ORIGINAL ARTICLE

Crime prevention through environmental design (CPTED) and its potential for campus safety: a qualitative study

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Abstract

Despite growing interest in crime prevention initiatives on college campuses, little is known about the practicality of such approaches. This case study was conducted in a college which had systematically applied crime prevention through environmental design (CPTED), a proactive crime prevention approach. Qualitative methods (semi-structured interviews, a focus group, participant observations, and a review of secondary sources) were utilized to contribute to the evidence base on the application of CPTED in academic settings. Findings suggested the CPTED program can be a promising campus safety initiative due to its cost-efficiency, educational value, and potential diffusion of benefits. Yet, this program may face several challenges in the implementation due to limited interdepartmental collaboration and limitations in funding and human resources.

Keywords College campus safety · School safety · Campus design · Crime prevention through environmental design · CPTED · Qualitative study

Introduction

The issues of crime and violence on American college campuses had not been raised as a social concern until the late 1980s. Several fatal incidents that resulted in criminal proceedings shattered the historical image of universities as being sanctuaries and led to a new standard of legal responsibility, which held schools liable when appropriate protection measures were lacking for campus communities (Smith 1989). A defining moment in the history of campus safety regulations was the passage of the *Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act* in 1990. This Federal law was named after Jeanne Clery, a college freshman who was raped and killed by another student in her residential dormitory

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in 1986. The Clery Act required all institutions of higher education that participate in Federal financial aid programs to report their campus crime statistics in their annual safety reports and to devise crime prevention programs to protect campus communities. Thus, campus crime is no longer considered a private problem solely related to victims and individual institutions (Sloan et al. 2010; Tewksbury 2014). Although the Clery Act emphasizes the implementation of preventive measures on college campuses, the campus safety discourse often fails to grasp the role of practical and proactive approaches to safeguard campus facilities. One such practical approach is Crime Prevention through Environmental Design (CPTED) that entails environmental strategies to reduce criminal opportunities by manipulating the physical and social qualities of the environment.

In the three decades following the enactment of the Clery Act, much of the existing research on campus safety has focused on describing the nature and prevalence of campus crime (Fisher et al. 2000; Kilpatrick et al. 2007; Stewart and Fisher 2013; Belknap and Erez 2013) or testing the theories that explain campus victimization (Siegel and Raymond 1992; Volkwein et al. 1995; Fisher et al. 1998; Henson and Stone 1999; Sloan et al. 2000; Mustaine and Tewksbury 2002, 2007; Dowdall 2013). Even so, there is a growing body of research focusing on the mechanisms through which bystander intervention programs (Banyard et al. 2007; Coker et al. 2011) and sexual assault prevention initiatives (Gidycz et al. 2006; Moynihan et al. 2011; Paul and Gray 2011; Mabachi et al. 2020) are implemented on university campuses. These studies have reported several key challenges in program success including lack of buy-in among program stakeholders, limited resources, lack of awareness, and bureaucratic burdens.

Recent policy literature has raised a need for greater clarity in explaining evaluated interventions to inform future policy decisions. A detailed description of the mechanisms through which programs were implemented, the context in which interventions work, and the outcomes that the policies produced provides such clarity for practitioners who will be seeking to replicate existing programs/policies (Eck 2010; Johnson et al. 2015). To address this call, a case study was conducted on a college campus with a systematic CPTED program in place. A case study approach entails systematic investigation of a set of related events in a natural setting using a variety of data collection techniques to understand a particular subject (Berg and Lune 2011). This case study sought to observe and learn from actions of and interactions between program stakeholders. Qualitative methods were utilized to understand the dynamics of implementing the CPTED program, the mechanisms that caused the outcomes, and the program's strengths and challenges.

Literature review

CPTED is regarded as a useful planning tool for reducing criminal opportunities through empowering residents and eliminating vulnerabilities of the built environment (Cozens 2011; Cozens and Tarca 2016). This crime prevention approach is rooted in the notion of Defensible Space developed by Oscar Newman in 1972. Newman argued that vulnerability to crime increases where certain design and

