Concept and evidence of tourist risk gaze

Abstract: Gaze describes the experiential way that tourists perceive destinations during trips. Destination-related risks are inevitable in tourism; however, little attention has been given to the tourist gaze based on travel risk. Our research addresses this disparity by proposing and exploring the concept of tourist risk gaze. In Study 1, findings suggest that this type of gaze involves three interrelated aspects: risk information gaze, risky attraction gaze, and risky behavior gaze. In Study 2, we invited 50 Chinese university students to participate in an eye-tracking experiment to test tourist risk gaze. Participants displayed distinct visual attention patterns towards these three aspects when tourists encountered them during trips. This research offers a new lens through which to consider the tourist gaze and risk perception. It also introduces a novel eye-tracking method to analyze travel risk and the tourist gaze.

Keywords: tourist risk gaze, risk information, risky attraction, risky behavior, content analysis, eye-tracking experiment

Introduction

The concept of the "tourist gaze" has been thoroughly addressed in tourism studies. Urry (1990) coined the term based on Foucault's (1976) notion of the medical gaze. The tourist gaze is a social construct concerning how tourists find, see, and interpret information (Britton, 1992). Tourists' observations and activities, along with available services, facilities, and attractions, arise outside daily life and routine behavior. Therefore, identifying what tourists gaze at—and how they do so—requires one to ponder tourism and the "normal society" in a destination (Britton, 1992). The tourist gaze is a multifaceted notion shaped by social and cultural factors. It encompasses the richness of a tourist's experience and reactions (Yick et al., 2020; Yu & Xu, 2018). The act of gazing is a culturally constructed practice that involves visual spectacle, cognitive discernment, and emotional responses. The tourist gaze is inherently subjective, as it is informed by one's personal encounters and background (Reisinger et al., 2013). Tourists often perceive risks while traveling. Urry and Larsen (2011) discussed several threats (e.g., positive competition, oil issues, and climate change) affecting tourism. The authors suggested that these dangers stem from proliferation of the tourist gaze and accompanying "compulsions to consume" (Urry & Larsen, 2011, p. 218).

An important facet to consider is how the tourist gaze is tied to risk. For instance, adventure tourism is rooted in the excitement derived from perceived risk and apparent danger (Cater, 2006). The allure of the unknown, combined with one's willingness to accept a certain degree of risk, yields an experience that is both thrilling and gratifying. One's propensity to face threats gives rise to the "risk gaze," a form of visual consumption that concentrates on the perceived danger associated with a particular activity. However, risks are not solely prevalent in adventure tourism. Travel-related risks can emanate from diverse sources, such as terrorism, public health crises, natural disasters, food, and inappropriate tourist behavior (Agarwal et al., 2021; Larsen et al., 2011; Shin & Kang, 2020; Wang et al., 2019). Some level of risk applies to nearly every tourism experience (Elsrud, 2001; Holm et al.,

2017; Reichel et al., 2007; Wang & Ritchie, 2012). Establishing a link between the tourist gaze and tourism risk is essential for destination management. It is similarly necessary to determine how tourists gaze at travel-related risks.

Two noteworthy voids exist in the literature about the tourist gaze and tourism risk. First, no work appears to have assessed tourists' visual attention to things or people related to risks during trips. Scholars may therefore struggle to determine how to search for and process tourist risk information (Cahyanto & Pennington-Gray, 2015). This topic is pivotal: most safety incidents occur because tourists are unaware of potential threats and tend to ignore warnings or safety instructions. Researchers must pinpoint effective strategies to encourage tourists to engage in self-protective behavior (Wang et al., 2019). Our research examines tourists' visual attention to risks during travel to provide solutions. Second, although authors have considered tourists' risk perceptions (Aliperti & Cruz, 2019; Cater, 2006; Saunders et al., 2019; Seabra et al., 2013; Yin & Poon, 2014), none have directly connected the tourist gaze and tourism risk. Gaze based on visual attention is a key part of visual perception (Hollinshead, 1999; Urry, 1992). Meanwhile, tourism risk based on the tourist gaze has not been scrutinized.

To address these knowledge gaps, we propose the idea of "tourist risk gaze." The aforementioned studies evaluated the visual consumption of socially mediated risk gaze and visual attention to tourism risks. Our research is one of the earliest attempts in tourism to describe the relationship between the tourist gaze and tourism risk. We initially put forth the idea of "tourist risk gaze" based on content analysis. A quantitative method, eye tracking, was subsequently used to verify this phenomenon. Our findings contribute to theory by expanding the connotations and dimensions of the tourist gaze to discourage tourist-related accidents.

Literature review

Gaze and tourist gaze

Urry (1990) reconceptualized gaze from a tourist's perspective. He argued that tourists' observations of locals in a destination are akin to viewing a lunatic in prison or to a physician examining a patient. Put simply, tourists may judge or develop a sense of superiority from watching residents. Urry (1990) defined the tourist gaze not as an objective view of a destination but as a highly subjective, socially constructed travel experience. Numerous social relationships and patterns of looking and learning influence this gaze (Urry & Larsen, 2011). The fundamental features of gaze play crucial roles in tourism (Urry, 1990). Power dynamics between tourists and hosts, and the relationship between the self and "others," can constrain and regulate locals' behavior (Huang et al., 2017; Maoz, 2006).

Gaze is often associated with tourists but is not exclusive to them (Wassler & Kirillova, 2019). Maoz (2006) introduced the concept of the mutual gaze to emphasize that gazes are interdependent; that is, attention from residents can affect visitors' actions. Scholars have expanded the scope of the tourist gaze to show that this interdependency relates to the power dynamics and mutual influence

among hosts, guests, and other tourists (Samarathunga & Cheng, 2021). Samarathunga et al. (2020) underscored the context-specificity of the tourist gaze, highlighting the sociocultural, political, and economic factors that shape it. Yet the thin literature on the tourist gaze in non-Western regions, such as Asia and Africa (Stone & Nyaupane, 2019), reinforces the need for further investigation.

Building upon Urry's concept of the tourist gaze, we frame it as a primarily visual process that underlies observation, learning, and exploration in a destination. These phenomena jointly produce tourism experiences. Furthermore, the tourist gaze is a form of visual consumption that occurs during travel; it is reflected in a destination's services, facilities, and attractions, all of which deviate from everyday life. Finally, the tourist gaze implies that tourists yield some power over hosts and fellow tourists while traveling. The tourist gaze generally consists of the visual processes of viewing, consuming, and influencing (Figure 1).

[Insert figure 1 here]

Tourists' risk perceptions through gaze

Risks are not restricted to usual family and work environments; threats also extend to travel (Ritchie & Jiang, 2019). Tourists' risk perceptions greatly inform destination selection and tourists' behavior (Reichel et al., 2007). As such, some researchers in this field focus on risk perception, particularly regarding large-scale crises (e.g., earthquakes, tsunamis, disease epidemics) (Ritchie & Jiang, 2019). Less is known about smaller-scale risks attributable to tourists themselves (e.g., falls, animal attacks). The causes of perceived accidents are typically ascribed to tourists—especially to visitors who neglect warnings, display overconfidence, exaggerate their skills, or engage in showboating and reckless behavior (Bentley et al., 2000).

