Relationship between Natural Surveillance and Fear of Crime among Students: The Case of a Kenyan University

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ABSTRACT

The increasing crime rates among university students in Kenya have raised significant concerns. To address this issue, this study investigates the potential of natural surveillance to alleviate the fear of crime among students at the Institute of Tourism, Hospitality, and Management (IToHM) within the Dedan Kimathi University of Technology. Drawing upon Crime Prevention through Environmental Design Theory, the study employs a descriptive research design to explore the connection between natural surveillance and fear of crime. The study encompasses a target population of 200 IToHM students across different academic levels: 16 Diploma students, 44 First Year Bachelor's students, 19 Second Year, 36 Third Year, and 23 Fourth Year Bachelor's students. Using Yamane's (1967) formula, a sample size of 147 students was determined. Data collection was facilitated through a questionnaire, whose construct validity was confirmed through pilot testing. Measurement instrument validation was accomplished using Cronbach's alpha (1951) correlation coefficient, which yielded robust reliability coefficients of 0.701 for natural surveillance, 0.849 for fear of crime, and 0.868 for the frequency of fear of crime. The study's analytical approach involved both descriptive and inferential statistics. Pearson's correlation coefficient was employed to gauge the relationship between natural surveillance and students' fear of crime within their residential contexts. The study's results revealed a significant negative correlation ($r = -0.514$, $p = 0.000$) between natural surveillance and the fear of crime experienced by IToHM students at Dedan Kimathi University of Technology. This finding underscores the effectiveness of various natural surveillance strategies implemented by university management in reducing students' fear of crime. Based on these findings, it is recommended that university administrators allocate resources proactively to areas with heightened crime concerns and adopt comprehensive natural surveillance protocols. This study contributes a valuable perspective to discussions on crime prevention within university campuses, highlighting the pivotal role of environmental design strategies in creating secure and conducive learning environments.

Keywords: Natural Surveillance, University Students, Fear of Crime

INTRODUCTION

Over the years, the escalating crime rates in Kenya have ignited widespread concerns, drawing attention from various quarters, including the government, local communities, and individuals themselves (Daniel, 2020). The country's rapid urbanization and population growth have triggered social and economic disparities, particularly in urban areas (Ongoma et al., 2013). These complex interactions of factors, along with social, economic, and political dynamics, have woven an intricate web of crime in Kenya. The challenges faced by the nation span a broad spectrum, encompassing both violent and property-related offences, as well as emerging forms of transgressions such as cybercrimes and organized illicit activities

(Winter et al., 2022). Recent statistics highlight an 8.4% increase in reported crimes in 2022 alone, reaching 88,083 incidents (Nation Africa, 2023).

Running parallel to this narrative is an emerging concern that has cast its shadow over university campuses across Kenya – spaces traditionally symbolizing safety, enlightenment, and personal growth (Pryce et al., 2018). These campuses, anticipated to foster knowledge and individual development, have become sites of various criminal incidents ranging from theft and assaults to drug abuse, cybercrimes, and even instances of violent extremism. However, the repercussions extend beyond the criminal acts themselves, permeating into the tangible fear now gripping the minds of university students across the nation. Termed as the "fear of crime," this apprehension profoundly affects their overall well-being, academic accomplishments, and general campus experience (Yaseen et al., 2022). This term encapsulates the emotional turmoil and unease experienced by individuals due to their perceived vulnerability to criminal victimization.

LITERATURE REVIEW

Globally, societies have implemented various measures to manage and diminish crime rates and community apprehension. Among these strategies is Crime Prevention Through Environmental Design (CPTED), an approach that Cozens and Sun (2019) highlight. CPTED, which emerged in the late 1970s, focuses on curbing actual criminal activities and the perceived fear of crime in localities (Piroozfar et al., 2019)—functioning as a proactive framework, CPTED endeavours to enhance security for nearby structures while mitigating crime concerns. It incorporates fixed elements amenable to alteration through deliberate planning and design. Rooted in the principle that the designed environment can influence human behaviour, CPTED embraces the notion that architectural and psychological factors are intertwined (Wahab et al., 2018). Various research endeavours underscore the role of the physical environment in either fostering opportunity for criminal acts or deterring them (Marzukhi et al., 2018). By adopting CPTED, preventive measures are deployed proactively, anticipating potential criminal incidents and diminishing crime rates and fearfulness (Reynald, 2011).

Notably, one pivotal component within the CPTED framework is the concept of "natural surveillance." As elucidated by various researchers, this element is paramount in enhancing security and curbing criminal activities. Natural surveillance involves configuring the built environment to facilitate unobtrusive monitoring and observation of public spaces (Jeffery, 1977). It is predicated on the understanding that well-designed spaces encourage bystanders and inhabitants to keep watch, thus deterring potential wrongdoers naturally. This concept encourages strategically placing structures, windows, lighting, and landscaping to foster visibility and minimize concealed areas where criminal activities might occur (Jeffery, 1977). Consequently, through the skilful integration of natural surveillance within the CPTED framework, communities can not only dissuade criminal actions but also cultivate a sense of safety and connectedness among their residents.

