
MEASURING CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN¹

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Crime Prevention Through Environmental Design (CPTED) has considerable support among the built environment professions. Yet the underlying assumptions on which it is based have rarely been evaluated to assess their effectiveness or efficacy. This paper reports the development and use of a scale that measured the actual levels of "incidental" CPTED in two residential areas in Gold Coast, Australia. The scale was administered in parallel with a victimization and social attitude survey. Analysis based on the combination of the two suggests that CPTED measures may have some effect on reducing victimization, particularly the kind of CPTED measures that apply to the group of dwellings on a single street, but the effect on fear of crime is surprisingly limited. It also indicates that there is potential in the application of such a scale in a wider assessment of the effectiveness of operationalizing CPTED design measures.

INTRODUCTION

Some reports (e.g., Wekerle and Whitzman, 1995) illustrate successful examples of CPTED. There are some examples of the detailed specification of CPTED design principles (e.g., Bell, 1992; Geason and Wilson, 1989; Jeffery, 1971), there is now an extensive CPTED industry (e.g., CPTED Training, 2004; DOCA, 2004), and CPTED principles are included in some building development guidelines (e.g., City of Tempe, 2001). However, on the whole, the assumptions and processes underlying CPTED are poorly tested. If CPTED is going to be more widely accepted, its proponents need to be able to demonstrate its effectiveness; if it is, in fact, not worthy of our attention, then this, too, should be capable of being shown.

There are increasing demands that cities provide a safer, more secure living environment. Cities should both appear to be safe places to live as well as actually being safe. Although actual safety and perceived safety are not necessarily directly related (Dillon, 1994:9), reducing crime is a necessary component of creating a safer city. And CPTED is a proactive strategy, where resources are committed to preventing crime before it happens, rather than in apprehending, judging, and incarcerating offenders after the event. Yet crime prevention is a complex matter. All approaches to it, including CPTED, are based on underlying assumptions. These assumptions influence the choice of methods and targets for crime prevention strategies. No single strategy is ever going to prevent crime. Modifications to the physical environment are clearly but one small component of crime prevention and even then need to be linked to other management and social processes (McCamley, 1992).

The main objective of the study reported here was to determine the effectiveness of CPTED measures in reducing both crime and fear of crime. There were two main elements to the investigation: the identification and measurement of the degree to which CPTED measures were in place and an assessment of actual levels of crime and of fear of crime. Although there have been many surveys and reports on levels of crime and on fear of crime, an instrument for measuring levels of CPTED implementation had not, at the time of the survey, been developed. Thus, although the main task in the analysis was to assess the degree to which levels of crime and levels of fear of crime connected (or did not connect) to CPTED, a secondary task was the development and testing of a scale for measuring actual levels of implementation of CPTED elements in the design of the built environment.

METHOD

Crime Statistics

The approach used was partially determined by the objective of the analysis and partially by the restrictions on available information on crime. The study was carried out in the City of Gold Coast, in Queensland, Australia, at the end of 1995 and the beginning of 1996. Official statistics on reported crime in Queensland are available only at the police district level. This is a very coarse level of aggregation. CPTED is a local, intimate, small-scale phenomenon. It can be applied over large areas, but its impact is strongest at the local scale. Police district scale statistics were inappropriate.

In addition, statistics based on reported crime do not show the true picture of crime incidence (Geason and Wilson, 1989; Minnery, 1986, 1988; Minnery and Veal, 1981). There are many reasons for crimes not being reported to the police, ranging from fear of retaliation to the feeling that the police can do nothing or a concern about putting juveniles into the criminal justice system. The study also sought to link CPTED measures with both perceptions of crime and actual crime. There are no public indicators of fear of crime available. Thus, one essential component of the study was a household crime victimization study. The survey instrument for this was based on earlier victimization surveys. It was modified to exclude kinds of crime that are unrelated to CPTED (such as fraud and other white-collar crimes) and to include questions concerning perceptions of crime and safety. A random sample of 1,000 households was selected in the Gold Coast City areas described below. After pilot testing, the

survey instrument was administered through face-to-face interviews by trained interviewers. The survey was administered in tandem with the CPTED survey described below.

