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Introduction

Within almost one year, the outbreak of 2019 novel coronavirus (COVID-19) has caused over 1.45 million deaths and 62.36 million confirmed cases, generating an overwhelmed public panic in over 220 countries (World Health Organization, 2020). When a public health crisis occurs, tourism is almost the most vulnerable industry showing drastic decrease in tourist arrivals and tourism consumptions (Ritchie & Jiang, 2019). Given the global scale of social distancing and travel ban, the challenges of COVID-19 to the tourism sectors are unprecedented (Gössling, Scott, & Hall, 2020). The World Tourism Organization (UNWTO) (2020) estimated that the pandemic may cause a shock decline of 70% international arrivals, resulting in US\$ 1.2 trillion revenue and 120 million job loss in tourism sector in 2020. As the situation of COVID-19 remains unpredictable, people may regard travelling as an uncertain and high-risky behavior even when travel ban is lifted (Chemli, Toanoglou, & Valeri, 2020). Therefore, tourism sectors may experience a long-term process of recovery due to public's reduced travel intentions. To overcome the long shadow of COVID-19 on tourism, it is particularly important to understand tourist psyche and behaviors toward post-pandemic travel (Kock, Nørfelt, Josiassen, Assaf, & Tsionas, 2020).

Despite the destructive impacts of infectious diseases on tourism, research on health-related crisis management is limited (Mair, Ritchie, & Walters, 2016). In the past decades, tourism studies have been launched to investigate several epidemic diseases, including SARS (e.g., Wen, Huimin, & Kavanaugh, 2005), Foot and Mouth Disease (e.g., Blake, Sinclair, & Sugiyarto, 2003), Swine Flu (e.g., Page, Song, & Wu, 2012) and Ebola (e.g., Cahyanto, Wiblishauser, Pennington-Gray, & Schroeder, 2016). However, the extant literature mainly explored post-epidemic tourism from a micro perspective (e.g., destination resilience, overall tourism demand, impacts on tourism industry), neglecting individuals' psychological mechanism of travel behaviors toward a public health crisis (Mao, Ding, & Lee, 2010; Novelli, Burgess, Jones, & Ritchie, 2018; Solarin, 2016; Zheng, Luo, & Ritchie, 2021b).

Travel behaviors after an epidemic outbreak may be changed in many ways, including destination choices, tourism interests, transportation, length of stay and adoption of hygiene measures (Hsu, Lin, Wang, & Jhang, 2020; Wen et al., 2005). Previous research suggested that tourist post-crisis travel behaviors can be affected by their risk perceptions (Chua, Al-Ansi, Lee, & Han, 2020; Cui, Liu, Chang, Duan, & Li, 2016), emotions (Zhang, Hou, & Li, 2020), and motivations (Bhati, Mohammadi, Agarwal, Kamble, & Donough-Tan, 2020). For instance, tourist may be motivated to adopt protective behaviors when they perceive health risks in travelling (Ruan, Kang, & Song, 2020; Wang, Liu-Lastres, Ritchie, & Mills, 2019). Since the uncertainties linked to infectious diseases can generate fear and anxiety emotions among populations, tourists may seek various coping strategies to overcome the psychological distress (Wang, Xue, Wang, & Wu, 2020). Moreover, given individuals' differences in psychological resilience toward a public health threat, people may perform differently in post-pandemic travel behaviors (Zheng, Luo, & Ritchie, 2021a). Although people may respond to threats differently (Hou et al., 2020), there is seldom discussion on the heterogeneity of tourists' psychological and behavioral responses toward post-pandemic travel.

Thus, this paper aims to contribute to literature by identifying distinct post-pandemic tourist segments based on their psychological, behavioral, and sociodemographic attributes. By integrating protection motivation theory (Rogers, 1975) and resilience theory (Rak & Patterson, 1996), this study provides insights in understanding how individuals appraise and behave differently toward travelling after a pandemic outbreak. Further, the study applies an integrated segmentation approach combining both common-sense and data-driven clustering to identify relevant constructs in profiling tourists in a post-COVID-19 context. Three research questions are addressed: (1) What risk-related variables are useful in segmenting post-pandemic tourists? (2) How do tourists share similar levels of fear, resilience, and protective behaviors toward post-pandemic travel? (3) What are the sociodemographic characteristics among the post-pandemic tourist segments?

