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Attraction and Retention Green Place Images of Taipei City

Lankyung Kim and Ching Li *

Graduate Institute of Sport, Leisure and Hospitality Management, National Taiwan Normal University, Taipei City 10610, Taiwan
* Correspondence: t94002@ntnu.edu.tw

Abstract: This study investigates levels of green place image and their association with different types of greenspace by examining residents' perceptions of urban greenspaces. Place image refers to an individual's comprehensive perception of a location, formed through various interactions, and it encompasses two distinct aspects: attraction and retention. The former can be established without extensive interaction, while the latter requires deeper physical and psychological connections, such as a sense of place (SOP) and place identity (PI). Although much research on urban greenspaces has concentrated on the retention aspect, focusing on residents' psychological, physical, social, and environmental engagements, the attraction dimension, including place brand (PB), visual image (VI), and place reputation (PR), has been less explored. This study collected data from 536 on-site surveys across four types of urban greenspaces in Taipei city: small-size greenspaces, neighborhood parks, multipurpose parks, and green corridors, and they were analyzed through factor analysis (FA) and multivariate analysis of variance (MANOVA) using R software (R-4.3.3). The FA identifies two factors and their significant sub-attributes aligning with theoretical findings, i.e., attraction and retention. Further analysis using MANOVA determines that the multipurpose park is the most influential type of greenspace, significantly affecting urban residents' development of positive green place images. These findings highlight the importance of perceiving urban greenspaces as critical areas for multi-dimensional stakeholders, suggesting a balanced approach to development and management that emphasizes both attraction and retention strategies as well as nature and built facilities.

Keywords: green place images; attraction; retention; multipurpose park; Taipei City

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1. Introduction

Greenspace, defined as either a human-modified or natural outdoor environment containing varying amounts of vegetation [1], has emerged as a critical asset for enhancing quality of life, particularly in urban settings [2]. Human interaction with greenspace covers a wide range of activities and experiences [3–6]. It plays a pivotal role in fostering humans' attachment to nature within densely developed urban landscapes.

A place image represents the cumulative perception of a location by individuals, informed by behavioral interventions within a spatial context. The application of the place-image concept aids in deciphering the complex meanings associated with a place [7]. The discussion of greenspace in the context of place image reveals that the concept of green place image can offer a comprehensive perspective on achieving sustainable urban development goals by understanding human interventions in greenspaces [8]. According to a review paper that approached greenspace studies from a place image standpoint, green place image encompasses residents' and visitors' sense of place, shaped by layers of interventions in greenspace, such as psychological restoration, physical recreation, social cohesion, and environmental consciousness [9].

Clouse and Dixit (2017) [10] introduced a conceptual model of place image based on the level of human connection with the place, including place brand (PB), place visual image (VI), place reputation (PR), sense of place (SOP), and place identity (PI). The first

three components have predominantly been examined in the context of destination marketing, focusing on the attraction level [6,11,12]. Conversely, the latter two components have been explored at the retention level, centered on residents' place attachment and identity [10,13–15]. In greenspace contexts, discussions on place image have primarily unfolded at the retention level, as researchers have focused on users' direct interactions with greenspaces through various activities and layers of emotional response [9].

Recent studies, furthermore, identify the significant impact of urban greenspace attributes, including size, amenities, and tranquility, on residents' place attachment and the perceived value of these areas [16,17]. These attributes, along with spatial characteristics, vegetation density, and accessibility, hold a crucial role in defining the interaction between urban residents and greenspaces. This study delineates urban greenspaces into four categories: small-sized greenspace, neighborhood park, multipurpose park, and green corridor [9]. By exploring different types of greenspace in relation to urban green place images, the research contributes to an extended understanding of urban environmental perception.

This study aims to explore both levels of greenspace images, attraction and retention, in an urban context, investigating on-site survey data collected from four types of greenspaces in Taipei City. It also determines whether a significant difference exists among these types in their association with certain factors of place image. Firstly, the data are analyzed using factor analysis (FA) to identify underlying factors within the different levels of place images. Based on the results of the FA, a multivariate analysis of variance (MANOVA) is conducted to find the specific association between greenspace and place images. R software [18] is used for the statistical analysis.

This study offers theoretical insights by highlighting specific aspects of the different levels of place image that have received less attention in prior research. Furthermore, the findings have practical implications by emphasizing the potential of greenspaces to engage multi-dimensional stakeholders, such as policymakers, planners, and residents, in integrating these spaces more effectively into urban management strategies. By emphasizing the significance of greenspaces in fostering residents' attachment to urban nature and improving the quality of life, this study contributes to the broader discourse on sustainable urban living and the essential role of greenspaces within it.

2. Literature Review

Place image involves complex meanings associated with a location, which vary based on an individual's connection to the place [7]. For example, potential or one-time visitors base their place images on symbolic aspects, while frequent visitors or residents form attachments through accumulated experiences. It has also been shown that size differences significantly impact visitors' emotional responses [19]. Thus, prior research on place images and greenspace types is examined.

2.1. Greenspace Place Image

Clouse and Dixit (2017) [10] introduced a conceptual framework for place image that includes five attributes: PB, VI, PR, SOP, and PI, divided into two domains: the level of attraction and the extent of retention. PB is the image of the place as intended and promoted by the authorities. In contrast, VI and PR allow people to visually and verbally recognize and describe the place without direct involvement, making these attributes central to the place's attractiveness. However, SOP and PI pertain to the retention or nostalgic level of place image, developing through direct interactions with the place across various experiences.

