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Does Soundscape Perception Lead to Environmentally Responsible Behavior? A Case Study in Longcanggou Forest Park, China

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Abstract: Soundscape perception (SP) plays an important role in promoting tourist-place interaction and enhancing tourists' environmentally responsible behavior (ERB). In this study, we defined SP as a second-order factor and investigated its relationships with place attachment (PA) and tourists' ERB using structural equation modeling (SEM). Our aim was to identify how a soundscape could be improved to enhance the ERB of forest park tourists. Our results confirm the multidimensionality of SP, i.e., the three subdimensions of physical soundscape perception (PSP), psychological soundscape perception (SSP), and regional soundscape perception (RSP). Furthermore, our SEM results show that PA mediates the effect of the three subdimensions of SP on high-effort ERB (HERB). Our empirical results also reveal that the enhancement of tourists' SSP will foster their ERB. This study therefore extends the multisensory landscape literature by offering insights into the relationship between SP, PA, and tourists' ERB. Our findings provide empirical evidence for understanding the influence of SP on tourists' ERB in forest parks and demonstrate that PA should be considered an important context for soundscape design.

Keywords: soundscape perception; place attachment; tourists' environmentally responsible behavior; structural equation modeling

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1. Introduction

Forest parks play an important role in improving air quality, maintaining biodiversity, and providing recreation destinations. However, as an increasing number of tourists visit parks for leisure and recreation, the contradiction between tourists and the park environment is becoming more prominent, as improper tourist behavior has adverse effects on the environment [1,2]. At present, the adoption of various restrictive regulations to regulate tourists' behavior may aggravate the conflicts between tourists and park officials. Instead of adopting restrictive rules to restrict tourists' behavior, it is better to stimulate tourists' environmentally responsible behavior (ERB) to promote the sustainable development of forest parks [3].

Many scholars have conducted detailed studies on the mechanisms and influencing factors of ERB. For example, Vaske et al. [4] suggested that encouraging an individual's connection to a natural setting facilitates the development of general ERB. Likewise, Halpenny et al. [5] studied visitors to a Canadian national park and confirmed that place attachment (PA) could predict ERB. Stedman [6] found that a positive emotional and identity-based attachment to a place strongly influences the intentions of seasonal and full-time lake district residents to engage in place protective behaviors. A similar finding was reported by Kelly [7], who found that PA is positively linked to behaviors such as volunteering and environmental conservation in Western Australia.

Although existing research has suggested that PA is a potentially useful concept to promote ERB, few scholars have used PA as a mediator to study the effects of soundscape perception (SP) on tourists' ERB. The sensory dimension of the landscape has drawn increasing attention in recent years. Soundscapes, composed mainly of sound and its

related environmental elements, can be directly perceived by humans and are a determinant factor in how tourists perceive a place [8]. As an important component of forest landscape elements, the soundscape has important comprehensive value for spatial cognition and landscape experience. Tourists are able to perceive a landscape, evaluate their experience, form attitudes, and strengthen or create values from the soundscape that they experience [9]. These values can influence the form of human behavior regarding a soundscape. Thus, soundscapes are vital for research on the ERB of tourists and may undermine "the tyranny of the visual" in the field of landscape architecture research. However, previous studies have lacked theoretical research on tourists' SP and an in-depth understanding of how soundscapes affect ERB in forest parks. Thus, it is still unclear whether the influence of each dimension of SP on ERB is different. Studies that incorporate the three subdimensions of SP and their influence on ERB in a single theoretical model are therefore needed.

To address this need, we considered SP a second-order factor comprising physical perception, psychological perception, and regional perception. Based on the above background, we attempted to construct a causal relationship model of "SP-PA-ERB" based on the theory of PA and a "cognition-attitude-behavior" model. The relationships among the theoretical constructs of interest in this study is presented in Figure 1. The model was tested using data collected from tourists to Longcanggou Forest Park, China. We used exploratory factor analysis to confirm the dimensionalities of the SP construct and structural equation modeling (SEM) to test the influence of SP on PA and ERB. We thus developed perspectives and explored the effects of tourists' SP and PA on ERB for forest tourism to bridge the identified gaps in the literature. Specifically, we investigated whether tourists' soundscape perceptions from different dimensions are related to their ERB. In summary, the purpose of this study is to explore the process of tourists' SP and analyze the relationship between SP and tourists' ERB. The mechanism of sustainable development between tourists and the environment is discussed through SP, PA, and tourists' ERB formation.

