang et al., 2020; Ko et al., 2022). The negative emojis in the risk amplifying frame exacerbated tourists' negative perceptions of high-risk messages (Boutet et al., 2021), due to the negativity bias (Rozin & Royzman, 2001; Zhang et al., 2021). By contrast, the positive emojis in the risk attenuating frame increased tourists' positive

perception of low-risk messages, thus no significance was founded in information processing, communication, and sharing in the risk attenuating frame. This may also explain why after the crisis occurs, online public opinion develops in a negative direction, and the negative information quickly spreads.

Previous research has investigated the role of emojis as an antecedent for individual attitudes and behaviors, such as positive affect, purchase intention, and perceived usefulness (Das et al., 2019; Huang et al., 2020). Furthermore, studies have examined the interaction effect of text and emoji on individual behavioral decision-making (Manganari et al., 2020; Wang et al., 2023). Several factors, such as emoji valence, position, and meaning multiplicity, influence the role of emojis in communication (Boutet et al., 2021; Wu et al., 2022; Hewage et al., 2021; McShane et al., 2021), and it also has negative effects or a "dark side" (Glikson et al., 2018; Huang et al., 2020). Therefore, there is no consensus on the role of emojis in message communication. Unlike previous investigations, this research examined the moderation effect of emojis on tourists' reception, processing, and sharing of risk messages in the context of tourism risk communication. It reveals that the role of emoji varies under different risk message frames, enriching empirical investigation on the use of emojis.

7.2. Theoretical implications

This research contributes to the existing literature on tourism risk communication by examining the process through which tourists transition from passive recipients of risk messages to active communicators of such messages (Luo & Zhai, 2017; Xie et al., 2022). Prior studies have highlighted the role of tourist-driven communication in tourism resilience

and recovery (Sano & Sano, 2019; Zhang et al., 2023). Defleur's information communication model suggests that the roles of information source and host are not unique, as the receiver can also serve as both the host and communicator of information (Zhang et al., 2021), offering a new and significant theoretical perspective for research on tourism risk communication. However, the process by which tourists transition from receiving risk messages to communicating them has not been adequately explored. This study unveils the importance of information processing and perceived value of information sharing as important factors that facilitate the shift from message reception to message sharing. This not only enhances the empirical investigation of tourism-driven risk communication, but also elucidates the mediating mechanisms linking risk messages between recipients and communicators by introducing the heuristic-systematic model and perceived value, thereby expanding our understanding of the interactive mode of risk information communication. Furthermore, this research uncovers the dual-processing mode of tourists when it comes to risk messages, addressing the research gap identified by Zhang et al. (2022) and Xie et al. (2021) regarding tourism risk message reception and processing, and deepening our understanding of the effects of risk message framing and the formation of information sharing intentions.

This research further contributes to the literature by uncovering the moderation effect of emojis on the influence of tourism risk messages, thereby identifying new boundary conditions for the effects of such messages. Previous studies examining tourists' responses to risk messages have primarily focused on their reactions to text-based messages, neglecting the potential impact of visual cues, such as emojis (Kim et al., 2020; Kim et al., 2022;

Savadori et al., 2023; Xie et al., 2023). While the influence of emojis in information exchange and communication has been increasingly recognized, empirical investigations of their role in tourism risk communication have been limited (Huang et al., 2020; Manganari et al., 2020; Wang et al., 2023). Previous research highlights the positive effects of emojis when combined with text, facilitating recipients' information processing, evaluation of usefulness, and sharing decisions (Boutet et al., 2021; Puce, 2013; Song et al., 2019). However, it also reveals the "dark side" of emojis, such as an increased cognitive burden for recipients (Glikson et al., 2018). Despite the growing use of emojis in tourism risk communication practice during crises, their effects on tourists' risk communication have not been theoretically explored. In light of this, this research introduces emojis into the field of tourism risk communication and reveals their differentiated effects in different risk situations, based on the principle of negativity bias in risk communication. This provides new insights and implications for future research in tourism risk communication. Furthermore, this research contributes to the ongoing debate in previous studies regarding the roles of emojis, thus offering significant theoretical implications for destinations to strategically incorporate emojis in their risk communication efforts and encourage tourists to actively share risk messages. By considering the effects of emojis, destinations can enhance their risk communication strategies and facilitate tourists' engagement in responsible risk communication practices.

