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The Role of Car-Free Zones as Public Open Spaces in Enhancing Place Identity in Kigali City

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Abstract
Car-free zones as pedestrianized, non-motorized public open spaces within urban realms offer various functions based on their physical elements. The activities within foster special connections based on their physical characteristics, meanings and memories attached, leading to formation of place identity (PI). Despite the rapid emergence of car-free initiatives in African cities, limited empirical research has examined how such spaces contribute to place identity formation. There are few studies in Africa currently that delve into place-people relationships within car-free zones. The car-free zone within Kigali City's central business district presents the case study. The study aimed first to analyze the functions of the space, second to analyze the physical elements and image of the space and lastly to investigate perceptions on PI. A mixed-methods approach was employed using a survey of 183 respondents, field investigation through photography and mapping. Regression analysis identified landscape values, such as air quality, recreation and therapeutic values as significant predictors of PI, while correlation analysis revealed moderate positive spatial associations.

Keywords: Car-free zones, place identity, place attachment, landscape urbanism, urban public space, Kigali City

INTRODUCTION

According to Njeru and Kinoshita (2018), most car-free initiatives such as car-free zones are found in developed countries, while the central business districts (CBDs) of most developing countries continue to be dominated by automobiles. These authors posit that car-free streets provide an opportunity for residents to relax through various forms of recreational activities, including opportunities for children to play. Gubic and Baloi (2020) further posit that walkable and reliable streets that are centered on humans enhance social interactions and livability within urban areas.

According to Gubic and Baloi (2020), Rwanda has faced challenges due to rapid urbanization within various towns. Public space provision is also a problem facing its towns. Many public open spaces experience accessibility challenges and require upgrading. These concerns led to the closure of an existing main street within the CBD of Kigali City to give way for the current car-free zone in order to encourage greater public use (Gubic & Baloi, 2020).

This article delves into place identity (PI) within the car-free zone with focus on the place type, image and the landscape functions that influence user perceptions. It seeks to fill the knowledge gap in people–place relationships within this type of urban public open space. The author in this paper concurs with Njeru and Kinoshita (2018) that there is very little research dedicated to car-free zones in developing countries, especially in Africa. The findings are important to urban place makers and keepers in terms of maintaining the quality of places for urban users.

The study had three objectives:

i. To analyze the functional values of the car-free zone.
ii. To examine the physical elements and spatial image of the space.
iii. To investigate user perceptions of place identity within the car-free zone.

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The rest of the paper is organized into sections consisting of the theory, research methods, results and discussion, and finally the conclusions and recommendations.

THEORY

Importance of Car-Free Zones

Several functions have been identified to be offered within various urban landscapes that include the car-free zones. This include: economic, learning, cultural, spiritual, therapeutic, biodiversity, recreation, aesthetic, wilderness value among others (Brown & Raymond, 2007). Gossling (2020) opines that taking some space from the cars by closing some streets to form car-free zones has several benefits. This includes economic, health, environmental and social benefits. Most cities are currently charactrized by highly motorized transport systems. This leads to problems such that congestions, traffic accidents, noise and air pollution (Gossling, 2020). Abdelhamid et al. (2018) state that most cities in Egypt face problems due environmental pollutions due to crowded streets from high number of automobiles. This affects human health. There are attempts to introduce car free zones and other car free initiatives to curb this problems (Abdelhamid et al., 2018).

Developing PI within Car Free Zones and Other Public Spaces

Lewicka (2008) posit that PU and resultant attachments occur at different levels. This includes apartment, house, neighborhood, district, city and at small scales such as streets. The car- free zone is closed street from automobiles in order to serve as a public open space. PI has been described by earlier studies and those in recent times to be the emotional attachment that gives a symbolic importance to a place as a repository for emotions and relationships (Hernandez et al. 2007). Proshansky (1983; 1978) describes PI as the deep connection that represents a personal connection to a place.

Ujang (2017) states that PI develops through the user's positive identification with a place in addition to being satisfied, enjoying and feeling secure. PI entails continuity in the physical, social and meanings aspects and attachments held by people for a given place (Ujang, 2017). Jorgensen and Stedman (2001) posit that PI is a collection of beliefs that result from the cognitive perceptions of a place and are important in defining the self-identity.These are needed to understand and recognize their environments (Jorgensen & Stedman, 2001).