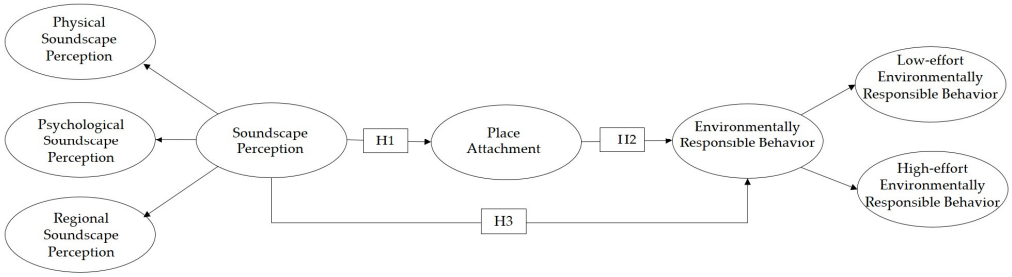

Figure 1. The theoretical framework.

2. Literature Review and Hypotheses

2.1. SP and PA

The soundscape concept was proposed in the 1970s by R. Murray Schafer, a Canadian composer and researcher interested in the acoustic environment. The International Organization of Standardization (ISO) defined soundscape as "the acoustic environment as perceived or experienced and/or understood by a person or people, in context" [10]. The soundscape is a comprehensive environment that contains three basic elements, sound, listener, and environment, which interact with each other to form a pattern of interaction between sound and listener with the environment as the background [11]. SP is the result of the interaction between humans and their acoustic environment and is based on the "sound-listener-environment" perception mechanism. Thus, SP is not only influenced by the physical characteristics of sound but also depends on subjective factors, such as the listener's preferences and emotions. Many researchers have considered SP a multidimensional concept. For example, Axelsson et al. [12] divided the set of soundscape attributes into three perception dimensions: pleasantness, eventfulness, and familiarity. Likewise, Hong et al. [13] used the descriptive terms "pleasant", "favorite", and "harmonious" to characterize the perceptual dimensions of soundscape preference. In general, the dimen-

sions of SP are diverse and vary depending on the environment. The location factors associated with a soundscape play an important role in perceiving soundscapes because these factors influence every element, including auditory perception, interpretation of auditory perception, and outcomes in the acoustic environment [10]. Thus, the auditory information received by listeners in conjunction with their acoustic environment, personal dimensions, and nonacoustic contexts lend meaning to a soundscape. As the soundscape in outdoor spaces is a complex system related to physical, psychological, and regional factors, in this study, we used the "enviroscape" (other environmental factors) and "psychscape" (listener variables) proposed by Job [14] as the basis to propose three SP subdimensions: physical SP (PSP), psychological SP (SSP), and regional SP (RSP). Exploratory factor analysis was used to test and verify these subdimensions.

Place attachment, originating in environmental psychology, is an emotional connection that arises from the interaction between individuals and places, emphasizing individuals' positive emotions toward places. Williams [15] defined PA as "a connection between people and places based on sensations, perceptions, and behaviors". PA is a multidimensional concept that is always described with "place dependence" and "place identity". Place dependence is tourists' functional attachment to a specific place and their awareness of the uniqueness of this setting [16]. Place identity, in contrast, refers to the connection between a place and its identity. It contains both cognitive and affective elements [5].

Soundscape has been referred to as an element of the sense of place [9]. Most scholars have focused on the relationship between SP and PA. Thompson [17] described the relationship between soundscapes and humans as a cultural construct, noting that humans benefit from their own constructed framework of soundscape perception. He suggested that the important values of soundscapes include creating a sense of place or providing cultural and historical heritage values. Similarly, Schafer [18] recognized the relationship between a soundscape and sense of place, arguing that "every natural soundscape has its unique tones and often these are so original as to constitute soundmarks". Leopol et al. [19] described how natural and rural soundscapes usually evoke a sense of place in a textual way. In addition, Liu et al. [20] suggested that a soundscape is an important carrier for tourists to acquire a sense of place. It has positive significance in shaping tourists' identity recognition and place perception. Thus, tourists connect themselves to their environment through SP. The absence of a soundscape can lead to alienation from an environment, making it difficult to form PA. PA serves as an emotional bond between tourist-place relationships, and this emotional connection can be complemented by functional connections that can be strengthened by SP.

