frontiers | Frontiers in Environmental Science

TYPE Original Research
PUBLISHED 11 October 2022
DOI 10.3389/fenvs.2022.1028508

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OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to Environmental Economics and Management, a section of the journal Frontiers in Environmental Science

RECEIVED 26 August 2022
ACCEPTED 23 September 2022
PUBLISHED 11 October 2022

CITATION
Zhang Y, Cao R, Xiao X, Wei Z, Yang J, Gao Y, Lu S and Zheng C (2022), How to coordinate the use and conservation of natural resources in protected areas: From the perspective of tourists' natural experiences and environmentally responsible behaviours.
Front. Environ. Sci. 10:1028508.
doi: 10.3389/fenvs.2022.1028508

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How to coordinate the use and conservation of natural resources in protected areas: From the perspective of tourists' natural experiences and environmentally responsible behaviours

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One of the important purposes of opening protected areas to the public is providing tourists with natural experience products and education so as to stimulate their environmentally responsible behaviours (ERBs) and achieve sustainability. However, there are often contradictions between the recreational use of natural resources and eco-environmental protection, and scholars have not directly determined whether natural experiences always trigger tourist ERBs. To fill this gap, we study the formation of ERBs (including environmentally friendly behaviours, environmental concern-based behaviours and sustainable behaviours) by integrating the mechanisms of tourists' experiences (including sensory experience, mental involvement and norm arousal) and their effects on ERBs. The results of a sample of 682 tourists at a National Nature Reserve in China affirm that there are spillover effects among tourists' experiences and that tourists' experiences influence ERBs. Sensory experience and norm arousal positively affect people's environmentally friendly behaviours, their behaviours that are based on their concern for the environment and their sustainable behaviours. While mental involvement has a positive impact on environmentally friendly behaviours, a negative impact on sustainable behaviours, and no effect on people's environmental concern-based behaviours. In addition, mental involvement and norm arousal play an important role in mediating the impacts of sensory experience on ERBs. This study explores the relationship between use and conservation of natural resources *via* tourists' experiences and ERBs, and it reveals that tourists' experience stays in mental involvement, which may not conducive to eco-environmental conservation in the protected areas. It opens

the field for future research paths in the exploration of the paradox that emerges out of the natural experience and tourists' ERBs and provides insights into and points to ecological implications for reserve managers and tourism operators.

KEYWORDS

tourists' experience, resource and environment management, sustainability, spillover effects, environmentally responsible behaviours

1 Introduction

Experience has been emerging as the dominant factor for the success of the tourism industry, along with environmental conservation at tourist destinations, especially in nature-based tourist sites (Wang et al., 2020). However, as tourism grows, adverse impacts on the environment and natural resources may occur due to tourists' inappropriate behaviours (Ballantyne et al., 2011). For example, in 2018, four tourists sneaked into the special protection zone of the picturesque Danxia scenic area in Zhangye City, Gansu Province, China. These tourists directly trampled on the Danxia landscape and lifted the dust, savagely destroying the beautiful landscape that has resulted from the evolution of nature over the last hundreds of millions of years. It is predicted that one of their footprints in the core protected area may take 60 years to disappear on its own. In 2020, an off-road vehicle drifted on the Hulunbuir grassland in China. The body of the vehicle slid rapidly, and black mud splashed under its wheels, illegally crushing and destroying grassland over an area estimated at 1953.3 m^2. Such incidents happen from time to time in developing countries where tourists destroy resources and the environment in order to gain special experiences or where tourists' experiential activities lead to behaviours that damage resources and the environment. These actual phenomena contradict the previous research conclusion that tourists' experiences of nature promote their environmentally responsible attitudes and behaviours (Uriely, 2005; Lee et al., 2015; Kim and Thapa, 2018; Lee et al., 2018; Rosa and Collado, 2019; Radovi, 2021). This paradox raises important study questions: Is the tourists' experience layered? And do all experience dimensions have a positive effect on visitors' behaviours?

Recreation experiences play an important educational role in promoting tourists' environmentally responsible behaviours (ERBs) in the nature-based tourism context (Ballantyne et al., 2011). However, different types of recreational experiences and activities may influence tourists' environmental attitudes and behaviours in various ways (Berns and Simpson, 2009; Lee et al., 2018). Although our predecessors have made great contributions to the research on experience and on the relationship between experience and tourists' behaviours, they have not answered three questions: 1) What is the relationship between the endogenous dimensions of tourists' experiences? That is, are there spillover effects from tourists' experiences? 2) What is the relationship between different dimensions of experiences and behaviours? That is, do all kinds of experiences have a positive effect on ERB? And 3) Do the spillover effects of experiences have an impact on tourists' ERBs? That is, is there a mediating effect of higher hierarchy experiences on the relationship between primary hierarchy experiences and tourists' ERBs? These knowledge gaps have motivated our research, whose conceptual contribution entails the identification and development of theoretical linkages among tourists' experiences, as well as the provision of a deeper understanding of the critical experience antecedents of ERB in nature-based tourist sites. This study also provides practical implications.

Our research seeks to address four objectives. First, we develop and validate a conceptual model to integrate the spillover effects of tourists' experiences and the mechanisms that promote ERBs. Second, we verify that experiences are layered and that higher hierarchy experiences are activated by lower hierarchy experiences. Third, we examine and compare the relative importance of experience variables in affecting ERBs in the nature reserve context. Fourth, we determine the mediation relationships between experience variables (sensory experience, mental involvement and norm arousal) and ERBs.

