Research on the Mechanism of Tourists' Autonomic Nervous System Regulation and Emotional Expression in Yunnan Ancient Village Tourism Experience: an Empirical Analysis Based on the Individual-Environmental Learning Motivation Model

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Abstract. This study focuses on analyzing the effects of tourism experiences in ancient villages in Yunnan on tourists' physical and mental health and emotional expression. In this study, data were taken for paired t-test and analysis of variance (ANOVA) in the laboratory of Kunming College(Lab) and Wengji Guzhai, Jingmai Mountain, Pu'er, Yunnan(TV) to compare different scenarios of traveling with daily life scenarios. In the heart rate variability experiments of Lab and TV, there were 7 groups of data with significant differences, and the HRV parameters SDNN, RRmean, RMSSD and SD2 of the 16 Participants in different scenarios showed a decreasing trend, and Stress and LF/HF increased to a certain extent, which indicated that the Participants were in a relaxing state during the visit to the ancient villages and at the same time, they showed higher interest and physiological activation level, which stimulated strong curiosity and exploration. In Lab and TV's POMS questionnaire, there were 19 sets of data with significant differences, and Participants ' negative emotions were significantly reduced and positive emotions were significantly increased in different scenarios, suggesting that the ancient village tour could significantly improve the Participants ' emotions. This article will discuss how ancient village tourism affects the physical and mental changes of tourists from the perspective of tourists.

Keywords: Ancient Village Tourism, Physical and Mental Health, Heart Rate Variability.

1 Introduction

As globalization continues to deepen, the strategy of rural revitalization has become an important way for countries to promote local economic development and to protect and pass on their cultural heritage. In China, this strategy has particularly emphasized the importance of rural tourism, aiming to promote economic growth in rural areas through tourism activities, while preserving and promoting the natural beauty and cultural characteristics of the countryside[1]. In China, this strategy emphasizes the importance of

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rural tourism. Rural tourism not only provides tourists with opportunities to get closer to nature and experience rural life, but also brings economic benefits to local communities and helps to improve the quality of life of rural residents[2]. Hence, the success of rural communities depends on economic activity. The success of rural communities depends on the diversification of economic activities, and rural tourism is considered as the driver of regional economic development[3].Meanwhile, farmers develop recreational activities based on a typical rural environment by providing food and lodging for tourists, thus pulling the entire community forward[4].

With the rise of rural tourism, "ethnic traditional village style tours" have sprung up like bamboo shoots[5]. As an important human resource in the development of rural tourism, ancient villages contain profound cultural history and heritage, and reasonable tourism development of traditional villages is not only conducive to the maintenance of rural characteristics, but also beneficial to strengthen the cultural confidence of the nation, with integrity and diversity of Chinese culture[6].Ancient village tourism provides tourists with the opportunity to gain an in-depth understanding of different modes of life by integrating the traditional lifestyles of local residents and the unique cultural values of the area into the tourism product, and this integration not only enhances the experiential value of the destination, but also promotes the understanding of cultural diversity and sustainable development practices. In this process, tourists are able to temporarily escape from the hustle and bustle of urban life to enjoy the physical and mental changes brought by exotic cultures. In this paper, we selected Wengji Ancient Village in Jingmai Mountain of Yunnan Province as a case study. With the help of learning motivation theory, we used HRV (heart rate variability) technology to monitor the physical and mental changes of the Participants in the daily life surroundings and in the tourism environment of ancient villages, and constructed the model of "Individual-Environmental Learning Motivation Interaction", aiming to explore the influence of tourism in ancient villages on the physical and mental health of tourists, especially from the point of view of ancient villages. By constructing the model of "individual-environment learning interaction", we aim to explore the influence of ancient village tourism on tourists' physical and mental health, especially from the perspective of the influence of the environment and cultural values of ancient villages on tourists' independent learning and emotions. Through empirical research, this paper will reveal how ancient village tourism can be used as a positive form of tourism to promote tourists' mental health and emotional experience, and then provide strategic suggestions for the sustainable development of cultural tourism.