In discussions of greenspace, the focus predominantly lies on the retention level, reflecting the wide range of human interactions within greenspaces, encompassing a variety of activities and experiences [3–6]. These interactions foster place images through direct human engagement with greenspaces. Kim and Li's (2023) [9] review study, from a place image perspective, found that SOP is the most extensively studied concept, with research confirming its reassuring aspects, such as place attachment, sense of belonging,

community attachment, and place identity. However, this study aims to delve into the broader discourse on place images, including the attraction levels, to ascertain the different aspects of green place images.

2.1.1. Greenspace Place Brand (PB)

The concept of PB, when integrated with urban greenery, has begun to capture academic interest, despite place branding itself being a well-established topic in marketing and management research for many years. Place branding typically involves promoting a specific image of a place, utilizing marketing strategies to highlight its unique attributes [7,10].

Although discussions on PB have infrequently focused on greenspaces, Hong Kong has emerged as a prominent example of how green place branding approaches can contribute to sustainable city management [12,20,21]. Specifically, Chan (2017) [20] proposed a model for green city branding that emphasizes a pleasant experience, natural beauty, and recreational opportunities, based on an analysis of residents' perceptions of Hong Kong's green city image. Also, studies comparing different groups' perceptions of Hong Kong as a green city have further explored city brand attributes. For instance, Fok and Law (2018) [21] discovered that residents perceive the green image of their city to be lower than that perceived by tourists and overseas investors. Building on these discussions, the current study seeks to explore the level of green place brand image among urban residents, drawing upon previous research on green city assets [12,21].

2.1.2. Greenspace Visual Image (VI)

The place's visual image represents the visually distinctive and discernible asset of the place. As Clouse and Dixit (2017) [10] claimed, VI refers to the place's attractiveness, which can be perceived by either direct or indirect involvement with the place. In greenspace discussions, greenspace VI was investigated to mainly uncover the greenspace visual environment and the level of preference, especially for visual pleasantness and mental restorative effect [11,22,23]. Campagnaro et al. (2020) [11] compared greenspace attributes affecting visual preferences from different standpoints, such as general, stress relief, and safety concerns, and their on-site survey of greenspace visitors found that artificial elements have more influence on stress relief than vegetation elements themselves. Nevertheless, Kozamernik et al. (2021) [22] and Chen et al. (2018) [23] discerned that urban greenery promotes the attractiveness of the urban ambiance, and the greenery setting also affects visual preference. Following the previous findings regarding greenspace VI interpretation, the present study measures urban residents' visual perception of greenspace with pleasantness and mental restoration effects [11,22].

2.1.3. Greenspace Place Reputation (PR)

Place reputation is associated with word-of-mouth, enabling the development of a positive perception of a place [23]. Clouse and Dixit (2017) [10] categorized PR as a component of the attractiveness levels of place image, alongside PB and VI. In the realm of tourism destination marketing, Chen et al. (2018) [23] adopted an environmental psychology perspective to investigate how local residents' online word-of-mouth is influenced by place satisfaction or place attachment. When focusing on greenspaces, researchers have analyzed user-generated content, such as Twitter posts, to explore the connection between attention restoration effects and types of greenspace [24]. Similarly, Andersson-Sköld et al. (2018) [25] examined the opinions of public and civil workers regarding the general ecosystem services provided by different types of greenspace. It has been found that greenspace PR correlates with positive word-of-mouth concerning the beneficial effects of greenspaces [23,25].

2.1.4. Greenspace Sense of Place (SOP)

The meaning of a SOP is inseparable from the concepts of placeness and topophilia. In the 1960s and 1970s, the concept of place-making emerged to promote the creation of memorable places. It evolved into academic attention, especially geography, emphasizing

the connectedness between people and place [26,27]. For example, Relph (1976) [26] contended that *placeness* comes from the place's authenticity, which people can draw from the spatial experience. His idea shares the concept of topophilia, defining the affective ties between a person and the environment [27]. Following the concepts from Tuan (1974) [27] and Relph (1976) [26], human geography has preferably adopted the term sense of place to interpret human association with the place [28].

Place-based research on urban planning [29] has diverged into various disciplines, such as environmental psychology, sociology, natural resource management, and destination marketing. Through place-based studies, the sense of place has demonstrated its theories and ideas largely adopting perceived attachment to the place., i.e., place attachment [30], and embedding distinctiveness of the place, i.e., place identity [31]. Place attachment has mainly been explored in environmental psychology, emphasizing the importance of positive emotional ties between people and the place [28].

Van Dinter et al. (2022) [17] adopted a sense of place as the mediating factor between greenspace visitation and life satisfaction. Their study investigated the influential relationship among factors regarding its usage, such as personal characteristics, park characteristics, and user behavior. Among park characteristics, park size, nature, and facilities showed significant relationships with a SOP, while the distance to the park and tranquility did not. While Van Dinter et al. (2022) [17] and Irvine et al. (2013) [32] relied on place attachment and place identity as subdimensions of the sense of greenspace, McCunn and Gifford (2014) [33] found the interdependent relationship between residents' sense of greenspace and neighborhood commitment by surveying three aspects of SOP, i.e., place attachment, place identity, and place dependence.

In the extent of greenspace place image discussion from Close and Dixit's (2017) [10] standpoint, SOP was the most studied attribute of place image, although most studies seldom directly involved the term SOP. They generally implied a SOP as an umbrella concept traversing place attachment [13,15], a sense of belonging [34], and community attachment [35]. On the contrary, a few studies only impressed a SOP into the argument instead of implying it as a superordinate concept of place attachment, criticizing that place attachment can only imply an emotional part of a sense of place, i.e., an affective attribute [17,28,32,33]. They regarded place dependence and place identity as complementing aspects, arguing that the utilitarian value of greenspace must be considered distinctively in SOP.

