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Effect of Soundscape on Place Attachment for Historical Blocks: A Case Study of Harbin, China

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Abstract: Sound is a memory carrier in places with rich history and culture, which can invoke place memories and images. The purpose of this paper is to explore the effect of soundscape on place attachment in different types of historical blocks. Six historical blocks in Harbin, China, were selected, and a questionnaire survey was conducted to evaluate place attachment and soundscape. The soundscape evaluations of harmony, quietness and nature were significantly higher in residential historical blocks than in tourism historical blocks. The mechanical sound source preference of residential historical blocks was lower than that of tourism historical blocks. The main components of place attachment were place bonding and identity, and place dependence, but in different orders in different types of historical blocks. In tourism historical blocks, the preference of sound source helps to enhance place attachment, especially the sounds of activities and equipment related to the history and culture of the blocks. Soundscapes promote place attachment in tourism historical blocks and are positively correlated with place satisfaction. There was no significant correlation between soundscape and place attachment in the residential historical blocks surveyed.

Keywords: soundscape; place attachment; historical blocks; sound sources

Citation: Zhao, W.; Rui, Q.; Zhu, X.; Xu, H. Effect of Soundscape on Place Attachment for Historical Blocks: A Case Study of Harbin, China. *Buildings* **2023**, *13*, 607. https://doi.org/10.3390/buildings13030607

Academic Editors: Zhe Kong, Zheming Liu and Yue Wu

Received: 24 January 2023
Revised: 19 February 2023
Accepted: 24 February 2023
Published: 25 February 2023

1. Introduction

Historical blocks are unique business cards of each city, carrying people's emotions and memories. Protecting the historical architecture landscape and developing tourism would achieve sustainable development of historic blocks [1]. The audio–visual perception of historical blocks could stimulate memories and associations from residents or tourists who have an emotional attachment to and identify with historical blocks, namely place attachment. Place attachment has a positive effect on tourist loyalty, among which place identity has the greatest impact on tourist loyalty [2]. Exploring the influence of place attachment on different types of historical blocks is necessary to improve the cultural characteristics and sustainable development of historical blocks [3].

In related studies that explore the relationship between people and spatial environments, place attachment refers to the connections between people and places, which arise as people understand and give value to places [4]. It explores the experiences and emotional connections between people and the environment from the perspective of people's perception, attitude and values. Research on place attachment is helpful to improve residents' comfort and sense of belonging. Brown et al. proposed the relationships between landscape value and place attachment, and found that the aesthetic, entertainment, spiritual and other values of natural landscapes can promote place attachment [5]. Among environmental features which were found to affect neighborhood attachment were quiet areas and the presence of aesthetically pleasant buildings [6]. Lewicka emphasized the importance of the physical nature of places in the formation of place attachment [7].

The quality of high soundscape has a positive impact on human well-being and experience of comfort [8]. A well-preserved soundscape in a historical space is essential. The role of soundscapes in shaping the historical atmosphere and promoting the perception of culture and landscape has been recognized [9,10]. Pleasant and dominant natural sound sources in historical landscapes can improve the overall impression of the area [11]. Special sound sources, such as European music, which represented the characteristics of the historical block, had a positive impact on the soundscape and landscape evaluation [12]. Liu et al. (2019) established a structural equation model for soundscape evaluation and visitor experience of a historical block, and proposed an impact of sound source on visitor experiences [13]. Leus and Herssens (2015) proposed the importance of preserving the soundscape and landscape of the entire historical landscape during the renovation process [14]. Masullo et al. (2020) advocated renovating and constructing quiet areas in historical urban sites, for the preservation of the sense of place and identity of communities as well as their well-being [15]. Zhou et al. (2014) revealed positive correlations between acoustic satisfaction and subjective evaluation of cultural identity in urban historical areas [16].

As mentioned above, place attachment can be used as an indicator of perceptual evaluation of historic blocks, and soundscape is an important part of the cultural inheritance. However, there are few systematic studies on the relationship between soundscape and place attachment for different types of historical blocks. The aim of this paper is to explore the effect of soundscape on place attachment in different types of historical blocks. More specifically, factors of place attachment for two types of historical blocks, namely tourism and residential, were conducted, and the effect of sound sources and soundscape evaluations on place attachment was investigated.

2. Materials and Methods

2.1. Site Selections

Harbin City, China, was named as one of the third group of famous historical and cultural cities by The State Council in January 1994. So far, the Harbin municipal government has announced a total of four types and thirteen historical and cultural protection blocks. The types of historical blocks are tourism historical blocks, residential historical blocks, religious historical blocks, and celebrity monument historical blocks.

Specifically, there are five historical blocks of the tourism type in Harbin. They are all located in the urban center, with convenient transportation and easy access. Receiving a large number of local and nonlocal visitors and tourists every year, they are very famous historical blocks symbolic of Harbin City. The Red Army Street Museum historical block, one of the tourism-type blocks, does not have a particularly clear boundary to visit. With major traffic arteries and traffic roundabouts, sightseers are not able to form a complete image. The Sun Island tourism historical block is located in an urban park of Sun Island Park. The buildings are for external viewing, and the tourist flow is less than in other areas. Both sites were under repair at the time of investigation. As a result, the other three tourism historical blocks were selected for investigation.