Risk perception, also referred to as risk intuition judgment, is shaped by a range of factors (Slovic, 1987). This perception is subject to impact bias, wherein tourists tend to overestimate future threats and underestimate the danger of current activities such as visiting attractions (Kermer et al., 2006). Tourists' risk perceptions emerge from multiple sources: (a) news media reports (Kapuściński & Richards, 2016); (b) data provided by government agencies, academic experts, tourism suppliers, and destination residents (Aliperti et al., 2020; Liu-Lastres & Cahyanto, 2021); (c) information that tourists actively seek out (Aliperti & Cruz, 2019; Jeuring & Becken, 2013); and (d) tourists' risk expectations before traveling and their retrospective risk evaluations after trips (Wolff et al., 2019).

Visual perception refers to the process of interpreting one's surroundings via sight. This task is central to risk perception (Prentice, 1958; Weintraub, 1975): perceived gaze is paramount to social interaction, which guides and explains behavior (Frischen et al., 2007). Thus, gaze theory can elucidate tourists' risk taking.

Drawing on the idea of the tourist gaze, tourists' risk gaze encompasses their views of a destination's material elements, services, and any actions seen as threatening. Tourism companies (or destinations themselves) normally publish risk warnings. These recommendations, which are traditionally portrayed through text or images on signs or in safety manuals, urge tourists to exercise

care during trips to ensure personal safety. Encountering this type of content can partly safeguard tourists' gaze experiences in destinations. The related concept of a risk landscape refers to any type of landscape that may threaten tourists' safety when they visually process destination scenery. Examples include wild animals (Pagel et al., 2021), surging tides (Wang et al., 2019), and canyons or cliffs. While these natural features inherently involve danger, tourists—particularly professional adventurists—often disregard threats and approach them in person to obtain a better view or capture images for social media. Such behavior increases the likelihood of accidents (Weiler et al., 2021). The adage "When you watch the scenery from the bridge, the sightseer watches you from the balcony" implies that tourists' risk landscape gaze is also subject to the gaze of other tourists (i.e., an intertourist gaze) (Holloway et al., 2011). Rich experiences and emotions can coincide with observing risky behavior.

Summary of literature review

The preceding literature review on the tourist gaze, tourism risk, and risk perception indicates the significance of tourist risk gaze. Further research is required to determine how the tourist gaze is tied to threatening elements during travel, as this relationship remains overlooked. The tourist gaze is important because it involves observing and learning about a destination. This gaze is also based on consumption outside one's routine social environment amid the rights and persuasion of other tourists. Although these aspects are intertwined with risk during travel, they lack clarity with respect to the tourist gaze. Combining gaze and risk will delineate tourists' risk perceptions. In addition, exactly how tourists perceive risk should be assessed in terms of visual attention. The tourism risk perception literature has evaluated tourists' recall of past risks and anticipated future risks. It has also concentrated on external information communicators (e.g., news, expert agencies, tour providers, and hosts) while neglecting tourists' risk judgments from visual attention during trips. In other words, current methods insufficiently explain tourism risk perception. Fresh perspectives and technologies should be adopted to specify how tourists view threats.

We therefore present the idea of "tourist risk gaze" and scrutinize its elements to better understand how tourists perceive risk. In brief, we qualitatively analyzed the aspects of tourist risk gaze and constructed a new concept. Eye-tracking techniques were used to measure tourists' visual attention to risk, providing physiological evidence for the developed concepts and elements of tourist risk gaze.

Study 1: Social media content analysis

Data collection

Study 1 featured a qualitative approach under the constructivist paradigm to characterize tourists' risk perceptions by processing video reviews on Douyin (known as TikTok internationally) via content analysis. We obtained social media–generated content to identify important information without authorial interference. In doing so, we could solicit participants' spontaneous, honest

responses (Dybsand, 2020).

Tidal bore watching is a popular adventure tourism activity that attracts millions of visitors to China's Qiantang River annually. However, it is high-risk; people have even died while participating (Wang et al., 2019). Short-form videos about tidal bore watching on Douyin have amassed millions of likes and many user reviews. For example, a prominent Douyin blogger called "Qiangtang Style" boasts 1.832 million followers and has shared 586 short-form videos featuring the Qiantang River tide. These videos had garnered over 22,841 million likes and more than 100,000 user reviews as of September 23, 2022. The videos offered a rich dataset for analysis, enabling us to explore the yearly Qiantang River Tidal Bore Watching Festivals held in August. In September 2022, we used Python programming to automatically collect tourists' reviews from "Qiantang Style's" tidal bore videos. After excluding duplicate and fake reviews, 8,973 reviews were obtained, including posters' usernames, text content, and posting time. We anonymized all personal information to protect individuals' privacy.

Data analysis

We processed the reviews using content analysis (see Joffe & Yardley, 2004). User comments on TikTok are typically brief (i.e., one or two sentences). We assessed individuals' responses manually (vs. with software) so as not to overlook important content or themes (Dybsand, 2020). Comments were analyzed in two phases. First, we simplified risk-related opinions about tourists' encounters during tidal bore watching into core elements (e.g., "warning," "danger," "attention," "prohibition," "safety"). Second, content analysis and open coding were conducted to ascertain recurring content and themes (see Table 1).

[Insert table 1 here]

Results of Study 1

Study 1 revealed that tourists displayed a complex risk gaze during tidal bore watching activities, covering various risk-based elements (e.g., threat-related information, risky attractions, and risky behavior; see Figure 2). The risk gaze comprised (a) reading risk warnings provided during travel; (b) observing dangerous destination attractions that varied from "normal" society; and (c) tourists' visual power over others when watching fellow tourists' risky behavior.

[Insert figure 2 here]

Risk information gaze

Risk warning information is prevalent at tourist attractions that pose threats. We coined the term "risk information gaze" to describe tourists' observations of this information. Despite the widespread availability of warnings, many visitors possess insufficient awareness of threats and warning systems (see Aliperti & Cruz, 2019). Disregarding safety instructions is a contributing factor to negative tourism outcomes (Gstaettner et al., 2018). In a typical review, one tourist asked, "*Why is there a*

warning there, but they still go under the dam? So dangerous" (August 15, 2022).

We also noticed that some tourists with heightened risk awareness contemplated whether a destination adequately warned visitors about hazardous attractions. For instance, tourists mused, "*Why not write 'no swimming'?*" (August 28, 2022) and "*To enhance safety, guardrails should be installed along the riverside, and warning signs prohibiting visitors from approaching should be prominently displayed.*" (August 28, 2022). The "tourist risk information gaze" relates to tourists' visual attention to warnings as well as safety information and facilities. The gaze element refers to tourists' observations and investigation of potential destination risks, including the equipment that ensures personal safety.

