Post-pandemic Dark Tourism in Former Epicenters¹

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Abstract

As one of the first studies to explore the joint consumption of both leisure and pandemic-related tourism products in former pandemic epicenters, this research expands the scope of dark tourism to include former pandemic epicenters. The motivational determinants of intention to visit leisure and pandemic-related sites are empirically identified using an ordered logit model. This is the first study which formally proposes patriotism as a new push motive in stimulating people to visit post-disaster destinations. The identified segmentations of tourists with different levels of push-pull motives and socio-demographic features provides key stakeholders and practitioners in former epicenters with a systematic recovery plan in the post-pandemic era.

Key Words

Post-disaster tourism, intention to visit, push and pull motives, ordered logit regression, factor analysis, cluster analysis

Introduction

Although the development of the tourism industry significantly contributes to economic growth in various economies, it has been catastrophically interrupted by the outbreak of the COVID-19 pandemic. The global deluge of the pandemic has led to worldwide travel restrictions, which not only hindered the flow of international tourists but also (due to epidemic control policies such as the 14-day quarantine in China) drastically reduced the number of tourists within each country. The tourism industry and overall economic prosperity were seriously harmed by the pandemic, especially in former epicenters which had the majority of confirmed cases or COVID-related deaths compared to other cities. With ongoing vaccination programs and the increase in herd immunity, it is likely that epidemic control policies will be relaxed. It is thus essential for key stakeholders in the tourism industry to put forward a systematic recovery plan for the post-pandemic era, especially within former epicenters.

Due to the fact that consumption of tourism products was mostly considered as pursuit of hedonic and pleasant experience (Strange and Kempa, 2003; Biran *et al.*, 2014), a recovery plan relying on traditional leisure tourism products and markets is the major focus of extant post-disaster tourism studies. Tourists' perception of the risk in consuming traditional leisure tourism products is a major focus of previous post-disaster tourism literature. However, contemporary evidence shows that travel to sites or attractions associated with death and suffering is a rising trend (Strange and Kempa, 2003; Light, 2017). Although the definition and scope of "dark tourism" are not yet unified, Light (2017) proposed that dark tourism has become a generic term for any form of tourism associated with death, disaster, suffering, the macabre, or anything unpleasant. The potentiality of dark tourism can accelerate recovery processes in post-disaster destinations, which further enables the affected community to be resilient to adversity (Korstanje and George, 2018a). Therefore, in a post-pandemic era, along with recovering the traditional leisure tourism market, attention should also be given to the development of dark tourism products in epicenters that were traumatically devastated by the COVID pandemic. This

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study proposes that the joint consumption of both leisure and pandemic-related dark tourism products be considered by destination marketing organizations and the tourism industry as a potential path of recovery for former epicenters.

Wuhan, a well-known destination for traditional tourism, is also one of the former COVID epicenters, and it is taken as an example in this study—which aims to explore the potential of and a strategy for developing dark tourism in former pandemic epicenters. Research questions of this study are fourfold. Via online questionnaires, we plan to examine domestic tourists' intention to travel to Wuhan in the post-pandemic era. Another focus is the motivational determinants of tourists' intentions to engage in both leisure tourism and pandemic-related activities in former epicenters. Additionally, based on different intentions (i.e., the intention to visit traditional leisure tourism attractions and the intention to visit "dark" pandemic-related sites), this study aims to develop a typology of post-pandemic tourists to Wuhan. Based on tourist typologies, we are able to develop a systematic market segmentation scheme which illustrates the push-pull features of each type of tourist. Each market segmentation is portrayed in light of push and pull motivations and socio-demographic features. The remainder of this paper will review extant studies on dark tourism, introduce the study methods employed by this paper, and finally present the findings and results. This paper will conclude by proposing suggestions for governors and industrial practitioners in former epicenters based on the results shown in earlier chapters.

Literature Review

Dark Tourism: definition and categorization

Travelling to places related to death and suffering is not a new phenomenon (Light, 2017; Korstanje and George, 2018b), and it has drawn academics' attention since the mid-1990s. Some similar concepts are "black spots" (Rojek, 1997) and "dissonant heritage" (Tunbridge and Ashworth, 1996; Dann and Seaton, 2001; Sharpley, 2005; Hartmann, 2014; Ashworth and Isaac, 2015), which contain the theme of heritage of atrocity (Tunbridge and Ashworth, 1996). The term "dark tourism" was first coined by Foley and Lennon (1996) to indicate "the presentation and consumption (by visitors) of real and commodified death and disaster sites." Seaton (1996) proposed a different label for this type of tourism: "thanotourism," which is "travel to a location wholly, or partially motivated by the desire for actual or symbolic encounters with death, particularly, but not exclusively, violent death." Compared to the definition of dark tourism given by Foley and Lennon (1996), thanotourism's exclusive focus on violent death means that its definition is narrower. However, Seaton (1996) recognized that this phenomenon does not occur in an absolute or isolated form, but varies in intensity depending on the extent to which it is either a tourist's sole motivation or accompanied by other motivations. Other studies propose various definitions of dark tourism or thanotourism based on different aspects such as heritage (Dann and Seaton, 2001), practice (the act of visiting particular types of places) (Foley and Lennon, 1997; Robb, 2009), motivations (Seaton, 1996), and form of experience (Ashworth, 2008). At present, the terms "dark tourism" and "thanotourism" are considered interchangeable. The current definition of this phenomenon is broader, referring to tourism around sites of death, disaster, and suffering (Light, 2017; Weaver *et al.*, 2018). Korstanje and George (2018b) agree on this generic definition, stating that dark tourism should be characterized as the desire to visit macabre spaces where mass death and suffering prevail.

Since the proposal of definition of dark tourism, academic interest has primarily centered on research into the supply side – that is, theme, scope, and typology – of dark tourism (or thanotourism) in the decade following the mid-1990s (Light, 2017). The substantial body of tourism in sites associated with death, suffering, and the macabre initiated research into tourism in the United Kingdom at battlefields and sites associated with war. This research soon spread to other countries that had witnessed traumatic events such as war, slavery, genocide, or natural disasters (Hartmann, 2014). Numerous tourism studies have also investigated places associated with death and suffering (Lennon and Foley, 2000; Light, 2017). Although a complete categorization of dark tourism is extremely complicated and has yet to be finalized, scholars have proposed a typology of dark tourism that depends on the level of sanctions (Weaver *et al.*, 2018) and on the type and degree of "darkness" associated with the site. Examples of "sanctioned" dark tourism include those associated with war (Butler and Suntikul, 2013), which Smith (1998) describes as possibly the largest type of dark tourist attraction, as well as former incarceration sites that

embody policies of state-sanctioned punishment (Strange and Kempa 2003). According to Weaver *et al.* (2018), dark tourism also involves “unsanctioned” suffering, such as celebrity deaths (e.g., the sites of Princess Diana crash and John F. Kennedy’s assassination), sensational and mass murders (e.g., Jack the Ripper’s London), and terrorist attacks (e.g., 9/11 crash sites in New York and Pennsylvania). Another branch of supply-side studies, which focuses on the spectrum and subcategories of dark tourism destinations, explores a site’s degree of darkness, which is socially constructed in different ways, and depends on the specific context (Seaton, 1996; Stone and Sharpley, 2008; Biran, Poria and Oren, 2011).

Based on the various contexts of darkness identified (Stone and Sharpley, 2008), some researchers have attempted to analyze specific manifestations of dark tourism. These varieties of dark tourism include penal/prison tourism, fright tourism, genocide tourism, grief tourism, disaster tourism, favela tourism, pagan tourism, suicide tourism, atomic tourism, history of conflict heritage tourism, and dystopian tourism. Among the many contexts of dark tourism destinations, research commonly focuses on those associated with wars and national conflicts such as Kinmen battlefield (Chen and Tsai, 2019), Ieper battlefield, Belgium (Winter, 2010), Lyushun War Museum, China (Weaver *et al.*, 2018), slavery sites such as Cape Coast Castle, Ghana (Mowatt and Chancellor, 2011), Holocaust sites such as Auschwitz, Poland (Biran, Poria and Oren, 2011), Westerbork, Netherlands (Isaac and Çakmak, 2014) and natural disasters which caused visible damaged landscapes such as Sichuan, China after the earthquake (Yang, Wang and Chen, 2011; Biran *et al.*, 2014; Yan *et al.*, 2016), New Orleans in the United States after Hurricane Katrina (Robbie, 2008) and Phuket, Thailand after the tsunami (Rittichainuwat, 2006). Although the manifestation of dark tourism may vary, death, disaster and suffering are the most commonplace (Korstanje and George, 2018a).

