Enhancing Safety and Security in Residential Communities: A Defensible Space Approach in the Beverly Hills Compound, Egypt

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Abstract:

Ensuring safety and security in residential areas poses an ongoing challenge even within gated communities. This study explores the application of defensible space principles in the Beverly Hills compound, a residential development in Egypt. To establish a framework that enhances residents' safety and security. The study incorporates a comprehensive review of defensible spaces as a theoretical lens. employing a mixed-method approach that involves an observational study of the district and a detailed survey to analyze proposed defensible space attributes that influence perceptions of safety and security such as territoriality, natural surveillance, access control, and social cohesion. The survey findings provide insights into how residents prioritize and perceive the importance of proposed design features. Highlighting the critical significance of access control measures, such as restricted entry and private gates, while personal status representations, like façade decorations and balcony designs, are of relatively lower priority. This suggests that residents prioritize functional and security-oriented aspects of the built environment. The derived findings inform the development of a comprehensive framework comprising eight key approaches represented by specific design attributes for enhancing safety and security in residential gated communities. These insights can guide urban planners, designers, and policymakers in improving safety and security in gated communities.

Keywords:

Defensible space**;** Gated communities**;** Safety and security**;** Residential neighborhoods.

1. Introduction:

Urban crime has emerged as a global concern with more than 60% of all criminal activities taking place in developing cities' neighborhoods [1]. In Egypt, Safety and security remain ongoing challenges for Egypt's rapidly expanding residential compounds, which now account for over 50 % of new urban construction [2]. Safety and security provided in residential areas are actual essential needs for residents' satisfaction and well-being [3], as depicted by Alfonzo in Figure 1. It is also a crucial aspect of gated community development; as it can influence people's choice and investment in certain housing [4,5]. However, despite having private security, fence walls, and controlled access, initially intended to deter crime among individuals, these communities have become targets of theft, violence, and traffic misbehavior; probably due to their isolation, significant wealth holdings, and reduced sense of safety. Thus, residents and developers now opt to invest in security aspects, such as guards, surveillance technology, and secured building designs [6,7]; as an attempt to fulfill this necessary demand.
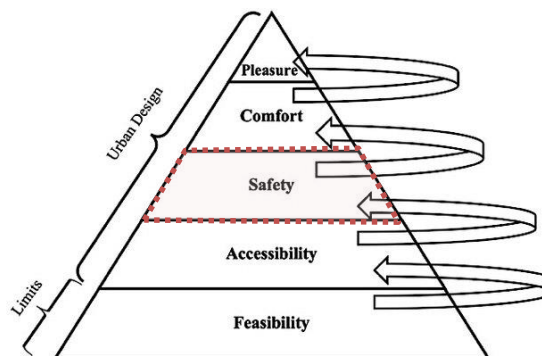

Figure 1 User Needs [3]

Generally, safety is defined as the absence of danger, risk, and injury while security means the state of being protected or safe from harm. Both safety and security aim at the same condition, which is a good quality of life. And because there is a great difference between criminal and disorderly behavior, much of the disorderly and anti-social behavior associated with public spaces exists in multi-use districts such as the case study in this research, which includes activities in addition to residential; Beverly Hills gated community in Egypt, encounters manifestations of recreational, commercial, educational and administrative activities. That figure that the security system can never control who can or cannot enter is contrary to the main concept of the gated compounds' borders and boundaries which prevent entry for the public to their streets and areas [8]. Therefore, beyond physical security measures, attention must be paid to neighborhood layout and design. Defensible space theory can be an approach to this issue, introduced by architect and city planner Oscar Newman in 1972. It proposes that the neighborhood layout and physical design could positively or negatively impact

crime rates, According to the Defensible Space Theory, an urban space is safer when its residents have a accountability and ownership for it [9].

1.1 Research problem

Ensuring safety and security presents an ongoing challenge in current residential neighborhoods even within gated communities. Where Crime rates remain high, with vandalism, theft, and violence occurring, lacking the sense of Defensible Space, Figures 2, and 3 are the problem's evidence

Figure 2: left photo: The old buildings in Beverly Hills without guards, right photo and middle photo: the public gardens in between the residential buildings are not recognized as a gathering space for social cohesion between inhabitants, they became vacant and isolated. source: Authors, 2023.

Figure 3: The most vivid spot in Beverly Hills is the commercial and recreational area called 'West Town Hub' for is a space full of cafes and restaurants and kids' area zones, one of the reasons that residents do not feel safe and secure because of allowing intruders entering their gated community. Source: Authors, 2023.

1.2 Research Aim

The Research aims to investigate the real-life application of defensible space principles in new residential neighborhoods in Egypt, to extract and provide recommendations for enhancing residents' sense of security

1.3 Research significance

The importance of this research arises from the massive rate of launching new gated communities in Egypt, seeking high levels of safety and security with extremely restricted access for non-guests or non-residents, but still feeling unsafe. This is especially true of the Beverly Hills Compound, which was the driving force behind

starting this research. The findings can inform urban planners, designers, and policymakers on improving safety and security in low and high-income housing, addressing safety issues faced by most Egyptians. Moreover, examining the compound conditions offers a window into the country's broader urban safety challenges.

This research is also aligned with two UN Sustainable Development Goals; it explores how neighborhood design can make cities safer, with SDG 11 for sustainable cities; and it examines how environmental factors can help decrease violence in line with SDG 16 for peaceful societies [10]. By investigating urban safety interventions based on defensible space theory, the study provides insights that address the objectives of both SDGs related to creating safe public areas and reducing urban crimes.