Risky attraction gaze

Risky attractions threaten tourists' safety, such as when viewing wildlife (Pagel et al., 2021), tidal bores (Wang et al., 2019), and *Kjeragbolten* (a dangerous boulder and a famous attraction in Stavanger, Norway). Tourists' visual consumption of risky attractions is deemed "risky attraction gazing" in this research. This behavior is twofold: the viewer appreciates natural attractions while also putting themselves at risk. Two tourists remarked, "*Too spectacular and dangerous*" (August 2, 2022) and "*Too beautiful and dangerous*" (April 23, 2022). The tourist gaze refers to the fundamental visual nature of the tourist experience and implies that visual consumption influences tourists' activities (i.e., to create a destination worth visiting) (Urry, 1992; Zheng et al., 2021). The reviews indicated that tourists who engage in risky behavior while observing natural attractions experience conflicting emotions: they appreciate the wonder of scenery but acknowledge the dangers, as shown by descriptions of attractions being "spectacular," "beautiful," and simultaneously "dangerous." These adjectives suggest that tourists recognize the risks involved but are still drawn to these places. This dichotomy highlights the complexity of emotions and the interplay between one's desire for adventure and innate need for self-preservation.

The tourist gaze on risky attractions reveals people's visual consumption of tidal bore activities, which provide adventurous experiences. Many visitors are eager to capture stunning images that will impress their social media followers. This motivation can compel people to ignore the potential hazards of visiting natural attractions and thus neglect safety warnings. Some reviewers were "*Not afraid to die taking pictures?*" (September 13, 2022) and questioned whether "*A small number of likes on WeChat Moments [are] really so significant?*" (July 22, 2022). Overlooking the dangers associated with tide watching can heighten the probability of visitor accidents (Weiler et al., 2021).

Risky behavior gazing

Other tourists observe visitors gazing at risky attractions. This mutual attention is termed the intertourist (Holloway et al., 2011). We refer to the act of tourists viewing other tourists' risky attraction gazing as "risky behavior gazing." Maoz (2006) argued that gazing is not exclusive to tourists; hosts watch tourists while tourists watch locals. Given this idea, Holloway et al. (2011)

introduced the "intertourist gaze" to describe the phenomenon of tourists gazing at fellow tourists.

In tide-watching tourism, other tourists can observe participants on-site and virtually (e.g., via social media). Several tourists shared comments such as, "*Outsiders come to see the tide, [while] locals come to see outsiders who are seeing the tide*" (September 11, 2022), "*What is that person doing?*" (September 13, 2022), and "*I think those people taking photos are putting themselves in danger*" (September 13, 2022).

Similar to other concepts related to the tourist gaze (Chen & Xu, 2021; Samarathunga et al., 2020; Wight, 2020), we found that tourists gazing at others' risky behavior generated a variety of emotions. This type of gaze involves nuanced reactions such as disapproval, anger, and concern while observing risky behavior. Disapproval is commonly associated with this type of gaze. Many reviews reflected this sentiment, illustrating how tourists' lack of awareness about safety (and their own carelessness) could put them at risk. One reviewer said, "*People who take pictures are arrogant and have no respect for nature*" (August 19, 2022). Another claimed that "*These people are not mindful of their safety*" (July 21, 2022). Poor safety awareness and negligence can create risky situations for tourists, especially in the age of social media when travel photos and videos are shared widely (Bentley et al., 2000; Pagel et al., 2021; Weiler et al., 2021).

Anger also accompanies this type of gaze. Some tourists in our sample believed that people who watched the tide up close were "asking for trouble." Individuals sometimes used harsh language to express their anger, such as "*Can these people please stay away? Will there be fewer deaths then*?" (September 15, 2022). These intense reactions may emerge from a desire to protect others and prevent unnecessary risk taking, implying an intricate interplay of emotions.

Concern for others' safety is prevalent in tourists' risky behavior gaze. Many reviews revealed gazers' worry, urging others to abandon potentially dangerous situations to prevent harm: "*Stay away, I'm worried about your safety*" (September 11, 2022); "*Standing so close! It really makes people worry about the safety of close watchers*" (September 10, 2022).

These results show that tourists do not passively observe risky behavior. Rather, they experience multiple emotions such as disapproval, anger, and concern. These responses can influence how the observer and the observed behave, potentially shifting one's actions or attitudes towards risk. Our findings are consistent with Wang et al. (2019), who discovered that most tide-watching tourists did not realize the risks and did not partake in on-site self-protection. Visually observing others' risky behavior produces "tourists' risky behavior gaze" through which observers react to people's risk taking.

Overall, this study defined tourist risk gaze according to three components: risk information, risky attractions, and risky behavior gazing. Hollinshead (1999) asserted that the tourist gaze is one mode of 'institutional seeing' in tourism, which is primarily visual. In a similar vein, Urry (1992) claimed that the tourist gaze points to the visual nature of the tourist experience. Thus, in Study 2, we used physiological data from eye movements to quantify tourists' risk gaze by considering how eye

movements convey visual attention (Scott et al., 2019). This quantitative approach represents a pioneering method in evaluating the tourist gaze. By conducting eye-tracking experiments and analyzing eye movement indicators, we examined the potential existence of risk gaze during travel. The following hypotheses were tested (see Figure 3):

H_1: Tourists exhibit greater visual attention to areas of tourists' photos that depict potential risks (vs. non-risky areas); that is, tourists pay closer visual attention to risk-related information.

H_2: Tourists exhibit greater visual attention to photographs depicting risky attractions (vs. non-risky attractions); that is, tourists pay closer visual attention to high-risk attractions.

H_3: Tourists exhibit greater visual attention to areas of tourists' photos that depict risky behavior (vs. non-risky areas); that is, tourists pay closer visual attention to other tourists displaying high-risk behavior.

[Insert figure 3 here]

Study 2: Eye-tracking experiment

Eye-tracking technology is gradually being applied in tourism studies to evaluate visual attention (Scott et al., 2019). It has been used to examine tourism photos (Li et al., 2016; Wang & Sparks, 2016), destination advertisements (Lourenção et al., 2020; Zhao et al., 2021), tourism brands, and menu-labeling formats (Barcelos et al., 2019; Kim et al., 2018). Eye movements are closely related to visual attention; therefore, eye-tracking devices are suitable for measuring such attention (Scott et al., 2019). This experiment evaluated tourists' gaze towards risk during travel, hence our use of eye-tracking technology. Frequent indicators in eye-tracking research are total fixation duration and fixation count, which reflect subjects' focal points and key information (Barcelos et al., 2019; Kim et al., 2018; Scott et al., 2019; Wang & Sparks, 2016; Zhao et al., 2021). We chose these metrics to monitor participants' visual attention to risky attractions and behavior. Additionally, to account for small areas of interest in photos, we used the fixation count and average fixation duration to measure participants' visual attention to risk-related information.