In summary, many studies have focused on tourism in distressing and sad sites that are associated with death and disasters (Stone and Sharpley, 2008). These have collectively been referred to as “dark tourism” sites since the end of the 2000s (Stone and Sharpley, 2008; Light, 2017). However, there are two deficiencies in the extant literature. First, in dark tourism literature concerning China, focus has mainly centered on earthquake sites (Wang and Zhang, 2016; Yan *et al.*, 2016). Studies on dark tourism and post-disaster destinations have paid little attention to the possible contexts of epidemics or pandemics. Secondly, while numerous supply-side studies have considered various contexts of death, disaster, and suffering, these studies have little to say about why individuals might be interested in visiting such destinations. As a result, it has yet to be revealed what determines a person’s intention to experience dark tourism specifically in a pandemic context. These research gaps inspired us to explore tourists’ intention, as well as the motivational determinants of intentions in visiting dark tourist destinations.

Joint consumption of a post-disaster destination

Despite some controversy around the definition of dark tourism, Light (2017) generally defined it as “a generic term for any form of tourism that is associated with death, disaster, suffering, the macabre, or anything unpleasant.” According to the United Nations Office for Disaster Risk Reduction (UNDRR, 2021), “disaster” is defined as “a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.” Since the outbreak in January 2020, the COVID pandemic has caused great loss of life, as well as vast economic and social losses, in former epicenters. At that time, given the limited resources available, the traumatic impacts of the pandemic were extremely hard to cope with. For this reason, a pandemic falls inside the definition of “natural disaster” given by the United Nations. As a result, engagement in tourism activities and tourism sites in post-pandemic destinations could be included as a subcategory of dark tourism. However, under the umbrella of dark tourism, most examples in previous studies of post-disaster destinations are of destinations that have visibly damaged landscapes caused by natural disasters such as earthquakes, tsunamis, and hurricanes (Rittichainuwat, 2006, 2008; Robbie, 2008; Wang and Zhang, 2016). To the best of our knowledge, this paper is one of the first studies that extends the sub-forms and scope of dark tourism to those in former pandemic epicenters.

Speaking of tourists' consuming behavior of tourism in post-disaster destinations for the purpose of utility maximization, tourists will choose an "optimal" mix of goods and services based on their preferences and tastes (Eadington, 1991). What tourists choose to include as part of their consumption bundle is subject to constraints on their money, time, and other resources. As a result, economists regard consumers as rational goal-oriented actors whose consumption decisions are undertaken (under income and time restrictions) to fulfill personally defined motives and objectives. Nicolau (2006) states that tourist motivations can become the main generators of utility when visiting certain destinations. Individuals have multiple needs and motives for travel and tourism, and higher utility level can be generated when more needs and motives are satisfied within a limited budget and travel time. In the particular context of post-disaster destinations, tourists' motivations are twofold, consisting of both traditional leisure tourism motives and motives that are related to the disaster. Thus, in order to maximize utility by satisfying more motives and needs given budget and time constraints, tourists might tend to jointly consume traditional leisure tourism products and disaster-related tourism products. From an the perspective of trip efficiency, the transport of one trip is fixed and already paid, so is the time consumed for travelling from home to a destination. In this way, consuming more tourism products can be regarded more value for money and more efficient for a given time and travel budget. For above reasons, the non-leisure (in this case, pandemic-related) tourism products should be considered along with the traditional leisure tourism products, as this gives certain type of tourists to maximize their utility by jointly consuming both types of services as a bundle in the same trip. However, research in dual-purpose consumption of traditional leisure tourism sites and pandemic-related tourism activities in post-pandemic destinations is an absence in extant literature.

Wuhan, a famous national historical and cultural city and an important birthplace of Chu culture, is situated in the east of the JiangHan plain and the middle reaches of the Yangtze River. It is recognized as the "thoroughfare of nine provinces" and a famous national historical and cultural city (Zhu and Zhang, 2019). Before the outbreak, Wuhan's tourism level was among the highest in China. In total tourist arrivals in 2017, Wuhan ranked fourth after Chongqing, Shanghai, and Beijing. Traditional leisure attractions are abundant in Wuhan. Notable sites include The Yellow Crane Tower, a symbolic historical relic, and Shouyi Square, a famous heritage site. Popular entertainment and shopping centers in Wuhan include Chuhe Han Street and Jiangnan Road Pedestrian Street. Well-known cuisine and local delicacies such as hot dry noodle and popular places such as Sakura in Wuhan University are gaining growing attention from all over the nation with its popular online platform and increasing impacts of local online influencers.

As one of the major cities and the capital of Hubei province in China, Wuhan has long been a prominent tourism destination because of its extraordinary natural beauties, cultural and historical heritage, and unique cuisine. Income generated by tourism industry in Wuhan accounted for 22.01 percent of local GDP in 2019. However, the pandemic has caused many changes in Wuhan. For instance, Leishenshan and Huoshenshan hospitals are maintained as pandemic memorials where tourists can pay their respects to the national heroes who sacrificed their lives during the pandemic. Although Wuhan has no visibly disaster-damaged landscapes (such as those in Sichuan after the Wenchuan Earthquake), it is still possible to generate dark tourism activities associated with the pandemic. Some examples include visiting the old modular hospitals and reflecting on their history, visiting a memorial hall or museum (if any are built), exhibiting objects used during the outbreak of the pandemic, and using virtual reality devices to "visit" Wuhan during the January 2020, city lockdown, and so on. As the tourism industry plays a vital role in the Wuhan economy, it is necessary to develop an effective recovery scheme after the end of the pandemic. Wuhan, as both a well-known destination for traditional tourism in China and one of the former epicenters, features not only various traditional leisure tourism sites but also significant pandemic-related attractions. Thus, joint consumption of both leisure and pandemic-related tourism products should be explored.

Intentions and motivations of visiting post-disaster destinations

Since the mid-2000s, scholars have explored the consumer aspects of dark tourism. Nature of demand, motivations, and experiences of dark tourists are focal points of this branch of extant literature (Light, 2017). There are both theoretical and practical implications of investigating tourists' intentions and

motivations in post-disaster tourism. From a theoretical point of view, scholars agree that research into dark tourism is incomplete without an exploration of why visitors are attracted to locations or experiences associated with death and suffering (Stone and Sharpley, 2008; Biran, Poria and Oren, 2011; Biran *et al.*, 2014). Though academic interest in dark tourism has increased, understanding of the term remains insufficient, especially from a consumer perspective. Plentiful supply-side-related research has been conducted to elicit the definition and the spectrum model of dark tourism sites, limited studies have explored visitors' perspectives on dark tourism, such as how they interact with dark tourism sites and why they are drawn to these places of death and disaster (Isaac and Çakmak, 2014). There have been few attempts to explain tourists' motivations and intentions in visiting post-disaster destinations (Biran *et al.*, 2014). Thus, although motivational determinants of tourist's intentions in participating in dark tourism is of great importance, this branch of empirical studies are lacking. From a practical perspective, supply-side research disregards the diversity of an individual's inner motivations in visiting dark tourism sites, resulting in a distorted view of dark tourism that arbitrarily mixes all types of potential tourists (Biran, Poria and Oren, 2011). Thus, classification of tourists according to their intention to jointly consume both traditional leisure products and pandemic-related tourism products is of great managerial importance. The exploration of tourists' intention provides solid foundation for market segmentation strategies in a post-disaster era. And the push-pull motives, as well as socio-demographic features portray each market segment to a detailed extent.

Pull-push framework is a classic, sophisticated, and widely used approach for understanding the decision-making process of tourists (Kim, Lee, & Klenosky, 2003; Wong and Yeh, 2009; Biran *et al.*, 2014). The push-pull theory claims that tourists' motivations to visit a specific destination consist of two components—namely, push motives and pull motives. While push factors arise from intrinsic psychological motivations (and are thus important for explaining individual motivations for travelling), pull motives are extrinsic, indicating features of the destination (Hsu and Huang, 2008; Bhati *et al.*, 2020). Up till now, five extant studies on dark tourism (namely Rittichainuwat, 2006, 2008; Biran *et al.*, 2014; Yan *et al.*, 2016; Chen and Tsai, 2019) employed push-pull schemes. Scholars generally agree that, in the context of dark tourism, tourists' fascination with death exists alongside other motivations that are part of traditional leisure tourism (Dann and Seaton, 2001; Stone, 2012; Biran *et al.*, 2014; Light, 2017).

