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Appraisal of Landscape Design Attributes and Park Security of Selected Recreational Parks in Lagos State, Nigeria

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This study examined the relationship between landscape design attributes and park security in selected recreational parks in Lagos State, Nigeria. Guided by Crime Prevention Through Environmental Design (CPTED) principles, the study assessed natural surveillance, territorial reinforcement, access control, and target hardening attributes using a mixed-method approach comprising observation, user surveys (N = 423), and expert evaluations (n = 12). Descriptive statistics and Chi-square analysis were employed for data analysis. Findings revealed that landscape security attributes across the parks were moderately effective, with access control demonstrating relatively stronger performance compared to other components. Users' perceptions indicated statistically significant associations ($p < 0.05$) between landscape design elements and perceived safety, particularly natural surveillance, maintenance quality, and lighting adequacy. Expert assessments further emphasized the importance of improved lighting, vegetation control, defined pedestrian pathways, and CCTV surveillance in enhancing security performance. However, disparities in infrastructural investment and maintenance consistency were observed across parks. The study concludes that while CPTED principles are partially integrated within Lagos recreational parks, more systematic and holistic implementation is required to optimize crime prevention outcomes. The findings contribute to urban design and park management discourse by highlighting the critical role of landscape planning in promoting safer public recreational environments in rapidly urbanizing cities.

Keywords: Landscape Design; Park Security; Crime Prevention Through Environmental Design (CPTED); Recreational Parks; Urban Safety; Lagos State, Nigeria.

Introduction

Urban parks occupy a paradoxical position in contemporary cities. On one hand, they are widely recognized as essential public spaces that promote physical health, social interaction, environmental quality, and psychological well-being (Annerstedt *et al*., 2012; Basu & Nagendra, 2021; National Recreation and Park Association, 2021). On the other hand, they are frequently associated with concerns about crime, disorder, and fear, particularly when design, management, and surveillance are inadequate (Mak & Jim, 2022; Marquet *et al*., 2020). This tension is especially pronounced in rapidly urbanizing contexts where park provision and maintenance struggle to keep pace with population growth. As Lagos continues to expand as a mega-city (Chidi & Badejo, 2024), the role of recreational parks as safe and inclusive public spaces becomes increasingly critical.

Parks are not merely aesthetic amenities; they are shared urban territories characterized by fluid boundaries, diverse user groups, and varying temporal patterns of use. Their openness, while central to their democratic character can also create opportunities for crime if spatial design does not support visibility, territorial clarity, and informal supervision (Cozens & Love,

2021; Marzbali *et al*., 2021). Empirical studies demonstrate that park features such as vegetation density, pathway configuration, lighting quality, and spatial enclosure significantly influence both actual crime occurrence and perceived safety (Feng & Tan, 2022; Foster & Giles-Corti, 2022; Chen, 2024). In addition, the presence or absence of maintenance and clear territorial cues can shape users' interpretation of safety and control (Lee & Kim, 2021; O'Neill *et al*., 2023).

In the Nigerian context, research has shown that safety concerns directly affect park usage and social interaction (Odufuwa *et al*., 2019; Akinlabi *et al*., 2022). When parks are perceived as unsafe, their social and health benefits are undermined. Yet, much of the existing literature treats safety either as a policing issue or as a general social problem, rather than as a spatial and landscape design challenge. This creates the need to re-centre park safety within the domain of environmental design.

Crime Prevention Through Environmental Design (CPTED) provides a structured framework for addressing safety through physical and spatial interventions. CPTED emphasizes natural surveillance, access control, territorial reinforcement, and maintenance as mechanisms for reducing opportunities for crime (International CPTED Association, 2023; Cozens *et al*., 2021). Unlike situational crime prevention alone which broadly focuses on reducing criminal opportunities through managerial or target-hardening measures (Chen, Liu, & Zhang, 2020) CPTED explicitly integrates environmental design as a preventive strategy embedded within the physical fabric of space.

This distinction is particularly relevant for recreational parks. Parks are landscape-dominated environments where vegetation layout, sightlines, lighting, pathway networks, and spatial zoning directly affect visibility and user interaction. Studies have shown that park visibility, vegetation management, and lighting design significantly influence perceived and actual safety (Feng & Tan, 2022; Lis & Iwankowski, 2021; Foster & Giles-Corti, 2022). Furthermore, longitudinal evaluations of CPTED-based interventions in park settings demonstrate measurable improvements in safety perception and reductions in crime-related concerns (Cozens, Hillier, & Prescott, 2021).

However, existing CPTED applications have largely emerged from Western urban contexts characterized by relatively stable maintenance regimes, stronger institutional capacity, and different socio-cultural usage patterns. The transferability of these principles to high-density, infrastructure-constrained cities requires critical examination. Simply importing CPTED without contextual adaptation risks overlooking local dynamics of park use, informal activities, and resource limitations.

Lagos presents a distinct urban context. It is one of Africa's fastest-growing mega-cities, with intense population density, mixed land uses, and uneven infrastructure provision (Chidi & Badejo, 2024). Recent state-level reports indicate persistent crime concerns across key districts, including areas with high recreational and commercial activity (Lagos State Government, 2024; Lagos State Government, 2025). Public perception surveys also reveal ongoing anxieties regarding safety in urban environments (CLEEN Foundation, 2023; Numbeo, 2025). While these statistics are not park-specific, they underscore the broader urban security climate within which recreational parks operate.