Li et al. (2023) supporting Wan et al. (2022) posit that people more likely develop emotional identifications and belongingness (i.e. place identity) if the places provide physical conditions and characteristics that meets their individual needs. Mohammed and Sadek (2022) opine that when people develop a physical identity for a place this enhances the users' feelings of the place characters and thus raise their sense of place and eventually leads to attachment for the place. This can raise the quality of life enhance the need to care for such places (Mohammed & Sadek, 2022). Liu et al. (2020) point out a concern on the need to maintain the characteristics of various places. These authors posit that when the physical characteristics of a place changes then people's experiences, memories and attachments is disrupted. This is supported by recent studies on impact of urban renewal on urban landscape identity by K'oyoo, (2023); K'oyoo and Breed, (2023; 2024). Ujang (2017) opine that weakening of place identity has been identified as one of the issues in contemporary urban design. Loss of PI weakens the depth of meanings, diversity of place experiences and the attachments to various places.

Conceptual Framework

Based on the theoretical discussion, the conceptual framework explains how car-free zone characteristics and urban public space functions influence the development of place identity (PI) among users. The framework draws from landscape urbanism and place attachment theory which suggest that the physical characteristics, landscape functions, and user experiences within public spaces contribute to emotional attachment and identity formation (Lewicka, 2008; Ujang, 2017; Li et al., 2023).

In this study, the independent variables consist of the physical elements and image of the car-free zone together with urban public space values/ functions such as recreation, aesthetic value, therapeutic value, learning value, economic value and air quality value (Brown & Raymond, 2007). These landscape features influence users' interactions with the space, including frequency

of visit, familiarity, and engagement.

Through these interactions, users develop emotional connections, memories and perceptions of belonging, which contribute to the formation of place identity (PI) as the dependent variable. The framework therefore assumes that well-designed car-free zones that provide attractive landscape features and diverse functions can enhance place identity among users.

The relationships between the variables examined in this study are illustrated in the conceptual framework presented in **Figure 1**.

RESEARCH METHODS

Study Area

Kigali CBDs car-free zone also known as Imbuga City Walk is a public open space located on the KN 4 Avenue in Kigali City, Rwanda. Its central location makes it a popular destination for city residents and tourists. It is the largest car-free zone in Kigali that was developed by the City of Kigali. It has been in use since 2021. **Figure 2** shows the location of the car-free zone and the study respondents' location within the college of Science and Technology (CST) campus of University of Rwanda. CST campus was purposively chosen due to its large number of students in the CBD, who consider the car-free zone the largest public open space accessible to all.

Research and Sampling Design

A combination of random and convenience sampling was employed, as previously described by Brown and Raymond (2007) in a similar study. A sample size of 183 student respondents was used to achieve statistically significant results. Informed consent for participation in the study was obtained verbally from all the participants. The study involved voluntary participation of university students. Participants provided informed consent and no personal or sensitive data were collected. Anonymity was guaranteed to the willing participants.

University of Rwanda's CST campus students were the respondents. The study aimed to investigate their perceptions of the car-free zone as the largest public open space nearest to their campus within the CBD. Five schools within CST provided study respondents through different departments through random and convenience sampling. Other studies that have used university students to study PI include those by Khaidzir and Kamal (2023), Biedenweg et al. (2019), Casakin et al. (2015), and Kyle et al. (2004). Gundlach et al. (2018) used students to investigate their preferences for car-free city centers. Casakin et al. (2015) used convenience samples to select participating university students from different faculties and

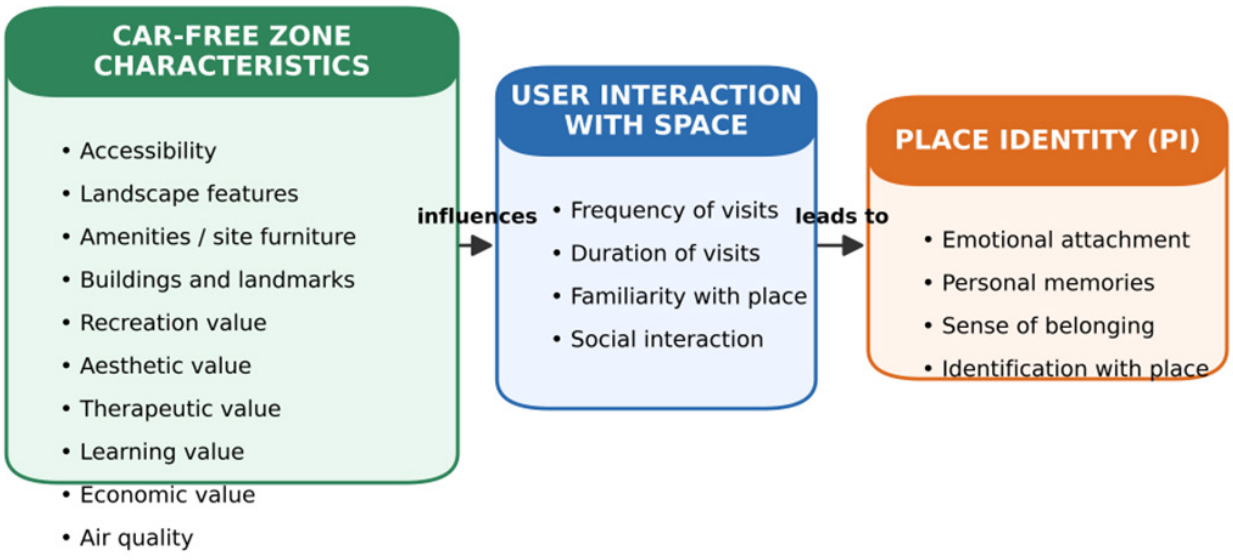

FIGURE 1
Conceptual framework illustrating the relationship between car-free zone characteristics, user interaction with space and place identity
Source: Authors, 2026

