

Evaluating CPTED-Based Campus Security Practices: A Perception on Safety in Malaysian Public Universities

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Abstract

Purpose: This study examines campus security practices in Malaysian public universities using Crime Prevention Through Environmental Design (CPTED), focusing on how environmental design and organisational culture shape students' and staff members' perceptions of safety. **Design/methodology/approach** – A qualitative, exploratory design using Focus Group Discussions (FGDs) across four public universities was employed. Thematic analysis mapped participant insights onto five CPTED components to identify environmental and operational safety gaps. **Findings**— Results reveal persistent weaknesses in access control, surveillance coverage, patrol visibility, boundary clarity, and environmental maintenance. There is inconsistent safety communication, limited emergency systems, and underdeveloped technological integration. These shortcomings collectively weaken safety culture and heighten perceived vulnerability. **Practical implications**—Universities should enhance surveillance infrastructure, upgrade access-control mechanisms, adopt third-generation CPTED technologies, and strengthen safety communication and enforcement. **Originality/value**—This study offers one of the first qualitative CPTED-based assessments of Malaysian campuses, providing a comprehensive diagnostic framework for improving campus safety culture and environmental security.

Keywords: Campus Security, Campus Safety, CPTED, Safety Culture, Malaysia

Introduction

Crime Prevention Through Environmental Design (CPTED) has evolved into a foundational framework for shaping built environments to deter criminal activity through strategic environmental cues and behavioural influences. The traditional CPTED paradigm focuses on four core principles: natural surveillance, access control, territorial reinforcement, and maintenance, all of which collectively aim to reduce crime opportunities by increasing

visibility, regulating access, demarcating territorial ownership, and preserving orderly physical conditions (Reddy, 2023). In response to contemporary security challenges, third-generation CPTED extends this framework by embedding advanced technologies, including intelligent sensors, electronic access-control systems, predictive analytics, and mobile reporting applications, into environmental design strategies, thereby enabling real-time threat detection, instantaneous emergency communication, and data-driven security responses (Ruirui et al., 2023). This technological evolution is particularly notable on university campuses, where large, open, and densely populated spaces present unique vulnerabilities that traditional CPTED measures may inadequately address.

Within Malaysia's rapidly urbanising landscape, rising public concern over crime has amplified scholarly and policy interest in CPTED and allied environmental strategies, positioning university campuses as critical sites within broader national discourses on urban safety, community well-being, and sustainable development (Malek et al., 2024; Sakip et al., 2023). Recent empirical research emphasises the value of pointing out the value of unobstructed sightlines, adequate lighting, and explicit ownership signals, factors that are directly applicable to campus planning (Senna et al., 2025). These results are consistent with broader campus safety research, which indicates that perceived safety is influenced by a combination of demographic factors (e.g., gender, age), user familiarity with the environment, and essential design elements such as lighting quality, visibility, and the presence of individuals that enable natural surveillance (Huang et al., 2022). Women's safety perceptions are disproportionately sensitive to environmental features; poorly illuminated areas with concealment opportunities diminish perceived safety by undermining surveillance capacity and increasing vulnerability to perceived threats (Huang et al., 2022). Consequently, campus designs that enhance prospect-refuge balance, minimise entrapment spots, and improve lighting and sightlines consistently correlate with higher perceived safety, whereas specific "hard" security measures, such as metal detectors, may paradoxically elevate anxiety by signalling that violence is imminent (Huang et al., 2022). Complementary research further reveals that among CPTED dimensions, natural surveillance deficiencies exert the most decisive influence on FoC, with territoriality playing a secondary but still significant role, thereby establishing clear priorities for environmental interventions in university settings (Senna et al., 2025).

