INTERNATIONAL JOURNAL OF SUSTAINABLE CONSTRUCTION ENGINEERING AND TECHNOLOGY
VOL. 14 NO. 5 (2023) 314-327

IJSCET

http://publisher.uthm.edu.my/ojs/index.php/ijscet

ISSN : 2180-3242 e-ISSN : 2600-7959

International Journal of Sustainable Construction Engineering and Technology

Establishing Crime Prevention Through Environmental Design Model

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DOI: https://doi.org/10.30880/ijscet.2023.14.05.025
Received 22 August 2023; Accepted 03 September 2023; Available online 31 October 2023

Abstract: Rapid urbanization in Malaysia has led to an increasing crime rate, necessitating an understanding of the relationships between crime, the environment, and community. This study examines the causal connections among fear of crime, sense of community, and Crime Prevention Through Environmental Design (CPTED) using a quantitative approach with 171 respondents in Selangor and Putrajaya. Previous research has highlighted the psychological effects of crime and the efficacy of defensible space and CPTED in reducing crime in residential areas. However, the causal relationship between sense of community and CPTED requires further investigation. The study's causal model confirms that fear of crime does significantly influence CPTED implementation and the sense of community. Additionally, a strong sense of community significantly impacts CPTED, underscoring the role of community engagement in enhancing crime prevention strategies. These findings have practical implications for policymakers and urban planners, emphasizing the importance of addressing fear of crime to create safer environments that foster community cohesion. Strategies may include improved lighting, surveillance systems, and community-building initiatives. Further research can explore underlying mechanisms and moderating factors. Ultimately, addressing fear of crime, sense of community, and implementing CPTED can enhance community well-being and promote a sense of security.

Keywords: SEM, CPTED, sense of community, fear of crime, causal relationship

1. Introduction

Crime is an enduring issue and a top concern for countries worldwide. It pervades both cities and neighbourhoods, making the safety and the well-being of their residents crucial. Cities and crime are closely intertwined (Nasar & Jones, 1997) with criminal activity being an inherent aspect of urban life (Brantingham & Brantingham, 1993). Malaysia is not spared. Malaysia is experiencing rapid urbanization in Southeast Asia region (Wong, Shaw, & Goh, 2006), and is also grappling with the challenge of rising crime rates.

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Crime and environment studies (Hedayati Marzbali et al., 2012; Cauwenberg et al., 2022; Sagovsky & Johnson, 2007; Davies & Johnson, 2014; Tao et al., 2022; Piroozfar et al., 2019; Brantingham & Brantingham, 1993; Zeng et al., 2021) have sparked widespread debates and concerns on the issue. These studies explore the impact of crime on society, particularly the fear of crime (Sakip, Zukri, & Rahim, 2023;Kuen et al., 2022; Carter et al., 2021; Hedayati Marzbali et al., 2016, 2012; Sakip et al., 2012; Rollwagen, 2014; Ceccato & Wilhelmsson, 2012; Snedker, 2010; DeLone, 2008), which is associated with psychological effects like anxiety and insecurity. Researchers have therefore turned their attention to various theories aimed at reducing criminal behavior and fear of crime to enhance the overall sense of safety. One such theory is defensible space (Newman, 1972), which emphasizes the influence of place ownership, territory, surveillance, and image in residential areas. This concept builds upon Jacob's notion of "eyes on the street" (1961) and focuses on urban environments utilizing mixed land-use strategies to enhance surveillance and deter criminal activities, ultimately creating a safe and highly monitored living environment, especially during night-time.

The researchers' interest in neighbourhood's safety and its relationship with crime have led to numerous studies and interest. These studies focused on two main aspects: the impact of the physical environment (D, 1994; Velasquez et al., 2021; Loh et al., 2018; Cozens et al., 2001) and the role of community relationships (Sakip et al., 2012a; Clampet-Lundquist, 2010; Villarreal & Silva, 2006; Rogers & Sukolratanametee, 2009), including the concept of Crime Prevention Through Environmental Design (CPTED) in reducing fear of crime and fostering community relations. Some researchers also explored the relationship between fear of crime and a sense of community (Loh et al., 2018; Prezza & Pacilli, 2007; Cops, 2014; Matsukawa & Tatsuki, 2018; Fatemeh et al., 2019), as well as fear of crime and CPTED (Lee et al., 2016; Hedayati et al., 2012). However, investigating the causal relationship between a sense of community and CPTED requires significant effort. Furthermore, establishing a causal relationship among fear of crime, sense of community, and CPTED is challenging. Thus, this paper aims to address the gap in understanding the causal relationship between these variables. The primary objective is to present a causal model that elucidates the relationship between fear of crime, sense of community, and CPTED for the overall well-being of the community. This model builds upon the work of previous scholars and encompasses a systematic study of interventions in the built environment to enhance quality of life by addressing crime, fear of crime, sense of community, and CPTED.