There are four historical blocks of the residential type. Three of them were originally built in the same year (1951) and were also investigated. They were all attached residential communities for factories built during the construction period in the Northeast old industrial base, and they have important historical significance and value.

In addition, there are four blocks of the religious and celebrity monument types. The needs and context of visitors are probably different from those of tourism type. Therefore, they were not chosen for this investigation.

In total, six historical blocks of tourism and residential types in the city of Harbin, China, were selected, as shown in Figure 1. Three tourism historical blocks were selected: the Central Street historical block, the Daowai traditional commercial historical block and the Stalin Street historical block. The Central Street historical block was originally built in the 1900s. It is European style, which is different from Chinese traditions, with the

historical and cultural representation of Harbin City. The Daowai traditional commercial historical block was originally built in the 1920s. It has the largest existing area and the most complete preserved Baroque architectural complex, and is rich in material and cultural resources. The Stalin Street historical block was originally built in the 1950s near the bank of the Songhua River. There are squares and parks to commemorate the victory over a flood. Trees line the streets and birds can be heard singing. These historical blocks receive a large number of local visitors and travelers each year.

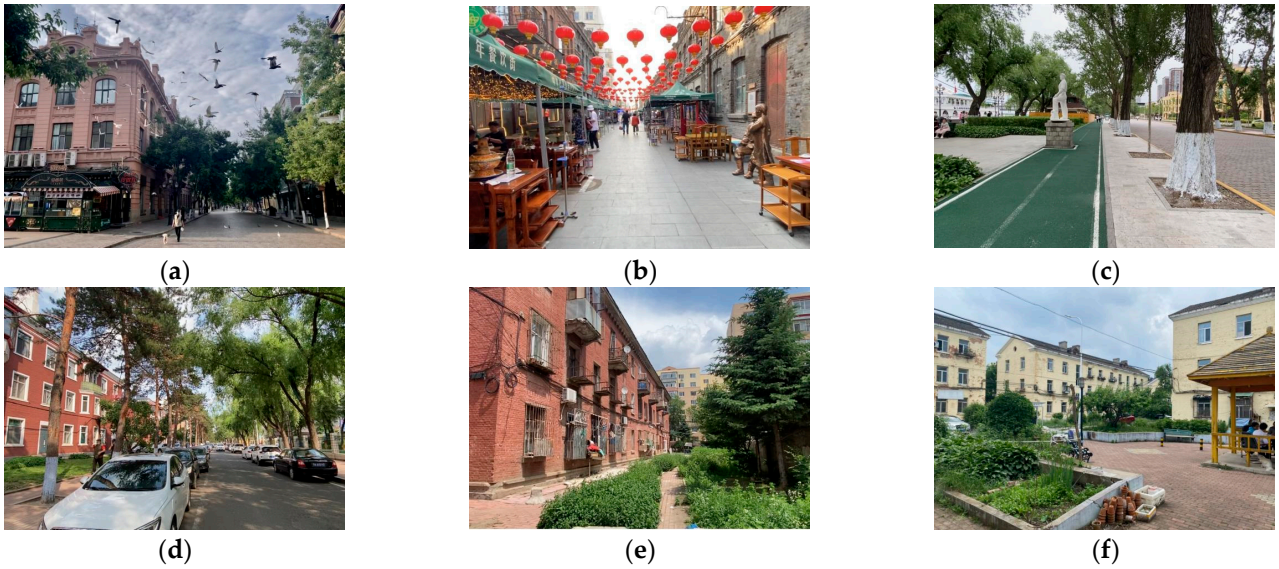

Figure 1. Sites selected for field investigations. (**a**) Central Street historical block; (**b**) Daowai traditional commercial historical block; (**c**) Stalin Street historical block; (**d**) Yama Factory dependent family community; (**e**) Hafei Factory dependent family community; (**f**) Dong'an Factory dependent family community.

Three residential historical blocks were selected: the Yama Factory dependent family community, the Hafei Factory dependent family community and the Dong'an dependent family community. These blocks were originally built in 1951. They are communities with the imprints of Harbin's large factories. Many of the employees and their descendants still live here today, and there are a lot of memories and emotions.

2.2. Questionnaire Design

The questionnaire was composed of four parts, and the basic framework was taken from ISO/TS 12913-2 [17]. Demographic indicators were collected in the first part of the questionnaire; they included gender (male or female), age group (below 18, 18–30, 31–40, 41–50, 51–60, or above 60 years old), place of residence (local or nonlocal) and visiting frequency (first time, once a year, once a month, once a week, or once a day). Additionally, overall satisfaction, glad to be here, live around here for a long time, understanding of historical knowledge, intention to revisit and recommend to friends were also investigated. A five-point Likert scale from 1 to 5 was used (not at all, a little, neutral, a lot, or completely).

Perception frequency, intensity and preference of sound sources were evaluated in the second part. The interviewees were asked to select the sounds they perceived at each site. Sound sources were listed in the questionnaire according to the sound source classification [18,19] and the field conditions of each site. A five-point Likert scale from 1 to 5 was used to evaluate the perceived sound sources (not at all, a little, neutral, a lot, or completely).