2 Sample and Methods

2.1 Sample

Participants Selection. (1) Recruitment method: This project recruits participants by means of convenient sampling, such as posting posters, sending leaflets, and We Chat group push.(2) Recruitment conditions: 1. Voluntarily cooperate with the test conditions; 2. Voluntarily participate in this study and sign a personal consent form; 3. Aged

18-60; 4. Non-pregnant women; 5. No serious cardiovascular or other diseases (e.g., heart disease, high blood pressure, epilepsy, and other past medical history); 6. No long-term use of medication; 7. Ability to distinguish colors as normal; 8. Ability to take care of themselves and freely participate in outdoor activities; 9, Hearing, smell, vision, taste is normal; 10, clear consciousness, no mental illness or cognitive impairment, normal communication; 11, no experience of over-sensitivity to travel; 12, no skin allergy to alcohol; 13, no history of motion sickness; 14, non-travel industry workers; 15, the ability to use electronic mobile products.(3) Number of recruits: 40.

Research scenarios. Wengji Ancient Village is one of the five traditional villages of the Brown ethnic group in Jingmai Mountain, with a unique geographical location, situated in the mountainous area above 1,300 meters above sea level, surrounded by tea gardens and relying on the mountains and the water. The village retains the traditional layout and historical features of the Brown villages, and the buildings are staggered along the contour line around the center of the village.

The purpose of this study is to collect experimental data in different surroundings from the perspective of tourism experience by comparing the heart rate variability (HRV) indices of the subjects in the daily life scenario, the arrival at wengji Guzhai scenario, and the touring wengji Guzhai scenario. In addition, the study will incorporate the use of the State of Mind Scale in order to explore the psychological and emotional responses of the subjects in different scenarios. The results of the study will contribute to an in-depth understanding of the effects of tourism experiences on individual mental states, providing a scientific basis for the field of tourism planning and development and mental health.

2.2 Methods

HRV analysis methods for dynamic evaluation. HRV dynamic tracking and evaluation technique is one of the well-established research methods in the field of psychology and neuroscience, which can directly reflect the continuous high-precision signal tracking of HRV indexes of Participants in the time and frequency domains under dynamic situations[7].To find out the regularity and interaction of Participants ' autonomic nervous activities (sympathetic nervous system and parasympathetic nervous system), to objectively and meticulously measure Participants'physiological mechanisms, psychological cognition, sensory-emotional and autonomic nervous system regulation indexes, to avoid all kinds of disadvantages of Participants in the verbal expression test, and then to evaluate the differentiated information of the Participants ' physical and mental health dimensions in the course of different tourism scenarios, and to realize the tourism elements in case space Extraction. **Questionnaires.** (1)Basic information: age, sex, physical condition, HRV data collection instructions, control scales;(2) Mood State Scale: to investigate the emotional state of the Participants before and after the experiment.

2.3 Procedures

Pre-intervention testing (daily living). (1) One week before the outdoor test, the Participants went to the Tourism Management Laboratory of Kunming College for pre-intervention data collection, which included administering the HRV test and filling out questionnaires and scales.(2) Participants will arrive at the laboratory at the specified time, complete the questionnaire and scale, and rest for 10 minutes. Afterwards Participants will be asked to remain in a quiet and relaxed resting position without any behavioral actions and heart rate variability data will be recorded continuously under natural breathing conditions.

Intervention testing (on-site). Participants will form a tour group as tourists, led by a tour guide (a teacher with a senior tour guide certificate from Kunming College), and travel to Wengji Ancient Village in Jingmai Mountain to conduct a nature field experiment. Participants will intervene before and during the relevant tourist scenes of the selected route. The process is as follows:

(1). Wear a chest strap (type H10);

(2). 10-minute break;

(3). Completion of questionnaires and scales;

(4). Participants were asked to remain in a quiet and relaxed resting position without any behavior, and pre-test data on heart rate variability under natural conditions were recorded continuously;

(5). Participants were asked to perform normal traveling activities, and interim data on heart rate variability measurements were recorded continuously under natural conditions;

(6). Participants were asked to remain in a quiet and relaxed resting position without any behavior, and post-measurement data on heart rate variability were recorded continuously under natural conditions;

(7). At the end of the tour, participants will fill out the questionnaire and scale and rest for 10 minutes. Afterwards, the participant will be asked to remain in a quiet and relaxed resting position without any behavioral actions, and heart rate variability data will be continuously recorded under natural breathing conditions.