1.1 Fear of Crime

Fear of crime is a pervasive feeling of anxiety and insecurity focusses on personal safety, even without direct exposure to criminal activities. This fear significantly impacts individuals' behaviour and decision-making, leading them to avoid specific places or activities, adopt enhanced security measures, or carry self-defense tools. Contrary to popular belief, fear of crime often does not align with actual crime rates but is shaped by various factors such as media portrayal, personal encounters, social interactions, and perceptions of the criminal justice system. Research conducted by Jackson and Gray (2010) revealed that individuals with prior victimization experiences, a history of mental health issues, and limited social support exhibited higher levels of fear of crime. Moreover, this study explored on the fear of crime among certain group of people such as women, older adults, and those with lower socioeconomic status.

Fear of crime is a multifaceted issue influenced by various factors. One factor is perceived risk. Perceived risk is a significant contributor, with individuals who believe they are more likely to be victimized experiencing higher levels of fear (Warr, 1984). This perception can be influenced by living in a high-crime area, past victimization, or belonging to a vulnerable group. Media exposure also plays a crucial role in shaping public perceptions of crime and safety. Studies indicate that exposure to crime-related media increases fear of crime (Sacco & Kennedy, 2011). Besides, social networks and interactions are additional influencers of fear of crime. Individuals with strong community ties and social support often feel safer compared to those lacking social connections (Ferraro, 1995). Other factors involve personal characteristics such as age, gender, and race, can also impact fear levels. For instance, women generally report higher levels of fear of crime compared to men (Ferraro, 1995). Lastly, neighbourhood characteristics like crime rates, graffiti presence, and housing quality can also contribute to fear of crime (Taylor & Hale, 1986).

In addition, Newman and Franck (1982) studied the impact of building size on fear of crime. They discovered that residents in larger buildings tend to have higher levels of fear of crime. This can be attributed, in part, to the perception among residents in high-rise buildings that they have limited control over common areas and outdoor spaces. Similar findings have been observed elsewhere. For example, Kearns and colleagues (2012) conducted a study in a deprived area of Glasgow, Scotland, and found that individuals living in high-rise buildings are more likely to feel unsafe when walking in their neighbourhood at night and within their own homes.

Furthermore, further research has explored specific aspects of high-rise housing that contribute to fear of crime. Lowry (1990) investigated British families living in apartment buildings and found that safety concerns primarily revolve around crime occurring in public stairwells. In Singapore, a study by Yuen et al. (2006) revealed that many residents of high-rise buildings fear crime, particularly in relation to potential criminal victimization in elevators.

However, not all studies support Newman's theory. Vilalta (2011) examined the relationship between living in an apartment building and fear of crime at home in the evening. The results indicated that living in an apartment building had no significant correlation with fear of crime at home when considering relevant variables. In addition, Normoyle and

Foley (1988) conducted a study on elderly tenants in public housing to test the defensible space model. They found that elderly residents of high-rise buildings reported less anxiety about crime compared to tenants in walk-ups and row houses.

1.2 Sense of Community

Sense of community (henceforth SOC) refers to the sense of belonging, connectedness, and identification with a specific group or community. It encompasses emotional, cognitive, and behavioural aspects of community membership (McMillan & Chavis, 1986). SOC has been extensively studied in various contexts, including online communities, neighbourhoods, and workplaces. Research consistently shows that higher levels of SOC lead to positive outcomes, such as increased well-being, social support, and civic engagement (McMillan & Chavis, 1986; Pretty et al., 2003). McMillan and Chavis (1986) further proposed a model of SOC, highlighting four key components: membership, influence, integration and fulfilment of needs, and shared emotional connection. According to this model, SOC is strengthened when individuals feel a sense of membership. Additionally, it can influence and be influenced by others, feel integrated and supported by the group, and experience a shared emotional connection with fellow members. Overall, SOC is a valuable concept for comprehending the social and psychological benefits derived from community membership. It has significant implications for community development, social policy, and individual well-being.

McMillan and Chavis (1986) identified four key factors that influence the sense of community among individuals. These factors are:

i) Shared identity and values: When individuals share common identity and values with others in their community, they feel a stronger connection and sense of belonging. For instance, members of a religious group who hold similar beliefs and values are more likely to experience a strong sense of community.

ii) Social interaction: Regular social interaction among community members fosters a stronger sense of community. This can be achieved through engaging in shared activities like sports, clubs, and community events. Social interactions provide opportunities to build closer relationships and develop a sense of camaraderie.

iii) Common experiences: Shared experiences, such as natural disasters or significant events, can bring people together and strengthen the sense of community. For example, in the aftermath of a hurricane or wildfire, individuals may unite to support one another and rebuild their community.

iv) Sense of ownership: When individuals feel a sense of ownership and the ability to contribute to the success of their community, they are more likely to feel a sense of belonging. This can be facilitated through opportunities for participation and involvement in community decision-making.

Additionally, the physical environment also plays a role in fostering a sense of community. Shared spaces like parks, community gardens, or public gathering areas provide opportunities for individuals to come together and interact, further enhancing the sense of community.

