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The Forgotten (Practical) Side of School Safety: What Do Clery Reports Say about CPTED and Crime on College Campuses?

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ABSTRACT

Following incidents of school violence, common discourse often neglects the role of practical approaches, such as CPTED, to safeguard campuses. This study utilized a content analysis of U.S. Clery Act Safety Reports from a national, randomly drawn stratified sample of n=100 American universities to determine the extent CPTED techniques were implemented. Findings suggested that 1) CPTED use is limited; 2) two CPTED techniques, access control and activity support, were most common; 3) institutions with higher crime rates tended to have implemented more CPTED measures; and 4) CPTED use appears to be related to less severe campus crimes. Implications are discussed. **KEYWORDS**

College campus safety; campus design; crime prevention through environmental design; CPTED; Clery Act

Introduction

Few crimes provoke moral outrage as readily as those which involve the killing or other violent victimization of children. Because schools and higher education campuses are tasked with maintaining secure and protected learning environments for children and young adults, they are intended as safe havens and are expected to be immune from violence and other harmful disruptions. It is perhaps for this reason that incidents of school violence are followed by passionate debate about what more could be done to prevent future occurrences. Commonly, extreme measures such as arming teachers with guns and overhauling constitutional protections on the ability to maintain firearms are demanded, yet, they often result in little if any meaningful reform. This 'incident-debate-limited reform' cycle has been the case for at least the last several decades.

While this sort of scenario plays out in national media and political circles, school and university administrators are faced with the necessity of safeguarding school campuses on a daily basis. Any victimization of a student, even those not reaching media scrutiny, carries potential liability and must be dealt with effectively. This burden to take campus crime seriously became required with the passage of the *Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act* in 1990. This Federal law, known as the 'Clery Act', requires all colleges and universities to annually disclose crimes that occur on and around their campus to the public and to establish crime prevention programs to safeguard students. Those institutions which fail to comply may be subject to substantial civil penalties by the U.S. government. Due to this greater transparency, higher education institutions have dramatically increased the expenditure of resources devoted to safeguarding students. According to at least one report, annual spending on campus security by universities was expected to exceed 400 USD million as of 2018 (Cantorino, 2017).

One practical approach to facilitating campus safety entails the manipulation of environmental design to reduce the suitability of college campuses as a venue for crime. Crime Prevention Through Environmental Design (CPTED) is a proactive crime control perspective that refers to strategies that focus on reducing criminal opportunities by manipulating the physical and social qualities of the environment. In urban planning literature, CPTED is regarded as 'a useful planning tool for assisting in the creation of more efficient, sustainable and livable urban design' (Cozens, 2008, p. 272). CPTED comprises inexpensive and simple design tactics that lead to long-lasting deterrent outcomes (McCormick, 2011). Thus, it can be an appropriate preventive tool for college campuses, because it ostensibly will produce long-term savings on policing. Moreover, the proactive nature of CPTED may be better suited to learning and research environments than reactive and coercive strategies. Indeed, the U.S. Center for Disease Control has advocated for the use of CPTED to safeguard schools and has recently developed a checklist for gauging the extent of crime prevention through environmental design among existing facilities employing in-site observations (CDC, 2017).

Although empirical research on CPTED is growing, little is known about the application of this method within educational settings. While some research has assessed the type of security and prevention programs employed by institutions of higher education (Woodward *et al.*, 2016; Dameron *et al.*, 2009; Hayes-Smith & Hayes-Smith, 2009; Krivoshey *et al.*, 2013), no studies have empirically examined the extent to which CPTED principles have actually been implemented on college campuses. Resultantly, the appropriateness of CPTED in academic settings has not been adequately studied. Distinct from the existing literature, this study sought to shed light on the extent that CPTED measures have been used to safeguard American universities. It also aimed to advance scientific knowledge on how the use of this method is related to campus crime and security.

Literature Review

Crime Prevention Through Environmental Design (CPTED)

The catalyst of the CPTED approach dates back to the work of Jacobs (1961), Jeffrey (1971), and Newman (1972). In her seminal work '*The Death and Life of Great American Cities*,' Jacobs discussed the role of environmental factors in crime and disorder emphasizing the impact of visibility, demarcation of public and private spaces, and diverse use of environment on crime prevention (Cullen & Wilcox, 2010; Cozens & Love, 2015). The term 'CPTED' was coined by Jeffrey (1971). He argued that spatial factors play a critical role in crime occurrence. Thus, manipulating those conditions can be an effective way to reduce crime. The 'Defensible Space' theory (Newman, 1972) is considered as another pillar in the development of CPTED. Newman's theory establishes a link between environmental conditions and crime and emphasizes the role of residents in defending their

space and reducing criminal opportunities (Newman, 1996; Reynald & Elffers, 2009). This theory soon became a standard of urban design and planning for crime prevention in the United States and constituted a baseline for CPTED (Crowe & Zahm, 1994).