Experimental design

Preparation of photo materials

In line with previous eye-tracking studies (Li et al., 2016), we chose eight travel photos for this experiment from Ctrip.com, China's main online travel booking platform. Criteria included photo clarity and size (see Figure 4). All photos were in PNG format, measured 1024×768 pixels, and spanned three types: 1) travel photos with risk warning information (two photos); 2) tourists' photos of risky and non-risky attractions (four photos); and 3) tourists' photos of risky and non-risky behavior (two photos).

[Insert figure 4 here]

We pre-tested the photo materials using a questionnaire in which we verified risk-related

information with a single item: "Does the travel photo contain any clear risk warning information?" We measured risky attractions and behavior via a survey containing items scored on a 7-point Likert scale. These items were based on Wolff et al.'s (2019) and Ritchie and Jiang's (2019) definitions of risk perception. The survey assessed potential risk probability (impossible/possible), the severity of consequences (not serious/serious), and the level of danger (not dangerous/dangerous) in travel photos (see Appendix A for details).

Among the responses collected, 77 were deemed useful (46 women, $M_{age} = 24$). All respondents identified clear risk warning information in photos A1 and A2. As for the risk score evaluations for attraction photos, the high-risk group received significantly higher scores than the low-risk group ($M_{high\ risk} = 5.496$, $M_{low\ risk} = 4.067$; $t = 11.692$, $p = 0.000$). The degree of risk in photo C1 was significantly higher than in photo C3 ($M_{C1} = 6.186$, $M_{C3} = 4.238$; $t = 11.781$, $p = 0.000$) and photo C4 ($M_{C1} = 6.186$, $M_{C3} = 3.896$; $t = 11.483$, $p = 0.000$). Relatedly, the degree of risk in photo C2 was significantly higher than in photo C3 ($M_{C2} = 4.805$, $M_{C3} = 4.238$; $t = 2.478$, $p = 0.015$) and photo C4 ($M_{C2} = 4.805$, $M_{C4} = 3.896$; $t = 5.392$, $p = 0.004$). As for the risk scores of risky behavior photos, the behavior of Tourist #1 in photo B1 was deemed significantly more dangerous than that of Tourist #2 ($M_{Tourist\ \#1} = 6.074$, $M_{Tourist\ \#2} = 3.970$; $t = 12.976$, $p = 0.000$). The risk level of Tourist #1's behavior in photo B2 was significantly higher than that of Tourist #2 ($M_{Tourist\ \#1} = 5.532$, $M_{Tourist\ \#2} = 2.913$; $t = 13.050$, $p = 0.000$).

Based on these pre-test results, we chose photos A1 and A2 as examples of risk information, photos C1 and C2 as high-risk attractions, and photos C3 and C4 as low-risk attractions. Tourist #1 in photo B1 and photo B2 displayed high-risk behaviors, whereas Tourist #2 demonstrated low-risk behaviors (see Appendix A).

Participants

Volunteers for this experiment were recruited through convenience sampling on university campuses. This technique is common in tourism studies using eye-tracking technology (Barcelos et al., 2019; Kim et al., 2018; Li et al., 2016; Lourenção et al., 2020; Zhao et al., 2021). Such an approach helps to minimize errors in the results that may arise from individual differences (Barcelos et al., 2019). Eligibility criteria included being at least 18 years old, having normal or corrected-to-normal vision, and having travel experience. Of the 50 volunteers, we chose 23 men between ages 19 and 33 to participate. This relatively small sample was justified because many eye-tracking studies in psychophysical or physiological disciplines have small samples (Goldberg & Wichansky, 2002). Earlier eye-tracking studies in tourism included samples ranging from 12 to 63 participants (Scott et al., 2019). We calculated the target sample size in G*Power software (Erdfelder et al., 1996). Results showed that at least 27 participants would be needed to ensure an effect size of 0.5 and a significance level of 0.05, assuming sufficient test power ($1\text{-}\beta > 0.8$).

Experimental procedure

Apparatus. The eye-tracking experiment took place in a closed laboratory to eliminate external sound, light, and other disturbances that could affect participants' experiences (Scott et al., 2019). The chosen eye-tracking tool was the Eyeso Ec80 remote sensing system, which had a sampling frequency of 30–150 Hz. The Eyeso Studio experimental design and data analysis program were used to monitor this experiment and simultaneously record and analyze data. During the experiment, photo materials were displayed on a laptop with a 14-inch screen and a resolution of 1366×768 pixels.

Procedure. The experiment began with the researchers providing instructions to participants, who were asked to remain in a fixed sitting position while the eye-tracking system was calibrated. Participants viewed photos on the laptop with viewing times adjusted based on individual needs. To balance the sequential effects of photos and prevent fatigue, the researchers inserted a 1-second fixation cross before each photo along with nine distraction photos. The experiment ended once all photos were viewed. Developing new concepts requires researchers to compare qualitative and quantitative results. This cross-validation enhances findings' reliability (Molina-Azorín & Font, 2016; Xin et al., 2013; Zhou et al., 2018). Therefore, we held semi-structured interviews to gather qualitative data on participants' attention to risk information, awareness of risky attractions, and risky behavior. These data shed light on participants' personal experiences and emotions during risk gazing.

Manipulation check

We included a manipulation check to verify two risk factors that differed across risky attractions and risky behavior. Participants' risk perception scores were obtained for both photo types. The high-risk group demonstrated significantly higher scores on photos portraying risky attractions compared with the low-risk group ($M_{\text{high risk}} = 5.686$, $M_{\text{low risk}} = 4.238$; $t = 7.302$, $p = 0.000 < 0.01$). The risk level of photo C1 was significantly higher than that of photo C3 ($M_{C1} = 6.210$, $M_{C3} = 4.086$; $t = 9.173$, $p = 0.000 < 0.01$) and photo C4 ($M_{C1} = 6.210$, $M_{C4} = 4.390$; $t = 6.177$, $p = 0.000 < 0.01$). The risk level of photo C2 was also significantly higher than that of photo C3 ($M_{C2} = 5.162$, $M_{C3} = 4.390$; $t = 2.523$, $p = 0.016 < 0.05$) and photo C4 ($M_{C2} = 5.162$, $M_{C4} = 4.086$; $t = 3.137$, $p = 0.004 < 0.01$). Tourist #1's behavior in photo B1 was significantly more dangerous than that of Tourist #2 ($M_{\text{Tourist \#1}} = 5.933$, $M_{\text{Tourist \#2}} = 3.981$; $t = 9.397$, $p = 0.000 < 0.01$). Similarly, the risk level of Tourist #1's behavior in photo B2 was significantly higher than that of Tourist #2 ($M_{\text{Tourist \#1}} = 5.410$, $M_{\text{Tourist \#2}} = 2.990$; $t = 8.145$, $p = 0.000< 0.01$). Findings indicated that the risk levels of risky attractions and risky behavior were both manipulated successfully.