Therefore, SP offers the possibility of PA for tourists. The following hypotheses were thus developed:

Hypothesis 1a (H1a). *PSP will positively affect PA.*

Hypothesis 1b (H1b). *SSP will positively affect PA.*

Hypothesis 1c (H1c). *RSP will positively affect PA.*

2.2. PA and ERB

According to Steg [21], ERB is an action by an individual or a group that promotes or results in the sustainable use of natural resources. ERB, as a multidimensional construct, can be classified into low-effort ERB (LERB) and high-effort ERB (HERB) [17]. LERB refers to tourists' ERB under the constraints of laws, regulations, and ethics, while HERB refers to the environmental protection actions that are taken by tourists voluntarily and spontaneously. Within the literature on PA and ERB, several studies have demonstrated significant associations between these two constructs in different contexts and situations. Ramkissoon et al. [22] studied the impact of cultural landscapes, natural landscapes, and educational activities on the emotional aspects of tourists in national parks. They found

that emotions between tourists and places can promote ERB. Walker et al. [23] showed that people who strongly identify with a rural landscape are more likely to support and participate in conservation programs to protect the rural landscape. Cheng et al. [24] used SEM to explore the relationship between destination attractiveness, PA, and ERB. It was found that PA is positively related to ERB and that PA mediates the relationship between place attractiveness and ERB. Moreover, Zhou et al. [25] studied the Xixi National Wetland Park in Hangzhou, and their results show that tourists' ERB is directly or indirectly influenced by PA.

Therefore, PA can enhance tourists' ERB. The following hypotheses were thus developed:

Hypothesis 2a (H2a). *PA will positively affect LERB.*

Hypothesis 2b (H2b). *PA will positively affect HERB.*

2.3. SP and ERB

Environmental perception is closely related to individual behavior. It is one of the important indicators of environmental attitude, which largely determines the direction and attitude of individual environmental behavior. Miller et al. [26] stated that the more comprehensive tourists' perception of an environment is, the more individuals will adopt behaviors to protect it. Research in the field of environmental psychology has found that people with high perceptions of noise are more proactive in their environmental behavior [27]. People who think deeply about urban sound issues reinforce their environmental protection values and thus consciously comply with environmental norms. Harmon [28] claimed that as individuals understand soundscape values and then provide information and educational opportunities, it is possible to compel individuals to change their behavior toward the environment.

Based on the above analysis, SP can promote ERB among tourists. Hence, the following hypotheses were developed:

Hypothesis 3a (H3a). *PSP will positively affect LERB.*

Hypothesis 3b (H3b). *PSP will positively affect HERB.*

Hypothesis 3c (H3c). *SSP will positively affect LERB.*

Hypothesis 3d (H3d). *SSP will positively affect HERB.*

Hypothesis 3e (H3e). *RSP will positively affect LERB.*

Hypothesis 3f (H3f). *RSP will positively affect HERB.*

2.4. Theoretical Framework

Previous studies have found that tourists' connection with their natural environment affects their attitudes toward the environment. It is anticipated that tourists who perceive the acoustic environment strongly and demonstrate increased PA will also demonstrate high levels of ERB toward the place of attachment. However, few studies have incorporated the three SP subdimensions, PA, and tourists' ERB in their theoretical model to investigate the mechanism among them. Defining SP as the independent variable, PA as the mediating variable, and tourists' ERB as the dependent variable, we thus constructed a theoretical framework of the relationship between three-factor dimensional SP and tourists' ERB. The theoretical framework regarding the dimensions of SP and ERB was established, as shown in Figure 1.

3. Methodology

3.1. Study Area

The area selected for this study was Longcanggou National Forest Park (Figure 2). The park is located in Ya'an on the western edge of the Sichuan Basin, China. As a well-known tourist destination in China, it enjoys a reputation as a great resort and is one of the popular tourism destinations in the Giant Panda National Park area. Longcanggou National Forest Park is an ecological national park with a diversity of forest plants and water scenery, integrating ecological tourism, vacations, cultural entertainment, and science education. The park has distinctive landscape features and is attractive to tourists from the surrounding cities. A natural soundscape and humanistic soundscape are both available in the park, constituting a comprehensive soundscape.