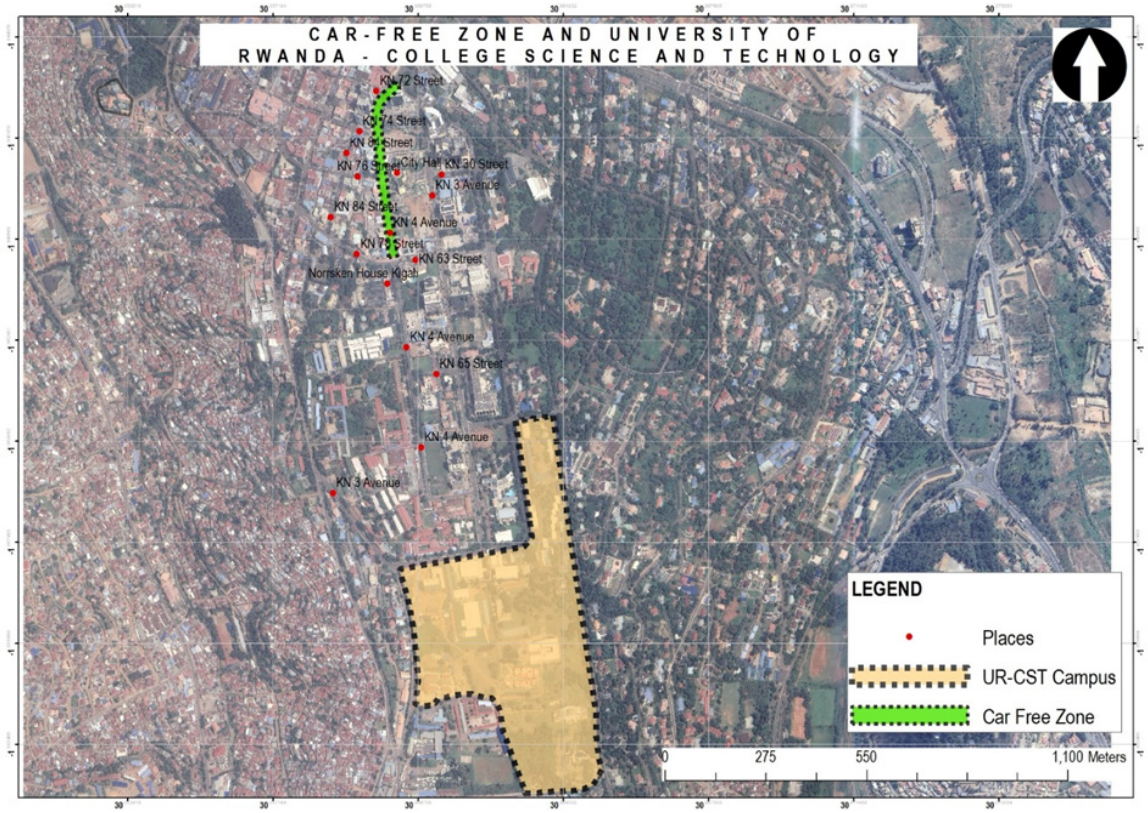

FIGURE 2
Kigali Car Free Zone and CST campus location
Source: Authors, 2026

departments using random sampling. The car-free zone was purposively selected as the site for PI investigation as it is the largest and nearest public open space to the students and the city residents.

Survey Instrument

The survey instrument was structured into parts, incorporating the key concepts under investigation. Part 1 of the instruments consisted of demographic characteristics, namely, school/department/year of study of the respondents, gender, and age. To explore the predictive validity of PI, scale-based questions that assess related behaviors or outcomes were incorporated. For example, 'How often do you visit the car-free zone?' Length of time spent in Kigali CBD, last time the respondent visited the car-free zone, and knowledge duration for car-free zone by the respondents. Part 2 of the survey instrument was on urban public space (CBDs car-free zone) values/functions. This section assessed the level of agreement or disagreement with various values/functions within the car-free zone and used a 5 -point Likert scale (e.g., 1 = strongly disagree, 5 = strongly agree) to measure the importance of each value. Examples include economic, aesthetic, recreation, learning, therapeutic, and air quality. These were selected from Brown and Raymond (2007) and Biedenweg et al. (2019).