7.3. Practical implications

Practical implications of this study are as follows: First, destination management organizations (DMOs) should actively guide tourists to transition from passive recipients of

risk messages to responsible sharers. To achieve this, DMOs should develop risk communication agendas that encourage tourists to play an active role in risk communication, thereby facilitating the rapid recovery of the post-crisis tourism market. Specifically, DMOs can combine the portrayal of safety tips, risk response guidelines, and protection instructions when editing and presenting high-risk messages. This approach strengthens health education for tourists and provides them with valuable information to share. Moreover, DMOs should prioritize information quality and authenticity in risk communication, ensuring that the messages they design and communicate are analytically and narratively structured. By focusing on the benefits that the information can bring to recipients and sharers, DMOs can enhance tourists' value perception and facilitate informed sharing decisions. DMOs should also actively monitor tourists' risk communication activities, intervening in rumors and false news circulating on the internet to prevent the spread of misinformation.

Second, DMOs should employ emojis judiciously in risk communication to mitigate the negative development of online public opinion during crises. The study suggests that combining high-risk messages with negative emojis can enhance tourists' processing, perception, and sharing of such messages. However, in the risk attenuating frame, the utility of emojis is less apparent. Therefore, DMOs should consider incorporating negative emojis that align with the text when educating tourists through high-risk messages. This approach enhances tourists' processing fluency, perceived value, and sharing decisions related to these messages, thereby promoting the effectiveness of risk education. Additionally, when dealing with the accumulation and development of negative online public opinion, DMOs can use positive emojis to create a more positive emotional tone when setting the risk communication

agenda. This strategy fosters tourists' perception of kindness and warmth towards the destination. Importantly, DMOs should also focus on strengthening tourists' ability and confidence to handle risks, encouraging responsible risk communication practices. By doing so, they can help avoid negative interpretations of risk messages by the public and mitigate the adverse development of online public opinion.

7.4. Limitations and future research

This study has several limitations that warrant further investigation in future research. First, the study focuses solely on the use of risk amplifying and attenuating frames to examine the impact of risk messages on tourists' information sharing. To enhance our understanding of risk communication, future studies could explore other categories of risk message frames, such as subjective and objective frames, loss and gain frames, and cognitive and emotional frames (Gursoy et al., 2022). This would provide a more comprehensive analysis of the effects of different message frames on tourists' information sharing behavior. Second, it is important to acknowledge that there are inconsistencies in the backgrounds of Study 1 compared to Studies 2 and 3, which may raise concerns regarding the robustness, reliability, and generalizability of the study's conclusions. To improve the validity of the research findings, future studies should aim for more consistent backgrounds across multiple studies and conduct additional validation to confirm the conceptual model. Furthermore, this research only examines the moderation effect of emojis and specifically places congruent emojis at the end of sentences. However, research suggests that the placement of emojis before or within sentences can also influence message interpretation and emotional responses (McShane et al., 2021). Therefore, future research could investigate the positional effect of

emojis in tourism risk message communication, shedding light on the nuances of how emojis are perceived and their impact on tourists' information processing and sharing intentions. Lastly, while this study focuses on the moderation effect of emojis, there are other potential moderators that could influence tourists' responses to risk messages. For instance, the role of opinion leaders, the public opinion climate, and the presence of negative disturbance information could play important roles in shaping tourists' information sharing behaviors. Future research should explore these potential moderators to provide a more comprehensive understanding of the factors influencing tourists' engagement in risk communication.

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Table 1.

Descriptive statistics

Variables	Items	Study 2 (N=225)				Study 3 (N=1026)			
		Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
Heuristic processing	HP01	5.164	1.067	0.001	-0.692	5.308	1.365	-0.658	0.287
	HP02	4.960	1.058	0.012	0.025	5.136	1.394	-0.632	0.366
Systematic processing	SP01	5.227	1.012	-0.233	0.274	5.477	1.229	-0.825	1.070
	SP02	5.333	1.082	-0.290	-0.098	5.590	1.266	-0.993	1.123
Perceived value of information sharing	PV01	4.809	1.011	-0.263	1.111	5.192	1.315	-0.587	0.550
	PV02	4.742	1.075	-0.079	1.003	5.033	1.393	-0.543	0.308
	PV03	4.716	1.085	-0.048	0.824	5.083	1.347	-0.449	0.246
	PV04	4.831	1.060	0.002	1.188	5.175	1.296	-0.579	0.644
Information sharing intentions	ISI01	4.622	1.063	0.127	0.567	4.846	1.422	-0.511	0.309
	ISI02	4.662	1.074	0.227	0.506	4.870	1.433	-0.518	0.269
	ISI03	4.747	1.062	0.183	0.386	5.076	1.387	-0.593	0.409

Table 2.