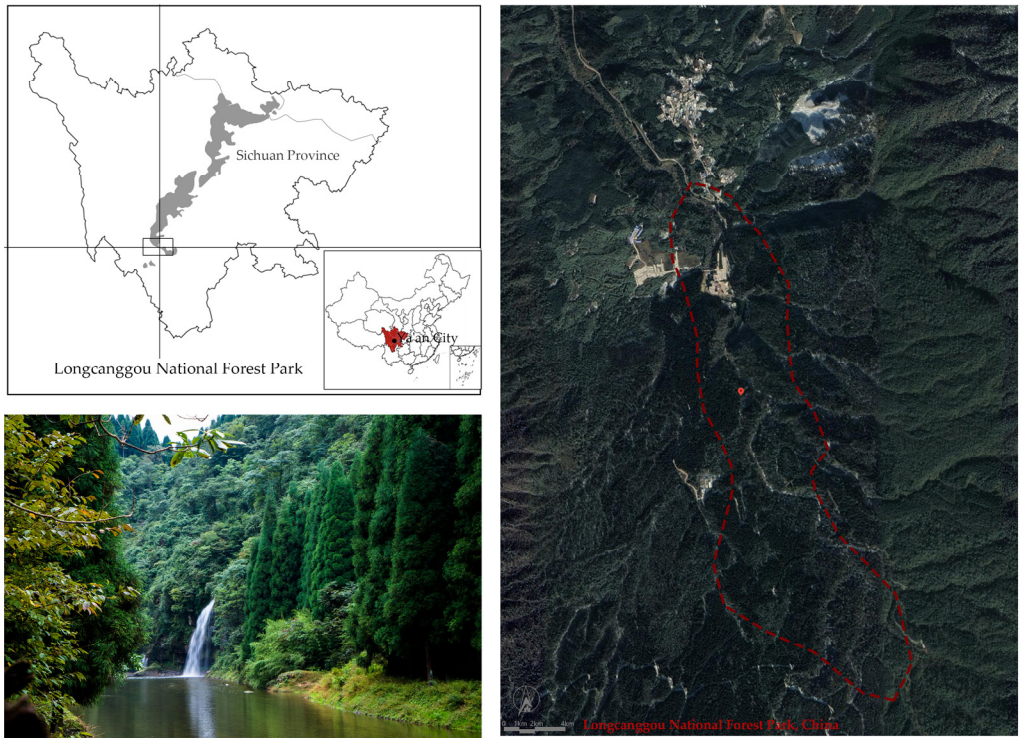

Figure 2. Location of the study area.

3.2. Data Collection

The measurement items of the three subdimensions of SP, PA, and ERB were adopted from previous literature. The questionnaire was composed of four parts: part one—demographic information on tourists; part two—measurement of the three latent variables of SP; part three—measurement of PA; and part four—measurement of tourists' ERB. All measurement items are shown in Appendix A. For all constructs, a five-point Likert scale was adopted, ranging from 1 for "strongly disagree" to 5 for "strongly agree". The questions regarding PA and ERB were employed based on the protocols of Williams [16] and Cheng [24]. As there is no standardized scale for SP, the SP scales used in this study were modeled on preexisting SP scales and modified to fit the current study's objectives, setting, and population. Thus, it was necessary to conduct a small sample pretest (100 valid questionnaires) to verify the reliability and validity of the SP scale. The results are shown in Table 1.

During 26 April–3 May 2022, the research team distributed questionnaires to 550 park tourists through random sampling in Longcanggou National Forest Park. A total of 550 questionnaires were distributed, and 510 valid questionnaires were returned, for a return rate of 92.7%. The demographic information is shown in Table 2.

Table 1. Results of the EFA for soundscape perception.

Latent Construct	Indicator	Components			Cumulative (%)	Cronbach's α
		1	2	3		
PSP	PSP1	0.735 *	0.201	0.000	26.230	0.828
	PSP2	0.829 *	0.080	0.193		
	PSP3	0.784 *	0.362	0.052		
	PSP4	0.684 *	0.081	0.348		
SSP	SSP1	0.361	0.704 *	0.202	49.621	0.814
	SSP2	0.418	0.510 *	0.304		
	SSP3	0.432	0.757 *	0.131		
	SSP4	0.161	0.843 *	0.153		
	SSP5	−0.077	0.676 *	0.329		
RSP	RSP1	0.408	0.183	0.701 *	67.966	0.788
	RSP2	0.406	0.269	0.671 *		
	RSP3	0.388	0.296	0.679 *		
	RSP4	−0.190	0.170	0.782 *		

Note: * Extraction method: principal component analysis; rotation method: Varimax with Kaiser normalization; rotation converged in 6 iterations.

Table 2. Demographic profile of the respondents.

Demographic Trait	Frequency (n = 510)	Percentage (%)
Gender		
Male	240	47.1
Female	270	52.9
Age		
≤18	24	4.7
19–34	252	49.4
35–49	118	23.1
50–64	85	16.7
≥65	31	6.1
Educational level		
High school or below	53	10.4
Junior college	59	11.6
University	312	61.1
Graduate school	86	16.9
Previous visits		
First time	352	69.0
Two times	83	16.3
Three times	25	4.9
Four times and above	50	9.8
Tour duration		
<2 h	72	14.1
2–5 h	350	68.6
>5 h	88	17.3
Soundscape satisfaction		
Strongly dissatisfied	0	0
Dissatisfied	2	0.4
General	92	18.1
Satisfied	273	53.5
Strongly satisfied	143	28.0

3.3. Data Analysis

The data were analyzed using SPSS (version 27.0) and AMOS 26.0. Frequency analysis of demographic characteristics and reliability analysis were conducted. SEM is a multivari-

ate statistical method often used to verify the relationship among latent variables. SEM has two components: the measurement model and the structural model. SEM was performed with a three-step approach in this study. First, confirmatory factor analysis (CFA) was conducted to test the goodness of fit and convergent and discriminatory validities of the measurement model. Second, SEM was employed to identify the causal relationships among the constructs and test the hypotheses of the research model [29]. Third, the bootstrap method was used to analyze the sampling distribution of indirect effects, and the number of bootstrap samples was set to 2000 [30].