Local studies have begun to explore park safety in Lagos (Ajayi *et al*., 2020; Adegun & Taiwo, 2020; Adeoye & Lawal, 2023). These studies acknowledge links between park design and user safety perception. Nevertheless, three critical gaps remain. First, existing research often evaluates safety descriptively without systematically assessing specific landscape design attributes such as natural surveillance, access control, and territorial reinforcement in an integrated framework. Second, CPTED principles are frequently referenced but rarely operationalized through

structured empirical measurement within Lagos parks. Third, fear of crime is commonly discussed as a general sentiment rather than analytically examined as a measurable outcome linked to environmental characteristics. In this study, fear of crime is treated as an outcome variable operationalized through perceived safety indices and user assessments, while landscape design attributes function as explanatory variables influencing that perception. This distinction clarifies the analytical direction of the research and strengthens its methodological coherence.

Despite growing international evidence that park design influences safety outcomes, there remains a limited empirical evaluation of how specific landscape design strategies function within recreational parks in Lagos State. More importantly, there is insufficient critical interrogation of whether and how CPTED principles require contextual adaptation in dense, resource-constrained urban environments. This study addresses that gap by systematically evaluating landscape design strategies, natural surveillance, access control, territorial reinforcement, target hardening, and maintenance and examining their relationship with crime perception and security performance in selected recreational parks in Lagos State. By doing so, it moves beyond descriptive accounts of park safety and provides an evidence-based assessment of how environmental design can contribute to crime prevention within a rapidly urbanizing African mega-city. In essence, the study responds directly to the central problem: how can landscape design strategies be evaluated and optimized to enhance crime prevention and perceived safety in recreational parks in Lagos State? By foregrounding parks, landscape design, and the Lagos context, the research establishes a focused and contextually grounded contribution to urban safety scholarship.

Literature Review

CPTED Principles in Recreational Parks

Crime Prevention Through Environmental Design (CPTED) provides a design-oriented framework for reducing opportunities for crime by shaping the physical environment (Atlas, 2020; International CPTED Association, 2023). Contemporary reviews show that CPTED remains central to park safety planning, particularly where environmental modification is more feasible than intensive policing (Cozens & Love, 2021; Marzbali *et al*., 2021).

Rather than functioning as isolated measures, CPTED principles operate interdependently. Natural surveillance improves visibility; access control regulates movement; territoriality communicates ownership; and maintenance reinforces social order. Evidence suggests that parks implementing multiple CPTED components simultaneously report stronger improvements in perceived and actual safety than those applying single interventions (Cozens, Hillier, & Prescott, 2021; Chen *et al*., 2021).

Natural Surveillance

Natural surveillance refers to the design of spaces to maximize visibility and informal observation (Newman, 1973; Cozens & Love, 2021). In park environments, this includes clear sightlines, appropriate lighting, controlled vegetation height, and the strategic placement of seating and activity nodes (Feng & Tan, 2022; Foster & Giles-Corti, 2022).

Empirical findings consistently indicate that visibility is strongly associated with perceived safety. Lis and Iwankowski (2021) demonstrate that users prefer locations where they can see and be seen without compromising privacy. Similarly, Mak and Jim (2022) found that both environmental openness and user presence significantly influence safety perceptions. When vegetation blocks sightlines or lighting is insufficient, users report higher fear levels and reduced visitation (Lee,

2022; Chen, 2024). Thus, natural surveillance functions both as a physical deterrent and a psychological reassurance mechanism in recreational parks.

Access Control

Access control involves regulating entry, exit, and movement patterns to reduce unauthorized or risky use (Atlas, 2020; Kubalova & Loveček, 2023). In parks, this may include defined entrances, pathway hierarchy, fencing, signage, and spatial zoning.

Studies show that clearly organized circulation systems reduce ambiguity and limit opportunities for concealment or escape (Chen *et al*., 2020). Loukaitou-Sideris and Wong (2020) emphasize that access management in specialized recreational facilities reduces vulnerability to opportunistic crime. When entrances are undefined or poorly monitored, crime risks tend to increase due to uncontrolled movement and limited accountability (Nwokoro & Onukwube, 2022). Effective access control, therefore contributes to both risk reduction and enhanced user confidence in park environments.

Territoriality

Territorial reinforcement communicates ownership and signals that a space is monitored and valued (Newman, 1973; O'Neill, Tilley, & Beck, 2023). In recreational parks, territorial cues may include signage, landscaping boundaries, distinct activity zones, and visible management presence. Research indicates that clearly defined spaces promote normative behavior and discourage disorder (Marzbali *et al*., 2021). Johnson *et al*. (2021) link territorial markers to increased informal social control, as users feel a stronger sense of responsibility toward well-demarcated spaces. Where territorial cues are weak or absent, ambiguity can undermine accountability and increase fear (Adegun & Taiwo, 2020).

Territoriality, therefore reinforces both social cohesion and behavioural expectations within park settings.

