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Paul Cozens
Curtin University
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Terence Love
Design Out Crime and CPTED Centre
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A Review and Current Status of Crime Prevention through Environmental Design (CPTED)

Paul Cozens[1] and Terence Love[2]

Abstract

This article reviews the current status of the concept of Crime Prevention through Environmental Design (CPTED). It provides an overview of its history and origins and defines how it is commonly understood and conceptualized. Globally, CPTED is an increasingly popular crime prevention strategy supported by governments all over Europe, North America, Australia, and New Zealand, as well as in Asia and South Africa. This review inspects some of the evidence associated with CPTED and provides a detailed overview of the main criticisms facing this field.

Keywords

crime/delinquency, environment behavior, sustainability, CPTED, crime prevention through environmental design

Introduction

This article reviews the concept of Crime Prevention through Environmental Design (CPTED). It begins with an overview of its history and origin and defines how it is commonly understood and conceptualized. This article then highlights some of the evidence associated with CPTED and provides an overview of the main criticisms and challenges for the future. CPTED (pronounced ''sep-ted'' and also known as Designing out Crime) draws on ideas that argue that it is possible to use the built urban form to reduce opportunities for crime. In *Crime Prevention through Environmental Design: Applications of Architectural Design and Space Management Concepts,* Crowe (2000, 46) asserted ''the proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement in the quality of life.'' The term was first coined by Jeffery (1971) and remains the most commonly used definition.

Significantly, given that more than half of the World's population is now urbanized (United Nations 2010) and is projected to rise to 60 percent by 2030 (van Ginkel and Marcotullio 2007), it is argued that these ideas are increasingly important and in need of review. Some have also argued that CPTED ideas have often been oversimplified and poorly applied (Ekblom 2011a; Cozens 2014). Indeed, Crowe (2000, 220) argued, ''The greatest impediment to the widespread use of CPTED is ignorance.'' This is why it is necessary to revisit CPTED. This article reviews the origins, development, and current status of CPTED for the twenty-first century, drawing on research and literature in this field and within the discipline of environmental criminology.

Origins, History, and Development of CPTED

The use of design and CPTED ideas goes back a long way and CPTED-style security measures can be traced to early human settlements. These include the establishment of iron-age forts and castles, which used landscaping, walls, moats, and drawbridges to control access (Schneider and Kitchen 2002). Significantly, Edward I enacted the Statute of Winchester in 1285 to remove areas of concealment provided by ditches and vegetation along highways. Landowners were responsible for removing vegetation and ditches and were also held liable for crimes that took place due to their negligence in not removing concealment opportunities.

> The highway from one merchant town to another shall be cleared so that no cover for malefactors should be allowed for a width of two hundred feet on either side; landlords who do not effect this clearance will be answerable for robberies committed in consequence of their default, and in case of murder they will be in the King's mercy. (Statute of Winchester of 1285, Chapter V, King Edward I, quoted in Kuo and Sullivan 2001, 343).

Some of the more recent origins of CPTED can be traced to Jane Jacobs (1961), C. Ray Jeffery (1969, 1971), and Oscar

[1] Curtin University, Perth, Western Australia, Australia
[2] Design out Crime Research Centre of Western Australia

Corresponding Author:
Paul Cozens, Curtin University, Kent Street, Perth, Western Australia 6054, Australia.
Email: p.cozens@curtin.edu.au

Newman (1972, 1973), among others. In 1976, Jeffery acknowledged Newman's work on Defensible Space (1972, 1973) as the basis of modern CPTED, not his own work (Jeffery 1976). A significant reason for this was that Jeffery's work was complex and required long-term research while Newman's proposals were much simpler and had the potential for immediate application (Andresen 2010).

Jane Jacobs's *The Death and Life of Great American Cities* (1961) did much to challenge contemporary ideas about planning. It identified safety and security as significant elements of a well-functioning city, arguing "the bedrock attribute of a successful city district is that a person must feel personally safe and secure on the street" (Jacobs 1961, 30). A safe city street, for Jacobs (1961, 35), "must have three main qualities:

1. There must be a clear demarcation between what public space is and what private space is.
2. There must be eyes upon the street; eyes belonging to those we might call the natural proprietors of the street. The buildings on a street equipped to handle strangers . . . must be oriented to the street . . .
3. The sidewalk must have users on it fairly continuously, both to add to the number of effective eyes on the street and to induce the people in buildings along the street to watch the sidewalks in sufficient numbers."

In *Crime Prevention through Environmental Design*, Jeffery (1971) suggested that the social causes of crime had been overstated and the biological and environmental determinants of crime required inspection. He saw the causes of crime in a more multidisciplinary and holistic way and drew on social, behavioral, political, psychological, and biological explanations. The internal environment of the brain was as important as the external physical environment in determining criminality. Interestingly, Jeffery (1971) called for a new school of thought in the field of environmental criminology.

In the late 1960s and early 1970s, an American architect and city planner, Oscar Newman, studied crime rates and the design of public housing. He published his findings as *Defensible Space: Crime Prevention through Urban Design* in 1972 (see also Newman 1973). In many ways, this work operationalized Jacobs's theories. In both America and Britain, Newman's work created immediate and significant interest (Mawby 1977). This was at a time of rising crime rates and widespread disillusionment with existing frameworks for tackling crime.

Developed largely from an architectural perspective, *Defensible Space* drew on the work of social and behavioral scientists such as Hall (1959), Wood (1961), Jacobs (1961), Sommer (1969), Angel (1968), and Jeffery (1969, 1971). It was based on observations of the built form (public housing) and argued there was an association between specific design features and variations in recorded crime rates.

Two social housing projects in New York (Brownsville and Van Dyke) were compared and analyzed with regard to recorded crime rates, revealing far higher crime rates for the high-rise blocks of the Van Dyke project than for the low-level buildings of Brownsville. The tenant populations in both projects were considered broadly similar and Newman argued that the environmental design of the buildings was a causal factor explaining the differing crime rates between the two housing projects. The high-rise flats in the Van Dyke projects contained a maze of winding corridors and public areas with limited opportunities for surveillance. Newman reported that over half of all crimes were committed in less visible locations or in places with potential for concealment.

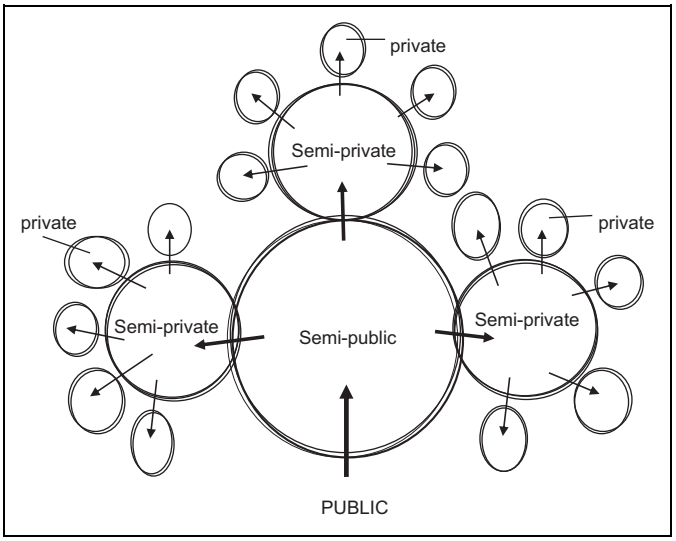

Figure 1. Hierarchy of defensible space (Newman 1973, 9): Arrows indicate entrance and exit points at different levels of the hierarchy.

Influenced by Jacobs's (1961) concept of delineating between private and public space, Newman (1973) developed his hierarchy of defensible space (Figure 1).

He argued that large public areas, shared by numerous residents, could become underused, anonymous, and poorly maintained and fail to encourage a sense of ownership. Newman also claimed low levels of surveillance, the presence of internal corridors, and external entrances invisible from the street facilitated crime. Finally, the presence of "alternative escape routes" could assist criminals by providing access via interaccessible lifts, staircases, and exits. As these factors increased in number, so did crime and the potential for crime. Where a housing block in Newman's study combined all three of these "alienating mechanisms," crime would be at its highest. In addition, Newman suggested that if one or more of these negative design features were improved or removed, the recorded crime rate would decline.

Defensible Space is defined (Newman 1973, 50) as

> A residential environment whose physical characteristics—building layout and site plan—function to allow inhabitants themselves to become key agents in ensuring their security.