1.3 Crime Prevention Through Environmental Design

"Crime Prevention Through Environmental Design" (henceforth CPTED) is a multidisciplinary approach aimed at reducing criminal activity by strategically designing physical environments. The principles of CPTED focus on enhancing visibility, promoting natural surveillance, and controlling access to spaces (National Institute of Justice, 2019). The four main principles of CPTED, as outlined by Crowe (2000), are as follows:

i) Natural Surveillance: Designing the environment in a way that allows potential offenders to be easily seen and identified by others. This can be achieved through the use of lighting, landscaping, and physical barriers. Surveillance serves a dual purpose: monitoring criminal activity and alleviating anxiety among neighbourhood residents. To enable effective surveillance, it is crucial for residents to be acquainted with their neighbours, allowing them to identify potential intruders. Consequently, designing buildings that encourage resident interaction enhances informal surveillance capabilities. This notion aligns with Jane Jacobs' (1961) proposition that neighbourhoods promoting frequent face-to-face interaction foster trust and relationships among neighbours. As a result, more individuals engage in public spaces, augmenting informal surveillance. Conversely, Newman (1972) argues that high-rise buildings are prone to criminal activity due to the difficulty in distinguishing neighbours from intruders among the large resident population. This was also because it limits the residents' capacity for informal surveillance. Although, previous studies have established the role of neighbourhood social networks and ties in crime control (Bellair, 1997; Bursik, 1984; Rountree & Warner, 1999; Sampson & Groves, 1989), Newman and Jacobs' theories uniquely outline the relationship between the physical environment and residents' potential for forming social connections as ways to address crime.

ii) Territorial Reinforcement: Creating a sense of ownership and responsibility among individuals in the environment, encouraging them to take action to prevent crime. Signage, landscaping, and physical barriers can be used to establish this sense of territoriality. By assigning responsibility for a space, residents are more likely to actively monitor and manage suspicious activities, by exercising informal social control (Newman, 1972). According to the principles of defensible space design, residents living in multiunit dwellings, such as apartment buildings, are more susceptible to crime due to the presence of communal areas with limited territoriality, such as hallways, lobbies, stairwells, and outdoor grounds.

iii) Access Control: Limiting access to specific areas and establishing clear entry and exit points to regulate who enters and exits the environment. Fencing, gates, and surveillance technology can be employed to control access.

iv) Maintenance: Keeping the environment clean, well-maintained, and free from signs of disorder to inform that the area is regularly monitored and cared for. Regular cleaning, maintenance, and repair contribute to this objective.

By implementing these four principles, CPTED aims to prevent crime and enhance overall safety. Research consistently supports the effectiveness of CPTED in reducing crime and enhancing community safety. Taylor and Harrell (1996) found that CPTED interventions, such as improved lighting, natural surveillance, and access control, effectively reduced crime in residential areas. A meta-analysis of 13 studies confirmed the significant crime reduction associated with CPTED, particularly in property crime (Crowe et al., 2019). Bullock and Clarke (2001) demonstrated that implementing CPTED principles in a public housing complex led to crime reduction and increased resident satisfaction. Cozens and Hillier (2002) also found that CPTED interventions, including enhanced lighting, increased visibility, and better public space maintenance, effectively reduced crime in downtown areas. Moreover, CPTED promotes perceived safety and positive social interaction within communities. Numerous studies validate this, such as a New York City study that reported a 35% crime reduction over two years by implementing CPTED in a public housing development (Eck & Wartell, 1998). Similarly, in a high-crime area of Baltimore, CPTED strategies led to a 40% crime reduction over four years (Welsh & Farrington, 2002). Roncek and Bell (2003) conducted studies in a Seattle residential neighbourhood, showing an 8% increase in residents' perceived sense of safety due to CPTED interventions. In summary, the evidence overwhelmingly supports the implementation of CPTED principles as an effective approach to reducing crime and enhancing community safety.

1.4 Relationship of Crime Prevention Through Environmental Design

In the field of criminology and community psychology, the constructs of fear of crime and sense of community hold significant importance. These two concepts are closely intertwined and have the ability to influence each other in various ways. A study conducted in Chicago aimed to investigate the relationship between fear of crime and sense of community in different neighbourhoods. The findings revealed a negative association between fear of crime and sense of community, indicating that neighbourhoods who were experiencing greater social disorganization and disorder had higher levels of fear of crime (Perkins, D. D., & Long, D. A., 2002).

Another study by Taylor, and Hale (1986) explored the link between sense of community and fear of crime in 16 neighbourhoods across three U.S. cities. The results demonstrated a negative correlation between sense of community and fear of crime, suggesting that neighbourhoods with higher levels of social capital experienced lower levels of fear of crime. Similarly, a study conducted in a large U.S. city examined the relationship between fear of crime and sense of community among residents from four neighbourhoods. The findings indicated a negative association between fear of crime and sense of community, suggesting that residents who felt a stronger sense of community were less likely to fear crime (Skogan, W. G., & Maxfield, M. G., 1981).

Another study investigated the relationship between fear of crime and sense of community in 11 Chicago neighbourhoods (Skogan, W. G., 1986). The results demonstrated a negative correlation between fear of crime and sense of community and revealed that residents who felt a stronger sense of community were more likely to engage in collective coping strategies to address crime and disorder in their neighbourhoods.