Part 3 of the instrument was on PI questions. This section assessed the level of agreement or disagreement with various place identity questions for the car-free zone and used a 5 -point Likert scale (e.g., 1 = strongly disagree, 5 = strongly agree) to measure the importance of each. The consent of the survey respondents was sought by the researchers verbally before issuing the questionnaires. The common questions used in PI investigation by earlier studies (Williams and Vaske, 2003; Kyle et al., 2004; Brown and Raymond, 2007; Liu et al. 2020; Li et al. 2023) include: "Z" means a lot to me, I am very attached to "Z", I identify strongly with "Z", I feel that "Z" is part of me. All these were measured on either 5 or 7 point Likert scale in surveys. The car-free zone study had four questions modified to "I have a lot of personal memories link to the car free zone", "The car free zone is very special to me", "I identify strongly with visiting the car free zone" and lastly

"The car free zone means a lot to me". All these were measured on a 5 point Likert scale.

Field Investigations

Field investigation was carried out in the months of February and March 2025. The first author carried out analysis of the car-free zone based on the attributes by Ujang (2017) with a few modifications. This involved photography of various landscape elements in addition to observations from 8am to 7 pm during the days of study for all the 7 days a week. Timing varied for the observations varied due to availability.

RESULTS

Field Investigation

Field investigation through photography yielded various photos. The car-free zone is embarked by new high-rise buildings, bank buildings, metallic landmark monument, concrete planters with seating areas, pergolas and seats, city hall building, curio shops, soft and hard landscaping. **Table 1** shows the field investigation findings.

These dimensions were used in this study with a few modifications as depicted on **Table 1**. A

TABLE 1
Components and attributes analyzed

Component	Major attributes	Specific elements	Car-free zone characteristics
Physical element	Accessibility	Location	Kigali City CBD street KN4.
		Access	Tarmac road from 4 ends
		Layout	Linear along 1 former CBD street
	Amenities/ legibility	Signage	Available within and on closed road ends
		Greenery	Available although trees are still establishing
		View	Embarked front parts of street buildings, rear side of city hall building
		Landscape features	Variety available from greenery to amenities/site furniture
		Buildings & facade	High rise buildings mostly 1 floor up to over 10 floors up. Good looking facades of embarking buildings
		Landmark & Nodes	One high rise stands out as the CBD landmark building beside city hall building that is administrative/civic/governmental and symbolic. Metallic monument as site landmark
		Shopping complexes	Available within embarking buildings offering several goods and services
Image	Legibility	Image	The zone is popular with people of all races, ages, genders and social classes. The author believes that the zone has a good urban image due to functions within, around in addition to other landscape values
		Popularity	
	Distinctiveness	Distinction	The area is distinct due to its landscape characteristics, amenities, proximity, and accessibility. It is unique as the first car-free zone within the CBD and is aesthetically appealing because of overall good image due to good maintenance.

Component	Major attributes	Specific elements	Car-free zone characteristics
		Uniqueness	
		Historical	
		Aesthetics	
	Comfort	Resting spaces	Available places for sitting. Available site amenities/ furniture for users' convenience. Adequate facilities. Good environmental qualities due to the greenery. Well maintained through regular cleaning
		Convenience	
		Facilities	
		Environmental qualities	
		Maintenance	
	Safety/ Security	Surveillance	Regular police presence around the roads that lead into the zone. Regular patrols/spot checks by city council security officials.

Source: Authors, 2026

detailed description of the landscape elements and spaces that constituted the car-free zone as at the time of the study are described in **Table 2**.

As at the time of the study, the entire car-free zone was characterized by good storm water drainage due to adequate catch basins and natural slopes because of the site terrain. The area lacks landscape structures and elements that can shade the users from rain. Some of frontages and elaborate porches of embarking buildings are utilized for shading in case of rains. **Figures 3** to **5** provide elaborate photos of the car-free zone in terms of the various spaces, landscape elements that make it a great public open space that offers various landscape values.

TABLE 2
Landscape spaces and elements

Landscape element/space	Characteristics and status
Pergola (Free standing)	Square with metallic posts with timber spaced top to bring it partial sunlight. With timber seats above concrete bases. In good condition
Planters	Timber box planters at strategic points near pergola. Most have plants that have failed to establish. Concrete planters with walls as sitting areas
Greenery	Tree species include *Washingtonia robusta* (palm tree), cane palm, *Jacaranda mimosifolia*, *Delonix regia,* cypress species, *Filicium decipiens and Delonix regia. Delonix regia* has the characteristic of shallow/superficial root system that will cause problems in future when fully established by breaking the paving around. Grass species planted with paved areas to add interest and sink part of storm water. Ground covers like *Agapanthus agapanthus, Setcreasea pallida.* Most of the greenery are established.
Landmark/monument	Metallic monument with the writing "KIGALI" is placed near the centre of the car-free zone next to the city hall building. Its location is frequented for photography and videography.
Paving	Variety of paving materials within different sections of the car-free zone. They are in various shapes, colours and fixed in various patterns.