2 Literature review and theoretical framework

2.1 Nature-based tourism

The main role of nature in attracting tourists to specific destinations is well known (Valentine, 1992). With the rapid development of urbanisation, the demand for nature-based tourism has steadily grown and is the fastest growing sector in the world tourism industry. Laarman and Durst (1987) used the term 'nature travel' to express nature-based tourism, which includes education, recreation and adventure. Boo (1990) used 'eco-tourism' as synonymous with 'nature tourism' and defined it as 'travel to relatively undisturbed or polluted natural areas for the specific purpose of studying, admiring and enjoying the landscape and its wild flora and fauna, as well as any existing cultural manifestations' (Valentine, 1992). Fredman and his colleagues (2010) identified four recurrent themes to define nature-based

tourism: 1) visitors coming to a natural place, 2) experiences in an eco-environment, 3) participation in an activity, and 4) normative components related to local impacts (including ecology, the economy, society and local culture). Later, Fredman and Tourism (2010) proposed a minimalistic definition based on the official Swedish definition of tourism that states that nature-based tourism represents human activities occurring when people visit natural areas outside their usual residential areas. Based on a previous understanding of nature tourism, we believe that nature-based tourism is related to recreational activities in natural areas, and the key aspect of nature-based tourism is that tourists are away from home and their experiences take place in nature.

Nature-based tourism has increased worldwide and involves natural spaces such as oceans, wetlands, forests, grasslands, and islands (Ballantyne et al., 2011; Lee et al., 2015; Xu et al., 2018). Protected areas are the focus of many nature-based tourism projects in the world, which has led to an increase in the number of people visiting protected areas. This increase creates a dilemma for protected areas, given their dual mission of protecting wildlife and its habitat and providing visitors with a meaningful experience in the natural environment (Moore et al., 2013). Some scholars have categorised tourists by assessing their recreational experiences, which can be helpful for interpreting tourists' experiences and the implementation of environmentally responsible behaviours in natural areas (Carvache-Franco et al., 2019; Lee et al., 2018). Some researchers have analysed the dimensions and interrelationships of tourists' environmental behaviours to try to essentially address behaviours that interfere with the environment by changing those behaviours (Nilsson et al., 2016; Wang et al., 2020). Additional scholars have studied the mechanisms that are driven by environmentally responsible behaviours from a social psychology perspective, examining motivation, values, experiences, sense of place and so on, to make suggestions and provide guidance for nature-based tourism management agencies to implement scientific and effective environmental protection measures in tourism (Ramkissoon et al., 2013). An increasing number of studies on tourists' experiences and environmental behaviours have shown that tourists' experiential activities have had a profound impact on the resources and environment of tourist destinations; these studies have received great attention from all sectors of society, including academia (Carvache-Franco et al., 2019; Lee et al., 2018).

2.2 Tourists' experiences

In the 1960s, Boorstin first put forward the concept of tourist experience. He considered tourist experience to be a trivial, superficial, frivolous pursuit of vicarious, contrived experiences (Boorstin, 1961). MacCannell (1973) advanced that the fervent pursuit of authenticity and pilgrimages undertaken by modern people were the essence of the tourism experience. For Xie (2010), the tourist experience referred to the experience gained by tourists in the tourism world when they are deeply integrated in their current situations and derive a sense of comfort from their body and mind being integrated. In fact, scholars have shown that tourists may have different motivations for travelling. Different scholars have had different understandings of the concept of experience. However, we accept that the tourist experience is determined by the "centre" to which the visitor adheres, and that this centre represents their personal worldview (Cohen, 1979). In our study, tourist experience is defined as tourists' sensory cognition, psychological feelings and mental thoughts generated as a result of their participation in nature-based tourism activities and based on the specificity of natural resources and the ecological environment of nature reserves.

As modelled by Holbrook and Hirschman (1982), experience includes symbolic, hedonic, and aesthetic dimensions. Pine and Gilmore (1998) suggested that experience entailed entertainment, education, aesthetics, and escape. Schmitt (1999) divided experience into five dimensions: sensory, emotional, cognitive, operational, and related experience. Walls and his colleagues (Wall et al., 2011) proposed four dimensions for experience, which entailed extraordinary, ordinary, emotional and cognitive experience. Ballantyne et al. (2011) proposed that experiential and reflective engagements were part of nature-based tourism destinations. Lee et al.'s (2018) study showed that experiential observation included sensory, learning and experiential reflection and ecological observation. Furthermore, it has been shown that the structure of experience is as diverse as the concept is, and there is a consensus that educational and recreational experiences are increasingly important functions of nature-based environments that contribute to human society and that the constructs of nature-based tourism experiences should include sensory, emotional, functional, and educational elements (Lee et al., 2015).

Existing studies on tourist experience have focused on analysing the dimensions of tourist experience and related knowledge from a speculative angle (Uriely, 2005; Wu and Tang, 2018). Furthermore, factors influencing the tourist experience and the resulting effect of experience value have been discussed from an empirical perspective (Chen et al., 2020; Teng, 2021). Scholars have not paid enough attention to the relationship between the dimensions of experience, and whether there are spillover effects from this experience. The term 'spillover' has been applied to a wide variety of phenomena, including the spread of knowledge, attitudes, feelings, roles, identities, or behaviours attributed to a given domain, group, or location into a different domain, group or

location (Galizzi and Lorraine, 2019). In the realm of experience, Hultén (2011) indicated that customers' sensory experiences can intensify brand experiences. In nature-based tourist destinations, tourists' sensory experience constitutes their basic acquisition; mental involvement represents the psychological enjoyment derived from sensory experience (which is the medium hierarchy experience); and norm arousal is the experience of the highest hierarchy order, playing a role in knowledge acquisition, environmental education, norm activation, *etc.* Considering Maslow's hierarchy of needs theory, fulfilling human needs requires a certain sequential relationship; that is, there is a sequential evolutionary path when people demand results, and this demand goes from low to high. Therefore, we formulate the following hypotheses:

Hypothesis 1a: Tourists' sensory experience stimulates their mental involvement.
Hypothesis 1b: Tourists' sensory experience stimulates their norm arousal.
Hypothesis 1c: Tourists' mental involvement stimulates their norm arousal.