Enhancing natural surveillance can mitigate the fear of crime (Loukaitou-Sideris, 2012). Using natural surveillance as a crime prevention strategy has been a longstanding practice in built environments (Katyal, 2001). The proposed design is a conceptual framework to maintain surveillance over potential intruders within a defined geographical area. The lighting design, the entrances' positioning, and the windows' strategic arrangement allow people to see the street from within the buildings (Olajide & Lizam, 2017; Perkins et al., 2015). Formal monitoring functions function as a deterrent and guardianship for criminals. They are less inclined to offend due to the opportunity for intervention, which may lead to arrest by public members and, later, punishment (Cozen & Love, 2015). In general, reduced use of natural surveillance relates to residents' increased fear of crime. Lighting, CCTV cameras, and a clear sightline by eliminating blocking materials, such as trimming or removing overgrown plants inside the residential area, are the features of natural surveillance and the constructs the current study focused on.

Effective lighting is pivotal in establishing a sense of security and alleviating the fear of crime within a given environment (Perkins et al., 2015). A comprehensive investigation conducted by Ceccato (2020) delved into the efficacy of lighting in mitigating the fear of crime, revealing a notable trend. Across 35 separate publications, the collective impact of illumination on fear of crime exhibited a negative correlation. Notably, 72% of the studies underscored the positive influence of optimal lighting in bolstering citizen safety. To elucidate, superior lighting conditions were found to have a dual effect: curbing criminal incidents while enhancing residents' safety. It is worth highlighting that Ceccato's study concentrated primarily on the cognitive aspect, omitting the emotional facet of the fear of crime. In contrast, the current investigation addresses this emotional dimension, thus contributing to a more comprehensive understanding of the subject.

Although crucial in a given location, excellent illumination alone is insufficient to reduce crime and comprehensively alleviate associated fears (Piza et al., 2019). While previous studies have highlighted the connection between inadequate lighting and heightened perceptions of risk or fear of crime among citizens (Castro-Toledo & Perea-Garcia, 2017), it is evident that relying solely on illumination is insufficient. Interestingly, the efficacy of surveillance cameras in curbing school violence in poorly lit areas has been called into question by various investigations (Tanner-Smith et al., 2018). Insufficient lighting impairs visibility, making it challenging to detect criminal activities.

Drawing from research conducted in the United States, insights were gleaned from female student responses in high school settings that adhered to Crime Prevention Through Environmental Design (CPTED) principles, including CCTV cameras and optimal lighting (Vagi et al., 2018). The findings indicated that these measures significantly contributed to enhancing the safety perception of the students on campus. Areas necessitating good lighting, such as restrooms, ladies' locker rooms, parking lots, and bus loading zones, experienced decreased concerns about criminal incidents. Notably, the amalgamation of well-lit environments and high-quality CCTV cameras played a pivotal role in diminishing both crime rates and the prevailing fear. Consequently, the combination of robust lighting infrastructure and advanced surveillance mechanisms emerges as an effective strategy for bolstering security and reducing apprehension in various settings.

Taking this concept to a university setting, it becomes evident that the influence of lighting extends to students' residing spaces within dormitories and other campus locales. Through the strategic incorporation of sufficient illumination and sophisticated CCTV setups, the fear of crime among students is notably diminished, creating an environment that promotes a sense of safety and well-being.

In a study conducted in Sweden to illustrate the efficiency of CCTV cameras as crime control measures, a researcher revealed that the influence of CCTV cameras was associated with a significant and slight decline in crime, which might lead to a low fear of crime (Piza et al., 2019). Similarly, research in Botswana found that excellent lighting and CCTV cameras at night could increase visibility and lessen inhabitants' fear of crime (Molepo et al., 2020). More so, South African research validated the utility of CCTV video surveillance systems in city centres for crime prevention. It concluded that the equipment deterred criminals, reducing crime and fear of crime (Minnaar, 2013). According to this study, CCTV cameras effectively reduced citizens' fear of crime and acted as deterrent measures. Furthermore, the outcomes of a study conducted in Kenya (Mombasa) to demonstrate the usefulness of CCTV cameras were similar to those of earlier studies. According to the study, crime management was effective in regions where security CCTV cameras were put in because offenders were deterred and saw the cameras as a roadblock to their illegal operations (Cheruiyot & Wanaina, 2020).

Other measures can be implemented besides using technology to deter criminals from committing a crime, such as a clear sightline in an environment. Previous research in Stockholm, Sweden, within transportation

contexts, has shown that planning for visibility and strong sightlines lessens people's fear of crime. The absence of nooks and corners, visible ticket booths, overpass (rather than underpass) walkways, and separation of passenger flow in a railway station promotes safety. It reduces the fear of crime (Ceccato et al., 2013 & Woodward, 2016).