Malaysian research has begun to place these international findings in the context of local residential and urban settings, showing that fear of crime affects the implementation of CPTED and is also affected by a sense of community, with strong community ties making CPTED efforts more effective (Sakip et al., 2023). Parallel policy-oriented work advocates integrating data-driven crime risk assessment and predictive policing into security planning. The technological orientation of third-generation CPTED aligns with this direction, which Malaysia's public safety architecture is increasingly promoting (Maidin et al., 2024). At the institutional level, targeted security management systems, including intelligent key management and performance assessment tools, have demonstrated quantifiable reductions in theft and operational inefficiencies in Malaysian colleges, suggesting that managerial and technological controls can improve environmental design strategies (Juri et al., 2022). These advancements, however, have not been systematically evaluated within the specific context of Malaysian public universities, where student populations, campus layouts, and security governance structures differ markedly from residential or private college settings.

Demographic and experiential factors further complicate the dynamics of safety perception. Consistent evidence across various campus contexts demonstrates that gender is a reliable predictor of perceived safety, with women indicating lower safety levels and heightened fear of specific crimes, such as sexual assault and robbery, in comparison to men (Azevedo et al., 2022; Huang et al., 2022). Likewise, familiarity with campus spaces, often proxied by frequency of use or tenure, tends to enhance perceived safety among regular users, suggesting that knowledge and routine reduce environmental uncertainty (Azevedo et al., 2022; Huang et al., 2022). These individual-level patterns intersect with environmental conditions, including surveillance opportunities, territorial clarity, and maintenance quality, which moderate gender-based safety gaps and familiarity effects. However, Malaysian public universities continue to underexplore these interactions. Additionally, comprehensive campus security surveys indicate that robbery, theft, and property damage are the most commonly perceived offences. At the same time, substance use and youth conflicts are commonly cited as crime promoters, reinforcing the need for integrated social and environmental prevention measures in higher education settings (Azevedo et al., 2022).

Despite these advancements, the literature reveals several persistent gaps that limit the development of evidence-based, student-centred security strategies for Malaysian public universities. First, most campus safety studies prioritise either objective crime occurrence or subjective fear of crime in isolation, failing to integrate physical design audits, managerial controls, and student-centered spatial feedback into a unified assessment framework tailored to Malaysia's public university context (Huang et al., 2022; Sakip et al., 2023). Second, while there is a growing push for third-generation CPTED technologies to be used on campuses, there aren't many studies in Malaysian higher education that link specific tools, like intelligent sensors, mobile reporting apps, predictive analytics platforms, and electronic access control systems, to how safe students feel and how they behave (Maidin et al., 2024; Ruirui et al., 2023). Third, although emerging evidence clarifies how individual CPTED dimensions shape FoC, Malaysian campus-specific analyses that isolate the relative effects of natural surveillance, territoriality, access control, and maintenance on perceived safety and test how these effects vary by gender and campus familiarity are absent (Sakip et al., 2023; Senna et al., 2025). Fourth, the mediating roles of place attachment and sense of community in linking CPTED-based environmental design to overall safety perception are theoretically plausible but empirically under-tested in campus environments, with few studies examining these pathways across diverse Malaysian public universities (Ling et al., 2024). Finally, operational factors such as security patrol practices, maintenance standards, and design features that impede visibility are frequently acknowledged in qualitative accounts but remain under-measured in quantitative perception studies, constraining actionable guidance for campus facilities and security management units (Frances Medlyn Luha Martecio, 2025; Huang et al., 2022).

Addressing these interrelated gaps necessitates a comprehensive, student-centred evaluation framework that synchronises environmental audits, technological deployment data, and This study includes managerial performance metrics that rigorously measure safety perceptions and fear of crime (FoC). By situating this investigation within Malaysia's public university system, the present study offers a novel contribution to the social science literature: it represents the first integrated assessment of both third-generation technological interventions and traditional CPTED dimensions within a single analytical model, explicitly

examining how student-centred mediators (place attachment, sense of community) and moderators (gender, campus familiarity) shape safety outcomes. This approach advances CPTED scholarship by moving beyond isolated technological or environmental evaluations toward a sociotechnical systems perspective that recognises campuses as complex social-ecological settings where hardware, software, and human-place bonds interact dynamically. Practically, the study generates evidence-based recommendations for campus planners and security managers seeking to design responsive, student-focused safety strategies that are culturally attuned to Malaysia's higher education context.