Descriptive analysis

We collected 280 (8×35) eye-tracking data points during the formal experiment. Fifteen participants' eye movement data were not recorded. Upon analyzing the missing data, we discovered that participants' eye-tracking data were not recorded in the area of interest (AOI) of low-risk behavior, specifically for Tourist #2 in photo B2. Therefore, among photos depicting risky activities,

participants tended to ignore tourists with low-risk behavior.

The post-experiment interviews revealed that participants' visual attention was primarily directed towards tourists displaying high-risk (vs. low-risk) behavior. This pattern likely emerged because tourists who engaged in high-risk behavior were frequently in dangerous areas; these visitors needed to take exceptional actions to capture photos. Their behavior naturally garnered participants' attention. Several observers voiced concerns about these individuals' risky actions, intently observing the tourists and imagining whether they would be safe.

Heat maps were assembled to visualize participants' visual attention to risk-related photos. Each heat map displays the fixation location and duration within specific photo areas. A color spectrum indicates the fixation duration, with the longest duration shown in red and the shortest in green. Heat maps were generated using a Gaussian function; Figure 5 displays the maps for all eight photos. Participants' visual attention was trained on photo areas that demonstrated risk, such as warning information (A1 and A2), tourists engaging in high-risk activities (B1 and B2), and the attractions themselves (C1–C4).

[Insert figure 5 here]

Gaze details were retained for 35 participants with complete data. The average fixation duration on risk-related information was 6.84 seconds, with a standard deviation (*SD*) of 4.38 seconds; the average number of fixations was 6.83 (*SD* = 3.57). For risky attraction photos, the average fixation duration was 5.59 seconds (*SD* = 5.73 seconds); the average number of fixations was 5.98 (*SD* = 3.32). Regarding risky behavior photos, the average fixation duration was 5.74 seconds (*SD* = 4.92 seconds); the average number of fixations was 6.28 (*SD* = 4.28). Table 2 lists eye-tracking index data for participants' AOIs related to tourism risk information, risky attractions, and risky behavior.

[Insert table 2 here]

Results

We conducted paired sample *t* tests to compare the total fixation duration, fixation count, and average fixation duration of risk information photos (including the warning information area and the non-AOI area), high-risk attraction photos, and low-risk attraction photos. We also compared risky behavior photos featuring tourists engaging in high-risk activities (AOI: RB) and low-risk activities (AOI: LB).

Regarding tourists' visual attention to risk information, on average, participants fixated on the risk information areas for significantly longer than the non-risk information areas ($M_{\text{risk information}}$ = 1.61, $M_{\text{non-risk information}}$ = 0.81, t = 7.177, p = 0.000). A significant difference emerged between the risk information areas and the non-risk information areas in terms of fixation count ($M_{\text{risk information}}$ = 2.16, $M_{\text{non-risk information}}$ = 4.67, $t_{\text{fixation count}}$ = - 5.217, p = 0.000). However, no significant difference applied to the total fixation duration ($t_{\text{total fixation duration}}$ = 1.634, p = 0.111). This lack of significance may be

due to the small AOIs in the risk information photos. Therefore, variation in the total fixation duration between information areas and non-information areas was not significant for small areas. The average fixation duration and total fixation counts both showed that tourists tended to visually focus on risk-related information, supporting H_1.

Second, regarding visual attention towards risky attractions, participants demonstrated significantly longer total fixation durations and fixation counts for high-risk attractions than for low-risk attractions ($M_{\text{high-risk attractions}} = 6.11$, $M_{\text{low-risk attractions}} = 5.08$, $t_{\text{total fixation duration}} = 2.266$, $p = 0.03$; $M_{\text{high-risk attractions}} = 6.78$, $M_{\text{low-risk attractions}} = 5.19$, $t_{\text{fixation counts}} = 3.930$, $p = 0.000$). This trend suggests that tourists paid closer visual attention to high-risk attractions, supporting H_2.

Finally, based on visual attention towards risky behavior, tourists who engaged in high-risk activities had significantly longer total fixation durations and fixation counts than those partaking in low-risk activities ($M_{\text{high-risk behavior}} = 3.28$, $M_{\text{low-risk behavior}} = 1.76$, $t_{\text{total fixation duration}} = 3.358$, $p = 0.002$; $M_{\text{high-risk behavior}} = 3.28$, $M_{\text{low-risk behavior}} = 1.98$, $t_{\text{fixation counts}} = 4.136$, $p = 0.000$). Tourists paid closer visual attention to other tourists displaying high-risk behavior; H_3 was thus supported.

Post-experiment interviews revealed that participants' gaze behavior was tied to risky phenomena during trips (e.g., risk-related information, risky attractions, and risky behavior). Participants paid careful attention to the risk and safety alerts displayed in photos while traveling. These details could mitigate potential risks in unfamiliar destinations. One participant explained, "*Seeing risk alert information in a scenic area makes me feel safer because it helps me know where potential dangers are.*" Tourists' gaze behavior towards risk-related information improved their safety perceptions and contributed to their overall sense of destination safety.

Participants frequently saw the risky attractions depicted in photos as hazardous despite being interested in these sites. Some even saw the destination as unsafe. One tourist shared the following about a photo of a rock: "*That rock looks like it could fall and hit someone at any time and, even though it looks cool, I wouldn't want to go there because it's too dangerous.*"

When presented with photos showing tourists' risky behavior, many participants felt that people who stood in dangerous places to take photos were unsafe. One person stated, "*Their behavior is not worth promoting because not only did they fail to ensure their own safety, but they also caused trouble for the management of the tourist attraction.*" These findings reinforce the conclusions of Study 1 that tourists' risk gaze is commonplace and features numerous connotations.

Conclusion

General discussion and theoretical implications

Even though tourist gaze theory was established more than three decades ago, tourist risk gaze has received limited academic attention (Lin & Fu, 2021; Samarathunga & Cheng, 2021). Drawing on Urry's idea of the tourist gaze, this research integrated content analysis to explore the concept and elements of tourist risk gaze with eye-tracking technology to provide visual evidence. Three

theoretical implications merit discussion.

First, content analysis demonstrated that tourist risk gaze explains how people view risk-related characteristics during trips. We focused on small-scale risks that tourists may face, particularly during outdoor activities in natural areas (e.g., falling, drowning). Gstaettner et al. (2018) argued that all threats cannot possibly be eradicated in these settings, as risks are unavoidable when humans interact with nature. In addition, visitors to natural areas tend to be relatively less responsible for their safety; many destinations rely on physical risk information such as signs and warnings (Rickard, 2014). From a tourist gaze perspective, this research develops the notion of tourist risk gaze and explores its attributes.