1.4 Research Methodology

The study employs a mixed-method approach, incorporating a qualitative comprehensive review of existing planning guidelines of defensible space theories, Then, it is tested on a particular case study, Beverly Hills development in Egypt using documentation, assessment, and investigation, The case study involves an observational study of the district, coupled with a detailed survey as a quantitative approach to investigate the perceived and actual safety and security levels. The analysis examines specific attributes that contribute to perceptions of safety, such as territoriality among users, natural surveillance, access control, and community engagement. By highlighting examples of both successful and unsuccessful translations of defensible space theory into built form, The findings derived from this research will provide evidence-based recommendations for planners, architects, developers, and other professionals involved in shaping neighborhood layouts and built environments, bridging the gap between design guidelines and actual outcomes on the ground, promoting the well-being and security of residents in housing areas.

2. Defensible Spaces Background:

Extensive research has been conducted in the fields of criminology and urban planning to examine the influence of design on crime rates and the users' sense of safety and security in neighborhoods and housing developments. In general, security is the defense of a person, building, organization, or nation against crime or attacks by other nations or external entities, whereas safety is the belief held by individuals that certain locations are safe or that they are not at risk of harm or crime [11]. One notable theory in this area is Newman's space theory, which proposes that certain design elements can empower residents to take control of and monitor shared spaces thereby enhancing safety through natural surveillance and fostering positive community behaviors. seeking to improve the physical layout and foster social bonding among populations to decrease crime in the residential community [12,13].

Defensible space is referred to as areas of residence where inhabitants establish an environment that is safe, functional, and well-maintained; an environment where residents' latent boundaries and sense of belonging can be translated into accountability for maintaining a community framework that shields itself against crime [11]. Defensible spaces are bounded, visible, and recognizable areas that promote surveillance, social coherence, and safety, fostering social ties among inhabitants.

The theory implies "capable of being defended"; where the environment can defend itself against any impending threat that affects the building layout and the surrounding environment, two scales on which the residents perceive their level of safety [14]. It highlights the importance of planning neighborhoods and community spaces in a way that encourages residents to feel responsible for their urban space. When residents believe they have control over an area they will probably engage in behaviors to monitor actions within that area.

Features like boundaries, placed entry points, good lighting, visible maintenance signs, and designated areas for residents can help them assert their authority over the space. On the other hand areas without ownership markers or that seem neglected can attract criminal activities. By designing spaces to align with residents' instincts for protection and surveillance defensible spaces influence psychological processes to prevent crime. This approach does not enhance safety only but also strengthens social connections among community members who feel authorized to safeguard their surroundings. Following the rules to create a defensible building would therefore aid in securing a smaller defensible unit, which would then serve to create a defensible atmosphere that encourages both safety perceptions and conducting natural surveillance[15,16].

With the aid of surveillance opportunities, Oscar Newman partitioned the space into successive transitional sections even though there are no clear boundaries; these divisions began with the public, semi-public, private, and semi-private spaces, presenting levels of the hierarchy of defensible spaces, as illustrated in Figure 4.
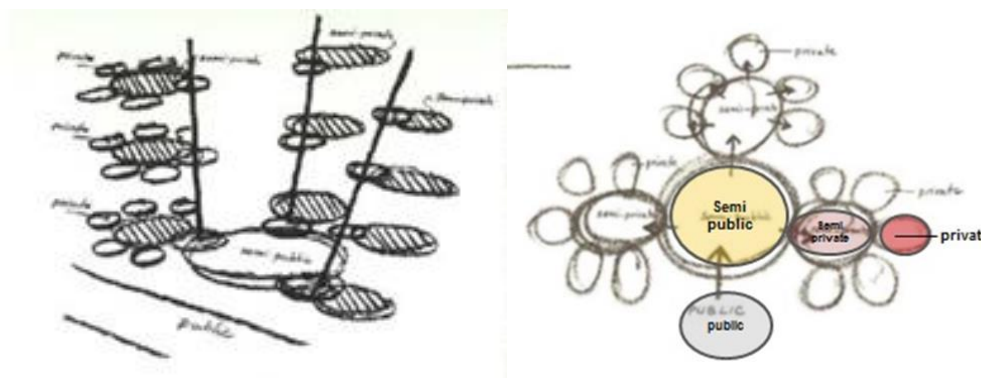

Figure 4 Schematic sketches illustrating Defensible Spaces Hierarchy according to Oscar Newman
source: Newman, 1973.

2.1 Jacobs Defensible Space Approach

Although Oscar Newman is widely known for introducing the concept of defensible space, urban planner Jane Jacobs had thoughts on neighborhood planning and safety long before. In 1961 Jacobs challenged planning ideas by advocating for the acceptance of disorder and diversity rather than their eradication. She emphasized the importance of sidewalk life constant surveillance by residents and a sense of ownership as crucial elements in crime prevention greater the effectiveness of rigid regulations [17]. Jacobs proposed that urban communities possess the ability to manage security if designed appropriately. This involves constructing buildings with eyes on streets; for monitoring purposes, integrating commercial areas to ensure continuous activity and movement, and fostering a lively street environment with diverse residents who are deeply connected to their surroundings. Similar to Newman's theory on space that emphasized empowering residents to control and protect their spaces, Jacobs acknowledged the impact of design on fostering positive community supervision. Generally, her perspective aligns with modern principles of defensible space focusing on access control, surveillance, cohesion, and image often seen in urban renewal projects today.

Both viewpoints agree that structured physical spaces promote the flourishing of social dynamics. The key themes of activity, surveillance, territorial definition, and control were the main aspects that Jacobs dealt with while discussing the theme of defensible space or crime prevention. Jacobs insisted on the need for activity to provide surveillance and for efficient territoriality between residents, she argued that distinguishing between public and private is a need and demand for residents in their neighborhood and that is the main prerequisite of feeling safe and secure and if they are active participants, this would give more surveillance rather than security or police [18].