The following research questions guide the study:

1. How do certain third-generation CPTED interventions (like smart sensors, mobile reporting apps, and access-control systems) affect Malaysian university students' feelings of safety and fear of crime?
2. What is the relative contribution of the four core CPTED dimensions, which are natural surveillance, territoriality, access control, and maintenance, to students' perceived safety across public universities in Malaysia, and how do these effects differ by gender and campus familiarity?
3. To what extent do student-centred place attachment and a sense of community mediate the relationship between CPTED-based environmental design and overall safety perception?

The primary aim of this study is to assess how CPTED-based security practices, particularly third-generation technological interventions and the four core CPTED dimensions (natural surveillance, territoriality, access control, and maintenance), shape the perceptions of safety and fear of crime among Malaysian public university students. By integrating environmental audits, student-centred surveys, and mediation analyses of place attachment and sense of community, the research seeks to identify which CPTED elements most effectively enhance perceived safety, uncover demographic variations (e.g., gender, and campus familiarity), and generate evidence-based recommendations for campus planners and security managers to design more responsive, student-focused safety strategies.

Literature Review

Campus Security Issues of Student Safety in Malaysian Public Universities

Campus security in Malaysian public universities encompasses intertwined physical, social, and digital challenges, with evidence that traditional measures alone often fall short and require more integrated, technology-enabled approaches to address evolving risks effectively (Ruirui et al., 2023; Salam et al., 2025). Physical environment concerns, such as inadequate lighting, limited surveillance coverage, and gaps in emergency communication and response, have been reported, which points to the need to upgrade campus design and operations in line with third-generation Crime Prevention Through Environmental Design (CPTED) principles that combine access control, intelligent sensors, alarms, and real-time data capabilities (Ruirui et al., 2023). Technological solutions, such as a crime identification system that leverages video analytics, behavioural monitoring, and centralised alerts, illustrate the push toward proactive detection and rapid response to rising campus threats among university populations (Zhen Bang et al., 2025). Social safety risks are persistent and multifaceted: bullying remains a concern requiring comprehensive institutional strategies, while sexual harassment is prevalent, disproportionately affecting female students and has

historically faced inadequate policy responses, underscoring the necessity for robust prevention, reporting, and support mechanisms (Abdul Halim et al., 2023; Ehsan & Hidayah, 2025). Residential safety is also salient; student hostels contain significant combustible materials, and buildings constructed under older prescriptive standards may not meet current requirements, necessitating enhanced and compliant means of escape to ensure effective evacuation (Jaafar, 2024). On the digital front, universities are particularly vulnerable to ransomware, phishing, and data breaches due to their open, inter-departmental characteristics, making structured governance, risk management, infrastructure security, human factors, compliance, and monitoring critical components of a cybersecurity maturity model for higher education (Salam et al., 2025). The variability in crisis management during the COVID-19 period impacted student motivation and experience, underscoring the importance of well-designed, consistently implemented plans to minimise service disruptions and maintain academic quality and safety during emergencies (Nathanael Utomo et al., 2024). Digital harms such as cyberbullying are prevalent and driven by personal, sociocultural, psychological, and environmental factors, indicating that institutional policies and preventive education must extend beyond physical grounds into online environments (Arifin et al., 2025). Compounding these risks, many students experience anxiety and depression and face barriers to counselling (including stigma and accessibility), which points to the need for visible, inclusive mental health support systems as part of a holistic campus safety strategy (Aisyah et al., 2025).