Maintenance and Image

Maintenance is closely associated with the symbolic dimension of safety. Well-maintained parks communicate care, oversight, and active management, while visible neglect may signal vulnerability (Lee & Kim, 2021; Mark & Jim, 2022). Evidence from urban green space research demonstrates that regular cleaning, repair of damaged facilities, and vegetation management significantly improve user perceptions of safety (Chen, 2024; Mak & Jim, 2022). Conversely, signs of deterioration, litter, or vandalism contribute to fear and avoidance behaviors (Odeku & Rudolf, 2019). Maintenance, therefore functions as a continuous reinforcement mechanism, sustaining the effectiveness of other CPTED measures and supporting long-term security outcomes.

Landscape–Security Relationship in Recreational Parks

Beyond individual CPTED principles, a growing body of literature highlights the broader relationship between landscape characteristics and crime outcomes. Landscape configuration, including vegetation density, spatial openness, pathway layout, and land-use adjacency, directly influences both surveillance capacity and user movement patterns (Feng & Tan, 2022; Paydar, Fard, & Navarrete, 2023). Studies demonstrate that parks with balanced vegetation design providing shade without obstructing sightlines are associated with higher usage and lower fear (Oyebanji & Adebayo, 2022; Chen, 2024). Similarly, mixed-use activity nodes and diverse user presence contribute to informal guardianship and perceived safety (Bahriny & Bell, 2020; Johnson *et al*., 2021).

Importantly, empirical evaluations reveal that safety perception is not solely dependent on crime statistics but is strongly shaped by environmental cues (Mak & Jim, 2022; Ortiz-Brunel, 2025). Landscape design thus operates at the intersection of physical risk reduction and psychological reassurance. Collectively, the literature establishes that well-designed recreational parks integrate visibility, structured

circulation, territorial cues, and consistent maintenance. These environmental attributes interact to influence both crime occurrence and safety perception, underscoring the central role of landscape design in urban park security.

Theoretical Integration

This study is theoretically anchored in a light integration of three complementary perspectives: **Crime Prevention Through Environmental Design (CPTED), Routine Activity Theory,** and **Broken Windows Theory**. Rather than treating these as separate explanatory models, the study adopts them as mutually reinforcing lenses for understanding crime prevention in recreational parks.

First, Crime Prevention Through Environmental Design **(CPTED)** provides the primary environmental framework. CPTED emphasizes that the physical design of spaces, lighting, visibility, access organization, territorial definition, and maintenance can reduce opportunities for crime. In park environments, these principles translate into clear sightlines, defined pathways, functional lighting systems, and spatial zoning that enhances natural surveillance and discourages concealment. However, while CPTED focuses strongly on physical interventions, it does not fully account for the social dynamics that influence how spaces are used in patterns (Feng & Tan, 2022).

To complement this, the study integrates Routine Activity Theory, which explains crime as occurring when three elements converge: a motivated offender, a suitable target, and the absence of a capable guardian. In recreational parks, design features influence the presence or absence of guardianship. Active park usage, family activities, and community programs increase informal surveillance, thereby strengthening guardianship and reducing opportunities for opportunistic offences such as theft or vandalism (Johnson *et al*., 2021). Thus, landscape design and user behavior are directly interconnected. Additionally, Broken Windows Theory provides insight into the importance of maintenance and image. This theory posits that visible sign of disorder such as vandalism, litter, broken facilities, or neglected vegetation can signal weak social control and invite further deviant behavior (Mak & Jim, 2022). In the context of Lagos recreational parks, irregular maintenance may amplify perceptions of insecurity even where serious crime levels are low. Conversely, consistent upkeep reinforces perceptions of oversight and order. By integrating these three perspectives lightly rather than exhaustively, the study establishes a balanced conceptual foundation:

1. **CPTED explains** how physical design can reduce opportunity**.**
2. **Routine Activity Theory explains** how user presence and guardianship influence crime occurrence**.**
3. **Broken Windows Theory explains** how maintenance and environmental image affect behavior and perception**.**

Together, these theories support a multidimensional understanding of crime prevention in Lagos State recreational parks. The integration remains intentionally light to avoid theoretical redundancy while ensuring that environmental, social, and managerial dimensions of park safety are conceptually grounded.

Methodology

This study adopted a cross-sectional survey research design to examine the relationship between landscape design characteristics, management practices, and perceived crime prevention outcomes in selected recreational parks in Lagos State. The design enabled the collection of data at a single point in time without manipulation of variables, making it suitable for investigating environmental attributes and user perceptions where the objective was to establish associations rather than causal relationships. The target population comprised all eighteen formal recreational parks in Lagos State, including fourteen government-owned and four privately managed parks. From this population, nine parks were purposively selected based on representativeness criteria, including ownership structure, geographic