2.2 Newman Defensible Space Approach

Oscar Newman developed some of Jacobs' ideas by mentioning mostly surveillance and territorial definition. After studying many locations of crime in New York, he extracted and proposed three factors associated with increasing crime rates in residential blocks and neighborhoods [19], as depicted in Figure 5. Anonymity means that people don't know their neighbors and this often occurs in huge compounds and neighborhoods, considered one of the big problems that help in creating a non-defensible space. Moreover, the availability of escape paths made it simpler for criminals to flee the scene, while a lack of surveillance made it easier for crimes to be performed covertly. Oscar Newman used the term "defensible space" to emphasize the control that residents had over their surroundings.
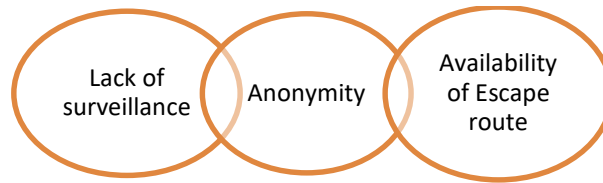
Figure 5 Oscar Newman's Three Factors Leading to Crime [13]

Since Oscar's theory's inception, it received a lot of criticism because it is deemed ambiguous and without evidence [20], where Numerous real-world studies have been conducted to measure the efficiency of space theory in dropping crime in settings. The effectiveness of principles like access control, territorial demarcation, and maintenance, in preventing crimes, robberies, and violations has been widely explored by researchers [21]. Brown and Altman (1983) conducted an analysis finding a mix of results but overall backing the link between territorial behaviors and crime outcomes [22]. Subsequent meta-analyses that included controlled before and after studies by Macdonald (1995), demonstrated significant impacts of implementing space elements resulting in an average 10% decrease in criminal activities only [23]. While key principles like controlling access, through street closures enhancing visibility, and marking boundaries were consistently effective. In terms of settings, the changes made to create environments, in public housing complexes have received the most attention. Positive impacts have also been observed on university campuses by Griffith in 2004 [24]. However, there was a common issue, which was the lack of focus and identifying the attributes considering potential psychological factors. Later extensions of defensible space theory move beyond pure architecture, integrating principles into residential management, policy initiatives, and public education around territorial functioning and community capacity for natural guardianship over shared development spaces.

2.3   Crime Prevention Through Environmental Design (CPTED)

Both defensible theory and CPTED concepts share similar goals and principles in promoting safety and security in urban environments. C. Ray Jeffery, Robinson's CPTED approach emphasizes using natural surveillance, access control, and activity techniques to prevent access to criminal targets. The concept is that a well-managed environment promotes safety and reduces crime. According to Robinson 1996, developing a sense of control and care for one's home can reduce crime rates [25]. This confirms Newman's theory, as Newman used this theory later to add maintenance to his key approaches. Management measures such as private security, police patrol, Public-private partnerships, or the integration of city and town center management were supported to reduce fear, by encouraging people to use specific areas more regularly. By 2004, the CPTED approach had gained global recognition thanks to law enforcement support [26].

Based on the various theories we discussed earlier, it's clear that the concept of neighborhood safety is a multifaceted, sophisticated concept that has been studied from different perspectives. While most urban safety theories focus on aspects like social cohesiveness, territorial boundaries, and preventing crime this study proposes a broader perspective. It aims to explore how various elements of urban planning work to influence people's sense of safety in their neighborhoods. Understanding, arranging, and measuring the factors that contribute to perceived safety is essential for ensuring security.

3. Key Approaches to Enhance safety and security :

The defensible space theory focuses on altering the environment to empower residents to regulate entry and oversee their areas. Various approaches have been extracted be implemented in the design of urban projects to promote safety behaviors among residents.

3.1 The Territoriality Approach

The Territorial behavior of human beings is multi-faceted, It is not limited to the defense of boundaries, as it merges with other feelings about personal space and status. Territorial feelings may relate to individual belongings, as well as shared belongings and spaces with temporary privilege of access and control. It includes personal property and possessions, group property, and temporary territory [27]. Defensible space theory applies these tendencies by emphasizing the importance of defining semi-public spaces while encouraging inhabitants to feel ownership, over zones close to their homes. This is achieved through customizing amenities and creating boundaries such as porch enclosures, unique landscaping, and personalized signs that reflect a connection and personal status [9]. In Figures 6,7 and 8, we can observe how people in settlements, along Egypt's coast and deserts express their identity, status, and territorial boundaries through their choices of planting, decorations, and color schemes, in the front yard of their house or hanging some unique accessories representing old myths. These elements reflect the resident's self-perceptions. When these features are carefully integrated they send a message to outsiders that the areas are well maintained and overseen by residents. By treating elements of the environment as extensions of their homes inhabitants promote a sense of protection and surveillance. As Newman established, effectively structured architectural and spatial cues activate territorial cognitions and behaviors critical for community safety.