The emotional SOP is represented by place attachment and a sense of belonging as its subordinate aspects. Place attachment emphasizes the emotional attachment to the place, while a sense of belonging delivers the idea of community or neighborhood attachment. Place attachment involves emotional layers that people develop through their interventions in greenspace, while place dependence represents the perceived utilitarian value of the place [28]. When place attachment was adopted as a mediating variable, the researcher investigated its mediation effect between greenspace components and perceived health benefits [36] or its mitigating effect of an environmental stressor on perceived well-being [37]. On the contrary, Subiza-Pérez et al. (2020) [15] directly brought place attachment as the psycho-environmental variable to examine its predictor value of experienced restoration; Zhang et al. (2015) [38] and Budruk et al. (2013) [1] approved the influencing value of place attachment to perceived health and environmental attitude, respectively.

In the event that place attachment came into the measured variable or a research object in the greenspace discussion, researchers claimed the crucial role of greenspace for urban residents or social minorities [10,13,39]. Colley and Craig (2015) [10] even emphasized the need for studies that discuss emotional attachment to the place in the ecological dimension. Most studies adopted empirical data and analyzed them with measurement scales elicited from peripheral concepts, such as place identity, place dependence, social bonding, or nature bonding.

A person's affective ties to the place can be expanded to more significant levels, such as community, society, or nation. In the greenspace sense of place discussion, studies delivered an expanded view of place attachment by addressing the sense of belonging [34,35,39]. Kimpton et al. (2015) [39] explored the influential effects of greenspace proximity and availability on place attachment by utilizing longitudinal sample data over ten years. They found that social ties, neighborhood-level control measures, are a stronger predictor of place attachment than greenspace proximity and availability.

In their study, however, the content of the place attachment measuring scale fully focused on the sense of community, such as perceived belonging to the community, future living intention, and feeling proud of the community. On the same continuum, Zhu et al. (2017) [35] used community attachment as a research objective to explore greenspace satisfaction as a mediating effect; they surveyed urban residents with a questionnaire that facilitates a sense of community. In sum, a sense of belonging is an emotional attachment to the community as the expanded space claims social cohesion through greenspace [34].

The utilitarian SOP, i.e., place dependence, indicates conative or functional aspects of the sense of place, while place attachment refers to emotional or affective aspects [40]. It emphasizes the utilitarian value of the place that the other place cannot substitute for the specific usage, such as activities or rituals [28]. However, when the concept came into the greenspace discussion, there was a lack of consistency as it had been adopted as a subordinate concept of place attachment [13,36]. Moreover, the measurement content broadly includes a questionnaire traversing emotional responses from greenspace usage [14,39]. Following the genuine interpretation of place dependence, with which people develop a goal-oriented user perception towards the place, the present study addresses place dependence with a distinct value. Measurement scales for place dependence are solely retrieved.

2.1.5. Greenspace Place Identity (PI)

In the field of environmental psychology, PI is understood as the complex dimensions that define an individual's identity in relation to the physical environment [31]. Conversely, studies in human geography have embraced PI as a cognitive aspect of SOP, employing it to delve into the three-dimensional dynamics of the people-place relationship, including place attachment, place dependence, and place identity [40]. Furthermore, within discussions on greenspaces, PI has been applied as a nuanced concept within place attachment, albeit without the provision of consistent measurement scales [1,13,36–38].

Clouse and Dixit (2017) highlighted PI as epitomizing the highest level of place retention, premised on the idea that PI signifies a person's profound engagement with a place. This perspective has led researchers to explore PI through immersive methodologies that interpret complex human-place interactions. These include the use of device-assisted techniques such as mobile instant messaging diaries [41], participatory video recordings [3,42], and in-depth walking interviews in greenspaces [43].

Beyond methodology, the preference for specific types of greenspaces, such as allotments and community gardens, has been observed. These settings facilitate the development of place identity through active engagement, including place-making horticultural activities and volunteer participation [44]. This study reaffirms the original conceptualization of PI in the context of greenspace, where individuals express their identity through interactions with their environment [10,17,36,38].

2.2. Four Types of Urban Greenspace

The discrete definition and classification of greenspace have yet to reach the collective. The spatial boundary of greenspace differs according to the research focus, emphasizing the special functions of the site. The present study follows Kim and Li's (2023) [9] study, in which urban greenspace was categorized into four types: small-sized greenspace, neighborhood park, multipurpose park, and green corridor.

The exploration of small-sized greenspaces, such as pocket parks, allotments, and community gardens, highlights their significance in urban environments, specifically excluding private gardens to focus on the collective image of public greenspaces in Taipei. While private gardens have been studied for their unique characteristics and immediate accessibility to nature, the current study centers on public greenspaces that foster community and utility, with research indicating that these smaller greenspaces can enhance social cohesion and offer therapeutic landscapes for social minority groups [45]. Despite their size, pocket parks and community gardens play a pivotal role in urban ambiance and psychological well-being, though they are sometimes overlooked in discussions on greenspace benefits [22].

Neighborhood parks, defined as accessible public green areas within a 10–15 min walk from home, are essential for providing active outdoor recreation and contributing to the quality of urban life [38]. These parks serve as a minimum greenspace provision for physical activity [46], leading to varying levels of place attachment [13]. Demographic and cultural attributes, along with the activities conducted within these parks, shape the place image of neighborhood parks, emphasizing their role in leisure and utilitarian values within the urban greenspace discussion.