Defensible Space is made up of four design elements, which act individually and in combination to help create a safer urban environment:

- Territoriality: the capacity of the built form to create perceived areas of proprietary concern by clearly defining ownership of space using both symbolic and real barriers;
- Surveillance: the capacity of the built form to provide opportunities for surveillance for residents and others using the building configuration and the design and placement of windows and building entrances;
- Image and milieu: the capacity of design and management of the built form to influence the perception of space, promoting clean, well-maintained, and well-ordered places; and
- Geographical juxtaposition (environment): the capacity of the surrounding spaces to influence the security of adjacent areas and vice versa.

The four elements of *Defensible Space* combine to promote a sense of ownership, community, and responsibility in residents to secure and maintain a safe, productive, and well-maintained neighborhood. Newman (1973, 2) argued that the built environment can act to facilitate criminal activities and therefore promotes the use of *Defensible Space* as

> A means for restructuring the residential environments of our cities so they can again become livable and controlled not by police, but by a community of people sharing a common terrain.

As a design theory, it is "informed by human occupancy and use experience, a novel approach in architecture at the time" (Schneider and Kitchen 2002, 92).

Since Newman (1973), the application of Defensible Space has expanded beyond social housing projects to include other types of residential housing and to a variety of land uses such as retail, commercial, transportation nodes, schools, hospitals, town centers, and sporting locations (e.g., the Sydney and London Olympics). Defensible Space theory has been further refined to include a clearly defined social dimension (Newman and Franck 1980, 1982; Newman 1995, 1996), and many of the concepts are central to the modern approach to CPTED. His projects received support from the US Department of Housing and Urban Development and the Department of Justice and was adopted under the CPTED program by the Westinghouse Corporation (1976, 1977a, 1977b, 1978). Newman's ideas were further endorsed by the Department of Housing and Urban Development in the mid-1990s (Cisneros 1995).

Many others contributed to the development of CPTED. For example, Brantingham and Brantingham (1975) investigated burglary in Florida and encouraged the emergence of environmental criminology (1981, 1991). The UK Home Office was also working on "designing out crime" strategies (Clarke and Mayhew 1980, 1982; Poyner 1983). Wilson and Kelling's (1982) Broken Windows theory was also influential in the refinement of CPTED, particularly in relation to Newman's concept of "image and milieu," which has evolved into the CPTED concept of "image maintenance/management."

Coleman (1985, 1990) received significant funding and support in the United Kingdom for the Design Improvement Controlled Experiment (DICE). This amended the design of over 4,000 blocks of flats and maisonettes in London. She suggested sixteen features of design disadvantage—all CPTED related. Her ideas were initially well received, but later criticized for lack of scientific rigor (Smith 1986). However, her publication, *Utopia on Trial: Vision and Reality in Planned Housing* (1985, 1990) did much to popularize CPTED ideas. Poyner and Webb's (1991) *Crime Free Housing* investigated crime in the suburbs and new towns of the United Kingdom, proposing twelve CPTED features that could be modified to reduce crime.

Crowe, a criminologist and former director of the American National Crime Prevention Institute (NCPI), developed and conducted numerous CPTED training programs for police and others. His publication *Crime Prevention through Environmental Design: Applications of Architectural Design and Space Management Concepts* (1991, 2000) stimulated interest in CPTED and provided firm foundations for the progression of CPTED into the 1990s and thereafter (Carter and Carter 1993).

Since the 1990s, a wave of studies in the field of environmental psychology continued to investigate and refine CPTED ideas (e.g., Vrij and Winkel 1991; Brown and Bentley 1993; Fisher and Nasar 1992; Nasar and Fisher 1993; Perkins et al. 1990; Perkins and Taylor 1996). These focused on the crucial perceptual dimensions to CPTED—and how offenders, police, planners, or citizens, for example, perceive urban space and features within it—including those related to CPTED. This perceptual focus has continued into the new millennium (e.g., Kuo and Sullivan 2001; Hertzog and Kutzli 2002; Cozens, Hillier, and Prescott 2001, 2002; Cozens et al. 2003a, 2003b; Blobaum and Hunecke 2005; Cinar and Cubukcu 2012; Jorgensen, Ellis, and Ruddell 2013).

The work of Wekerle and Whitman (1995) also assisted in the evolution of CPTED from "defensible space" architecture and physical security into more of an urban planning approach. They argued that awareness of the environment, visibility by others, and finding help were important to personal safety and could be supported by using appropriate lighting, promoting sightlines, land-use mix, activity generators, informative signage, and a sense of ownership and by reducing entrapment spots and movement predictors (Wekerle and Whitman 1995).

Significant contributions to CPTED can also be traced to situational crime prevention research (e.g., Clarke 1997, 2008; Cornish and Clarke 2003) and the emergence of opportunity theories (e.g., Cohen and Felson 1979; Cornish and Clarke 1986; Jeffery and Zahm 1993; Felson and Clarke 1998; Ekblom 2001). A recent focus on residents' capacity for capable guardianship has also emerged in the CPTED field (e.g., Reynald 2009, 2010a, 2010b; Reynald 2014; Reynald and Elffers 2009).

Several researchers have linked CPTED with the sustainability and public health agendas (Du Plessis 1999; Knights, Pascoe, and Henchley 2002; Plaster Carter and Carter 2003; Cozens 2002, 2007a, 2007b, 2008, 2015; Armitage and Gamman 2009) while others highlight how crime also has carbon costs (Pease and Farrell 2011).

CPTED is now supported by the United Nations (United Nations Human Settlements Programme 2007) and by governments all over the world (Ekblom et al. 2013; Cozens 2014) including the United States, Canada, the United Kingdom, Australia, New Zealand, and throughout Europe (e.g., Austria, Hungary, Norway, Belgium, Iceland, Portugal, Czech Republic, Ireland, Slovakia, Denmark, Italy, Spain, Finland, Luxembourg, Sweden, France, Malta, Switzerland, Germany, Greece, and the Netherlands). It is evident in South America (e.g., Chile, Honduras, Brazil, and San Salvador) and in South Africa and parts of Asia (e.g., Japan, South Korea, Malaysia, Singapore, the United Arab Emirates, and Iran). Consequently, in the twenty-first century, there is now a plethora of policy guidance and standards, which operationalize CPTED as part of codes and standards (Atlas 2008, 2013; Ekblom et al. 2013; Cozens 2014). There are also CPTED standards for US Federal Facilities and the Federal Emergency Management Agency (Atlas 2013).

The Seven First-generation CPTED Concepts

CPTED draws on environmental and behavioral psychology. It focuses on the relationships between people and the environment. Environmental cues within the built form are perceived and decoded and can influence the way people react to an environment. Elements that make legitimate users of a space feel safe (e.g., being visible to others) can discourage illegitimate users from carrying out undesirable acts (such as robbery or theft from motor vehicles). CPTED strives to incorporate natural strategies into human activities and space design. Crime prevention has traditionally relied almost exclusively on labor-intensive procedures (e.g., security guards and police patrols) and capital-intensive mechanical/electronic devices (e.g., security cameras, locks, and fences) often significantly increasing existing operating costs for personnel, equipment, and buildings. CPTED can be proactively implemented at the design stage, and it is based on seven key strategies: territorial reinforcement, surveillance, image, access control, legitimate activity support, and target hardening. The seventh is geographical juxtaposition (surrounding environment). Figure 2 illustrates the seven concepts of CPTED.

The design concept of territorial reinforcement seeks to promote notions of proprietary concern and a "sense of ownership" in legitimate users of space, thereby reducing criminal opportunities by discouraging the presence of illegitimate users. Early CPTED ideas are now known as first-generation CPTED, and territorial reinforcement was considered to be the primary concept from which all the others are derived. It includes symbolic barriers (e.g., signage, subtle changes in road texture) and real barriers (e.g., fences or design elements that clearly define and delineate private, semiprivate, and public spaces). Access control and surveillance will also promote territoriality by enhancing the levels of informal social control for legitimate users. These strategies act in combination, to use the physical attributes to promote opportunities for surveillance

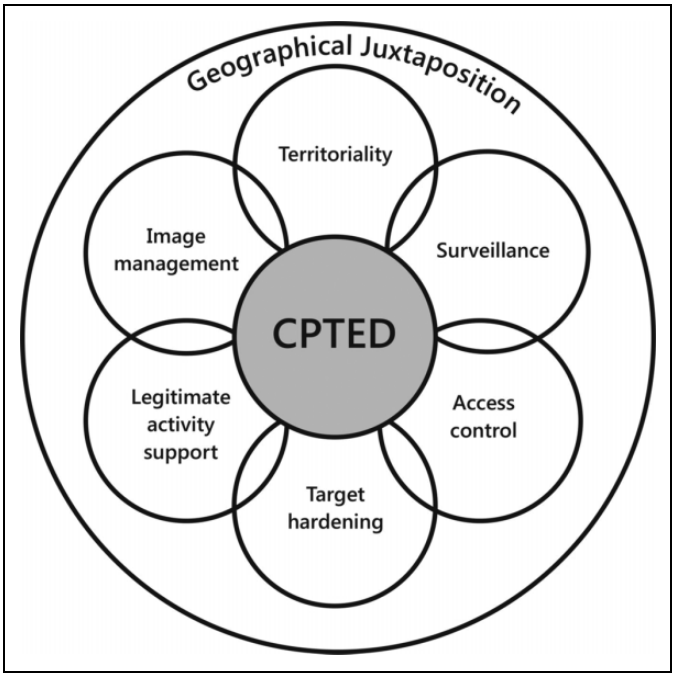

Figure 2. The seven crime prevention through environmental design (CPTED) principles. *Source:* Adapted from Cozens 2014).