Newton (2014) posited a compelling argument linking high crime rates in transit areas to overcrowding, obstructing clear sightlines. The presence of a dense crowd not only creates opportunities for potential criminals but also poses a challenge to supervision. This lack of unobstructed views ultimately contributes to heightened fears of crime among passengers. The solution lies in implementing natural surveillance measures, prominently establishing clear sightlines. This principle holds across different environments, as it effectively curbs criminal activities and, in turn, diminishes the fear of crime experienced by citizens.

Furthermore, excessive access restrictions have been shown to impede natural surveillance efforts. Hence, the imperative remains: Environments should prioritize clear sightlines to foster low levels of fear associated with criminal activities. To illustrate, consider the case of a residential neighbourhood enclosed by a perimeter wall with a height of 1.5–2 meters, functioning as an access control barrier. Although intended to enhance security, this barrier inadvertently diminishes visibility and obstructs the ability to see through it. As a result, it becomes easily traversable, elevating the fear of crime among inhabitants (Sakip et al., 2016).

Similar findings emerged from studies conducted along a South African railway line with inadequate sightlines. Residents expressed heightened concerns about crime due to a combination of factors, including poor visibility, inadequate street lighting, overgrown vegetation providing hiding spots for potential robbers, and damaged fences bordering the railway line (Landman, 2020). These insights emphasize the significance of unobstructed sightlines in reducing both criminal incidents and the associated fear of crime within various settings.

Conducted against the backdrop of Seoul, South Korea, a study sought to discern the efficacy of natural surveillance in contrast to architectural design within residential spaces in reducing both crime rates and the prevailing fear of crime (Lee et al., 2016). Intriguingly, the findings pointed to the superiority of surveillance tactics in yielding more significant outcomes. The impact of this phenomenon extended across international borders, as evidenced by a study conducted in Michigan, United States, focused on elementary and middle schools. The institutions that embraced natural surveillance measures exhibited a palpable increase in perceived safety, coupled with decreased reported incidents of school violence, ultimately reducing the fear of crime (Vagi et al., 2018). By harnessing the power of natural surveillance, unnecessary risks were minimized, impeding criminal activities and fostering a lower degree of fear among students.

Elevating the effectiveness of natural surveillance encompasses several strategies, including minimizing the height of shrubs and surrounding walls, augmenting tree coverage, and implementing features like grass, smooth ground, and water elements. These enhancements, well-documented by scholars such as Ceccato and Tcacencu (2018) and Fennelly and Perry (2020), contribute to heightened natural surveillance capabilities. However, the nuanced nature of this concept warrants consideration. Notably, the positioning of these measures may lead to varying outcomes. For instance, some researchers, such as Ceccato (2020) and Pain (2000), have contended that increased exposure to the surroundings could heighten fear of crime in specific contexts.

Interestingly, Sakip et al. (2012) diverged from the conventional wisdom by asserting that clear sightlines and increased lighting could, in specific scenarios, exacerbate people's fear of crime. This perspective stemmed from their examination of severely deteriorated areas, like dumps and vandalized spaces, where the presence of lighting and clear sightlines paradoxically heightened attacks from the criminals. This finding was attributed to residents' perception of heightened vulnerability in isolated regions, making them

more exposed and susceptible during solitary moments. This insight urged the present study to investigate the correlation between clear sightlines and fear of crime within residential settings.

While numerous previous inquiries predominantly assessed the fear of crime through the lens of perceived safety, with a particular emphasis on residential locales and transportation sectors like railway lines and schools, a fresh concern has emerged: crime rates affecting university students in Kenya. Recognizing the potential of natural surveillance to alleviate fear, this study endeavoured to establish the relationship between natural surveillance and the fear of crime within the context of IToHM students at the Dedan Kimathi University of Technology.

THEORETICAL FRAMEWORK

Crime Prevention Through Environmental Design Theory

Crime Prevention Through Environmental Design (CPTED) is a dynamic concept built on the notion that the built environment can influence potential criminals' choices before committing a crime. Developed by Jane Jacobs in the early 1960s and further advanced by criminologist Timothy D. Crowe, CPTED aims to implement natural surveillance principles within the built environment to prevent crime and alleviate the fear of crime. This theory emphasizes unique design elements and the strategic use of space to achieve its goals (Cozens et al., 2005).

CPTED strives to create an environment where crime opportunities are minimized, fostering positive interactions between citizens and their surroundings. As a proactive and preventative approach, CPTED emphasizes integrating security-enhancing features at the early design stages to reduce crime rates and the fear of crime within a community. While the existing literature has primarily addressed crime reduction, applying CPTED theory to address fear of crime still needs to be explored.