Multipurpose parks, distinguished by their large scale and variety of service facilities [47,48], are identified as offering comprehensive greenspace benefits, including mental, physical, and social well-being [24]. Their design, balancing naturalness with built amenities, facilitates a wide range of recreational and utilitarian activities, contributing to place attachment, identity, and a sense of belonging [17,32]. On the contrary, green corridors represent the broadest spectrum of urban nature, offering extensive ecosystem services and enabling a deep human–nature connection [49].

3. Methodology

This study was conducted through an on-site survey of 536 participants who visited urban greenspaces in Taipei City from September to November of 2023. The questionnaire, a 5-point Likert scale, focused on green place images, measured through PB, VI, and PR as attraction levels and SOP and PI as retention levels (Table 1). To analyze the data, FA and MANOVA were conducted to identify the underlying factors of place images and their association with types of greenspaces using R software [18].

FA is a statistical technique used to uncover the latent structure within a set of observed variables [50]. Before conducting FA, the suitability of the data for the statistical manipulation was assessed. Firstly, a correlation matrix between variables was inspected to confirm that all the variables constitute a homogeneous set of perceptions. Secondly, Bartlett's Test of Sphericity was conducted to ensure that the correlation matrix is not an identity matrix, which would make FA inappropriate. Thirdly, the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was calculated to ensure a value exceeding 0.6.

The decision on the number of factors was guided by several criteria, including eigenvalues greater than 1 and Parallel Analysis Scree Plots. The factor loadings from the FA were interpreted to find which survey items were strongly associated with each factor. A high loading on a particular factor (commonly an absolute value of 0.4 or higher) suggests that the item contributes significantly to that factor. Subsequently, each variable's communality was examined (less than 0.50 as not having sufficient explanation) to support the amount of variance accounted for by the factor solution for each variable. Finally, the VARIMAX rotation was applied to maximize possible simplification by identifying variables that have high loadings on each factor.

Based on the number of factors extracted and the variables that determined the factor structure, a one-way MANOVA was conducted to investigate their associations with different types of greenspaces: small-sized greenspaces, neighborhood parks, multipurpose parks, and green corridors. After confirming differences among the factors, a one-way ANOVA (analysis of variance) was performed to explore the differences between each factor and the types of greenspaces. Subsequently, the Tukey HSD (Honestly Significant

Difference) procedure was applied to conduct pairwise comparisons as a post-hoc analysis and ascertain the significance of the relationships.

Table 1. Levels of greenspace place images in attraction and retention.

Constructs of Greenspace Place Images	
Place Brand	
PB1	This place has a peculiarity.
PB2	This place is representative of the city (or the neighborhood or the community).
Place Visual Image	
VI1	I feel pleasant when I see this place.
VI2	I feel mentally restorative when I see this place.
Place Reputation	
PR1	The beneficial effects of visiting this place are well-known.
PR2	I will recommend this place to others.
Sense of Place	
SOP1	I am very attached to this place.
SOP2	I feel quite at home in this place.
SOP3	I feel like I belong to this city (or this neighborhood).
SOP4	I would like to be living in this city (or this neighborhood) for the next three years.
SOP5	This place cannot be a substitute for the other place for doing what I intended to do here.
SOP6	This place provides the optimal environment to make me achieve my goal.
Place Identity	
PI1	Visiting this place says a lot about who I am.
PI2	This place reflects what type of person I am.
PI3	I feel this place is a part of me.

Prior to the commencement of this study, ethical approval was obtained from the Institution Review Board of the National Taiwan Normal University (case number: 202308HS011). Participants provided informed consent and were briefed on the objectives of this study before taking part in it.

The survey data collected from 536 participants who visited urban greenspaces in Taipei City provided several demographic insights (Figure 1). The gender distribution exhibits a higher proportion of female participants (321), compared to males (215). In terms of age, the distribution leans towards the younger demographic, with the majority of participants falling within the 20–39 age range (161 for 20–29 and 186 for 30–39). The 40–49 age group had a significant representation with 154 individuals, while the 50–59 age group had the smallest count at 35. As for the educational background, a large number of participants had an undergraduate level education (381), followed by those with postgraduate education (90), and a smaller portion had non-higher education (65).

Regarding the types of greenspaces where the survey questionnaire was collected, neighborhood parks were the most common, with 174 responses, followed by small-sized greenspaces with 137, the multipurpose park with 119, and the green corridor with 106 (Table 2). These data highlight a tendency toward younger, predominantly female visitors who have at least an undergraduate degree. The specific applications of the four types of greenspaces are as follows: *Zhian Park* (17), *Shida Park* (82), *Dongpo Park* (18), and *Wanhua Triangle Park* (20) are categorized as small-sized greenspaces; *Yongzhi Park* (14), *Yongkang Park* (91), *Dongyang Park* (27), and *Wanhua Park* (42) are neighborhood parks; *Daan Forest Park* and *Huazhong Riverside Park* are the multipurpose parks and green corridors, respectively.