Landscape element/space	Characteristics and status
Concrete wall seats	Are sited next to the city hall wall fence within a large open area
Curio shops	Are positioned at both extreme ends. Exhibit various curio items and are joints for fast foods and snacks.
Rest rooms/toilets	The building is located in a recessed area within the city hall compound.
Open area	Sited next to the city hall area. Is commonly used for placing tents for exhibitions and events on selected days of some months. Common area for skating, bicycle riding and other children activities
Buildings	The area is embarked by several bank buildings, city hall, buildings that offer business spaces for supermarkets, forex bureaus, restaurants, offices, curio shops.
Site furniture	Seats: Timber seats on concrete bases are provided with the pergola, open areas next to the pergolas and next to the palm trees near curio shops. Litter bins/receptacles: Placed at strategic areas near within the area. Bollards: Used to block vehicles and motorbikes from access into the area. Found on the end of the roads that feed into the car-free zone. Lighting: Adequate overhead lighting nicely placed throughout the area. Signage: Found near the blocked roads to warn motorists of no entry into the area.
Circulation paths	The paths for movement are on either sides of the areas with pergolas, curio shops. Are wide enough on either sides for the users. Entirely paved throughout

Source: Authors, 2026

(a) (b) (c) (d)

FIGURE 3

a) Parked bicycles that are hired for riding, b) overhead lighting, paving and palm trees, c) variety of paving, storm water management, d) Concrete seats along wall of city hall building.

Source: Authors, 2026

(a) (b) (c) (d)

FIGURE 4

a) Frontage/entry of embarking building for shading during rains, open sitting areas, b) signage closing with bollards one of the roads formerly into car-free zone, c) Setcreasea pallida ground covers around tree base and paving around, d) wide walking areas on either side of the pergolas and sitting areas.

Source: Authors, 2026

(a) (b) (c) (d) (e)

FIGURE 5

a) Portable timber planters, b) Delonix regia tree that are establishing, c) Signage on bicycle riding within the walking paths, d) exposed sitting areas, e) Cypress species with concrete sitting areas along wall fence of one of the banks.

Source: Authors, 2026

Demographic Characteristics of Respondents

The respondents were requested to provide their demographic characteristics, and the results are presented in **Table 3.**

The demographic breakdown (**Table 3**) shows a gender distribution of 64.5% (n=118) for males and 35.5% (n=65) for females, depicting gender disparity among the study participants. The majority of respondents (86.3%) were at least 21 years of age and were considered mature enough to respond to the various questions sought in the study. The cross-tabulation between gender and respondents from the respective schools shows a significant association (χ^2=18.765; P-value=0.001<0.05). The majority of students (90.8%) indicated that they frequently visited the car-free zone either once a week or 2-5 times per week or 2-3 times per month, or once a month, implying that they felt a strong connection to this car-free zone. The study found a statistically significant difference in the frequency of visits to the car-free zone by the respondents from different schools (χ^2=29.79; P-value=0.02<0.05). The majority of respondents (86.4%) indicated that they spend at most 2 hours during their visit to the car-free zone, implying that the car-free zone is important to them and would therefore spare some time involving themselves in productive activities in the car-free zone; the study found a statistically significant difference in the duration of visits to the car-free zone by the respondents from different schools (χ^2=29.001; P-value=0.004<0.05). The majority of students (75.4%) indicated that they had known car-free zone since they joined the university campus, as opposed to since the car-free zone was opened to the public in 2021.

TABLE 3

Demographic characteristics of respondents

Characteristics	Percentages	X^2	P-value
Gender		18.765	0.001
Male	64.5%		
Female	35.5%		
Age		16.370	0.037
18–20 years	13.7%		
21–25 years	76.5%		
Over 25 years	9.8%		
Frequency of visit		29.794	0.02
Daily	9.3%		
Once a week	29%		
2–5 times per week	22.4%		

Characteristics	Percentages	X^2	P-value
2–3 times per month	11.5%		
Once a month	27.9%		
Duration of visit		29.007	0.004
< 1 hour	64.5%		
1–2 hours	21.9%		
2–4 hours	9.8%		
> 4 hours	3.8%		
Last visit		27.338	0.04
Within this week	26.2%		
Last week	26.8%		
Few weeks ago	22.4%		
Last month	10.4%		
A few months	14.2%		
Knowledge of car free zone		1.934	0.748
Since joining UR CST	47.5%		
Since 2021	52.5%		
In session visit to car free zone		30.450	0.000
Must	6.6%		
Always	23%		
Some times	70.5%		

Source: Authors, 2026

Relative Importance Ranking of Urban Public Space Values/Functions

The study sought to examine the relative mean importance of the six urban public space values/functions of the car-free zone using mean, standard deviation, and ranges to perform the rankings. The results are presented in **Table 4**.