Central to CPTED is the concept of natural surveillance, which ensures that residents have clear sightlines of their surroundings. Features like well-lit areas and unobstructed views enhance surveillance capabilities (Cozens & Love, 2015). CCTV cameras, adequate lighting, and unobstructed sightlines have been demonstrated to effectively decrease citizens' fear of crime when appropriately integrated into an environment.

In summary, the theory of CPTED emphasizes implementing natural surveillance principles through thoughtful environmental design to reduce crime and cultivate a decreased fear of crime. When lacking crime prevention measures like bright lighting, CCTV cameras, clear sightlines, and secure access points, college campuses could become susceptible to criminal activities. Consequently, it becomes evident that the principles of CPTED, including and incorporating natural surveillance, are highly relevant to the current study context. This alignment underscores the significance of adopting CPTED strategies to address the fear of crime among students on college campuses (Makhaye, 2021, pp. 44-46).

Conceptual Framework

A conceptual framework serves as a guide, illuminating the intricate connections among the variables that constitute or contribute to the underlying issue (Regoniel, 2015). In this study, the researcher delves into the intricate interplay between natural surveillance and the fear of crime experienced by IToHM students at the main campus of Dedan Kimathi University of Technology.

At the heart of this exploration lies natural surveillance, a strategic approach aimed at detecting potential intruders within a given area. The fundamental objective of a surveillance strategy is to establish a system of

vigilant monitoring, fostering a discernible relationship between the heightened fear of crime and the effective implementation of natural surveillance measures among residential-dwelling students. Commonly employed strategies for effective surveillance encompass well-regulated and bright lighting, unobstructed sightlines that enable clear views, and the strategic placement of CCTV cameras. By thoughtfully incorporating these safeguards within the residential neighbourhoods where students reside, the anticipation is that the fear of crime will be mitigated.

The study delves into the emotional facet of the fear of crime experienced by IToHM students at Dedan Kimathi University of Technology. In this endeavour, the exploration delves into the profound emotional dimensions that underscore students' apprehensions. This emotional component is gauged by assessing the intensity and frequency of students' fear of crime within the context of their residential neighbourhoods, as depicted in Figure 1 below.

Through this comprehensive exploration of the connections between natural surveillance and the fear of crime, the research aims to provide valuable insights into the intricate dynamics at play among IToHM students, ultimately contributing to a better understanding of effective strategies to alleviate this fear and enhance the overall well-being of the student community.

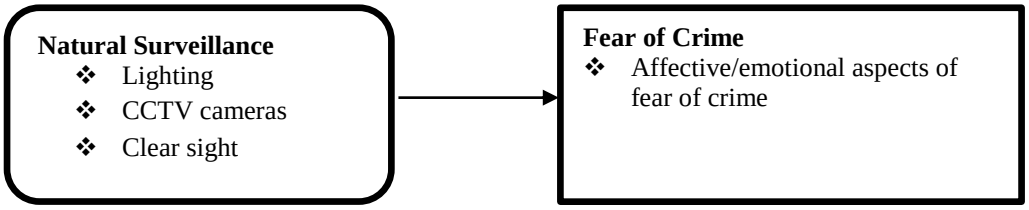

Figure 1: Relationship between natural surveillance and the fear of crime

METHODOLOGY

Research Design

According to Kombo and Tromp (2006), the research design is "a plan for the research that helps the researcher in collecting, analysing, and interpreting observable data." This study utilized descriptive research design. Descriptive survey research is quantitative and is used to gather, organize, and analyse data (De Vaus, 2013). This concept offers various advantages, including minimal cost, increased validity, respondent anonymity, and flexibility in data collection (Wimmer & Dominick, 2014).

Study area

The research was carried out at the main campus of the Dedan Kimathi University of Technology in Nyeri County, which has five institutes and five schools. Like any other university globally, the Dedan Kimathi University of Technology has some CPTED measures in place, either fully or partially in operation as security measures. Nevertheless, the relationships between these measures and the fear of crime among the students at DeKUT are yet to be established.

Target population and sample size

A population refers to a specific group of individuals residing in a particular locality, region, or setting (Naseri, 2021). Meanwhile, a sample size, as defined by Hamrang and Balkose (2014), constitutes a subset of units drawn from the entire collection of elements outlined by the sampling criteria. As elucidated by Kombo and Tromp (2006), the sample size mirrors the opinions or attributes of the broader study

population. In this study, the focus was on 200 students encompassing Diploma, Bachelor First Year, Bachelor Second Year, Bachelor Third Year, and Bachelor Fourth Year students from the Institute of Tourism and Hospitality Management (IToHM), Dedan Kimathi University of Technology. Employing Yamane's (1967) formula with a margin of error of 0.05, a sample size of 147 was determined, distributed across different academic levels within IToHM. Selection within each stratum utilized a simple random sampling approach.