Figure 6 Mediterranean coastal settlements customized as personal domains and signaling territorial behaviors.
Authors, 2023

Figure 7 Symbols, and stories on a house façade in Aswan, Egypt. Signaling Personal Status. Authors, 2023

Figure 8 Articulating the front yards of modern houses with plants as a sign of Personal Status.
Authors, 2023

3.2 Access Control Approach

The access control approach seeks to limit entry to gated neighborhoods solely to residents and authorized guests or service providers. Physical features such as perimeter walls or fences create a separation between the internal areas of the development and the surrounding public spaces. All entry points for pedestrians and vehicles are then concentrated in controlled access areas typically monitored by security personnel and equipped with entry control systems such as gates, surveillance cameras, or registration booths as shown in Figure 9 [28]. Inside the community, the layout of roads should be planned to reduce traffic by using looped streets, cul-de-sacs, and other techniques, The design of landscaping within the community is intended to ensure that certain areas can only be accessed by authorized individuals [29]. The objective is to utilize access restrictions and entry control measures that establish a sense of ownership while making any unauthorized presence noticeable to residents. When combined with strategies like symbols of ownership, natural surveillance by residents serves as an effective deterrent against crime, in enclosed residential areas [30].
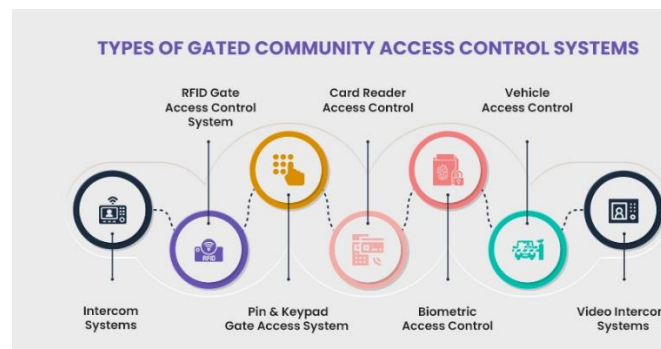

Figure 9 Types of Technological Access Control Systems [30]

3.3   Surveillance Approach

This approach highlights the importance of maintaining clear lines of sight and creating opportunities for residents to naturally observe public and semi-public areas within their neighborhood. However, it is essential to strike a balance by respecting the privacy of homes and private residential spaces [12]. Privacy Characteristics include Physical Segregation. Establishing adequate distance buffers between residences and communal areas using landscaping changes in elevation, etc. where surveillance is appropriate.

Visual Obstructions like Employing fences, walls, and greenery to block views into private yards or windows from shared spaces but permit monitoring of spaces, serves personal territoriality as well. Moreover, Strategic Placement, such as arranging home features such as windows, entrances, and outdoor living areas facilitates community oversight while limiting visibility from streets, sidewalks, and neighboring properties. Another classification for Surveillance is formal and informal categories [31], in which the formal/is physically represented in the security cameras, security men, guards, security dogs, and electronic gates as shown in Figure 10. The informal represents the social cohesion between residents, community programs, and social activities in the compound like the gatherings for a party or event as revealed in Figure 11. However, the study explores social cohesion as a separate approach.

Figure 10   Example of the surveillance in its formal category. Authors, 2023
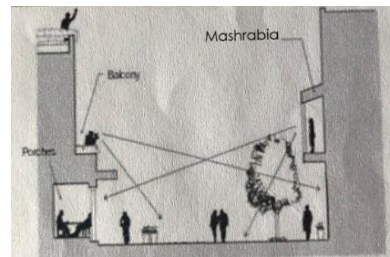

Figure 11 A sketch showing surveillance in its informal category, represented in neighbors monitoring each other from balconies, windows, and street [32]

3.3.1 Privacy Approach

Privacy is a crucial architectural principle that was achieved historically through features like courtyard houses and screened windows- mashrabeya- in Arabic cultures as represented in Figure 12. In modern residential communities, maintaining privacy involves negotiating desires for seclusion with needs for community surveillance aligned with defensible space goals. Residents now use improvised measures like trellis overhangs, tentlike canvases, planted buffers, or fenced-off gardens to define their personal realms. Formal elements like louvered screens, walls, and monitoring systems protect residents from outside visual access. However, too much segregation undermines the "eyes on the street" critical for communal safety [33].

Urban planning should delicately manage privacy gradients across spatial levels within a community from individual residences to shared amenities and boundaries. By blending privacy measures with community surveillance initiatives residents can establish a balance between territoriality and safety.

Figure 12 left photo: Narrow Openings in Elevations used as Privacy translation
middle photo: inner courtyard in a modern house, right photo: Inner court of Beyt Al Suhaymi in
Cairo. source: ARCHDAILY, 2023

3.4 Maintenance Approach

The strategy for maintaining space emphasizes the importance of keeping the area orderly and promptly addressing any disorder to make residents feel a sense of ownership. A maintained environment shows that the space is cared for and actively looked after. Well-kept environments demonstrate active proprietorship and oversight. Attributes include rapid repair of vandalism, graffiti removal, and litter clean up that signifies ownership investment in the area's security and image [34]. In gated communities having a maintenance plan with dedicated teams to quickly deal with issues like graffiti, neglected landscaping, or property damage is crucial to create a robust defense mechanism that deters potential criminals from seeing the community as an easy target.

3.5 Social Cohesion Approach

Strong social cohesion allows territorial functioning and communal surveillance, which are required for defensible space to be effective in preventing crime. When people in a neighborhood know each other well, it becomes easier to spot any suspicious behavior [35]. By designing areas where people can gather and interact, like parks, pools, and recreation centers, we can build social ties among residents, in addition to trust and a shared responsibility for keeping the community safe. Encouraging interactions in outdoor spaces and organizing neighborhood events further strengthen these bonds. When residents feel connected to each other they are more likely to work to protect their neighborhood. Building relationships between residents, law enforcement, and first responders also helps improve safety by addressing concerns.