landscaping criteria are lacking. He suggested that the presence of ample surveillance opportunities, clearly defined public and private spaces, and a well-maintained environment would instill a greater sense of responsibility in residents enabling them to be actively involved in improving their own safety (Newman 1972). While the term 'CPTED' was coined by Jeffery in (1971), he later acknowledged Newman's work on defensible space as the main theoretical building block that gave rise to CPTED (Jeffery 1976; Cozens and Love 2015). CPTED initially focused on the physical environment but redefined its boundaries over time to embrace the social factors that can play a role in creating safe environments. The first generation CPTED entails strategies to manipulate physical design to decrease opportunities for criminal behavior. The basic strategies of first generation CPTED are providing proper visibility, specifying the boundaries, maintaining a pleasant image of the neighborhood, and limiting intruders' access to a given area. The second generation is regarded as a complementary addition to the first generation CPTED, as it focuses on improving safety through attracting people and encouraging prosocial activities in a given area (Saville and Cleveland 2008; Letch et al. 2011; Atlas 2013). Although discrepancy continues to exist in both academic and practitioners' realms regarding the number of CPTED principles and the terms used to describe them (see Ekblom 2011; Armitage and Monchuk 2019), the five commonly recognized principles are as follows:

Natural surveillance

The principle of natural surveillance assumes that providing appropriate visibility enables legitimate users of a given area to observe any suspicious behavior and intervene as necessary. This would also discourage would-be offenders from committing crime as they feel they are being watched (Armitage 2006; Welsh and Farrington 2009; Reynald 2015). Some natural surveillance strategies on a college campus would include proper lighting in common areas, physical features (e.g., large windows/glass doors) to improve sightlines, and removal of potential hiding spots.

Access control

Access control is defined as limiting unauthorized access to an area in an effort to reduce criminal opportunities (Zahm 2007; Armitage 2014). In the context of a college campus, this aim can be accomplished through use of traffic control (main entrance), front desk control (residential buildings), and physical/electronic keys (academic, residential, and administrative buildings).

Maintenance

The maintenance principle suggests that signs of deterioration (e.g., presence of broken fixtures, litter, and graffiti) are related to higher levels of crime and fear in a given environment (Armitage 2016). An effective maintenance system ensures that such signs are removed quickly to promote an appealing image for the area and

reduce risks of crime and social incivilities (Wilson and Kelling 1982). On a college campus, common maintenance strategies include landscaping, grounds-keeping, and regular repair of security/hardware failures.

Territoriality

The principle of territoriality presumes that clear demarcation of space through physical barriers (fences and hedges) and symbolic barriers (signage and landscaping) would convey that the area is monitored by authorized individuals and would discourage unlawful activities (Cozens et al. 2005; Armitage 2016). Common strategies on a college setting are defining campus boundaries through physical barricades and signage, delineating boundaries of individual offices/buildings, and defining boundaries between residential and non-residential areas.

Activity support

The activity support principle, the second generation addition to CPTED framework, refers to the design strategies that seek to encourage the presence of legitimate users in an area and promote the intended use of space (Gibson and Johnson 2016). In the university context, this aim can be achieved through active tactics (e.g., holding on-campus events) and passive strategies (providing areas for recreational opportunities and student gathering).

Although CPTED has shown promise in reducing crime in residential and commercial areas (Poyner 1993; Pascoe 1999; Armitage 2000; Teedon et al. 2010; Armitage and Monchuk 2011), research has yet to assess the compatibility of this method with educational environments and its potential for addressing campus safety issues. There is some research indicating that CPTED strategies are being used by institutions of higher education (Reyns and Henson 2021; Shariati and Guerette 2020) and that they can be an effective solution for campus safety problems (Atlas and Schneider 2008; Cozens and Sun 2019; Shariati and Guerette 2019). Yet, literature examining how to best integrate CPTED in educational environments is scarce. The present research advances the literature using a case study method in a college campus that systematically applies CPTED strategies. Qualitative methods were used to gain an in-depth understanding of the implementation procedures, strengths, and challenges of the systematic CPTED program.

Contextualization of the CPTED program: research site

The site of this case study is Colorado College (CC), a private liberal arts college in Colorado Springs, Colorado. According to the Carnegie Classification of Institutions of Higher Education, CC is a four-year private not-for-profit college offering baccalaureate degrees. It is located in a predominantly residential area, near downtown Colorado Springs, with an enrollment population of 2118 in the academic year of 2016–2017 (Carnegie 2018). CC is a primarily residential college

that can house 1148 students on campus. The college was selected as the site of the case study because its campus safety department has implemented a systematic CPTED program.