Data Collection Methods and Procedures

Data collection involves gathering, measuring, and analysing data using established techniques (Johnson & Turner, 2003). A Likert-scale questionnaire was designed for this research. After establishing the questionnaire and determining the sample size, a consent letter was included in the forms. The questionnaires were physically distributed to respondents, obtained from the Registrar's office, based on academic levels: diploma, first, second, third, and fourth years. This approach ensured participants' understanding and accurate responses, making the data collection process viable and relevant to the study's objectives.

Piloting

A pilot study involving ten students from the School of Engineering at the same university was conducted to facilitate instrument refinement with input from supervisors and colleagues. The aim was to ensure instrument clarity and logic. The pilot test's outcomes determined if data collection instruments effectively captured required data and guided potential instrument adjustments, if needed.

Validity

Validity in research pertains to the accuracy of findings for broader application (Khorsan & Crawford, 2014). Employing construct validity, this study investigated the correlation between natural surveillance and fear of crime among IToHM students at Dedan Kimathi University of Technology.

Reliability

To assess the consistency of eliciting uniform responses, Cronbach's alpha (1951) correlation coefficient was employed. A correlation coefficient of 0.5 or higher signifies instrument reliability, with Knapp and Mueller (2010) emphasizing its importance for questionnaires. The reliability of the instruments used was confirmed by Cronbach's alpha (α) coefficients: 0.701 for the variables measuring Natural surveillance, 0.849 for constructs related to fear of crime, and 0.868 for constructs measuring the frequency of fear of crime. These coefficients indicated high reliability, ensuring the consistency of the measurement instruments.

Data Analysis

Collected data underwent analysis employing descriptive statistics (frequency distribution and percentages), with results presented in tables. Pearson's correlation coefficient was utilized to ascertain the relationship between natural surveillance and fear of crime among residential area students.

RESULTS

The study aimed to assess the fear of crime among IToHM students at DeKUT. Through descriptive analysis, the study gauged the intensity and frequency of fear of crime among the students, with the results displayed in Tables 1 and 2 below.

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Table 1: Descriptive Analysis of intensity of Fear of Crime among IToHM students at Dedan Kimathi University of Technology

Response	Property Theft Crime n (%)	Malicious Damage n (%	Assault Crime n (%)	Rape Crime n (%)	Robbery n (%)	Burglary n (%)
Not fearful at all	16 (13.4%)	26 (21.8%)	37 (31.1%)	69 (58.0%)	18 (15.1%)	26 (21.8%)
A little bit fearful	35 (29.4%)	38 (31.9%)	34 (28.6%)	18 (15.1%)	38 (31.9%)	43 (36.1%)
Fearful	39 (32.8%)	37 (31.1%)	29 (24.4%)	17 (14.3%)	31 (26.1%)	25 (21.0%)
Very fearful	29 (24.4%)	18 (15.1%)	19 (16.0%)	15 (12.6%)	32 (26.9%)	25 (21.0%)
Total	**119 (100%)**	**119 (100%)**	**119 (100%)**	**119 (100%)**	**119 (100%)**	**119 (100%)**

Analysis of the findings revealed that after excluding the respondents who said they were not fearful at all of the crimes provided from the survey, the results showed that theft of property was most feared (86.55%, n=103), followed by robbery (84.87%, n=101) respondents, malicious property damage and burglary with (78.10%, n= 93) each respondent, assault (68.90%, n= 82) participants, and last being rape with (42.01 %, n= 50) respondents who indicated that they were fearful.

Table 2: Descriptive Analysis of Frequency of Fear of Crime among IToHM students at Dedan Kimathi University of Technology

Responses	Property Crime n (%)	Malicious Damage to property n (%)	Assault Crime n (%)	Rape Crime n (%)	Robbery n (%)	Burglary n (%)
Just once	29 (28.6%)	30 (31.9%)	25 (30.3%)	26 (52.9%)	28 (27.7%)	25 (27.7%)
Twice	16 (15.1%)	17 (18.5%)	16 (19.3%)	5 (10.9%)	19 (18.5%)	12 (13.4%)
Three times	16 (16.0%)	15 (16.0%)	13 (16.0%)	7 (14.3%)	13 (10.9%)	17 (18.5%)
Four times	14 (13.4%)	11 (11.8%)	10 (12.6%)	3 (5.9%)	9 (9.2%)	6 (6.7%)
Five times	9 (8.4%)	9 (9.2%)	7 (8.4%)	3 (5.0%)	6 (5.9%)	10 (10.9%)
Six times	4 (4.2%)	10 (10.9%)	8 (9.2%)	3 (5.0%)	7 (6.7%)	8 (8.4%)
Seven times	6 (5.9%)	1 (.8%)	3 (3.4%)	3 (5.9%)	9 (9.2%)	4 (4.2%)
Eight times	2 (1.7%)	1 (.8%)	1 (.8%)	–	8 (7.6%)	6 (6.7%)
Nine times and more	7 (6.7%)	–	–	–	4 (4.2%)	3 (3.4%)
Total	**103 (100)**	**93 (100%)**	**82 (100%)**	**50 (100%)**	**101 (100%)**	**93 (100%)**