2.3 Environmentally responsible behaviours

With the rise of nature-based tourism and the increasing number of tourists, tremendous negative eco-environmental consequences have occurred due to tourists' behaviours. The management and protection of natural resources and the environment have attracted great attention from theoreticians and practitioners (Zhang et al., 2020). It is imperative that we mitigate the environmentally harmful effects induced by tourists' activities and encourage tourists to implement ERBs. ERBs require tourists to have a strong sense of responsibility for local natural and human environmental factors (Wang et al., 2020). For example, tourists may actively participate in eco-environmental protection in destinations, focus on environmental policies and measures in the destination, monitor other tourists or organisations so they comply with aggressive environmental responsibility norms, and even pay attention to local customs and culture related to protecting the environment in the destination (Lee et al., 2015; Wang et al., 2020).

In discussing the driving mechanism of tourists' ERBs, researchers have focused on two aspects. The first one is the establishment of a theoretical framework, and the other is the selection of corresponding influencing factors and analysis of the relationship between those factors on the basis of the analytical framework. Several theoretical frameworks have been widely used to explain ERBs; these are the theory of reasoned action, theory of planned behaviour, value-belief-norm theory, and model expansion (Fishbein and Ajzen, 1977; Ajzen, 1991; Stern et al., 1999; Fu et al., 2019; Shabnam et al., 2021; Wan et al., 2021). It has been shown that environmental values (or attitudes) significantly affect personal ERBs (Kil et al., 2014; Maichum, et al., 2016) and combine environmental knowledge, environmental education, environmental awareness, norms, ethics, satisfaction, motivation, place attachment, and environmental sensitivity as the factors influencing tourists' ERBs (Carvache-Franco et al., 2019; Cheng and Wu, 2015; Farrow et al., 2017; Liu et al., 2020; Varela-Candamio et al., 2018). In addition, some scholars have studied the reasons behind tourists' ERBs from the perspective of destination attractions, destination images, perceived value, recreational involvement and environmental orientation (Wu and Tang, 2018; Kim and Koo, 2020).

Since experience is an important part of tourism activities, it has attracted attention from scholars as a factor influencing tourists' ERBs. Tourists' experiences play an important environmental educational role in promoting tourists' knowledge and ERBs in the nature-based tourism context (Ballantyne et al., 2011; Lee et al., 2015). Millar and Millar, 1996 investigated the impact of direct and indirect experiences on customer attitudes and behaviours. The scholars found that direct experiences were more predictive of customer behaviours than indirect experiences. Although the results of their analysis did not support their proposed model, their findings supported the relationship between recreational experiences and ERBs (Duerden and Witt, 2010). Lee and Jan (2015) found that understanding and appreciating nature through a recreational experience could improve tourists' environmental attitudes and increase their ERBs, and these scholars' empirical model proved that experiences that reflected environmental attitudes impacted tourists' ERBs. Huseynov's (2020) research extended previous research by revealing that not all the dimensions of destination experiences equally influenced tourists' behavioural intentions and that only the sensory and intellectual dimensions of experience could affect behavioural intentions (Huseynov et al., 2020). Xu et al. (2018) provided deeper insight into how each facet of tourist involvement (magnitude and pleasure, risk probability and consequence, and sign value) performed differently in predicting tourist experience and ERBs in Nansha Wetland Park in China. In fact, it has been shown that tourist experience positively and significantly impacts ERBs. Based on these findings, we postulate the following hypotheses:

Hypothesis 2a: Tourists' sensory experience is positively related to their environmentally friendly behaviours (EFB).
Hypothesis 2b: Tourists' sensory experience is positively related to their environmental concern-based behaviours (ECB).

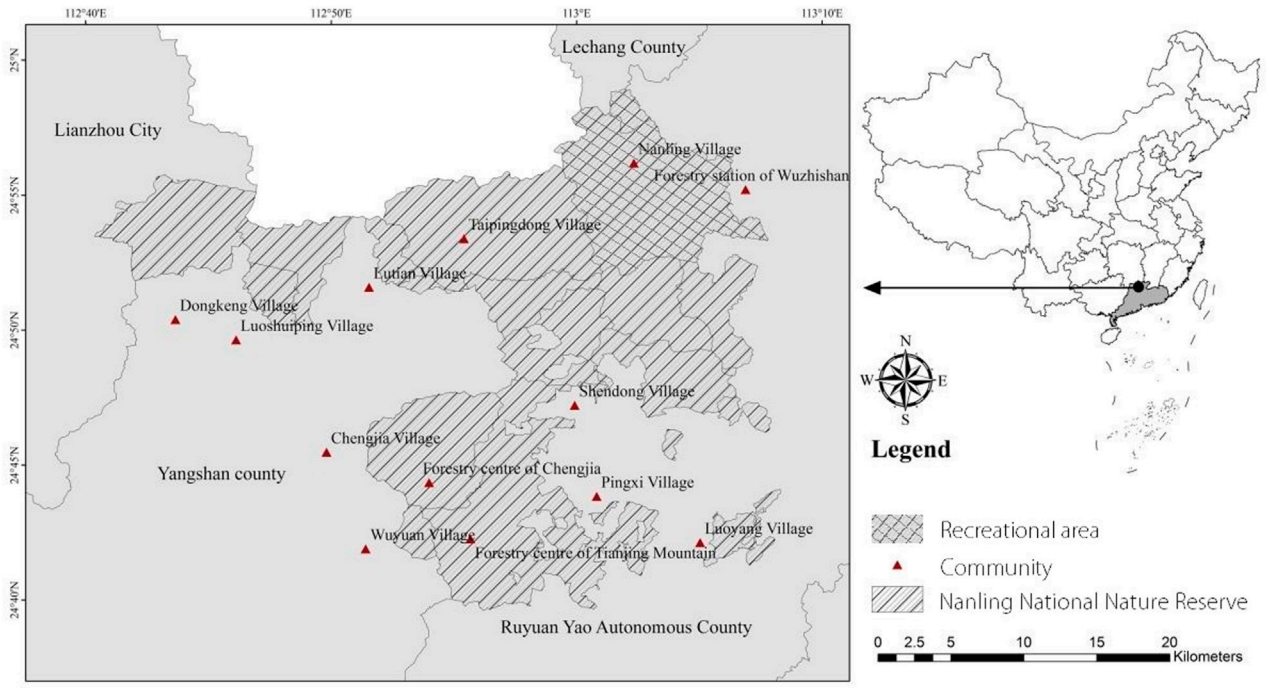

FIGURE 1
Location of nanling national nature reserve.