4. Results

4.1. Constructs of Soundscape Perception

The first stage was to test the second-order factor model to determine whether the three subdimensions (PSP, SSP, and RSP) can be considered appropriate indicators of SP. Exploratory factor analysis (EFA) with SPSS was performed to determine the subdimensions of SP. These results are shown in Table 1. Principal component analysis of the 13-item SP responses provided support for the existence of the three factors. The three-component solution explained a total of 67.966% of the variance, which meets the normal requirement of 60% needed for social science [31]. The Cronbach's alpha of each factor lay between 0.788 and 0.828, larger than the required threshold of 0.70, which means the credibility of the scale was high [32].

4.2. Measurement Model

To measure correlation among the dimensions, we conducted CFA and tested the validity and reliability of the returned valid questionnaires. In this study, the internal consistency reliability was examined by Cronbach's alpha and composite reliability (CR). As shown in Table 3, the minimum of Cronbach's alpha was greater than 0.70, and the CR values for all the constructs were above the 0.7 threshold value [33], indicating the internal consistency of the indicators. These results show that the internal consistency of the measurement items was good and the reliability was acceptable.

Validating scales requires observation of convergent validity and discriminant validity. We assessed convergent validity by examining the standardized factor loadings (Std.) and average variance extracted (AVE) for each item. As shown in Table 3, the factor loadings ranged from 0.536 to 0.918, which was significant ($p < 0.001$) and matched the standard of 0.50–0.95 [34]. Additionally, the AVE value of each latent construct was greater than 0.5 [35,36], which indicated that the scale had good convergent validity. Moreover, discriminant validity analysis was used to verify whether there were significant differences between two different dimension correlations [37]. To evaluate discriminant validity, we compared the square root of AVE values with latent construct correlations [38]. As shown in Table 4, all latent constructs with the square root of AVE were greater than their correlation coefficients with the remaining latent constructs. Therefore, the scale had good convergent validity and discriminant validity.

Table 3. Results of reliability and validity analysis.

Latent Construct Reference Value	Indicator	Std. >0.5	CR >0.7	AVE >0.5	Cronbach's α >0.7
SP					
PSP	PSP1	0.714	0.822	0.537	0.818
	PSP2	0.770			
	PSP3	0.756			
	PSP4	0.688			

Table 3. *Cont.*

Latent Construct Reference Value	Indicator	Std. >0.5	CR >0.7	AVE >0.5	Cronbach's α >0.7
SSP	SSP1	0.719	0.859	0.554	0.841
	SSP2	0.725			
	SSP3	0.868			
	SSP4	0.828			
	SSP5	0.536			
RSP	RSP1	0.792	0.829	0.552	0.798
	RSP2	0.845			
	RSP3	0.750			
	RSP4	0.553			
PA	PA1	0.697	0.885	0.563	0.884
	PA2	0.681			
	PA3	0.768			
	PA4	0.784			
	PA5	0.743			
	PA6	0.819			
ERB					
LERB	LERB1	0.918	0.913	0.777	0.912
	LERB2	0.872			
	LERB3	0.854			
HERB	HERB1	0.668	0.759	0.513	0.755
	HERB2	0.784			
	HERB3	0.692			

Note: Std. refers to the standardized factor loadings; CR refers to composite reliability; AVE refers to average extracted variance.

Table 4. Results of discriminant validity analysis.

Latent Construct	AVE	RSP	SSP	PSP	PA	HERB	LERB
RSP	0.552	0.743 *					
SSP	0.554	0.603	0.744 *				
PSP	0.537	0.502	0.671	0.733 *			
PA	0.563	0.565	0.487	0.487	0.750 *		
HERB	0.513	0.358	0.430	0.318	0.428	0.716 *	
LERB	0.777	0.292	0.393	0.291	0.268	0.192	0.881 *

Note: * Represents the square of the average variance.

4.3. Structural Model

After ensuring that the overall measurement model was valid and acceptable, the structural model was tested. AMOS (version 26.0) was used to measure causal relationships between latent constructs and observable variables. We adopted SEM and maximum likelihood estimation (MLE) to estimate the correlations of the variables in the proposed model. The fit indices for the structural model (Table 5) are as follows: χ^2 = 654.856 (p = 0.000); GFI = 0.911; CFI = 0.940; AGFI = 0.90; NFI = 0.906; IFI = 0.942; RMA = 0.034; RMSEA = 0.054, and CMIN/df = 2.490. All indices suggest a good fit [39], showing that the model fits the data well.