3.6 Evaluation Approach

Continuous evaluation is an important factor to consider when assessing the implementation and effectiveness of space strategies in residential areas; Performing formal evaluations that focus on specific aspects of defensible space such as territoriality, access control, and surveillance is crucial for assessment [36]. These evaluations involve observations and measurements related to; Strengthening territorial boundaries; Ensuring boundary markings are sufficient defining zones of influence and

adhering to maintenance requirements. Managing access; Implementing entry protocols conducting credential checks and creating spatial accessibility maps for various user groups. Enhancing surveillance capabilities; Assessing visibility, lighting coverage and factors that could potentially obstruct visibility. Reviewing policies/procedures; Examining rules in place staffing needs and enforcement procedures. Conducting audits helps proactively identify any design or policy shortcomings that may compromise the integrity of a residential area before safety concerns arise [37]. Moreover, analyzing the frequency of incidents is essential for evaluating the effectiveness of defensible space strategies, an increase, in assaults or violence could highlight vulnerabilities. It is also important to consider residents' perceptions of safety through community surveys. If the design effectively promotes territoriality as intended residents should feel safer and more secure [38]. Community feedback and open discussion are crucial for the lasting success of defensible space initiatives. Neighborhood groups or local leadership play a role in providing authentic feedback on how well-defensible space concepts manifest in daily interactions involving ownership, authority, and community involvement [39].

3.7 Gated Community Urban Design Safety Framework/ Strategies:

The theoretical study conducted prior provided valuable insights for creating an effective defensible space within residential compounds. Thus, a comprehensive framework consisting of 8 key approaches and 31 specific attributes was developed in Table 1, serving as the foundation for the survey carried out in the case study area. This survey was carefully designed to align with on-site visits, allowing for observations and data collection to further enhance the understanding of defensible spaces in practice.

Table 1 Defensible Space Design Attributes for Residential Gated Communities, Authors

APPROACH	DESIGN ATTRIBUTES
Territoriality	Private gates
	Clear transitional spaces
	Plant barriers
Personal status	Unique outdoor plants
	Façade decorations
	Balconies design
	Sheds on windows
	Dominant gates
	Articulated entrances
Access control	Restricted entrance to registered users
	Registration kiosks
	Utilization of access control systems (key cards, codes, or intercoms).
	Limited space access
Surveillance and Privacy	Clear sightlines from windows and public spaces to monitor the surroundings
	Regular monitoring of surveillance.(security men)
	Adequate lighting around buildings and paths
	No blind areas hidden from view

	Installation of cameras, motion sensors, and alarms to detect unauthorized entry (security system)
	Louvers/ Shutters
	High barriers
Maintenance approach	Rapid repair of vandalism, graffiti removal, litter clean up
	Repair of broken lights, fences, or other security features.
	Collaboration with residents to report maintenance issues promptly.
Activity pattern	Mixed-use design with shops and cafes integrated into the compound fabric
	Public parks, play areas, and event spaces inside the compound
	Building orientation to encourage active street life, porches
Social cohesion	Community ties : familiarity and connections between residents host events to support familiarity between residents
	Collective activities: create community chat groups and watch programs
	Ensure design supports positive gathering opportunities
	Trust in police - confidence in authorities addressing local issues
Evaluation	Regular safety checks that assess territoriality, access, surveillance measures
	Reviewing crime statistics and community members concerns
	Regular feedbacks and surveys from neighborhood organizations

4. Empirical study

The study seeks to develop a Framework for improving safety and security in residential districts, based on theoretical concepts of defensible space. An observational study was conducted by the researchers to gain insight into the actual circumstances of the selected case study. As indicated in Table 1, we focused on the main elements found in the literature review. which were further investigated through questionnaires to enhance the reliability of our findings. The researchers used a systematic rating system to record the variables' status and distributed questionnaires to residents for additional insights.
The analysis process included two main components. First, for the observational investigation of the case study approaches. Then, a field survey analysis to evaluate the effect of the design attributes on residents' perception of safety. By finding the weight of each element and organizing them based on users' priorities; The data analysis methods will include examining the questionnaire data on resident satisfaction and priorities using the SPSS software, followed by calculating the weighted average.

4.1 Case Study Investigations

The study area selected is Beverly Hills Compound, a mixed-use compound that is situated in Sheikh Zayed City, Egypt. It can be accessed through the 26th of July Axis or Waslit Dahshur Road as depicted in Figure 13. The compound includes several sub-communities inside, as well as a business district encompassing office buildings. In addition to a great spot of recreational area, a sporting club, and schools as illustrated in the following figures 14, and 15. 1,500 acres of growth land [40]. The reason for selecting this case study is that; it encompasses several distinct districts, representing a

broad cross-section of the Egyptian gated community. The diversity of people participating in the survey enhances the validity of the survey, as it provides a more comprehensive understanding of the community's dynamics. Furthermore, the compound's strategic location and the residents' ongoing safety concerns make it a convincing subject for investigation.

Figure 13 Beverly Hills map and the main roads leading to
Source: https://www.google.com/maps

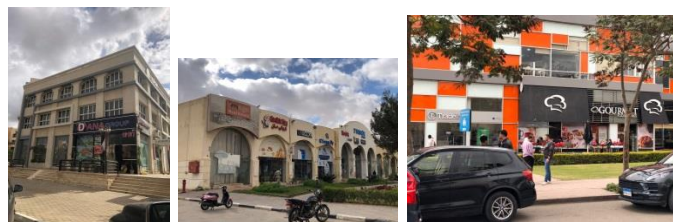Figure (14) Schools in Beverly Hills. Authors, 2023

Figure 15 Multi-use Functions in Beverly Hills, businesses, shops, office buildings, mosques, restaurants, and cafes. Authors, 2023

4.2 Observational study

The observation was carried out in September 2023, where observers spent approximately 9 hours during daytime and nighttime hours. Observation was focused on the main approaches just as shown in Figure 16. These variables will help to validate the theories of defensible space and assess to what extent each variable was present within the neighborhood and the degree to which these variables were significant in the residents' perceptions of safety and security.