Hypothesis 2c: Tourists' sensory experience is positively related to their environmentally sustainable behaviours (ESB).
Hypothesis 3a: Tourists' mental involvement is positively related to their EFB.
Hypothesis 3b: Tourists' mental involvement is positively related to their ECB.
Hypothesis 3c: Tourists' mental involvement is positively related to their ESB.
Hypothesis 4a: Tourists' norm arousal is positively related to their EFB.
Hypothesis 4b: Tourists' norm arousal is positively related to their ECB.
Hypothesis 4c: Tourists' norm arousal is positively related to their ESB.

3 Materials and methods

3.1 Study site

Nanling is the largest mountain range in southern China and an important natural geographical boundary located at the border of Guangdong Province, Hunan Province, Jiangxi Province and Guangxi Zhuang Autonomous Region in China. The Guangdong Nanling National Nature Reserve is located in northern Guangdong Province, at the southern foot of the middle section of the Nanling Mountains and within the administrative boundaries of Ruyuan County, Shaoguan City, Yangshan City, Qingyuan City and Lianzhou City, Guangdong Province (Figure 1). The forest coverage rate in the Nanling Nature Reserve is 90.6%, which allows for the preservation of the complete mountain forest ecosystem and vegetation vertical belt spectrum. There are 2,608 species of wild vascular plants in the Nanling Nature Reserve, among which 30 species have been placed under special state protection. There are 486 species of terrestrial vertebrates, accounting for 18.4% of the total number of terrestrial vertebrates in China (2,638 species). Therefore, Nanling has been called a subtropical species genetic bank. Moreover, it is the source of almost all major rivers in Guangdong Province. One hundred million people depend on Nanling for drinking water and crop irrigation, and the region has also been called the Guangdong Water Tower.

The area constitutes an abundant and rare biological resource, and its high-quality ecological environment provides conditions for the development of natural sightseeing in the Guangdong Nanling Nature Reserve. However, due to unreasonable development, ecological damage in the core area of the nature reserve has been a serious issue. The State Environmental Protection Administration of the People's Republic of China ordered business to be suspended in the region in May 2018 so that improvements could be made. To date, Guangdong Nanling Nature Reserve has not been allowed

to receive tourists again, and only a few nature education activities have been allowed in the buffer area. Studying the relationship between tourists' experience and ERBs in the Nanling Nature Reserve will usher its reopening, ensure the quality of tourists' experiences and provide scientific guidance for protecting the ecological environment.

3.2 Sampling and surveying

The pilot survey was conducted with 30 tourists who visit Nanling National Nature Reserve. Finally, 26 items were comprised in the formal questionnaire after reliability and validity analysis. The survey was conducted in October 2017 and April 2018 for a total duration of 15 days. The targeted respondents for this study were nature-based tourists who visited the five sightseeing and rest areas inside the reserve. A convenience sampling method was employed to collect data during daylight hours. Eight trained research assistants administered the questionnaire survey. Each respondent was informed of the research purpose and variables and asked if he or she would like to participate in the interview process. Additionally, small gifts were offered to those who agreed to participate in the survey. We distributed 800 questionnaires, and 724 were returned. After discarding 42 questionnaires due to too many missing values and outliers, 682 questionnaires were used for final analysis, yielding a response rate of 81.00%.

3.3 Questionnaires and measurement scales

Together with the classification questions related to the sociodemographic variables, the measurement scales used for constructing tourists' experiences and ERBs, which were addressed in the proposed conceptual model, were included in a structured questionnaire. These constructs were measured as follows:

The section covering tourists' experiences was based on Ballantyne's (2011) findings, Lee's (2015) scales, as well as our own field observations and five visitors' interview results. Interview questions include "What kind of experience did you have when you came here?", "What concern did you have about when visiting here?", and "What have you got here, especially in environmental education?". Eventually, a 14-item scale for tourists' experiences was developed according to the answers of the respondents and relevant literature, and measured by the 5-point Likert-type scale. It comprised sensory experience (seven items), mental involvement (three items), and norm arousal (four items).

ERBs were measured on a twelve-item, 5-point Likert-type scale based on Zhang's (2015) scale, as well as our on-site observations. The ERBs included environmentally friendly behaviours (four items), behaviours linked to concerns about the environment (four items) and sustainable behaviours (four items).

The demographic variables consisted of gender, marital status, age, educational level, occupation, residential region, and monthly income.

3.4 Quality of the research instrument

The survey results were accurate within a 4.62% sampling error with a confidence level of 95% in the Guangdong Nanling National Nature Reserve. Moreover, the sample sizes in the empirical survey appeared to be adequate for performing a structural equation modelling analysis based on the findings by Westland (2010). All factor loadings of the measurement indicators were higher than 0.550 (Table 1). The Cronbach's alpha scores and KMO scores for the total measurement instrument and latent variables of environmental conservation behaviours and experience were 0.867 and 0.910, respectively, and 0.831 and 0.903, respectively. All of the Cronbach's alpha scores exceeded the benchmark of 0.800, and the KMO scores exceeded 0.800, indicating that the research instrument had an acceptable internal consistency for measuring items in the same construct (Vaske, 2008).

3.5 Data analysis

Descriptive statistics as well as exploratory factor analysis were evaluated with SPSS 21.0 for Windows. Amos 21.0 for Windows was used for the confirmatory factor analysis (CFA) and SEM. To ensure the quality of the measurement, model fitting, composite reliability, convergent validity and discriminant validity were tested for the tourist experience and ERB scales. Then, SEM analysis was used to estimate all the parameters with the maximum likelihood method. Third, all hypotheses were tested to determine the direction and significance of the relationships among factors (Hair et al., 2010). Finally, the mediating effects were tested in the conceptual model with the bootstrapping method by Amos 21.0.