As shown in Table 6 and Figure 3, the path coefficients of the three subdimensions of SP were all statistically significant at a significance level of 0.001 [40]. The three subdimensions of SP, namely, PSP (β = 0.258, p < 0.001), SSP (β = 0.227, p < 0.001) and RSP (β = 0.213, p < 0.001), had a significant positive effect on PA. In terms of the path leading to ERB, PA had a statistically insignificant effect on LERB but significantly and positively affected HERB (β = 0.274, p < 0.001). Only SSP among the three subdimensions of SP had a significant

effect on ERB, supporting H3c and H3d. That is, we found that SSP has a positive effect on both the LERB and HERB of tourists.

Table 5. Goodness-of-fit test for the structural model.

Fitness Index	CMIN/*df*	GFI	AGFI	RMA	RMSEA	NFI	IFI	CFI
Reference Value	<3	≥0.9	≥0.9	<0.05	<0.08	≥0.9	≥0.9	≥0.9
Model Fit	2.490	0.911	0.90	0.034	0.054	0.906	0.942	0.940

Note: CMIN/*df*, chi-square/degrees of freedom; GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; RMA, root mean square residual; RMSEA, root mean square error of approximation; NFI, normed fit index; IFI, incremental fit index; CFI, comparative fit index.

Table 6. Path coefficients and hypothesis results.

Hypothesis Path	Std.	*p* Value	Result
H1a: PSP PA	0.258	***	Supported
H1b: SSP PA	0.227	***	Supported
H1c: RSP PA	0.213	***	Supported
H2a: PA LERB	0.073	0.231	Not supported
H2b: PA HERB	0.274	***	Supported
H3a: PSP LERB	0.019	0.806	Not supported
H3b: PSP HERB	−0.036	0.659	Not supported
H3c: SSP LERB	0.313	***	Supported
H3d: SSP HERB	0.289	***	Supported
H3e: RSP LERB	0.053	0.441	Not supported
H3f: RSP HERB	0.050	0.497	Not supported

Note: *** $p < 0.001$; Std. refers to the standardized factor loadings.

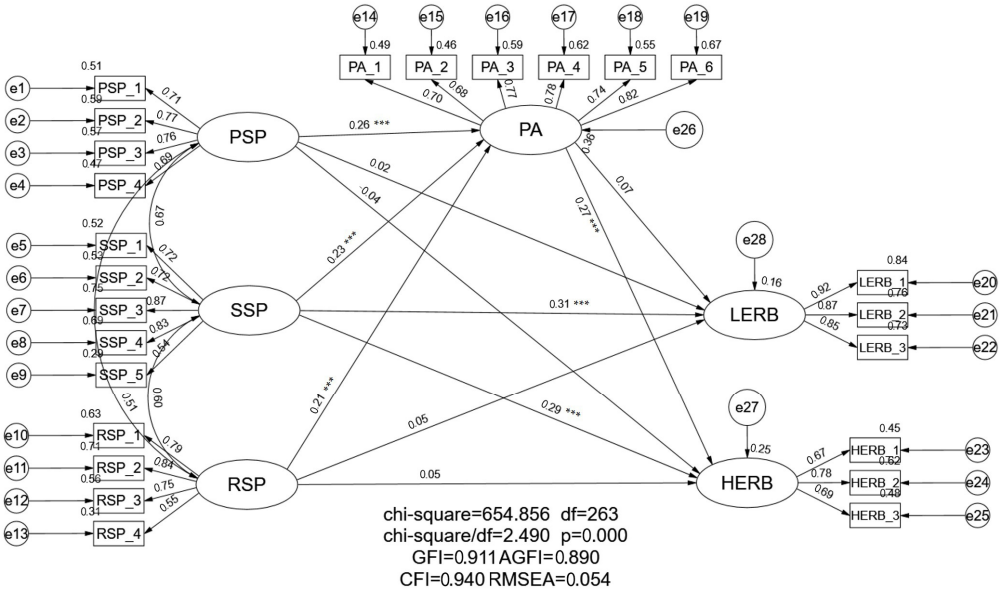

Figure 3. Structure diagram of load and path coefficient.