Confirmatory factor analysis results

Variables	Items	Study 2 (N=225)				Study 3 (N=1026)			
		Factor loadings	t value	AVE	CR	Factor loadings	t value	AVE	CR
Heuristic processing	HP01	0.728	7.900	0.552	0.712	0.684	14.669	0.459	0.629
	HP02	0.758	-			0.671	-		
Systematic processing	SP01	0.784	9.311	0.612	0.760	0.833	18.364	0.619	0.764
	SP02	0.781	-			0.737	-		
Perceived value of information sharing	PV01	0.747	13.025	0.639	0.876	0.792	27.416	0.641	0.877
	PV02	0.805	14.568			0.808	28.114		
	PV03	0.768	13.567			0.800	27.765		
	PV04	0.871	-			0.802	-		
Information sharing intentions	ISI01	0.851	11.563	0.672	0.859	0.857	22.315	0.635	0.837
	ISI02	0.896	11.927			0.859	22.338		
	ISI03	0.700	-			0.657	-		

Table 3.

Participant profiles

Category		n	%	Category		n	%
Gender	Male	453	44.2	Marital status	Married	474	46.2
	Female	573	55.8		Unmarried	552	53.8
Age	Below 18 years	49	4.8	Occupation	Corporate staff	178	17.3
	18-25 years	447	43.6		Public servant	74	7.2
	26-35 years	197	19.2		Teacher and researcher	98	9.6
	36-45 years	219	21.3		Self-employed	78	7.6
	Above 46 years	114	11.1		Student	360	35.1
Education	Junior high school or below	65	6.3		Professional and technical	59	5.8
	Senior high school	98	9.6		Freelance	64	6.2
	Junior college	126	12.3		Retired	9	0.9
	Bachelor's degree	652	63.5		Soldier	6	0.6
	Master's degree or above	85	8.3		Other	100	9.7
Monthly income (CNY)	≤ 2,500	425	41.4	Travel frequency in the past 12 months	0	382	37.2
	2,501-5,000	207	20.2		1	249	24.3
	5,001-10,000	272	26.5		2-3	307	29.9
	10,001-20,000	85	8.3		4-5	57	5.6
	≥ 20,001	37	3.6		6 and above	31	3.0

Table 4.

The moderation effect of emoji

Variables	Heuristic processing		Systematic processing		Perceived value of information sharing		information sharing intentions	
	F value		F value		F value		F value	
Covariates								
Gender	2.369	1.901	9.924**	8.822	5.066*	4.352	9.362**	6.783
Marital	12.083**	9.693	1.933	1.719	2.489	2.138	2.421	1.754
Age	0.473	0.38	6.565*	5.836	3.26	2.8	0.13	0.094
Education	0.431	0.346	28.167***	25.039	0.94	0.808	0.032	0.023
Occupation	0.121	0.097	0.613	0.545	0.74	0.635	0.021	0.015
Monthly income	0.028	0.022	0.444	0.394	0.473	0.406	0	0
Travel frequency	28.938***	23.215	4.933*	4.386	24.782***	21.288	23.022***	16.68
Direct effect								
Risk message frame	57.389***	46.04	71.944***	63.954	62.872***	54.008	49.995***	36.224
emoji	11.865**	9.519	9.019**	8.018	15.649***	13.442	11.201**	8.116
Moderation effect								
Risk message frame * emoji	6.603*	5.297	5.487*	4.878	15.314***	13.155	9.485**	6.872

Note: ***p<0.001; **p<0.01; *p<0.05.