Application of CPTED in Educational Institutions

Crime Prevention Through Environmental Design (CPTED) aligns closely with campus architecture and planning by embedding natural surveillance, clear territorial delineation, controlled access, and adequate lighting into site and building layouts, which can be extended through third-generation CPTED using access control systems, intelligent sensors, alarms, and real-time communication to strengthen prevention and response on university grounds (Ruirui et al., 2023; Teo et al., 2018). Globally, CPTED has been institutionalised through policy and practice. U.S. jurisdictions have incorporated CPTED into land-use and design ordinances. New South Wales issued CPTED guidelines for developments, South Africa adopted “Design Safer Places” planning strategies, Korea established a national CPTED centre, and UN-Habitat advocates for CPTED in urban safety, providing transferable frameworks for campus settings (Wen et al., 2025). Empirical evidence on effectiveness is consistent: improved lighting and removal of concealment areas increase perceived safety by enhancing prospect and natural surveillance, while campuses with higher CPTED features are associated with higher student safety perceptions (Huang et al., 2022). Surveillance systems contribute to deterrence and case resolution, with Malaysian findings noting effectiveness in solving crimes despite costs and analytic skill gaps, echoing broader criminological evidence on CCTV’s preventive role (A. Sukor et al., 2024; Othman et al., 2020). Spatial redesign, such as clarifying public–private boundaries, improving visibility and layout, and applying layered defences, reduces opportunities for offence and fear and can be operationalised with planning tools (e.g., BIM) to integrate CPTED criteria across campus projects (Ruirui et al., 2023; Teo et al., 2018). Together, these measures suggest that campus-specific CPTED, which combines environmental design and targeted technologies, can significantly enhance safety outcomes through lighting upgrades, surveillance systems, and spatial reconfiguration (A. Sukor et al., 2024; Huang et al., 2022; Ruirui et al., 2023).

Empirical Studies on Campus Security and safety, and CPTED

Empirical research across diverse university settings has demonstrated that CPTED-based interventions, particularly enhancements to natural surveillance, territorial reinforcement, and adequate lighting, are associated with measurable reductions in fear of crime and actual offending (Huang et al., 2022; Senna et al., 2025). Surveys of students at Malaysian and Indian campuses reveal that perceptions of safety improve when CPTED elements, such as clear sightlines, well-lit pathways, and controlled access, are incorporated into campus design. Respondents report lower anxiety and a greater willingness to use outdoor spaces (Huang et al., 2022; Reddy, 2023). A systematic review of half a century of street-lighting evaluations found an average 21 % decline in crime after lighting upgrades, and a city-wide LED retrofit in Philadelphia produced a 15 % drop in nighttime street crimes, underscoring the potency of illumination as a CPTED component (Macdonald et al., 2025; Welsh et al., 2024). Case studies of third-generation CPTED implementation on university campuses report that integrating access-control technologies, intelligent sensors, and real-time emergency communication with traditional design principles further enhances deterrence and response, while qualitative interviews with Malaysian campus security personnel highlight persistent gaps in lighting and surveillance that limit current effectiveness (Ruirui et al., 2023; Shariati & Guerette, 2020).

Research Gaps Identified

The current literature on campus security in Malaysian universities reveals several critical research gaps. First, most studies rely on quantitative assessments of environmental variables, leaving a dearth of qualitative investigations that capture students' lived experiences and nuanced perceptions of CPTED interventions. Second, while CPTED's physical principles are documented, there is limited empirical understanding of how these design strategies function within the specific spatial, cultural, and operational contexts of Malaysian campuses. Third, the interaction between CPTED and the broader organisational "safety culture," including training, maintenance routines, and cross-departmental coordination, remains underexamined, despite evidence that cultural factors shape the implementation and sustainability of security measures. Fourth, culturally specific safety concerns, such as gender-related fears of poorly lit or concealed areas, have not been thoroughly explored, which hinders the development of context-responsive design solutions. Finally, while numerous Malaysian universities have invested in security infrastructure (e.g., lighting, CCTV, emergency communication), research offers scant insight into the real-world experiences of users interacting with these systems, thereby limiting the assessment of actual effectiveness and user satisfaction.

Methodology

This study adopts a qualitative method to explore complex social phenomena that involve meanings, perceptions, and lived experiences (Creswell, J.W. and Poth, C.N. (2018)). The central aim of this study is to evaluate how campus stakeholders perceive, experience, and enact CPTED-based security practices within Malaysian public universities, which requires an in-depth understanding of their subjective realities rather than numerical measurement. Since campus safety and security culture is socially constructed through interaction, shared norms, and environmental engagement, qualitative inquiry allows the researcher to capture the nuanced relationship between physical design (CPTED principles) and social behaviour (security culture).