4.4. Mediation Analysis of Place Attachment

Bootstrapping was conducted in AMOS to test the mediating effects. The number of bootstrap samples was set to 2000, with bias-corrected confidence intervals of 95% [36]. Notably, when the bootstrap confidence interval does not contain 0, the mediation effect is proven to exist [29]. The findings in Table 7 show that SSP has a significant indirect effect on HERB via the impact of PA ($\beta_{SSP \rightarrow PA \rightarrow HERB} = 0.331$; CI = [0.028, 0.098]), supporting the SSP → PA→ HERB path. Since SSP has a positive direct effect on HERB (H3d), PA partially mediates the SSP → PA→ HERB path. While we found that the direct effects of

PSP and RSP on HERB are not statistically significant (H3b, H3f), PA completely mediates the PSP → PA→ HERB and RSP → PA→ HERB paths.

Table 7. Results of the mediation effect.

Path	Effects	Z Value	Bootstrapping Bias-Corrected 95% CI Lower	Upper
PSP → PA→ HERB	0.059	2.034	Indirect effect 0.017	0.134
	−0.034	−0.312	Direct effect −0.246	0.182
SSP → PA→ HERB	0.331	2.606	Indirect effect 0.028	0.098
	0.319	2.381	Direct effect 0.081	0.613
RSP → PA→ HERB	0.133	2.509	Indirect effect 0.049	0.270
	0.05	1.619	Direct effect −0.045	0.401

Note: Significant at Z Value > 1.96.

5. Discussion

5.1. Coupling Relationship among SP, PA, and Tourists' ERB

This study set up a model based on the cognition-attitude-behavior theory to explain the effects of tourists' SP on their PA and ERB. Unlike previous studies, we defined SP as a second-order factor comprising the subdimensions of physical soundscape perception, psychological soundscape perception, and regional soundscape perception. The goodness-of-fit statistics reported above show that the model fits the data well and suggests that the three subdimensions are an accurate representation of the SP construct. Our findings are in line with those of Job et al. [14], who noted that SP comprises "enviroscape" and "psychscape".

Hypotheses 1a, 1b, and 1c involve the relationship between SP and PA. As the path coefficients show, SP has positive effects on tourists' place attachment. This result lends support to earlier place theories [41], suggesting that a soundscape can create a sense of cultural identity with and attachment to a place. We found that if tourists perceive their soundscape more strongly in a forest park, they are likely to develop a deep attachment to the place.

Additionally, Hypotheses 2a and 2b involve the relationships between PA and tourists' ERB. Our findings suggest that PA has a significant positive effect on HERB but an insignificant effect on LERB. The main reason for such an unexpected finding is that first, many previous studies on the relationship between PA and ERB have been visually oriented. Tourists' ERB is, however, a highly contextual variable that has led to different results in our study compared to previous studies due to the specificity of the focal soundscape [27]. Second, as tourists' SP, through hearing, can deepen their visual perception, SP strengthens tourists' connection with their tourism environment. The emphasis on soundscapes in our study made the respondents generally aware of their landscape's diversity; thus they were willing to take more proactive measures to protect their environment, which is an HERB.

The results of our SEM analysis with mediating tests show that PA acts as a complete mediator in the PSP-HERB relationship and RSP-HERB relationship with the assistance of an insignificant direct effect of PSP and RSP on HERB (H3b, H3f). Meanwhile, the mediation analysis indicated that PA partially mediates the SSP-HERB relationship because there is a significant direct effect of SSP on HERB (H3d). Therefore, proposing that PA is a mediator is more appropriate in terms of the relationship between SP and tourists' ERB. This finding implies that if tourists' SP at their destination is significant, it will enhance their affective identification with the place; meanwhile, they will show responsible behavior toward other places as well.

Specifically, only SSP, among the SP three subdimensions, has a direct effect on LERB and HERB. These results validate Harmon's theory [28], i.e., an individual's behaviors are influenced by how one perceives a soundscape and understands the soundscape's values. The soundscape concept thus implies that the distinction between sound and noise is essentially an emotional one. This emotion is reflected in tourists' soundscape psychological perception. This result also indicates that tourists with a high level of positive SP are more likely to enjoy their destination's environment. They are more willing to prevent it from being damaged and to even convince others to adopt ERB.