(e.g., placement of windows); to separate public, public–private, and private space; to define ownership (e.g., fences, pavement treatments, signs, landscaping, and artwork); and define acceptable patterns of usage.

The promotion of natural surveillance is a long-established crime prevention strategy. Opportunities for residents to observe the street are facilitated by the design of the street, the location of entrances, and the placement of windows, for example. This natural surveillance is considered as a form of capable guardianship that can reduce crime since offenders who perceive that they can be observed (even if they are not), are less likely to offend, in the light of the increased potential for intervention, apprehension, and prosecution. Other forms of surveillance include formal or organized (e.g., police and security patrols) and mechanical/electronic surveillance strategies (e.g., street lighting and closed-circuit television [CCTV]).

Image/space management seeks to promote a positive image and routine maintenance of the built environment to ensure the continued effective functioning of the physical environment and this also transmits positive signals to all users. An extensive body of research supports the importance of the physical condition and "image" of the built environment and the potential effect on crime and the fear of crime. Examples include Lynch (1960), Newman (1973), Wilson and Kelling (1982), Perlgut (1983), Eck (2002), Kraut (1999), Ross and Mirowsky (1999), and Ross and Jang (2000). Poorly maintained urban space can attract crime and deter use by legitimate users. For example, vacant premises have been found to represent crime "magnets" providing opportunities for a range of deviant and criminal offenses. This also links with the concept of "crime attractors" and "crime generators" (Brantingham and

Brantingham 1993, 2008) and is related to Newman's (1973) concept of "geographical juxtaposition."

The CPTED concept of using spatial definition to deny access to potential targets is known as natural access control and is focused on reducing opportunities for crime by creating a heightened perception of risk in offenders. It can also empower local stakeholders to watch over spaces and potentially intervene. There is also formal or organized access control (e.g., security personnel) and mechanical access control (e.g., locks and bolts), but these strategies were not generally considered as part of the early definitions of CPTED. The refinement of these ideas has added the strategies of legitimate activity support, image/space management, and target hardening to the CPTED toolbox.

Legitimate activity support uses design and signage to encourage acceptable behavior in the usage of public space and places "unsafe" activities (such as those involving money transactions) in "safe" locations (those with high levels of activity and with surveillance opportunities). Similarly, "safe" activities serve as attractors for legitimate users who may then act to discourage offending. This strategy has clear links with those of territoriality, access control, and surveillance. However, although increased numbers of pedestrians may provide additional "eyes on the street" and potentially discourage some offenses, in a different context, this may also actually encourage and provide additional potential targets for crime (e.g., pickpocketing).

Target hardening increases the effort and risk of offending and reduces the rewards associated with the commission of a crime and is a long-established and traditional crime prevention technique. There is, however, much disagreement concerning whether or not target hardening should be considered as a component of CPTED. It focuses on denying or limiting access to a crime target through the use of physical barriers such as fences, gates, security doors, and locks, and target hardening is often considered to be access control at a micro scale (e.g., individual buildings). Crucially, excessive use of target hardening can result in the development of a "fortress mentality" and imagery whereby citizens withdraw behind their domestic physical barriers. This can damage the self-policing capacity of the community and work against CPTED strategies that rely on surveillance, territoriality, image, and the legitimate use of space. Gated communities are arguably an example of the "fortressification" of space, a trend that appears to be growing throughout the world.

CPTED can be divided into seven related areas. In Figure 2, the six dimensions to CPTED are surrounded by Newman's fourth Defensible Space mechanism, "geographical juxtaposition." Although some of this concept has been incorporated into that of legitimate activity support, it has been argued that geographical juxtaposition has been largely ignored (Cozens 2014, 2015). This is discussed in more detail subsequently, in the subsection on boundary issues in research evaluating CPTED.

CPTED seeks to optimize opportunities for surveillance, clearly define boundaries (and define the preferred use within such spaces), and create and maintain a positive "image" using the design and management of the built environment in order to reduce opportunities for offending. Within this setting, offenders are more visible to legitimate users, and offenders may feel more at risk of being challenged, reported, or apprehended. Furthermore, a well-maintained and appropriately used urban environment can indicate that a sense of "ownership" and social control exists within that community, and offenders may feel that the heightened risks associated with offending are simply not worth taking.

Second-generation CPTED

CPTED ideas have been refined since the 1970s by researchers, practitioners, and policy makers. A relatively recent development is the increased significance of social dimensions in what is known as second-generation CPTED (Saville and Cleveland 1997), "community CPTED" (Plaster Carter 2002), or "social CPTED" (Mallett 2004). This foregrounds the social characteristics of the community, social cohesion, and "collective efficacy" (Sampson, Raudenbush, and Earls 1997) in response to criticisms that CPTED was physically deterministic and neglected important social factors.

The ideas extend beyond physical design to focus on social programs and community participation to promote self-policing by the community (Saville and Cleveland 2008). There are four key concepts to second-generation CPTED. These are social cohesion, community connectivity, community culture, and threshold capacity (Saville and Cleveland 1997).

Social cohesion is about nurturing an environment where there exists a mutual respect and appreciation of the similarities and differences between people and groups within a community. It is central to second-generation CPTED and also focuses on recognizing, supporting, and celebrating community diversity. A socially cohesive community values diversity, shares a common vision and a sense of belonging, and works to develop positive relationships between people from different backgrounds.

Partnerships within the community can be nurtured by community connectivity. Such connections are the foundation to coordinating activities and programs with and between government and nongovernment agencies. In theory, a more empowered, well-connected, and integrated community will have a stronger sense of place. This connectivity can help to encourage and maintain community self-policing to potentially discourage crime and deviant behavior.

The third concept of second-generation CPTED is community culture. This is present when residents come together and share a sense of place and partly explains why they display any territoriality. This is about the community setting up and participating in festivals, cultural events, youth clubs, and commemorating significant local community events and people. A strong sense of community can encourage the neighborhood to adopt positive outlooks and behaviors, including self-policing.

Finally, neighborhoods can be regarded as ecosystems with a finite carrying capacity for certain activities and land uses. It