HRV throughout the experiment. Participants' continuous heart rate (respiratory rate, heart interval, etc.) data have been collected and analyzed by the Fitlab® system. The system includes:

(1). Mobile devices (tablets, cell phones) with test-related applications installed;

(2). Cardiac chest strap (Polar, type H10), the cardiac chest strap and the mobile device were connected to each other via Bluetooth to obtain the heartbeat interval data of the subject;

(3). Wireless and remote servers;

(4). A working website for the Health and Exercise Lab, which will synchronize the monitoring of data from all participants in each test, track the quality of the monitoring data in real time, and objectively measure people's emotional responses.

3 Theory and Model

Motivation for learning is generally viewed as the intrinsic drive or reason that drives an individual to engage in learning activities[8].It can be further categorized into intrinsic and extrinsic motivation. It can be further categorized into intrinsic and extrinsic motivation, with intrinsic motivation stemming primarily from an individual's interest in and satisfaction from the learning activity itself, while extrinsic motivation is usually caused by rewards or pressures outside of the learning activity[9].The extrinsic motivation is usually caused by rewards or pressures other than the learning activity. In the context of intrinsic motivation, emotional states play a key role and can significantly influence the formation of motivation, while in the context of extrinsic motivation, environmental factors also have a multifaceted impact on motivation[10]. In the context of extrinsic motivation, environmental factors also have a multifaceted impact on motivation.

Wengji Ancient Village, an ancient village with traditional cultural characteristics of ethnic minorities, has unique architectural features, residents' living customs, dietary traditions and festivals that contrast sharply with the rhythm of urban life. This kind of environmental background can significantly stimulate the intrinsic motivation of tourists, especially when tourists show strong interest and curiosity in exploring and experiencing new cultures, and this intrinsic learning drive prompts tourists to not only act as viewers, but also as active learners, actively absorbing and learning about the culture of the ancient village in the process of touring. At the same time, the environmental factors of ancient villages, as an aspect of extrinsic motivation, also provide tourists with a rich background that promotes the formation of learning motivation, thus facilitating the learning behavior during the tour experience. Based on this, the research model of this paper is constructed, as show in figure 1:

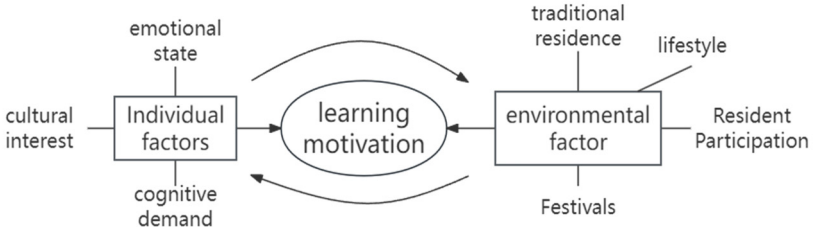

Fig. 1. Individual-environment interaction model of learning motivation

4 Results

4.1 HRV Parameters in Different Scenarios

As can be seen in Table1, the variability of HRV parameters in different scenarios was investigated using ANOVA, in which 7 indicators, including LF, HF, and LF/HF,

showed significant differences ($p<0.05$), which indicates that the HRV indicators of the Participants changed significantly in three different scenarios: in daily life, arriving at wengji Guzhai, and at the end of touring wengji Guzhai.

