

Article

Assessing the Preference and Restorative Potential of Urban Park Blue Space

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Abstract: Urban parks are essential parts of a city's natural environment, and blue spaces of urban parks bring aesthetic and health benefits to people. However, the current blue spaces mainly focus on the marine environment or a giant water body scale at the urban or regional level. The urban park blue spaces (e.g., rivers, creeks, ponds) are relatively neglected. An experiment involving 10 different urban park blue spaces in Huanhuaxi park was conducted to assess urban park blue spaces' aesthetic preference and restorative potential. The results indicated that (1) a water body with good water quality and natural visual form may be more attractive and have restorative potential; (2) blue spaces with high vegetation diversity are preferred, and artificial elements should be evaluated more carefully when added to the scene to avoid disharmony and conflict with the surrounding environment; (3) in practical design, the proportions of plants, buildings, topographical changes, and water should be coordinated to maintain the blue space's landscape heterogeneity; (4) more leisure activities and interactions should be considered for better recovery; and (5) designers need to emphasize the balance of natural and man-made elements to enhance the visual quality of the water feature. This investigation is important for the management and development of leisure and natural resources in urban parks.

Keywords: aesthetic preference; blue space; landscape characteristics; restorative potential; urban park



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1. Introduction

People living in dense city areas are regularly exposed to stimuli that can cause mental fatigue [1] and are moving away from natural environments. Urbanization and high-density physical environments have led to significant global health challenges [2], while the restorative environment in the city is a vital component of healthy cities. Two broad categorizations of environment (i.e., green space and blue space) have received acclaim for restorative wellbeing in urban areas [3]. The restorative potential of blue space is evident [3–7]. However, blue space was regarded as a part of green space in previous studies [8,9]. With increasing attention to blue space as a restorative environment, blue space is no longer simply regarded as a by-product of green spaces [10]. A previous study showed that different freshwater types might have different potentials for reducing and restoring stress. For example, humans prefer the scenery of rivers and ponds to swampy areas and large bodies of water [11]. More efforts should explore different kinds of blue spaces' restorative potential to promote the study of healthy places and therapeutic landscapes.

1.1. Relation between Preference and Restoration

Landscape preference studies started in the 1960s [12]. The work of Kaplan and Kaplan [13] and Ulrich [14] proved that the landscape experience is related directly to a psychological model, describing an approach to understanding restorative environments based on cognitive functioning. Some environmental theories have shown that people's preference for a particular environment is related to restoration, since environmental

preference depends on environmental attributes that have potential functional significance for the perceiver [15,16]. Such perceptual mechanisms could allow the individual to rapidly and automatically assess whether a particular environment should be approached or avoided [17]. For example, urban green spaces that combine natural water, dense vegetation, and a large well-kept lawn are considered to bring better restoration because urban green spaces with high biodiversity are an important preference indicator. The generation of this restorative environment is believed to be derived from the integration of preferences formed by human evolution [18]. However, empirical evidence indicates that people who are stressed or fatigued are most likely to recover from their preferred landscape [17–19]. Thus, the above reasoning may explain why one's preference for an environment could be concerned with restoration brought by this environment.

Two influential accounts have been mainly concerned with research on the restorative environment in recent years, that is, attention restoration theory (ART) [13,15] and stress reduction theory (SRT) [14,16]. ART has emphasized the importance of restoration from attentional fatigue based on cognitive functioning and proposes four components: fascination (an effortless attention and interest to a scene), being away (enabling people to free their minds from directed attention and everyday stress), extent (the potential of an environment to allow the user to explore with scope and coherence), and compatibility (engaging in activities that are “compatible” with our intrinsic motivations). These four components depend on the interaction between the scene and the observer [12] and are measured by improving attention and affective recovery [20]. SRT is a psycho-evolutionary model that emphasizes the importance of recovering from psychological and physiological stress related to threats or challenges based on affective functioning. SRT mainly supports the affective and physiological recovery from acute “stress” or depletion of emotional resources, which is measured by physiological indicators, such as lowering blood pressure and stress hormone levels [20].

1.2. Health Benefit of Blue Spaces

Drawing an analogy with the related term greenspace, the term “blue space” summarizes all visible surface waters in space [4], which provides the regulation or provision of cultural ecosystem services (e.g., improving living environments and affecting the health and wellbeing of citizens) [21]. The health benefits of blue spaces as restorative environments have been found. In previous studies, subjects were asked to observe photos of different landscapes to explore the association between green space and wellbeing, in which blue space (i.e., water body) is regarded as a part of green space [8,9]. An Irish study on “hydro-therapeutics” showed that holy wells and curative waters provide a form of “mind healing”. All visitors regard these sites as a retreat/restful asylum since one's connections with nature are enhanced sensually [22]. Moreover, Karmanov and Hamel [5] reported the direct health benefits of urban blue spaces. They asked the participants to watch the nature and the city (a former eastern dock with a small canal in Amsterdam) for 10 min and found that both natural and urban environments used for the research were equal in terms of affective restoration potential. The research results indicate that adding some natural elements (e.g., water and greenery) to the city can effectively promote residents' health and is visually attractive. In recent research, blue space has been considered as a health resource to promote environmental health. Based on the therapeutic landscapes, Foley and Kistemann proposed the conception of “healthy blue space” defined as “health-enabling places and spaces, where water is at the centre of a range of environments with identifiable potential for the promotion of human wellbeing” [23]. Depledge and Bird [24] state that “Blue Gyms” (i.e., coastal areas) have always attracted residents and visitors and motivate outdoor activities, enhancing wellbeing of humans. Moreover, an empirical study showed that increasing the proportion of water in the natural and built environment would significantly increase restorativeness. This study suggests that certain visual properties (e.g., water reflecting light, lines, and patterns of light) of aquatic environments are potentially restorative [6]. Furthermore, other studies emphasized the psychological and mental

health benefits of visiting the beach [25], that blue spaces restore mental wellbeing for women in Copenhagen [3], and urban waterways as positive amenities for neighborhood quality of life [7].