The principles of CPTED have informed planning policy and practice across the globe (see Ekblom, 2011; Cozens & Love, 2015). In the UK, Secured by Design (SBD) is an award scheme which 'encourages the building industry to design out crime at the planning stage' (Armitage & Monchuk, 2011, p. 323). SBD standards are synonymous with CPTED strategies. Empirical studies have consistently found reductions in crime and fear of crime following SBD modifications (Armitage, 1999; Brown, 1999; Cozens *et al.*, 2007; Pascoe, 1999; Teedon *et al.*, 2010). In Australia, the substantial research focusing on CPTED as a potential tool for creating sustainable communities suggests that there needs to be an evidence-based knowledge of spatial and temporal patterns of crime problems prior to the development of CPTED strategies (see Cozens, 2011).

The conceptual framework of the present study discussed below is composed of the five principles of CPTED, which are defined in light of the defensible space theory.

Natural Surveillance

Natural surveillance refers to an area's status in terms of appropriate visibility. Sufficient lighting and lack of potential hiding spots cause legitimate users to feel safe in an area. This also dissuades rational would-be-criminals from committing unlawful acts by increasing the inherent risk and difficulty of crime (Armitage, 2006; Bennett & Wright, 1984; Brown & Altman, 1983; Reynald, 2015; Welsh & Farrington, 2009).

Access Control

Access control is defined as limiting intruders' opportunities to gain access to an area to commit crime. This can be accomplished by including features that indicate who is authorized to be in a given site, who is not allowed to be there, and what activities are permissible (Zahm, 2007). Research suggests that highly accessible areas are more vulnerable to crime (Beavon *et al.*, 1994; Johnson & Bowers, 2010; Poyner & Webb, 1991; Wiles & Costello, 2000; for an exception see Hillier & Sahbaz, 2009).

Maintenance

The maintenance principle assumes that a well-kept area creates higher perception of safety and reduces the opportunity for unlawful acts. Common strategies are regular control of security/hardware failures, landscaping, and grounds-keeping (Johnson *et al.*, 2014; Fritz, 2009). Empirical evidence suggests that physical dilapidation reflects the lack of informal social control and leads to social incivilities (Lewis & Maxfield, 1980; Perkins *et al.*, 1992; Reynald, 2011; Skogan, 1990).

Territoriality

Territoriality is defined as specifying the boundaries of property to convey the message that the area has restricted access and is monitored by authorized individuals (Reynald & Elffers, 2009). While some research has found that this strategy would deter rational offenders from their potential victims (Armitage, 2000; Perkins *et al.*, 1992; Taylor *et al.*, 1984), other studies have illustrated that secluded areas are more attractive to motivated

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offenders due to insufficiency of informal surveillance and potential hiding spots (Bennett & Wright, 1984; Coupe & Blake, 2006; Reynald, 2015).

Activity Support

The activity support principle refers to the design strategies that are used in an area to support its legitimate use through employing two types of tactics: active efforts (e.g. organizing events to attract more legitimate users to an area) and passive strategies (e.g. integrating aesthetically pleasing design features into the environment to attract people accordingly) (Fritz, 2009). Evaluation literature on the effectiveness of this strategy is scarce.

Study Background

The heinous murder of a 19-year-old student at Lehigh University in 1986 led to national campaigns demanding transparency on campus crime and security (Janosik & Gregory, 2003). As the risk of violence and victimization was foreseeable due to evident failures in the security features of the campus, Lehigh University was held liable in a lawsuit brought by the Clery family, laying the foundation for enactment of laws on campus safety (Fisher & Sloan, 2013). The Clery Act requires all institutions of higher education that participate in Federal financial aid programs, referred to as Title IV universities, to report their campus crime statistics in annual safety reports (herein referred to as *Clery Reports*) and to devise crime prevention programs to protect campus communities.

Security and Prevention Programs on College Campuses

Several studies have examined the availability of security and crime prevention programs on college campuses. A content analysis of the public safety webpages of 323 Title IV universities revealed that more than half of the institutions provided safety tips, escort services, and alcohol and drug policy information and over one-third of them communicated information on crime prevention programs, crime alerts, and emergency medical services (Dameron et al., 2009). A similar study examined online resources of 423 Title IV institutions to measure their compliance with Clery policies and accessibility of crime prevention programs (Woodward et al., 2016). The analysis found that most institutions provide some preventive methods, but only a few rise above adhering to Clery requirements by offering proactive crime control strategies and educational programs. A subset of these studies assessed the availability of sexual assault information and prevention resources on college campuses. Conformity with regulations regarding service provision and consistency across the universities were investigated (Hayes-Smith & Hayes-Smith, 2009; Judson et al., 2010; Garcia et al., 2012; Krivoshey et al., 2013; Franklin et al., 2016). The overall findings of these studies suggest that variations exist across institutions in terms of offering and advertising programs to students and that many schools, particularly small 2-year colleges, fail to provide basic information and preventive resources.

The Current Study

In an effort to measure the level of CPTED and determine if this level of consistency is associated with campus crime rate, this study utilized a national sample of one hundred Title IV institutions. A content analysis of their Clery Reports is conducted to offer insight into the deployment of CPTED strategies in U.S. institutions of higher education. Although the principles of CPTED have been used as a practical standard for proper urban design over the past four decades, investigations of CPTED application in educational environments are scarce. While some individual school case studies have examined the level of CPTED in relation to students' fear of crime and/or perception of safety (Tseng *et al.*, 2004; Fernandez, 2005; Cozens & Sun, 2018; Shariati & Guerette, 2019), no study has systematically measured the level of CPTED deployment in a representative sample of college campuses. Nor has any inquiry been devoted to understanding the relationship between CPTED use and campus safety and crime.