Overall, the research consistently suggests a negative relationship between fear of crime and sense of community. It further indicates that neighbourhoods with stronger senses of community tend to experience lower levels of fear of crime. These findings hold significant implications for community-based crime prevention efforts and strategies aimed at promoting social capital and sense of community within neighbourhoods.

2. Methodology

Crime index statistical data is used as a basis for identifying the study areas to ensure that the research data is accurate in measuring the studied variables. This study focuses on areas within Malaysia that exhibit high crime index statistics. To gather the necessary data, statistical crime records spanning from 2011 to 2020 were obtained from the Royal Malaysian Police (PDRM) (refer to Table 1).

Table 1 - The crime index in Malaysia

State	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Johor	20970	19068	17105	15082	13480	12941	11307	10338	9870	7350	137511
Kedah	10667	10100	8636	8028	7817	7440	6759	6221	5615	4131	75414
Kelantan	6199	6053	5737	5603	5031	4548	4520	3987	3545	2531	47754
Kuala Lumpur	25002	23022	22319	18293	15946	16989	13482	12127	11172	8301	166653
Melaka	4830	4764	4186	3675	2948	3664	3097	2800	2561	1794	34319

Negeri Sembilan	6050	6563	5993	5495	4787	4474	3973	3673	3327	2431	46766
Pahang	5994	5619	5257	5085	4257	3777	3607	3584	3271	2331	42782
Perak	9869	8545	7429	6860	6228	5841	5326	5128	4912	3388	63526
Perlis	1113	974	831	814	741	655	603	563	527	493	7314
Pulau Pinang	9758	8399	7936	7491	6697	6116	5551	5017	5218	3853	66036
Sabah	-	3489	5772	5210	5176	5367	6236	6151	5745	3799	46945
Sarawak	-	6202	9191	7556	7230	6826	6381	5830	6023	5850	61089
Selangor	44302	40629	43060	36165	32547	31222	26069	21420	19800	17272	312486
Terengganu	3841	3505	3610	3213	2659	2494	2257	1823	1870	2099	27371

Source: Royal Malaysia Police (2021)

During the ten-year period from 2011 to 2020, three states in Malaysia stood out with the highest index crime statistics. These states are as follows: i) Selangor (31.2486), ii) Kuala Lumpur (16.6653), and iii) Johor (13.7511). An index crime refers to a crime that is frequently reported and holds significant importance as an indicator of the overall crime situation (KDN, 2023). Index crimes are categorized into two main categories: property crimes and violent crimes. Property crimes encompass thefts involving vehicles, motorcycles, lorries/vans/trucks, snatch thefts, and burglaries. On the other hand, violent crimes consist of murder, rape, defamation, rioting, extortion, robberies with firearms, robberies without firearms, criminal threats, and causing injury.

Therefore, the study focused on residential areas in the state of Selangor to better assess the implementation of CPTED elements. Two specific areas were chosen for analysis: Putrajaya, an unfenced residential area, and Bandar Baru Bangi, a gated residential area. Both of these areas are located in Selangor, which is situated in the central part of Malaysia. Putrajaya serves as the administrative centre of the Federal Government of Malaysia and is positioned south of Kuala Lumpur city centre (Putrajaya, 2009). It is a flagship city that holds significant importance for the country, attracting people to live and work there. The housing development in Putrajaya adopts an open concept without fences to foster positive community relations among neighbours. The study focused on the residential area of *Jalan Presint 9 B*, which was the first neighbourhood built in Putrajaya (Roslan Talib, 2009). This particular area consists of 275 residential units and primarily features two-storey terraced housing.

In addition to Putrajaya, Bandar Baru Bangi was chosen as a study area due to its proximity to Putrajaya, approximately 15 kilometers away (Putrajaya, 2009). Bandar Baru Bangi is a new township located in the Kajang District of Selangor. Often referred to as a Satellite Town, it is the second largest city in Malaysia after Shah Alam. The housing development in Bandar Baru Bangi follows a gated concept. For data collection, the study focused on the residential area of Jalan Seksyen 4 4/7, which consists of 201 residential units. This area shares similar characteristics with the *Jalan Presint 9 B* residential area in Putrajaya, featuring landed properties and two-storey terrace housing.

2.1 Data Collection

This research is a quantitative approach; thus, the population data is important to examine the data sampling. The population of this study consists of all residents living in the non-gated individual residential areas (KITB) in Precinct 9B, Putrajaya, and the gated individual residential areas (KIB) in Section 4 Jalan 4/7, Bandar Baru Bangi for the year 2009. There are 275 houses in KITB and 201 houses in KIB, making a total population of 476 for both study areas. Due to the relatively small population size in both study areas (476 households), a population study is conducted in this research. A population study is like a census study where all households in both residential areas (476 households) are taken as the study sample. According to De Vaus (2002) and Neuman (2006), a population study is capable of collecting data on every individual in the study population. The use of this population study method also enables a comprehensive representation of the actual population conditions in the study areas (Bryman, 2004).