Given the nature of joint consumption in dark tourism products, pull motives specific to dark destination attributes and the push reasons to travel that are related to death, disaster, and suffering should be considered along with the traditional push-pull scheme. According to Mansfeld (1992), classic leisure tourism push factors include seeking novelty and excitement, recreation, relaxation, prestige, socialization, and so on. From the perspective of push motives specific to dark tourism, specific interest in the site of an earthquake is mentioned and used by Biran *et al.* (2014). Apart from this, dark push motives are still unexplored in the extant literature. In this study, we seek to shed light on a new construct of dark push motives named patriotism. Dark tourism is typically mentioned in association with sites related to war and ethnic and national conflicts. Therefore, it is often closely connected to the broader topic of remembrance (Seaton, 2009): many sites of dark tourism also play important political roles as places of collective and national memory (Knox, 2006; Allar, 2013; Bird, 2013; Du, Littlejohn and Lennon, 2013; Forsdick, 2014; Pendleton, 2014). Visits to places of death, disaster, or atrocity create opportunities for tourists to acquire or affirm their senses of nationhood (Seaton, 1999; Slade, 2003; Pezzullo, 2009; Tinson, Saren and Roth, 2015; Clarke and McAuley, 2016). In the context of natural disasters, peoples' sense of national identity and support for national heroes is another manifestation of patriotism. In post-disaster tourism, no previous study has incorporated patriotism as a push motive. However, a Chinese paper has found that the COVID pandemic has greatly increased vocational students' sense of national identity. The dedication of the frontline medical staff in the fight against the epidemic has greatly touched the inner feelings of vocational students (Chen, 2021). This inspired us to be the first study to incorporate patriotism as a new construct in the push factors in the context of dark tourism.

According to Stone (2012), dark tourism has become “part of a broader visitor economy and often packaged and promoted with other mainstream attractions.” From the perspective of tourism, pull items

associated with both leisure and non-leisure (i.e. pandemic-related) tourism products are of necessities, given that a tourist will seek to maximize utility by visiting a place of joint interest. Thus, pull motives in the context of dark tourism are composed of both traditional leisure and disaster-specific pull attributes. General leisure tourism pull motives such as tourism infrastructure and accessibility are important but not related to the disaster (Rittichainuwat, 2006, 2008; Biran *et al.*, 2014). However, as some disasters can cause enormous changes to a tourist destination, special attention should be paid to the destination features that are affected by the disaster.

Methods and Data

To explore the relationship between tourists' intentions and motivations in post-pandemic travel, as well as the relationship between intention and socio-demographic features, this study adopted a two-stage mixed-method approach, dominated by the quantitative approach and based on an online survey. In the first stage, focus group interviews and a literature review were carried out to extract the main items to be included as push-pull motivation factors. In the second stage, an online questionnaire was designed incorporating the push-pull motives revealed by both previous literature and the focus group study. The questionnaire was pilot tested (N=20) and refined with regard to the wording and clarity. The refined version of the questionnaire was then released on a recognized third-party online questionnaire platform—Wenjuanxing—in China. Efforts were made to monitor the quality of questionnaire data. For instance, reverse questions were set up in the questionnaire. Trap questions, which are generally common-sense questions were inserted randomly into the questionnaire to examine the respondents' attention. Moreover, if responses containing regularly repeat answers or malicious answers in different questions were identified by random manual check, those would be marked as invalid ones.

After the response data was collected via the online channel, it was then processed with quantitative methods. Regarding data analysis techniques, factor analysis was implemented first to extract the main themes of push and pull motives. Secondly, an ordered logistic regression was used to examine motivational determinants of intentions to visit. A clustering analysis was then carried out to identify the market segmentation of post-pandemic Wuhan tourists and to portray the features of each segment in light of their push-pull motives and socio-demographic features.

Focus group study

With the goal of discovering potential tourists' push and pull motives in visiting Wuhan and other recovering pandemic epicenters (and thereby identifying the main themes to be included in the push-pull motive framework), a focus group study was conducted during the study's exploratory stage in February 2021. In terms of the selection of interviewee profiles, Biran *et al* (2014) assumes that experiencing a recent disaster would affect individuals' travel behavior and motivation to travel. Experiencing the disaster might increase individuals' perception of risk (Uriely, Maoz and Reichel, 2007) or cause them to be more sensitive to ethical and moral tensions arising from disaster sites being used as tourism attractions (Coats and Ferguson, 2013). The globally prevailing pandemic has affected the economies all over the country, with confirmed cases appearing in almost all provinces. Thus, ten interviewees were recruited from a province in China that was among the major source markets of Wuhan and one of the areas in China least affected by the pandemic. Aiming to maximize the outcome of the focus group study, we enriched interviewee sample profiles by purposive sampling.

The final focus group consisted of 10 participants from various socio-economic backgrounds such as different age ranges, employment types, income levels, marital and fertility status, and educational levels. In terms of age distribution, each of the following age group (20-24, 25-29, 30-34, 45-49, 50-54) contained two participants. While one participant earns less than 2000 Yuan per month, three other participants earn more than 8000 Yuan. Meanwhile, each of the following income group (2000-4000 Chinese Yuan, 4000-6000 Chinese Yuan and 6000-8000 Chinese Yuan) consisted of two participants. Half of the whole group has bachelor's degree. Two participants are with master's degree. Another two participants were graduated from junior college. One participant is with high school degree. Speaking of participants' employment types, half of the whole sample is working in private companies. Two of the whole group are students. Other three participants work in state owned enterprise, small business

and government unit respectively. In addition, the focus group included two participants who have prior travel experience in Wuhan and remaining are those who have none.

The themes uncovered from the focus group study were then compared with those identified by previous post-disaster studies on push-pull schemes namely, Biran *et al.* (2014) and Rittichainuwat (2006, 2008) and Weaver *et al.* (2018). Apart from traditional push and pull motivations, participants mentioned “to pay tribute to national heroes who sacrificed their lives”, “to see how aid from all over the country helped Wuhan”, “to visit old sites of Leishenshan and Huoshenshan hospital and feel the unity of the country in defeating the pandemic”, “to witness the changes in people’s lives caused by the pandemic”, “to explore the recovery of daily lives and the economy” as new push motivational items in the focus group discussion. In terms of pull motives, potential changes caused by the pandemic and media image of Wuhan during/after the pandemic were revealed in companion with traditional pull factors. The revealed motives were then included in the push-pull motive framework in section 2 of the online survey.

The online survey

The online questionnaire consisted of three sections. The first section collected respondents’ willingness and intention to visit Wuhan in the post-pandemic era. Due to constraints on time and budget, some individuals may be unwilling to visit a former pandemic epicenter. Therefore, in order to filter out respondents who did not want to travel in the post-pandemic era, the questionnaire began with a yes or no question asking if the respondent would be willing to visit Wuhan when the pandemic ended. Respondents who answered that they would be willing could then proceed to the remaining part of the questionnaire. In order to unify respondents’ understanding towards the definition of the “end of the pandemic” and to avoid any resulting bias, we defined the post-pandemic era as the time when all travel restrictions around the world are cancelled, and overall risk of infection during travelling is eliminated. Behavioral intention was defined as “individuals’ expectations of a particular behavior in a particular setting” and in practice meant “the likelihood to act”. After the filter question on individuals’ willingness to travel, the second question asked respondents to rank on a scale from one to seven their overall intention to visit Wuhan in the post-pandemic era. More specifically, participants were asked to rate their intention of engaging in traditional leisure tourism and pandemic-related tourism in Wuhan respectively. The former term (traditional leisure tourism) refers to the intention to visit traditional tourism sites and engage in non-dark tourism activities (for example, natural, historical, and cultural sites that are not affected by the outbreak of pandemic, such as Dong Lake, Wuhan University, and Jiangnan Road). The latter (pandemic-related tourism) refers to the intention to visit sites and engage in activities that are associated with the pandemic such as the old sites of modular hospitals, the memorial sites, and so on. Intention was measured by a one-to-seven scale, 1 being “extremely unlikely” and 7 being “extremely likely.”

In the second section, participants’ motivations were investigated based on the push-pull framework. These pull-push motivation questions were based on results from both the focus group study and the existing literature reviewed on the previous stage of this study. In order to examine if respondents will be jointly motivated by both leisure and pandemic-related factors, the final list of push and pull motive factors employed in the online survey included both motives related to traditional leisure tourism and those specifically related to pandemic tourism. Based on the results of focus group study and previous literature namely, Rittichainuwat (2006, 2008), Biran *et al.* (2014) and Weaver *et al.* (2018), we considered 28 push items and 17 pull items for respondents’ motivations to travel to Wuhan in post-pandemic era. On a one-to-seven scale, 1 being “extremely unimportant” and 7 being “extremely important,” respondents are asked to state the importance they would attach to each push reason and destination pull attributes in their decision to visit Wuhan post-pandemic.