Based on the rank values in **Table 4**, the mean importance scores for the six public space values in the study indicated that the respondents perceived air quality value, recreation value, and therapeutic values to be most important. Learning and economic values were considered the least important.

TABLE 4
Relative importance ranking of car-free zone functions/values

Value/functions	n	Mean	Standard deviation	Overall rank	Min.	Max.
Economic	183	3.53	1.20	5	1	5
Aesthetic	183	3.68	1.07	4	1	5
Recreation	183	3.74	1.06	2	1	5
Learning	183	3.45	1.14	6	1	5
Therapeutic	183	3.70	1.16	3	1	5
Air quality	183	3.96	1.05	1	1	5

Source: Authors, 2026

Relationship between Place Identity and Respondent's Variable

Bivariate correlation was done to determine the strength of the relationship between selected respondents' variables, namely frequency of visit to car-free zone, length of visit to car-free zone, knowledge of car-free zone, age and respondent's gender, summative scales of place identity. **Table 5** presents the results.

Table 5 indicates that the respondents who expressed knowledge of the car-free zone since they joined the university had an insignificantly higher place identity (r= -0.026; p-value=0.725>0.05). Respondents' age was found to have no statistically significant relationship with the summative scale for place identity (r= 0.05; p-value=0.538>0.05). Respondents' gender was found to have no statistically significant relationship with the summative scale for place identity (r= 0.04; p-value=0.824>0.05). The frequency of visit and the duration of visit was found to be significant for place identity.

Association between Scale Measures of Place Identity and Urban Public Space Values/ Functions

The relationship between scale-based measures of PI and urban public space values using multiple regression analysis was undertaken. The linear regression results for urban public space functions values against PI scale-based measures are presented in **Table 6.**

TABLE 5

Correlation between place identity and respondents' variables related to car-free zone usage

Variable	Correlation (r)	P-value	n
Visit Frequency to car-free zone	Pearson correlation r = -0.265**	0.000	183
Duration of visit to car-free zone	Pearson correlation r = -0.249**	0.001	183
Knowledge of car-free zone	Spearman rank (r = -0.026**)	0.725	183
Gender	Spearman rank (r = 0.040**)	0.824	183
Age	Spearman rank (r = 0.05**)	0.538	183

Note: ** P<0.001; 2-tailed sig.

Source: Authors, 2026

TABLE 6

Regression results for urban public space functions predicting place identity

Model Summary	**Value**			
Dependent Variable	Place identity			
R	0.368			
R^2	0.135			
F -statistic	4.59			
Significance (p-value)	0.000*			
Independent variables (Functions/values)	**β (Standardized Coefficient)**	**t-value**	**Tolerance**	**VIF**
Economic	-0.110	-1.560	0.755	1.325
Aesthetic	0.029	0.356	0.692	1.446
Recreation	0.355	4.560	0.776	1.288
Learning	-0.041	-0.507	0.717	1.395
Therapeutic	-0.062	-0.031	0.747	1.338
Air quality	0.079	0.974	0.747	1.338

Source: Authors, 2026

Notes:

- $p < 0.05$ indicates statistical significance.
- Recreation value is the only statistically significant predictor of place identity.
- The model explains 13.5% of the variance in place identity ($R^2 = 0.135$).
- Multicollinearity is not a concern (VIF < 5; Tolerance > 0.1).

Regression models were used to identify the urban public space values of the car-free zone that best predicted the scale-based measures of place identity, as determined by the magnitude of the standardized beta coefficients. The results of the regression models was statistically significant (P<0.05). Urban space values showed 13.5% of the variance in place identity. Recreation value was the strongest predictor based on the standardized beta coefficient. Economic value and learning value were insignificant predictors of place identity.

Exploratory Factor Analysis for PI Items for the Respondents

Principal factoring analysis with varimax rotation to determine the number of latent components that give a good fit for the latent constructs of PI items was undertaken. The results are presented in **Table 7**.

The correlation between each variable (survey question) and each factor indicated moderate positive correlation for all the items under the place identity as variables. The exploratory factor analysis extracted four components with eigenvalues ranging from 2.656 to 4.023. The communalities ranged from 0.654 to 0.826. This indicates that the extracted four factors explain a substantial portion of the variance in each variable. The variance in each variable is accounted for by the extracted factors, this suggest that the factors are effectively capturing the underlying structure of the data set. These high communalities suggest that the selected factors are a good fit for the variables.