Results presented in Table 2 above indicated that majority of the respondents reported that they were fearful of theft crime just once in the past year (28.6%, n = 29), fearful of malicious damage to property just once in the past year (31.9%, n = 30), fearful of assault crimes (30.3%, n = 25) just once in a year, fearful of rape crimes (52.9%, n = 26) just once in a year, fearful of robbery (27.7%, n = 28) just once in a year and lastly, fearful of burglary (27.2%, n = 25) just once in a year.

Natural Surveillance and Fear of Crime Among IToHM Students at Dedan Kimathi University of Technology

The study aimed to ascertain the association between natural surveillance and fear of crime among IToHM students at Dedan Kimathi University of Technology. This led to the formulation of the research question:

"What is the relationship between natural surveillance and fear of crime among IToHM students at DeKUT?" To address this question, a blend of descriptive and inferential analyses was employed. Descriptive analysis encompassed frequency and percentage calculations, while inferential analysis utilized the Pearson correlation coefficient to determine the nature and strength of the relationship between the independent and dependent variables.

Descriptive analysis for Natural Surveillance Sub-variables among IToHM students at Dedan Kimathi University of Technology

To quantify the operationalization of natural surveillance, a specific set of statements was utilized and organized using a four-point Likert-type scale. This scale ranged from (1) strongly disagree to (2) disagree, (3) agree, and (4) strongly agree. This approach aimed to comprehensively capture individuals' perspectives and reactions pertaining to the existence and effectiveness of natural surveillance, a pivotal facet of the Crime Prevention Through Environmental Design (CPTED) framework. Within this construct, three distinct statements were chosen to gauge the presence and impact of natural surveillance measures—a cornerstone of CPTED. These statements encompassed crucial elements, including: 1. The presence of strategically positioned CCTV cameras in and around residential areas to serve as deterrents against potential criminal activities. 2. The establishment of unobstructed, clear sightlines enabling the identification of offenders from a distance, thereby reducing the potential for anonymity. 3. The provision of ample, well-regulated bright lighting in and around residential areas, acting as a deterrent for criminals.

Through careful selection, these statements aimed to holistically capture the essential aspects of natural surveillance within the CPTED framework. By utilizing the four-point Likert-type scale, these statements sought to quantitatively gauge respondents' perceptions and feedback concerning the existence and efficacy of natural surveillance measures within their residential surroundings.

The initial statement inquired about the presence of sufficient bright lighting in and around the residential areas, aiding in the identification of potential criminals from a distance. The outcomes demonstrated that a significant percentage of students strongly disagreed (42%, n = 50), followed closely by those in disagreement (34.5%, n = 41). Additionally, a notable portion expressed agreement, including those who strongly agreed (10.9%, n = 13), and those who agreed (12.6%, n = 15), as depicted in Table 3. These results underscored the insufficiency of bright lighting in the residential areas to adequately identify approaching individuals from a distance. Consequently, it can be inferred that IToHM students at Dedan Kimathi University of Technology necessitated improved bright lighting within their residential zones to enable the recognition of individuals entering the vicinity, thereby contributing to a reduction in their fear of crime.

Respondents were questioned regarding the presence of sufficient and operational CCTV cameras around the buildings in their residential areas. A notable portion of respondents strongly disagreed (51.3%, n = 61), with a closely following group expressing disagreement (37.0%). Additionally, a smaller number indicated agreement, including those who strongly agreed (10.8%, n = 10, and 3.4%, n = 4), respectively, as illustrated in Table 3. This analysis illuminated that a prevalent perception among respondents was the inadequacy of installed CCTV cameras in their residential zones to effectively monitor and discourage criminal activities.

Similarly, respondents were also inquired about the existence of a proper, unobstructed sightline in their residential areas that would allow them to observe an approaching offender from a distance. A substantial proportion of students strongly disagreed with this statement (41.2%, n = 49), with a considerable portion in disagreement (24.9%, n = 32). Moreover, a subset expressed agreement, including those who strongly agreed (18.5%, n = 22, and 13.4%, n = 16), respectively, as evident in Table 3. This assessment underscored

the necessity for improved clear sightlines in the respondents' residential areas, as the absence of such visibility made it challenging to spot potential criminals approaching from a distance.