In the third section, we collected respondents’ socio-demographic features including gender, age, income, type of employment, marital status, number of children, educational level, current city of residence, prior travel experience, and residential history in Wuhan. We posed the question on respondents’ residential history in Wuhan according to the place attachment theory. Respondents were asked if they have resided in Wuhan for more than one year. According to the division standard used by China’s National Bureau of Statistics, the age distribution lies from 20 to 64 years old with an age

separation of 5 years between each set. The five-layer income distribution (i.e. lower than 2000 Chinese Yuan, 2000-4000 Chinese Yuan, 4000-6000 Chinese Yuan, 6000-8000 Chinese Yuan, more than 8000 Chinese Yuan) followed the standard of personal monthly income division employed by Weaver *et al* (2018). Apart from traditional socio-demographic features, the respondents were asked to state on a scale from one to seven their agreement with the following statement: “I pay more attention to the news and updated data about the pandemic than the people around me.” This question reflects the respondent’s level of concern about the pandemic. Before the formal data collection process, a pilot study with 20 participants, was conducted in February 2021 to improve the wording and clarity of the questionnaire. The formal data collection process was then implemented in March 2021 by releasing the questionnaire on a well-recognized third-party online platform. Participants are restricted to those who live in the low-risk area in China, and do not include those who are currently Wuhan residents. A coupon incentive was awarded to each participant who successfully completed the online survey.

Results and analysis

Out of 310 responses collected, five respondents claimed that due to budget limitations and time constraints, they were not willing to visit Wuhan after the end of the pandemic. Hence, excluding respondents who were unwilling to travel, 305 respondents willing to visit Wuhan were included in the final sample.

1. Factor analysis of push and pull motives

On a scale from one to seven, participants of the online survey were asked to state their level of agreement with statements regarding 28 items of push motives. In order to group push motives into different latent constructs and thus identify their common dimensions, factor analysis was conducted using principal component analysis (PCA) and the Quartimax rotation method. Jeffrey and Xie (1995) employed Quartimax rotation in principal analysis and found that it produced the most useful combination of interpretability and orthogonality. Components with an eigenvalue greater than 1.0 were employed. Only items with factor loading after orthogonal rotation greater than 0.4 were included in the final list. After obtaining the main constructs, the internal consistency of each construct was found by calculating the Cronbach’s Alpha, an indicator that varies from zero to one. A construct is with good reliability if its Cronbach’s Alpha is greater than 0.6 (Chen and Myagmarsuren, 2010; Kamata and Misui, 2015; Chen *et al.*, 2016). Garcia *et al* (2015) and Wong and Yeh (2009) also uses 0.6 as the cutoff threshold for an acceptable level of reliability. A Cronbach’s Alpha above 0.7 indicates “good” construct reliability, and above 0.8 indicates “strong” construct reliability.

The Kaiser–Meyer–Olkin (KMO) test was carried out, and Bartlett’s test of sphericity was calculated to assess if factor analysis could be applied to the data (Hair *et al.*, 1998). As a result, the KMO value was 0.87, and Bartlett’s test was significant at the 1% level. Both results prove that the use of Exploratory Factor Analysis was appropriate (Field, 2009). The results of factor analysis, shown in table 1, indicate that 28 push motive factors should be grouped into six main categories, explaining 56.46% of total variance. The factor scores for each item are all greater than 0.4. Thus, no factors are excluded. And none loaded on more than one factor. The first construct, labeled “patriotism,” represents participants’ feelings about how the country controlled the spread of the pandemic and how national heroes sacrificed their lives protecting the whole country from infection. The second construct—humanism and interest in pandemic—reflects respondents’ humanitarian feelings such as sympathy towards Wuhan and its residents, a willingness to help the local economy recover, and their curiosity about the dark sides of the pandemic in Wuhan. Novelty seeking, the third main component, indicates motivations associated with willingness to do unusual things and pursue excitement. The fourth construct, entitled “relaxation and escape,” indicates respondents’ willingness to escape from daily routine to seek refreshment and relaxation in the journey. “Fun and recreation” reflects seeking enjoyment in cuisine, natural beauties, and the journey itself. The last main factor, “socialization,” represents participants’ willingness to establish interpersonal connections with others during the trip. The fifth column of table 1 shows that Cronbach’s Alpha for socialization is greater than 0.6, indicating an acceptable reliability level. “Patriotism,” as a new construct, has a Cronbach’s Alpha greater than 0.8, indicating strong reliability. The Cronbach’s Alpha values for other components are all over 0.7 and indicate good reliability.

“Fun and recreation,” “patriotism,” and “relaxation and escape” appear to be three most important push motive dimensions, each having a mean value over five. “Fun and recreation” is the most important push factor motivating people to travel to Wuhan in the post-pandemic era. “Patriotism” and “relaxation and escape” are respectively the second and third most vital push factors in the whole sample. Socialization, with mean equal to 3.90, is the most trivial push factor. The final two factors (i.e. “humanism and interest in pandemic” and “novelty-seeking and self-esteem”) are still relatively important with mean values greater than four.

Table 1. Factor analysis of push motives

	Factor loading	Eigen-value	Variance explained	Cronbach's Alpha	Mean
1) Patriotism		7.16	15.85	0.82	5.45
Pay tribute to national heroes who sacrificed their lives	0.61				
See how aid from all over the country helped Wuhan	0.62				
Visit the old site of two hospitals and feel the unity of the country in defeating the pandemic	0.60				
2) Humanism and interest in pandemic		2.99	11.13	0.79	4.95
Witness the changes in people's lives caused by COVID	0.47				
Explore the recovery of daily lives and the economy	0.61				
Help the local economy recover through tourism	0.49				
Contemplate fate at the disaster sites	0.50				
Seek out the dark sides of the pandemic without mainstream media's encouragement	0.52				
3) Novelty-seeking and self-esteem		2.16	8.63	0.76	4.98
Experience a different lifestyle	0.54				
Find thrills and excitement	0.58				
Engage in outdoor activities	0.51				
Go to places not many people have visited	0.59				
Visit places other people wish to see but cannot	0.58				
Visit Wuhan to impress friends and relatives	0.63				
Broaden one's horizon and gain knowledge	0.48				
4) Relaxation and escape		1.35	8.45	0.72	5.27
Find physical and emotional refreshment	0.50				
Get the opportunity to exercise	0.63				
Relieve stress and alleviate pressure	0.64				
Escape from daily routine and change one's pace of life	0.65				
Get the opportunity to relax	0.53				
5) Fun and recreation		1.13	8.16	0.70	5.76
Enjoy travelling as a hobby	0.53				
Enjoy local delicacies and cuisine	0.54				
Enjoy natural beauties	0.46				
See the locals' way of life	0.48				
6) Socialization		1.02	4.24	0.68	3.90
Making friends	0.57				
Developing potential romantic relationships	0.70				
Visiting friends and relatives	0.75				
Enhancing one's relationship with travel companions	0.52				
Total variance explained			56.46		

Note: KMO = 0.87, Bartlett's Test of Sphericity = 2953.77, df = 378, $p \leq 0.01$.

To extract common dimensions of pull motive items, factor analysis with PCA and Quartimax rotation was implemented. One of the 17 factors was excluded from the final list since its factor loading was less than 0.4. As indicated by the results of factor analysis (shown in Table 2), the remaining 16 factors can be grouped into four main components, explaining 59.56% of the total variance. All dimensions are reliable in terms of internal consistency, given that the Cronbach's Alpha in each case is greater than 0.6. The first key pull motive component, labeled “the pandemic,” highlights the pull attributes related to the media portrayal and impact of COVID on Wuhan. The Cronbach's reliability index of “the pandemic” is 0.8, indicating high internal consistency. The second key dimension is “safety, cleanliness, and accessibility,” indicating practical attributes of the destination such as safety, service quality, hygiene level, public transportation, and environmental quality.