The program is part of a wider initiative, *The Blended Model of Campus Safety,* launched in 2010. Its goal was to address crime issues affecting the college community. The campus safety officials at the time analyzed campus crime data and realized that the most frequent campus crimes were theft, burglary, vandalism, and sexual assault. Two factors were found to be the major underlying causes of the problem: (1) campus location and (2) certain failures in the campus design and security elements. Colorado College is an open campus located in an urban setting. The openness of the campus attracts transients to the college, some of whom reportedly committed crime. Also, the existence of design failures such as dark areas and potential ambush zones had been exacerbating the problem.

The college's CPTED program includes two key components: (1) regular inspections (informed by CPTED standards) of campus design or security elements, and (2) a series of interventions, aligned with CPTED principles, used to address safety issues. The inspections are designed as a vulnerability assessment tool to identify any design or security failures. The college also performs a series of regular activities to enhance college security through several environmental tactics that are in line with CPTED principles. These interventions are conducted in collaboration with CC's facilities services department and the city of Colorado Springs.

Figure 1 presents two key components of the CPTED program: inspections and interventions. The figure also displays the two forms of CPTED inspections that are being conducted in two separate settings—on campus and off campus.
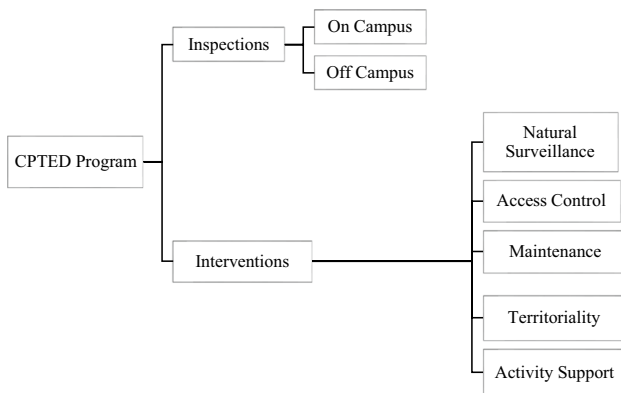

Fig. 1 Colorado college CPTED program

Methodology

Two research questions were examined: (1) How is CPTED utilized in the college context?; and (2) What are the strengths and challenges of using CPTED techniques on a college campus? The data for this case study were gathered during two field trips to Colorado Springs, in April and June of 2016. This research was funded by Florida International University (FIU), the researcher's affiliated university. All data collection was conducted in compliance with policies pertaining to human subjects' protection approved by FIU. The interviews were conducted under pledges of confidentiality. In addition, a focus group with students and a series of participant observations on campus were conducted. Further, some secondary sources of data were reviewed, including campus safety website and CC's archived Clery Reports.

Data collection continued until the point that saturation was reached—no new patterns of data were emerging. The collected data were analyzed using the qualitative data analysis software NVivo 11.4. The software helped to identify and code the emerging themes and recurring ideas. Following the initial coding, the patterns and clusters in data were explored and analytic memos were written. The next step was to interpret the emerging patterns and generate categories (theme descriptors). This process enabled the researcher to gain an in-depth understanding of the administrative processes involved in CPTED inspections and the methods used in CPTED interventions, and to draw conclusions about program's strengths and challenges.

Data collection

Semi-structured interviews

Four groups of interviewees—campus safety officers, college administrators, staff, and faculty members—participated in the study. Participants were selected using a purposive sampling strategy. To identify the interviewees, the college website was examined and relevant administrative and service departments were determined. The initial contacts were made with the campus safety department, which is the main stakeholder of the CPTED program, and the office of facilities services that is responsible for campus design and maintenance. Both departments agreed to facilitate face-to-face interviews with their employees. Through interviews with campus safety officers, the researcher sought to understand the methods and standards used in the regular CPTED inspections as well as any potential barriers/challenges faced by the department. The staff of the facilities services department was interviewed to investigate the department's role in campus design, landscaping, and maintenance as well as the extent of its involvement in the CPTED program.

A list of potential faculty and administrator participants was created based on a review of the college's online directory. Targeted faculty members included those from the social sciences departments and the inter-disciplinary program of environmental studies. Several college administrators from the offices of student life, residential life, sustainability, and Title IX were also invited. These individuals were

selected based on their responsibilities and expertise related to student experiences of campus safety. Through interviews with faculty members, the author sought to explore their perceptions of the use of CPTED techniques on campus, campus safety status, and what they believe should be changed or improved. Interviews with college administrators were conducted to investigate administrative processes involved in developing the CPTED program, the goals and means of the program, and their perception of program effectiveness.

The length of the interviews ranged from twenty minutes to one hour. Written consent was obtained from all the subjects before starting the interviews. Table 1 presents a list of interviewees' demographic information, including their gender, position, department, and average work experience.