Data Collection

The primary data collection method employed in this study is the Focus Group Discussion (FGD). The FGD is a qualitative technique that gathers insights from a small group of participants who share common experiences, enabling interaction, reflection, and co-construction of meanings (Krueger et al., 2015). This method is particularly appropriate when exploring perceptions, attitudes, and social norms that influence behaviors— in this case, the perceived effectiveness, challenges, and cultural dimensions of CPTED-based security practices on university campuses.

Each FGD will involve 8-10 participants representing diverse campus stakeholders, such as students and staff. Data collection involves four universities: University A, B, C, and D. This heterogeneity ensures a multifaceted understanding of campus security and safety culture, highlighting how different actors interpret and practice CPTED principles in their daily interactions.

Table 1.1

Malaysian Public University

University	Category	Geographical setting
A	Research University	- Urban / Sub-Urban Area - Inland (Non-Coastal) Area
B	Research University	- Urban Area - Inland/Island Urban Environment
C	Focus University	- Coastal / Marine Area - Sub-Urban Area
D	Comprehensive University	- Urban / Sub-Urban Area - Coastal / Marine Area

Result and Discussion

System, Manpower & Technology Limitations

Table 1.2

System, Manpower & Technology Limitations

Theme	Meaning of Theme	Referenced	Evidence
System & Manpower Limitations	Campus safety reliant on manpower and weak operational systems	FGD with staff university A	"Fully dependent on manpower... no proper system... just lucky nothing happened."
Security Staffing & Capacity	Perceived limitations of manpower and readiness of safety enforcement		"Manpower in security is not enough, high workload..."
Lack of Security Personnel	Staffing limitations affect patrol frequency and coverage		"Security manpower is not enough; workload is high..."
Technology & Surveillance Gaps	Absence or weakness of digital tools and monitoring systems for safety control		"Mosques and public spaces have limited CCTV... budget constraints."
Absence of Technology-Based Patrol	Lack of digital support systems (GTS, e-sticker, e-summons)	FGD with students from universities A and B	"We don't have a system... Everything depends on human resources." / "No e-summon."
Technology-Based Patrol Systems	Weak cybersecurity systems and awareness	FGD with staff university A	"UMT has no antivirus policy..."

Safety Awareness, Education & Regulation Exposure

Table 1.3

Safety Awareness, Education & Regulation Exposure

Theme	Meaning of Theme	Referenced	Evidence
Exposure to Security Regulations	Regulations exist but not well communicated	FGD with staff university A	"Dissemination to staff and students lacking..."
Safety Awareness & Education Exposure	Mixed exposure to briefings and safety programs		"Briefings, input, talks have been given..."
Weak Enforcement & Inconsistent Rules	Rules exist but not consistently communicated or enforced	FGD with students from university D, B, C	"Sometimes lazy, sometimes strict."
Awareness & Education	Need for effective communication, especially for international students	FGD with staff university A, D, B	"Need sharing about the rules... online for international students."

Patrol Presence, Coverage & Effectiveness

Table 1.4

Patrol Presence, Coverage & Effectiveness

Theme	Meaning of Theme	Referenced	Evidence
Inconsistent or Limited Patrolling	Patrols insufficient, irregular, reactive	FGD with staff university A	"Patrolling should take place during the day and night... enforcement lacking."
Presence of Patrols	Patrols exist but limited in coverage	FGD with staff university B	"Patrolling is done at night..."
Patrol Frequency & Coverage	Limited due to campus size and manpower	FGD with staff university B	"Coverage is limited... hilly areas are not frequently checked."
Patrol System & Technology	Use (or absence) of digital patrol tools	FGD with staff universities B and D	"They use WhatsApp as a channel for GTS."
Student Perceptions of Patrols	Students' views on visibility and effectiveness	FGD with student university B	"No patrols at night or during holidays."
Patrol Suggestions	Student suggestions to improve patrols	FGD with students from university A, B, D	"Increase patrols in dark and quiet places."