To address this void in the literature, two research questions were raised: (1) to what extent universities are employing CPTED strategies; and (2) how the use of CPTED techniques are related to campus crime rates. To gather information on the institutions' level of CPTED and other crime prevention programs a content analysis of the Clery Reports of the sampled universities was conducted. Content analysis is 'a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding' (Stemler, 2001, p. 1). The office of Federal Student Aid of the U.S. Department of Education publishes a list of the Title IV institutions on its website every academic year. This list provides certain information for all the listed schools, including school code, school name, address, city, state, ZIP code, region, and division. This list was obtained for the academic year 2015–16, which included 6,708 institutions.

Using a proportionate stratified sampling technique, a national sample of U.S. universities was drawn. This sample includes 100 higher education institutions located across nine divisions within four regions of the country: West, Midwest, Northeast, and South. U.S. Census taxonomy for the regions and divisions of the United States was adopted for the purpose of sampling. To comply with the geographic classification adopted from the U.S. Census, 137 institutions that were located in unincorporated territories of the United States were removed from the baseline data. To draw the sample, first, the stratification was done for the nine divisions of the United States and a proportionate number for each stratum (division) was obtained. Then, the same method of stratification was used for the states and a proportionate number for each state was calculated. Finally, a systematic sampling with a random start was used to select the schools within each state.

The Clery Reports of the sampled universities were retrieved from the official websites of the institutions. However, the researchers' attempts to obtain the Clery Reports were not successful for several sampled schools. Although these schools were listed by the Federal Aid Program as Title IV institutes, they had not produced Clery Reports or they did not upload reports to a public website. To address this issue, all of the institutes without obtainable Clery Reports (976 schools) were removed from the total list and the sample was drawn again. The final list of schools from which the sample was redrawn included 5,595 higher education institutions.

Figure 1 presents the distribution of sampled universities across the United States. Despite the use of stratified sampling technique, which increases the representation



Figure 1. Distribution of sampled universities across the U.S.

from all the different divisions and states, the final list shows that eight states (Montana, Wyoming, New Mexico, South Dakota, Rhode Island, New Hampshire, Alaska, and Hawaii) and District of Columbia are not represented in the final sample. This is because a sample of 100 institutions is relatively small to capture schools from every state.

Variables and Data

The variables used in the analysis, their descriptions, and data sources are described below.

Dependent Variables

Campus crime rate is the dependent variable of the study, which in turn, includes four types of crime – violent crime, property crime, violence against women (VAWA), and other violations. Violent crime entails criminal homicide, aggravated assault, robbery, and sex offenses. Property crime comprises burglary, motor vehicle theft, and arson. VAWA comprises dating violence, domestic violence, and stalking. Last, other violations include drug law violations, liquor law violations, and illegal carrying of or possession of weapons. These crime statistics were obtained from then latest Clery Reports of the sampled institutions. Next, campus crime rates were calculated per 1,000 student enrollment population.

The Handbook for Campus Safety and Security Reporting, published by the U.S. Department of Education, provides the definitions of each of these crime types. For the purpose of counting and reporting criminal offenses, all Title IV institutions must

comply with this document's definitions which stem from the Uniform Crime Reporting (UCR) System of the Federal Bureau of Investigation (FBI) (USDOE, 2016).

Independent Variables

The main independent variables of the study are the five principles of CPTED, which are estimated using two data sources: universities' Clery Reports and campus maps. The Clery Act requires all participating institutions to collect, distribute, and publish information concerning their security policies and access to their campus facilities. Accordingly, Clery Reports typically include a section entitled 'campus security and access' which reports on the state of visibility within the campus, methods of access control, and maintenance services. They also report on regular campus social and cultural events. This information allowed researchers to estimate the level of compliance of each institution with four CPTED principles – natural surveillance, access control, maintenance, and, in part, activity support. Then, campus maps were used to measure activity support (in part) and territoriality.

Composite measures (scales) were developed for each CPTED principle, based on their definitions and the existing research literature. Three sub-variables were defined for each CPTED variable; then, for each sub-variable, three indicators were developed. Appendix A presents the measurement criteria used to operationalize CPTED concepts. The list includes the indicators of each CPTED principle as well as the source of identification of each indicator (i.e.: Clery Reports or campus maps). The total CPTED score for each institution ranges from 0 to 45 and the total possible value of each CPTED strategy ranges from 0 to 9.

However, the indicators of territoriality and activity support principles are not fully reflected in the Clery Reports. Thus, campus maps were obtained from institutions' websites to complement the measurement. A thorough review of campus maps allowed researchers to determine if the campus was an open or closed campus, whether individual campus buildings were separated from surrounding areas using walls, gates, and partitions, and whether or not clear boundaries were defined between residential and non-residential areas through signage and physical barricades. For activity support, both Clery Reports and campus maps were utilized by the researchers, and each school was scored based on the existence or lack of the indicators.