A series of semantic differential indices were compiled based on previous research [20–23] relating to urban soundscape for the third part. Twelve adjective word pairs of descriptors were used. A five-point bipolar rating scale from 1 to 5 was employed. The indicators were agitating–

calming (A–C), artificial–natural (A–N), boring–interesting (B–I), conflicting–harmonious (C–H), dark–bright (D–B), discomfort–comfort (D–C), monotonous–vibrant (M–V), noisy–quiet (N–Q), simple–varied (S–V), tense–relaxed (T–R), unpleasant–pleasant (U–P) and unsafe–safe (U–S).

Evaluations of place attachment for each investigated site were conducted for the fourth part. The descriptors were taken from previous studies [24,25]. The indices are shown as Table 1, where place dependence, place identity, place affect and place social bonding were included. A five-point Likert scale from 1 to 5 was used to evaluate the perceived sound sources (disagree, disagree a little, neutral, agree a little, agree).

Table 1. Constructs of place attachment and scale items.

Place Attachment	
Place dependence	(1) For what I like to do, I could not imagine anything better than the settings and facilities provided here (2) For the activities I enjoy the most, the settings and facilities provided here are the best (3) I enjoy visiting here and its environment more than any other historical block
Place identity	(4) I identify strongly with this historical block (5) I feel here is part of me (6) Visiting here says a lot about who I am
Place affect	(7) I am very attached here (8) I feel a strong sense of belonging here and its settings/facilities
Place social bonding	(9) Many of my friends/family prefer here over many other historical blocks (10) If I were to stop visiting here, I would lose contact with a number of friends (11) My friends/family would be disappointed if I were to start visiting other settings and facilities

The surveys were conducted during the spring and summer in 2022. A total of 401 interviewees participated in the field questionnaire investigation; they were selected randomly at each investigated site. The percentage of males was 46.9%, and the percentage of females was 53.1%. The age of all respondents was mainly distributed from 18 to 60 years old. As the main purpose of the tourism historical blocks is traveling and leisure, young people and middle-aged people account for a large proportion of the survey. People aged from 18 to 50 accounted for 91.6% of the total number of surveyed visitors. In contrast, a number of elderly people live in residential historical blocks, so people over 50 years old accounted for 87.3% of the total number of surveyed residents. A larger number of couples with children and families were tourists, especially in the well-known tourist attractions. The percentage of nonlocal interviewees was 70.6% in tourism historical blocks, and the percentage of local interviewees was 97.1% in residential historical blocks.

2.3. Data Analysis

Statistical Product and Service Solutions (SPSS) 25.0 software was used to calculate statistical parameters based on the data collected with the questionnaire surveys. The main statistical method used in this study included an independent-sample T test for differences in evaluations of soundscape descriptors and preferences of sound sources between tourism and residential historical blocks. Spearman's rho correlation analysis can be used for correlation analysis of non-normally distributed data, as well as data whose variables contain ordinal variables. For this research, Spearman's rho correlation analysis was used for detecting the effects of sound sources and soundscape evaluations on place attachment. Furthermore, principal components analysis (PCA) is a statistical method that derives a few main components from the original variables to reveal the internal structure, so that they retain as much information as possible about the original variable and are not

related to each other. For this research, PCA was used for place attachment perception of indicators for different types of historical blocks.

3. Results

3.1. Evaluations of Soundscape Descriptors

The results of an independent-sample T test of evaluations of soundscape descriptors in investigated tourism and residential historical blocks are shown in Figure 2. It is seen that the significance of artificial–natural (A–N) evaluation was 0.01 (t = −4.120, $p = 0.000$), and the mean value of tourism type (3.17) was lower than that of residential type (3.78). The significance of conflicting–harmonious (C–H) evaluation was 0.05 (t = −2.339, $p = 0.020$), and the mean value of tourism type (3.32) was lower than that of residential type (3.66). The significance of noisy–quiet (N–Q) evaluation was 0.01 (t = −8.098, $p = 0.000$), and the mean value of tourism type (2.78) was obviously lower than that of residential type (3.80). There is no difference in evaluation of other soundscape descriptors between tourism and residential historical blocks.