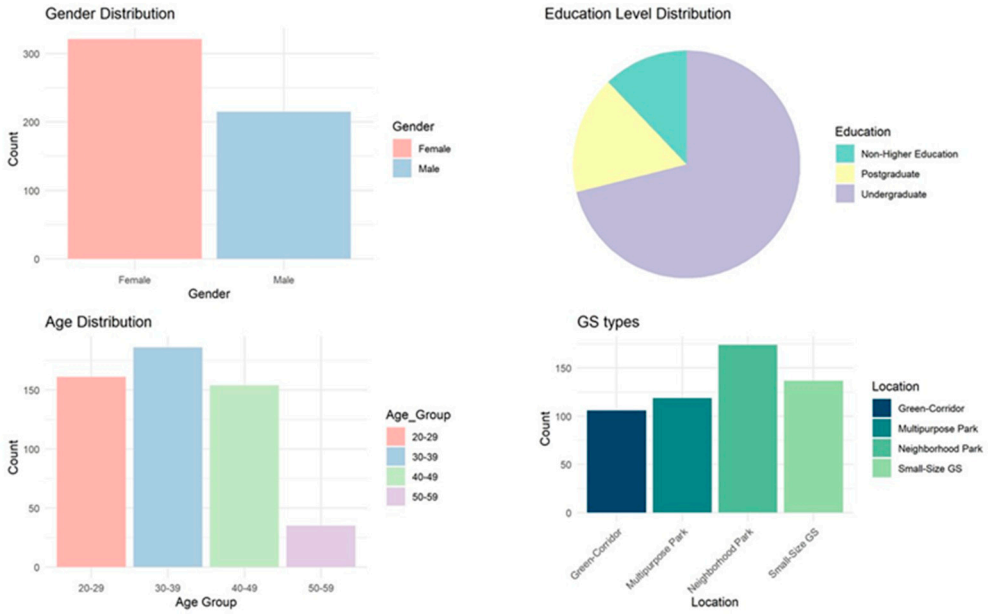
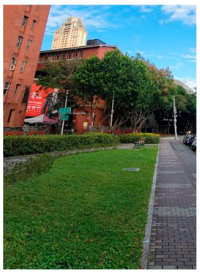
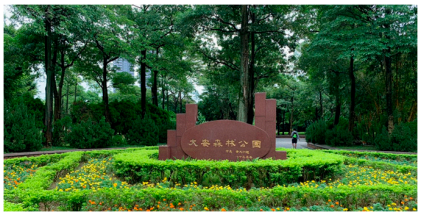


Figure 1. Demographic information of research participants.

Table 2. Four types of greenspaces as research areas.

Small-Size Greenspace	Neighborhood Park	Multipurpose Park	Green Corridor
Shida Park	*Yongkang Park*	*Daan Forest Park*	*Huazhong Riverside Park*
			

Data source: Department of Information and Tourism, Taipei City Government.

4. Results

The overall statistical results contributed mostly to the theoretical analysis (Appendix A). All correlation values were significant at the 0.01 level, confirming that all the variables present homogeneous concepts. The KMO measure of sampling adequacy was consistently high (ranging from 0.94 to 0.97), indicating that these data are well-suited for FA. The Bartlett's test of sphericity $\chi^2(105) = 4025.639$ was significant ($p < 0.001$), which supports the factorability of the correlation matrix.

The eigenvalues from the factor analysis revealed a dominant first factor with an eigenvalue of 7.345, indicating a strong underlying structure. The second factor had an eigenvalue of 1.218, which is above the common cutoff of 1, justifying its retention (Appendix B). The cumulative percentage of variance explained by the first two factors was approximately 57%. This means that the first two factors together account for about 57% of the total variance in the observed variables. This is generally considered an acceptable amount of variance explained, where variables can be influenced by a wide range of factors, and achieving very high cumulative variance can be challenging [51]. The Parallel Analysis Scree plot (Appendix C) illustrated that the eigenvalues were above the eigenvalues for both the simulated and resampled data for the first two factors, which further supported the retention of these two factors.

Factor loadings were substantial for both factors, with factor loadings above 0.4 significantly following a common rule of thumb (Appendix D). The unrotated component analysis provided a first glimpse into how variables related to place images might cluster together, with Factor 1 and Factor 2 showing significant loadings across different variables. Variables like PI3 (personalization and space) and PI2 (symbolic representation) had strong loadings, indicating their importance in the initial factor structure. However, this unrotated structure might not offer the clearest interpretation due to potential overlap in the dimensions represented by the factors. After the deletion of four variables, X5 due to cross-loadings and X2, X7, and X10 due to their communality values being under 0.50, the rotation was applied to maximize the variance of the loadings within factors, yielding more interpretable solutions.

The deletion of four variables was motivated to enhance the clarity and interpretability of the factor structure. Variables that do not load strongly on any factor or that do not contribute to a coherent interpretation of the factors should be removed to simplify the structure and make the resulting factors more meaningful since FA aims to identify clear and interpretable factors. Removing such variables can lead to "purer" factors that better represent distinct dimensions of the construct under study. After the deletion, the factor analysis results in a slightly adjusted percentage of total variance explained (61.6%).

The VARIMAX rotation resulted in a clearer bifurcation of variables into two distinct factors (Figure 2; Table 3). The rotated factor matrix revealed that certain variables loaded strongly on the first factor, which could be interpreted as 'Retention Green Place Images'. For instance, Retention Green Place Images sees variables like PI2 (symbolic representation) with a loading of 0.831 and PI3 (personalization and space) with 0.785, indicating strong associations with a coherent theme around how individuals symbolically engage with greenspaces. The second factor, possibly determined as 'Attraction Green Place Images', was characterized by variables like PR2 (recommendation intention) with a loading of 0.793 and VI1 (visual pleasantness) with 0.719 suggesting it captures meaningful elements that make a place visually appealing and recommendable.