Defensible Space Approaches			
Territoriality	Personal status	Access control	Surveillance
Maintenance	Activity pattern	Social cohesion	Evaluation

Figure 16 The Tested variables for the observational and survey analysis

4.3 Field Survey

Based on the suggested design aspects, a structured, closed-ended questionnaire was constructed by the researchers. The survey was disseminated both manually and digitally. Twenty of the study's 120 anonymous participants were eliminated since their responses didn't accurately reflect their true preferences. The majority of respondents were Egyptian (82%) with a smaller share of non-Egyptians (12%). Data was collected between September and December 2023.

The survey consists of three parts, the first section includes age, gender, nationality, and years of compound residence. The second one is the users' ranking of the 31 design attributes proposed for enhancing safety and security, using ranked typed questions, based on their preferences or priority. The final part is an in-depth evaluation of each design attribute, in the case study, from a resident's perception through Semantic Differential Scale questions; The SPSS software was utilized to analyze the data from the survey to find the relative weighted mean and ascertain how each suggested element would affect their feeling of security and safety, which was then used to develop the conceptual framework.

5. Results and Discussion

The observational analysis revealed that the district exhibited an intense sense of territoriality that supported the neighborhood in protecting its space. This territoriality was manifested in various design attributes such as fences, hedges, vegetation, and building entrances. The absence of public engagement, social connection, and cohesiveness was further indicated by the analysis's findings leading to inadequate levels of informal surveillance, such as community programs and resident awareness. where events play a pivotal role in drawing the public to attend and engage in local events, thus becoming active surveillance agents. Additionally, the analysis identified a presence of anonymity in the compound, which, as Newman mentioned, is a crime-associated factor.

The observational analysis also showed a lack of gatherings of children playing in the gardens and no gatherings of housewives in the mornings, resulting in empty public spaces as clearly shown in Figure 17. Furthermore, the analysis revealed a lack of formal surveillance in some areas of the compound, such as poor lighting, an unorganized security system, and a lack of security guards, particularly in the old spaces of Beverly Hills near the gates. Lighting is a crucial crime deterrent that serves as natural surveillance, lighting conditions in the old area were poorly maintained and not well-functioning, putting this zone at risk to offenders as shown in Figure 18. In contrast, the new spaces in the neighborhood had a more regular system of security, which helped in crime prevention.

Figure 17 Shows no gatherings in the green spots. Authors, 2023

Figure 18 Shows no lighting units attached to the old residential buildings except for short lighting units in the green spots
Authors, 2023

Regarding personal status representations, the analysis found them to be very weak and not well-recognized, except for some old villas that insisted on making special sheds or door designs that differed from the rest of the villas on the road. Similarly, the balconies in the residential buildings appeared to be all equal in design and general look as shown in Figure 19, with some exceptions in the Casa area, where owners had hung outdoor accessories, modified their Facades, and added uncommon plants as shown in Figure 20.

Figure 19 Balconies give the same vision, no personal status is shown. Authors, 2024

Figure 20 Personal Status is shown when one owner decides to change the whole façade with different materials and colors. Authors, 2024

Privacy was also found to be inadequate, especially in the old spots of Beverly Hills, where guards were not present for the residential blocks, and only one security guard was assigned to monitor the entire road or zone. Interviews with volunteers confirmed this opinion, indicating that privacy was not well-enhanced despite the area being a gated community. However, the observational analysis noted some signs in the largest recreational area, called the West Town HUB, which demonstrated the existence of families only on weekends, indicating the presence of privacy measures for the residents as in Figure 21.

Figure 21 The recreational area town hub- shown in the first photo the sign of families only on weekends. Source: Authors, 2024

5.1 Survey Analysis Results

The survey findings represented in Table 2; give us an understanding of the prioritization and perceived importance of various defensible space design attributes within the studied residential context. The analysis of the weighted means and ranking of these attributes helps us see what factors are significant in making residents feel safe and secure.

One of the most significant findings is the high ranking of "Restricted Entrance to Approved/Registered Users" (rank 1, weighted mean 10.5%), indicating that access control is a critical element in the residents' perception of a defensible space. This reflects the principles of space theory emphasizing the importance of limiting and managing access to residential areas to establish a sense of territorial control and exclusivity. The significant ranking of " Gates" (rank 2, weighted mean 8.5%) and

"Registration Kiosks" (rank 3, weighted mean 7%) further supports the importance of physical and technological measures to control and monitor access to the community. This shows that residents prioritize having boundaries and entry procedures to feel more secure.

Conversely, design elements like "Façade Decorations " "Balconies Design," and "Sheds on Windows" were rated lower at 28, 30, and 31 respectively suggesting that personal symbols of status are of less importance in how residents perceive secure spaces. This indicates that residents value functional and security-related aspects of the built environment rather than the aesthetic or individualistic features.

Furthermore, the study highlights the significance of surveillance as evidenced by the rankings of "Regular Monitoring of Surveillance (Security Men)" at 9 and "Adequate Lighting around Buildings and Paths", at 13 based on their weighted means. These results are in line with the principles of CPTED which indicate the significant role of natural and formal surveillance in improving the feeling of safety and security.

On the other hand, the lower rankings for "Clear Sightlines from Windows and Public Spaces " at 21, and "No Blind Areas" at 25 suggest that the residents may not perceive these design features as crucial as other surveillance-related attributes, such as the presence of security personnel and adequate lighting.

The survey results also highlight the importance of maintenance and collaboration with residents in upholding the integrity of the defensible space. The high ranking of "Rapid Repair of Vandalism, Graffiti Removal, Litter Clean Up" (rank 6, weighted mean 5%) and "Repair of Broken Lights, Fences, or Other Security Features" (rank 8, weighted mean 4%) underscores the residents' expectations for a well-maintained and cared-for environment., The findings related to social cohesion, such as "Community Ties: Familiarity and Connections Between Residents" (rank 11, weighted mean 3.7%) and "Collective Activities: Create Community Chat Groups and Watch Programs" (rank 9, weighted mean 3.8%), emphasize the residents' desire for a sense of community and shared responsibility in sustaining the security in their residential area.