distribution across Local Government Areas, park typology (Neighbourhood, Special-Use, and Pocket Parks), spatial scale, user density, accessibility, and operational status, thereby capturing approximately 50% of the total park system and reflecting institutional and spatial diversity. The minimum sample size was determined using Cochran's formula for large populations at a 95% confidence level and 4.5% margin of error, producing 475 respondents, which was adjusted for a 10% non-response rate to 528 and subsequently increased to 540 to ensure balanced representation, with 60 respondents selected from each park. Sampling was conducted in two stages: purposive selection at the park level and systematic intercept sampling at the user level during peak and off-peak periods to ensure proportional representation across gender, age groups, and frequency of park use. Primary quantitative data were collected through structured questionnaires comprising mainly close-ended items, including Likert-scale and categorical formats, covering perceptions of landscape design features such as lighting, visibility, access control, and pathways; maintenance and management conditions; patterns of park usage; and perceived safety and observed crime occurrences. Structured field observations were also conducted to objectively assess physical design and environmental characteristics of each park, allowing triangulation between perceived and observed conditions. Instrument validity was established through expert review by specialists in landscape architecture and urban planning, alignment with Crime Prevention Through Environmental Design (CPTED) principles and environmental criminology constructs, and a pilot study conducted outside the main sample to refine clarity and relevance. Reliability was assessed using Cronbach's Alpha, which yielded a coefficient of 0.88, indicating high internal consistency, while observational data were systematically coded to ensure measurement consistency. Data were analyzed using SPSS version 27, employing descriptive statistics to summarize socio-demographic characteristics, park usage patterns, safety perceptions, and design evaluations, and the Chi-square test of independence to examine associations between socio-demographic variables and perceived park safety, with results presented using tables, charts, and graphical summaries for interpretability.

Results

Assessment of Environmental Attributes in Recreational Parks

This section presents objective observations of park design features based on structured field assessments. Table 1 a – 1d present observation rating of the physical characteristics of the landscape elements in the recreational parks by CPTED indicators.

The findings presented in Table 1a indicate that natural surveillance attributes across the selected recreational parks are moderately effective in supporting security outcomes, with an overall mean score of 3.13. This suggests that while surveillance-related design elements are present, their effectiveness varies across parks. Signage and wayfinding recorded the highest mean rating (3.29), implying relatively clearer spatial orientation that may enhance user awareness and territorial legibility. Viewscapes and sightlines (3.18) and lighting adequacy (3.14) were rated as fairly adequate, indicating that most parks provide reasonable visibility conditions that can deter opportunistic crime. However, vegetation height and density recorded the lowest mean score (2.96), reflecting weaknesses in landscape maintenance that may obstruct visibility and reduce informal surveillance. Variations across park codes further reveal disparities in environmental quality, with parks such as AAP and ORP demonstrating stronger surveillance attributes compared to NKP and RJP. In relation to the study's focus on landscape design and crime prevention in recreational parks, these findings suggest that although natural surveillance principles are partially integrated within Lagos parks, inconsistencies in vegetation management and lighting quality may limit their full crime deterrence potential.

Table 1a: Mean Rating of Natural Surveillance Attributes Across Parks in Relation to Effective Security

Natural Surveillance Indicators	NKP	DOAFP	MOP	SP	RJP	GFP	BRP	AAP	ORP	Mean Rating	Remark
Lighting adequacy	2.4	3.3	3.2	3.0	2.6	2.8	2.9	3.9	4.1	**3.14**	Fairly adequate
Viewscapes / Sightlines	2.3	3.4	3.3	3.2	2.7	2.9	3.0	3.8	4.0	**3.18**	Moderately clear
Seating visibility	2.5	3.1	3.2	3.0	2.8	2.9	3.0	3.7	4.0	**3.13**	Partially visible
Vegetation height/density	2.2	3.0	3.1	2.8	2.5	2.7	2.8	3.6	3.9	**2.96**	Poorly managed
Noise level (low = safer)	2.8	3.2	3.3	3.0	2.9	3.1	3.0	3.7	3.8	**3.09**	Moderately low
Signage / Wayfinding	2.7	3.3	3.4	3.2	3.0	3.1	3.0	3.8	4.1	**3.29**	Fairly clear
Overall Mean (Natural Surveillance)	**2.5**	**3.2**	**3.3**	**3.0**	**2.8**	**2.9**	**2.9**	**3.8**	**4.0**	**3.13**	Moderately effective

Source: Field Observation, 2025; **Park Codes:** NKP – Ndubuisi Kanu Park; DOAFP – Dr. Oluyomi Abayomi Finnih Park; MOP – Muri Okunola Park; SP – Skate Park; RJP – Rafiu Jafojo Park; GFP – Gani Fawehinmi Park; BRP – Badagry Recreational Park; AAP – Apapa Amusement Park; ORP – Omu Resort Park. and **Rating Scale:** 1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Excellent

The results presented in Table 1b show that territorial reinforcement attributes across the selected recreational parks are moderately effective, with an overall mean score of 3.20. This indicates that most parks demonstrate visible efforts to establish territorial identity and spatial ownership, though with varying degrees of strength. Civic symbols and public art recorded the highest mean rating (3.36), suggesting that symbolic elements contribute positively to place identity and perceived legitimacy of space. Signage and branding identity (3.28) as well as formal entrances and gateways (3.24) were also rated moderately clear, indicating that spatial demarcation and entry definition are generally present. However, stewardship and sense of ownership (3.11) and management presence/security staff (3.08) received comparatively lower ratings, reflecting weaker institutional and social reinforcement of territorial control. Parks such as AAP and ORP consistently recorded higher scores across indicators, whereas NKP and RJP showed relatively lower performance. In relation to the study's focus on landscape design and crime prevention in recreational parks, these findings suggest that while territorial reinforcement principles are visibly integrated within Lagos parks, inconsistencies in management presence and perceived ownership may limit their full capacity to deter crime and strengthen informal social control.