Focus group

To obtain an in-depth understanding of CC students' perceptions, concerns, and priorities regarding campus safety, a focus group was conducted with six student participants. The focus group size was intentionally small to ensure effective management of each member's participation (Berg and Lune 2011). To recruit focus group participants, three methods were used. First, the schedule of summer classes was obtained on the college website. Four professors were contacted and permission to attend a class session was requested—to invite students to participate in the focus group. Second, a flyer was posted on the student center's bulletin boards which invited students to join a conversation on campus safety at the assigned location, date, and time. Third, the researcher reached out to residential life staff, asked to forward the flyer and other recruitment materials to several student leaders.

The average age of the participants was 20.1 years. Gender was equally represented as three male and three female students attended. The focus group population

Table 1 Interviewee demographics

Position	Total participants	Department	Gender		Average years of experience
			F	M	
Safety official	12	Campus safety	2	10	5.9
Administrator	6	Student life	2	4	9.3
		Residential life			
		Sustainability			
		Title IX			
Staff	10	Facilities services	2	8	7.9
Faculty	6	Political science	5	1	9
		Sociology			
		Psychology			
		Education			
		Philosophy			
Total	34		11	23	8

was also equally distributed in terms of students living on-campus (three) and off-campus (three). The researcher served as moderator for the focus group. The discussion started by providing background information on the study objectives, its significance, and the data collection methods. Then, the researcher asked questions about campus safety, campus design, and participants' perception of safety.

Participant observations

Participant observations were conducted to directly learn about the environmental design and social dynamics of the campus. Through these observations, the researcher sought to immerse in the setting, observe, experience, and better understand the state of campus design and safety beyond the stakeholders' perceptions. The field observations began with activities that included walking around, watching, listening, and interacting with people to obtain an initial understanding of the area. On the initial visit, the researcher's first impression of the site was that it was an active college campus—a family-oriented event targeting younger children was in progress. During the next few days, the observations were conducted more systematically by watching, asking questions, and recording events, behaviors, and objects. These ethnographic activities enabled the researcher to engage in reflexivity and actively construct interpretations of the observed phenomena. A check-list was created to guide the field observations, and was used while investigating CPTED indicators on campus. The observed indicators were check-marked and field notes were taken when needed.

Table 2 presents the CPTED principles and their indicators as listed on the guiding check-list. The blank space was used to record researcher's field notes.

Table 2 Field observation check list

CPTED principles	Indicators	Field notes
Natural surveillance	Campus visibility	
	Buildings visibility	
	Regular control of lighting	
Access control	Main entrance control	
	Restricted access to residential buildings	
	Restricted access to non-residential buildings	
Maintenance	Landscaping	
	Grounds keeping	
	Regular control of broken fixtures	
Territoriality	Defining campus boundaries	
	Defining individual buildings' boundaries	
	Defining boundaries between residential and non-residential areas	
Activity support	Holding events	
	Existence of recreational facilities	
	Existence of gathering areas	

Secondary sources

Two sources of secondary data were reviewed: the college campus safety website and CC's archived Clery Reports, published from 2014 to 2019. The annual reports provide an overview of the department's safety services (including CPTED), a detailed description of physical and environmental features of campus, including lighting, access control, and maintenance. These secondary sources provided further insight into the college safety policies and practices.

Findings

The analysis and interpretation of the collected data helped to contextualize the CPTED program at Colorado College and revealed several central findings. The study findings are generally consistent with the growing body of research on the application of CPTED in academic environments suggesting that CPTED has the potential to promote safe learning environments (Atlas and Schneider 2008; Atlas 2013; Shariati and Guerette 2019) and that on-campus CPTED inspections help to identify campus design vulnerabilities and develop practical safety solutions (Cozen and Sun 2019). In the following sections, the findings related to the CPTED program implementation, and its key components (inspection and interventions) are presented first, followed by a detailed description of the strengths and challenges of the program.

Program implementation

CPTED inspections are provided free of charge for both on-campus and off-campus buildings. Several campus safety officers have completed basic CPTED trainings offered by the Colorado Springs Police Department (CSPD); the officers earned certification as inspectors. These inspections are guided by the first four principles of CPTED (natural surveillance, access control, maintenance, and territoriality) suggesting that the program aligns with the first generation of CPTED. But these assessments go beyond what is included in CPTED by definition—they include inspections of fire safety, alarm system, smoke detectors, surveillance cameras, etc. Thus, these thorough assessments are augmented by how the campus safety department interprets CPTED. The template of these inspections is provided in the Online Appendix. Content unrelated to the CPTED principles has been removed from the original inspection template.