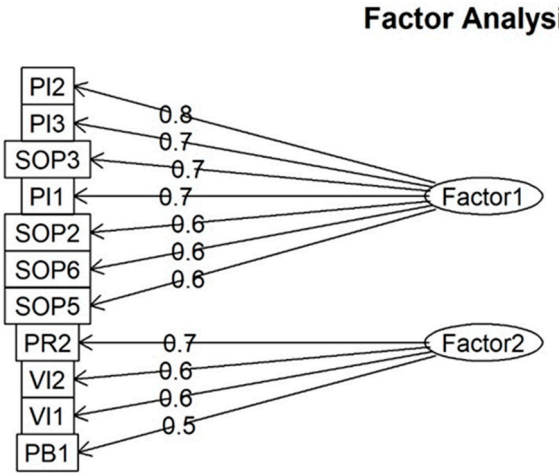


Figure 2. The results of factor analysis.

The results of the MANOVA confirmed significant differences among the four types of greenspaces in terms of place image factors ($F(4531) = 2.048$, $p < 0.001$), leading to the rejection of the null hypothesis that the vectors of means are equal. Subsequently, a one-way ANOVA was conducted to analyze the relationship concerning each factor of green place images. The results indicate that both factors, attraction and retention levels, contribute to different associations among the four types of greenspaces. In particular, the attraction level showed a more significant difference ($F(3532) = 5.075$, $p < 0.001$) compared to the retention level ($F(3532) = 3.019$, $p = 0.017 < 0.05$), implying that the attraction level of place images is more influenced by the types of greenspaces a person visits. Finally, the Tukey HSD

post-hoc analysis revealed that the multipurpose park has the most significant association with both attraction and retention factors of greenspace images (Table 4).

Table 3. VARIMAX-rotated component analysis factor matrix.

		VARIMAX-Rotated Loadings Factor		
Reduced Set of Variables		**1**	**2**	**Communality**
X14	PI2	0.831		0.728
X15	PI3	0.785		0.678
X9	SOP3	0.765		0.639
X8	SOP2	0.716		0.576
X12	SOP6	0.702		0.564
X13	PI1	0.701		0.607
X11	SOP5	0.684		0.596
X6	PR2		0.793	0.658
X4	VI2		0.727	0.595
X3	VI1		0.719	0.615
X1	PB1		0.650	0.522
				Total
Sum of squares (eigenvalue)		4.154	2.630	6.784
Percentage of trace		37.7	23.9	61.6

Table 4. The result of Tukey HSD pairwise comparison.

Pairwise Comparison	**Within Retention (Factor 1)**				**Within Attraction (Factor 2)**			
	diff	**lwr**	**upr**	***p*-adj**	**diff**	**lwr**	**upr**	***p*-adj**
Corridor-2	−0.711	−2.527	1.104	0.820	0.461	−1.052	1.975	0.919
Multipurpose-2	−0.294	−2.107	1.519	0.991	0.626	−0.885	2.137	0.788
Neighborhood-2	−0.431	−2.240	1.378	0.966	0.287	−1.220	1.795	0.985
Small-2	−0.452	−2.264	1.359	0.959	0.244	−1.265	1.754	0.991
Multipurpose-Corridor	0.417	0.075	0.758	0.007 **	0.164	−0.120	0.449	0.509
Neighborhood-Corridor	0.280	−0.034	0.595	0.107	−0.174	−0.436	0.088	0.366
Small-Corridor	0.258	−0.071	0.589	0.203	−0.217	−0.492	0.058	0.199
Neighborhood-Multipurpose	−0.136	−0.439	0.165	0.728	−0.338	−0.590	−0.086	0.002 **
Small-Multipurpose	−0.158	−0.477	0.160	0.653	−0.381	−0.647	−0.115	0.000 ***
Small-Neighborhood	−0.021	−0.312	0.269	0.999	−0.042	−0.285	0.199	0.988

A baseline reference group is labeled as 2. $p < 0.01$ **, $p < 0.001$ ***. Bolded text indicates the significance among pairwise comparisons.

In the analysis focusing on the attraction factor, a baseline reference group (labeled as 2) was used for comparison against other types of greenspaces and denoted no significant difference between the four types of greenspaces and the reference group. However, when comparing different types of greenspaces directly with each other, two exceptions were identified: neighborhood park vs. multipurpose park and small-sized greenspace vs. multipurpose park. The comparison between the neighborhood park and multipurpose park revealed a mean difference of −0.338 and a *p*-value of 0.002 < 0.01, while the comparison between the small-sized greenspace and multipurpose park showed a mean difference of −0.381 and a *p*-value of <0.001. These results suggest that multipurpose parks have a higher influential association with green place images compared to both neighborhood parks and small-sized greenspaces.

In the analysis concerning the retention factor, using a baseline reference group indicated no significant difference between the four types of greenspaces and the reference

group. However, direct pairwise comparisons among the greenspace types revealed that multipurpose parks are significantly different from green corridors, exhibiting a positive mean difference of 0.417 and a *p*-value of <0.001. This result suggests that multipurpose parks are more strongly associated with retention factors in green place images compared to green corridors when individuals perceive the retention level of place images in these two types of greenspaces.

5. Discussion

The concept of place image represents a holistic perception of space, applicable across various research domains, from human geography [26,27] to destination marketing [7]. Despite being discussed for decades, the distinction between different levels of place images, i.e., the attraction and retention levels, has not been clearly defined [10]. Furthermore, the various types of greenspaces, i.e., small-sized greenspace, neighborhood park, multipurpose park, and green corridor, have received insufficient attention within the characteristics of such levels of place images [9]. Therefore, this study proposes a statistical foundation to distinguish between 'Attraction Green Place Images' and 'Retention Green Place Images' along with their association with different types of greenspaces in the urban context. Each factor encapsulates a set of variables that align with specific dimensions of place images, and a specific type of urban greenspace is noticed as having the highest association with residents' urban green place images.