Furthermore, the proposed tourist risk gaze has properties that apply to other concepts associated with the tourist gaze (Chen & Xu, 2021): risk information gaze, risky attraction gaze, and risky behavior gaze. Risk information gaze involves tourists' visual attention to a destination's safety measures (e.g., warning signs, safety facilities, and equipment). Urry (1990) posited that the tourist gaze is a subjective experience and an acquired observational technique. Tourists form risk perceptions and travel experiences by observing risk-related information such as warnings and safety measures while viewing a destination. Risky attraction gaze pertains to tourists' visual consumption of risky locations, consistent with Urry's (1990) claim that "the gaze's feature is the core of tourism." Content analysis indicated that appreciating and consuming a destination's risky attractions inspires tourists but also puts them at risk. These outcomes align with risk-seeking behavior in adventure tourism (Wang et al., 2019). Risky behavior gaze refers to tourists' observation of other tourists' gaze at risky attractions. The tourist gaze reflects tourists' power over others (Huang et al., 2017; Maoz, 2006). We determined that risky behavior gaze includes tourists' criticism, anger, and concern about others.

Finally, to supplement the literature on tourism risk and the tourist gaze, we investigated tourist risk gaze for the first time using eye tracking. Tourism risk and crisis management studies have conventionally relied on questionnaires, experiments, and scenarios with emphases on case studies, content analysis, and structural equation modeling (Ritchie & Jiang, 2019; Wut et al., 2021). Samarathunga and Cheng's (2021) review of tourist gaze studies showed that content analysis and thematic analysis were used to validate researchers' views. Given the principally visual nature of the tourist gaze and the tourist experience (Hollinshead, 1999; Urry, 1992), an eye-tracking approach based on visual attention is fitting. Eye tracking is not a new data collection tool; it has been used extensively to scrutinize other tourism topics (cf. Scott et al., 2019). However, our research is one of the first efforts to apply this tactic to study tourist risk gaze.

Managerial implications

Keeping tourists safe from harm is crucial to destination development but is challenging (Agarwal et al., 2021). Destination managers can refer to the results of this research to promote attractions from a

tourist risk gaze perspective and to work towards creating a safe environment. First, risk-related information is a key element of the tourist gaze. Tourist risk information gaze comes in response to destination attractions' risk warning systems. Therefore, the design of related information can guide tourists' safe behavior (e.g., by encouraging them to avoid threats).

Second, risky attractions direct tourists' gaze and attention. These types of attractions also hold scenic appeal. Managers could consider marketing attractions from a risk perception perspective, such that risk gazing becomes a major draw in popular destinations. However, when visitors observe risky attractions, they often put themselves in danger. Tourists may pursue excitement, feel overconfident, overstate their past experience, or show off (Bentley et al., 2000; Pagel et al., 2021). Scenic spot managers should strive to elicit visual attention around risky attractions while guaranteeing safe viewing for visitors.

Finally, risk behavior gaze can aid destination and scenic area managers in uncovering tourists' unsafe behavior. Site managers should monitor visitors' visual attention to risky actions. Doing so will enable these staff to readily identify activities that may endanger individuals' well-being. Such behaviors can serve as a basis for governance so managers can ensure tourists' safety in scenic areas.

Limitations and future research

This research employed an eye-tracking experimental method to analyze differences in tourist risk gaze. This approach is intuitive and scientific for studying the tourist gaze but is not without limitations. Results from an artificial laboratory setting could be biased. The experimental sample was also limited to Chinese students in this case, which tempers findings' external validity; for instance, the conclusions may not generalize to Western contexts. The experimental materials were primarily outdoor natural attraction photos as well. Although nature-based settings and outdoor leisure travel are often associated with risk, scholars should investigate other popular tourist attractions (e.g., theme parks and water parks). Lastly, the mutual gaze between tourists and hosts was not addressed in this research. Follow-up studies should evaluate this concept to provide a more holistic understanding of the phenomenon.

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Appendix. A: Questionnaire on the rationality of photo material selection

Risk information: Is there any clear risk warning information in the travel photos? (yes or no)

Risky attraction:

1. How dangerous do you think it is to travel here? (not dangerous = 1, dangerous = 7)

2. What do you think is the probability of a dangerous accident while traveling here? (impossible = 1, possible = 7)

3. What do you think are the consequences of a dangerous accident or injury while traveling here? (not serious = 1, serious = 7)

Risky behavior:

1. How dangerous do you think the behavior of Tourist #1/2 is? (not dangerous = 1, dangerous = 7)

2. What do you think is the probability of a dangerous accident for Tourist #1/#2? (impossible = 1, possible = 7)

3. What do you think will be the consequences of a dangerous accident for Tourist #1/#2? (not serious = 1, serious = 7)

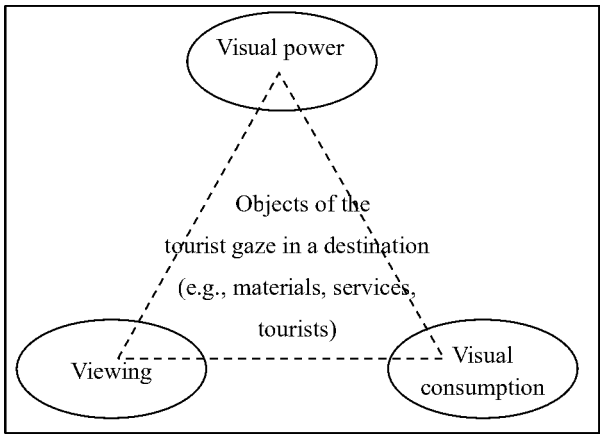

Figure 1. Conceptual framework of tourist gaze

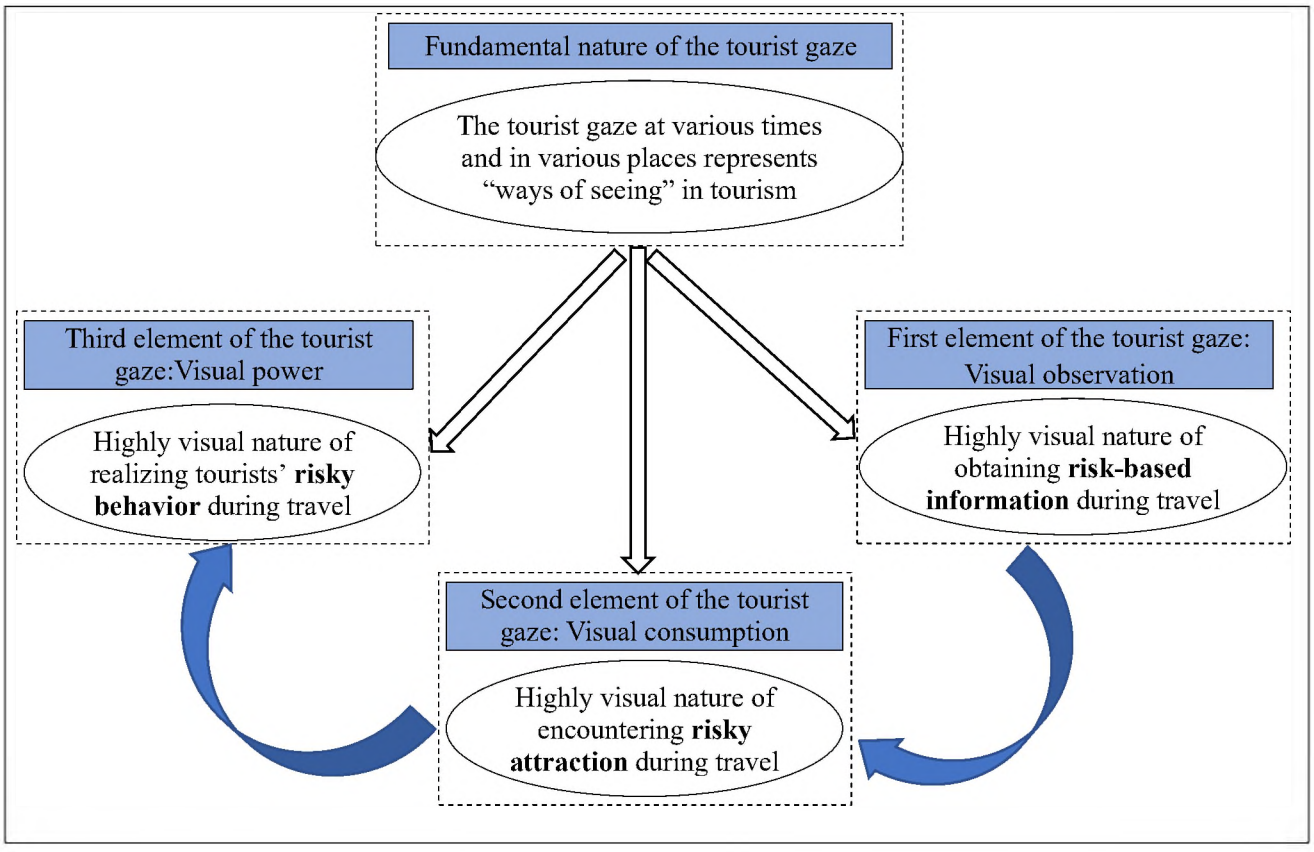

Figure 2. Conceptual framework of tourist risk gaze

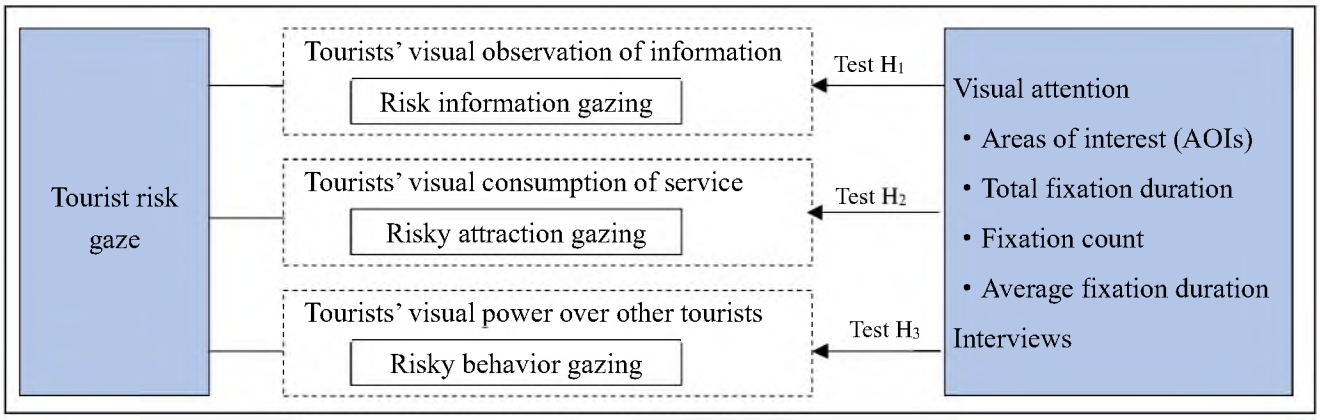

Figure 3. Conceptual model of tourist risk gaze

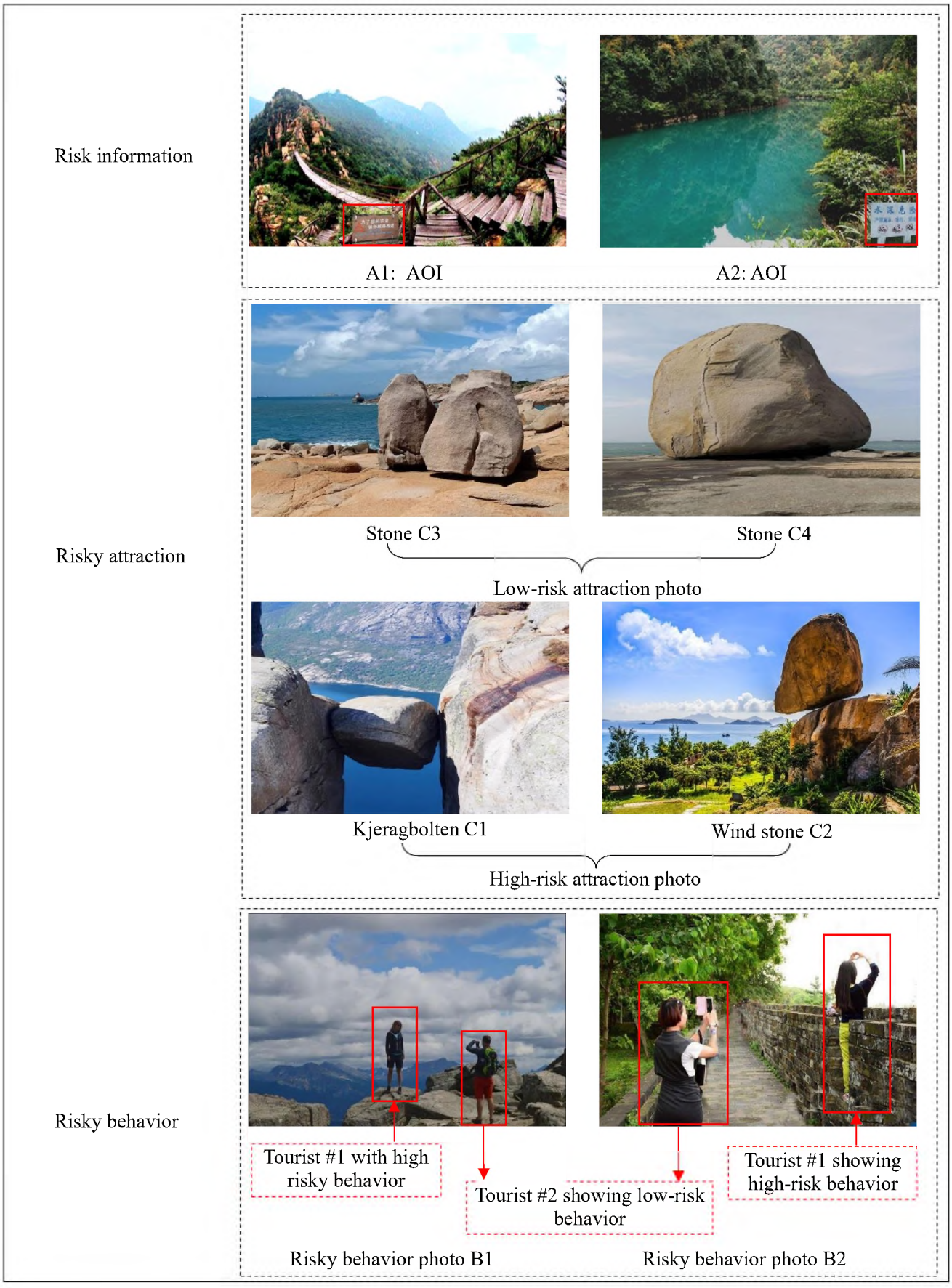

Figure 4. Experimental photo materials

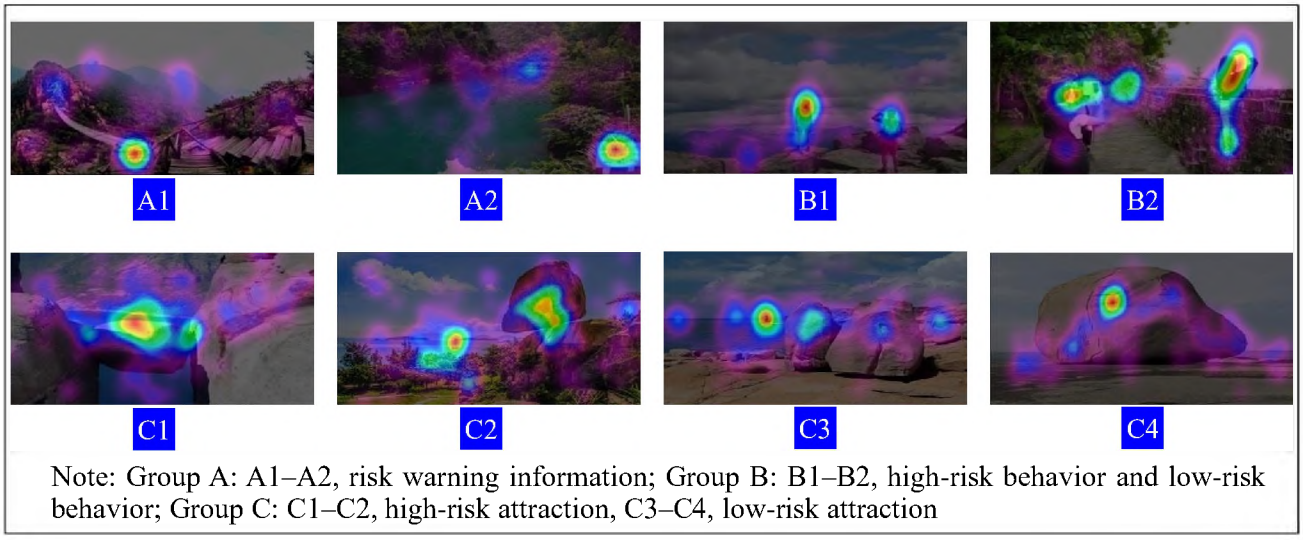

Figure 5. Heat maps of visual attention.

Table 1. Codes and themes identified in content analysis.

Codes (▲)	Categories (●)	Themes (○)
▲Risk information	●Warning signs of prohibited categories	○Why did [the destination] not write the prohibition of swimming?
		○Why is there no warning sign prohibiting swimming? It looks so dangerous.
		○Why is there no sign prohibiting swimming? Negative feedback.
		○[No written warning] to prohibit swimming.
	●Safety warning messages	○Should repair the guardrail, post warning signs.
		○Safety first, and stay away from the river.
		○Safety hazards away from the river.
		○Safety first. Stay away from potential hazards.
	●Information on safety precautions	○Guardrail quality is really good.
		○It is recommended that a cordon and guardrail be set up, and it is strictly forbidden to cross the cordon[;] violators are sentenced to imprisonment.
		○Better fix a strong guardrail! It's too dangerous.
▲Risky attraction	●Beautiful but scary landscapes	○This scene is too beautiful, but also too scary for people.
		○Although the natural scenery is spectacular, the hidden dangers are also serious.

		○Beautiful waves, but a little scary.