Although on-campus inspections were initially conducted at the request of heads of college departments, since 2016 the safety department has provided this service for all campus buildings regardless of formal request. Additionally, off-campus inspections are offered to all members of the college, including faculty, students, and staff on request. Students who reside on campus, but plan to move off-campus, are strongly encouraged to use this service. A CSPD officer is present for off-campus

evaluations and can conduct a background check of the property and nearby houses to determine if these areas have been victimized before, which helps the inspectors identify the vulnerabilities. This sort of proactive approach—regular CPTED inspections for existing campuses—has been recommended by Cozens and Sun (2019). In a case study on an Australian university campus, they found that students tend to feel safer in those campus spots which feature high levels of CPTED compliance, and argued that regular CPTED assessments help to identify problem areas and inform appropriate corrective actions (Cozens and Sun 2019).

The CPTED program at CC was not well known among the student- and faculty-participants of the study. Yet, the findings indicate that they preferred proactive strategies of crime control over reactive policing. Students who participated in the focus group expressed their overall satisfaction of campus safety services. Faculty interviewees noted that they normally feel safe on campus as well, and they are certain that their safety concerns (if any) will be addressed properly. Thus, it appears that the CPTED program has the potential to increase college community's perception of safety.

Apart from CPTED inspections, Colorado College employs a series of environmental strategies on a regular basis to enhance campus safety. Below is a detailed description of Colorado College CPTED interventions, based on the five-fold CPTED taxonomy.

Natural surveillance

Providing adequate visibility on campus is a recurring concern of the college. An annual campus walkthrough is conducted through a collaboration between the city's utilities department and CC's departments of campus safety and facilities services. Any identified failures in relation to campus visibility will be documented and corrective actions will be taken, such as trimming vegetation, fixing hardware failures, and removing potential hiding spots. In addition, a biweekly campus lighting report is produced by the departments of campus safety and facilities services for remedial action. One of the campus safety officers described the activity: "We do a campus light report with the electric people in the facilities, where we identify lights that are out, broken ones that are not working properly. That, at least, we do two reports every month". This approach is largely supported by previous research that indicates college students tend to feel safer in those parts of campus that provide higher levels of prospect and limited opportunities for concealment (Fisher and Nasar 1992; Nasar and Fisher 1993; Fisher and May 2009).

Figure 2 contains two pictures which illustrate the level of natural surveillance on the CC campus. The first picture shows a well-lit walkway leading to the campus student center at night and the second picture indicates proper visibility provided by large windows in the area enclosing the college library.

Access control

Colorado College is an open campus that welcomes visitors and facilitates the organization of athletic and entertainment events. Although this atmosphere

Fig. 2 Pictures displaying natural surveillance

provides opportunities for social and cultural connections, it can be hazardous—in the sense that would-be-offenders may be attracted to the potential targets on campus. To limit intruders' access, the college implements both physical key access and electronic key card access. The installation of card-swipe security features has rapidly expanded since the Blended Model was launched. Yet, several buildings still use a physical key control system in which officers are assigned to lock doors every night. The buildings that are equipped with electronic key card readers automatically lock and unlock according to a schedule. The importance of these efforts is confirmed by the findings of Cozens and Sun (2019) that being "accessible by non-students" is a major reason for students identifying some campus areas as "unsafe spots".

Fig. 3 Pictures displaying access control

Figure 3 shows an exterior and an interior door which were locked and could only be opened using electronic key cards.

Maintenance

To ensure that the campus image remains within certain standards and address the maintenance needs of the area, two techniques are being used. First, officers physically lock the doors of certain buildings every night. If they discover broken fixtures or safety hazards, they submit reports to the facilities office, and request work orders to remedy the situations. Second, campus safety and facilities services work together on a maintenance-related initiative. This intervention plan entails a quarterly walk with the presence of a campus safety officer and a member of the facilities services department to make sure that there are no safety hazards on campus. These maintenance actions are supported by previous research reporting that students' perception of safety is lower in cluttered and poorly maintained campus spots (Shariati and Guerette 2019; Cozens and Sun 2019).

In Fig. 4, the first picture indicates that CC campus was well maintained with trimmed vegetation, and the second picture shows a clean well-kept area which leads to the student center with a designated spot for securing bicycles.