Following the review of all reports/maps, a total CPTED score was assigned to each institution. Similar procedures have been used in urban planning research to grade urban design qualities. By developing operational definitions, physical features can be measured and then statistical relationships between these features can be analyzed (Ewing *et al.*, 2006).

Standardization of the CPTED Variables

Fifty-one of the total 100 sampled universities did not have any student residential facilities. Thus, one indicator of access control (i.e. restricted access to residential buildings) and one indicator of territoriality (i.e. defining boundaries between residential and non-residential areas) were not applicable in those cases. Therefore, the total possible score of access control and territoriality for these institutions ranged from 0–6 rather than 0–9. This could have created inconsistency in the variables' weights. To address this limitation, the values assigned to all the CPTED sub-variables were standardized by calculating a proportionate value for each quantity. Following standardization, each CPTED sub-variable ranged from 0 to 3, and the indicators of each sub-variable ranged from 0 to 1.

Control Variables

Three groups of control variables are accounted for in the regression model. The first group comprises non-CPTED crime prevention strategies, which include measures that are designed to prevent crime but are not considered to be environmental design techniques. These variables include educational and awareness programs, presence of patrol officers, surveillance cameras/CCTV, emergency callboxes, community-oriented programs, and campus escort. These factors are also measured using the Clery Reports.

The second group of variables that are controlled for in the model are school characteristics, which include public vs. private, graduate vs. undergraduate, size of the school, and urban vs. rural (Carnegie Foundation, n.d.). These data were gathered from Carnegie Foundation and U.S. Census Bureau (2010) websites. The last group of control variables includes city crime rates (e.g. city violent crime rate and city property crime rate), which were obtained from FBI's UCR Data. City crime rates are calculated per 100,000 populations. Table 1 lists the study variables, the data sources, and the years for which the data were collected.

Educational and Awareness Programs. Universities typically offer educational programs for campus safety. These programs can include lectures, seminars, workshops, and trainings. To operationalize this variable, three indicators were developed: providing basic security tips online, providing primary awareness programs (for newcomers), and

	Variables	Sources	Year
DV: Campus Crime	Violent Crime Property Crime Violence against Women Crime Other Violations	Clery Reports	2014
IV: CPTED	Natural Surveillance Access Control Maintenance	Clery Reports	2014
		Campus Maps	
	Territoriality Activity Support	Clery Reports & Campus Maps	
IV: Non-CPTED Crime Prevention	Awareness Programs Patrol CCTV Emergency Callbox Community-oriented Programs Campus Escort	Clery Reports	2014
IV: School Characteristics	Graduate vs. Undergraduate Public vs. Private Size	Carnegie Foundation	2014
IV: City Crime	Urban vs. Rural City Violent Crime City Property Crime	U.S. Census	2010 2012

Table 1. Variables and Data.

holding ongoing awareness events. The total possible score for this variable ranges from 0 to 3. If a university offers only one of these three services, the assigned score is 1. If two are offered, the score is 2. And, if all three are offered, the score is 3. A 0 score was assigned to schools that do not perform any of these tasks. Thus, this variable was coded as an ordinal variable, based on the universities' Clery Reports.

Presence of Patrol. The model also controls for the presence of patrol officers on campus. These officers can be either campus safety officers – who are non-sworn and unarmed – or sworn police officers who are authorized to carry firearms and make arrests. This variable was coded as a binary variable based on the institutions' Clery Reports, where 0 indicates lack of patrol officers, and 1 indicates their presence on campus.

Surveillance Cameras (CCTV). The utilization of surveillance cameras on school campuses was controlled for in the study. This was reported on institutions' Clery Reports and coded as a binary variable. The schools that have camera systems in place were coded as 1, and institutions without CCTV were coded as 0.

Emergency Callboxes (Blue Light Phones). Blue light phones or emergency callboxes are usually located throughout campuses to facilitate communication with campus security offices in case of a security hazard. Upon pressing a button, it connects to the dispatcher for immediate assistance. Institutions with this security feature were coded as 1, and institutions without it were coded as 0. This variable was also coded based on schools' Clery Reports.

Community-Oriented Programs. In the context of universities, these strategies refer to the involvement of campus community in crime prevention. Neighborhood watch and bystander intervention programs are two common community-oriented strategies used on college campuses. This was also coded as a binary variable according to schools' Clery Reports, 1 representing the use of this type of program, and 0 indicating lack of such program.

Campus Escort. This service provides safe transit – from one location on campus to another – at night for students, faculty, and staff upon request. Using Clery Reports, institutions that offer this service were coded as 1; they were coded as 0 if the service is not offered.