Table 1. HRV parameters (M±SD) in 3 different scenes

	DL	GT	ET	F	p
RRmean	763.26±105.48	737.56±88.94	714.41±93.77	1.738	0.183
SDNN	50.63±17.77	46.59±20.13	50.96±23.35	0.379	0.686
RMSSD	31.15±15.19	28.11±17.34	23.41±12.24	1.809	0.171
pNN50	11.85±13.85	10.22±14.95	4.11±4.15	3.118	0.050*
SD1	22.11±10.80	19.78±12.30	16.48±8.68	1.886	0.158
SD2	67.85±23.18	62.44±26.81	70.04±32.45	0.536	0.587
VLF	873.04±747.20	791.63±640.55	1417.70±1357.66	3.338	0.041*
LF	649.81±556.09	303.15±270.64	334.00±271.75	5.837	0.004**
HF	760.04±823.50	308.67±362.53	133.48±169.61	10.097	0.000**
LF/HF	1.57±1.74	3.17±2.84	4.02±3.74	5.013	0.009**
%LF	0.50±0.22	0.66±0.21	0.71±0.16	7.918	0.001**
%HF	0.51±0.22	0.34±0.21	0.29±0.16	8.778	0.000**
Stress	75.62±9.83	77.93±8.95	72.33±11.43	2.081	0.132

* $p<0.05$ ** $p<0.01$, DL:daily life status scene;GT: arrival at wengji Guzai scene; ET: end of tour scene

Figure 2 shows the results of two-by-two comparisons of the three scenarios, from which it can be seen that the arrival at wengji Ancient Walled City scenario, the end of the tour scenario and the daily life scenario, respectively, showed significant differences in comparison, which represents that the Ancient Walled City Tourism can affect the physiological level of the tourists to a certain extent.

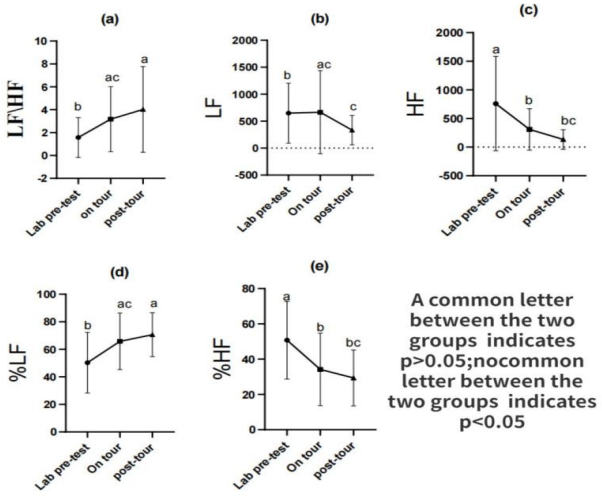

Fig. 2. Significance representation after two-by-two comparison of three scenarios

4.2 POMS in Different Scenarios

As can be seen from Table 2, the paired t-test analysis was used to study the differences in the Participants ' emotional states in different scenes, in which 15 indicators such as nervousness, listlessness, and relaxation showed significant differences ($p<0.01$);and 4 indicators such as energetic and vigorous showed significant differences ($p<0.05$), which indicates that in daily life and at the end of the tour to wengji Ancient Walled City Significant changes in the Participants ' emotions occurred in two different scenarios.

Table 2. Mood indicators in 2 different scenarios

name (of a thing)	DL	ET	difference	t	p
keyed up	1.84±0.93	1.06±0.25	0.77	4.509	0.000**
listless	1.71±0.86	1.16±0.37	0.55	3.770	0.001**
easy and pleasant	3.06±1.06	3.90±1.04	-0.84	-3.763	0.001**
frenetic	1.45±0.68	1.06±0.25	0.39	3.013	0.005**
heart distracted	1.84±1.07	1.06±0.25	0.77	3.967	0.000**
exhausted	2.10±1.08	1.45±0.68	0.65	2.752	0.010**
in high spirits	3.10±1.01	3.90±0.98	-0.81	-3.758	0.001**
can't concentrate	1.81±0.83	1.23±0.43	0.58	3.503	0.001**
feel ill at ease	1.42±0.89	1.06±0.25	0.35	2.160	0.039*
body weary	2.10±1.08	1.16±0.37	0.94	4.636	0.000**
proactively	3.26±1.03	3.61±0.99	-0.35	-1.731	0.094
flustered	1.45±0.68	1.16±0.58	0.29	1.871	0.071
restless	1.42±0.89	1.06±0.25	0.35	2.160	0.039*
worn out	2.06±1.12	1.19±0.48	0.87	4.227	0.000**
become exhilarated	3.13±1.26	3.87±0.99	-0.74	-3.025	0.005**
forgetfulness	2.00±0.93	1.32±0.54	0.68	3.851	0.001**
excitable	2.32±1.01	2.23±1.12	0.10	0.399	0.693
vibrant	3.03±0.95	3.55±1.06	-0.52	-2.380	0.024*
uncertainty	1.97±1.05	1.26±0.51	0.71	3.926	0.000**
worrisome	1.94±1.03	1.13±0.34	0.81	4.292	0.000**
full of vigor	3.06±1.03	3.55±1.18	-0.48	-2.182	0.037*
current state	7.48±2.20	8.39±1.56	-0.90	-2.830	0.008**