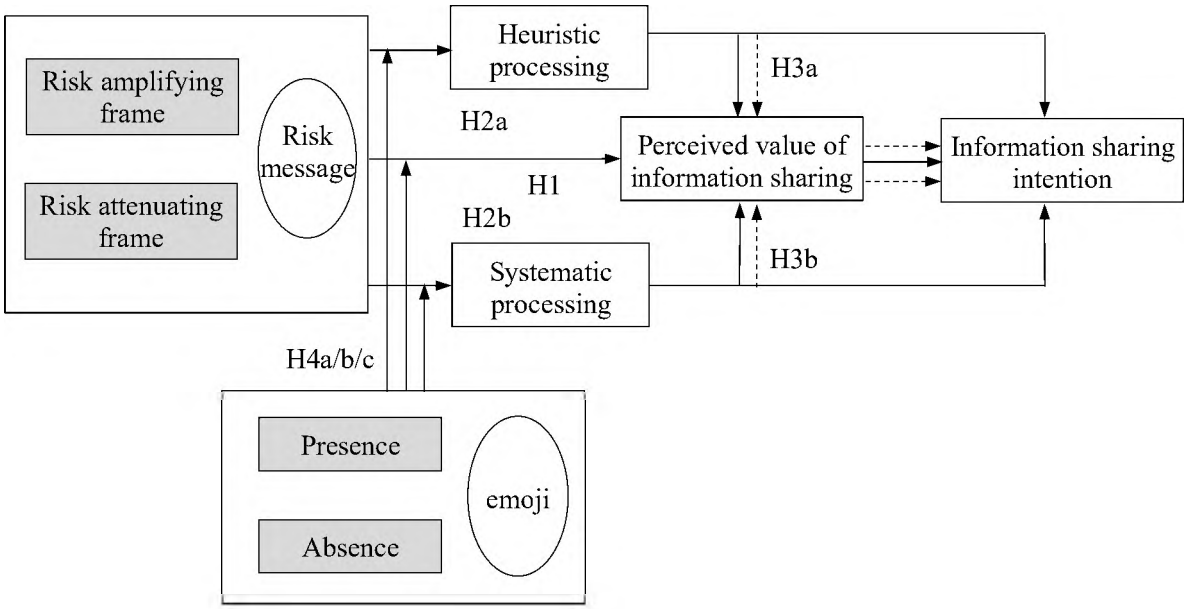


Figure 1. Conceptual model

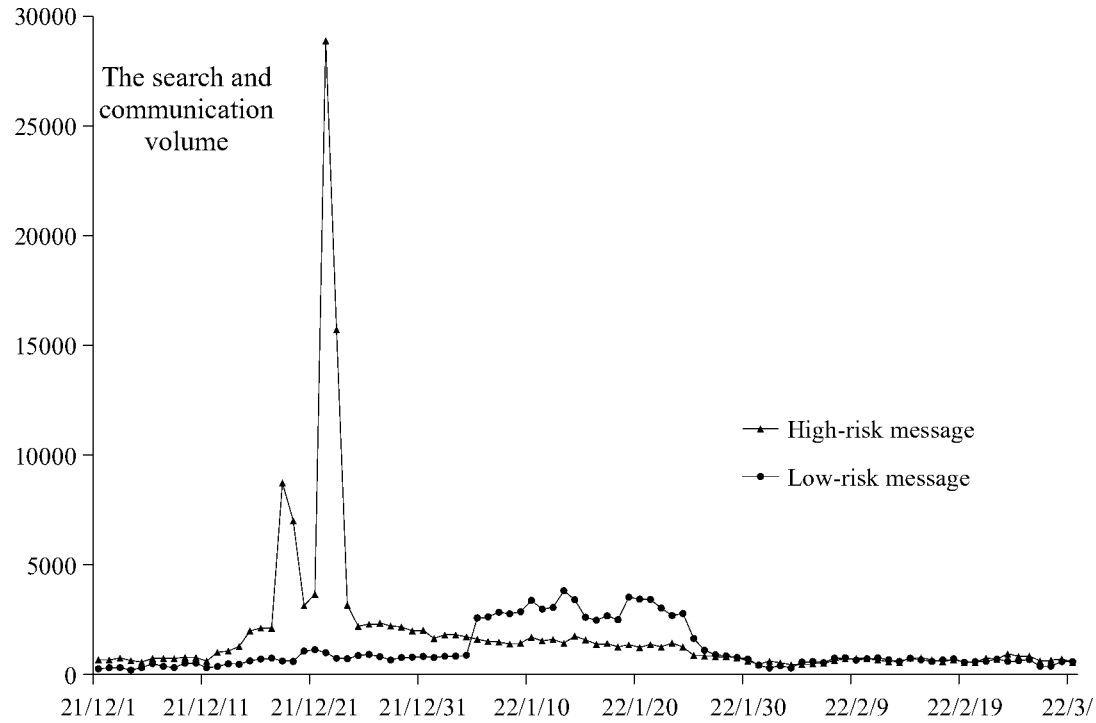


Figure 2. The search and communication volume of pandemic risk message during Xi'an outbreak