Inter-Coder Reliability

Using the above operationalization technique, the Clery Reports and the campus maps of the sampled institutions were reviewed. All CPTED principles and non-CPTED control variables were coded for each institution. Then, to improve the reliability of self-coded data and reduce the possibility of any bias, an inter-coder reliability technique was used. 'Intercoder reliability is an indispensable validity criterion for studies that employ content analysis' (Freelon, 2010, p. 20). 'The ultimate aim of testing reliability is to ensure that unreliabilities are negligible so as to justify continuing the coding or starting an analysis of the data toward answering research questions' (Krippendorff, 2004, p. 241). To ensure inter-coder reliability, four conditions must be met: using multiple independent coders, having a proper operationalization technique, setting a threshold for agreement, and reporting reliability scores (Berke & Godschalk, 2009).

Two graduate students were recruited to measure the same variables: CPTED and non-CPTED concepts. Each student reviewed one-half of the Clery Reports and campus maps (i.e. 50 schools each student) and coded them using the same operationalization criteria. Two sets of data, one coded by the researchers and one coded by the recruited students, were compared to check the reliability of coding. To assess the level of agreement between the two datasets, the Reliability Calculator OIR (Freelon, 2013) was used. This is an inter-coder reliability web-service. It can calculate reliability coefficients for ordinal, interval, and ratio data coded by two or more individuals.

Inter-coder reliability for nominal-level data is calculated by dividing the number of agreements between two independent coders by the total number of the unit of analysis. However, the nominal method cannot be applied for variables at the other three levels of measurement: ordinal, interval, and ratio (Freelon, 2010, 2013). To address this limitation, Hayes and Krippendorff (2007) explain how the *Krippendorff* reliability coefficient can be used for all four levels of measurement (Freelon, 2013). 'The result is a suite of four mathematically distinct Krippendorff's alpha formulae, each calibrated to fit the contours of one of the measurement levels' (Freelon, 2013, p. 11). The Reliability Calculator OIR (ReCal OIR) web-service has added a new function to the original two nominal-only ReCal modules (Freelon, 2010), which operates with all four levels of measurement (Freelon, 2013). The next step was to select a threshold for an acceptable level of agreement between coders. The Krippendorff's standard, which relies on variables with reliabilities above.80, was adopted (Krippendorff, 2004). Agreement coefficients among the two datasets of the study variables are reported in Appendix B.

Data Analysis and Results

Figure 2 displays the level of CPTED use within the sampled institutions across the U.S. states. The dots represent universities and the colors represent the level of CPTED application. No clear pattern is observed here; however, in the Northeast region, there is a lower application of CPTED. The South Atlantic is medium to high, except for Florida which is very low. Similarly, in the Midwest the majority of sampled universities are medium to high, but those in Indiana and Michigan are very low.

Descriptive Statistics

Table 2 presents descriptive statistics for the variables used in the analysis; the table presents several important findings. First, violent crime and property crime were committed at about the same rate in the sampled school campuses, M = 3.01 and M = 3.02, respectively, whereas the rate of VAWA and other violations differed significantly from violent crime and property crime (VAWA M = 1.32 vs. other violations M = 15.87). Second, standard deviation of the mean for other violations is higher than the other three crime types, suggesting that the other violations' data are more spread out from the mean (other violations SD = 33.66 vs. violent crime SD = 10.73, property crime SD = 6.52,



Figure 2. Level of CPTED application across sampled universities.

VAWA SD = 5.77). This might be due to the wide range of violations that fall within this crime category (i.e. violations of drug, liquor, and weapons laws). Third, the total CPTED score average was less than one (M = .95) with the highest observed score of 2.48, out of a total possible of 5. This suggests that the use of CPTED is very limited and has not been implemented as comprehensively as it could. Fourth, among the CPTED strategies, access control and activity support are more common across the sampled universities (access control M = .29, activity support M = .28), whereas the other three CPTED measures are not as visible (natural surveillance M = .14, maintenance M = .13, territoriality M = .12).

Fifth, among non-CPTED prevention measures, patrol (M = .61), awareness programs (M = .56), and campus escort (M = .48) are more commonly used. In addition, Table 2 reveals the institutional characteristics of the sampled schools. Fifty-seven percent of the schools is located in an urban area. Fifty-one percent is predominantly undergraduate. Thirty-six percent is public institutions and twenty-two percent are categorized as large schools. Finally, the table reports on city crime rates, suggesting that the mean of city's property crimes is significantly higher than the mean of city's violent crimes. Boxplots further illustrate the variability of the five CPTED strategies across the sample, as presented in Figure 3.

Correlation and Regression Findings

To further analyze the study variables, correlations were run to determine any significant relationships. The variables were not normally distributed. Thus, Spearman's correlations were conducted to statistically test the relationships. As reported in Table 3, Spearman's