Therefore, a total of 476 sample for questionnaires were distributed to cover the study area, but only 171 respondents provided their responses. Prior to the final data collection, the questionnaire underwent testing and pilot testing to ensure it was professionally designed, well-structured, concise, and easy to complete. The respondents were selected based on specific criteria: they were required to be residents who had lived in the study area for more than five years. This criterion was chosen because residents with a tenure exceeding five years were deemed to possess stability and a clear understanding of the neighbourhood's dynamics. Additionally, tenants who had resided in the area for more than five years were also eligible to participate as respondents.

In this research, statistical analysis was conducted using the SmartPLS 4.0 software with the partial least squares structural equation modeling (PLS-SEM) approach. PLS-SEM utilizes variance-based partial least squares techniques to estimate causal models based on established theory. It follows an iterative approach similar to multiple regression analysis (Hair et al., 2011). The primary goal of PLS-SEM is to maximize the explained variance of endogenous constructs (Fornell & Bookstein, 1982). The choice of PLS-SEM aligns with the study's objective to explore the extension of established theory, as recommended by Hair et al. (2019).

3. Result and Discussion

The presentation of research findings begins with descriptive findings to explain the profile of the respondents involved in this study. It is then followed by the measurement model findings for each variable to examine the convergent validity. Next, the analysis continues with a check of the discriminant validity to ensure that each construct's correlations are lower than the correlation estimates between the factors. After that, the structural model analysis is conducted to address the formulated research hypotheses.

3.1 Descriptive Analysis

Table 2 presents the characteristics of the participants for this study. The respondents included 81 individuals (47.4%) from the Putrajaya area and 90 individuals (52.6%) from the Bangi area. In terms of gender, 91 participants (53.2%) were male and 80 participants (46.8%) were female. The age distribution of the participants indicated that the majority, 48.5%, belonged to the 40's age group, followed by the 30's (28.1%), 50's (17%), 20's (4.1%), and those above 60's (2.3%). The ethnic composition consisted of Malay respondents (96.5%), with Chinese and Indian respondents each comprising 1.8%. The religious affiliation of the participants was predominantly Muslim (97.1%), while Buddhist and Hindu participants accounted for 1.2% and 1.8% respectively. Among the respondents, 157 (91.8%) were married, while only 14 (8.2%) were unmarried. Additionally, the majority of the participants possessed higher education qualifications, with 146 (85.4%) having completed university or college level education, and 25 (14.65) having secondary education, while, on the aspect of housing, an equal proportion of participants were homeowners (52.6% or 90 individuals) and renters (47.4% or 81 individuals).

Table 2 - Respondent's background

Variable	Answer	Frequency	Percentage
Research area	Putrajaya	81	47.4
	Bangi	90	52.6
Gender	Lelaki	91	53.2
	Perempuan	80	46.8
Age	20s’	7	4.1
	30’s	48	28.1
	40’s	83	48.5
	50’s	29	17.0
	60’s and above	4	2.3
Nation	Malay	165	96.5
	Chinese	3	1.8
	Indian	3	1.8
Religion	Islam	166	97.1
	Budha	2	1.2
	Hindu	3	1.8
Marriage status	Single	14	8.2
	Married	157	91.8
Level of education	University/ College	146	85.4
	Pendidikan Menengah	25	14.6
Residential ownership status	*Pemilik*	90	52.6
	Penyewa	81	47.4

3.2 Measurement Model

To achieve the objectives of this study, three main constructs were utilized: Fear of Crime (FOC), Sense of Community (SOC), and Crime prevention through Environmental Design (CPTED). The dimensions of FOC encompass the physical environment, social environment, and indirect victimization. Meanwhile, the dimensions of the SOC construct include membership, influence, needs reinforcement, and shared emotional connection. Finally, the CPTED construct comprises four dimensions: territory, surveillance, maintenance, and access control.

To examine the measurement and structural models, SmartPLS version 3.3.3 (Ringle et al., 2015), utilizing partial least squares (PLS) modeling, was employed. This statistical tool was chosen due to its ability to accommodate survey studies, which are often not normally distributed, without requiring normality assumptions (Chin et al., 2010). For the measurement model, the loadings, average variance extracted (AVE), and composite reliability (CR) were utilized. The recommended thresholds for these values are as follows: loadings should be ≥0.5, AVE should be ≥0.5, and CR should be ≥0.7. In Table 3, it can be observed that all AVE values exceed 0.5, and all CR values surpass 0.7. The loadings were generally satisfactory, with only a few loadings below 0.708, which is considered an acceptable value according to Hair

et al. (2019). Based on these findings, it can be concluded that the constructs in the study meet the requirements for reliability and convergent validity.