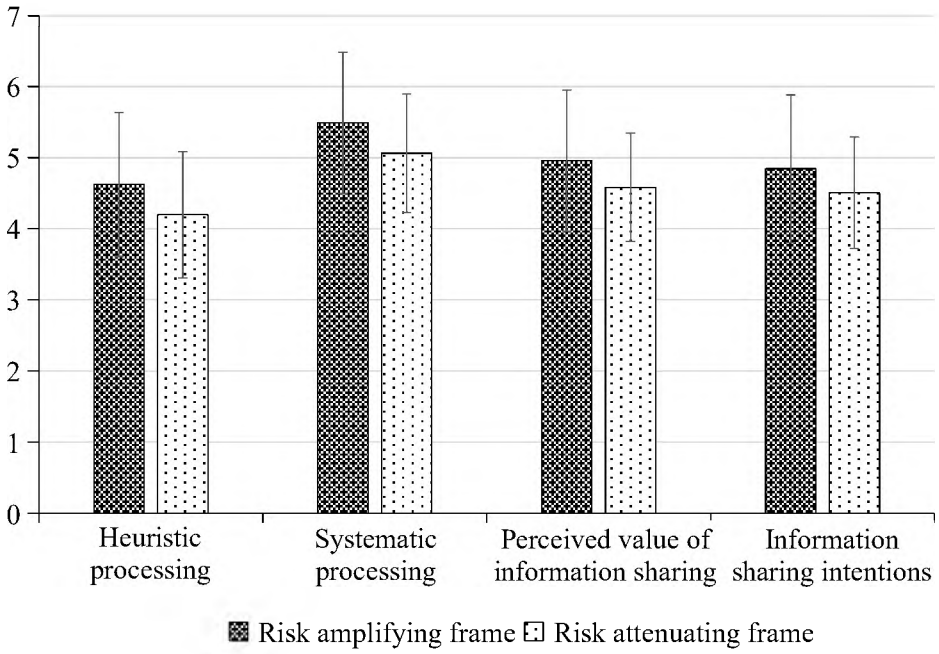
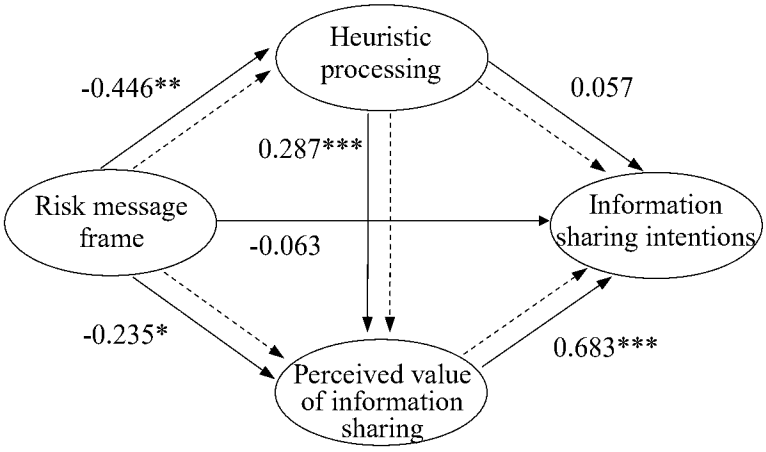


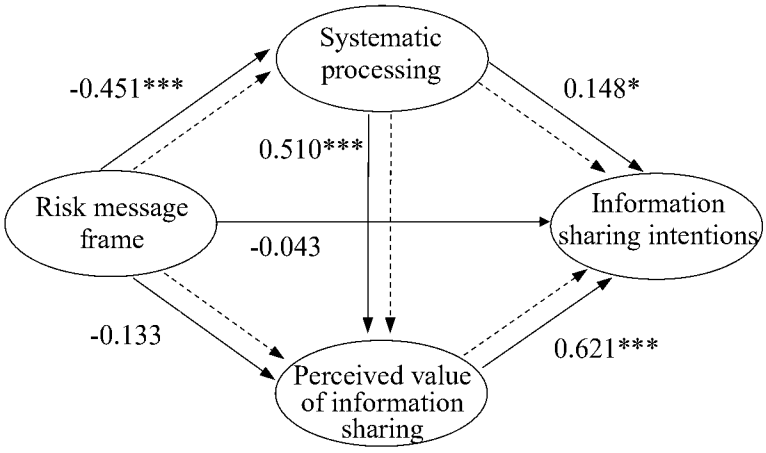
Figure 3. Independent sample T-test of Experiment 1