The findings presented in Table 1c indicate that access control attributes across the selected recreational parks are moderately clear and relatively stronger compared to other CPTED components, with an overall mean score of 3.44. Defined entry points (3.53) and perimeter fencing/barriers (3.58) recorded comparatively high ratings, suggesting that most parks exhibit visible boundary control mechanisms that regulate movement and reinforce spatial order. Pedestrian and vehicular segregation (3.49) and lighting at entrances and exits (3.47) were also rated fairly prominent, reflecting deliberate design measures that enhance controlled access and improve user safety, particularly during transitional periods such as evening hours. However, surveillance cameras (CCTV) recorded a lower mean score (3.28), indicating limited technological reinforcement of access control across several parks. Notably, parks such as AAP and ORP consistently demonstrated higher ratings across all indicators, whereas NKP and BRP recorded comparatively lower values, highlighting disparities in infrastructural investment and management intensity. In relation to the study's focus on landscape design and crime prevention in recreational parks, these findings suggest that while physical access regulation mechanisms are visibly integrated within many Lagos parks, uneven

implementation of surveillance technologies and gate-level security may constrain the overall effectiveness of access control strategies in reducing crime opportunities.

The results presented in Table 1d indicate that target hardening attributes across the selected recreational parks are moderately effective, with an overall mean score of 3.22. Security lighting along perimeters and pathways recorded the highest mean rating (3.42), followed by lighting maintenance and reliability (3.36), suggesting that illumination remains the most consistently applied hardening strategy across the parks. Perimeter fencing quality (3.33) and protective barriers such as guardrails and bollards (3.21) were rated moderately secure, reflecting visible but uneven physical reinforcement of park boundaries. However, vandal-resistant fixtures (3.00) and CCTV/electronic surveillance systems (3.02) received comparatively lower ratings, indicating limited integration of durable materials and technological monitoring systems in several parks. Significant disparities were observed across locations, with AAP and ORP demonstrating stronger target hardening measures, while NKP and BRP recorded relatively weaker performance. In relation to the study's focus on landscape design and crime prevention in recreational parks, these findings suggest that although physical security reinforcements are present within Lagos parks, inconsistencies in technological surveillance and material durability may constrain the full effectiveness of target hardening strategies in reducing crime risks and enhancing long-term safety resilience.

Table 1b: Mean Rating of Territorial Reinforcement Attributes Across Parks

Territorial Reinforcement Indicators	NKP	DOAFP	MOP	SP	RJP	GFP	BRP	AAP	ORP	Mean Rating	Remark
Formal Entrances and Gateways	2.7	3.3	3.4	3.1	2.8	3.0	2.9	3.8	4.2	3.24	Moderately clear
Signage and Branding Identity	2.6	3.2	3.5	3.2	2.9	3.1	3.0	3.9	4.1	3.28	Fairly visible
Edge Definition and Boundaries	2.5	3.1	3.3	3.0	2.8	3.0	2.9	3.7	4.0	3.15	Partially defined
Civic Symbols / Public Art	2.8	3.4	3.5	3.1	3.0	3.3	3.0	3.9	4.3	3.36	Fairly prominent
Stewardship and Sense of Ownership	2.4	3.1	3.3	3.0	2.7	2.9	2.8	3.8	4.0	3.11	Weak ownership
Management Presence and Security Staff	2.5	3.2	3.4	3.1	2.9	3.0	2.8	3.7	4.1	3.08	Limited presence
Overall Mean (Territorial Reinforcement)	**2.58**	**3.22**	**3.40**	**3.08**	**2.85**	**3.05**	**2.90**	**3.80**	**4.12**	**3.20**	Moderately effective

Source: Field Observation, 2025; **Park Codes:** NKP – Ndubuisi Kanu Park; DOAFP – Dr. Oluyomi Abayomi Finnih Park; MOP – Muri Okunola Park; SP – Skate Park; RJP – Rafiu Jafojo Park; GFP – Gani Fawehinmi Park; BRP – Badagry Recreational Park; AAP – Apapa Amusement Park; ORP – Omu Resort Park. and **Rating Scale:** 1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Excellent

Table 1c: Mean Rating of Access Control Attributes Across Parks

Access Control Indicators	NKP	DOAFP	MOP	SP	RJP	GFP	BRP	AAP	ORP	Mean Rating	Remarks
Defined Entry Points	3.0	3.6	3.8	3.2	3.0	3.4	2.9	4.3	4.6	**3.53**	Moderately clear
Perimeter Fencing / Barriers	3.1	3.6	3.7	3.3	3.1	3.4	3.0	4.4	4.6	**3.58**	Fairly visible
Security Presence at Gates	2.9	3.5	3.7	3.0	2.9	3.3	2.8	4.2	4.5	**3.42**	Partially defined
Lighting at Entrances and Exits	3.0	3.4	3.6	3.1	3.0	3.4	2.9	4.3	4.5	**3.47**	Fairly prominent
Surveillance Cameras (CCTV)	2.8	3.2	3.5	2.9	2.7	3.1	2.6	4.2	4.5	**3.28**	Weak ownership
Pedestrian and Vehicular Segregation	3.2	3.6	3.8	3.3	3.1	3.4	3.0	4.4	4.6	**3.49**	Limited presence
Emergency Access Provision	3.0	3.3	3.5	3.1	2.9	3.3	2.8	4.2	4.5	**3.29**	Moderately effective
Overall Mean (Access Control)	**3.00**	**3.46**	**3.66**	**3.13**	**2.96**	**3.33**	**2.86**	**4.29**	**4.54**	**3.44**	Moderately clear