Table 3: Descriptive analysis for Natural Surveillance Sub-variables among IToHM students at Dedan Kimathi University of Technology

	Natural Surveillance Indicators		
Responses	**1, n (%)**	**2,** n **(%)**	**3, n (%)**
Strongly Disagree	50 (42.0%)	61 (51.3%)	49 (41.2%)
Disagree	41 (34.5%)	44 (37.0%)	32 (26.9%)
Agree	13 (10.9%)	10 (8.4%)	22 (18.5%)
Strongly Agree	15 (12.6%)	4 (3.4%)	16 (13.4%)
Total	**119(100%)**	**119(100%)**	**119(100%)**

Note: Indicator 1= There is sufficient bright light around and in your residential area to identify a person clearly.

Indicator 2= There are sufficient CCTV cameras fitted around your (residential area to deter criminals from committing crime.

Indicator 3= There is adequate clear sightline with no obstructions so that you can see and identify someone approaching at a distance within your residential area as a deterrence measure to criminals.

Correlation Analysis of Natural Surveillance sub-variables and Fear of Crime among IToHM Students at Dedan Kimathi University of Technology

A comprehensive correlation analysis was undertaken to evaluate the strength and direction of the relationship between the independent variables—natural surveillance and its sub-variables including lighting, CCTV cameras, and clear sightlines—and the dependent variable, fear of crime. The results of this analysis were summarized in Table 4. The dependent variable, fear of crime, was further dissected through a descriptive examination, yielding two sub-variables: the intensity and frequency of fear of crime. The results of intensity of fear of crime were then correlated with natural surveillance and its sub-variables during the analysis.

Lighting constituted the initial sub-variable of natural surveillance that was correlated with fear of crime. The theoretical premise anticipated a negative correlation between bright lighting and fear of crime among IToHM students at Dedan Kimathi University of Technology. The rationale behind this anticipation lies in the belief that well-lit areas discourage criminal activity, as criminals avoid being noticed in well-illuminated surroundings. The Pearson correlation coefficient analysis of lighting as a sub-variable of natural surveillance and fear of crime yielded a result of ($r = -0.380$, $p = 0.000$), as delineated in Table 4. These findings indicated a significant and negative relationship between the two variables, suggesting that increased light intensity led to a reduction in the fear of crime among respondents. In essence, the outcomes underscored that the use of bright lighting in residential areas effectively diminished the fear of crime among IToHM students at Dedan Kimathi University. The analysis of the second sub-variable of natural surveillance cantered around the connection between CCTV cameras and the fear of crime. In CPTED theory, the presence of CCTV cameras within residential areas diminishes community-wide fear of crime, as potential criminals are deterred from targeting places under surveillance. Upon conducting a Pearson correlation coefficient analysis, a noteworthy and negative correlation ($r = -0.260$, $p = 0.004$) between

CCTV cameras and fear of crime emerged, as depicted in Table 4. This outcome supports the conclusion that the implementation of CCTV cameras in residential zones effectively lowered the fear of crime among IToHM students at Dedan Kimathi University of Technology.

Moving on, the third sub-variable of natural surveillance revolved around the concept of clear sightlines. By facilitating unobstructed views into the compounds of student residential areas, this operational design enhances natural surveillance within residential settings. The use of clear sightlines acts as a deterrent to crime and concurrently alleviates residents' apprehensions of crime. Employing a Pearson correlation coefficient analysis, the results unveiled a significant and negative association ($r = -0.524$, $p = 0.000$) between clear sightlines and fear of crime, as outlined in Table 4. This underscores the finding that the incorporation of clear sightlines in residential areas effectively diminished the fear of crime among IToHM students at Dedan Kimathi University.

Table 4: Correlation Analysis of Natural Surveillance sub-variables and Fear of Crime among IToHM students at Dedan Kimathi University of Technology

Sub-Variables		**1**	**2**	**3**	**Fear Crime**
1. Lighting	Pearson Correlation	1			
	Sig. (1-tailed)				
	N	119			
2. CCTV Camera	Pearson Correlation	.391**	1		
	Sig. (1-tailed)	.000			
	N	119	119		
3. Clear Sightline	Pearson Correlation	.529**	.242**	1	
	Sig. (1-tailed)	.000	.008		
	N	119	119	119	
Fear Crime	Pearson Correlation	-.380**	-.260**	-.524**	1
	Sig. (1-tailed)	.000	.004	.000	
	N	119	119	119	119
Note. **. Correlation is significant at the 0.01 level (1-tailed).					

The Correlation Analysis of Natural Surveillance and Fear of Crime among IToHM Students at Dedan Kimathi University of Technology

Integrating all sub-variables of natural surveillance, they were collectively transformed into a unified variable. This amalgamation represented natural surveillance as an independent factor, which was then correlated with the dependent variable of fear of crime, where a negative relationship was anticipated. The hypothesis was that an environment fortified by natural surveillance measures would yield lower fear of crime among its occupants. The application of a Pearson correlation coefficient revealed a substantial negative relationship ($r = -0.514$, $p = 0.000$) between these variables, as depicted in Table 5.