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Variable	Description	Min	Max	Mean	Std. Dev.	Range	Ν
Dependent Variables							
Campus Crime Total	Rate Per 1000	0	209.85	23.23	41.62		100
Violent Crime	Rate Per 1000	0	80.9	3.01	10.73		100
Property Crime	Rate Per 1000	0	42.31	3.02	6.52		100
VAWA	Rate Per 1000	0	43.47	1.32	5.77		100
Other Violations	Rate Per 1000	0	188.9	15.87	33.66		100
Independent Variables CPTED Principles							
Natural Surveillance		0	.55	.14	.145	0-1	100
Access Control		0	.77	.29	.173	0-1	100
Maintenance		0	.44	.13	.132	0-1	100
Territoriality		0	.66	.12	.121	0-1	100
Activity Support		0	1	.28	.266	0-1	100
Total CPTED Score		0	2.48	.95	.591	0-5	100
Non-CPTED							
Awareness Programs		0	3	1.68	1.014	0-3	100
Patrol	1=Yes	0	1	.61	.490	0-1	100
CCTV	1=Yes	0	1	.39	.490	0-1	100
Emergency Call Box	1=Yes	0	1	.37	.485	0-1	100
Community-Oriented	1=Yes	0	1	.47	.502	0-1	100
Campus Escort	1=Yes	0	1	.48	.502	0-1	100
School Characteristics							
Undergraduate	1=Yes	0	1	.51	.502	0-1	100
Large	1=Yes	0	1	.22	.416	0-1	100
Public	1=Yes	0	1	.36	.482	0-1	100
Urban	1=Yes	0	1	.57	.498	0-1	100
City Crime Rate							
City Overall Crime	Rate Per 100,000	943	16712.3	4620.5	2326.81		100
City Violent Crime	Rate Per 100,000	10.4	1750.3	570.5	370.8		100
City Property Crime	Rate Per 100,000	887.8	16194.4	4049.9	2111.2		100

Table 2. Descriptive Statistics of Variables Used in the Analysis.

correlations identified significant positive correlations between CPTED variables and campus crime rates, which was an unexpected finding. THE total CPTED Score is correlated with all types of campus crime in a positive direction.

This unexpected positive correlation also exists between campus crime and non-CPTED crime prevention strategies, as presented in Table 3. Awareness programs and emergency callbox are significantly correlated with all types of crime. Presence of patrol and community-oriented programs are significantly correlated with VAWA and other violations. Campus escort is correlated with violent Crime, VAWA, and other violations.

Given this significant correlation, it appears that universities that have higher rates of crime are more likely to use CPTED and other crime prevention strategies. In other words, universities that are experiencing crime issues seem to be implementing crime prevention measures that are aligned with CPTED and non-CPTED techniques. As the correlation analyses do not control for the time element, no causal conclusion can be made asserting that CPTED/non-CPTED measures are creating the crime issue, because it is not known which factor comes first.

To further test this proposition, a series of nested regression models were used. Two sets of regression equations were run to estimate the inter-relationships between campus crime and CPTED techniques – using Ordinary Least Square (OLS) approach. The first set of regression equations included four models. In the first model, only CPTED



Figure 3. Variability of CPTED strategies across the sample.

strategies were included. The second model considered non-CPTED measures in addition to the CPTED variables. Then, school characteristics were introduced into the third model. Finally, city crime rates were added to the last model. Three groups of control variables are also considered in the model, including non-CPTED prevention measures, school features, and city crime rates.

Table 4 provides the results of the four models explaining campus crime rates. In Model 1, access control and activity support are significant at the .01 level, and they

Table 5. Correlation results.					
Independent variables	Violent Crime	Property Crime	VAWA Crime	Other Violations	Overall Crime
CPTED Principles					
Natural Surveillance	.185	.132	.375***	.157	.157
Access Control	.249**	.228**	.225**	.262***	.383***
Maintenance	.309***	.204**	.430***	.313***	.274***
Territoriality	.092	.100	.411***	.283***	.166
Activity Support	.269***	.251**	.497***	.541***	.356***
Total CPTED Score	.327***	.288***	.574***	.502***	.420***
Non-CPTED Prevention					
Awareness programs	.259***	.219**	.305***	.310***	.302***
Patrol	.094	.131	.492***	.369***	.229**
CCTV	.028	.055	.114	.106	.118
Emergency Callbox	.280***	.198**	.449***	.298***	.262***
Community-oriented programs	.164	.051	.352***	.313***	.186
Campus Escort	.263***	.151	.384***	.261***	.195

Table 3.	Corre	lation	resu	lts.
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*p <.1 **p <.05 ***p <.01.

		J		
	Model 1	Model 2	Model 3	Model 4
CPTED Strategies				
Natural Surveillance	984	721	724	723
Access Control	1.309***	1.276***	1.220***	1.189***
Maintenance	.978	.902	1.023	1.089
Territoriality	804	856	867	835
Activity Support	1.041***	1.227***	1.338***	1.326***
Non-CPTED Strategies				
Awareness Program		.090	.098	.105
Patrol		330	311	329
CCTV		.58	.036	.040
Emergency Callbox		.143	.130	.130
Community-oriented		.053	.074	.061
Campus Escort		114	100	090
School Features				
Undergraduate			.042	.048
Public			098	079
Large			103	101
Urban			007	012
City Crime Rate				
City Violent Crime				.105
City Property Crime				.044
R ²	.229	.264	.272	.275

Table 4						
Lanie 4	()) \	rearession	models	explaining	campus	crime
TUDIC II	015	regression	moucis	coplaining	cumpus	CHINC

*p <.1. **p <.05. ***p <.01.

remain significant through the fourth model. However, none of the control variables are found to be significant. R-Square has slightly increased through the last model. While the study hypothesis is not supported here, this significant positive association aligns with the correlation results discussed earlier. The reverse relationship between two CPTED measures (i.e. access control and activity support) and campus crime reinforces the argument that time is playing a role in the model. In other words, universities with crime issues tend to implement higher levels of access control and activity support.