Source: Field Observation, 2025; **Park Codes:** NKP – Ndubuisi Kanu Park; DOAFP – Dr. Oluyomi Abayomi Finnih Park; MOP – Muri Okunola Park; SP – Skate Park; RJP – Rafiu Jafojo Park; GFP – Gani Fawehinmi Park; BRP – Badagry Recreational Park; AAP – Apapa Amusement Park; ORP – Omu Resort Park. and **Rating Scale:** 1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Excellent

Table 1d: Mean Rating of Target Hardening Attributes Across Parks

Target Hardening Indicators	NKP	DOAFP	MOP	SP	RJP	GFP	BRP	AAP	ORP	Mean Rating	Remark
Perimeter Fencing Quality and Integrity	2.7	3.3	3.5	3.0	2.9	3.1	2.8	4.2	4.5	**3.33**	Moderately secure
Security Lighting (Perimeter and Paths)	2.8	3.2	3.6	3.1	3.0	3.3	2.9	4.3	4.6	**3.42**	Fairly effective
Guardrails / Bollards / Barriers	2.6	3.1	3.3	2.9	2.8	3.0	2.7	4.1	4.4	**3.21**	Partially protective
Use of Vandal-resistant Fixtures	2.5	3.0	3.2	2.8	2.7	2.9	2.6	4.0	4.3	**3.00**	Minimally durable
CCTV / Electronic Surveillance	2.4	2.9	3.0	2.6	2.5	2.8	2.4	4.1	4.5	**3.02**	Moderately monitored
Lighting Maintenance and Reliability	2.8	3.3	3.5	3.0	2.9	3.2	2.8	4.2	4.5	**3.36**	Fairly reliable
Overall Mean (Target Hardening)	**2.63**	**3.13**	**3.35**	**2.90**	**2.80**	**3.05**	**2.70**	**4.15**	**4.47**	**3.22**	Moderately effective

Source: Field Observation, 2025; **Park Codes:** NKP – Ndubuisi Kanu Park; DOAFP – Dr. Oluyomi Abayomi Finnih Park; MOP – Muri Okunola Park; SP – Skate Park; RJP – Rafiu Jafojo Park; GFP – Gani Fawehinmi Park; BRP – Badagry Recreational Park; AAP – Apapa Amusement Park; ORP – Omu Resort Park. and **Rating Scale:** 1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Excellent

Users' Perception of Landscape Design and Safety

The findings presented in Table 2 demonstrate that users perceive landscape design elements as significantly influencing park security across the selected recreational parks. Natural surveillance recorded the highest mean score (M = 4.02, SD = 0.89), with over 73% of respondents rating it as either highly effective or effective, underscoring the importance of visibility, openness, and clear sightlines in enhancing perceived safety. Maintenance quality (M = 3.98, SD = 0.90) and lighting adequacy (M = 3.89, SD = 0.95) were also strongly rated, indicating that well-maintained environments and adequate illumination contribute substantially to users' sense of security. Access control (M = 3.89, SD = 0.94) and territorial reinforcement (M = 3.83, SD = 0.91) similarly received positive evaluations, suggesting that defined entry points, fencing, signage, and ownership cues reinforce perceptions of order and control. Importantly, the Chi-square results show statistically significant associations ($p < 0.05$) across all design elements, confirming that these landscape attributes are not perceived as incidental but are meaningfully related to security outcomes. In relation to the study's focus on landscape design and crime prevention in recreational parks, the results highlight that users recognize CPTED-based design strategies particularly visibility, maintenance, and controlled access as critical contributors to safer park environments in Lagos State.

Table 2: Users' Assessment of Landscape Design Elements Influencing Park Security

Design Element	Highly Effective F(%)	Effective F(%)	Moderately Effective F(%)	Ineffective F(%)	Not EffectiveF (%)	Mean	SD	χ^2	p-value	Remark
Natural Surveillance (visibility, openness, sightlines)	173 (41.0)	137 (32.3)	73 (17.3)	27 (6.3)	13 (3.0)	4.02	0.89	12.327	0.032	S
Access Control (entry points, fencing, pathways)	143 (33.7)	158 (37.3)	76 (18.0)	30 (7.0)	17 (4.0)	3.89	0.94	14.229	0.027	S
Territorial Reinforcement (signage, space definition, ownership cues)	126 (29.7)	166 (39.3)	80 (19.0)	33 (7.7)	18 (4.3)	3.83	0.91	11.452	0.041	S
Lighting Adequacy (illumination, visibility at night)	151 (35.7)	144 (34.0)	76 (18.0)	33 (7.7)	18 (4.3)	3.89	0.95	10.834	0.035	S
Maintenance Quality (cleanliness, repair, landscape care)	159 (37.7)	152 (36.0)	68 (16.0)	30 (7.0)	13 (3.0)	3.98	0.90	9.214	0.041	S
Total (N = 423)										

Source: Field Survey, 2025. S = Significant, NS = Not Significant at $p < 0.05$.