		○It's spectacular! Don't go down dangerously! You can only admire its beauty from afar.
	●Frightening landscapes	○A bit scary.
		○It's too scary, like a black cyclone, too dangerous.
		○Too much like a beast coming at you.
		○Feel like a monster coming, panic in my heart.
		○When the wave came up[,] I felt my life ended.
	●Tourist risk behavior (neutral/positive mood)	○Most admire this photographer.
		○Award a chicken thigh to the photographer in danger.
		○The photographer [does not] turn a hair.
		○I like to see this, I see them being shot into the soup[.] I am very happy. …
		○I like to see you running in embarrassment.
▲Risky behavior	●Tourists' risky behavior (anxiety)	○The man in black is so dangerous.
		○Those people are not safe, right, too close to the [tidal bore].
		○Really do not need to stand so close to take photos or video, safety should always be put [first].
	●Tourists' risky behavior (anger)	○The man outside the parapet is a cocky, indulgent man.
		○The guy inside is too self-righteous.
		○These people do not deserve sympathy.

Note: The content analysis yielded multiple categories and themes; only select content is shown here.

Table 2. Descriptive statistics of eye-tracking indicators (n = 35)

	Risk information		Risky attractions		Risky behavior	
	Information area (AOI)	Non-information area	*Kjeragbolten* and wind stone	stone	Tourist #1 in photos B1 and B2	Tourist #2 in photos B1 and B2
			High-risk attractions C1, C2	Low-risk attractions C3, C4	High-risk behavior (AOI: RB)	Low-risk behavior (AOI: LB)
Total fixation duration	3.07 (1.89)	3.77 (3.02)	6.11 (5.51)	5.08 (5.90)	3.28 (2.50)	1.76 (1.47)
Fixation count	2.16 (0.97)	4.67 (3.06)	6.78 (3.31)	5.19 (3.13)	3.28 (1.74)	1.98 (1.29)
Average fixation duration	1.61 (0.82)	0.81 (0.35)	0.85 (0.37)	0.92 (0.54)	1.01 (0.44)	0.87 (0.41)

Note: The displayed values are means; values in parentheses are standard deviations.