Access Control, Perimeter Security & Outsider Intrusion

Table 1.5

Access Control, Perimeter Security & Outsider Intrusion

Theme	Meaning of Theme	Referenced	Evidence
Uncontrolled Access & Weak Entry Regulation	Weak enforcement at gates	FGD with staff university A	"Campus gates... unofficial entry doors... not fully secure."
Campus Perimeter, Access & External Environment Security	Concerns about outsiders entering freely		"Grab and Foodpanda are entering the campus, allowing outsiders to reach the hostel floors."
Physical Access Control & Security Checks	Cheques vary by location/time	FGD with staff university B	"Enforcement is not consistent at night."
Access Control Weaknesses	Sticker misuse, lack of verification	FGD with staff university D	"Outsiders use stickers without verification."
Coordination with External Agencies & Contractors	Limited oversight and monitoring	FGD with student university D	"Contractors enter freely without notice."
Students' Perception of Access Control	Mixed perceptions of gate control & CCTV	Students all universities	"Outsiders can enter freely."
Suggestions for Improvement	Proposed improvements	FGD with student university A, B, C, D	"Add more CCTVs... create visitor pass system."

Traffic Management, Regulations & Enforcement

Table 1.6

Traffic Management, Regulations & Enforcement

Theme	Meaning of Theme	Referenced	Evidence
Traffic Congestion & Behavioural Issues	Unsafe driving behaviour, congestion	FGD with staff university A	"Students not wearing helmets."
Road Conditions & Physical Layout	Signage and road layout issues		"Road signs are unclear."
Technology-Based Traffic Management & Enforcement	Limited integration of technology	FGD with staff university B	"E-sticker system exists but not integrated."
Traffic Regulations & Enforcement	Regulations exist but inconsistently enforced	FGD with staff university D	"Staff fined if sticker expired."
Issues & Challenges	Students' challenges with lighting, parking, behaviour	FGD with student university A, B, C, D	"Vehicles move fast... lack of parking..."
Suggestions for Improvement	Students propose improvements	FGD with student university A, B, C, D	"Add zebra crossings and bumps."

Emergency Systems, Fire Safety, Cybersecurity & Welfare Support

Table 1.7

Emergency Systems, Fire Safety, Cybersecurity & Welfare Support

Theme	Meaning of Theme	Referenced	Evidence
Emergency and External Support Readiness	Weak coordination with emergency agencies	FGD with staff university A	"If there was a system, we wouldn't rely on manpower alone."
Emergency Notification & Safety Systems	Lack of proper emergency technology	FGD with staff university C	"Emergency notification system... does not exist."
Collaboration with External Agencies	Exists but limited in internal readiness	FGD with staff university B	"BOMBA nearby but no immediate internal response unit."
Medical & Welfare Support Gaps	Weak internal student support	FGD with staff university A	"Break-in cases... response was slow."
Environmental & Animal Safety Issues	Includes stray animals, unsafe environments	FGD with student university A, B, C, D	"Monkey problem."

Welfare & Support Systems	Student perceptions of support availability	FGD with student university A, B, C, D	"Counseling exists... but medical system lacks common medicines."
Suggestions for Improvement	Student-proposed improvements	FGD with student university A, B, C, D	"Conduct regular fire drills... develop mobile safety apps."