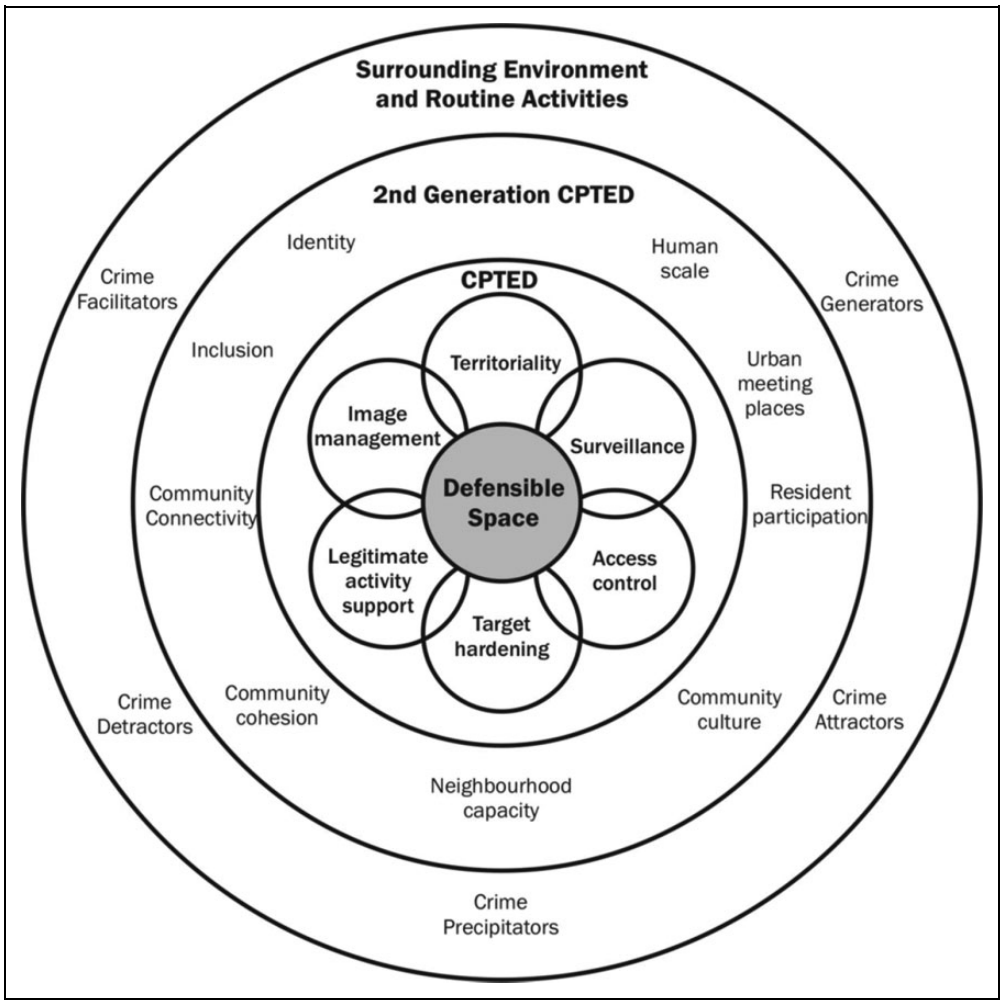

Figure 3. A dynamic integrated model for CPTED. *Source:* Adapted from Cozens 2014).

is important to recognize and manage this threshold capacity in order to maintain the local community ecosystem by promoting human-scale and pedestrian-oriented land uses and activities. For example, where the size and density of development do not inadvertently promote anonymity, the threshold capacity has not been exceeded. Where neighborhood ecosystems exceed their threshold capacity, this is referred to as the tipping point (Saville 1996) where the functionality of the neighborhood is affected. This can result in increased levels of crime and fear of crime. For example, where there is a high concentration of bars in a city center, at some point, the density of patrons and increases in offending can exceed the ability for police and emergency services to function effectively. A second example of a tipping point is when law-abiding residents decide to migrate of out of a suburb. As the rate of out-migration of these residents increases, the neighborhood can change rapidly. Once stable, law-abiding neighborhoods can become less-stable transient neighborhoods. Increasing concentrations of abandoned and derelict properties can affect the image of a neighborhood and poor maintenance can attract vandalism and graffiti. These tipping points can signal a downward spiral of dereliction and crime. These examples of exceeding the neighborhood threshold capacity and lack of management/maintenance can disrupt the neighborhood ecosystem and facilitate crime and antisocial behaviors.

Another key element to second-generation CPTED is inclusion and community participation. In inclusive, healthy, and safe communities, people can generate and implement practical ideas for enhancing their neighborhoods. It is important to ensure community members actively participate in decision-making processes for managing or modifying their neighborhood (Brassard 2003). Inclusion also involves the equal access to amenities and services. This participatory dimension of inclusivity is crucial to the effectiveness of CPTED (Sarkissian, Cook, and Walsh 1997). This involves engagement with the community to undertake local safety audits of perceived problems, conflict resolution, and enhancing social interactions that can nurture second-generation CPTED (Saville and Cleveland 1997).

In an attempt to help to conceptualize first- and second-generation CPTED in a more holistic way, Cozens (2014, 108) has recently developed the Dynamic Integrated Model for CPTED (see Figure 3). Although Armitage (2013a) warns against extending the CPTED net too widely, she does suggest there is merit in integrating the social approach adopted by

second-generation CPTED (see Saville and Cleveland 2003a, 2003b).

Social factors can impact the effectiveness of CPTED since they affect the quality of "eyes" on the street. Indeed, Saville and Cleveland (1997, 1) have suggested, "What is significant about Jacobs' 'eyes on the street' are not the sightlines or even the streets, but the eyes." Moreover, the existence of "eyes on the street" where residents may know their neighbors is insufficient—they must actually "care." An important issue here is that the role of physical environment is easier to measure than more elusive social factors such as a sense of community and "caring." Newman (1972) arguably addressed this aspect, at least to some extent, as part of the concept of territoriality within the Defensible Space, where territoriality *may* encourage people to care/want to defend their local environment.

This model links to the social elements of second-generation CPTED, which can help ascertain the extent to which members of the community are actually participating in the self-policing of the neighborhood. As Cozens (2014, 92) has argued, "given the complexity of crime, and its dependence on many aspects of the socio-cultural milieu, taking into account the social dimension should always be part of the CPTED process."

The model also links to Newman's largely forgotten Defensible Space concept of geographical juxtaposition by encouraging CPTED practitioners to consider the potential criminogenic capacity in the surrounding environment. This relates to the routine activities of the area and the potential location of crime generators, crime attractors (Brantingham and Brantingham 1995), crime detractors (Kinney et al. 2008), crime facilitators (Clarke and Eck 2005), and crime precipitators (Wortley 2008). Table 1 provides a basic summary of these concepts.

Table 1. Land-use Types and Criminal Opportunities.

Crime generators	Activity nodes that pull masses of people toward them, who don't necessarily have any predetermined motivations to offend, but they act on criminal opportunities if they become evident
Crime attractors	Activity nodes with well-known opportunities for crime that can entice motivated offenders
Crime detractors	Locations that have few attractions and can push people away. This can then encourage use by potential offenders
Crime facilitators	Things that foster the capability of offenders or assist them in circumventing existing crime prevention measures. They can be physical (e.g., firearms), social (e.g., gangs and organized criminal networks), or chemical (e.g., alcohol/drugs).
Crime precipitators	Things in the immediate environment that actively encourage individuals to commit crimes who would not normally consider offending (e.g., lack of public toilets may encourage public urination).

Source: Adapted from Brantingham and Brantingham (1995), Clarke and Eck (2005), Wortley (2008), and Kinney et al. (2008).

Having provided an update of CPTED, the next section considers the research evidence underpinning CPTED.

Evidence for CPTED as a Crime Prevention Strategy

Formal evaluation of CPTED projects and evaluation of the value of CPTED interventions in crime prevention is important. Zahm (2005, 291) has argued, "without evaluation, it will never be clear when, where, and why such programs have been effective."

This section presents the evidence relating to CPTED as a general crime prevention strategy. There are many studies that suggest individual CPTED concepts of territoriality, surveillance, image management, access control, legitimate activity support, and target hardening when taken in isolation can reduce crime and fear of crime. A detailed discussion of the evidence relating to each individual CPTED concept is outside the scope of this article, and readers are directed to other sources (e.g., Cozens, Hillier, and Prescott 2001; Cozens, Saville, and Hillier 2005; Reynald 2014).

Instead, this section reviews the evidence for CPTED as a general strategy. It discusses the current limitations of the evidence and the insights offered by understanding them. This can be seen as addressing the following questions:

- Does CPTED reduce crime?
- How significant are boundary issues?
  - Does CPTED displace crime?
  - Does CPTED reduce crime beyond the intervention?
  - Is crime prevention influenced by factors beyond the intervention?
  - How much of crime reduction is due to incidental factors?
  - How can we better understand the boundaries of CPTED?
- How significant are theoretical issues?
  - How appropriate are current CPTED definitions and concepts?
  - How dependent is CPTED on the theories from environmental criminology?
- How significant are implementation factors?
  - How can oversimplification affect outcomes?
  - How can value-laden decisions, agendas, and politics affect evaluation?
  - When does CPTED demonstrate negative effects?
  - When is there conflict between CPTED strategies?
  - When is there conflict with other factors and planning agendas?
- What is the relationship between CPTED and social crime prevention?
  - Is the integration of first- and second-generation CPTED more holistic and effective?

As can be seen from the scope of the abovementioned questions, CPTED interventions and crime prevention contexts offer a highly complex mix of interdependent factors.