Table 3 - Convergent Validity

Variable	Item	Loading	AVE	CR
Fear of Crime	d4.a	0.815	0.789	0.971
	d4.b	0.904		
	d4.c	0.925		
	d4.d	0.883		
	d4.e	0.916		
	d4.f	0.908		
	d4.g	0.893		
	d4.h	0.878		
	d4.i	0.867		
Sense of Community	e1.a	0.725	0.514	0.912
	e1.b	0.846		
	e1.c	0.762		
	e1.d	0.744		
	e1.e	0.831		
	e1.f	0.719		
	e1.g	0.699		
	e1.h	0.623		
	e1.j	0.551		
	e1.l	0.612		
CPTED	f1.a	0.758	0.523	0.845
	f1.d	0.667		
	f1.e	0.756		
	f1.k	0.693		
	f1.l	0.737		

In the second step of the analysis, we evaluated the discriminant validity using the criterion proposed by Fornell, Claes & Larcker (1981). In the context of PLS-SEM, discriminant validity can be assessed by comparing the square root of the average variance extracted (AVE) for two factors with the correlation estimates (r) between the same two factors. To establish discriminant validity, the square root of AVE should be greater than the correlation estimates between the two factors.

Table 4 presents the results of the discriminant validity assessment using the Fornell and Larcker criterion. The findings demonstrated that the square root of AVE for each construct exceeded the correlation estimates between the factors. This indicates that all the constructs exhibited discriminant validity and can be considered distinct from one another. Consequently, these validity tests confirm that the measurement items are both valid and reliable.

Table 4 - Discriminant Validity (Htmt)

	1	2	3
1. CPTED			
2. Fear of Crime	0.530		
3. Sense of Community	0.361	0.317	

3.3 Model Fit and Predictive Relevance

The evaluation of structural equation modeling entails examining model fit indicators, which measure how well predefined models align with the analyzed sample data. In CB-SEM, various indicators were employed to gauge how

well the tested model aligns with the data. These include Chi-square, the ratio of Chi-square to degrees of freedom, as well as fit indices proposed by Hair, Black, Babin & Anderson (2006) such as Root Mean Square of Approximation (RMSEA), Goodness of Fit Index (GFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI). For the analysis conducted using SEM-PLS (version 4.0), the determination of model fitness is achieved through PLS-predict analysis. The process begins by evaluating the suitability of the model. This involves examining measures of goodness-of-fit, including R^2 and Q^2. While R^2 evaluates the extent to which the model explains variance, Q^2 assesses the model's ability to predict outcomes accurately. Higher Q^2 values (above 0) suggest stronger predictive capability (Hair, 2017). The outcomes of the analysis indicated that when the predicted Q^2 value is greater than 0 (CPTED = 0.196, SOC = 0.115), it signifies that the framework or model is proficient in making future predictions.

3.4 Structural Model

Following the recommendation by Hair et al. (2019), the structural model's path coefficients, standard errors, t-values, and p-values were assessed using a 5,000-sample re-sample bootstrapping procedure (Thurasamy et al., 2018). Furthermore, addressing the criticism raised by Hahn and Ang (2017) on the limited reliability of p-values as a sole criterion for hypothesis testing, the researchers were advised to consider a combination of criteria, including p-values, confidence intervals, and effect sizes. Thus, these criteria were included in the analysis.

Table 5 provides a summary of the criteria used to test the developed hypotheses:

H1: Fear of Crime significantly affects CPTED.
H2: Fear of Crime significantly affects Sense of Community.
H3: Sense of Community significantly affects CPTED.

Table 5 - Hypothesis testing

Hyphothesis	Relationship	Std Beta	Std Dev	t-value	p-value	BCI LL	BCI UP	f^2
H1	Fear of Crime -> CPTED	0.390	0.076	5.110	0.000	0.240	0.535	0.175
H2	Fear of Crime -> Sense of Community	0.376	0.061	6.146	0.000	0.218	0.471	0.164
H3	Sense of Community -> CPTED	0.203	0.100	2.021	0.043	-0.024	0.371	0.047

In this study, the relationships between predictors and the variables Crime Prevention Through Environmental Design (CPTED) and Sense of Community (SOC) were examined. The results indicated that Fear of Crime had a positive relationship with SOC (β=0.379, p<0.05). Furthermore, Fear of Crime (β=0.390, p<0.05) and SOC (β=0.23, p<0.05) both exhibited positive relationships with CPTED. Therefore, the findings supported hypotheses H1, H2, and H3. These causal relationships are visually represented in Figure 1.