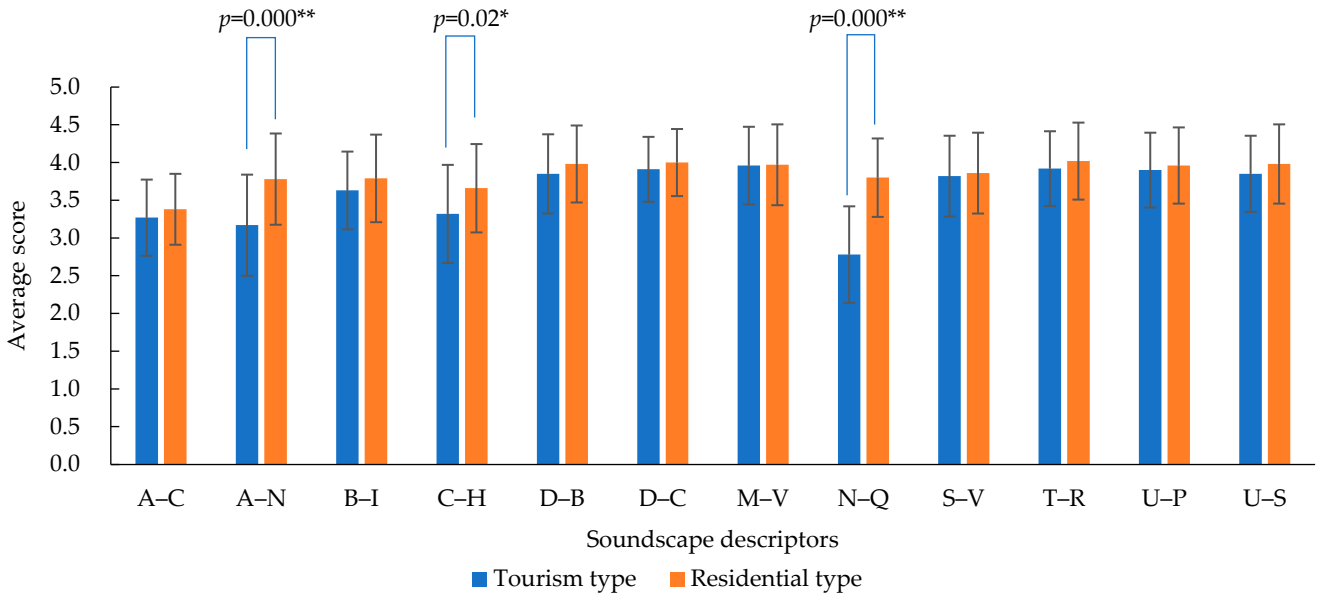

Figure 2. Average scores of descriptors of soundscape evaluations between tourism and residential historical blocks (* $p < 0.05$, ** $p < 0.01$).

Soundscape evaluation scores were relatively high for each tourism historical block. In the Central Street historical block, the highest score was 3.80, and the descriptor was relaxation, followed by vitality (3.77) and comfort (3.76). In the Daowai traditional commercial historical block, the highest score was 4.14, and the descriptor was pleasantness, followed by vitality (4.08) and comfort (3.97). In the Stalin Street historical block, the highest score was 4.06, with brightness as the main descriptor, followed by vitality (4.05) and relaxation (4.05). In residential historical blocks, the highest score was 4.00, with the main descriptor of relaxation, followed by comfort (3.99) and safety (3.98). These descriptors are consistent with residents' basic demands for their living environment.

3.2. Principal Component Analysis for Place Attachment

A principal component analysis was carried out on the evaluations of place attachment obtained from the questionnaire of six historical blocks. Varimax-rotated principal component analysis was employed to extract the orthogonal factors from eleven indicators of place attachment. With the criterion factor of an eigenvalue > 1, factors are determined as shown in Table 2, and the color of the background was used to distinguish the compositions of the factors. Two main factors were determined.

Table 2. Factor analysis for historical blocks with Kaiser–Meyer–Olkin measure of sampling adequacy: 0.883; cumulative: 70.4%.

Descriptors of Place Attachment	Factor 1 (38.9%)	Factor 2 (31.5%)
(1)	0.292	0.665
(2)	0.339	0.747
(3)	0.121	0.875
(4)	0.210	0.855
(5)	0.824	0.239
(6)	0.795	0.338
(7)	0.454	0.682
(8)	0.743	0.371
(9)	0.686	0.357
(10)	0.904	0.144
(11)	0.813	0.209

Factor 1 (38.9%) is mainly associated with social bonding and identity, including contacting friends, to be a part of here, to be disappointed, great significance, belonging here, preference and happy to visit here. Factor 2 (31.5%) is generally associated with place dependence, including enjoying better facilities, environment, identification and attachment. The two factors cover 70.4% of the total variance, indicating the complexity of evaluating place attachment.

To examine the differences in evaluations on place attachment between tourism and residential historical blocks, factor analysis was carried out based on two types of data separately, as shown in Table 3, and the color of the background was used to distinguish the compositions of the factors. For tourism historical blocks, two factors covered 71.2% of the total variance, where factor 1 (38.2%) related to place bonding and identity, and factor 2 (33.0%) to place dependence. For residential historical blocks, three factors covered 69.4% of the total variance, where factor 1 (24.9%) related to place dependence, factor 2 (23.7%) to place identity and factor 3 (20.7%) to social bonding.

Table 3. Factor analysis for place attachment of tourism and residential historical blocks.

Descriptors of Place Attachment	Factor Analysis for Tourism Historical Blocks with Kaiser–Meyer–Olkin Measure of Sampling Adequacy: 0.887; Cumulative: 71.2%.		Factor Analysis for Residential Historical Blocks with Kaiser–Meyer–Olkin Measure of Sampling Adequacy: 0.737; Cumulative: 69.4%.		
	Factor 1 (38.2%)	Factor 2 (33.0%)	Factor 1 (24.9%)	Factor 2 (23.7%)	Factor 3 (20.7%)
(1)	0.305	0.667	0.681	−0.135	0.489
(2)	0.401	0.741	0.721	0.020	0.261
(3)	0.190	0.888	0.755	0.042	0.030
(4)	0.287	0.844	0.781	0.294	−0.093
(5)	0.807	0.286	0.052	0.768	0.292
(6)	0.784	0.348	0.251	0.848	0.237
(7)	0.479	0.679	0.643	0.528	−0.243
(8)	0.685	0.468	0.025	0.760	0.314
(9)	0.688	0.368	0.290	0.222	0.576
(10)	0.874	0.229	−0.095	0.466	0.790
(11)	0.791	0.260	0.030	0.269	0.842

3.3. Relationships between Sound Sources and Place Attachment

The results of preference differences of the same sound sources in tourism and residential historical blocks are shown in Figure 3. As expected, people had mainly higher preferences for natural sounds than other sound sources. There was no difference in natural sound preferences between tourism and residential historical blocks, except birdsongs. Preference for birdsong was significantly (t = −5.579, p = 0.000) higher in residential historical blocks (4.73) than in tourism historical blocks (4.25).