Gathering and analyzing evidence that is comprehensive and robust enough to ensure valid findings can be drawn is a challenge. In reality, a large amount of CPTED research is not comprehensive enough and can be challenged in a variety of ways. This high level of uncertainty flows into the validity of findings as to the benefits of CPTED, regardless of the widely held conviction that CPTED is generally seen as ''a good thing'' and reduces crime.

The following subsections cover the abovementioned questions to provide a basis for reviewing the quality of evidence supporting CPTED.

Evidence and Evaluation Whether and How CPTED Reduces Crime

Evidence as to whether and how CPTED as a general strategy reduces crime comes from studies of individual projects and reviews of collections of such individual CPTED case studies. The evidence presented is subject to a variety of other considerations and challenges, some of which are presented in the later parts of this section.

The complexity of CPTED means the evaluation of individual CPTED projects typically suffer from research quality problems that compromise the potential to derive unequivocal findings from them. The limitations of such evaluation projects include that the scale of evidence is small relative to the number of factors that potentially influence outcomes, and because each CPTED case is unique in its detail, the potential for findings to be generalized is limited. Research that collates multiple individual cases and analyzes them as a collection benefits by having a larger evidence base across a similar range of potential causative factors and the possibility of sampling across a greater range of types of situation.

One of the first empirical evaluations of CPTED occurred from 1971 to 1973. Richard Gardiner, an urban planner, was hired by the US Department of Justice to test the use of CPTED interventions at the neighborhood level in Hartford, Connecticut. Following three years of extensive data collection, Gardiner's (1978) large-scale study found a direct inverse relationship between crime and CPTED-based neighborhood design and that environmental design aimed at reducing crime worked by reducing opportunities for crime. Gardner's findings stimulated a Federal program to implement and analyze CPTED strategies across America (Westinghouse Electric Corporation 1976, 1977a, 1977b, 1978). Following from Gardner's research, one of the best documented case studies of CPTED according to Schneider and Kitchen (2002, 158) was Newman's study of the Five Oaks project in Ohio (1996), which reported a general 26 percent reduction in recorded crime after a range of CPTED interventions were implemented. More specific was a case study from California focused on the crime reductive potential of a range of CPTED measures (Pieser and Chang 1998). These included reducing escape routes, improved lighting, improved signage, target hardening, access control, CCTV, and nighttime security patrols. It was reported break-ins, vandalism, and graffiti were halved from every weekend to bimonthly. Additionally, occupancy rates in the industrial park increased from 75 percent to 98 percent.

Reviews of collections of CPTED case studies have in general indicated CPTED interventions typically reduce crime. Sometimes, this is tenuously expressed, for example, Rubenstein et al. (1980, 63) empirically reviewed a range of studies from the 1970s concluding, ''the available evidence suggests changes in the physical environment can reduce crime and the fear of crime.'' Sometimes, the findings are more confident. For example, Kushmuk and Whittermore (1981) reviewed studies of CPTED interventions in Portland, Oregon, and found reductions in burglaries of commercial properties and ''a 'stabilisation' of the neighbourhood's quality of life, physical appearance and social cohesion among the business community'' (Schneider and Kitchen 2002, 173).

Some reviews offer partial confirmation of the benefits of CPTED. For example, in a review of 122 evaluations of crime prevention projects, Poyner (1993) found that over half of those in the area of environmental design (24 out of 45) demonstrated firm evidence of crime reductions across all crime. Positive evaluations were focused on lighting, fencing, design changes to improve surveillance opportunities, the cleanup of neighborhoods, road closures/street changes, wider market gangways, electronic access control, the use of car steering-column locks and target removal or modification. Limited evidence of crime reduction was also found in another twelve evaluations. An extensive review of crime prevention in four residential areas (Feins, Epstein, and Widom 1997) found CPTED modifications '' . . . do reduce crime, although they are not 'proof' that this is the result'' (Schneider and Kitchen 2002, 158).

Sometimes the reviews offer significant confirmation for CPTED. Casteel and Peek-Asa (2000) reviewed twenty-eight CPTED studies on robbery and reported higher reductions of between 30 and 84 percent in the sixteen multiple component CPTED studies and all but one of the twelve single component studies. They concluded that their review demonstrated that CPTED is an effective and adaptable approach to reducing robberies. Also in 2000, the US Department of Justice reviewed over a hundred problem-solving projects conducted by police departments across the United States. They found that 57 percent of successful projects utilized CPTED strategies (Scott 2000). The US Congress report *Preventing Crime: What Works, What Doesn't, What's Promising* (Sherman et al. 2002) is one of the most significant reviews of crime prevention project evaluations. Importantly, it revealed that the majority (90 percent) of place-based crime prevention evaluations showed significant evidence of crime reduction effects. These were often relatively large reductions. Sorensen (2003, 36) reviewed the evidence in relation to burglary, finding a ''high'' amount of reliable evidence for CPTED as a technique.

Secured by Design (SBD) is a UK CPTED initiative, where police inspect and award certification to buildings/estates that have utilized CPTED ideas. Studies have consistently demonstrated SBD properties/estates can reduce crime (see Armitage 1999; Brown 1999; Pascoe 1999; Cozens, Pascoe, and Hillier

2004; Cozens, Pascoe, and Hillier 2007; Teedon et al. 2010; Armitage and Monchuk 2011). The Australian Institute of Criminology (Morgan et al. 2014) recently reviewed the effectiveness of a range of crime prevention interventions. CPTED was supported, showing evidence of effectiveness generally, and in relation to reducing residential burglary, stealing from motor vehicles, malicious damage, and stealing from the person. The authors observed "while further research into the impact of CPTED is warranted, there is sufficient evidence to support the application of CPTED principles . . . as a key consideration in the development of the built environment, including new development proposals and urban regeneration initiatives" (Morgan et al. 2014, 15).

For those taking a critical overview of the state of evaluation and review of CPTED, it is clear the research findings are highly variable and these potentially reflect high variability in outcomes of CPTED interventions and the level of commitment for research capable of addressing the complexity of these situations.

Taylor (2002) in his chapter entitled "Crime Prevention through Environmental Design (CPTED); Yes, No, Maybe, Unknowable, and All of the above," analyzed the evidence on whether modifications to the built environment reduced crime, finding the research was varied and largely inconclusive. He reported some studies indicated CPTED had reduced crime while others showed that it did not. For some studies, Taylor (2002) concluded that "maybe" crime was reduced, while in others, it was "unknowable" as to whether design reduced crime. Taylor (2002, 423) concluded that it "depends crucially on how you define the key terms, how rigorous is the proof you demand and how complete an answer you seek."

The US Congress review *Preventing Crime: What Works, What Doesn't, What's Promising* (Sherman et al. 2002) used the Maryland Scientific Methods Scale as a framework for categorizing research methods used in the studies evaluated to attempt to identify the reliability of evaluations' conclusions. This effectively assessed the empirical robustness of the research method of each study, which in turn reflected on each study's claims of evidence about program effects on crime. The use of the Maryland Scientific Methods Scale focused on establishing whether there is reasonable evidence that a program has any beneficial effect at all in preventing crime (see Table 2).

For the majority of place-based initiatives typical of CPTED, most evaluations were categorized as "unknown" and failed to meet the highest methodological and evaluative standards (Sherman et al. 2002). Only two place-based studies (Crow and Bull 1975; Eck and Wartell 1996) met level 3 on this scale (Sherman et al. 2002). However, this does not necessarily mean that studies not reaching level 5 did not work. Rather, this suggests that it cannot be empirically "proven" to be effective using the research methods that were chosen.

Furthermore, given CPTED is about reducing crime, fear of crime *and* improving quality of life, evaluations of CPTED should arguably also measure indices for quality of life, as well as impacts on crime and fear of crime.

Table 2. Maryland Scientific Methods Scale.

Scale	Methodology
1	Correlation between a crime prevention program and a measure of crime or crime risk factors at a single point in time. Studies without pre-intervention measures
2	Temporal sequence between the program and the crime or risk outcome clearly observed, or the presence of a comparison group without demonstrated comparability to the treatment group. Pre–post design without control areas
3	A comparison between two or more comparable units of analysis, one with and one without the program
4	Comparison between multiple units with and without the program, controlling for other factors, or using comparison units that evidence only minor differences
5	Randomized assignment

Source: Sherman et al. (2002).

A further issue is that many CPTED clients are unwilling to fund follow-up research evaluating design interventions and even when this is achieved, client confidentiality can act to restrict the availability of the findings. These factors constrain the amount of case studies available for review and evaluation.