1.3. Landscape Characteristics Related to Blue Space

Different landscape characteristics have been proven to enhance aesthetic preference or mental restoration [18,19,26,27]. Similarly, landscape characteristics of blue spaces have significant influences on aesthetic preference and restorative potential. Arriaza et al. [28] found that “amount of water” and “water movement” have a significant positive correlation with the landscape’s visual quality. Zhao et al. [29] found that “river accessibility” and “number of colors” are reliably positive predictors of aesthetic preferences of urban rivers, while “coverage of riparian vegetation”, “perspective”, and “wood diversity index” for rural rivers. A natural environment with water features and wavy terrain where plants grow well will comfort male eyes [30]. Moreover, it has been discovered that highly accessible water features and flat terrain can effectively improve the quality of landscape restoration [31]. Exploration of these characteristics provides explicit keystones for the design and management of the blue space. However, it is still not well understood what kind of blue space people like when visiting an urban park, the restorative potential of different blue spaces, and how to design and improve these blue spaces. Understanding these can more effectively create a restorative environment with a high aesthetic value.

1.4. Study Objectives

As far as health research is concerned, the current blue spaces mainly focus on the marine environment or a giant water body scale at the urban or regional level (i.e., canals, coast, lakes [3,5]). However, freshwater blue spaces (e.g., rivers, creeks, ponds [32]) are relatively neglected. Simultaneously, as public spaces that promote restoration, urban parks have always been regarded as restorative places to improve citizens’ health and wellbeing, while there is a lack of research on urban parks’ blue spaces (UPBSs, mainly freshwater blue spaces). Thus, clarifying the health-promoting potential of these blue spaces is valuable.

Overall, our research questions are as follows:

1. How is the restorativeness of UPBS evaluated?
2. Is the restorativeness associated with the aesthetic preference of UPBS?
3. What are the driving factors for restorative potential and aesthetic preference of UPBS?

Moreover, Carrus et al. [33] found that the more participants that rated a scene as natural, the higher their perceived restorativeness and preference scores. Therefore, this leads us to another question:

4. Do the restorative potential and preferences of UPBS change with its naturalness?

2. Methodology

2.1. Study Stimuli

This research used photographic images instead of real landscapes. Despite the presence of disadvantages, this method has been widely used by previous researchers and is generally accepted as highly reliable and cost-effective [19,27]. Furthermore, according to Karmanov and Hamel [5], a site visit is believed not to change their perception of the recovery potential and environmental attractiveness. Thus, photographs were used as visual stimuli for estimating aesthetic preference, restorative potential, and perceived naturalness.

The images used in this study were taken from Huanhuaxi Park (Figure 1), which is the only five-star urban natural park in Chengdu, China [18]. We chose this park for the following reasons: (a) It is an open park for investigation and photography, (b) it is the largest in the region with many types of water bodies, and (c) visitors are allowed only to walk; hence, no bikes or cars are visible. The authors freely photographed the park,

capturing all the blue spaces that visitors can approach. In addition, to ensure reliability in the perception and measurement process, we chose similar weather and light conditions for photography. To ensure seasonal consistency, all photos were taken in July 2020. A total of 98 photos were taken, and a screening procedure was executed to avoid excessive evaluation by the subjects. The exclusion criteria were unclear photos, unrecognized water bodies, too many visible visitors in an image, and repeated blue space types. Finally, we screened 10 unique images that can represent different UPBS types. Each image has its own water body type, spatial characteristics, and major focal views. Detailed information about the 10 images studied is shown in Table 1.