Ind 1: RMF→HE→ISI: -0.025; CI: -0.099, 0.037

Ind 2: RMF→HE→PV→ISI: -0.087; CI: -0.175, -0.029

Figure 4-1. The mediation effect of heuristic processing and perceived value of information sharing



Ind 1: RMF→SY→ISI: -0.067; CI: -0.143, -0.014

Ind 2: RMF→SY→PIV→ISI: -0.143; CI: -0.247, -0.061

Figure 4-2. The mediation effect of systematic processing and perceived value of information sharing

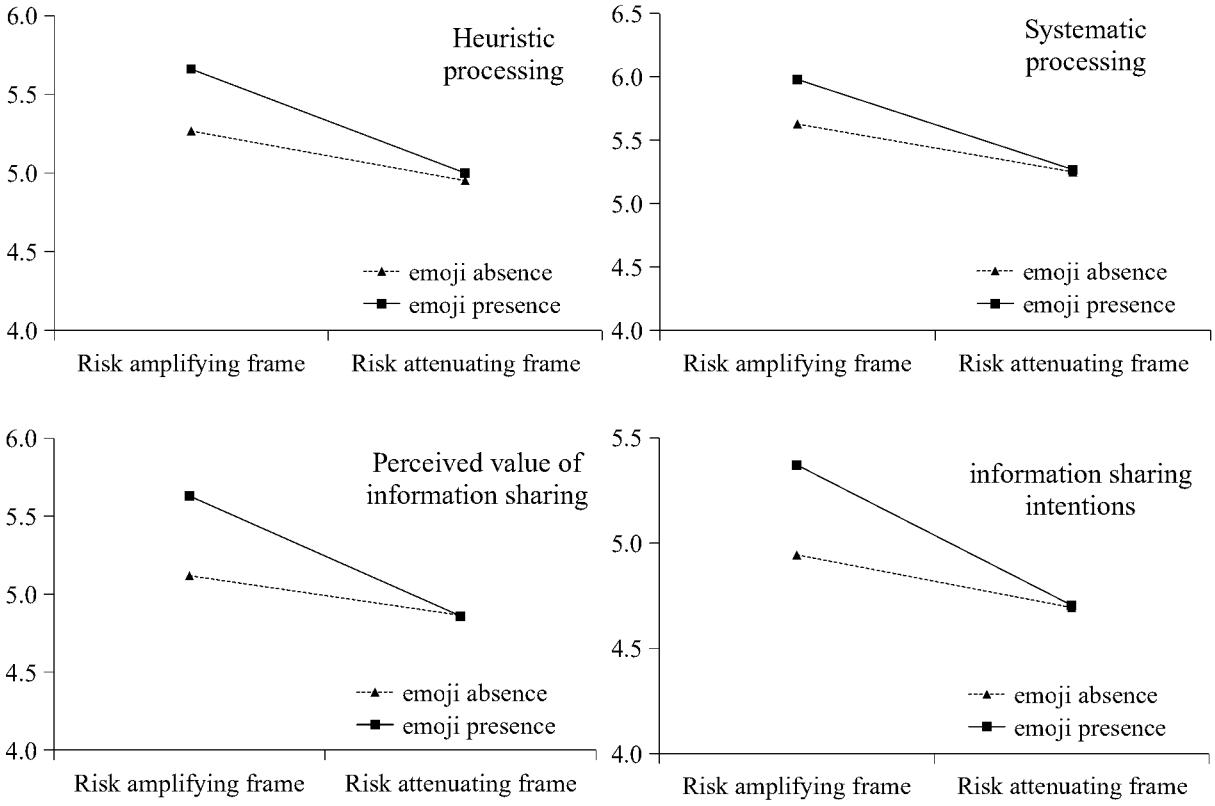


Figure 5. The moderation effect of emoji