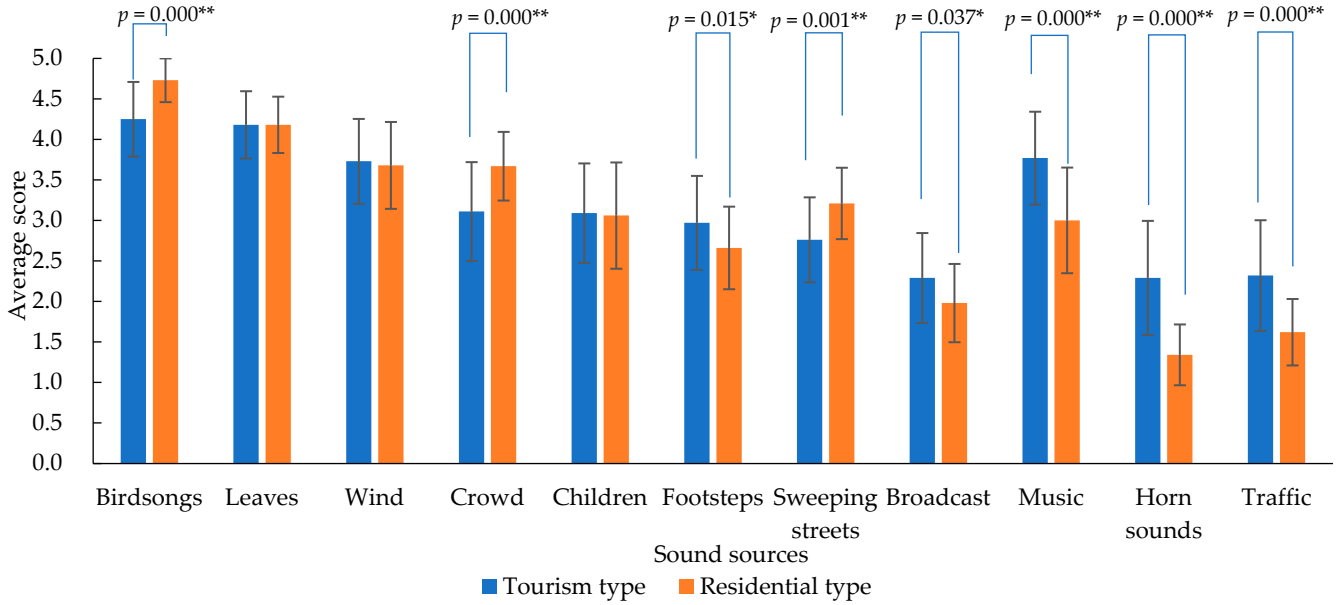

Figure 3. Average scores of preferences of sound sources between tourism and residential historical blocks (* p < 0.05, ** p < 0.01).

For preferences of human behavioral sounds, such as crowds, footsteps and street-sweeping, there were significant differences between tourism and residential historical blocks (p < 0.05), except for children's sounds (p > 0.05). For crowd sound, people in residential historical blocks (3.67) had a significantly higher preference (t = −5.100, p = 0.000) than in tourism historical blocks (3.11). It is interesting to note that for street-sweeping, people in residential historical blocks (3.21) had a significantly higher preference (t = −3.230, p = 0.001) than in tourism historical blocks (2.76). For preference of sweeping sounds, 50.1% of residents in residential historical blocks chose "neutral" and 35.3% chose "prefer a little" and "prefer", whereas 53.6% of travelers in tourism historical blocks chose "neutral" and only 13.4% chose "prefer a little" and "prefer".

For mechanical sounds, such as broadcasts, music, horn sounds and traffic sounds, as expected, people had mainly lower preferences than for other sound sources. There were significant differences for preferences of mechanical sounds between tourism and residential historical blocks (p < 0.05). Mechanical sound preferences in residential historical blocks were all lower than in tourism historical blocks.

The relationships between sound preferences and place attachment were identified by conducting Spearman's rho correlation analysis, as presented in Table 4. It is seen that the high preferences for natural sounds of wind and waterscape both showed significantly positive relationships with place attachment (p < 0.05). For the behavioral sound sources of people, which indicated medium preference in the likability evaluation, there was a significant positive correlation with place attachment evaluation (p < 0.05), except street-sweeping. There was a significant positive correlation between high music preference and place attachment (p < 0.05). For the special sound sources of mini-trains and performances in the tourism historical blocks, high preferences (average preference of 3.74 for mini-trains and 3.97 for performances) were significantly positively correlated with the evaluation

of place attachment ($p < 0.05$). There were significant correlations between evaluations of place attachment and low preference for horn sounds and traffic sounds ($p < 0.05$), illustrating that the low preference of mechanical sound sources influenced the evaluation of a community's place satisfaction.