The Physical Focus

Many reports on CPTED focus on special housing provisions such as public housing for low income families (Newman, 1972; Perlcut, 1982), on shopping centers or other commercial developments (de Gruchy and Hansford, 1980), or on high-rise housing (Newman, 1972). Howe (n.d.) reports quite different approaches for industrial, residential, and land uses. The report by the U.S. Department of Justice (1976) identifies many CPTED strategies but clearly differentiates those for residential areas from those for commercial areas, schools, and transportation facilities. Clearly, there are substantial design differences among these land-use types that must be reflected in the way CPTED measures are applied to them. More recent reports, such as that by Samuels (1995), specify CPTED design principles for special land uses, in this case university campuses.

We were interested in residential rather than commercial or industrial land uses. We were also interested in results that would be widely applicable. In Australia a very low proportion of housing is "public" housing (i.e., provided by state housing authorities for needy households); by far the majority of housing is provided by the private housing sector. Only three percent of the dwellings in the Gold Coast City local authority, the area chosen for the survey, are public housing (Stimson, *et al.*, 1996:27). In addition, partly as a backlash against the problems associated with the concentrated public housing estates developed in the 1960s and 1970s, public housing authorities now buy existing houses or build small clusters of dwellings (or single units) in suburban areas. For both these reasons, we felt it was most appropriate to concentrate on private housing rather than public housing.

The general locality chosen for the survey was the City of Gold Coast, a city with about 438,000 people in southeastern Queensland (see the Wilson and Wileman article in this issue for further demographic and descriptive information about Gold Coast). The area's economy relies heavily on tourism and leisure activities, as well as on construction and service activities serving tourism and development. It is one of the fastest growing regions in Australia. It is also a national and international tourist destination, but one where "land booms, speculative residential and holiday accommodation construction, and retail development were fostered by a development-oriented local government" (Stimson, *et al.*, 1996:24).

Despite this tourist focus, it also has a substantial permanent population, many of whom have migrated from other areas in Australia. Like "sun-belt" regions elsewhere, there are many retirees in the population (Stimson, *et al.*, 1996).

These characteristics make Gold Coast an ideal location for a study of CPTED principles. The population is mixed but with a high proportion of elderly; there has been considerable recent dwelling construction activity, but there is also a substantial permanent population.

Many previous CPTED studies have focused on high-rise or high-density housing. It appeared, however, that this focus was largely the result of social criteria correlating with higher density rather than the fact of the housing's physical form. For example, Newman's (1972) study compared two housing estates with medium- and high-rise housing. Other examples of studies relating to higher-density housing are reported in the collections by Hough and Mayhew (1982) and Bell Planning Associates and Gaston (1995). Even the classic analysis by Jane Jacobs (1961), from which many CPTED ideas have sprung, related to higher-density urban neighborhoods. In the Gold Coast City area, the majority of high-rise housing developments are specifically for either short-term tourist/visitor accommodation or for retirees. Developers of high-rise buildings also tend to be very security conscious and include considerable "target hardening" in the construction, including secure entry to buildings, facilities for full-time supervision, and closed-circuit TV monitors. Although these measures come within a very broad definition of CPTED, the main focus for this study was informal measures that

were part of good (and unobtrusive) dwelling and neighborhood design. Thus, the study concentrated on low- and medium-rise dwellings rather than high rise.

However, there are no residential areas of any scale in the Gold Coast City area or elsewhere in Queensland that have been consciously designed using CPTED principles. Some residential enclaves are now being designed and built with crime prevention in mind and would make a useful focus for later studies. At the time of the survey, it was impossible to directly measure the effectiveness of deliberately implemented CPTED. However, observation of residential areas in Gold Coast showed that some areas incorporated in their design more features that are identified as CPTED features than did other areas. Many CPTED principles are approaches that are components of normal, good design. For example, separating inappropriate land uses from residential areas is a standard approach in land-use planning and is also often mentioned as a CPTED principle (e.g., Bell, 1991, 1992). And at the scale of the individual dwelling, clear separation of private ("defensible") space from the public street on a suburban lot is a standard design principle. Thus, features identified as "good" from the CPTED point of view may occur incidentally as part of other design approaches. There appeared to be sufficient differentiation among the residential areas of Gold Coast in terms of incidental CPTED features to be able to identify some areas with high levels and others with lower actual levels of CPTED occurrence.

In residential areas, the scale of analysis is also important. CPTED design measures that are appropriate at the neighborhood level may not be appropriate at the level of the individual dwelling. The three important scales for suburban residential areas are (i) the individual dwelling and its lot, (ii) the street immediately adjacent to the dwelling and lot, and (iii) the neighborhood in which the dwelling is located. The clear physical differences between low-rise multiple dwellings and detached houses also have to be taken into account. For example, there is no equivalent to the apartment block's common entrance foyer in individual houses.