Table 5: Correlation Analysis for Natural Surveillance and Fear of Crime among IToHM Students at Dedan Kimathi University of Technology

Variables		**Fear Crime**	**Natural Surveillance**
Natural Surveillance	Pearson Correlation	-.514**	1
	Sig. (1-tailed)	.000	
	N	119	119
Note. **. Correlation is significant at the 0.01 level (1-tailed).			

DISCUSSION

The researcher partitioned the concept of natural surveillance into three distinct sub-variables, operationalized to gauge the application of natural surveillance within the respondents' residential surroundings. The initial sub-variable explored pertained to lighting. Analysis involving the Pearson correlation coefficient revealed a noteworthy and negative correlation between ample lighting and fear of crime among the respondents in their residential areas ($r = -0.380$, $p = 0.000$). This finding was consistent with earlier research demonstrating that incorporating adequate lighting in space reduces the fear of crime within that community (Edwards et al., 2015). Similarly, Ceccato's (2020) work corroborated this trend by showcasing lighting's overall detrimental impact on crime and the fear of crime across 35 publications. Furthermore, aligned with the current study, a distinct research initiative demonstrated that 72% of the surveyed studies established that improved lighting heightened public safety and concurrently mitigated fear of crime (Ceccato, 2020).

Relevant insights were also derived from the work of Nikunen and Korpela (2012), who utilized computer-generated urban designs to investigate lighting's influence on people's fear of crime in a specific locale. Their findings indicated a decline in fear of crime within well-illuminated environments, substantiating a negative relationship between lighting and fear of crime.

The second component of natural surveillance considered using CCTV cameras within respondents' residential areas. Typically, having CCTV cameras in place acts as a deterrent to potential criminals, as their presence discourages criminal activities. An analysis using a Pearson correlation coefficient explored the connection between CCTV camera implementation and the fear of crime. The findings revealed a significant negative correlation between the two variables ($r = -0.260$, $p = 0.004$). This outcome indicated that when CCTV cameras were adequately utilized in residential areas, the respondents experienced reduced fear of crime. These results were in line with previous research, affirming that the presence of CCTV cameras deters criminals, consequently leading to a diminished fear of crime among citizens (Piza et al., 2019).

The third aspect of natural surveillance, which focuses on clear sightlines in respondents' residential areas, was operationalized and analysed. In settings where clear sightlines are present, criminals find hiding spots difficult, making it challenging for them to commit crimes. Consequently, a sense of fear among the residents is expected to be low. A Pearson correlation coefficient was employed to explore the relationship between clear sightlines and the fear of crime among the respondents. The results revealed a significant negative correlation between the two variables ($r = -0.524$, $p = 0.000$). This outcome indicated that respondents in areas with clear sightlines experienced reduced fear of crime, as they could identify potential criminals from a distance.

These findings align with earlier research by Ceccato and Tcacencu (2018) and Fennelly and Perry (2020), which demonstrated that enhancing visibility in the surroundings by measures such as lowering bush and wall height, increasing tree cover, and maintaining well-trimmed grounds contributed to reduced fear of crime among citizens. Moreover, these results were consistent with Landman's (2020) study, which highlighted concerns among individuals along the railway lines with poor sightlines due to limited visibility and overgrown vegetation, creating hiding spots for potential criminals. This convergence of findings reinforces that improving visibility through clear sightlines can effectively alleviate the fear of crime in various societal contexts.

Combining all three sub-variables of natural surveillance, a single composite variable was formed, correlated with the fear of crime. Theoretically, an environment equipped with well-implemented natural surveillance measures is expected to yield reduced fear of crime among its occupants. This outcome stems from the deterrence effect that makes criminal activities challenging, fostering lower fear levels. A Pearson

correlation coefficient analysis revealed a significant negative correlation between natural surveillance and fear of crime ($r = -0.514$, $p = 0.000$) among respondents in residential areas. These findings align with the conclusions drawn by Lee, Park, and Jung (2016), indicating that natural surveillance strategies surpass architectural design in reducing crime and fear of crime in residential settings. Thus, deploying natural surveillance as a security strategy effectively curbed fear of crime among IToHM students at Dedan Kimathi University within their residential zones.

CONCLUSION AND RECOMMENDATION

Most of the correlation coefficients of the current study yielded negative correlations, suggesting that the various aspects of natural surveillance implemented by residential areas management reduced the students' fear of crime. Therefore, a commitment by management is considered an operational necessity to achieve a conducive environment free from fear of crime on campus. To reduce fear of crime among university students, top management must commit to reallocating scarce resources to areas of high fear of crime and adopt well-defined and natural surveillance measures. Lack of commitment from management leads to poor enforcement of the rules. Therefore, many university students are more likely to become victims of crime, and this situation may lead to a high fear of crime among them.

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