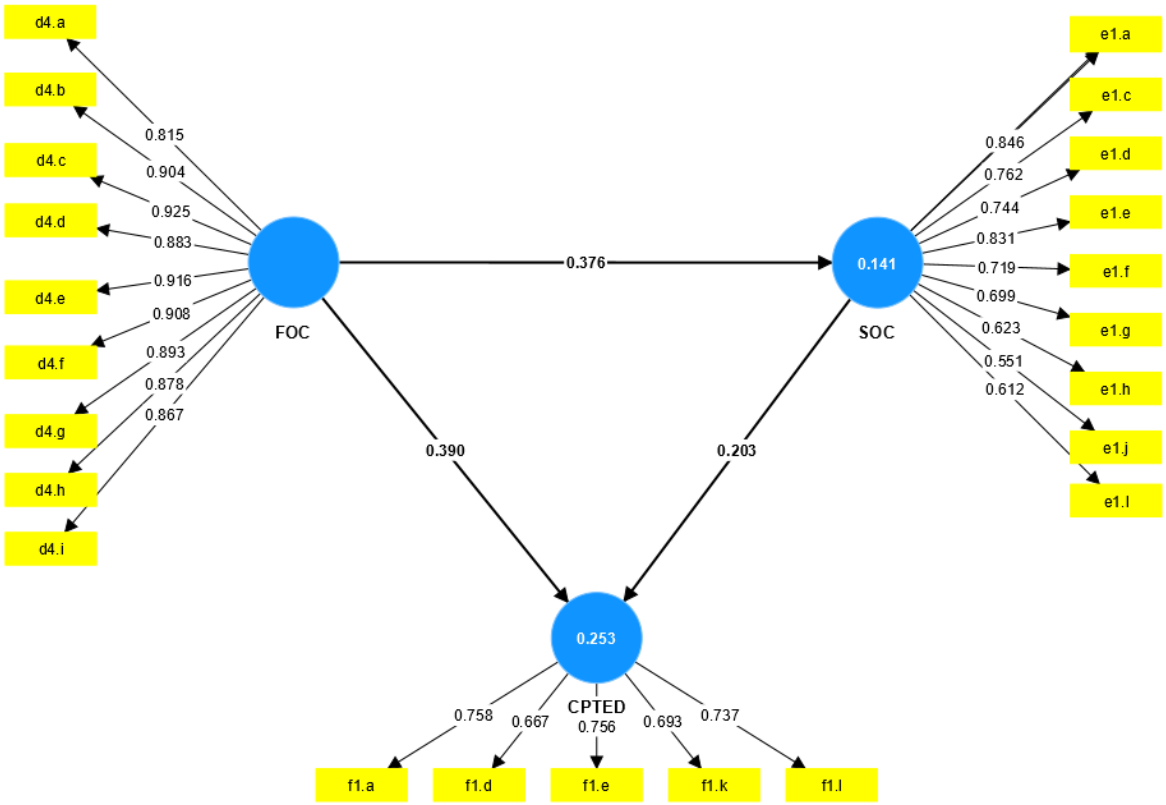

Fig. 1 - Research Framework of causal relationship between FOC and SOC towards CPTED and FOC towards SOC

Note: FOC= fear of crime, SOC= sense of community, CPTED= crime prevention through environmental design

Figure 1 explain the findings of the study revealed several significant relationships. Firstly, Fear of Crime was found to have a positive relationship with SOC (β=0.379, p<0.05). This suggests that individuals who experience higher levels of fear related to crime are more likely to have a stronger sense of community. This finding implies that a shared perception of fear may lead to increased social cohesion and community bonding as individuals seek support and security from their community members. Additionally, the study found that both Fear of Crime (β=0.390, p<0.05) and SOC (β=0.23, p<0.05) exhibited positive relationships with CPTED. This indicates that higher levels of Fear of Crime and stronger Sense of Community are associated with greater implementation and effectiveness of Crime Prevention Through Environmental Design strategies. CPTED involves designing the physical environment in a way that discourages criminal activities and enhances feelings of safety and security. The positive relationships found in this study suggest that communities with higher levels of fear and stronger social connections are more likely to implement CPTED strategies and experience their benefits.

The results of this study provide support for the hypotheses H1, H2, and H3, which presumably predicted the relationships between the variables. These implies that the researchers had formulated predictions about the associations between Fear of Crime, SOC, and CPTED prior to conducting the study. Overall, this study contributes to the academic understanding of the relationships between Fear of Crime, Sense of Community, and Crime Prevention Through Environmental Design. The findings suggest that fear and community cohesion play important roles in the implementation and effectiveness of CPTED strategies. These insights can inform policymakers, urban planners, and community development practitioners in designing and implementing crime prevention initiatives that leverage the connections between fear, social bonds, and the physical environment to create safer and more cohesive communities.

4. Discussion and Conclusions

The objective of this study was to explore the causal relationships among three latent constructs: fear of crime, sense of community, and Crime Prevention Through Environmental Design (CPTED). To achieve this goal, three hypotheses were formulated and subsequently tested using structural equation 323odelling (SEM) based on the pre-established theoretical model.