Considering the above results, another set of regressions were run to explore the possible influence of campus crime rates on the use of CPTED. Hence, in the second set of equations, CPTED was the dependent variable and campus crime the independent

Table 5. OLS regression models explaining CPTED application.					
	Model 1	Model 2	Model 3		
Campus Crime Rate					
Campus Violent Crime	.011	.034	.037		
Campus Property Crime	038	029	033		
Campus VAWA Crime	.099*	.057	.061		
Campus Other Violations	.066***	.051***	.051**		
University Characteristics					
Undergraduate		066***	070***		
Large		.060*	.060*		
Public		.052*	.049		
Urban		.008	.013		
City Crime Rate					
City Violent Crime			039		
City Property Crime			.062		
R ²	.225	.399	.407		

*p <.1. **p <.05. ***p <.01.

variable. School characteristics and city crime rates are also included in the analysis as control variables.

Table 5 presents the results of the second set of regression equations. Model 1 examines campus crime rates as the independent variables. There are several important findings here. Most important and in support of the reverse relationship argument, two types of campus crime are associated with higher use of CPTED. Other violations – violations of liquor, drug, and weapons laws – are significantly and positively related to the use of CPTED. On-campus violence against women is also associated with a higher application of CPTED measures.

In the second model, violence against women no longer influences the use of CPTED strategies on campus – however, other violations remained significant through the third model. Additionally, Model 2 controls for institutional characteristics, suggesting that universities that are predominantly undergraduate use less CPTED. This model further reveals that large universities tend to apply CPTED strategies more than smaller institutions. Last, Model 2 identifies a significant positive relationship between being a public school and higher CPTED application.

Following the inclusion of city crime rates in Model 3, being a public school no longer influences the use of CPTED, whereas city crimes were not found to be significant. In the final model, three variables remain influential on CPTED utilization: other violations and being a large institution – in a positive direction – and being a predominantly undergraduate institution in a negative direction.

Discussion and Conclusion

This study reported on the extent and impact of CPTED on campus crime and safety. The content analysis of the Clery Reports and campus maps of a sample of one hundred Title IV institutions revealed several central findings. Notably, environmental strategies aligned with CPTED are being used by the sampled universities, although to varying extent. Techniques of access control and activity support were more common than the other three measures (i.e. natural surveillance, maintenance, and territoriality) within these institutions. Given the overall low average CPTED score found among the sample, it is important to note that none of these 100 schools appear to have had systematically implemented a CPTED program. The analysis measured security provisions that conform with principles of CPTED, which were presumably utilized by the institutions as independent crime control tactics rather than part of a comprehensive CPTED plan. This can explain the extensive use of two CPTED mechanisms while the other three are scarcely used. It might further imply that universities perceive access control and activity support measures to be more effective, easier to implement or otherwise more suitable for the purpose of campus safety.

The statistically significant positive relationship between the use of CPTED and campus crime rates remains an unclear finding. Because the Clery Reports do not specify when these CPTED strategies were implemented, the analyses could not control for the time factor. The inability to develop a time-series data set from the Clery documents limited any ability to control for temporal variations in the level of CPTED. Thus, the data of both dependent and independent variables came from the same academic year. On the surface, this unanticipated connection (i.e. significant positive relationship

between CPTED and crime rate) might suggest that universities with a higher level of CPTED application are likely to experience higher crime rates. However, the lack of control for the time factor in the present study makes it impossible to claim that there is a causal relationship between these two variables. In other words, it is not known if the use of CPTED precedes the high crime rates and, thus, the influence might be in the opposite direction, with crime affecting the use of prevention techniques. Given this, the second set of regression models sought to explore the possible effect of crime rate on the use of CPTED. The results supported the reverse relationship argument and suggested that institutions with higher crime rates tend to apply more environmental crime prevention techniques.

It is also interesting to note that CPTED techniques appear to have been more readily used in relation to low-level crime and disorder problems. Thus, it appears that CPTED may not be perceived by educational administrators as a viable option to prevent more serious violent crime incidents. While overall determinations on the effectiveness of CPTED to reduce violent crime specifically remains a work in progress, there is mounting evidence that when used comprehensively, CPTED measures can prevent some varieties of violent crime (Casteel & Peek-Asa, 2000; Vagi *et al.*, 2018). Considering this it seems plausible that more complete and widespread adoption of CPTED on college and university campuses could produce demonstrable reductions in all varieties of criminal victimizations, including more extreme violence.

Although this study offered several insightful findings to inform future research in this area, it is not without limitations. As mentioned, the time factor was not controlled for in the analyses because the data on crime rates and CPTED strategies were collected from the then latest Clery Reports of the sampled institutions – published in the 2014–2015 academic year. Collecting time-series data of CPTED application and crime rates in future studies can provide further understanding of the causal relationship between the use of CPTED and its influence on campus safety over time.