Territoriality

The Colorado College campus has expanded over the past several years. Some buildings in the surrounding neighborhood have been acquired by the college as part of this expansion. Because these buildings do not look structurally different from other buildings in the area, the college needed to define its boundaries. As walls, fences, or gates do not suit an open academic environment that aims to encourage social communication, other alternatives have been sought to simultaneously secure the college community and retain the open-access feature of the campus. A campus safety official explained:

Fig. 4 Pictures displaying maintenance

To indicate the institution's boundaries, we added signage for our parking lots and some other buildings. We also created a neighborhood watch sign that we put up on a lot of buildings and onto major pedestrian thoroughfares through campus, so as soon as you cross campus, there is a sign that says you're now on CC property. We also looked at the concept of rebranding our patrol vehicles. … The vehicles [are now] clearly branded as CC. They do patrols along the boundary. So, if somebody doesn't know that this is a college and happens through soon they realize that they are at CC.

This approach is aligned with the findings of previous research indicating that excessive use of physical barriers can increase crime by obstructing surveillance and creating hiding spots (Bennett and Wright 1984; Coupe and Blake 2006; Reynald 2015).

Figure 5 illustrates CC's territorial reinforcement efforts that draw clear boundaries for campus. The pictures indicate the use of signage to define the college's entrance (first picture) and to distinguish one of the buildings added to CC as part of the recent expansions (second picture).

Activity support

Activity support aims at improving safety through design elements that attract people and encourage prosocial activities in a given area. As the CC's CPTED program is informed by first generation CPTED, participant observations and focus group discussions were used to determine the extent of the use of activity support strategies. Based on the researcher's on-site observations, Colorado College is a friendly and inviting campus. Within academic buildings, study rooms and furniture encourage students to socialize and study together. Outside the buildings, benches, picnic tables, and playgrounds provide friendly spaces for the college community. Also, several events were observed, in which families, children, and students gathered. The focus group discussions and informal conversations with people confirmed the frequency of such events on campus.

Fig. 5 Pictures displaying territoriality

Fig. 6 Pictures displaying activity support

In Fig. 6, an entertainment event happening during the researcher's visit (picture one) as well as an interior area designated for student gatherings (picture two) can be seen. These activity support elements provide opportunities for community interaction and promote the intended use of the area.

Strengths

The interviews with campus safety officers were insightful—these individuals have been trained to implement the CPTED program and conduct regular inspections. Their real-life experience helped to gain a thorough comprehension of the program's strengths. Then, the interviews with college administrators, whose offices had been evaluated by the CPTED team, provided the other side of the story. Listening to their experiences of their offices undergoing safety-check helped to further understand the CPTED program's benefits.

Educational value

Several administrators whose offices were CPTED-evaluated revealed that they most appreciated the educational value of the CPTED assessments. These inspections identified some safety vulnerabilities in their buildings. The recognition of the vulnerabilities allowed them to address particular issues and empowered them by teaching them how easily CPTED interventions are to implement—particularly in their personal lives. A college administrator explained this process:

> My office was evaluated by the CPTED team. It's a great program to get off the ground, especially if the occupants are there during, it makes you aware. It encourages you to open your eyes a little bit, and it could show some of those things that would encourage crime that you might not have thought

about before. So, it's got that educational piece and it's something that's financially pretty easy to do most of the time.

Diffusion of benefits

The other advantage of the CPTED program, which was mentioned by several safety officers, is its potential to diffuse benefits to non-treated targets and areas. So, in addition to the direct impact on targeted buildings, the positive outcomes can spread to adjacent campus buildings and the surrounding neighborhoods. This "diffusion effect" has been reported considerably in previous studies on situational crime prevention (Clarke and Weisburd 1994; Guerette and Bowers 2009; Bowers et al. 2011). One of the safety officials explained:

> When you look at the community if you secure one building really well, then it has some spillover effect for other buildings on that area. Having several buildings secured, we can dis-incentivize the campus as being a viable target for crimes of opportunity.

Cost-efficiency

The CPTED program can be beneficial for the entire campus community due to its cost-efficiency (e.g., relatively inexpensive modifications can produce long term cost-savings in policing). Some CPTED techniques are basic, commonsense measures that ordinary people can easily learn and apply. Given the relative ease and modest cost of implementing some of the recommended fixes, individuals that receive the evaluations are more likely to embrace them. A safety official described the CPTED recommendations in the following words: "It's usually very small fixes that go into place that really cumulatively have a very positive effect on the safety and security of that building."