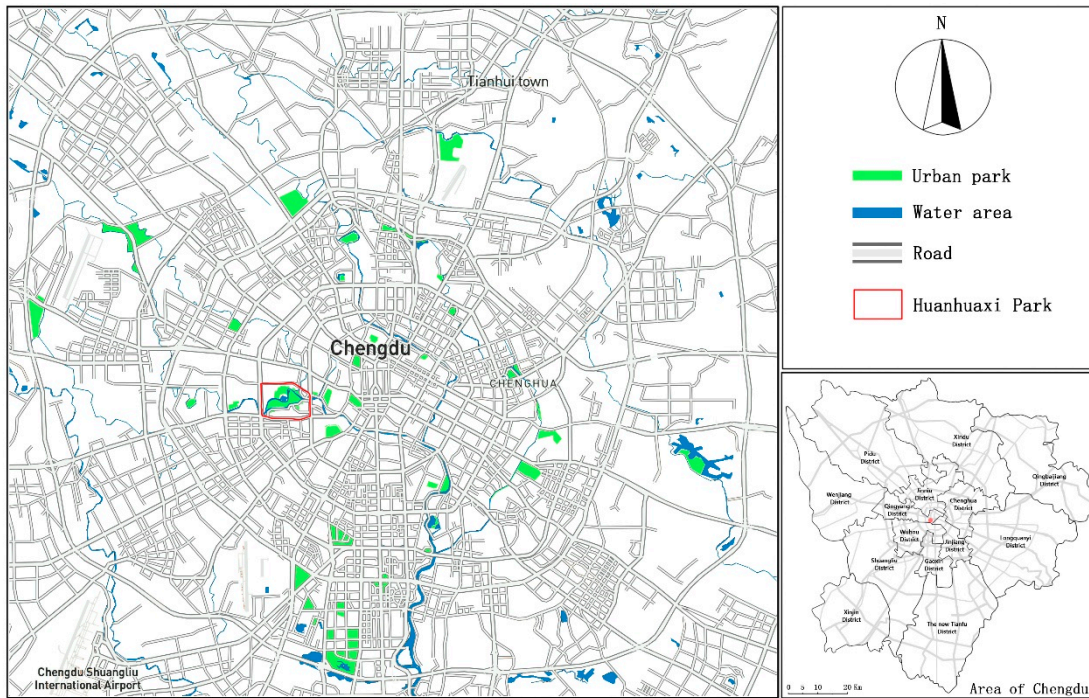


Figure 1. The location of Huanhuaxi Park.

Table 1. Description of the 10 urban park blue spaces.

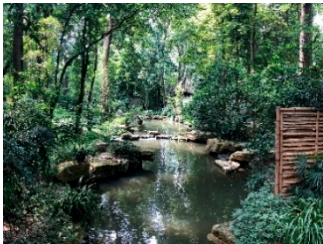
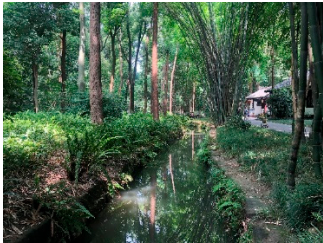
No.	Image	Description
1		A natural creek in the forest uses an artificial revetment built of stones. A little bonsai is located randomly on the riverside. A pavilion can be seen in the distance.
2		A small channel in a semi-open space with a nature trail and a traditional Chinese building located on the right side. On the left is a natural forest, surrounded by many bamboos, trees, and shrubs.

Table 1. Cont.

No.	Image	Description
3		A public leisure space with a small pond, surrounded by many trees and shrubs. Tourists can rest and watch carp here. Lotus flowers are planted in the center of the pond, and a traditional Chinese-style veranda is on the right side of the image.
4		A small pond in the green space, surrounded by bamboo and a large lawn, forming a highly natural environment. This is a blue space commonly seen in this park and is one of the sunniest areas.
5		A large pond in a semi-open space, surrounded by many bamboos. Some traditional Sichuan residential buildings (thatched huts) can be seen. Tourists can tour around this pond and enjoy the waterscape.
6		A river in Huanhuaxi Park. There are some trees on the banks of the river and some well-kept shrubs and lawns. Visitors can cross the river from a stone bridge deep in the picture.
7		A natural river with both sides surrounded by dense forests, forming a highly natural blue space. Tourists can visit, walk, or enjoy the landscape along the boardwalk along the river bank.
8		A small river in front of traditional Chinese architectures, surrounded by trees and bamboos to form a semi-open space. There are many rockeries and some bonsais along the riverbank and a stone arch bridge in the middle of the river.
9		A small pond next to a leisure pavilion, surrounded by artificial stone scenery, well-maintained shrubs, and little trees. Visitors can walk around the pond and rest in this semi-enclosed blue space.
10		A small blue space for rest, and a pavilion and corridor are above the pond. Many artificial rockeries and bonsais form this highly artificial environment. Many tourists enjoy the landscape and take photos here.

2.2. Subjects

The use of university student subjects to represent a public sample is valid according to previous research [18,30]. In total, 93 volunteers were recruited for our study. Participants were recruited from a local university campus through social media following the criteria (a) normal eyesight and (b) without the influence of any medication. Participants were from different disciplines, and this study divided them into two groups for comparison (major in landscape architecture and others). Similar research findings indicate that familiarity does not significantly affect preference and restorativeness [33]. Therefore, recruiting participants locally is considered appropriate. There was no examination of the human body or physiological data in this study, and all participants were kept anonymous. Therefore, no ethics review was required to be submitted to the ethics committee.

2.3. Measurements and Procedure

In this study, we mainly investigated the restorative potential, aesthetic preference, and perceived naturalness of different UPBSs through subjective perception.

First, to help participants better understand and follow the Chinese language's expression habits, aesthetic preference was defined as "the landscape is beautiful" in our survey [19]. This item was rated on a seven-point scale (1 = "totally disagree", 7 = "totally agree"). Restorative potential was measured as the extent to which subjects agreed that the UPBSs had "the potential to ease mental fatigue caused by directed attention" [34]. Based on other similar studies [18,35], this study used a short version of the Perceived Restorativeness Scale (PRS), adapted from the full version of the PRS [36]. Unlike the full-length version of the PRS, the short version PRS has five items that measure "extent" by "scope" and "coherence". Each item was rated on a seven-point scale (1 = "totally disagree", 7 = "totally agree"). The overall restorative potential score is the combined average score of these five items. For perceived naturalness, a single item that was used to measure ("this place is natural", [33]) rated on a seven-point scale (1 = "totally disagree", 7 = "totally agree"). A description of each problem is shown in Table 2.

Table 2. Restoration, aesthetic preference, and perceived naturalness scale for the UPBS.

Measurement	Description	Scale
Restoration	Fascination	That place is fascinating.
	Compatibility	I can enjoy myself in this setting and do anything I like.
	Being away	This is a place away from daily routine and stress.
	Scope	There are few hard boundaries here to limit me.
	Coherence	Everything here seems to have a proper place.
Aesthetic preference	The landscape is beautiful.	
Perceived naturalness	This place is natural.	