* $p<0.05$ ** $p<0.01$; DL:Scene of daily life status; ET: Scene at the end of the tour of Wengji Ancient Walled City

5 Conclusions and Implications

5.1 Conclusions

Ancient Village Excursions Significantly Improve Tourist Sentiment.

Tourists' positive mood is significantly increased and negative mood is significantly decreased during the tour of wengji Ancient Village. As can be seen from the data in Table 2, comparing the mood state of the Participants in daily life and after the tour of the ancient villages, it can be found that the positive mood indicators such as relaxed, happy, full of energy, excited, etc. after the tour are significantly improved; the negative mood indicators such as lethargy, panic, and upset, etc. after the tour are significantly reduced. Specifically, the mood state indicator in daily life was 7.48, while the mood state indicator at the end of the excursion rose to 8.39, with a significant difference between the two. This result suggests that ancient village tourism with local cultural characteristics can effectively enhance the mood state of tourists, making tourists obtain a higher emotional value at the end of the tour. **Ancient village tourism can stimulate independent learning among tourists.**

Tourists showed high interest and physiological activation level in the ancient village visit, which stimulated strong curiosity and exploration. From the data in Table 1, it can be seen that the indicators related to sympathetic nerves, LF, %LF decreased significantly; the indicators related to parasympathetic nerves, HF,%HF decreased significantly; the significance of LF/HF increased. It indicates that during the process of switching from daily life scenes to the ancient village tour, the overall heart rate of tourists is smoother and in a more relaxed state, but the tour process is still dominated by sympathetic nerve action. Through the data in Table 2, it can be seen that during the whole process, the indicators of worry and forgetfulness of tourists decreased significantly, and the mental state increased significantly. Combined with the individual-environment interaction model of learning motivation, it can be concluded that the better emotional state of tourists and the tour of the ancient villages with local cultural characteristics inspire tourists to have strong curiosity, and the tourists show strong learning motivation, and the process of attention allocation is mainly subjectively controlled and regulated by top-down control, which prompts the tourists to visit the village in the process. regulation, prompting tourists to engage in active independent learning in the tour process.

5.2 Implications

As a special form of rural tourism, the unique cultural atmosphere and historical value of ancient village tourism has a significant role in promoting the positive emotions and independent learning of tourists, and this finding provides the following insights into the development and management of traditional ancient village tourism:

(1) Focus on cultural protection and inheritance. The core attraction of ancient village tourism lies in its rich cultural value, if this cultural characteristic is neglected or weakened in the development process, ancient village tourism may lose its unique attraction and cultural significance.

(2) Improve the participation of residents. Through the implementation of targeted education and training programs to enhance local residents' understanding of the value of cultural heritage, and then stimulate their participation in tourism development, not only helps to maintain the traditional appearance of the ancient villages, but also can present tourists with the original way of life of local residents.

(3) Create an atmosphere of cultural immersion. The integration of the natural landscape of ancient villages with regional culture promotes the transformation and upgrading of the rural tourism industry while also increasing the types of rural tourism products and enriching the cultural connotation of rural tourism[11]. The natural and humanistic environment of the ancient villages has been a major factor in the development of rural tourism. The natural and humanistic environments of ancient villages together form a learning and cognitive field for tourists, which can stimulate deep thinking and reflection, and then deepen the cognitive process. In tourism planning and development, attention should be paid to the protection and display of the natural landscape and cultural characteristics of the village, while designing interactive experiential activities to motivate tourists to deepen their thinking and experience, thus enhancing the educational significance and cultural depth of tourism activities.

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