DISCUSSION

Field Investigation

Several studies have shown that physical elements and image of a place influences the place identity (Strorie et al. 2019; Ujang, 2017). Ujang (2017) analyzed physical elements in terms of accessibility and legibility and the image in terms of legibility, distinctiveness, comfort, and safety/ security. Each of this attributes had elements of study under them. The physical connections to the landscape features that are both natural and built is important in PI formation. Other

TABLE 7

Exploratory factor analysis for place identity items

Constructs	Component	Factor Loading	Communalities	Eigenvalues	Cumulative % variance explained
Place Identity Items					
I have a lot of personal memories link to the car free zone	1	0.662	0.654	4.023	90.374
The car free zone is very special to me	2	0.555	0.778	3.940	94.315
I identify strongly with visiting the car free zone	3	0.373	0.826	3.029	97.344
The car free zone means a lot to me	4	0.339	0.747	2.656	100.00
Cronbach's alpha (0.783)					

Cronbach's alpha (0.783)

Source: Authors, 2026

KMO=0.879; Bartlett's test for Sphericity=0.000

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studies that have explored relationship of the local landscape characteristics to attachment within places include Liu et al. (2020). The description of the environment, emotional connections to the environment all contribute to PI formation.

Abu Bakar et al. (2016) found out that accessibility issues and poor image of place leads to a weaker attachment to the place. This affects the various physical elements. These authors opine that improvements that deal with issues of safety, comfort and easy circulation for pedestrians could increase that attractions and frequency of visits to such places and thus lead to stronger place attachments. It showed the importance of improving the landscape elements that were not in good state. This increases the aesthetics, legibility and thus encourage visitation and social interactions (Abu Bakar et al., 2016). Kigali CBDs car-free zone that initially was a street used by automobiles has several functions to play. Borrowing from street functions by Furchlehner et al. (2021) the area serves several aspects that touch on ecological, social, functional and economic. It fosters environmentally friendly non-motorized transport through bicycle rides, skating. It offers quality public space that is safe and accessible. It serves as part of the urban green corridor through the greenery that form the cities green infrastructure. It is a hub of social interactions besides being economically important through several services and goods from the businesses within the buildings that embark it.

According to Li et al. (2023) the 6 dimensions of perception evaluation include aesthetics (beautiful or unattractive), unique (ordinary or distinctive), pleasant (pleasant or unpleasant), natural (natural or artificial), historical (traditional or modern) and lastly safety (safe or dangerous). According to Lewicka (2008) PI principles include place distinctiveness, continuity and familiarity. Distinctiveness was introduced by Twigger-Ross and Uzzell (1996). It is a result of the awareness of the relationships between one's self and the existence of a place that is then considered as unique. Karami et al. (2014) posit that distinctiveness of urban spaces is a significant factor in creating place attachment in addition to having buildings and streets that are legible. This is supported by Liu et al. (2020) who showed that stronger local characteristics and distinctiveness exhibited by a given place resulted into stronger attachments for those places by the residents and users. This is contributed to by the landscape characteristics that includes landmarks. Lewicka (2008) further opines that continuity is when a person is capable of seeing the similarity between a place and himself in a way that the place reflects who he is. It has a connection to the element of time. According to Ujang and Zakariya (2015) continuity of a place is embedded in the memory. This is supported by K'oyoo and Breed (2024). This is however under threat from transformations of places e.g. urban renewals (K'oyoo, 2023; K'oyoo and Breed, 2023; 2024).

Demographic Characteristics of Respondents

Familiarity as a principle for PI explains the awareness of people's intimacy with places through the various activities and facilities found within it. Familiarity within the car-free zone is in terms of the physical environment elements and the overall image (Lewicka, 2008). Karsono et al. (2021) showed that the level of attachment was reflected by the memories, knowledge, and high level familiarity to a given place. This created long-term integration with such places. This is supports Karami et al. (2014) and Ayoola et al. (2019) who established that length of residence among the other demographic factors was the most influential in developing of place attachment. Higher length showed higher place attachments through the social and physical aspects of places (Karami et al., 2014; Ayoola et al. 2019). Ayoola et al. (2019) posit that little attention has been given to the physical aspects of places in attachment studies and that there is need for more investigation. Place identity as indicated earlier is a form of emotional attachment to a place and therefore car free zone had its users develop more PI with more familiarity over time.

Relative Importance Ranking of Urban Public Space Values/Functions

The implication of the findings is that good recreational, therapeutic, and air quality values may lead to high place dependence because people rely on them for exercise and leisure; all these 3 values/functions scored above the midpoint of the scale, indicating generally positive importance ratings and how much the students do rely on the urban public space to meet their varied needs or achieve their goals.