The evaluation part of the study was conducted in October 2020. Our study's questionnaire was completed in a quiet laboratory to ensure that the subjects were not disturbed. Each subject was provided with detailed information in advance, and we obtained the oral consent of each participant. In addition, participants were told that they were free to stop and leave the experiment at any time. This experiment was only conducted on weekends to avoid conflict with students' regular class period. Ninety-three subjects were divided into nine groups (10 or 11 participants in each group) and entered the laboratory in turn. After entering, the volunteers were arranged to sit in front of different computers to view slides (i.e., images) prepared before, with 1 min for each slide. The participants were asked

to imagine that they were in each projected scene and fill in the questionnaire; they were informed that they were free to change their choices before submission. Only after all the participants of one group completed the questionnaire and left could the next group of participants enter. Finally, participants were required to report their age, gender, major, and living environment during childhood.

2.4. UPBS Landscape Characteristics Evaluation

The measurement scale of UPBS landscape features refers to the previous literature and represents the main 13 landscape characteristics of UPBS studied [28,37,38] (Table 3). Ten landscape architects (five doctoral students and five postgraduates majoring in landscape architecture) were invited to evaluate the landscape characteristics of each UPBS. In the office, after viewing the UPBS pictures projected on the white wall, five landscape architects evaluated the landscape properties of each image according to the scale of Table 3. The next image was not presented until everyone had completed the landscape characteristic survey for the current image, and the entire evaluation process took about 20 min.

Table 3. The scale of landscape characteristics to measure.

Landscape Characteristics	Scores
Landscape elements	Single = 0; two = 1; three = 2; four = 3
Color contrast	Strong = 0; clear = 1; weak = 2
Percentage of vegetation covered	No vegetation = 0; <25% = 1; 25–50% = 2; >50% = 3
Land vegetation types	None = 0; only grasses = 1; only tree and grass = 2; mixed type = 3
Perceived vegetation diversity	Single vegetation = 0; low = 1; moderate = 2; high = 3
Vegetation maintenance	Bad = 0; moderate = 1; good = 2
Percentage of water	<15% = 0; 15–50% = 1; >50% = 2
Visual naturalness of water	Orderly form = 0; semi-natural form = 1; natural form = 2
Accessibility of water	Difficult to access = 0; neutral = 1; easy to access = 2
Water quality	Bad = 0; moderate = 1; good = 2
Number of aquatic plants	No aquatic plants = 0; low = 1; moderate = 2; high = 3
Man-made elements	None = 0; few = 1; some = 2; many = 3
Water movement	No movement = 0; movement = 1

Note: Based on the research of Zhao et al. [39], landscape elements are divided into buildings, topographical variation, water bodies, and plants.

2.5. Statistical Analyses

Nonparametric tests (Mann–Whitney U test and the Kruskal–Wallis H test) were performed to assess the differences between demographic characteristics and restoration, aesthetic preference, and perceived naturalness. The stepwise multiple linear regression analysis method was used to explore the driving factors of UPBS restoration potential and aesthetic preference. The correlation analysis method (Spearman) was used to study the relationship between restoration potential and preference. All statistical analyses were performed using SPSS 20.0 (SPSS Inc., Chicago, IL, USA), and the level of significance was set to <0.05.

3. Results

3.1. Demographic Characteristics of Respondents

Table 4 shows the demographic characteristics of the respondents. To summarize, the female participants were slightly higher in number than males (43 men and 50 women), and the ages were mainly distributed between 23 and 26 years (24.73 ± 4.09), which accounted for more than half of the total number of participants. Regarding education level, postgraduate students had a higher chance of participating, and the number of participants belonging to the landscape architecture major (59%) was like that of other majors. More than 60% lived in an urban environment during their childhood.

Table 4. Profile of participant attributes.

Item	Subgroup	<i>n</i>	%
Sex	Male	43	46.2
	Female	50	53.8
Age	22	9	9.6
	23	15	16.1
	24	19	20.4
	25	15	16.1
	26	13	14.0
	27	5	5.4
	28	5	5.4
	29	4	4.3
Education	30	8	8.6
	Graduate	36	38.7
	Postgraduate	57	61.3
Major	Landscape	50	53.8
	Architecture		
	Others		
Living environment	Rural area	36	38.7
	Urban area	57	61.3

3.2. Demographic Characteristics' Differences among Overall Assessment

The difference between demographic characteristics, restoration, aesthetic preference, and perceived naturalness was investigated using the Mann–Whitney U test (two groups)/Kruskal–Wallis H test (more than two groups). As shown in Table 5, none of the three items found significant differences in the evaluation of all subgroups, which indicates that demographic characteristics does not affect the subjects' perception of UPBS on aesthetic preference, restoration potential, and naturalness. Therefore, in the following, the assessment results of all participants were combined for further analysis.

Table 5. Demographic characteristics, aesthetic preference, restoration potential, and perceived naturalness.