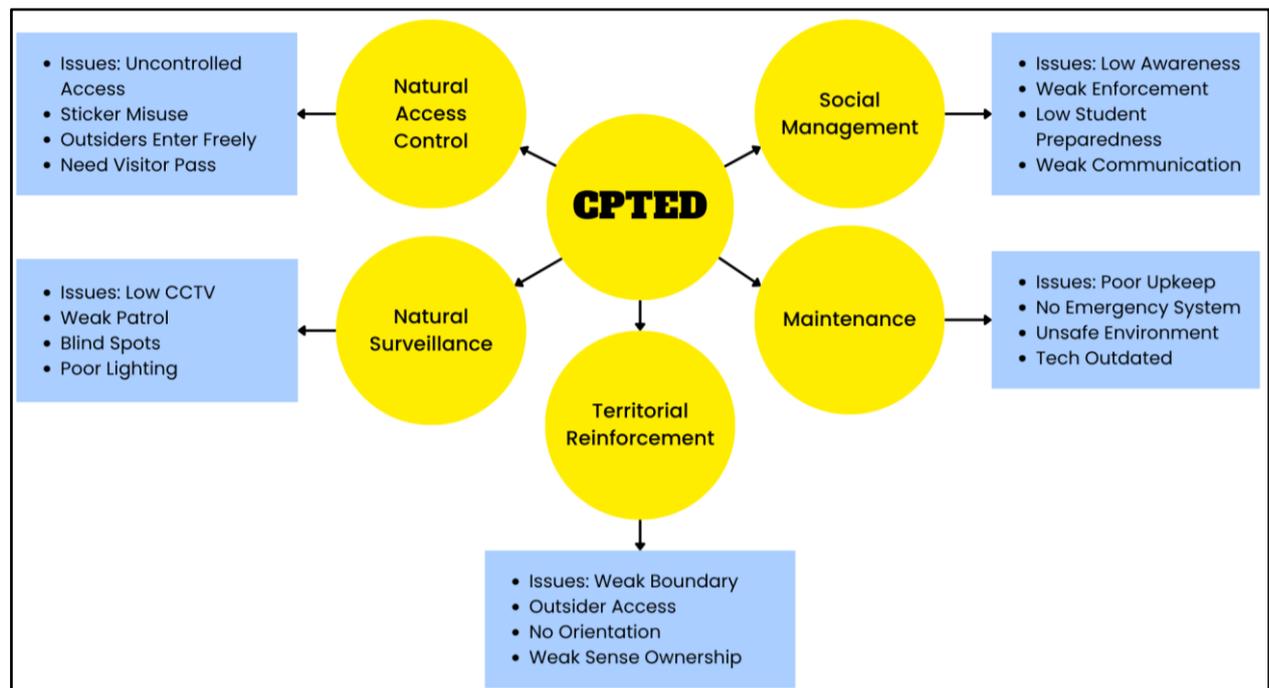


Figure 1.1 Mapping CPTED with perception of campus security

Figure 1.1 shows a complete picture of campus security problems in Malaysian public universities from the point of view of CPTED. By centralising CPTED as the core framework, the diagram visualises five foundational components: natural access control, natural surveillance, territorial reinforcement, maintenance, and social management, all linked to the dominant problem areas identified in the field data. This structure highlights that campus safety challenges are not isolated but interconnected, reflecting systemic weaknesses across the physical, technological, procedural, and sociobehavioral dimensions of campus security management.

The Natural Access Control section shows that there are still problems with controlling who can enter campus spaces. These problems include uncontrolled access points, misuse of vehicle stickers, and the lack of a good visitor management system. Alongside this, limitations in natural surveillance, such as inadequate CCTV coverage, weak patrol visibility, blind spots, and insufficient lighting, underscore operational constraints that reduce the ability of campus authorities to deter or detect risks effectively. Territorial reinforcement issues, including weak boundary definition, outsider intrusion into hostels, and the lack of structured orientation on safety protocols, further demonstrate how poor spatial ownership and unclear territorial cues contribute to reduced perceptions of safety among campus communities.

The remaining two CPTED elements, maintenance and social management, reflect deeper institutional and cultural dimensions of safety. Maintenance-related concerns, such as poor infrastructure upkeep, the absence of emergency alert systems, environmental hazards, and outdated technological tools, highlight how neglected physical environments undermine security readiness. Meanwhile, social management issues, including poor safety awareness, inconsistent enforcement, weak student preparedness, and ineffective communication, underscore the behavioural and organisational gaps that limit the development of a strong safety culture. Collectively, the figure demonstrates that improving campus safety in Malaysian public universities requires an integrated approach that strengthens both the physical design and social governance of university environments, in line with CPTED principles.