The second limitation relates to potential inconsistencies between what is reflected in Clery Reports and what is actually in practice, CPTED-wise. Although the Clery Reports should clearly detail the universities' safety policies and practices, discrepancies can create bias in the study results. This assessment relied primarily on universities' Clery Reports which could not be verified because of time constraints. It also reviewed campus maps for assessing territoriality and activity support principles, but it did not entail any campus visits or physical examinations. Future studies could address this issue by including a survey component targeting personnel from the institutions' safety departments as well as conducting systematic site observations to investigate the actual status of CPTED utilization.

Moreover, inconsistencies existed across institutions in terms of how they report on available security services and crime prevention procedures. Universities differed considerably in terms of the content and the narration style that they used in the Clery Reports to describe their safety and prevention programs. This could have affected the coding of CPTED components throughout the documents. To overcome this, an intercoder reliability procedure was relied upon, using multiple coders and an operationalization protocol to verify the reliability of self-coded data.

In spite of these limitations, this study uniquely contributes to the literature as it provides the first appraisal of the extent of CPTED use based on self-reported data from Clery Reports of a nationally representative sample of American universities. The operational definitions developed for the abstract concepts of CPTED offer benefits for both practice and policy efforts. The potential guidelines that can be developed based on the principles of CPTED for academic settings can benefit university communities – educating them on how to contribute to their own safety. Campus safety officials can also benefit from this study by using it as a model of CPTED in the college context. It can also define standard operation measurement tools to help college administrators and campus planners while they engage in design or construction processes.

This study has further sought to contribute to the ongoing dialogue across the fields of criminology and urban planning. Crime and fear of crime continue to be two major concerns in creating sustainable urban environments requiring collaborative preventive efforts among criminologists and planning professionals (Cozens, 2011). Creating safe and sustainable college campuses requires multi-faceted planning informed by an evidence-based understanding of campus safety issues. While more remains to be studied through future research, the growing body of literature, including the findings here, offers to advance interdisciplinary research on the extent and impact of CPTED in educational environments.

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Appendix A

CPTED PlaticipiesSub-valuatiesJudicationsJu	CDTED Dringinlag	Sub Variables	Indicators	Course
Natural Surveillance (0-9)Campus Visibility Status (0-3)Proper lighting in common areas Placement of physical features providing better visibility (e.g., big windows) Removing obstructions (e.g., potential hiding spots)Clery Reports8Buildings' Visibility Status (0-3)Illuminated building surroundings Buildings' proper interior visibility Encourage people to report lighting failures Perform regular interior subjections Conduct lighting surveysClery Reports Clery Reports Visitors sign up/Wear badges Locked 24/7 Front dex control Non-Residential Buildings (0-3)Clery Reports Clery Reports Vehicle traffic control Deteck 24/7Clery Reports Clery Reports Vehicle traffic controlMaintenance (0-9)Ladscaping (0-3)Planting and vegetation care Grounds Keeping (0-3)Clery Reports Sidewalk/road/bike path care Sidewalk/road/bike path care Signage to direct traffic Perform regular inspections Clery Reports Signage to direct traffic Perform regular inspections Clery Reports Signage to direct traffic Physical barricades around individual buildings Features defining entry/exit to individual offices Signage to direct traffic Physical barricades around residential areas Signage to direct traffic Physical barricades around resi		Sup-variables	indicators	Source
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Recreational facilities (0-3)Existence of outdoor recreational facilities Existence of student organizations/clubsExistence of Gathering Areas (0-3)Existence of picnic tables, benches, etc. Existence of cafes, food courts, student lounges Existence of shops and supermarketsCampus Maps		Existence of	Existence of indoor recreational facilities	Campus Maps
facilities (0–3) Existence of Gathering Areas (0–3) Existence of Student organizations/clubs Existence of Gathering Areas (0–3) Existence of cafes, food courts, student lounges Existence of shops and supermarkets		Recreational	Existence of outdoor recreational facilities	
Existence of Gathering Existence of picnic tables, benches, etc. Campus Maps Areas (0–3) Existence of cafes, food courts, student lounges Existence of shops and supermarkets		facilities (0–3)	Existence of student organizations/clubs	<i>c</i>
Areas (U-3) Existence of cares, food courts, student lounges Existence of shops and supermarkets		Existence of Gathering	Existence of picnic tables, benches, etc.	Campus Maps
באוזנכוונכ טו זווטשז מווע זעטכוווומואכנז		Areas (U-3)	Existence of cares, rood courts, student lounges Existence of shops and supermarkets	
Total CPTED (0–45) Sum of all the above variables	Total CPTED (0–45)		Sum of all the above variables	

Table A1. CPTED coding sheet.

Appendix B

Variables	Compliance Coefficients
CPTED Principles	
Natural Surveillance	.95
Access Control	.86
Territoriality	.89
Maintenance	.93
Activity Support	.88
Non-CPTED Crime Prevention	
Educational Programs	.95
Patrol	.90
CCTV	.91
Emergency Callbox	.88
Community-Oriented Programs	.83
Campus Escort	.89

Table B1. Reliability results of independent CPTED coding.