Demographic (<i>n</i> = 93)		Restorativeness (SD) ¹	<i>p</i> ²	Preference (SD) ¹	<i>p</i> ²	Naturalness (SD) ¹	<i>p</i> ²
Gender	Male	4.85 (0.55)	0.068	5.21 (0.86)	0.166	5.01 (0.91)	0.150
	Female	4.66 (0.50)		5.02 (0.75)		4.71 (0.85)	
Age	22	5.02 (0.55)	0.404	5.44 (0.96)	0.608	5.33 (1.09)	0.775
	23	4.76 (0.66)		5.12 (1.04)		4.83 (1.07)	
	24	4.68 (0.42)		5.02 (0.58)		4.76 (0.65)	
	25	4.66 (0.45)		4.91 (0.64)		4.82 (0.84)	
	26	4.68 (0.50)		5.05 (0.83)		4.82 (0.83)	
	27	4.80 (0.69)		5.24 (1.00)		4.52 (1.47)	
	28	4.30 (0.48)		4.62 (0.94)		4.50 (0.92)	
	29	5.03 (0.77)		5.35 (0.88)		4.90 (0.96)	
Education	30	4.98 (0.44)	0.534	5.43 (0.63)	0.277	5.07 (0.62)	0.491
	Graduate	4.81 (0.50)		5.21 (0.72)		4.92 (0.81)	
	Postgraduate	4.71 (0.56)		5.04 (0.86)		4.81 (0.94)	
Major	Landscape	4.83 (0.54)	0.101	5.25 (0.83)	0.051	4.96 (0.92)	0.154
	Architecture						
	Others						
Living environment	Rural area	4.66 (0.52)	0.322	4.94 (0.75)	0.984	4.73 (0.84)	0.696
	Urban area	4.70 (0.57)		5.09 (0.88)		4.89 (0.86)	
		4.78 (0.51)		5.12 (0.76)		4.83 (0.91)	

¹ Mean (SD) for each subgroup in this item. ² *p*-value for the difference results for each demographic characteristic item. The significance level of 5% was based on the Mann-Whitney U test (two groups) or Kruskal-Wallis H test (more than two groups).

3.3. Reliability

According to Landis and Koch [40], the assessment is considered excellent internal consistency if Cronbach’s alpha is greater than 0.8. Our study results of the Cronbach’s Alpha calculated were 0.834 (being away), 0.848 (fascination), 0.828 (scope), 0.827 (coherence), 0.833 (compatibility), 0.846 (aesthetic preference), 0.853 (perceived naturalness). Thus, the results indicated very good internal reliabilities of these items.

3.4. Overall Evaluation

According to the summary statistics (as shown in Figure 2), image 5 was rated as the most preferred (5.67 ± 1.33) blue space and had the highest restoration score (5.10 ± 0.71), while image 2 was the least preferred (4.25 ± 1.28) and considered the lowest restorative scene (4.20 ± 0.84). However, image 7 was considered the most natural blue space (5.77 ± 1.01), and image 3 had the lowest naturalness score (4.06 ± 1.41). In short, blue spaces that are considered more natural (such as images 1, 4, 5, 7, and 9) usually obtain higher restorative and landscape quality scores. Furthermore, according to the correlation analysis results (Spearman), there is a significant positive correlation between aesthetic preference and restorative potential ($R = 0.832, p < 0.01$), which means that when participants evaluate UPBS, their aesthetic preference increases as the blue space restorativeness increases, and vice versa. In addition, the restorative potential of UPBS ($R = 0.637, p < 0.01$) and preference scores ($R = 0.628, p < 0.01$) also showed a significant positive correlation with perceived naturalness. This means that the restorative potential and preferences of UPBS change with its naturalness (Table 6).

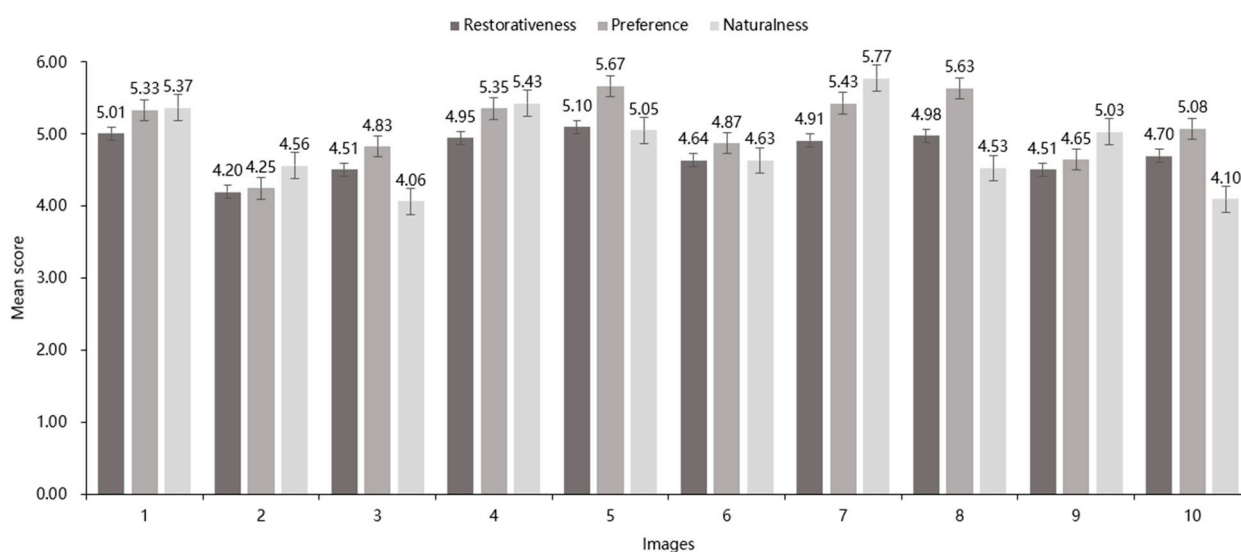


Figure 2. The aesthetic preference, restoration potential, and perceived naturalness of 10 images ($n = 93$); Mean \pm error.