Understanding tourist segments can provide valuable implications for tourism authorities and organizations (Frochot & Morrison, 2000), which, is particularly crucial in reviving tourism sectors in a post-COVID-19 era. This research can help tourism practitioners to establish tailored-in strategies, helping eliminate tourists' negative concerns toward post-pandemic travel. Moreover, since China is one of the largest travelling source countries, the results of this study can offer important insights and suggestions for general tourism destinations.

Literature Review

Pandemic fear

A pandemic refers to a widespread outbreak of infectious disease, which can affect large populations across nations and continents (French, Mykhalovskiy, & Lamothe, 2018). Since a pandemic is a new disease that the most people are not immune, it has been regarded as a challenging public health crisis for the world today (World Health Organization, 2010). Due to the high infection rate and mortality, the pandemic outbreak can trigger a series of adverse psychological reactions including fear, anxiety disorders, depression, stigma, and discrimination among individuals (Khan & Huremović, 2019). During the COVID-19 outbreak, many restriction measures were imposed to control the pandemic transmission by governments across the world, including school closures, social distancing, travel ban, self-quarantine, and isolation (Harper, Satchell, Fido, & Latzman, 2020). Consequently, the uncertainties and changing environments have disrupted people's social life in many ways, directly threatening the public's mental health (Ornell, Schuch, Sordi, & Kessler, 2020). Moreover, the pandemic fear was fueled by the misinformation and rumors spread in the social media (Islam et al., 2020). Health-related research reveals that fear is individuals' common response to infectious diseases, which causes psychological and behavioral consequences during and after the outbreaks (Mertens, Gerritsen, Duijndam, Saleminck, & Engelhard, 2020; Usher, Durkin, & Bhullar, 2020).

Although literature has been launched to investigate pandemic fear in public health and consumer contexts, there is seldom discussion in tourism research. Accumulating evidence find people may evoke various levels of fear toward infectious diseases owning their individual differences in gender, age, knowledge, attitude, and past experiences (e.g., Lippold et al., 2020). Tourism studies indicate that infectious diseases can generate tourists' fear toward travelling during and after the outbreaks (Novelli et al., 2018). Given the significant role of fear in post-pandemic travel (Zheng

et al., 2021a), profiling tourists on the basis of pandemic fear can help to identify individuals' different reactions toward post-pandemic travel from an emotion perspective.

Perceived threat and protective behaviors

Perceived threat refers to the cognitive processes that occur when people are in face with in a dangerous situation, which is made up of two dimensions: threat susceptibility and severity (Witte, 1994). In public health research, individuals' perceived pandemic threat can be determined by their beliefs about how vulnerable and serious they are to a pandemic-related health risk (Weerd, Timmermans, Beaujean, Oudhoff, & Steenbergen, 2011). In tourism contexts, tourists' risk perceptions have been identified as a major factor shaping travel-related behaviors (Fuchs & Reichel, 2011; Mizrachi & Fuchs, 2016). The existing literature suggest that risk perception is an essential predictor of tourists' behaviors, which can be applied as a meaningful segmentation criteria (Ritchie, Chien, & Sharifpour, 2017). For instance, Dolnicar (2005) identified four tourist segments based on risk perceptions, including high-fear, low-fear, 'overseas sceptics' and 'thrill seekers'. However, the majority research investigated tourists' overall risk perceptions in traveling, overlooking their specific perceived threats toward a public health crisis. Rather than investigating tourists' risk perceptions, understanding tourists' perceived susceptibility and severity toward pandemic travel may provide pandemic--specific information in explaining their preventive travel behaviors.

According to protection motivation theory (Rogers, 1975), people intend to adopt risk-avoiding behaviors to protect themselves against a particular threat. Research reveals that people tend to change consumption (e.g., increase purchase face masks, food, hand sanitizer) and safety behaviors (e.g., compliance with public policy, avoid contaminants, enhance personal hygiene) to minimize their perceived threats toward infectious diseases during the outbreaks (e.g., Arafat et al., 2020; Harper et al., 2020; Laato, Islam, Farooq, & Dhir, 2020). As tourists perceive a high level of health threat during infectious disease outbreaks, they may choose travel avoidance (e.g., avoid infected destinations, cancel travel reservations) or cautious travel (e.g., change tourism types, decrease social contacts) to minimize the risks (Cahyanto et al., 2016; Kock et al., 2020; Wen et al., 2005). Considering different behavioral intentions toward post-pandemic travel, it is necessary to examine tourists' segments by integrating behavioral variables.