Table 2. Factor analysis of pull motives

	Factor loading	Eigenvalue	Variance explained	Cronbach's Alpha	Mean
1) The pandemic		3.62	23.64	0.80	5.01
Potential changes to Wuhan from the pandemic	0.79				
Media image of Wuhan during/after the pandemic	0.78				
2) Safety, cleanliness, and accessibility		2.35	16.71	0.73	5.84
High personal safety	0.62				
Good quality of service	0.43				
Good public transportation	0.45				
Good sanitation and cleanliness	0.56				
Good environmental quality including water, air, soil	0.41				
3) Tourism resources		1.20	10.19	0.71	5.70
Special local customs and activities	0.59				
Well-recognized historical heritage	0.63				
Extraordinary natural beauties and scenery	0.53				
Spots that are popular and famous online	0.66				
Notable local delicacies and gastronomy	0.49				
Hospitality, entertainment, and shopping facilities	0.59				
4) Value for money		1.04	9.02	0.66	4.55
The best deal amongst possible destinations	0.70				
High value for money	0.77				
Special promotions and discounts	0.57				
Total variance explained			59.56		

Note: KMO = 0.83, Bartlett's Test of Sphericity = 1090.66, df = 120, $p \leq 0.01$

Included in the third main variable, labeled “tourism resources,” are traditional tourism attractions such as special folk customs, historical heritage, natural beauties, local delicacies, hospitality and entertainment facilities. The last key pull motive emphasizes the importance that respondents placed on value for money. The mean values listed in Table 2 indicate that respondents perceived “safety, cleanliness, and accessibility” (with a mean score of 5.84) and “tourism resources” (with a mean score of 5.70) as the most crucial factors attracting them to Wuhan. With a considerably high mean score—greater than five—“the pandemic” ranks as the third most important pull factor. Although “value for money” is perceived as the least important, its mean score is still above four.

II. Regression analysis: intentions to visit and motivations

In the web-based survey, participants were asked to reveal on a one-to-seven scale their level of agreement with two key statements, 1 being “I extremely agree” and 7 being “I extremely disagree” so as to elicit their potential intention to visit Wuhan in post-pandemic era. These statements are 1) “I visit Wuhan to enjoy traditional leisure tourism products,” and 2) “I visit Wuhan to visit dark (pandemic-associated) tourism sites and experience pandemic-related tourism activities.” Detailed clarifications were attached below the two statements in order to optimize respondents’ understanding.

Non-dark tourism activities are those not associated with the outbreak of the COVID-19 pandemic. Examples include sightseeing and entertainment activities in traditional tourism sites such as The Yellow Crane Tower, Wuhan University, Dong Lake, and Jiangnan Road. Dark tourism sites are places that exist as a direct result of the pandemic, such as the original sites of Leishenshan and Huoshenshan field hospitals, possible future memorial sites, and pandemic-related artifacts, museums and exhibitions. Examples of pandemic-related tourism activities include using virtual reality devices to reproduce street scenes during quarantine at the beginning of the outbreak and witness changes in Wuhan citizens’ daily lives after pandemic. In order to explore the potential motivational determinants of tourists’ intention to visit traditional leisure tourism attractions, as well as their intention to engage in pandemic-related dark tourism activities, we carried out regression analysis. The two intention terms were taken as separate dependent variables.

Key explanatory variables include six push motive variables and four pull motive factors extracted from factor analysis, which represent respondents’ prior level of knowledge about Wuhan and the pandemic.

Because one's demographic characteristics can influence his or her tourism demand (Li *et al.*, 2006), and thus for the purpose of minimizing endogeneity, we adopted demographic factors as control variables. For push and pull motives, factor scores from factor analysis were used as the input for motivational explanatory variables, which are in turn treated as continuous variables in regression models. Ordinal variables (i.e., the level of concern about the pandemic) were ranked from one to seven, which means growing importance is attached to those factors. For this reason, the level of concern is regarded as a continuous variable in the regression models. For each of the multiple categorical variables (number of total categories equal to N) which are not ordinal—namely, namely, age, income, educational level, marital status, and number of children—we set up N-1 dummy variables. To model those survey items whose values were either “yes” or “no,” we created binary dummy variables with a value of either zero or one. These items included travel experience (i.e., whether the respondent has visited Wuhan for tourism), residential history in Wuhan (i.e., whether the respondent has lived in Wuhan for more than one year), and gender (i.e., whether the participant is a male or female). Since dependent variables are ordinal variables with scores ranking from one to seven, indicating level of agreement from the lowest to the highest, the ordered logit regression method is suitable in this context (Greene, 2014). The estimated coefficients included in the resulting regressions and corresponding significant levels are recorded in Table 3.

Because the dependent outcomes ranged from “I extremely agree” to “I extremely disagree,” a positive coefficient indicated that an increase in the corresponding variable increases the level of the dependent variable (Leeuwen, Kourtit and Nijkamp, 2013; Sim *et al.*, 2018): in the case of this study, this is the level of agreement expressed with the questions about respondents' intentions to engage in dark/leisure tourism. The reverse is true for a negative coefficient. The impact of push variables such as novelty-seeking and self-esteem, relaxation and escape, and fun and recreation are significant in determining respondents' intention of visiting traditional non-dark leisure sites. Specifically, the higher these leisure tourism motives, the greater the intention to engage in traditional leisure tourism in Wuhan. Whereas socialization motive is significantly negatively related to leisure intention.

Table 3. Ordered logit regressions: motivational determinants of intentions to visit

	DV1		DV2	
	Intention to visit traditional sites		Intention to visit pandemic-related sites	
	Coefficient	Standard error	Coefficient	Standard error
Push motives				
Patriotism	0.20	0.14	0.46***	0.14
Humanism and interest in pandemic	0.04	0.15	1.88***	0.19
Novelty-seeking and self-esteem	0.44***	0.13	- 0.10	0.13
Relaxation and escape	0.24**	0.12	0.16	0.13
Fun and recreation	0.74***	0.16	0.17	0.16
Socialization	- 0.22*	0.08	0.05	0.13
Pull motives				
Tourism resources	0.14**	0.15	- 0.12	0.16
Safety, cleanliness, and accessibility	0.07	0.14	- 0.13	0.14
Value for money	- 0.08	0.14	0.03	0.14
The pandemic	- 0.27	0.16	0.45***	0.16
Knowledge of Wuhan and pandemic				
Prior travel experience: yes	0.62*	0.32	- 0.34	0.31
Residential history in Wuhan: yes	- 0.54	0.67	0.61	0.62
Level of concern about the pandemic	0.09	0.12	0.39***	0.12
Controls: socio-demographic features				
	yes		yes	

Note: Regression statistics for DV1: Pseudo $R^2 = 0.12$, Number of observations = 305, $p = 0.00$; Regression statistics for DV2: Pseudo $R^2 = 0.28$, Number of observations = 305, $p = 0.00$; *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$; Standard errors are in parenthesis

People who are more focused on enjoying the journey on their own are more likely to be interested in leisure tourism products. Biran *et al.* (2014) agrees on aforementioned results, stating that the potential tourists with highest intention in visiting leisure sites are more motivated by push factors that are associated with leisure pursuits such as fun and recreation, escape and relaxation, prestige than those who are less interested in leisure attractions. Meanwhile, among the three types of tourists identified by

Biran *et al.* (2014), those who are most attracted by non-dark leisure sites are least motivated by socialization factor. Turning to another aspect of intention, patriotism and human interest in the effects of the pandemic positively influence the intention to visit pandemic-related sites (at a significance level of one percent), whereas the influence of other leisure tourism push motives is insignificant. Existing literature on motivations of dark tourists supports the impact of patriotism and humanism and interest in pandemic motivations on intention to visit dark sites. For instance, as suggested by Bhati *et al.* (2020), Smith (2002), Biran *et al.* (2014) and Yoshida, Bui and Lee (2016), potential dark tourists tend to visit dark sites to remember events from past in the present, at not only family and individual level but also the national level. Tourists would also tend to see how victims of an unfortunate event cope with it (Kang, Lee and Han, 2018). Apart from these, the historical or morbid curiosity, or more generally, special interest in the disaster would attract tourists to dark tourism sites (Bhati *et al.*, 2020). To sum up, results on push motivations imply that a joint increase in leisure and pandemic-related push motives may increase a tourist's intention to jointly consume both types of tourism products and thereby maximize their utility.