According to Abdelhamid et al. (2018) urban

design policies through car-free zones promotes physical activities such as walking and cycling that are encouraged for good human health besides reducing road accidents and deaths. The majority of the car-free zone respondents ranked air quality value, recreation value, and therapeutic values to be most important space values/functions of the car-free zone. The authors opine that high place values on these functions was because the students rely on the car-free zone for exercises and leisure activities during their free times away from studies.

Relationship between Place Identity and Respondent's Variable

Karsono et al. (2021) showed that frequent and continuous engagement with place contributed to familiarity. The long-term involvements developed then led to a sense of belonging. This is important in forming place identity with the place. The study showed that frequency of visit and the duration of visit was significant for place identity. The respondents linked their awareness and familiarity with the car-free zone with the frequency of visits and the durations of engagements. However, the study found a statistical insignificance difference in the knowledge of existence of car free zone by the respondents.

Zhang and Lei (2013) showed that people developed stronger attachments to everyday landscapes probably because of higher frequencies of use in these settings during their everyday lives. Earlier study by Williams and Vaske (2003) posited that physical characteristics of a place such proximity influence the frequency of visitation and this had an effect on the attachment to the place. These authors opine that visitation frequency, familiarity and the belief perceptions that a place was special led to increased identity and attachments. The respondents who expressed knowledge of car free zone since they joined the university had insignificant higher place identity. However, the relationship between frequency of visit and duration of visit was found to be significant for place identity despite weak association. Gender and age of respondents were found to have no statistically significant relationship with summative scale for place identity.

Association between Scale Measures of Place Identity and Urban Public Space Values/ Functions

The regression findings show that some urban public space values/functions contribute more to place identity than others. Recreation value emerged as the strongest predictor of place identity. This suggests that the way students use the space for leisure and activity may be important in shaping emotional attachment and identity with the car-free zone. The relatively low explained variance also suggests that other factors not captured in the regression model may contribute to place identity.

Exploratory Factor Analysis for PI Items for the Respondents

The factor analysis findings show that the selected PI items capture substantial variance in the measured construct. The moderate factor loadings and high communalities suggest that the items are relevant for explaining place identity among the respondents. However, the statement on cumulative variance explained reaching 100% should be interpreted with caution and clearly presented in line with the factor extraction procedure used.

CONCLUSION

Kigali's car-free zone as part of the urban open spaces plays an important role in shaping the city's identity through landscape urbanism that leads to urban sustainability through the various landscape functions it offers. The study aimed first to analyze the functions of the space, second to analyze the physical elements and image of the space and lastly to investigate perceptions on PI. The implications of the findings show that visitation frequency is important in developing PI within the car-free zone as a public open space, and that various users attach different landscape values to the car-free zone as the reason for visit that then leads to PI. The study draws a conclusion that user visitation frequency, length of visitation, and reasons for visitation are influenced by the landscape elements, spaces and amenities that are provided by a given place hence leading to development of PI and attachments.

The study limitation was first in terms of only eliciting views of students without the general city residents or users within the car-free zone. The second limitation was that interviews that would elicit further insights into PI issues of the car-free zone were not included in data collection. Future studies should explore the use of interviews and

include a variety of users to this public space. The findings ventilate on the importance of considering both the functional values of landscape, the physical elements, image and the emotional connections that users form with the car-free zone. By understanding these relationships, urban place makers, keepers and policymakers can create and maintain people-centered public spaces that foster stronger attachments and enhance place identities and thus contribute to better urbanism within the public landscapes.

RECOMMENDATIONS

The following recommendations are suggested based on management, planning and design, and policy considerations, including the responsible stakeholders and timing of actions.

Management

i. Improve the quality of both new and existing amenities in order to increase vitality and foster the continuity of various landscape values. This should be an immediate and continuous undertaking by the City of Kigali.
ii. Check and control vandalism of the litter bins and timber planters that are important to the urban space. The City of Kigali should regularly ensure that the landscape elements are secure.
iii. Regularly plan and hold more public activities of leisure and recreation in the open area to attract more people and popularize this public space.
iv. Ensure good maintenance in terms of cleanliness and regular upkeep throughout the year to increase usability of the various landscape elements and spaces for the wellbeing of the users.

Planning and Design

i. Re-evaluate and replace the greenery in terms of planters. The plants should be properly selected and nurtured through maintenance to avoid their failure in getting fully established. The City of Kigali should immediately undertake monitoring and evaluation of the greenery to ensure proper establishment.

Policy

i. Inventory the best practices of this public urban space and include the planning and design metrics for the various landscape spaces and elements within spatial planning and design by-laws to protect the space.
ii. Involve the public in the aspects of planning and management of the car-free zone in order to elicit views important in fostering acceptance, dependence, identity and attachments to this public space.

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