5.1. Attraction Green Place Images

The 'Attraction Green Place Images' factor is characterized by variables such as recommendation intention (PR2), restorative visual impact (VI2), visual pleasantness (VI1), and peculiarity of the place (PB1). This factor highlights the immediate and perceptual qualities of places that make them appealing to people. The implication of the result is as follows:

First, the strong effects on visual pleasantness and restorative visual impact suggest that the aesthetic and restorative qualities of greenspaces are key to their attraction [22]. Urban planners and designers can leverage this insight by prioritizing greenspaces, natural features, and architectural uniqueness in their designs to enhance the attractiveness of urban environments.

Second, the recommendation intention variable underscores the role of social validation and word-of-mouth in attraction [23]. Marketing strategies for places, whether neighborhoods, parks, or entire cities, can focus on highlighting their unique aesthetic and restorative qualities to stimulate positive word-of-mouth and attract visitors or potential residents.

Third, the peculiarity of the greenspace indicates that distinctiveness is crucial in attracting people to a place [21]. Efforts to control the quality and promote the unique asset of urban greenspaces can strengthen interest from outside the community.

5.2. Retention Green Place Images

The 'Retention Green Place Images' factor encompasses variables such as symbolic representation (PI2), personalization and space (PI3), sense of community (SOP3), sense of comfortableness (SOP2), goal achievement (SOP6), identity expression (PI1), and utilitarian value of the place (SOP5). This factor reflects the emotional and symbolic connections that individuals form with places, which contribute to a desire to maintain a relationship with these spaces. The implication of this result is as follows:

First, the prominence of symbolic representation and personalization in this factor highlights the psychological dimensions of placeness [26]. This aligns with the principles of environmental psychology, which posits that personal and collective identities are both influenced by and reflected in the space individuals occupy [30,31]. It highlights the importance of designing urban greenspaces that deeply resonate with individuals' emotions, fostering a stronger sense of identity and community.

Second, the comfort [42] and utilitarian value of greenspace [41,52] suggest that personal well-being through greenspace is key to retaining positive green place images for urban residents. Therefore, sustainable management practices that emphasize spatial comfort and the encouragement of eco-friendly transportation and physical health through greenspaces can foster stronger bonds between individuals and urban nature.

Third, the statistical results underscore the importance of incorporating greenspaces into urban environments, not just for their aesthetic or recreational value but for their role in emphasizing a sense of belonging [14,35]. Policies and government practices that support the development of community programs along with the preservation of greenspaces can contribute to healthier and more cohesive communities for residents in densely developed urban environments.

The factor analysis reveals that place images are multidimensional, encompassing both the immediate and perceptual attributes that attract individuals as well as the emotional ties that encourage individuals' retention. Recognizing these factors enables stakeholders in various fields to adopt targeted approaches to enhance the appeal and sustainability of places, ultimately contributing to improved quality of life and community well-being.

5.3. The Importance of Multipurpose Parks in the City

Multipurpose parks are publicly managed urban forests that come with a range of park service facilities, covering areas ranging from 9.8 hectares to larger park areas [48]. The statistical findings of this study reveal that multipurpose parks are the most influential in shaping urban residents' perceptions of greenspaces, affecting both attraction and retention levels. This supports previous research indicating that, due to their extensive scale, multipurpose parks can offer comprehensive greenspace benefits, including mental, physical, and social well-being [15–17,32].

Regarding the attraction factor, multipurpose parks play a crucial role in fostering immediate and perceptual responses, such as visual pleasantness and the intention to recommend, more so than neighborhood parks or small-sized greenspaces. This finding aligns with the research by Hoyle et al. (2019) [47] and Bell et al. (2018) [43], which suggests that urban park visitors value naturalness, diversity, and wildlife encounters for enhanced well-being. In terms of the retention factor of place images, the comparison of neighborhood parks to green corridors, which possess the most extensive natural assets among the four types of greenspaces, revealed an insight. Despite green corridors having the largest volume of vegetation, it was found that visitors develop a higher emotional attachment to places where facilitated experiences are possible through the built environment and service facilities.

The statistical analysis reveals that the retention factor of green place images encompasses a sense of community and the utilitarian value of the place. Subsequently, this study determines a multipurpose park as the type of greenspace that most significantly influences urban residents to develop favorable perceptions of the urban natural environment. The insight indicates that multipurpose parks play a pivotal role in enhancing the environmental well-being of urban residents through a balanced integration of natural elements and service facilities.

5.4. Limitations and Further Study Recommendations

Despite the expansion of its theoretical scope and practical findings, this study has a few limitations. First, this study is conducted within Taipei City, where the climate remains relatively stable across the four seasons, influencing the outdoor activities of urban residents. Second, the research participants are primarily from the young and middle generations, as greenspace studies focusing on older residents require special consideration and are beyond the scope of this study. Third, this study did not achieve an equal gender distribution among participants, nor did it explore gender differences in spatial perception. This limitation stems from the initial scope of the research, which focused primarily on the general demographic characteristics rather than their variances. Future research could beneficially explore how different genders perceive and interact with urban greenspaces,

potentially revealing significant differences that could inform more tailored urban planning strategies. For future development, a qualitative approach is recommended, given that place identity emerged as the most significant attribute of place images for retaining them. Additionally, the attraction level of place images could be further explored through the perspectives of non-visitors to the city.