Limitations and Future Directions

This study acknowledges several constraints that temper the reach of its findings. Because the investigation relied exclusively on focus-group discussions with approximately 32–40 participants from a handful of Malaysian public universities, the results are context-specific. It cannot easily be generalised to other institutions or regions. Qualitative design also limits statistical inference about the strength of CPTED-safety relationships. Moreover, the authors note that third-generation CPTED technologies (e.g., intelligent sensors, mobile reporting apps, and data analytics platforms) were identified as underutilised and were not empirically evaluated within the study, leaving a gap in understanding how these tools affect perceived safety. The research further points to a broader omission of an integrated safety-culture lens—while safety-culture factors were discussed, they were not systematically measured alongside physical-design variables, which restricts the ability to assess their combined impact. Finally, the cross-sectional nature of the work precludes insights into how CPTED interventions evolve or how they interact with demographic variables such as gender and campus familiarity.

Future research should therefore expand the methodological toolkit and scope. Quantitative surveys or longitudinal designs could test the relative contributions of the four core CPTED dimensions (natural surveillance, territoriality, access control, and maintenance) to safety perceptions across a larger, more diverse sample of Malaysian universities, allowing for gender- and familiarity-specific analyses. Empirical trials of third-generation CPTED technologies are necessary to determine which interventions (e.g., smart sensors, mobile apps, predictive analytics) have the most potent impact on perceived safety and fear of crime. Integrating an auditable rubric that links CPTED dimensions to concrete safety-culture practices would enable systematic resource prioritisation and facilitate comparative benchmarking. Finally, mixed-method approaches that combine environmental audits, student-centred surveys, and mediation analyses of place attachment and sense of community would address the identified research gaps and provide a more holistic evaluation framework for campus security in Malaysian higher-education contexts.

Conclusion

The study aimed to assess how Crime Prevention Through Environmental Design (CPTED)-based security practices influence safety perceptions and the fear of crime among students and staff in Malaysian public universities. To achieve this, focus-group discussions were conducted. The study was conducted to map environmental and organisational factors for the five CPTED

components. Analysis of the qualitative data revealed persistent shortcomings across all core CPTED dimensions: weak access-control mechanisms, limited surveillance coverage, insufficient patrol visibility, unclear boundaries, and poor maintenance of built environments. Participants also reported inconsistent safety communication, underdeveloped emergency-notification systems, and low levels of technological integration, such as intelligent sensors and mobile reporting apps. These gaps collectively erode the campus safety culture and heighten perceived vulnerability, especially among female students who are more sensitive to lighting and concealment issues.

The findings underscore that improving natural surveillance (e.g., better lighting, expanded CCTV), strengthening territorial reinforcement (precise gate control, visitor-pass systems), and upgrading access-control technologies are the most immediate priorities for enhancing perceived safety. Equally important are social-management interventions enhancing safety awareness, consistent rule enforcement, and clear communication to address the behavioural and cultural dimensions of campus security. Practical recommendations therefore include (i) expanding and modernising surveillance infrastructure; (ii) installing robust, technology-enabled access-control solutions; (iii) formalising safety-communication channels and regular emergency drills; and (iv) fostering a participatory safety culture through student-centred training and community-building activities.

The study's limitations stem from its exclusive reliance on focus-group discussions with a relatively small, purposive sample from four universities, which constrains the generalisability of the results and precludes statistical inference about the strength of CPTED-safety relationships. Moreover, third-generation CPTED technologies were identified but not empirically evaluated, leaving an evidence gap regarding their actual impact on safety perceptions. Future research should therefore employ mixed-methods designs combining large-scale surveys, longitudinal tracking, and experimental trials of specific technological interventions to quantify the relative contributions of each CPTED dimension, examine gender- and familiarity-specific effects, and test the efficacy of Intelligent sensors, mobile reporting apps, and predictive analytics in reducing fear of crime.

In summary, the paper presents a diagnostic framework that highlights critical physical, technological, and social deficiencies in Malaysian university security and offers concrete, CPTED-aligned pathways for creating safer and more resilient campus environments.

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