Table 6. Correlation analysis results.

	Restorativeness	Naturalness	Preference
Restorativeness	1		
Naturalness	0.637 *	1	
Preference	0.832 *	0.628 *	1

Note: * $p < 0.01$.

3.5. Significant Predictors of Aesthetic Preference and Restorative Potential

A stepwise multiple linear regression analysis was performed to establish quantitative relationships between UPBS landscape characteristics and restorative potential and preferences. We tested the normality of model residuals through the Kolmogorov–Smirnov (K-S) test. The test result indicated that the residuals followed a normal distribution (K-S

Z value = 1.608, $p = 0.204$ for aesthetic preference; K-S Z value = 0.787, $p = 0.565$ for perceived naturalness; K-S Z value = 0.763, $p = 0.605$ for overall restorative potential; K-S Z value = 0.839, $p = 0.482$ for being away; K-S Z value = 0.72, $p = 0.677$ for fascination; K-S Z value = 0.706, $p = 0.702$ for scope; K-S Z value = 0.855, $p = 0.458$ for coherence; K-S Z value = 0.695, $p = 0.719$ for compatibility). Moreover, the variance analysis results in the regression analysis showed a significant relationship between the UPBS landscape characteristics with preference ($F = 21.233, p < 0.01$), restorative potential ($F = 24.873, p < 0.01$), and with five subscales of the short version of PRS (being away, $F = 19.051, p < 0.01$; fascination, $F = 29.96, p < 0.01$; scope, $F = 19.521, p < 0.01$; coherence, $F = 14.473, p < 0.01$; compatibility, $F = 18.008, p < 0.01$). In previous studies [18,28,37], if the model tolerance value was < 0.2 or $VIF > 10$, it indicated that there was a multicollinearity problem. The current model did not find the problem of multicollinearity (the lowest tolerance = 0.410 and the highest $VIF = 2.437$) and was considered acceptable.

In summary, as shown in Table 7, “water quality”, “visual naturalness of water”, “landscape elements”, and “accessibility of water” are significant predictors of overall restoration potential in UPBS, explaining 48.9% of the variance. This result indicated that visual naturalness of water, water quality, number of landscape elements might positively affect the psychological restorative effect, while the accessibility of water is negative. Likewise, “water quality”, “visual naturalness of water”, “accessibility of water”, “man-made elements”, and “vegetation diversity” are positive predictors of preference in UPBS, explaining 48.7% of the variance, which showed a similar result to overall restoration potential. For the five subscales of PRS, “water quality”, “visual naturalness of water”, and “landscape elements” are significant predictors of “being away”, “fascination”, and “compatibility”. The “water quality” and “vegetation type” are significant predictors of “scope”. Two predictors of “coherence” included “visual naturalness of water” and “plant maintenance degree”.

Table 7. Significant predictors of UPBS aesthetic preference and restorative potential.

Dependent	Independent	Unstandardized Beta	Standardized Beta	t	Sig.	Collinearity Statistics	
						Tolerance	VIF
Overall restoration potential (adjusted R2 = 0.489)	(constant)	0.313		0.857	0.392		
	water quality	0.717	0.215	5.848	0.000	0.720	1.388
	visual naturalness of water	0.533	0.186	5.331	0.000	0.801	1.248
	landscape elements	0.474	0.187	5.626	0.000	0.887	1.127
	accessibility of water	−0.167	−0.097	−2.784	0.000	0.796	1.256
Aesthetic preference (adjusted R2 = 0.487)	(constant)	−2.590		−2.743	0.006		
	water quality	1.439	0.268	6.469	0.000	0.564	1.774
	visual naturalness of water	0.780	0.169	4.803	0.000	0.567	1.764
	accessibility of water	−0.314	−0.114	−3.225	0.001	0.781	1.280
	man-made elements	0.665	0.303	6.569	0.000	0.456	2.191
Being away (adjusted R2 = 0.104)	(constant)	0.445		1.092	0.275		
	water quality	0.568	0.154	4.615	0.000	0.892	1.122
	visual naturalness of water	0.621	0.196	5.564	0.000	0.802	1.247
	landscape elements	0.429	0.153	4.563	0.000	0.888	1.126
	(constant)	−0.153		−0.364	0.716		
Fascination (adjusted R2 = 0.107)	water quality	0.627	0.165	4.966	0.000	0.892	1.122
	visual naturalness of water	0.524	0.160	4.569	0.000	0.802	1.247
	landscape elements	0.653	0.225	6.765	0.000	0.888	1.126
	(constant)	0.250		0.500	0.617		
	Scope (adjusted R2 = 0.074)	water quality	0.825	0.215	6.624	0.000	0.966
land vegetation type		0.595	0.142	4.376	0.000	0.966	1.035
(constant)		1.564		4.816	0.000		
Coherence (adjusted R2 = 0.080)	visual naturalness of water	0.803	0.241	6.967	0.000	0.859	1.165
	plant maintenance degree	0.293	0.133	3.863	0.000	0.859	1.165
	(constant)	0.330		0.724	0.469		
Compatibility (adjusted R2 = 0.058)	water quality	0.635	0.156	4.625	0.000	0.892	1.122
	visual naturalness of water	0.328	0.094	2.636	0.009	0.802	1.247
	landscape elements	0.525	0.170	5.003	0.000	0.888	1.126

4. Discussion

4.1. Findings of Demographic Characteristics

Humans are the subject of observing the environment; therefore, understanding how different individuals perceive and evaluate is essential for designers of blue space. According to Sevenant and Antrop [41], observer characteristics (e.g., childhood dwelling place, personal income, age class, gender) are factors affecting positive perception. A recent study also indicated that the subjects' majors would significantly affect the restorative potential and aesthetic preference. This difference may come from different educational backgrounds [18]. However, this study's results did not support this view because all three assessments (aesthetic preference, restoration potential, and perceived naturalness) found no significant differences in any sociodemographic characteristics.