As far as pull motives are concerned, a higher level of tourism resources is the only significant factor in increasing respondents' intention to engage in leisure tourism. This is consistent with traditional leisure tourism literature on tourists' motivation (Mansfeld, 1992). Turning to the second model, while leisure tourism attractions do not increase a tourist's intention to engage in dark tourism, the relationship between motivations associated with the pandemic and pandemic-related dark intention is significantly positive. Dark tourists—those who intend to visit pandemic-related sites—are more interested in the sites of suppressed events and deaths (Biran *et al.*, 2014; Bhati *et al.*, 2020). Daily information related to the pandemic such as updates on confirmed cases and reports of heroism in Wuhan will enhance one's emotional connection to the pandemic-related side of epicenters. Thus, factors that might increase one's previous knowledge of the pandemic (i.e., level of concern about the pandemic) is significantly and positively correlated to one's pandemic-related intention. Tourists with previous travel experience in Wuhan demonstrate a significantly greater intention of revisiting Wuhan for leisure purpose than inexperienced tourists' intention to visit leisure attractions for the first time. As revisit intention is an extension of satisfaction (Um, Chon, & Ro, 2006), this positive relationship demonstrates a generally good perception of quality of performance during onsite and post-purchase periods of leisure tourism in Wuhan.

III. Cluster Analysis: between- and within-cluster comparison of push and pull motives

Cluster analysis has long been used by tourism researchers as a means of segmenting the population in specific research contexts (Dolnicar, 2002; Biran, Poria, & Oren, 2011; Kamata and Misui, 2015; Yan *et al.*, 2016; López-Guzmán *et al.*, 2019). Market segmentation can be achieved a result of cluster analysis's ability to group together similarities and dissimilarities among respondents based on certain characteristics (Dolnicar, 2002; Liasidou, 2013). The TwoStep Cluster Analysis procedure is an exploratory tool for revealing natural groupings (or clusters) that would otherwise go undetected within a dataset. This procedure's algorithm has several desirable characteristics that set it apart from traditional clustering techniques. Firstly, the TwoStep Cluster is able to deal with categorical and continuous variables. By assuming that variables are independent, a joint multinomial-normal distribution can be placed on categorical and continuous variables. Additionally, this procedure is able to automatically determine optimal number of clusters by comparing the values of a model-choice criterion (i.e., Akaike Information Criteria or Bayesian Information Criteria) across different clustering solutions. Finally, the TwoStep algorithm is able to analyze large data files by constructing a cluster features (CF) tree that summarizes the records. Table 4 displays clustering results for tourists' intentions of visiting both types of attractions.

Looking at the overall mean as reflected in Table 4, the data indicates that respondents are more interested in seeking traditional leisure travelling experience than in engaging in pandemic-related sites and activities in the post-pandemic era. Although the intention to visit pandemic-related tourism site is lower than the intention to visit traditional leisure sites, it is still relatively high with a mean score over four. In other words, in the post-pandemic era, while Wuhan remains among the popular destinations

for traditional leisure tourism in China, it shows strong potential for developing pandemic-associated tourism sites and activities.

This study found that respondents' intentions in visiting Wuhan are varied, which indicates different types of tourists. Cluster analysis is one of the most powerful and well-recognized methods of identifying market segmentations (Kamata and Misui, 2015). Hence, a TwoStep cluster analysis was implemented based on respondents' level of agreement to key statements of intention. From the whole sample (N=305), three distinct clusters were identified by the TwoStep clustering method. As indicated in table 4, the analysis of variance (ANOVA) tests shows that the three clusters differ significantly in terms of both traditional leisure tourism intentions and dark tourism intentions. Descriptions of each cluster regarding cluster size, cluster and overall average, and leisure and dark intention are presented in Table 4.

Table 4. Intention to visit among clusters

Travel Intention	Cluster 1 (N=86)	Cluster 2 (N=147)	Cluster 3 (N=72)	Overall Mean	One-way ANOVA
Traditional leisure attractions	4.47	6.33	5.42	5.59 (1.06)	F = 193.00**
Pandemic-related sites and activities	5.79	5.22	2.51	4.74 (1.60)	F = 255.11**

Note: Standard deviations are in brackets

** $p \leq 0.01$

Among the three clusters, Cluster 2 is the largest in size (N=147, which accounts for 48.20% of the whole sample), and features the highest intention to visit traditional leisure tourism attractions in Wuhan (6.33 in 1~7 scale). In Cluster 2, although the intention of visiting dark tourism sites and experiencing pandemic-related activities is slightly lower than that of visiting traditional sites, it is still high (5.22 in 1~7 scale). Hence, respondents in **Cluster 2 are mainly leisure tourists with high dark tourism intentions**. That is, respondents in the largest group (Cluster 2) demonstrate interest in joint consumption of both traditional leisure tourism products and pandemic-related tourism products. The second-largest cluster identified (N=86, which accounts for 28.20% of the whole sample) is Cluster 1. Across the three clusters, respondents in Cluster 1 display the highest intention in visiting pandemic-related sites, and their intention of visiting dark tourism sites (5.79) exceeds that of engaging in traditional non-dark tourism sites and activities (4.47). Thus, horizontal comparison between clusters indicates that respondents in Cluster 1 display the lowest intention of visiting traditional leisure sites but greatest intention of engaging in pandemic-related dark tourism activities. Nevertheless, these respondents' intention of visiting traditional sites is over 4, which indicates that Cluster 1 respondents are still interested in jointly consuming post-pandemic destination. Therefore, respondents in **Cluster 1 can be classified as dark tourists with certain leisure needs**. Cluster 3 is the smallest in terms of cluster size: 72 respondents (accounting for 23.60% of the whole sample) are grouped into this cluster. Whereas respondents in Cluster 3 have the lowest intention (2.51) of visiting pandemic related dark tourism sites, they have a high intention (5.42) of visiting traditional leisure attractions in Wuhan. Thus, respondents in **Cluster 3 are identified as nearly pure leisure tourists** with a low intention of engaging in dark tourism. Having identified the three clusters, we then examined each segment by investigating their push-pull motives and socio-demographic features.

Push motives: between- and within- cluster comparison

In order to test whether there are significant distinctions in push motives between the three clusters, we employed a one-way analysis of variances test (ANOVA), the results of which are represented in Table 5. We first applied Levene's statistic to assess whether the homogeneous variance assumption of ANOVA would be satisfied. The results show that, apart from socialization, the other five motives for three clusters all feature unequal variances. Hence, Welch's ANOVA was used to conduct between-cluster comparison under heterogeneous variances. In the post-hoc analysis, the Games-Howell test was employed to identify the pairwise between-group differences in each push motive, not only when the

variance homogeneity assumption was contradicted, but also when the group sizes were unequal (Vaske, 2008; Biran *et al.*, 2014; Wilkins *et al.*, 2018). The results of ANOVA tests for push motives are listed in Table 5. The three clusters differ significantly regarding each push motive construct.

Table 5. Intention to visit and push motives

	Cluster 1	Cluster 2	Cluster 3	One-way ANOVA	Differences between clusters	Games-Howell (p value)
Patriotism	5.94	5.74	4.28	F = 44.37**	1 & 3, 2 & 3	0.00, 0.00
Humanism and interest in pandemic	5.41	5.21	3.86	F = 55.01**	1 & 3, 2 & 3	0.00, 0.00
Novelty seeking and self-esteem	4.94	5.30	4.38	F = 27.09**	1 & 2, 2 & 3	0.00, 0.00
Socialization	3.97	4.17	3.23	F = 19.16**	1 & 3, 2 & 3	0.00, 0.00
Fun and recreation	5.64	6.02	5.38	F = 19.36**	1 & 2, 2 & 3	0.00, 0.00
Relaxation and escape	5.00	5.57	4.96	F = 16.82**	1 & 2, 2 & 3	0.00, 0.00

Note: ** $p \leq 0.01$

Within-cluster comparisons were conducted to elicit differences in the importance of each push motive to every cluster. Looking at the mean value of push motives for those who prefer pandemic-related sites and activities to traditional leisure ones (Cluster 1), patriotism (with a mean value of 5.94) is the most significant pandemic-related motive, followed by humanistic and special interest in the pandemic (5.41). Fun and recreation is the second vital factor for Cluster 1 respondents, since they have certain leisure needs. For leisure tourists with a high intention of engaging in pandemic-related tourism activities (i.e. Cluster 2), fun and recreation is the most essential push motive (with a mean over 6 out of a possible 7). Patriotism has the second highest mean value (5.74) in Cluster 2. Relaxation and escape, novelty seeking and human interest in the effects of the pandemic are also important, given that they have means over five. In summary, respondents in Cluster 2 demonstrated higher and broader motivations: respondents were interested in both leisure and dark tourism activities, tended to have broader interests, and were more likely to pursue utility maximization by joint consumption than were other clusters. This fact again draws attention to the existence of motivations for joint consumption of both types of tourism products. For nearly pure leisure tourists (Cluster 3), traditional leisure push motives (namely fun and recreation, relaxation and escape, and novelty seeking) are the most important factors, and the mean values of pandemic-related push motives are therefore lower than those of leisure push motives. Paired sample t tests were implemented to assess the difference between push motives within Cluster 1. Patriotism, as a new construct associated with the pandemic, was found to be significantly different from traditional leisure push motives such as fun and recreation ($t = 3.05$, $p \leq 0.01$) and escape and relaxation ($t = 8.50$, $p \leq 0.01$). Similarly, there was a significant difference between human interest in the effects of the pandemic and recreation ($t = -2.29$, $p \leq 0.01$) and relaxation ($t = 3.93$, $p \leq 0.01$).