Psychological resilience

Psychological resilience is the ability that people can positively adapt and overcome the stress and adversity circumstances (Shi, Sun, Wei, & Qiu, 2019). Despite exposure to traumatic events (e.g., pandemic, disasters, illness, terrorism), people may engage in psychological adjustment to cope with the stressors (Chen & Bonanno, 2020; Hou, Law, Yin, & Fu, 2010). Literature on infectious diseases find that psychological resilience plays a buffering role toward the health threat, which helps to sustain individuals' mental health during the outbreaks (Heath, Sommerfield, & Von Ungern-Sternberg, 2020; Killgore, Taylor, Cloonan, & Dailey, 2020). However, as a psychological and physical characteristic possessed by people, studies reveal that there are significant individual differences in psychological resilience in confronting an adversity (Jackson, Firtko, & Edenborough, 2007). Tourism research mainly explored the resilience of destination and industry before, during or after a crisis, while much less attention has been paid in tourists' psychological resilience toward a threat in travelling (Prayag, 2018; Zheng et al., 2021a). Thus, identifying

tourists' various psychological resilience in post-COVID-19 travel can contribute to the extant literature beyond a protection motivation perspective.

Methodology

The study collected data via an online survey. Chinese tourists who are aged above 18 years old and travelled within past 12 months were selected as respondents. After a pilot test, the formal questionnaire was distributed by an online survey company through Wen Juan Xing (www.wenjuanxing.com) based on a quota sampling approach (in line with the proportion of age and gender of China's population) (China National Bureau of Statistics, 2010). Over 3000 questionnaires were distributed across almost every province in mainland China. 1208 responses were returned and applied in formal analysis. The study measured three fear items (nervous, frightened, anxious) (Gleicher & Petty, 1992), five perceived threat items (threat severity and threat susceptibility) (Masser, White, Hamilton, & McKimmie, 2011; Witte, 1996), five psychological resilience (Campbell-Sills & Stein, 2007), four items of protection motivation (Posey et al., 2015), two travel avoidance items and three cautious travel items (Mahoney, Hobbs, Newby, Williams, & Andrews, 2018; Mahoney et al., 2016).

A two-step cluster approach integrating both continuous and categorical data was applied to segment tourists. Clusters are identified based on Schwarz's Bayesian Information Criterion (BIC) and hierarchical clustering. The significance differences amongst the clusters were further examined by Chi-square tests and *t*-tests.

Results

The paper reveals that education, gender, infection area and income were the most significant predictors in segmenting the clusters. Four segments were identified, including *fearful*, *high resilient*, *inactive coping*, and *threat careless tourists*. *Fearful tourists* (34.6%) expressed the highest intense of fear and perceived threat toward post-pandemic travel. However, they also showed the highest level of protection motivation and intention to avoid travel. They were primarily female, young tourists, who have a high level of education. *High resilient tourists* (23.3%) showed the highest level of psychological resilience and lowest sense of fear. They were most likely to take cautious travel in post-pandemic era. These respondents are generally male tourists, who have a high level of education and income, and are from low and average infected area. *Inactive coping tourists* (23.3%) expressed the lowest intense of protection motivation and resilience. Then were most unlikely to engage in cautious travel. These group of people were middle-aged and senior tourists who have a low level of education and income. *Threat careless tourists* (18.8%) was the smallest segment who showed the lowest perceived threat and intention in avoiding post-pandemic travel. They were primarily from high infected area, who have above average level of income.

Conclusion and Discussion

The results illustrate distinct post-pandemic tourist segments based on psychological, behavioral, and socio-demographic clustering variables. This research makes several theoretical contributions to tourist segmentation by investigating pandemic risk-relevant constructs (i.e., fear, perceived threat, protection motivation and psychological resilience). The study reveals that people react to post-pandemic differently given their emotions, protective motivation, and resilient abilities. In

line with previous segmentation research (Dolnicar, 2005; Witte & Allen, 2000), finding found that young female tourists were more afraid to travel after the outbreak, whereas senior tourists who have low income were inactively in coping with the perceived threat and fear toward post-pandemic travel. Moreover, the study highlights the different psychological responses among tourists in different levels of pandemic-infected areas. Compared with average and low infected areas, results found that people who experienced high risks of pandemic infection (e.g., lived in Wuhan during COVID-19 outbreak) were more resilient and threat carefree toward post-pandemic travel. Practically, this study offers valuable information to understand different tourists' psychology toward post-COVID-19 travel. Moreover, it helps authorities and tourism partitioners to launch tailor-in strategies to eliminate negative consequences generated during the COVID-19 outbreak, which further helps to revive tourism industry after the pandemic.

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