Experts' Assessment of Design Interventions

The findings presented in Table 3 indicate that experts strongly affirm the relevance of landscape-based design interventions in enhancing security performance across recreational parks. All assessed strategies recorded high mean scores (M = 4.00–4.33) and statistically significant Chi-square values ($p < 0.05$), demonstrating consensus among park managers and LASPARK officials regarding their importance for crime prevention. CCTV and park management presence ranked highest (M = 4.33, SD = 0.72), followed closely by improved lighting and visibility (M = 4.25, SD = 0.77), highlighting the critical role of both technological surveillance and illumination in deterring criminal opportunities. Vegetation control for clear sightlines (M = 4.17) and defined pedestrian pathways and entry zones (M = 4.08) were also rated highly, reinforcing the value of spatial clarity and controlled movement in strengthening natural surveillance and access regulation. Strategic seating and gathering areas (M = 4.00) further underscore the role of planned activity zones in promoting legitimate use and informal social control. In relation to the study's focus on landscape design and crime prevention in recreational parks, these results demonstrate strong professional endorsement of CPTED-aligned interventions, aligning closely with users' perceptions and emphasizing the need for integrated design, maintenance, and management strategies to enhance park safety in Lagos State.

Table 3: Experts' Assessment of Design Interventions and Security Performance

Design Strategy	Very Relevant F(%)	Relevant F(%)	Moderately Relevant F(%)	Irrelevant F(%)	Mean	SD	χ^2	p-value	Remark
Improved lighting and visibility	6 (50.0)	4 (33.3)	1 (8.3)	1 (8.3)	4.25	0.77	7.842	0.031	S
Vegetation control for clear sightlines	5 (41.7)	5 (41.7)	1 (8.3)	1 (8.3)	4.17	0.81	8.415	0.028	S
Defined pedestrian pathways and entry zones	5 (41.7)	4 (33.3)	2 (16.7)	1 (8.3)	4.08	0.80	9.276	0.033	S
Strategic seating and gathering areas	4 (33.3)	5 (41.7)	2 (16.7)	1 (8.3)	4.00	0.84	10.024	0.027	S
CCTV and park management presence	6 (50.0)	4 (33.3)	1 (8.3)	1 (8.3)	4.33	0.72	11.536	0.022	S

•Source: Field Expert Survey, 2025. S = Significant at $p < 0.05$. (n = 12 experts: park managers and LASPARK officials.)

Discussion of Findings

The findings of this study provide empirical support for the central proposition that landscape design strategies significantly influence crime prevention outcomes in recreational parks in Lagos State. Across the four CPTED components assessed natural surveillance, territorial reinforcement, access control, and target hardening results indicate moderate effectiveness, with noticeable disparities between parks. These findings align with contemporary CPTED scholarship, which emphasizes that environmental design can reduce crime opportunities by shaping visibility, movement, ownership cues, and maintenance standards (Cozens & Love, 2021; Atlas, 2020). However, the moderate rather than high performance observed suggests that CPTED principles are partially implemented rather than comprehensively integrated across Lagos parks.

Natural surveillance emerged as a critical determinant of safety performance. Observation data indicated moderate effectiveness (mean = 3.13), while user perception ratings were significantly positive ($M = 4.02$, $p < 0.05$), confirming strong alignment between design visibility and perceived safety. This reinforces findings by Lis and Iwankowski (2021) and Mak and Jim (2022), who demonstrate that clear sightlines and openness strongly shape user comfort and fear reduction. However, the relatively low rating for vegetation management indicates that landscape maintenance practices may undermine surveillance potential. Studies by Feng and Tan (2022) and Oyebanji and Adebayo (2022) caution that excessive vegetation density can obstruct visibility and inadvertently create concealment opportunities. Thus, while Lagos parks demonstrate awareness of surveillance design, inconsistent vegetation control weakens its crime deterrence capacity. This suggests the need for structured vegetation management protocols to balance ecological and security objectives.

Territorial reinforcement attributes were also moderately effective (overall mean = 3.20), with stronger symbolic identity (public art, signage) than management presence. This partially supports Newman's (1973) defensible space theory and subsequent empirical work by Johnson *et al.* (2021), which highlight the role of ownership cues in strengthening informal

social control. However, weaker ratings for stewardship and security presence indicate that symbolic territorial markers alone may be insufficient without active management oversight. O'Neill, Tilley, and Beck (2023) argue that territorial cues must be supported by visible guardianship to produce measurable crime reduction outcomes. In Lagos, disparities between parks such as AAP and ORP (higher ratings) and NKP and RJP (lower ratings) suggest that institutional investment significantly influences territorial clarity. This finding underscores the importance of combining physical demarcation with consistent operational presence to enhance informal control.

Access control recorded the highest overall observational rating (mean = 3.44), suggesting relatively stronger implementation of boundary definition and entry regulation mechanisms. This aligns with Kubalova and Loveček (2023), who report that clearly defined entry points and circulation systems reduce ambiguity and crime opportunities. Similarly, Chen *et al*. (2020) demonstrate that structured pathway systems enhance safety perception. However, technological surveillance (CCTV) and gate-level security presence were unevenly distributed across parks. This reflects broader infrastructural disparities typical of rapidly urbanizing contexts such as Lagos (Chidi & Badejo, 2024). While physical boundaries exist, inconsistent technological reinforcement may limit sustained deterrence. This supports findings by Loukaitou-Sideris and Wong (2020), who caution that access control must integrate both spatial and managerial elements to achieve optimal outcomes.