Table 2 Safety and Security Approaches and Design Attributes Significance and ranking based on residents survey

Approach/ Weight	Code	Design Attributes	Weighted mean %	Average (Grand Total / Number of Items) *5/100	Rank
A1. Territoriality (18%)	A1.1	Private Gates	8.5	0.425	2
	A1.2	Clear Transitional spaces	5.2	0.26	5
	A1.3	Plant Barriers	4.3	0.215	7
A2. Personal Status (5 %)	A2.1	Unique outdoor Plants	1.1	0.055	27
	A2.2	Façade Decorations	0.9	0.045	28
	A2.3	Balconies design	0.6	0.03	30
	A2.4	Sheds on windows	0.4	0.02	31
	A2.5	Dominant gates	1.2	0.06	26
	A2.6	Articulated entrances	0.8	0.04	29
A3.	A3.1	Restricted Entrance to Approved/ registered users	10.5	0.525	1
	A3.2	Registration kiosks	7	0.35	3

Access Control (25%)	A3.3	Utilization of control systems (key cards, codes, or Intercoms).	5.5	0.275	4
	A3.4	Limited space access	2	0.1	22
A4. Surveillance 13%	A4.1	Clear Sightlines from windows and public spaces to monitor the surroundings	2.1	0.105	21
	A4.2	Regular monitoring of surveillance. (Security men)	3.8	0.19	9
	A4.3	Adequate Lighting around buildings and paths	3.2	0.16	13
	A4.4	No blind Areas hidden from view	1.4	0.07	25
	A4.5	Installation of cameras, motion sensors, and alarms to detect unauthorized entry	2.5	0.125	17
A5. Maintenance Approach 11%	A5.1	Rapid repair of vandalism, graffiti removal, litter clean up	5	0.25	6
	A5.2	Repair of broken lights, fences, or other security features.	4	0.2	8
	A5.3	Collaboration with residents to report maintenance issues	2	0.1	22
A6. Activity Pattern 9%	A6.1	Mixed-use design with shops and cafes.	2.8	0.14	14
	A6.2	Public parks, play areas, and event spaces inside the compound	3.6	0.18	12
	A6.3	Building orientation to encourage active street life, porches	2.6	0.13	16
A7. Social Cohesion 12%	A7.1	Community Ties: Familiarity and connections between residents Host events to support familiarity between residents	3.7	0.185	11
	A7.2	Collective activities: Create community chat groups and watch programs	3.8	0.19	9
	A7.3	Ensure design supports positive gathering opportunities	2.7	0.135	15
	A7.4	Trust in Police - Confidence in authorities addressing local issues	1.8	0.09	24
A8. Evaluation 7%	A8.1	Regular safety checks that assess territoriality, access, and surveillance measures	2.5	0.125	18
	A8.2	Reviewing crime statistics and community members' concerns	2.3	0.115	19
	A8.3	Regular feedback and surveys from neighborhood organizations	2.2	0.11	20

5.2 User Satisfaction Survey results:

The feedback from the satisfaction survey on the Beverly Hills compound shows a response among residents regarding the security elements in place. The disagreements on "Restricted Entrance" and "Registration Kiosks" highlight concerns about access control indicating a need to reassess and potentially reinforce entry protocols and access management systems to better meet residents' expectations of safety and exclusivity within the compound.

In addition, the survey reveals concerns about surveillance capabilities and visibility. The disagreements on "No Blind Areas" and "Window Clear Sightlines" suggest that residents believe the current design compromises surveillance leading to blind spots that could facilitate criminal activities. Improving these design aspects and enhancing surveillance through lighting, landscaping, building placement, and public space design could enhance residents' sense of safety.

Nevertheless, findings in the survey regarding the security features of the compound. The agreement on aspects, like "Adequate Lighting" and "Rapid Repair" indicates that residents value the maintenance of the environment. Furthermore, the favorable reception of "Mixed Use Design" and "Public Parks/Event Spaces" suggests that residents appreciate having community-focused facilities and chances, for engagement within the complex.