Boundary Issues in Research Evaluating CPTED

A key difficulty for research evaluating CPTED is the nebulous nature of the boundaries of the situation. There are many boundary considerations, including the following:

- Where are the boundaries of CPTED?
- Does CPTED displace crime beyond the boundaries of the intervention?
- Does CPTED reduce crime beyond the boundaries of the intervention?
- Is crime prevention influenced by factors beyond the boundaries of the intervention?
- How much of crime reduction is due to incidental factors in addition to CPTED?

Armitage (2013a) identified problems due to a lack of clarity regarding the scope and boundaries associated with CPTED. The lack of clarity about these boundaries impacts directly on the quality of CPTED evaluations. The CPTED principles relate to the broad areas of the design, management, and use of spaces, and Armitage asks how realistic it is for CPTED interventions to influence so many factors. Indeed, Ekblom (2009, 9) has commented, "There is a tendency to use the label CPTED indiscriminately to cover everything that aims to prevent crime in the built environment . . . this is not conducive to focused thinking." This may also relate to criticisms about the meanings and conceptualization of CPTED ideas.

One of the major criticisms leveled against CPTED and particularly use of Defensible Space in CPTED is crime displacement (Kaplan 1973). If crime is displaced beyond the

boundaries of a CPTED project and not included in the evaluation of that project, then the findings of the evaluation about the value of CPTED will be compromised. There are six types of displacement.

1. Spatial crime displacement is when offenders commit crimes in new locations.
2. Temporal crime displacement is when offenders commit crimes at a different time.
3. Tactical crime displacement is when offenders change their ''modus operandi,'' or their tactics for offending.
4. Crime target displacement is when offenders chose a different crime target.
5. Crime type displacement is when an offender may simply change the type of crime committed, and
6. Perpetrator displacement is when new criminals replace those who may have been deterred apprehended.

Crime displacement counts against the crime prevention benefits of CPTED. Assessing displacement, however, typically requires assessing crime changes outside the boundary of the CPTED project. It is difficult to measure displacement (Hollin 1989; Barr and Pease 1992) and it has been observed in studies of car steering locks (Mayhew, Clarke, and Elliott 1989) and CCTV (Burrows 1980). Gabor (1990) has argued that the inability to detect and measure displacement does not mean that it did not occur. Barr and Pease (1992) distinguished between ''benign'' and ''malign'' displacement. The ''benign'' displacement of a crime is where CPTED initiatives result in crimes that have less impact or cause less damage to persons and/or property. ''Malign'' displacement is displacement and replacement of a less important crime, by one that has a greater impact and more adverse effects. Intriguingly, Oc and Tiesdell (1997, 72) have argued ''a certain amount of displacement is not necessarily a compelling argument against preventive measures.'' Displacement occurs as a negative side effect of all crime prevention approaches and is not just a criticism leveled purely at CPTED.

CPTED can also have significant positive crime reduction effects beyond the boundaries of the CPTED project. This is known as the ''Halo effect.'' In a similar manner to crime displacement, if crime is reduced beyond the boundaries of a CPTED project and not included in the evaluation of that project, then the findings of the evaluation about the value of CPTED will be compromised. Some research findings have suggested CPTED initiatives can create such a halo effect in which the crime reductive effects extend beyond the areas in which they were implemented (Saville 1998). Taylor (2002) described how the diffusion of benefits of CPTED can outweigh any crime displacement effects (Clarke and Weisburd 1994; Green 1995; Anderson and Pease 1997).

It has recently been argued that geographical juxtaposition is a largely a forgotten dimension to CPTED (Cozens 2014). Evidence indicates certain land uses and environmental settings can exhibit increased levels of crime linked to their routine activities and can influence crime levels in nearby locations (e.g., Brantingham and Brantingham 1993, 1998; Eck, Clarke, and Guerette 2007). This means geographical juxtaposition is a crucially important CPTED concept. In evaluation terms, it means that if such effects are acting from outside a CPTED project boundary and are not accounted for in the evaluation of that CPTED project, then the evaluation of the project will be compromised.

In *Defensible Space*, Newman (1973, 50) referred to ''the influence of geographical juxtaposition with 'safe zones' on the security of adjacent areas; mechanisms of juxtaposition—the effect of location of a residential environment within a particular urban setting or adjacent to a 'safe' or 'unsafe' activity area.'' Newman was cognizant of the existence of the crime generators that underpin geographical juxtaposition and argued that commercial and institutional activity generators did not necessarily always promote safety in the surrounding streets. He argued mixed land uses, ''must be critically evaluated in terms of the nature of the business, their periods of activity, the nature and frequency of the presence of concerned authorities, and so on'' (Newman 1973, 112). He also noted that taking into account the crime effects of geographical juxtaposition with other land uses would be offensive to planners and architects (Newman 1973, 115). In some ways, this might partly explain the absence of this concept from most CPTED guidelines and conceptualizations. Importantly, key proponents of CPTED have continually failed to engage with geographical juxtaposition (Cozens 2014). These include Armitage (2013a, 2013b), Cozens, Hillier, and Prescott (2001), Cozens (2008), Ekblom (2011a), Reynald and Elffers (2009), Reynald (2009, 2010a, 2010b), Reynald (2011, 2014), and others. This shortcoming may also be affecting the effectiveness of CPTED and CPTED evaluations themselves where the effects of geographic juxtaposition are omitted from the evaluation.

The above is an example of incidental factors shaping crime and crime prevention outcomes in addition to the CPTED intervention(s). Some studies do not support the claim that CPTED is effective; however, many report that manipulating design factors was less effective than tackling other variables, rather than reporting no effectiveness whatsoever (e.g., Judd et al. 2002). Taylor (2002) observed social, cultural, and economic factors were more important than design in explaining crime reduction in two empirical studies (Donnelly and Majka 1996, 1998). However, he also stated ''it is extremely plausible ... that design factors are contributing partially to the crime reduction'' (Taylor 2002, 420). An example of evaluation problems from insufficiently included incidental factors relates to the criticisms of methodological issues associated with Newman's studies in *Defensible Space* (Newman 1973). These criticisms include understating socioeconomic and demographic factors (e.g., Hillier 1973; Mayhew 1979; Poyner 1983; Smith 1987; Moughtin and Gardner 1990), Newman's selection of study sites, and his analysis of crime statistics (e.g., Adams 1973; Hillier 1973; Kaplan 1973; Mawby 1977; Bottoms 1974; Merry 1981). The problems associated with isolating individual variables in the complex sociospatial analysis of crime continue to be problematic (Taylor 2002; Sherman et al. 2002).

Theory Issues in Research Evaluating CPTED

The quality, usefulness, and validation of evaluations of CPTED interventions depend to a large extent on theory issues. The way CPTED is theorized and conceptualised shapes what data are collected, and how they are analyzed. To a large extent, this depends on;

- choice and quality of definitions and concepts and
- choice and quality of theories about crime, crime prevention, and the role of CPTED.

Poor terminology definitions deeply compromise research and analysis and the findings from evaluations. CPTED and research relating to CPTED has been accused of lacking clarity (Ekblom 2009, 2011a; Armitage 2013a) and that its terminology is poor and too diverse (Johnson, Gibson, and Stevens 2014). There has also been a move to revisit and reconceptualize CPTED in terms of improving the meanings, definitions, and frameworks (e.g., Ekblom 2009, 2011a; Gibson and Johnson 2013; Johnson, Gibson, and Stevens 2014). In a review of sixty-four studies, several CPTED design concepts were more recognized than others including territoriality, surveillance, image management, access control, legitimate activity support, and target hardening (Gibson and Johnson 2013). The ongoing process of improving definitions is in part occurring via the fields of environmental criminology and environmental psychology, and also in the CPTED domain itself, which is involved in deconstruction and reconstruction of CPTED ideas. Interested readers are directed to www.reconstructcpted.wordpress.com for further details of the latter.

Sound theoretical foundations are important for CPTED and evaluating CPTED because these help explain how and why CPTED reduces crime. This provides the basis both for validly evaluating the crime prevention efficacy of CPTED interventions and the basis for developing new CPTED operational concepts and strategies. In general, these theoretical foundations of CPTED are from environmental criminology and environmental psychology and related disciplines. In theoretical terms, there are criticisms that CPTED has lost connection with its theoretical and intellectual roots. Ekblom (2011a) has suggested that CPTED has become isolated from its ''intellectual blood supply'' of environmental criminology. Zahm (2005, 291) referred to this as a problem of ''translation,'' where although ''environmental criminology has made important contributions to an understanding of crime and offending, much of the work of environmental criminologists has yet to be taken into consideration by the planning and design communities.'' Others have highlighted this criticism and have been attempting to reinvigorate the links with theory (Brantingham and Brantingham 1998; Cozens 2011, 2014).