Target hardening strategies were moderately effective (mean = 3.22), with lighting emerging as the most consistent intervention. This finding is consistent with Lee (2022), who identifies lighting as a primary factor in reducing fear of crime in park environments. However, vandal-resistant materials and electronic surveillance systems received comparatively lower ratings, indicating infrastructural vulnerabilities. O'Neill, Sidebottom, and Tilley (2023) emphasize that maintenance and durable infrastructure are critical for sustaining long-term crime prevention effects. In the Lagos context, resource limitations and maintenance inconsistencies may reduce the durability of hardening measures. Therefore, while physical reinforcement measures are visible, their sustainability remains a concern.

Importantly, both user and expert assessments strongly validated the relevance of landscape-based interventions. All design elements tested through Chi-square analysis were statistically significant ($p < 0.05$), confirming that users perceive environmental attributes as meaningfully associated with safety outcomes. Experts similarly prioritized CCTV, lighting, vegetation control, and defined pedestrian pathways. This convergence between user perceptions and professional judgment strengthens the validity of the study's core argument. The findings echo Marzbali *et al*. (2021), who demonstrate that integrated CPTED components significantly reduce fear of crime in public spaces. Furthermore, Lagos-specific studies (Adegun & Taiwo, 2020; Akinlabi *et al*., 2022; Odufuwa *et al*., 2019) similarly highlight the relationship between environmental quality and safety perception in Nigerian urban contexts.

However, the moderate performance across most indicators suggests that CPTED implementation in Lagos parks is uneven and fragmented. Rather than systemic design integration, interventions appear incremental and park-specific. This supports the argument advanced by Cozens and Love (2021) that CPTED effectiveness depends on holistic application rather than isolated measures. Additionally, broader urban challenges including rapid population growth and infrastructure strain (Chidi & Badejo, 2024) may constrain consistent design and maintenance standards.

From a policy and practice perspective, the findings suggest several implications. First, vegetation management protocols should be standardized to optimize surveillance

without compromising ecological value. Second, maintenance and visible management presence must be strengthened to reinforce territoriality. Third, technological reinforcement, particularly CCTV integration, should be strategically expanded in high-risk areas. Finally, equitable investment across parks is essential to reduce disparities in security performance.

Conclusion and Recommendations

This study assessed landscape design attributes and park security across selected recreational parks in Lagos State, Nigeria, using CPTED-based indicators, natural surveillance, territorial reinforcement, access control, and target hardening supported by users' perceptions and expert evaluations. The findings reveal that landscape security attributes across the parks are moderately effective, indicating partial but uneven integration of crime prevention principles. Among the CPTED components, access control recorded comparatively stronger performance, while natural surveillance and target hardening demonstrated variability due to inconsistencies in vegetation management, lighting reliability, and technological surveillance systems. Territorial reinforcement measures were visible but weakened by limited management presence and inconsistent stewardship.

Users' perceptions strongly affirmed the significance of landscape design elements in influencing park security, with all variables showing statistically significant associations ($p < 0.05$). Natural surveillance, maintenance quality, and lighting adequacy were particularly emphasized as key determinants of perceived safety. Similarly, expert assessments reinforced the importance of technological surveillance (CCTV), improved lighting, vegetation control, and structured pedestrian pathways in enhancing crime prevention outcomes. The convergence between observational findings, user perceptions, and expert evaluations strengthens the validity of the study's central argument that landscape design plays a critical role in shaping safety outcomes in recreational parks.

However, disparities observed among parks, particularly between higher-performing parks (e.g., AAP and ORP) and lower-performing ones (e.g., NKP, RJP, BRP) highlight uneven infrastructural investment and management intensity. The study, therefore, concludes that while CPTED principles are present in Lagos recreational parks, their implementation remains fragmented rather than systematically integrated. For landscape design to achieve optimal crime prevention outcomes, interventions must be holistic, consistently maintained, and supported by institutional management frameworks. Based on the findings, the following recommendations are proposed:

1. Regular pruning, height control, and spatial arrangement of shrubs and trees should be institutionalized to prevent visual obstruction while preserving ecological quality.
2. Lighting infrastructure should be upgraded to ensure uniform illumination along pathways, entrances, seating areas, and perimeters. Routine inspection and maintenance schedules should be enforced to ensure reliability.
3. Strategic installation of CCTV cameras at entrances, high-traffic zones, and vulnerable locations should be prioritized. In addition, visible park management and security personnel should be consistently deployed to reinforce territorial control and informal guardianship.
4. Beyond signage and symbolic elements, community engagement programs and park stewardship initiatives should be introduced to foster a stronger sense of ownership and collective responsibility among users.
5. Security-related landscape improvements should not be concentrated in selected flagship parks. Policy frameworks should promote equitable allocation of infrastructural and maintenance resources across all recreational parks in Lagos State.

6. Urban planning authorities and park management agencies should formally incorporate CPTED guidelines into park design, renovation, and management policies to ensure long-term sustainability of security outcomes.

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