Figure 22 reveals a notable disagreement regarding "Community Ties; Familiarity and Connections Between Residents" and "Collective Activities; Establish Community Chat Groups and Watch Programs" hinting at a perceived absence of community bonds and social opportunities among the residents. this finding is significant since community spirit and social unity are crucial aspects of defensible space theory. When residents sense a lack of connection with their neighbors and are devoid of shared activities or platforms for interaction it can weaken the sense of ownership and dedication to the communal living environment. Consequently, this may result in decreased feelings of safety and security as residents might not feel collectively responsible, for the welfare of the community.
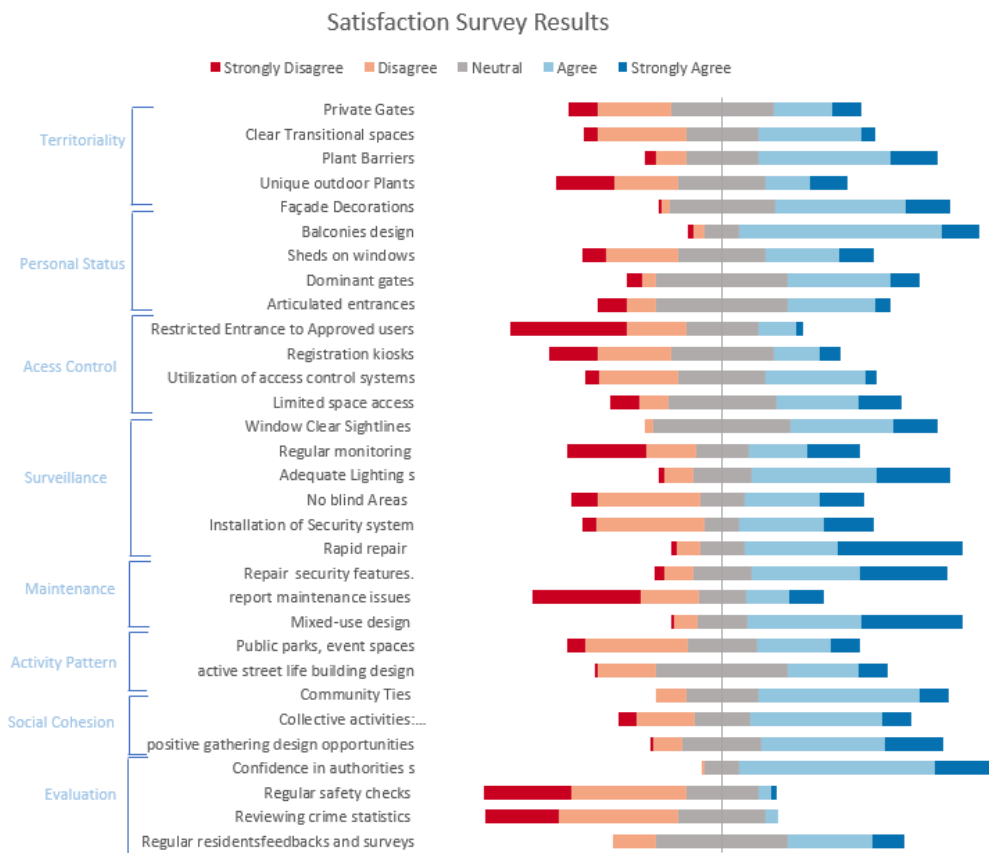
Figure 22 Defensible space design attributes
satisfaction survey analysis. Beverly Hills, Egypt. Authors

6. Conclusion:

This study highlighted a critical problem which is the lack of a sense of Defensible Spaces in some residential neighborhoods within gated communities, leading residents to feel unsafe and insecure in their surroundings. The key objective of the study was to examine the real-life application of safety and security aspects in a residential neighborhood and implement a framework for augmenting their perception of safety and security. The Beverly Hills Compound served as a case study due to its multi-use functions beyond residential purposes. The investigation of variables derived from the defensible space theory aimed to provide recommendations for city planners and designers during various phases of the design process. The researchers focused on identifying the most crucial variables that contribute to residents' feeling secured. The presence of elements resembling Oscar Newman's hierarchy of defensible space diagram in certain units, particularly Casa and Allegria, supported Newman's hypothesis regarding the levels of hierarchy in defensible spaces from residents' perspectives. Observations also revealed a lack of social cohesion among residents, hindering their ability to differentiate between neighbors and potential intruders, thus

creating an insecure environment. Despite this, volunteers were eager to participate in surveys concerning safety and security problems, demonstrating a keen attention to detail that exceeded the authors' expectations. The survey results provided valuable insights into the prioritization and perceived importance of various defensible space design attributes within the residential context. The weighting of factors emphasized the significance of access control measures, surveillance, and territoriality as core spatial defensive elements, as represented in Figure 23, supported by factors like maintenance of lighting, landscaping, activity patterns, community cohesion, and evaluation. Lower weightings were assigned to more subjective personal or identity-related cues.
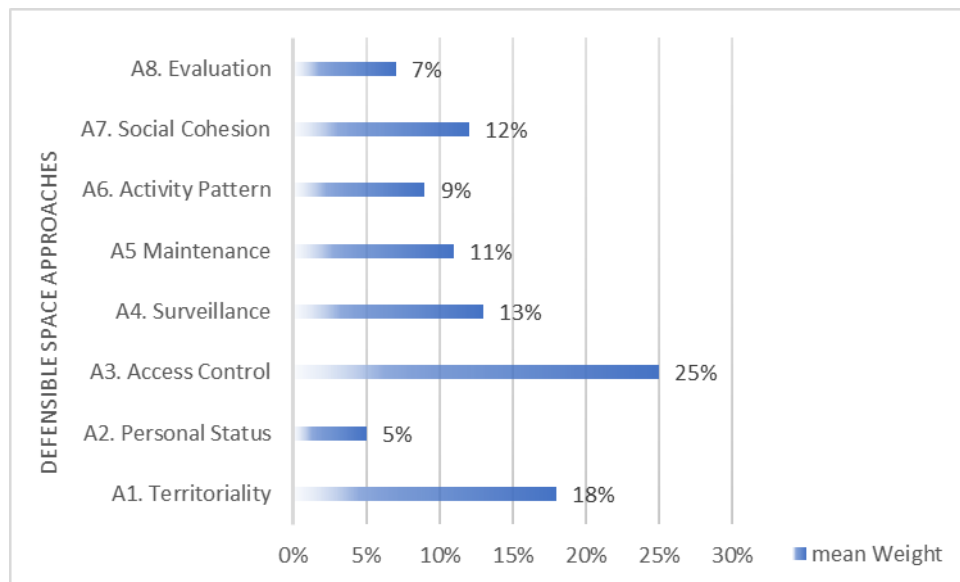

Figure 23 Main Approaches Significance Weight results
Authors, 2023

This indicated that residents prioritize functional and security-oriented aspects over personal status representations. Furthermore, enhancing recreational areas for community gatherings and providing adequate lighting can attract neighbors to engage in discussions and children to play in secure environments. Visible surveillance measures, including cameras and security personnel, are essential components for maintaining a safe and secure residential environment in every spot. These findings can guide the development of effective defensible space strategies tailored to residents' specific needs, ultimately enhancing their sense of safety and security within the community.

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