Sometimes, theoretical foundations become outmoded. Taylor (2002) has suggested CPTED was initially popular because it aligned with the architectural environmental determinism of the day, in which architects, urban designers, and planners assumed design exhibited the strongest influence on behavior (Broady 1972). Taylor (2002) pointed out that correlation does mean causation and that just because a relationship between design and crime may exist, it does not necessarily mean that design actually caused or protected against criminality in specific situations and environmental settings. Defensible Space and CPTED have been accused of environmental determinism by social scientists (Atlas 1982, 1999, 2013; Schneider and Kitchen 2002). Recently, it has been argued ''architecture does not force people to engage in certain behaviors, but the environment and social controls can exert a strong influence on how people respond to their spaces'' (Atlas 2013, 67). In his defense, Newman (1973, 201) noted, ''crime is caused by a multiplicity of factors—economic, social, governmental as well as physical—and it is extraordinarily difficult to isolate one sort of characteristic and discern its particular influence.'' Given the refinements to these ideas since the 1970s, the term ''environmental probabilism'' is perhaps a more accurate description of CPTED for the twenty-first century.

Implementation Factors in Research-evaluating CPTED

There are many indications that implementation factors strongly shape the quality of evaluation of CPTED interventions, in part through influencing the efficacy or otherwise of the CPTED interventions themselves. Examples of implementation factors that influence evaluation include

- oversimplification;
- effects of value-laden decisions, agendas, and politics;
- opposing effects and conflict between CPTED concepts; and
- conflict with other factors.

Several authors (e.g., Wekerle and Whitman 1995; Cozens 2014) have been critical of how CPTED is sometimes taught and implemented oversimplistically—as ''one-size-fits-all,'' ''cookie-cutter'' design elements, rather than as a critical crime prevention process. Where CPTED is implemented oversimplistically, it is unsurprising if evaluations indicate lower than expected crime prevention outcomes or even increases in crime. This need to avoid oversimplification is echoed by Crowe (2000, 6) who established CPTED as ''a process and not a belief system.'' It has therefore been argued that ''more thinking is needed to develop this process, and more information and data must be collected. The concepts are not enough on their own'' (Cozens 2014, 27). CPTED is not a collection of design elements. Rather, it is a process of thinking, analysis, and evaluation, where crime ''risk assessment is the problem-seeking part of the CPTED process'' (Atlas 2008, 141) and design and problem solving should occur afterward. Avoiding oversimplification requires assessing crime risks among other considerations (Clancey 2010; Cozens 2011, 2014).

Cozens (2014) has argued that treating CPTED as a simplistic design outcome has resulted in the development of a range

of assumptions about CPTED that may not always be correct. These include

- the assumption that "Eyes on the street" (Jacobs 1961) always reduces crime;
- the assumption that permeable streets always reduce crime;
- the assumption that high densities of people always reduce crime;
- the assumption that mixed-use development always reduces crime;
- the assumption that CCTV always reduces crime; and
- the assumption that improved street lighting always reduces crime.

It has been asserted that there is the need for CPTED practitioners to think about the criminological evidence, the local conditions, and the theories from environmental criminology and not to make assumptions (Cozens 2014). This latter helps avoid the problems of environmental determinism of the past.

A related problem of oversimplification, connected also with political aspects of CPTED implementation, occurs when CPTED is used as a "top-down" approach which is outcome based, rather than as a "bottom-up" participatory process (e.g., Atlas 2008; Cozens 2011, 2014; Johnson, Gibson, and Stevens 2014). Parnaby (2007) has highlighted this problem is underpinned by CPTED becoming an economically competitive enterprise in which not everyone is willing or able to pay for the associated costs of conducting the necessary CPTED assessment or necessary modifications that might be required. Any issues that result in oversimplification necessarily impact adversely on both the effectiveness of CPTED interventions and the quality and validity of evaluation of CPTED as a crime prevention strategy.

Parnaby (2006) is critical of CPTED for ignoring the value-laden nature of crime and crime prevention, and assuming crime risk is an objectively measurable and depoliticized phenomenon, whereby there is a "foreseeable danger" that can be identified and remedied using CPTED. Most decisions relating to crime, crime prevention, and CPTED are value-laden and are shaped by political factors and organizational agendas. In turn, they shape the effectiveness and evaluation of CPTED as a crime prevention strategy. An example of the reflexivity that adversely influences the quality of evaluation of CPTED is when it is tacitly assumed CPTED can help identify what is legitimate or illegitimate behavior. Parnaby argued that the sorting of people into "legitimate"/"normal," and "illegitimate"/"abnormal users" is exclusionary and this raises the notion that CPTED could be used as crime prevention through "exclusionary" design. Another example are the equity and social justice considerations relating to where CPTED is delivered—or not (Oc and Tiesdell 1997; Taylor 2002)—another concern that can be leveled at any crime prevention approach. Essentially, for Parnaby (2006), much of what CPTED does and how it does it is subjective and part of a value-laden process. Improving the evaluation of CPTED as a strategy depends on making explicit value-laden, political, and agenda-driven decisions, and, for CPTED practice, the reflective practice of the CPTED expert should acknowledge value-laden considerations and try to minimize subjectivity where possible.

More recently, Armitage (2013a) has highlighted that the principles, guidance, and application of CPTED can lack flexibility and result in the rigid use standards that lead to oversimplification. Armitage suggested this is partly explained by the fact that many agencies who deliver CPTED have backgrounds and training which focus on the necessity to follow instructions, rather than to challenge them (e.g., police, security consultants, ex-police). In terms of evaluation of CPTED, this lack of flexibility and oversimplification results in CPTED interventions that are not necessarily well aligned in detail with the crime context. In turn, this affects the quality of crime prevention and the evaluation outcomes for CPTED as a strategy.

Elements of a CPTED intervention can conflict with each other in ways that reduce or negate crime prevention benefits and thus influence the evaluation of CPTED. For example, defining territoriality with walls or fencing can compromise opportunities for surveillance and create opportunities for crime (e.g., Mawby 1977; Reynald 2009). Security shutters can help control access at the building level, but can compromise surveillance of the street (Cozens and Davies 2013).

In some cases, the use of CPTED interventions can support crime. Atlas (1991) identified "offensible space," where criminal gangs and drug dealers use CPTED strategies to protect their criminal activities. Here, CPTED and Defensible Space strategies are used by criminals and result in the obstruction of law enforcement through environmental design. For example, drug dealers and those engaged in organized crime use the CPTED strategies of access control and surveillance to actively enhance their criminal enterprises (Atlas 1990).

This is also related to the criticism that CPTED (like all good ideas) can be abused and result in negative outcomes (Reynald 2014; Cozens 2014). Too much CPTED intervention and an overreliance on target hardening can produce a "fortress mentality," where citizens and communities withdraw behind walls, fences, and overfortified homes. This can work against other CPTED concepts directed at supporting social interaction and promoting "eyes on the street."

Hollander (2005) provided another example by highlighting how the threat from and fear of terrorism has sparked an area of growth within the security industry, following the terrorist attacks on the World Trade Centre Twin Towers of New York, in September 2001. Hollander reported that many property owners (e.g., banks, city governments, utilities, and the US Government) have installed security measures to protect risky facilities and enhance perceptions of safety. The result is many previously vibrant and social spaces once used as markets, music concerts, and family picnics with high levels of informal surveillance have been lost because although CPTED measures secured the occupants and the structures, they did not consider local social, economic, aesthetic, or transport issues. CPTED modifications included street closures, the installation of concrete barriers, and other security devices

(e.g., CCTV). Subsequently, the new landscapes—these new security zones, are barren, sterile, and fortress-like (Hollander 2005). The application of CPTED to threats of workplace violence and terrorism are discussed at length by Atlas (2008, 2013).