4 Results

4.1 Sample profile

The final sample (n = 682) contained a higher proportion of males (55.1%) than females (44.9%). The most frequently reported age groups included people between 20 and 29 years (48.2%) and 30 and 39 years (29.9%), while other groups were represented in smaller proportions. Most respondents had received college and university level education (450) and had

TABLE 1 Construct measurement summary.

Factors	Indicators	Mean	Factor loading	Items-total correlation	CR	AVE
Measurement scale of environmental responsible behaviours (KMO = . 831 a = 0.867)						
EFB	Do not disturb the plants	4.375	0.804	0.534	0.815	0.526
	Do not feed animals	4.455	0.751	0.434		
	Keep clean and tidy	4.229	0.779	0.549		
	Actively avoid scenic spots that need ecological restoration	4.232	0.754	0.523		
SB	Respect local customs	3.780	0.642	0.567	0.817	0.531
	Prevent others from disturbing the environment	3.396	0.851	0.525		
	Actively collect rubbish found on the ground	3.502	0.795	0.541		
	Respect the life of local residents	3.387	0.811	0.615		
ECB	Pay attention to the quality of the environment in the reserve	4.106	0.734	0.557	0.819	0.531
	Worry about environmental damage in the reserve	4.249	0.823	0.566		
	Pay attention to the official attitude in the reserve	3.956	0.681	0.606		
	Worry about the loss of biodiversity in the reserve	4.085	0.780	0.555		
Measurement scale of experience (KMO = 0.902 a = 0.867)						
SE	Numerous animals and plants	4.325	0.571	0.678	0.871	0.500
	Fresh air	4.774	0.830	0.636		
	Good water quality	4.742	0.823	0.688		
	Picturesque scenery	4.748	0.839	0.741		
	Comfortable climate	4.460	0.699	0.575		
	Overall Landscape Coordination	4.461	0.745	0.659		
	Overall environmental comfort	4.478	0.613	0.706		
MI	Feel happy	4.434	0.843	0.646	0.877	0.704
	Feel relaxed	4.475	0.867	0.683		
	Escape everyday stress	4.349	0.828	0.551		
NA	Inspire personal ethics	4.006	0.858	0.715	0.834	0.560
	Raise personal environmental awareness	4.114	0.842	0.692		
	Correct some behaviours	3.777	0.771	0.601		
	Re-examine one's behaviours	3.874	0.792	0.624		

SB, sustainable behaviours; EFB, environmentally friendly behaviours; ECB, environmental concern-based behaviours; SE, sensory experience; MI, cognitive involvement; NA = norm arousal.

TABLE 2 Correlation matrix of the constructs.

Constructs	EFB	SB	ECB	SE	MI	NA
EFB	0.725					
SB	0.420*	0.727				
ECB	0.437*	0.575*	0.727			
SE	0.577*	0.300*	0.477*	0.707		
MI	0.668*	0.250*	0.507*	0.657*	0.839	
NA	0.582*	0.591*	0.604*	0.465*	0.642*	0.748

*$p < 0.05$. The bold numbers on the diagonal are the square roots of average variance extracted.

a personal monthly income below RMB 60,00 (64.7%). Employees of enterprises and public institutions and students and freelancers were the main source markets (24.7%, 23.2%, 13.8%, respectively).

4.2 Measurement model

The measurement model consisted of six constructs and 26 measurement items. Composite reliability was assessed to achieve the complete results of internal consistency, with values higher than 0.800 across all variables (Table 1). The measurement reached convergent validity at the item level because all factor loadings exceeded 0.500. Furthermore, convergent validity was also evaluated by average variance extracted (AVE), with values higher than 0.500 across all variables (Xu et al., 2018), as summarised in Table 1. These values demonstrated the measures' high internal consistency. As shown in Table 2, all correlation coefficients between the factors were significant and under 0.800, showing the distinctiveness of each factor (Xu et al., 2018). All values intercorrelated between subdimensions fell below the suggested threshold of 0.850 (Table 2), providing evidence

TABLE 3 Model fitting index.

Fit index		Criterias	Spillover effects among tourists' experiences model (model 1)	Proposed model (model 2)
Absolute indices	χ2/df	<6	6.242	4.768
	RMR	<0.05	0.036	0.055
	RMSEA	<0.08	0.088	0.074
Relative indices	CFI	>0.90	0.923	0.883
	GFI	>0.90	0.905	0.859
	NFI	>0.90	0.910	0.857
	RFI	>0.90	0.889	0.838
	IFI	>0.90	0.923	0.884
	TLI	>0.90	0.905	0.868
Parsimony indices	PGFI	>0.50	0.638	0.703
	PNFI	>0.50	0.740	0.757
	PCFI	>0.50	0.751	0.780

of satisfactory discriminant validity. In addition, the square root of the AVE of each construct was greater than the correlation coefficients among constructs, further confirming the discriminant validity of the measures (Lee et al., 2015).

4.3 Structural model and hypothesis testing

The structural model indicated that there was no multicollinearity in any of the variables. Among the R^2 values of the dependent variables, the value for environmentally friendly behaviours was 0.52; that for environmental concern behaviours was 0.45; that for sustainable behaviours was 0.46; that for mental involvement was 0.46; and that for norm arousal was 0.42. In addition, although other indicators did not reach the standard value, they were very close (Table 3). Therefore, the proposed model fit the data acceptably: $\chi 2/df = 4.768$, $p < 0.01$, RMSEA = 0.074, PGFI = 0.703, PNFI = 0.757, PCFI = 0.780.