Challenges

The interviews with campus safety officials and staff of the facilities services department helped explore the major challenges and impediments of using CPTED approach in the Colorado College campus. Despite the promising findings on the program's strengths, the analysis showed that the program faces several important challenges in the implementation phase. The analysis of these obstacles helped to identify the underlying issues and offer solutions.

Recommendations not acted upon

One common, recurring concern reported in the interviews with campus safety personnel was a lack of action following the CPTED security evaluations. The

security officers of the college emphasized the importance of making changes to address the vulnerabilities that were identified through CPTED inspections. Most of the safety officials expressed disappointment that their reports were often neglected by departments' decision makers. A safety officer explained:

> I mean probably the biggest challenge is that after we do it and we present it to whatever department, they automatically think we're going to pay for it, and we're going to go ahead and do it, which is not true, we have our budget, they have their budget, so it's up to them to go and actually make the changes, which don't always get done.

This frustration can intensify when officers' reports are neglected—leading to a crime that could have been prevented. Another safety officer described his frustration in the following words:

> We provide the information and things are not acted on, sometimes we saw things, we say we just told you a couple of months ago, and that can be a little frustrating, even though I understand that there's always reasons behind it, but I would say that safety comes first.

Dilemma between safety and openness of a campus

Another challenge that emerged consistently in the interviews is caused by the nature of the campus itself. Legitimate users prefer an open and public educational area, but this accessibility can be incongruent with safety. Controlling access to a given area or specifying the boundaries of a property are both essential components of CPTED; however, the case of a college campus differs from typical cases (e.g., residential or commercial properties). While controlling entry and exit in typical cases is usually appropriate, closing the whole campus or installing walls or fences around campus would not be desirable. In the discussions with faculty and students, most of the participants referred to the openness of campus as a potential safety issue that attracts transients to the college and creates criminal opportunities. However, they acknowledged the need for engagement and communication between the college community and the broader community of Colorado Springs. In sum, the idea of a closed campus is not considered to be acceptable; however, some level of access control is demanded. One safety official explained this dilemma in the following words:

> Realistically to make it safe does not make it friendly, and they really want it to be friendly, open and inviting, but with all that open invitation comes a potential danger, so they have to gauge, what is it that they want to do.

Historic buildings codes

It is expensive and difficult to modify older buildings. Safety officers believe that most of the campus buildings are old—in the era they were built, safety was not prioritized. Thus, modifying these buildings using CPTED interventions is challenging.

Additionally, many of these old buildings are on the national historic registry, which adds another set of obstacles that may hinder modification—as one safety official described: "There's not a lot of things that we can change about the older ones to implement safety, but we [need to] find ways to do it aesthetically, not messing up the building or anything like that."

Human resource limitations

Shortages in human resources were also raised as a limitation. The limited number of CPTED-certified officers, who could solely focus on the CPTED program was perceived by several safety officers as an obstacle for service delivery and program efficiency. These officers noted that they currently conduct CPTED inspections in addition to all other regular tasks. Hiring additional skilled individuals would enable the department to deliver the best outcomes. This finding was similar to that of Mabachi et al. (2020) suggesting that safety is typically not prioritized in a college campus. As many academic and administrative issues are usually addressed primarily, novel safety initiatives (e.g., CPTED) often have difficulty gaining resources and funding.

Funding limitations

The last prevalent challenge that emerged in the interviews was funding limitations. The safety department has a limited budget that does not allow it to pay for the changes. On the other hand, report recipients typically expect to have the safety department make the modifications. This conflict usually results in lack of action based on the CPTED recommendations. One safety officer described the situation in the following words:

> We can make all these [CPTED] suggestions and give it to the head of the departments but then they have to pay for the changes, so when they see they need to spend money fixing this and nothing bad happened yet, it just gets ignored. So, I guess if CC had a fund for making those changes, it would be so much more useful because everything could be updated. I just feel like when we put it in the hands of the departments, they're just going to skip over it.

Discussion and conclusion

This case study was carried out on a college campus with an ongoing CPTED initiative as part of a comprehensive campus safety plan. Based on the analysis, the CPTED program appears to be a promising campus safety initiative due to the campus safety department's embrace of the program and the supportive administrative efforts at the college. Although the program is still in its infancy, the awareness among college administrators and campus safety officials regarding the program's potential benefits was universal. Despite these promising findings, the program faces several ongoing challenges in the implementation. The qualitative analysis sought

to determine why these barriers exist and to offer recommendations for corrective actions.