Table 4. Correlations between sound preferences and place attachment in tourism and residential historical blocks.

Sound Sources	Tourism Historical Blocks		Residential Historical Blocks		
	Place Bonding and Identity	Place Dependence	Place Dependence	Place Identity	Place Social Bonding
Birdsongs	0.116 *	0.103	−0.089	−0.050	−0.040
Leaves	−0.003	0.111	0.129	−0.129	0.048
Wind	0.129 *	0.153 **	0.243 *	0.031	−0.047
Waterscape	0.232 *	0.170	-	-	-
Dogs	-	-	0.078	0.013	−0.013
Crowd	0.233 **	0.222 **	−0.044	0.080	0.031
Children	0.155 **	0.187 **	0.039	0.111	−0.132
Footsteps	0.237 **	0.248 **	0.010	−0.157	−0.020
Sweeping streets	0.091	0.179	−0.023	0.008	0.261 **
Selling	0.262 **	0.272 **	-	-	-
Music	0.212 **	0.261 **	−0.063	0.040	0.047
Commercial loudspeakers	0.449 **	0.300 **	-	-	-
Mini-trains	0.220 *	0.263 **	-	-	-
Performances	0.289 **	0.343 **	-	-	-
Horn sounds	0.379 **	0.331 **	0.166	0.010	0.172
Traffic sounds	0.330 **	0.325 **	0.128	−0.041	0.144
Electro-mobile	-	-	0.033	−0.093	−0.015

* $p < 0.05$, ** $p < 0.01$.

For residential historical blocks, most preferences of sound sources showed no significant relationship with place attachment in residential historical blocks ($p > 0.05$). There were significant correlations between respondents' evaluations of place satisfaction and low preference for horn sounds, traffic sounds and electro-mobile sounds ($p < 0.05$). It is also illustrated that the low preference of mechanical sound source influenced the evaluation of community's place satisfaction.

3.4. Effects of Demographic and Soundscape Descriptors on Place Attachment

The relationships between soundscape evaluations and place attachment for both tourism and residential historical blocks were identified by conducting Spearman's rho correlation analysis, as presented in Table 5. For tourism historical blocks, it is seen that most evaluations of soundscape showed significant positive relationships with place attachment ($p < 0.05$), with especially high scores of soundscape evaluations, such as descriptors of monotonous–vibrant (M–V, 3.96), tense–relaxed (T–R, 3.92), discomfort–comfort (D–C, 3.91) and unpleasant–pleasant (U–P, 3.90). For residential historical blocks, evaluations of soundscape showed no significant relationship with place attachment ($p > 0.05$).

Table 5. Correlations between soundscape evaluations and place attachment in tourism and residential historical blocks.

Soundscape Descriptors	Tourism Historical Blocks		Residential Historical Blocks		
	Place Bonding and Identity	Place Dependence	Place Dependence	Place Identity	Place Social Bonding
A–C	0.314 **	0.323 **	−0.080	0.098	−0.053
A–N	0.135 *	0.206 **	0.053	−0.025	−0.065
B–I	0.151 **	0.279 **	0.066	0.030	−0.013
C–H	0.276 **	0.322 **	0.065	−0.048	0.015
D–B	0.107	0.217 **	0.142	−0.037	−0.075
D–C	0.244 **	0.318 **	0.033	0.007	−0.038
M–V	0.093	0.247 **	0.084	−0.033	−0.086
N–Q	0.257 **	0.229 **	−0.061	−0.003	−0.186
S–V	0.134 *	0.215 **	0.028	−0.185	−0.176
T–R	0.194 **	0.292 **	0.000	−0.023	−0.122
U–P	0.214 **	0.354 **	0.126	0.044	0.009
U–S	0.178 **	0.239 **	−0.047	−0.026	−0.117

* $p < 0.05$, ** $p < 0.01$.

Because of the large number of tourists visiting the tourism historical blocks, the relationships between demographic factors, intention to revisit and place attachment for tourism historical blocks is also examined in Table 6. It is shown that age group is positively correlated with place attachment ($p < 0.01$). Overall satisfaction, glad to be here and liking to live in the area were all significantly positively correlated with place attachment ($p < 0.01$). Knowledge of history was also significantly positively correlated with place attachment ($p < 0.01$). Both intentions to revisit and recommend to friends were significantly positively correlated with place attachment ($p < 0.01$). Visit frequency was not significantly related to place attachment ($p > 0.05$). Additionally, there was no difference in place attachment between genders ($p > 0.05$).

Table 6. Correlations between demographic factors, intention to revisit and place attachment in tourism and residential historical blocks.

Social Factors	Tourism Historical Blocks		Residential Historical Blocks		
	Place Bonding and Identity	Place Dependence	Place Dependence	Place Identity	Place Social Bonding
Age	0.184 **	0.163 **	−0.083	0.018	0.216 *
Visit frequency	0.073	0.026	-	-	-
Overall satisfaction	0.487 **	0.531 **	0.378 **	−0.004	0.120
Glad to be here	0.393 **	0.471 **	0.447 **	0.081	0.246 *
Like to live around	0.506 **	0.362 **	0.220 *	0.365 *	0.395 *
Knowledge of history	0.255 **	0.219 **	0.315 **	0.107	0.177
Intention to revisit	0.243 **	0.303 **	-	-	-
Recommend to friends	0.234 **	0.295 **	−0.061	−0.038	0.280 **

* $p < 0.05$, ** $p < 0.01$.