The findings indicated that sensory experience positively affected mental involvement ($\beta = 0.64$, $p < 0.001$), and mental involvement significantly affected norm arousal ($\beta = 0.61$, $p < 0.001$). However, there was a nonsignificant relationship between sensory experience and norm arousal. Thus, Hypotheses 1a and 1c were supported, while Hypothesis 1b was not. Sensory experience was statistically significant in predicting environmentally friendly behaviours ($\beta = 0.23$, $p < 0.001$), environmental concern behaviours ($\beta = 0.21$, $p < 0.001$) and sustainable behaviours ($\beta = 0.24$, $p < 0.001$), which supported Hypotheses 2a, 2b and 2c. Mental involvement did not significantly impact environmental concern-based behaviours, while there was a significant positive relationship between mental involvement and environmentally friendly behaviours ($\beta = 0.31$, $p < 0.001$); thus, Hypothesis 3a was supported, while Hypothesis 3b was not. It is worth noting that there was a significant negative relationship between mental involvement and sustainable behaviours ($\beta = -0.40$, $p < 0.001$); hence, Hypothesis 3c was not supported. Additionally, the results showed that there was a significant positive relationship between norm arousal and environmentally friendly behaviours ($\beta = 0.30$, $p < 0.001$), environmental concern-based behaviours ($\beta = 0.78$, $p < 0.001$) and sustainable behaviours ($\beta = 0.55$, $p < 0.001$). Thus, Hypotheses 4a, 4b and 4c were also supported. An overview of the research model and achieved results are depicted in Figure 2.

4.4 Spillover effects among experiences

The results indicated that the spillover effects among tourists' experiences model (Model 1) fit the data acceptably: χ2/df = 6.242, $p < 0.01$, CFI = 0.847, PGFI = 0.586, PNFI = 0.658, PCFI = 0.667 (Table 4). Additionally, model 1 showed the predictive power of mental involvement and norm arousal; 45.0% of mental involvement can be explained by sensory experience, and 41.0% of norm arousal can be explained by sensory experience and mental involvement. Thus, there were spillover effects among tourists' experiences.

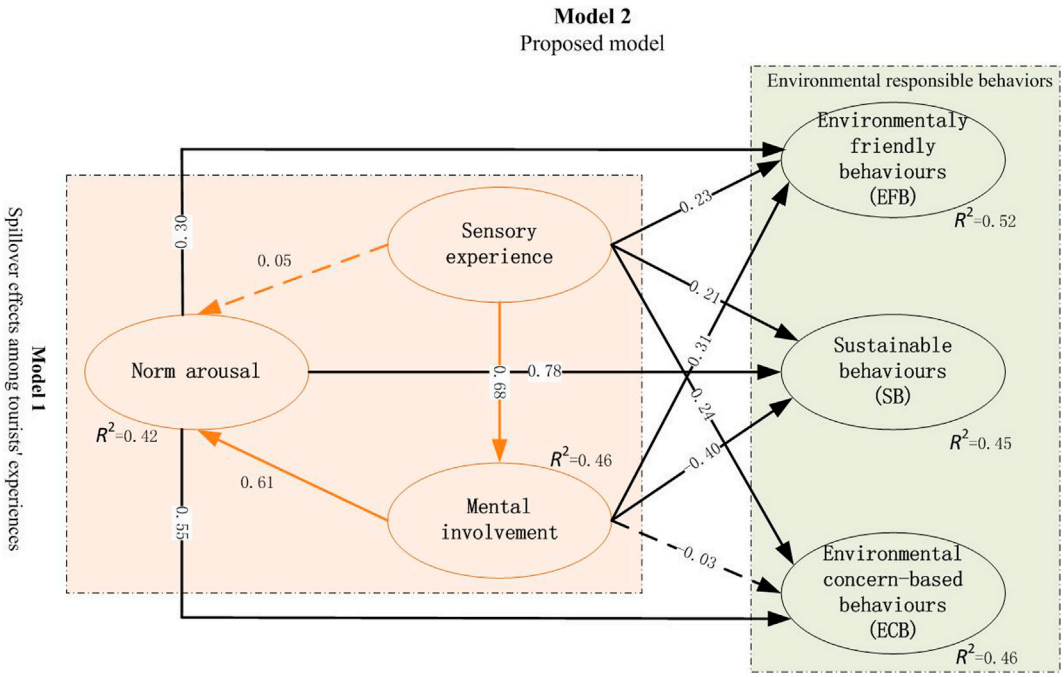

FIGURE 2
Results of the structural model.

4.5 Mediating effects of mental involvement and norm arousal

We adopted bootstrapping to test the mental involvement and norm arousal construct regarding its mediating role in the conceptual model. A 95% confidence interval (CI) of the parameter estimates was obtained by bootstrapping (n = 5,000).

4.5.1 Model 1: Mediating effects of mental involvement

Sensory experience was set as an independent variable; mental involvement was set as the mediating variable; and norm arousal was the dependent variable. We clarified the influence of tourists' sensory experience on their norm arousal, and mediation was examined. The results are provided in Table 4. The mediation relationship was statistically significant based on the bootstrapping results: $b_{\text{sensory experience -mental involvement -norm arousal}}$ = 0.499 not including zero at the 95% CI, with the lower limit CI (LLCI) and the upper limit CI (ULCI, Table 4). Additionally, the direct relationship of sensory experience with norm arousal was statistically nonsignificant: b = 0.070, including zero at 95% CI, LLCI = −0.089, ULCI = 0.257 (Hayes, 2017). The results supported the idea that mental involvement completely mediates the relationship between sensory experience and norm arousal. The details of the results can be found in Table 4.

4.5.2 Model 2: Mediating effects of mental involvement and norm arousal

Sensory experience was set as an independent variable; mental involvement was set as the mediating variable; and ERB was the dependent variable. We clarified the influence of tourists' sensory experience on their ERBs, and mediations were examined. The mediation relationship was statistically significant based on the bootstrapping results: bsensory experience-mental involvement-EFB = 0.232, not including zero at the 95% CI, with the lower limit CI (LLCI) and the upper limit CI (ULCI, Table 4). Additionally, the direct relationship of sensory experience on EFB was statistically significant: b = 0.261, also not including zero at 95% CI, LLCI = 0.110, ULCI = 0.357 (Hayes, 2017). The results supported the idea that mental involvement partly mediates the relationship between sensory experience and EFB. The details of the results can be found in Table 4. The mediation relationship was statistically nonsignificant based on the bootstrapping results: bsensory experience-mental involvement - ECB = 0.020, colluding zero at the 95% CI, with the lower limit CI (LLCI) and the upper limit CI. The mediation relationship was statistically significant based on the bootstrapping results: bsensory experience-ECB = -0.295 not including zero at the 95% CI. The direct relationship of sensory experience on ECB was statistically significant: b = 0.232, also not including zero at 95% CI, LLCI = 0.107, ULCI = 0.414 (Hayes, 2017).