Paired sample t tests were conducted to explore the between-cluster differences of push factors. Members of Cluster 1, who display the highest interest in pandemic-associated tourism activities, show the greatest mean scores in the pandemic-related push motives of “patriotism” and “humanism and interest in pandemic.” Moreover, significant differences with regard to pandemic-related motives were found between Cluster 1 and Cluster 3, as well as between Cluster 2 and Cluster 3 (Game-Howell p values less than 1%). This reflects that, while Cluster 1 and 2 were both interested in dark tourism sites, those who were purely interested in leisure tourism sites (Cluster 3) were least motivated by pandemic-related motives. Furthermore, the greater the patriotic and humanitarian feelings and the more curiosity respondents have about the pandemic, the greater was their intention to engage in pandemic-related sites and activities. Significantly, of all three clusters, Cluster 2 (leisure tourists with certain pandemic-related intentions) had significantly the highest score in “fun and recreation,” “relaxation and escape,” and “novelty-seeking and self-esteem.” when compared to Cluster 1 and Cluster 3. Cluster 3 (which included pure leisure tourists) was the cluster least motivated by socialization factors. This is consistent with results in a previous study which suggests that the mixed nature of dark tourism products created

more opportunity for socialization (Biran *et al.*, 2014). Thus, respondents in Clusters 1 and 2 pursuing joint consumptions were more likely to be interested in making interpersonal connections during the consumption of both types of tourism products.

In summary, paired sample t test shows that Cluster 1 and Cluster 2 were significantly more motivated by pandemic-related motives than was Cluster 3. Pure leisure tourists were least motivated by pandemic-related factors. Further, while of the three clusters, Cluster 2 respondents were most motivated by traditional leisure motives, they still were highly affected by pandemic-related factors when compared to those who sought to consume only a single leisure tourism product. Looking at the pairwise comparison in “socialization,” no significant differences were found between Cluster 1 and Cluster 2; however, clusters 1 and 2 were significantly different from Cluster 3. This may reflect tourists’ perceptions of joint consumption that includes both traditional leisure and pandemic-related tourism activities: dual-purpose consumption tourism may address socialization motives better than a trip based on a single tourism product. Table 5 thus demonstrates that respondents intending to consume joint products were more likely to be jointly motivated by both leisure and pandemic-related motivations (i.e., “patriotism” and “humanism and interest in pandemic”).

Pull motives: between- and within- cluster comparison

As shown in Table 6, Oneway-ANOVA was conducted to assess if the impact of each pull motive differs significantly between clusters. In light of the mean scores, “safety, cleanliness, and accessibility” and “tourism resources” were the most important pull motives for all three clusters. While “the pandemic” featured a mean score over five for joint product consumers (i.e., Cluster 1 and Cluster 2), it is the least attractive pull factor for purely leisure tourists (Cluster 3). Within-cluster comparison in Cluster 1 suggested that “the pandemic” was a significantly different motivator for attracting visitors to Wuhan than “safety, cleanliness, and accessibility,” “tourism resources,” and “value for money” ($t = 10.53, p \leq 0.0$; $t = 9.05, p \leq 0.01$; $t = -5.78, p \leq 0.01$).

Table 6. Intention to visit and pull motives

	Cluster 1	Cluster 2	Cluster 3	One-way ANOVA	Differences between clusters	Games-Howell (p value)
Safety, cleanliness, and accessibility	5.68	5.97	5.74	$F = 6.79^{**}$	1 & 2, 2 & 3	0.00, 0.04
Tourism resources	5.57	5.86	5.53	$F = 9.60^{**}$	1 & 2, 2 & 3	0.00, 0.00
Value for money	4.75	4.67	4.07	$F = 10.27^{**}$	1 & 3, 2 & 3	0.00, 0.00
The pandemic	5.42	5.28	3.98	$F = 40.49^{**}$	1 & 3, 2 & 3	0.00, 0.00

Note: $^{**}p \leq 0.01$

For between-cluster analysis, Games-Howell statistics were adopted to indicate pairwise differences in pull motives in the post-hoc analysis. The results identified two facts. First, leisure tourists with a high intention of participating in pandemic-related tourism attractions (Cluster 2) were significantly more motivated by “safety, cleanliness, and accessibility” and “tourism resources” in Wuhan than were the other two types of respondents. Secondly, Cluster 3, whose members were nearly pure leisure tourists, was significantly less motivated by pull motives related to the pandemic and value for money than were the other two clusters. In particular, it is worth noting that tourist who are joint tourism consumption pursuers (Clusters 1 and 2) rated value for money significantly higher than did pure leisure-tourism pursuers. This finding confirms the earlier argument that joint tourism consumption leads to a higher efficiency and enhanced utility of travel when compared to a trip focused on a single tourism activity.

IV. Socio-demographical portrait of each cluster

In addition to the push-pull motives, this study also explored the socio-demographic profiles of the three clusters. Prior knowledge about the destination from previous travel experience and residential history can influence a tourist’s intention to visit. The table attached to the appendix presents the number of

respondents and corresponding percentages taken in each cluster for each categorization in light of their travel experience and residential history in Wuhan. Among the three clusters, Cluster 2 and Cluster 3 (where respondents prefer leisure tourism attractions to pandemic-related ones) had a higher proportion of experienced tourists than Cluster 1 (where respondents prefer pandemic-related tourism activities). Experienced tourists generally intended to revisit Wuhan for the sake of leisure. The impact of residential history on travel intentions was different than that of travel experience. Respondents who lived in Wuhan for over one year for work, family, or educational purposes were more likely to prefer pandemic-related tourism activities to traditional ones (and therefore were more likely to be grouped into Cluster 1). This result is consistent with place attachment theory (Hidalgo and Hernández, 2001), which concludes that people feel socially and physically bonded to the cities where they have resided.

The socio-demographic distributions of each cluster—including gender, age, type of occupation, income, educational level, marital status, and location—are listed in the table attached to the appendix. Of all three clusters, Cluster 3 shows the greatest difference in gender distribution. The percentage of females in Cluster 3 was higher than in Cluster 1 and 2. While difference in the percentage of males and females was roughly 10 percent in clusters 1 and 2, the difference was three times greater in Cluster 3. The age distribution was similar in each cluster, but the proportion of young adults aged 20 to 29 was greater in Cluster 1 than in the other two clusters. In terms of occupational type, Cluster 1 (tourists with greater pandemic-related intentions) had a greater percentage of students and those employed by state-owned enterprises (SOE). In contrast, pure leisure tourists (Cluster 3) were more likely to work in private enterprises than were other types of respondents. For the educational level of respondents, Cluster 1 had the greatest proportion of respondents who finished junior college. Respondents who sought leisure tourism sites more than pandemic-related tourism attractions (i.e., Cluster 2 and Cluster 3) formed greatest proportion of respondents with undergraduate and master's degrees. For the geographical distribution of respondents in each cluster, respondents who lived in Northeast and Northwest China were more likely to be those who fascinate pandemic-related tourism attractions. In contrast, the largest proportion of participants from East and Southwest China preferred leisure tourism attractions to pandemic-related ones.

Concluding remarks

The majority of extant literature on tourism in post-disaster destinations has focused on the supply-side. In previous studies focusing on the consumer perspectives of dark tourism, attention has been given to the intentions and motivations of dark tourists, but the relationship between these has mostly been neglected. In the meantime, while it is crucial to design a recovery plan in post-pandemic era, the possibility of jointly consuming post-pandemic epicenters still shows a prominent vacancy. In light of aforementioned research gaps, this study contributes to the literature in four ways. First, as one of the pioneers, this study focus on the relationship between tourists' motivations and their intentions to visit from a joint consumption point of view. A second innovation of this study is the development of a new construct in the classic push-pull motive scheme: although patriotic motives have not yet been formally integrated into dark tourism push-pull frameworks, this study revealed patriotism through focus group discussions and the literature review, and examined its reliability. Third, this study is one of the first to adopt ordered logit regression models to examine the linkage between motivational factors and intentions to visit. Finally, by cluster analysis of the two types of visitor intentions, this study shows the market segmentation of tourists, explores the proportion of those who are seeking joint consumption of both types of tourism products in former pandemic epicenters, and describes each segment by their motives and socio-demographic features.