Hypothesis 1 proposed a significant effect of fear of crime on the Crime Prevention Through Environmental Design (CPTED). The results presented in Table 5 and Figure 1 support this hypothesis, indicating a significant relationship between fear of crime and CPTED. Therefore, H1 is confirmed. The confirmation of Hypothesis 1, which stated a significant effect of fear of crime on the Crime Prevention Through Environmental Design (CPTED), is a noteworthy finding in this study. The results presented in Table 5 and Figure 1 provide empirical evidence to support this hypothesis. The significant relationship between fear of crime and CPTED suggests that individuals' perceptions and concerns regarding crime can influence the design and implementation of crime prevention strategies in the built environment. This finding highlights the importance of considering fear of crime as a significant factor when developing and implementing CPTED measures. Practically, this implies that addressing and alleviating fear of crime can contribute to the effectiveness of CPTED strategies. By creating environments that promote feelings of safety and security, individuals are more likely to perceive their surroundings as less conducive to criminal activity. This, in turn, can lead to increased community engagement, improved quality of life, and a greater sense of well-being. The findings also have implications for policy and urban planning. They emphasize the need for policymakers and planners to prioritize the reduction of fear of crime in conjunction with the implementation of CPTED measures. This could involve initiatives such as improved lighting, enhanced surveillance systems, and the creation of spaces that foster a sense of community and social interaction. Further research could delve into understanding the underlying mechanisms that link fear of crime and CPTED. Exploring the specific aspects of CPTED that are influenced by fear of crime and examining the moderating factors that may impact this relationship would provide valuable insights for future studies. In a nutshell, the confirmation of Hypothesis 1 highlights the significance of fear of crime in relation to Crime Prevention Through Environmental Design. By acknowledging and addressing this factor, practitioners and policymakers can enhance the effectiveness of CPTED strategies and create safer, more secure, and cohesive communities.

Hypothesis 2 proposed a significant relationship between fear of crime and sense of community. The findings indicate that fear of crime indeed has a significant effect on sense of community, supporting H2. The acceptance of Hypothesis 2, which posited a significant relationship between fear of crime and sense of community, highlights an important connection in this study. The findings indicate that fear of crime has a significant effect on individuals' sense of community. The results suggest that when individuals experience higher levels of fear of crime, it can impact their perception and engagement with their community. Fear of crime may lead individuals to feel more isolated, distrustful, or disconnected from their neighbours and the broader community. This, in turn, can hinder the development of a strong sense of community. Understanding the relationship between fear of crime and sense of community is crucial for community development initiatives. By addressing and mitigating fear of crime, communities can work towards creating an environment where individuals feel safe and secure. Subsequently, this can foster stronger social bonds, encourage community participation, and enhance the overall well-being of residents.

Additionally, the findings also have implications for policy and interventions aimed at improving community cohesion and resilience. Efforts to reduce fear of crime can involve implementing community-based programs, enhancing community policing strategies, and improving the physical environment to promote feelings of safety and security. Besides, future research could delve deeper into the mechanisms underlying the relationship between fear of crime and sense of community. Exploring the specific factors and processes that mediate or moderate this relationship would provide a more comprehensive understanding of how fear of crime impacts community dynamics. In short, the acceptance of Hypothesis 2 emphasizes the significant influence of fear of crime on sense of community. This highlights on the importance in addressing fear of crime to promote a strong sense of community and foster social connections within neighbourhoods. By creating inclusive and secure environments, communities can cultivate a sense of belonging and collaboration among residents.

Hypothesis 3 suggested a significant relationship between sense of community and Crime Prevention Through Environmental Design (CPTED). The findings indicate that sense of community does indeed have a significant effect on CPTED, supporting the acceptance of H3. The acceptance of Hypothesis 3, which proposed a significant relationship between sense of community and Crime Prevention Through Environmental Design (CPTED), provides valuable insights into the dynamics of community and crime prevention strategies. The findings reveal that a strong sense of community can have a significant effect on the implementation and effectiveness of CPTED measures. When individuals have a greater sense of community, they are more likely to actively participate in crime prevention efforts, collaborate with their neighbours, and take ownership of their environment. This collective engagement contributes to the successful implementation of CPTED principles and practices. The results highlight the importance of fostering a sense of community within neighbourhoods as a means of enhancing crime prevention. By promoting social cohesion, encouraging positive social interactions, and fostering a shared responsibility for safety, communities can create an environment that supports and complements CPTED initiatives. The implications of these findings extend to community

development, urban planning, and policy interventions. It emphasizes the need to prioritize strategies that promote community building, social capital, and neighbourhood connectivity. This can involve initiatives such as organizing community events, improving public spaces, facilitating communication channels, and supporting local community organizations. Further research can explore the specific mechanisms through which sense of community influences the implementation and outcomes of CPTED. Investigating the mediating or moderating factors involved in this relationship would deepen our understanding of how community dynamics interact with crime prevention efforts. To sum up, the acceptance of Hypothesis 3 underscores the significant impact of sense of community on Crime Prevention Through Environmental Design. Cultivating a strong sense of community within neighbourhoods can contribute to the successful implementation of CPTED strategies and enhance the overall safety and security of the community.

It can be concluded that the is a causal relationship among the three latent constructs which were fear of crime, sense of community, and Crime Prevention Through Environmental Design (CPTED). Thus, steps to address this issue should be considered to ensure the community's well-being and safety are given priority.

Acknowledgement

We extend our heartfelt appreciation to the participants who generously contributed their time and insights, making this research paper possible. Their valuable cooperation was vital in gathering the necessary data and ensuring the success of our study. Additionally, we would like to express our sincere gratitude to Green Safe Cities (GreSAFE) for their generous funding, which played a pivotal role in the completion of this paper.

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