In some cases, choice of effective CPTED intervention elements must be balanced against other factors not related to crime prevention. Some have accused CPTED of failing to align with other agendas (Armitage 2013a) and that issues such as walkability, public health, and sustainability need to be balanced along with the CPTED focus of reducing crime (Armitage 2013a; Cozens 2014, 2015). Armitage (2013a) has argued CPTED has failed to innovate and adapt to change following cutbacks associated with the economic crisis. She notes how the method of delivery of CPTED in the United Kingdom did not adapt to changing economic conditions and that CPTED has also failed to adapt to changes in the nature of crime by continuing to focus largely on acquisitive property crimes and "rational offenders." How well these balances are achieved shapes crime prevention outcomes and the evaluation of CPTED. In particular, Armitage highlighted the failure of CPTED to clarify the confusion that exists in relation to the thorny and controversial issue of the impact of through movement and permeability on crime. The discussion focuses on weighing up the benefits of permeable street networks against crime risks repeatedly reported in the literature for those networks. Those advocating increased connectivity are often concerned about sustainability, walkability, and the need to reduce car use, traffic congestion, and pollution. Their position does not necessarily relate to crime reduction. Although criminological evidence strongly supports the use of less permeable street networks (e.g., the cul-de-sac) to lower crime rates (Cozens and Love 2009; Cozens 2010; Cozens 2011), planners and urban designers highlight several non-crime-related problematic features including increased travel distances, reliance on the car, less efficient use of land, and difficulties in locating public transport in close proximity to residential properties. Armitage (2014) points out that although research can present differing findings and perspectives, the debate has become polarized and this oversimplification has itself created unnecessary conflict and confusion.

There are evaluation considerations relating to *who* is delivering CPTED and how that shapes what is delivered (Armitage 2013a; Cozens 2014). Differences in the institutions and expertise delivering CPTED advice or assessing CPTED interventions directly shape CPTED crime prevention outcomes and hence result in differing evaluations of CPTED as a strategy. For example, in England and Wales, CPTED advice is delivered by the police. In the Netherlands, it is civilian based and in other locations (e.g., New South Wales, Australia), it is largely conducted by security consultants. Armitage (2013a) suggested the lack of professionalization of the CPTED role partly contributes to the nonstandardized variety of delivery of CPTED advice across jurisdictions. There have been attempts to address this by institutionalizing CPTED advice. For example, the Netherlands and Scotland have introduced legislation and/or building regulations and a requirement to meet specific security standards within residential dwellings. New South Wales have introduced legislation to require the consideration of crime risk and the United Kingdom and the Netherlands have incentivized the use of CPTED with awards accreditation schemes such as SBD and the Police Label Secured Housing (PLSH). Other examples include operational differences between when CPTED interventions are carried out for new developments compared to modifications to existing buildings, and differences in how jurisdictions assess crime risks and develop CPTED solutions at different stages of the development approval processes. These affect what CPTED interventions can be implemented and how successfully (or not) they might be. This latter is an area in need of much more investigation and research.

For more improved evaluation of CPTED, interventions in cases of conflict either between CPTED elements or with other factors, a primary strategy is to make such issues explicit, gather information, and include them in the evaluation analyses.

Social Aspects and Second-generation CPTED

Social and economic factors and conditions can affect evidence and evaluation indicating the success or otherwise of CPTED interventions and strategies. Within the field of CPTED, it has been frequently observed since the earliest days that negative socioeconomic and demographic dynamics and conditions could reduce the efficacy of CPTED strategies (e.g., Jeffery 1971; Newman 1973; Mawby 1977; Crowe 2000; Merry 1981; Taylor 2002). For example, Merry (1981) identified how cultural and social factors could influence the inclination for residents to self-police their neighborhoods.

Adverse socioeconomic conditions may generate or increase levels of fear, reduce the potential for intervention in crimes and potential crimes, and result in individuals withdrawing into their home (Merry 1981). Atlas (1991) also highlighted how criminal gangs can use CPTED principles to design and manage landscapes that protect their illegal activities. Recognizing the importance of socioeconomic conditions was a key factor underpinning the creation of second-generation CPTED in the late 1990s (Saville and Cleveland 1997). Reynald (2014) argues that crime resilient social communities and the idea of second-generation CPTED both need to be clarified. Furthermore, she suggests the evolution of second-generation CPTED could be enhanced by emphasizing strategies to encourage residents to act as guardians, which she labels as "responsibilization" (Reynald 2011).

To date, the effectiveness of second-generation CPTED has not been empirically well tested and evidential support is mainly through reasoning from the limited evidence that some social interventions have been demonstrated to reduce crime (e.g., see Sherman et al. 2002; Morgan and Homel 2013).

Discussion and Conclusions

In the twenty-first century, CPTED appears to be increasingly pervasive, and arguably it is in the midst of another wave of popularity. It has been the subject of several special issues in significant academic journals over the past ten years. For example, readers are directed to the 2005 themed issue on "Crime Prevention through Environmental Design: Themes, Theories, Practice and Conflict" in the *Journal of Architectural and Planning Research* (Volume 22, Issue 4, Winter); the 2009 Special Edition on "Security versus Safety: How to Deliver Less Crime and More Sustainable Design" in the *Built Environment Journal* (Volume 35, Issue 3), and the 2011 Special Issue on "New Thinking on Crime Prevention through Environmental Design (CPTED)" published in the *European Journal on Criminal Policy and Research* (Volume 17, Issue 1, March). There have also been a significant number of books on CPTED published since 2000. For examples, see Zelinka and Brennan (2001), Pease (2001), Schneider and Kitchen (2002), Calhoun (2004), Oxley et al. (2005), Poyner (2006), Schneider and Kitchen (2007), Atlas (2008), Reynald (2011), Crowe and Fennelly (2013), Paulsen (2013), Armitage (2013b), and Cozens (2014). There was also a significant inquiry into the principles of CPTED by the Australian Parliament of Victoria's Drugs and Crime Prevention Committee (The Parliament of Victoria 2013). This is testament to the increasing popularity of CPTED.

Ekblom (2011b) has argued that although crime prevention is highly complex, it is often, oversimplified. He urges practitioners "to *accept* this complexity rather than pretending it doesn't exist" (Ekblom 2011b, 46). The design-affects-crime debate is clearly highly complex in spite of the fact that many policy makers, planners, architects, and urban designers insist the connections are simple (Taylor 2002).

Given the criticisms of CPTED, and the complexity of the design-affects-crime debate, CPTED continues to represent an attractive option for individuals, communities, local, state, and national governments and international organizations alike.

Martin Luther King, Jr., is accredited with the quotation "Rarely do we find men [or women] who willingly engage in hard, solid thinking. There is an almost universal quest for easy answers and half-baked solutions." History has taught us that there is no such thing as an easy answer to the problems of crime and fear of crime—and CPTED is no "silver bullet." Indeed, it has been argued,

> It is no longer sufficient just to know about generic CPTED solutions. It is necessary to move away from cookbook approaches and instead, think more carefully about the particular characteristics of each specific situation. (Cozens 2014, 13)

Furthermore, following Ekblom's (2011a) call to reinvigorate the links with environmental criminology, and the increasingly urbanized character of the world, it is even more urgent for CPTED practitioners to think more critically and use evidence and theories from environmental criminology, in order to assess risk and craft appropriate CPTED (and other) interventions that are custom made for specific situations, places, and times.

Given the developments in CPTED since it was defined by Crowe in 2000, we might consider an updated definition for CPTED as "A process for analysing and assessing crime risks in order to guide the design, management and use of the built environment (and products) to reduce crime and the fear of crime and to promote public health, sustainability and quality of life" (Cozens 2014, 21).

To maintain its popularity, CPTED must continually adapt to changes such as increasing urbanization, population densities and population diversity, new technologies and products, new ways of life, and emerging crime problems. It also needs to continue to be reflective and to strive to evaluate and understand its successes and its failures.

This article has discussed the history, principles, and concepts CPTED. It has also discussed some of the key evidence associated with CPTED and outlined some of the criticisms made against CPTED. The future evolution of CPTED will be dictated by evaluations and reviews of its effectiveness in terms of research, policy, and practice. This review has provided an update of some of the challenges facing CPTED and the future will ultimately be the judge to its success in reducing crime and the fear of crime and in improving quality of life.

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Author Biographies

Paul Cozens is an environmental criminologist, an internationally accredited Advanced CPTED practitioner, and a director of the Design out Crime Research Centre (www.designoutcrime.org). His research focuses on creating safer, more sustainable, and healthy cities, and he has applied this research to various environmental settings including residential communities, railway stations, city centers, and the night-time economy.

Terence Love has been involved for over fifteen years in environmental design and research relating to reducing criminal and antisocial behavior in physical and digital environments. He is a director of the Design out Crime Research Centre (www.designoutcrime.org). Recent research projects have involved indigenous justice and community night patrols, reducing youth crime and antisocial behavior in rail environments, developing CPTED programs, and systems dynamic modeling approaches to CPTED.