For residential historical blocks, the relationships between residents' age, overall satisfaction, knowledge of history, recommendations and place attachment were also investigated, as also shown in Table 6. Age was positively correlated with place social

bonding ($p < 0.05$). Overall satisfaction was positively correlated with place dependence ($p < 0.01$). There were significant positive correlations between being glad to come here, living nearby and place attachment ($p < 0.05$). Historical knowledge was positively correlated with place dependence ($p < 0.01$). There was a significant positive correlation between recommendations and place social bonding ($p < 0.01$).

4. Discussion

4.1. Comparions of Soundscape and Place Attachment between Tourism and Residential Historical Blocks

The soundscape evaluations in tourism historical blocks were dynamic and comfortable, which also reflected the characteristics of commercial and tourism areas, attracting tourists from all over the world, and the blocks were full of vitality. Central Street and Daowai traditional commercial historical blocks have architectural styles that are dominated by architectural spatial layout and historical accumulation. Natural elements were relatively low, and evaluations were much more artificial and noisier than those in Stalin Street. Due to relatively high vegetation coverage, birdsongs and a river beside the street, soundscape evaluations of Stalin Street historical block, as a representative of leisure and recreational space, was much more natural. There was no difference in preferences for natural sounds, except birdsongs. In residential historical blocks, the preference for birdsong was much higher than in tourism historical blocks. Compared with the other types of commercial and leisure historical blocks, the sound environment perception is much more harmonious, quiet and natural. Birdsong in the residential area represents a natural, green and quiet environment. Correspondingly, the occurrence of mechanical sound represents a disturbance to the quiet life of the community. The level of annoyance to mechanical sounds occurring in the community is higher than in other open spaces. Therefore, residents' preference and tolerance for mechanical sound are much lower than those of tourism historical blocks.

Place bonding and identity and place dependence were the main factors extracted from the subjective evaluation of place attachment for tourism and residential historical blocks. The index composition of place attachment is similar, but the order of factors is different. Place bonding and identity, the first principal component of tourism historical blocks, was divided into place identity and place social bonding, which were the second and third components of residential historical blocks. Interestingly, place dependence, the second principal component in tourism historical blocks, was the first principal component in residential historical blocks. Place dependence is an individual's attachment to local functions, which refers to the degree to which a specific facility or material basis in a place meets individual needs [26]. It may explain why place dependence is the most important component of people's attachment to the place where they live.

4.2. Effects of Soundscape on Place Attachment in Tourism and Residential Historical Blocks

4.2.1. Effects of Soundscape on Place Attachment in Tourism Historical Blocks

For tourism historical blocks, the diversity of sound sources and soundscape showed the vitality and liveliness of the areas. Historical blocks carry the history and culture of the city in a certain period. Tourists' high soundscape evaluations of the tourism historical blocks promoted the formation of place attachment, and also contributed to the improvement of overall satisfaction.

There were also significant positive correlations between evaluations of place attachment and preferences for performances. For example, in the Daowai traditional commercial historical block, there was a mini-train running for display. The sound of whistling and steam from the running mini-train reminded people of the history of railway construction in Harbin. There were also stages for live theatrical performances. These performances and activities reflected the history and culture of Harbin and contributed to evaluations of place attachment. These results illustrate that sound source preferences that reflected the historical and cultural characteristics of historical blocks could promote the positive

evaluations of place attachment. Regarding the preference of sound sources, multiple types of sound sources made the soundscape evaluation of tourism historical blocks lively and diversified. The preference for music was much higher than it was in residential historical blocks, especially playing music which reflects the cultural background. For example, the Central Street historical block is full of a variety of classical European architectural and spatial patterns, and Harbin's history is also related to Russia. Playing Russian music in the Central Street historical block was similar to the connotation and architectural style. As a result, preference for sound source of Russian music was also high in this special historical block.

Additionally, the greater the visitors' knowledge of history, the greater was the perception of place attachment. By increasing related activities, tourism historical blocks could probably encourage visitors to understand the history of the city, improve the formation of place attachment and also contribute to the intention and recommendation of revisiting. This is similar to previous research. In a study by Nursyamsiah et al. (2023), place attachment mediated the relationship between satisfaction with revitalization and intention to revisit [27]. Visitors create an emotional attachment to the host destination and eventually become loyal to that destination. In addition, age was positively correlated with place attachment, which is similar to the findings of Buffel et al. (2014), and indicated that age brought an increasing attachment to social and physical environments [28].

In tourism historical blocks, there were significant correlations between soundscape evaluations and place attachment. Some atmosphere of history and culture can be reflected, especially through more special sound sources and performances. Therefore, in tourism historical blocks, creating particular sound sources and setting relevant scenes and performances that are related to the history and culture of the area will help to provide place attachment and a dynamic, lively, pleasant and harmonious sound environment. However, a noisy environment should be avoided, especially in the much enclosed and denser blocks for the high-density city [29], as Harbin of China.