Three major detrimental factors can explain why CPTED recommendations were not implemented in many cases. First, the safety department did not have the authority to compel other departments to implement changes. Nor was there a follow-up system to investigate to what extent the recommendations have been put into practice. Thus, the program's advisory status inhibits it from advancing beyond a consultative effort. Second, consistent with Mabachi et al. (2020), there was a lack of awareness among the recipients of the CPTED reports about the benefits of the program and how it works. Some recipients (e.g., assessed departments) mistakenly expect that the safety department is responsible for implementing the changes or paying for them. Thus, the recommendations are sometimes ignored by them as they hold the campus safety department accountable for making the changes. Third, limited inter-departmental collaboration also contributed to the lack of further action. The analysis revealed insufficient awareness of CPTED inspections among the staff of other departments. Some routine collaborations exist between facilities and campus safety personnel—including jointly conducted activities such as the annual lighting walk-through, or the quarterly maintenance walk-through. However, the facilities department has no involvement in regular CPTED inspections. Nonetheless, they can be a good partner in performing CPTED vulnerability assessments: the facilities department can promote safety inspections by examining and fixing design and landscaping deficiencies.

This lack of knowledge among the boarder college community explains why novel safety initiatives (e.g., CPTED) often have difficulty gaining funding and human resources. Safety is typically not prioritized in a college campus because many academic and administrative issues must be addressed primarily, often resulting in appropriation of inadequate resources to campus safety.

The other challenging situation, the dilemma between openness and safety, stems from a potential conflict in the nature of a college campus, which is simultaneously expected to be open and secure. Although difficult to address, this paradoxical expectation offers opportunities for innovative methods of environmental design, which can respond to both needs. The strategies of access control and territoriality—if tailored to the needs and nature of an academic area—will help to overcome this challenge.

Last, the historic buildings on campus, which require that any modification complies with the historic building codes, creates another challenge with regard to the CPTED implementation. It is difficult and expensive to modify these old buildings, and any modification must comply with the provisions of the historic building codes, which have higher structural and aesthetic requirements in comparison to modern buildings. Despite the complexity of this situation, CC has been able to systematically implement its CPTED program—implying that these case study results are transferable to other universities. In other words, Colorado College has made initial progress toward this proactive initiative. Thus, newly built campuses will be more likely to be able to implement a CPTED program successfully while older institutions could overcome this challenge by developing more creative solutions.

Analyzing the program's challenges offers recommendations to other colleges seeking to implement CPTED. As the advisory status of the CPTED program was diagnosed as an underlying reason for lack of corrective actions, institutions can create mandates on enforcement and follow-up systems. For instance, they can require CPTED recommendation recipients to act upon them in a certain amount of time, and then track changes accordingly. They may also post the reports on the college website, so that transparency forces the departments to take action.

The institutions can also offer rewards (e.g., cooperative grants and resources) to departments that act upon the reports and promote cross-departmental collaborations to facilitate the implementation phase. Providing appropriate training opportunities for departments that work with the CPTED program can eliminate future implementation problems. Furthermore, holding awareness campaigns can bring more resources by drawing attention to the potential benefits of the program.

Although, this study offers a step forward in assessing the CPTED approach for campus safety, it does have several limitations offering opportunities for future research. The single qualitative case study did not allow the researcher to examine more programs of this kind in different settings. The study identified Colorado College as the only institution in the United States that applies CPTED in an organized way. As more universities have recently begun to implement CPTED systematically, future research can compare CPTED programs at multiple campuses to determine in what manner and in which context the program achieves the best outcome. Moreover, the case study mainly captured the perspectives of campus safety officials, college administrators, and staff of the facilities services department. Another interesting area of future research entails a shift in focus to the experiences of students and faculty, particularly in the context of off-campus CPTED evaluations.

In spite of these limitations, the study findings offer university officials practical information on how to foster campus safety using CPTED approach. It also provides an in-depth understanding of the applicability of this method in the educational context and presents recommendations for college administrators on how to provide support for preventive interventions and help safety officials overcome their challenges. Methodologically, the triangulation of several data collection strategies—interviews, focus group, and observations—helped to control bias and increase the validity of the findings. Pursuing additional case studies in various academic settings will provide a better understanding of the appropriateness of CPTED for college campuses and inform the entire college community on how to use CPTED techniques to create a safe campus environment.

Declarations

Conflict of interest The corresponding author states that there is no conflict of interest.

Ethical approval This study was conducted in compliance with policies pertaining to human subjects' protection approved by Florida International University.

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