6. Conclusions

This research reveals an understanding of place images in urban greenspaces, emphasizing the significant roles of both attraction and retention factors. This study also determines the pivotal role of multipurpose parks in relation to these factors. These findings have implications for urban planning, marketing, and promotion, as well as for environmental advocacy and community development initiatives focused on urban greenspaces. By highlighting the importance of greenspaces in nurturing residents' connection to nature and improving quality of life, this study contributes to further discussion about sustainable urban living and the essential role of greenspaces, particularly multipurpose parks, within this context.

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Appendix A

Table A1. Assessing the appropriateness of FA for variables: correlations and measuring sampling adequacy.

		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	Note
X_1	PB1	1.000	0.491	0.422	0.432	0.510	0.445	0.476	0.361	0.407	0.382	0.451	0.380	0.457	0.397	0.354	14
X_2	PB2		1.000	0.427	0.380	0.457	0.439	0.358	0.385	0.396	0.404	0.427	0.330	0.395	0.378	0.389	14
X_3	VI1			1.000	0.507	0.472	0.468	0.473	0.417	0.393	0.447	0.444	0.394	0.370	0.362	0.414	14
X_4	VI2				1.000	0.415	0.496	0.466	0.414	0.410	0.447	0.419	0.392	0.432	0.405	0.406	14
X_5	PR1					1.000	0.413	0.455	0.508	0.545	0.384	0.497	0.447	0.524	0.515	0.573	14
X_6	PR2						1.000	0.430	0.329	0.316	0.400	0.374	0.326	0.416	0.335	0.392	14
X_7	SOP1							1.000	0.381	0.420	0.410	0.439	0.402	0.473	0.448	0.461	14
X_8	SOP2								1.000	0.621	0.412	0.491	0.444	0.446	0.581	0.598	14
X_9	SOP3									1.000	0.403	0.563	0.500	0.501	0.605	0.586	14
X_{10}	SOP4										1.000	0.487	0.423	0.395	0.369	0.490	14
X_{11}	SOP5											1.000	0.546	0.547	0.564	0.576	14
X_{12}	SOP6												1.000	0.591	0.576	0.530	14
X_{13}	PI1													1.000	0.648	0.591	14
X_{14}	PI2														1.000	0.650	14
X_{15}	PI3															1.000	14

Note: Assessing the appropriateness of FA for variables: correlations and measuring sampling adequacy. All correlation values are significant at the 0.01 level. Overall measure of sampling adequacy: 0.95. Bartlett's test of sphericity: 4025.639. Significance: 0.000.

Appendix B

Table A2. Results for the extraction of component factors.

Component	Eigenvalues		Cumulative %
	Total	% of Variance	
X1	7.345	48.9	48.9
X2	1.218	8.1	57.0
X3	0.744	4.9	62.0
X4	0.725	4.8	66.8

Table A2. *Cont.*

Component	Eigenvalues		Cumulative %
	Total	% of Variance	
X5	0.652	4.3	71.2
X6	0.584	3.8	75.1
X7	0.532	3.5	78.6
X8	0.520	3.4	82.1
X9	0.474	3.1	85.3
X10	0.445	2.9	88.2
X11	0.422	2.8	91.1
X12	0.386	2.5	93.6
X13	0.345	2.3	95.9
X14	0.311	2.0	98.0
X15	0.291	1.9	100.0

Appendix C

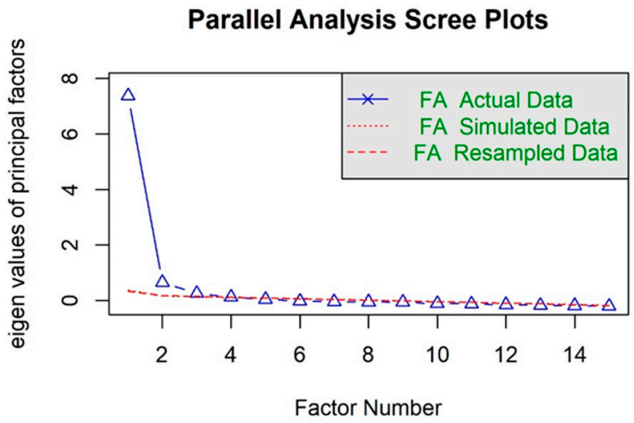

Figure A1. Parallel analysis scree plots.

Appendix D

Table A3. Unrotated component analysis factor matrix.

Variables		Unrotated Loading Factor		
		1	2	Communality
X_1	PB1	0.658	0.316	0.532
X_2	PB2	0.626	0.294	0.478
X_3	VI1	0.661	0.356	0.564
X_4	VI2	0.663	0.323	0.543
X_5	PR1	0.740	0.017	0.547
X_6	PR2	0.616	0.464	0.594
X_7	SOP1	0.673	0.203	0.494
X_8	SOP2	0.711	−0.261	0.572
X_9	SOP3	0.740	−0.301	0.637
X_{10}	SOP4	0.648	0.167	0.447
X_{11}	SOP5	0.753	−0.145	0.587
X_{12}	SOP6	0.700	−0.257	0.556
X_{13}	PI1	0.750	−0.194	0.600
X_{14}	PI2	0.758	−0.383	0.721
X_{15}	PI3	0.774	−0.292	0.684
				Total
Sum of squares		7.345	1.218	8.563
Percentage of trace		52.464	8.7	57.08

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