4.2.2. Effects of Soundscape on Place Attachment in Residential Historical Blocks

For residential historical blocks, most preferences of sound sources showed no significant relationship with place attachment ($p > 0.05$). There were significant correlations between respondents' evaluations of place satisfaction and low preference for horn sounds, traffic sounds and electro-mobile sounds ($p < 0.05$). The low preference of mechanical sound sources influenced the evaluation of the community's place satisfaction. Street-cleaning was done manually both in tourism and residential historical blocks. For inhabitants of residential historical blocks, the sound of sweeping was functional, representing a clean environment for living and contributing to community satisfaction. For travelers in tourism historical blocks, the behavior and sound of sweeping had no effect on contribution to place attachment, but rather interfered with it. Therefore, in residential historical blocks, the behaviors represented by functional sounds can promote the formation of place attachment.

In residential historical blocks, soundscape evaluations and environmental demands of residents tend to be quiet and harmonious. Therefore, residents had lower preferences and tolerance for unpleasant sounds, such as mechanical sounds and broadcast sounds. Soundscape evaluations had no effect on place attachment in residential historical blocks. As part of the survey was conducted in residential historical blocks, 97.1% of respondents were residents living there. Age was positively correlated with place social bonding, and the survey indicated that social bonding became much more familiar and stable with the increase in age and length of residence in residential historical blocks. It also verified that recommendation was significantly positively correlated with place social bonding. Residents had witnessed the historical changes of the big factories in Northeast China, especially in Harbin. Historical changes were closely related to workers' life and experience. It is also likely that residents' knowledge of history is positively correlated with place dependence.

Due to different functions, compared with tourism historical blocks, residents' demands and evaluations of the acoustic environment are mainly safety and stability. Physical environments may affect place attachment indirectly [30]. Stedman (2003) proposed a meaning-mediated model of place attachment, indicating that physical environments do not produce a sense of place directly [31]. Residential satisfaction partially mediated the path from environmental perceptions to place attachment. Buildings and surroundings, community facilities and amenities, and social attributes were significant predictors of place attachment [32]. Therefore, to improve the perception and evaluation of place attachment in residential historical blocks, it is necessary to improve the convenience and satisfaction of facilities, so as to improve the satisfaction of residents, which would probably promote the place attachment of the community.

5. Conclusions

This study evaluated place attachment for different types of historical blocks, and the relationships between place attachment and soundscape were investigated in tourism and residential historical blocks of Harbin, China. The following conclusions were obtained.

1. There were significant differences in soundscape evaluations between tourism and residential historical blocks in terms of nature, quietness and harmony. Most soundscape descriptors received high evaluations. Residential historical blocks emphasized the function of living and the demand for tranquility. The evaluations of harmony, quietness and nature were significantly higher than in tourism historical blocks.
2. The factors of place attachment evaluations of historical blocks were place bonding and identity and place dependence. Factors of place attachment were slightly different between tourism and residential blocks. The tourism type was characterized by place bonding and identity and place dependence, while the residential type was characterized by place dependence, place identity and place social bonding. Although the order was different, the components were similar between tourism and residential historical blocks.
3. Preferences of sound sources helped to promote place attachment in tourism historical blocks. In different types of historical blocks, there was no significant difference in preference for most natural sound sources. However, for mechanical sound sources, the preference in residential historical blocks was much lower than that in tourism historical blocks. The preference of sound sources in tourism blocks helps to enhance place attachment, especially the sounds of activities, performances and equipment that were related to the history, background and culture of the historical blocks.
4. Soundscape evaluation could promote place attachment for tourism historical blocks. Place attachment was also significantly positively correlated with overall satisfaction, revisitation and recommendation, which improves ways for historical block construction. In terms of surveyed residential historical blocks, there was no significant correlation between soundscape and place attachment.

The findings demonstrate the relationships between soundscape and place attachment for historical blocks. This study was conducted in some famous public open spaces of a city. In future studies, more research can be conducted on different types of parks and green spaces. In other types of open public spaces with different functions, such as business, commercial and leisure areas or parks, the main activities and purposes are different. Thus, the detailed relationships between soundscape evaluations and place attachment should be verified in these contexts as well. Residential historical blocks can further explore ways to promote place attachment through other dimensions, such as social and management dimensions.

Author Contributions: Conceptualization, W.Z., X.Z. and H.X.; methodology, X.Z.; software, W.Z. and H.X.; validation, W.Z., X.Z. and H.X.; formal analysis, W.Z.; investigation, Q.R. and X.Z.; resources, W.Z.; data curation, Q.R.; writing—original draft preparation, W.Z. and Q.R.; writing—review and editing, X.Z. and H.X.; visualization, Q.R.; supervision, X.Z. and H.X.; project administration, W.Z.; funding acquisition, W.Z. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by the Central Universities [Grant No. HIT.HSS.202210]; Contribution of forest and grass industry to carbon neutrality goal of Heilongjiang Province [Grant No. 22252]; Heilongjiang Philosophy and Social Science Planning Project [Grant No. 21YSB127]; National Natural Science Foundation of China [Grant No. 51908170].

Data Availability Statement: The data presented in this study are available on request from the authors.

Conflicts of Interest: The authors declare that they have no known competing financial interest or personal relationships that could have appeared to influence the work reported in this paper.

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