Although the samples of different subgroups are inconsistent, the results of this research are still meaningful. First, the previously studied target areas usually chose green spaces [17–19] and urban environments [41]. The selected scene for the research was only the blue spaces in the urban park, and the research results expand the knowledge in this field. Simultaneously, it can be assumed that the crowd's evaluation is different when perceiving blue space and green space or other environments. Therefore, in future research and practice, we need to treat these different spaces differently. Furthermore, conflicting results can stimulate more related research since the existing evidence for the effect of demographic characteristics is far from conclusive.

4.2. Driving Factors for Aesthetic Preference of Urban Park Blue Space

According to previous studies, aesthetic preference is usually related to the number of trees [19], human activities [18], environmental value orientations [42], number of colors [30], and safety level [43]. However, most of the driving factors related to the aesthetic preference of UPBS in this study are related to the characteristics of water bodies, such as water quality, visual naturalness of water, and accessibility of water. This is reasonable and meets the study's purpose. First, Yamashita [44] emphasized the importance of water quality in water landscape design, and adults and children prefer clear rivers without garbage, dead grass, or other litter. Simultaneously, poor water quality makes observers think of bad smells and reduces UPBS attractiveness. The visual naturalness of water is also an important indicator of scene preference. The more natural the form of water, the higher the preference for blue space. This is similar to the conclusion of Zhao et al. [31] that humans generally prefer natural scenes for evolutionary reasons because these scenes can promote human associations with the natural environment and natural activities. Unexpectedly, accessibility of water was negatively correlated with UPBS's aesthetic preferences, which is inconsistent with the research results of Zhao et al. [29]. They found that for urban river landscapes, river accessibility is a reliable positive predictor of aesthetic preferences. However, the blue spaces selected in this article are mainly located in an urban park, where visitors come from all ages. Therefore, each water body was designed with safety in mind, such as the scenes shown in images 3 and 8. Tourists in these areas usually can only view the water body from a certain distance without touch, resulting in the images' lower accessibility, yet they are still preferred. However, since this study only selected a limited number of UPBS samples, the results cannot summarize general rules from the limited data. Biodiversity is a critical issue in landscape planning. It has been proven that people can accurately perceive species richness, and aesthetic appreciation increases as species richness increases [45]. This is consistent with the regression model results of this study: The higher the vegetation diversity of UPBS, the more people prefer it. In addition, the number of man-made elements is another potential contributor to preferences, which may be contrary to general knowledge that the more the human-made elements, the more likely the scene is to be considered artificial rather than natural, resulting in a decline in preference. However, Strumse [46] pointed out that if the balance with nature is maintained, human influences can be appreciated, such as old buildings, stone walls, or stone bridges contained in natural scenes. Moreover, the results of the model did

not find a significant relationship between water area and preference. It can be considered that this may not be a relationship between attraction of UPBS and scale/area. In other words, whether it is a river or a pond, they may have the same attraction.

In summary, this study found that people prefer water bodies with good water quality and natural visual forms. Simultaneously, blue spaces with high vegetation diversity are preferred, and artificial elements should be evaluated more carefully when added to the scene to avoid disharmony and conflict with the surrounding environment.

4.3. Driving Factors for Restorative Potential of Urban Park Blue Space

The perception of inadequate resources causes humans mental stress [34]. Water is important for relieving mental stress [31], and the blue space (i.e., water body) enhances human health and wellbeing [10]. It is interesting and important to consider which landscape characteristics contribute to the restorative potential of UPBS. The regression analysis suggested that “water quality” and “visual naturalness of water” are positive indicators of evaluation, while “accessibility of water” is a negative indicator, like the aesthetic preference. The correlation analysis results show that the restorative potential of UPBS is positively correlated with aesthetic preference and naturalness. Therefore, for the blue space in urban parks, its restorative potential increases as the landscape’s attractiveness and naturalness increase, which is consistent with the research results of Carrus et al. [33] in green space. Furthermore, the number of landscape elements is another positive indicator of restorative potential. The point of view of evolution can explain this. The coexistence of multiple elements can increase the complexity of an environment (the possibility of providing food) and enhance the mystery of an environment (the possibility of exploration) [39]. However, Deng et al. [18] believe that complexity is an important quality of restorative environments. When viewers imagine that they are in such an environment, they prefer the existence of small animals, natural water, dense vegetation, rest facilities, and viewing platforms for relaxation and recovery.

In summary, good water quality and high naturalness are important characteristics of blue space as a restorative environment. At the same time, the proportions of plants, buildings, topographical changes, and water should be coordinated to maintain the heterogeneity of the landscape.