TABLE 4 Mediating effects of mental involvement and norm arousal in Models 1 and 2

Model	Path	Point estimate	Product of coefficients		Bootstrap 5,000 time 95% CI (Percentile)		P
			SE	Z	Lower	Upper	
Model 1	**Mediating effects of mental involvement**						
	Indirect effect: Sensory experience→ mental involvement→ norm arousal	0.499	0.062	8.048	0.392	0.633	0.000
	Direct effect: Sensory experience→ norm arousal	0.070	0.089	0.788	-−0.089	0.257	0.416
	Total effects	0.569	0.084	6.762	0.406	0.735	0.000
Model 2	**Mediating effects of mental involvement**						
	Indirect effect: Sensory experience→ mental involvement→ EFB	0.232	0.063	3.683	0.110	0.357	0.001
	Direct effect: Sensory experience→ EFB	0.261	0.079	3.304	0.126	0.432	0.001
	Total effects	0.493	0.082	6.012	0.344	0.663	0.000
	Indirect effect: Sensory experience→ mental involvement→ SB	−0.295	0.083	-3.554	-−0.488	−0.166	0.000
	Direct effect: Sensory experience→ SB	0.232	0.078	2.974	0.107	0.414	0.001
	Total effects	−0.063	0.049	-1.286	-0.170	0.023	0.150
	Indirect effect: Sensory experience→ mental involvement→ ECB	−0.020	0.064	-0.313	−0.159	0.095	0.168
	Direct effect: Sensory experience→ ECB	0.236	0.064	3.688	0.151	0.401	0.000
	Total effects	0.216	0.058	4.069	0.127	0.355	0.001
	Mediating effects of mental involvement and norm arousal						
	Indirect effect: Sensory experience→ mental involvement→ norm arousal→ EFB	0.141	0.036	3.917	0.078	0.220	0.000
	Direct effect: Sensory experience→ EFB	0.261	0.079	3.304	0.126	0.432	0.001
	Total effects	0.402	0.087	4.621	0.250	0.588	0.000
	Indirect effect: Sensory experience→ mental involvement→ norm arousal→ SB	0.353	0.068	5.191	0.236	0.502	0.000
	Direct effect: Sensory experience→ SB	0.232	0.078	2.974	0.101	0.405	0.001
	Total effects	0.585	0.125	4.680	0.372	0.869	0.000
	Indirect effect: Sensory experience→ mental involvement→ norm arousal→ ECB	0.238	0.048	4.958	0.156	0.343	0.000
	Direct effect: Sensory experience→ ECB	0.256	0.064	4.000	0.151	0.401	0.000
	Total effects	0.494	0.091	5.418	0.338	0.693	0.000

Thus, mental involvement partly mediated the relationship between sensory experience and ECB.

Sensory experience was set as an independent variable; mental involvement and norm arousal were set as the mediating variables; and ERB was the dependent variable. We clarified the influence of tourists' sensory experience on their ERBs, and multiple mediations were examined. The mediation relationship was statistically significant based on the bootstrapping results: bsensory experience-mental involvement-norm arousal-EFB = 0.141, bsensory experience-mental involvement-norm arousal-SB = 0.353 and bsensory experience-mental involvement-norm arousal-ECB = 0.238, not including zero at the 95% CI, with the lower limit CI (LLCI) and the upper limit CI (ULCI, Table 4). The results supported the idea that mental involvement and norm arousal play a mediating role in the relationship between sensory experience and norm arousal. The details of the results can be found in Table 4.

5 Discussion and conclusion

5.1 Theoretical implications

Tourists' environmentally responsible behaviours are important to natural resources and environmental protection and ensure sustainability in nature reserves (Zhang et al., 2020). Therefore, activating tourists' ERBs is critical to mitigating the negative impacts of tourism on the natural environment. However, the causes of tourists' ERBs are complex, and there are many factors influencing ERBs (Lin et al., 2022). Studying the relationship between tourists' experiences and ERBs is useful to meet the needs of tourists and protect the environment in nature reserves. Although some scholars have studied the relationship between tourists' experiences and ERBs (Rosa and Collado, 2019; Wu et al., 2022), few have theorised and empirically

validated the cognitive advancement process among tourists' experiences and the relationship between these experiences and distinct dimensions of ERBs. This study thus contributes to this body of knowledge by building a theoretical framework for various dimensions of experience, leading to the identification of distinct ERBs and mediating effects. It also proves that not all dimensions of tourists' experiences positively influence ERBs.

This study calls for a more nuanced understanding of tourists' experiences by adopting Lee's (2015) and Xu's (2018) scales. The dimensions of our experiential scale are different from those found in previous studies; indeed, we include sensory experience, mental involvement and norm arousal. The present research extends the existing studies on tourists' experience by affirming the predictive role of sensory experience on mental involvement and the predictive effect of mental involvement on norm arousal. Additionally, we found that mental involvement fully mediates the relationship between sensory experience and norm arousal. These findings underscore the need for a more careful study of the structure of tourists' experiences and the complex relationships that exist among these experiences. We conclude that through sensory experience, individuals gain a more in-depth recreational experience leading to their physical and mental enjoyment. Moreover, only on this basis will individuals engage in ecological observation, reflect on their behaviours and reach normative awakening. Sensory experience is essential in the tourist experience, and norm arousal is ranked the highest in the hierarchy of tourist experiences. Sensory experience can activate norm arousal only through mental involvement. Our research proves that Maslow's hierarchical needs theory is also applicable in the field of recreational experience. At the same time, it also proves that there is a spillover effect among tourists' experiences.