According to the levels of intention to visit recorded in the online survey, three clusters were identified from the whole sample. Respondents in Cluster 1 and Cluster 2, who sought to engage in joint consumption of both leisure and pandemic-related tourism products, both showed relatively high interest in traditional and dark tourist attractions and accounted for 76.4% of the whole sample. Therefore, it is evident from this study that recovery plans for the tourism industry in former pandemic epicenters should consider not only traditional leisure products but also pandemic-related ones. Tourism in the future should be developed to incorporate both types of products. Moreover, the study's results suggest that Cluster 2 (with highest desire for leisure tourism and second highest desire for dark tourism)

featured the greatest push and pull motivations for leisure and the second highest pandemic motives. That is, the intention of joint consumption was higher for those whose leisure traditional push (novelty-seeking, fun and recreation and relaxation and escape) and pull motivation (tourism resources) as well as pandemic-related motivations (i.e. patriotism and humanism and special interest in the pandemic as push motives; the pandemic as pull motive) are both greater. This reflects the fact that joint consumption seekers tend to maximize their utilities by engaging in both types of products. Cluster 3, the group of pure leisure tourists, composed the smallest percentage of the whole sample. This indicates that, in the post-pandemic era, the majority of tourists in Wuhan will be interested in visiting pandemic-related sites out of patriotic and humanitarian reasons. Leisure tourists, such as those in Cluster 3, had the lowest socialization and pandemic-related motivations and were more likely to be concerned with their own interest.

The policy and managerial implications of this study are as follows. From the perspective of traditional tourism, in the recovery of tourism in the post-pandemic era, governors and industrial practitioners should strengthen the development and construction of leisure tourism resources such as hospitality, entertainment facilities, local cuisine, and historical heritage sites. In addition, since experienced tourists are more willing to engage in leisure tourism than inexperienced ones, managers can recommend promotional information related to leisure travel to people who have been there. From the perspective of pandemic-related tourism activities, government officials and practitioners can provide people with channels to understand more about the process of the Wuhan epidemic through documentaries and virtual reality experiences, thereby strengthening potential tourists' humanitarian feelings and stimulating tourists' desire to visit pandemic sites. Finally, more attractions related to the pandemic (such as memorial halls, artifacts and theme exhibitions) could be constructed to provide extrinsic attractions to visitors seeking pandemic-related tourism products and joint consumption of both products. The socio-demographic portrait of each cluster indicates several intriguing findings and thus provides key industry stakeholders with solid frame of reference for designing recovery strategies. According to the place attachment theory, people who live in a certain place for a long time will establish an emotional connection with that place, and thus are more likely to be dark tourists with specific leisure needs. Hence, pandemic-related tourism sites could be promoted to individuals who have previously resided in Wuhan for more than one year.

In conclusion, to the best of our knowledge, this is one of the first studies to extend the sub-forms of dark tourism to former pandemic epicenters, to empirically examine the relationship between motivations and intention to visit, and to propose a reliable new push motive—patriotism—for post-disaster dark tourism. A market segmentation strategy is also provided for post-pandemic tourism in former epicenters. Although this study brings forward many important findings, it has some limitations and thus points towards avenues for future research. First, this study was conducted in the Chinese domestic tourism market, and it would be beneficial to explore individuals' intentions and motivations in visiting former epicenters in other countries. Second, it remains unknown whether the relationship between intention and motivation and the market segmentation framework will change with the passage of time. Finally, although we explored the motivational determinants of two intentions respectively, the interaction between these intentions calls for further research.

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Appendix. Intention to visit and socio-demographic features

	Cluster 1 (% of cluster)	Cluster 2 (% of cluster)	Cluster 3 (% of cluster)	Sub-total (% of whole sample)
1) Travel experience				
Experienced	11 (12.79)	29 (19.73)	15 (20.83)	55 (18.03)
Unexperienced	75 (87.21)	118 (80.27)	57 (79.17)	250 (81.97)
2) Wuhan residential history				
Resided	5 (5.81)	4 (2.72)	2 (2.78)	11 (3.61)
Never resided	81 (94.19)	143 (97.28)	70 (97.22)	294 (96.39)
3) Gender				
Male	37 (43.02)	69 (46.94)	20 (27.78)	126 (41.31)
Female	49 (56.98)	78 (53.06)	52 (72.22)	179 (58.69)
4) Age				
20~24	20 (23.26)	25 (17.00)	13 (18.06)	58 (19.02)
25~29	24 (27.91)	38 (25.85)	17 (23.61)	79 (25.90)
30~34	22 (25.58)	42 (28.57)	22 (30.56)	86 (28.20)
35~39	7 (8.14)	17 (11.56)	7 (9.72)	31 (10.16)
40~44	10 (11.63)	13 (8.84)	5 (6.94)	28 (9.18)
45~49	1 (1.16)	7 (4.76)	5 (6.94)	13 (4.26)
50~54	1 (1.16)	3 (2.04)	3 (4.17)	7 (2.30)
55~59	1 (1.16)	1 (0.69)	0 (0)	2 (0.66)
60~64	0 (0)	1 (0.69)	0 (0)	1 (0.32)
5) Type of employment				
State owned enterprise	18 (20.93)	28 (19.04)	13 (18.06)	59 (19.34)
Private enterprise	39 (45.35)	73 (49.66)	44 (61.11)	156 (51.14)
Government department / unit	9 (10.46)	19 (12.93)	5 (6.94)	33 (10.82)
Student	17 (19.77)	19 (12.93)	7 (9.72)	43 (14.10)
Owner of small business	2 (2.33)	4 (2.72)	1 (1.39)	7 (2.30)
Others	1 (1.16)	4 (2.72)	2 (2.78)	7 (2.30)
6) Personal monthly income (RMB)				
Less than 2,000	12 (13.95)	14 (9.52)	9 (12.5)	35 (11.48)
2,000~4,000	18 (20.93)	23 (15.65)	11 (15.28)	52 (17.05)
4,000~6,000	18 (20.93)	28 (19.05)	11 (15.28)	57 (18.69)
6,000~8,000	22 (25.58)	36 (24.49)	21 (29.17)	79 (25.90)
More than 8,000	16 (18.60)	46 (31.29)	20 (27.78)	82 (26.89)
7) Educational level				
Middle school or less than middle school	0 (0)	0 (0)	2 (2.78)	2 (0.66)
High school	2 (2.33)	5 (3.40)	3 (4.17)	10 (3.28)
Junior college	20 (23.26)	20 (13.61)	10 (13.89)	50 (16.39)
Undergraduate	58 (67.44)	106 (72.11)	49 (68.06)	213 (69.84)
Graduate (master's)	5 (5.81)	16 (10.88)	8 (11.11)	29 (9.51)
Graduate (doctoral)	1 (1.16)	0 (0)	0 (0)	1 (0.33)
8) Marital status				
Single	22 (25.58)	31 (21.09)	16 (22.22)	69 (22.62)
In a relationship	12 (13.95)	16 (10.88)	7 (9.72)	35 (11.48)
Married with no children	5 (5.81)	9 (6.12)	3 (4.17)	17 (5.57)
Married with one child	44 (51.16)	68 (46.26)	39 (54.17)	151 (49.51)
Married with two or more children	3 (3.49)	23 (15.65)	7 (9.72)	33 (10.82)
Others	0 (0)	0 (0)	0 (0)	0 (0)
9) Geographical location				
North China	17 (19.77)	28 (19.05)	13 (18.06)	58 (19.02)
Northeast China	9 (10.47)	6 (4.08)	0 (0)	15 (4.92)
East China	23 (26.74)	50 (34.01)	30 (41.67)	103 (33.77)
Central China	28 (32.56)	48 (32.65)	16 (22.22)	92 (30.16)
Southwest China	6 (6.98)	11 (7.48)	11 (15.28)	28 (9.18)
Northwest China	3 (3.49)	4 (2.72)	2 (2.78)	9 (2.95)
Cluster sample (% of whole sample)	86 (28.20)	147 (48.20)	72 (19.02)	305