5.2. Significance for Soundscape Planning and Impact Management at Forest Parks

Regarding the sustainable development of forest parks, it is very important to conduct an in-depth investigation of tourists' SP. Hence, several practical implications for soundscape planning and management can be obtained from our findings. First, our empirical findings reveal that SP positively affects tourists' ERB. As such, soundscape design should focus on enhancing the locality of a park's soundscape and creating an acoustic environment with a forest environment atmosphere by protecting the birds, streams, and plants in the park. In this way, the sense of place in terms of the acoustic environment can be accentuated to form a sense of place perception, thus triggering tourists' imagination in this environmental soundscape and creating specific spatial imagery of the soundscape. In addition, combined with the characteristics of forest parks, soundscape nodes or "soundscape listening" routes can be designed to enable tourists to perceive the soundscape comprehensively. This will make tourists perceive that sounds and a specific space have some kind of association and thereby form a symbiotic phenomenon, compelling people to be more willing to implement ERB. Second, we have revealed that tourists' SSP has a significant effect on their ERB. Therefore, to enhance tourists' ERB, soundscape design should pay attention to the feedback mechanism of tourists' psychological perception of their soundscape. Park managers should reduce the noise level to maintain the acoustic environment at a comfortable decibel level in their park. However, just reducing noise level alone is insufficient, they should reduce negative soundscapes, and reduce the impact of negative soundscapes on tourists by planting plants and creating water landscapes to produce a masking effect on the negative soundscapes. Meanwhile, soundscape planning at forest parks should pay attention to the diversity of biological soundscapes, creating a richly layered plant space is conducive to increasing the diversity of sound sources. Finally, our empirical findings indicate that PA significantly mediates the association between SP and tourists' ERB. Tourists could be cultivated with a sense of place so that they can emotionally endorse the local acoustic environment and consciously participate in environmental protection. It is proposed that the forest park environment could be improved by increasing investment in infrastructure to meet the different needs of tourists. Also, park design should foster an emotional connection between tourists and their environment through initiatives, e.g., creating a good environmental atmosphere at tourism destinations and enhancing tourists' soundscape experiences. Such human-place emotional connection can help promote the performance of ERB among tourists, who will demonstrate an even higher degree of ERB.

6. Conclusions

From the perspective of soundscape perception, we have defined SP as a second-order factor and used SEM to explore its relationships with PA and tourists' ERB in a single model. Our main findings are as follows: (1) There is a multidimensionality of SP with three subdimension—PSP, SSP, and RSP—in Longcanggou National Forest Park. (2) SP is the key antecedent variable of PA, while PA is the mediator of the relationship between the three dimensions of SP (PSP, SSP, and RSP) and tourists' HERB. (3) The enhancement of tourists' psychological perception of soundscapes strengthens tourists' ERB. These result reveal that soundscapes are perceived by humans and shaped by psychological attributes rather than

only by physical parameters; accordingly, physical parameters cannot sufficiently describe how a soundscape is truly perceived by humans.

Some limitations should be noted. Although the perspective of soundscape has revealed the mechanism of soundscape perception's influence on tourists' ERB, this paper cannot analyze all types of forest parks in China. In this case, we only take Longcanggou National Forest Park as a typical study area. However, it would be even better if more samples can be drawn from more forest parks to confirm the wider application of our findings. In addition, while SP was conceptualized as a multi-item construct in this study, we may have neglected other possibly relevant dimensions that could be explored in future research.

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Appendix A. Measurement Items

Latent Constructs	Item Label	Item	Reference(s)
Physical Soundscape Perception (PSP)	PSP1	I think the soundscape loudness here is appropriate.	[42,43]
	PSP2	The soundscape here is soothing.	
	PSP3	The soundscape here is natural.	
	PSP4	The soundscape here is quiet.	
Psychological Soundscape Perception (SSP)	SSP1	I am satisfied with the soundscape.	[10,41,42]
	SSP2	I think the soundscape is in harmony with the surrounding environment.	
	SSP3	I think the soundscape makes me feel comfortable.	
	SSP4	I think the soundscape makes me feel relaxed.	
	SSP5	I am impressed with the soundscape here.	

Latent Constructs	Item Label	Item	Reference(s)
Regional Soundscape Perception (RSP)	RSP1	I can feel the forest ambiance through sound.	Self-developed
	RSP2	The soundscape here is in line with its forest atmosphere.	
	RSP3	The soundscape here enhances the overall environment of the scenic area.	
	RSP4	The sound here draws my attention to the ecological environment.	
Place Attachment (PA)	PA1	I am more satisfied with this park than other tourism destinations.	[15,24]
	PA2	I stayed here longer than other tourism destinations.	
	PA3	I have a strong sense of identifying with this park.	
	PA4	Touring this park has a deep meaning for me.	
	PA5	When I am in this park, I consider myself a part of it.	
	PA6	When I leave this park, I will miss it.	
Low-Effort Environmentally Responsible Behavior (LERB)	LERB1	I will follow the environmental guidelines of the park.	[2,21,43]
	LERB2	I will properly dispose of trash during the trip.	
	LERB3	I have a responsibility to protect the park's environment	
High-Effort Environmentally Responsible Behavior (HERB)	HERB1	I try to convince my companions to adopt positive behaviors in the natural environments of this park.	
	HERB2	I am willing to participate in environmental protection activities if there are any here.	
	HERB3	I will take the initiative to learn about local ecological conservation.	

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