4.4. The Measurement to Restorative Potential

In this study, a shortened version of the PRS was used to measure the restorative potential of UPBS. The regression model results show that the “compatibility” has the lowest adjusted R², which is consistent with the model result of Wang et al. [19]. Participants need to imagine themselves in the blue space of this urban park (mainly river, creek, pond); hence, unlike the green space, they may not associate leisure activities (e.g., walking dogs, jogging, picnics) with these water bodies. In addition, “extent” (measured by scope and coherence) emphasizes the importance of the scene’s coherence. The rich vegetation types and natural forms of water in the image create a complex environment and comprise a whole world, stimulating the viewer’s desire to explore. Moreover, landscape characteristics related to water (water quality and visual naturalness of water) positively correlate with the restorative effect by attracting attention (fascination). Landscape elements in the blue space, such as bamboo, traditional architecture, bonsais, and stone bridges together form a natural and harmonious scene, allowing visitors to rest and relax here (being away). Arguably, the natural environment’s characteristics can help people recover from attention fatigue since they promote a restorative experience. However, both active involvement and observation are essential for restoring experience [26]. Consequently, UPBS can provide more leisure activities and interactions for better recovery.

4.5. Natural or Artificial? Far from a Decisive Conclusion

Water is highly attractive to people in urban green spaces and open spaces [47]. Humans prefer more natural water features [48], according to previous studies, which

fits the psychological theory of preference for naturalness [15]. However, another study showed that artificial features seem to be preferred (especially for women and children) because they provide active outdoor activities (e.g., water fights, boating, splashing in the stream, [49]). As a result, the results regarding whether people prefer natural or artificial water features remain ambiguous.

In this study, according to the results in Table 6, the correlation coefficient between naturalness and restorability as well as preference was greater than 0.6, which represents a strong correlation. Arguably, the more natural respondents perceived the UPBS, the more they preferred the scene, and the more likely they were to feel restored and relaxed. However, image 3, which had the lowest perceived naturalness (4.06), had a moderate preference score (4.83), while image 2, which was perceived as more natural (4.56), had the lowest preference (4.25) and the lowest restorative potential (4.20). Therefore, it seems that we cannot conclude that the UPBS assessed as more natural is more attractive (preferred). However, the contradictory result is consistent with the study of Ngiam et al. [50]; that is, visitors to urban parks desire natural landscapes on the one hand but also have cultural expectations for care and maintenance. In other words, in addition to aesthetic preferences, the public likes a tidy and managed landscape [51]. In addition, Bulut and Yilmaz [52] indicate that the most preferred water type is the urban water feature designed in a natural way, with the intrinsic motivation of integrating landscape architecture with natural elements. The results of this study agree with the point above, as the most preferred image 5 (5.67) is assessed as only moderately natural (5.05) but is a scene that blends highly natural environments and artificial elements—a large pond surrounded by bamboo forests and traditional buildings, with a platform in the foreground where visitors can view the water (a passive opportunity to play with water). Similarly, image 8 (5.63) is highly preferred, and there are numerous artificial landscape components in the image (rockeries, traditional structures, bonsais, a bridge) that blend nicely with the surrounding bamboo forest and sequoia. Furthermore, both scenes are well managed and cared for.

Therefore, based on the above discussion, this study concludes that public preference for natural or artificial water features is far from decisive. Managers of urban parks should create interactive artificial water features where visitors may participate in both active and passive outdoor activities. Natural water features, on the other hand, must be provided or capitalized on and their upkeep and management maintained. Most importantly, nature does not equal wilderness, and designers need to emphasize the balance of natural and artificial elements to improve the visual quality of water features.

4.6. Limitations and Future Study

There are still some limitations and deficiencies in this research. First, knowledge about restorative potential and preferences is complex; more population samples from different countries and cultural backgrounds need to be emphasized. Although this study did not find differences between individuals, population groups' differences in landscape assessment should not be ignored. For those who design and manage blue spaces, it is crucial to keep in mind diverse views, preferences, and experiences to avoid permanent retention of the dominant position of certain groups [53]. Second, considering the experimental cost, only the visual stimulation method was performed. However, bringing participants to these locations was not considered to significantly change their assessment of the scene's restoration potential and aesthetic preferences [5]. Moreover, the physical environment characteristics of the site (such as smell, weather, temperature) may affect the judgment of participants. Therefore, these potential problems can be eliminated through visual simulation techniques. In addition, this study only selected 10 types of UPBS, and more types (more landscape features) of UPBS need to be considered for evaluation in future research. Lastly, this is a cross-sectional study, and longitudinal perspectives are also required to test the long-term impact on preferences and experiences.

5. Conclusions

Urban parks are essential parts of a city's natural environment and provide residents with daily healthy places. The blue space in urban parks needs to be emphasized as an important dimension to promote visitors' physical and mental health. The results of this study provide valuable clues for enhancing the aesthetic quality and restorative potential of UPBS. In general, a water body with good water quality and natural visual form may be more attractive and have restorative potential. Furthermore, blue spaces with high vegetation diversity are preferred, and artificial elements should be evaluated more carefully when added to the scene to avoid disharmony and conflict with the surrounding environment (such as old buildings, stone walls, or stone bridges). In practical design, the proportions of plants, buildings, topographical changes, and water should be coordinated to maintain the heterogeneity of the landscape. Moreover, this study indicates that UPBS can provide more leisure activities and interactions for better recovery. Finally, designers need to emphasize the balance of natural and man-made elements to enhance the visual quality of the water feature.

In terms of possible future studies, samples from larger populations are still needed to enhance the generalizability of this study. Multisensory (auditory, olfactory) stimuli could be considered to create a more immersive laboratory environment. In addition, more types (more landscape features) of UPBS need to be considered for evaluation in future research.

This study indicates that landscape characteristics and landscape elements for restorative experience should be emphasized when designing blue spaces in urban parks. Furthermore, as an essential part of the urban natural environment and a daily healthy place for residents, this initiative may be useful for improving the urban population's quality of life by utilizing the positive impact of blue space on health.

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