Although prior research has extensively studied the associations between tourists' expectations and ERB, the present research extends this body of knowledge by segmenting experiences and ERB dimensions into a research model. The results of our study partly affirm the promotion of tourists' experiences, which is consistent with the conclusions found in previous studies (Duerden and Witt, 2010; Lee et al., 2015; Wu et al., 2022). Tourists' experiences affect their behaviours in relation to environmental conservation in nature-based tourism destinations. A tourist with a high level of sensory experience as well as norm arousal is more likely to engage in environmentally friendly behaviours, behave out of his or her concern for the environment and engage in sustainable behaviours. However, mental involvement only positively affects environmentally friendly behaviours and has no effect on behaviours related to environmental concerns. It is worth noting that the higher the level of mental involvement is, the more reluctant tourists are to engage in sustainable behaviours. This discovery differs from the results found in previous studies (Lee et al., 2015). This particular finding further underscores the necessity to consider the driving mechanism of different dimensions of tourists' experiences to identify distinct ERBs within an integrated model. Additionally, this finding highlights the need to identify and assess possible negative relationships between mental involvement and sustainable behaviours.

Furthermore, the present study also provides a more in-depth view into the mechanisms that influence the formation of ERBs by examining the role of mental involvement and norm arousal as mediating factors between sensory experience and ERBs in our research model. We find that mental involvement partly mediates the relationship between sensory experience→ environmentally friendly behaviours and sensory experience→ sustainable behaviours. We also find that mental involvement and norm arousal partly mediate the relationship between sensory experience→ environmentally friendly behaviours, sensory experience→environmentally concerned behaviours and sensory experience→sustainable behaviours. We conclude that the primary experience (sensory experience) of tourists can not only directly affect their ERBs but also influence their ERBs by stimulating a higher hierarchy experience (mental involvement and norm arousal) in nature reserves.

5.2 Managerial implications

From a practical perspective, the findings of this study provide important insights into sustainable development for tourism developers and nature reserve managers. The findings provide policymakers with a better understanding of the complex structure of tourists' experiences. It is worth remembering that mental involvement has a significant fully mediating effect on the relationship between sensory experience and norm arousal. This fact should remind policymakers that they should focus first on fostering tourists' primary experiences. Therefore, it is important to protect the biodiversity of protected areas, maintain a superior ecological environment quality, protect landscape integrity, and coordinate the planning of infrastructure and the surrounding environment. These factors play a decisive role in tourists' first impression, which leads to their most intuitive primary experience.

The influence of tourists' experiences on their ERBs has been confirmed, suggesting that improving the experience (except for the mental involvement dimension) that prompts tourists to engage in ERBs could be an appropriate intervention. We find that engaging in ERBs largely depends on the primary and advanced experience; when people initially enjoy natural landscapes visually or when their experience leads them to engage in ecological observation and to reflect on their

behaviour, they are more likely to engage in ERBs. If tourists are excessively immersed in an enjoyable experience that is brought about by the natural environment, they will not pay attention to environmental protection in the nature reserve or will not even stop others from interfering with the environment or pick up garbage to avoid unpleasant experiences for themselves.

This finding reveals that mental involvement and norm arousal significantly mediate the relationship between sensory experience (primary hierarchy experience) and ERBs. Managers should encourage tourists to have experiences that are ranked higher in the hierarchy by combining online and offline methods and reduce the negative impact on some ERBs caused by tourists' excessive immersion in the middle hierarchy experience. Thus, introducing tourists to the landscape formation process and making them ecologically sensitive to the nature reserve require educational films, advertisements, pedagogy and other tools to help tourists redirect their experience, reflect on their own environmental behaviours, and engage in ecological thinking and observation. Meanwhile, organizing activities such as hiking, camping, and environmental education workshops can also help tourists to improve their environmental awareness so they awaken to normative environmentalism. We emphasise that nature reserves should strengthen the supervision of tourists' behaviours. In high-quality landscape areas, warning signs and penalties should be established. Furthermore, combining electronic interpretation with soundscapes and educating tourists on the environment without interfering with their experience is also a feasible measure to upgrade tourists' mental experiences and to stimulate the implementation of ERBs.

5.3 Limitation and further research

The model constructed in this study is an empirical study of only the Nanlin National Nature Reserve. In the future, it needs to be verified in other types of protection areas. At the same time, our research variables use only experience and tourists' ERBs. In the future, we can embed experience factors into models such as theory of planned behaviour, value-belief-norm theory *etc.* to explain tourists' ERBs. In addition, the numbers of samples collected in the 2 years were very different, so we can further study whether there are differences in the relationship between tourists' experience and their ERBs in different seasons.

6 Conclusion

This study explores the relationship between the use and conservation of natural resources *via* tourists' experiences and ERBs. It reveals that tourists' experiences are hierarchical and sensory experience can activate mental involvement only through norm arousal. Second, not all dimensions of experience have a positive impact on behaviour. If tourists' experiences are limited to mental involvement, which may not be conducive to eco-environmental conservation in the protected areas. In addition, there is a mediating effect of higher hierarchy experiences (norm arousal) on the relationship between primary hierarchy experiences (sensory experience) and tourists' ERBs. The present research extends this body of knowledge by segmenting experiences and ERB dimensions into a research model. It opens the field for future research paths in the exploration of the paradox that emerges out of the natural experience and tourists' ERBs and provides insights into and points to ecological implications for reserve managers and tourism operators.

Data availability statement

The original contributions presented in the study are included in the Supplementary Material, further inquiries can be directed to the corresponding author.

Author contributions

Writing the initial draft, YZ; Conceptualization and methodology, RC; Visualization, investigation, and data curation, XX, Project administration, JY; Software and Validation, YG; Formal analysis and Supervision, ZW; Conceptualization, Writing—Review and Editing, SL; Formal analysis, CZ. All authors have read and agreed to the published version of the manuscript.

Funding

This work was supported by the National Natural Science Foundation of China [42171242,42271206,42271250]; GDAS′ Project of Science and Technology Development [2020GDASYL-20200104007]; Natural Science Foundation of Guangdong Province [2021A1515011073]; High-level Talents and Lingnan Scholars' Research Start-up Project of Foshan University [CGZ07001].

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fenvs.2022.1028508/full#supplementary-material

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