In choosing the sample of households to be surveyed, we were conscious of the need to include a range of socioeconomic statuses. The survey was carried out in late 1995 and early 1996. The Australian census of population and housing was completed in 1991, so up-to-date household socioeconomic indicators at the smallest scale (collector's district level) were unavailable. The high rate of population increase and migration to the City of Gold Coast virtually ensured that such data would be out of date. As a result, state government valuation rolls, used as a basis for assessing property rates, were used as a second-best socioeconomic indicator. The actual sample was drawn from two areas to represent the range of socioeconomic levels. The two areas were the recently developed, integrated town development of Robina and the beach-front area nearest Robina, centering on Mermaid Beach. Robina was identified as a medium to high valuation area, while Mermaid Beach was identified as a medium to low valuation area. This also allowed for a range of tenure types and age of housing.

The Survey Instruments

The research project set out to test the following two hypotheses, derived from the issues discussed earlier:

- (1) Dwellings, streets, and neighborhoods that score high on measures of CPTED will have lower rates of crime than dwellings, streets, and neighborhoods that score poorly on measures of CPTED; and
- (2) Households living in dwellings, streets, and neighborhoods that score high on measures of CPTED will have reduced fear of crime when compared with households living in dwellings, streets, and neighborhoods that score poorly on measures of CPTED.

If these hypotheses were supported, the study would corroborate the use of CPTED principles to increase safety and reduce crime in residential areas. The study could then be used to help create design guidelines that could be applied in the development of future residential estates.

The research used two survey instruments. The first was a safety and victimization survey based on interviews with the households chosen in a random sample, described above. This was based on previous safety and victimization survey instruments. The second was a CPTED scale, an innovation unique to this research project. Each dwelling where a household was interviewed about their attitude towards and experience of crime was also analyzed using the CPTED scale, recording CPTED levels for the dwelling, the nearby street, and the neighborhood.

Creating a CPTED Scale

The CPTED scale attempted to operationalize generally accepted principles of CPTED. The development of the measures in the instrument took place through a series of stages. First, a range of CPTED principles was identified from the literature. The starting point was the report by the U.S. Department of Justice (1976), which identified a number of strategies for crime prevention relating to four principal, relevant concepts: access control, surveillance, activity support, and motivation reinforcement.

For this study, a more limited range of elements that related more specifically to physical design was identified. The nature of the survey was such that the measures identified would have to be visible to researchers rather than being evaluated through additional later investigation. The CPTED principles identified, which more recently have been confirmed by additional literature sources, include the following:

- *"Defensible space" or territoriality*: space that is clearly owned by or is the responsibility of identifiable persons or groups and has some form of controlled access (Bell, 1992; Bell Planning Associates and Gaston, 1995; City of Tempe, 2001; Clarke and Mayhew, 1980; CPTED Ontario, 2002; Crowe, 1991; Geason and Wilson, 1989; NACRO, 1975; Newman, 1972, 1975; U.S. Department of Justice, 1976; Wekerle and Whitzman, 1995);
- *Surveillance and visibility*: the possibility of potential crime sites being overlooked or viewed by residents or passersby (Angel, 1968; Bell, 1992; Bell Planning Associates and Gaston, 1995; City of Toronto, 1990; Clarke and Mayhew, 1980; CPTED Ontario, 2002; Crowe, 1991; Geason and Wilson, 1989; Jacobs, 1961; Jeffery, 1971; NACRO, 1975; Newman, 1972, 1975; Perlgut, 1982; U.S. Department of Justice, 1976; Wekerle and Whitzman, 1995);
- *Legibility or permeability*: the ease with which the designed environment can be read and understood by passersby and residents so that there is no confusion in terms of movement and no excuse for loitering (Bell, 1992; Bell Planning Associates and Gaston, 1995; Wekerle and Whitzman, 1995);
- *Security*: residences and other buildings clearly and visibly secured with evidence of target hardening and involvement in crime-minimizing strategies such as Neighborhood Watch (Atlas, 1986; Bell, 1992; McCamley, 1992; Perlgut, 1982);
- *Robustness*: evidence of stability and pride in the neighborhood, assumed to make potential offenders aware of community support and cohesion (Bell, 1992; Bell Planning Associates and Gaston, 1995; CPTED Ontario, 2002; Jacobs, 1961; Kelling and Coles, 1996); and
- *Land-use mix*: a mix of land uses appropriate for the neighborhood (Bell, 1992; Bell Planning Associates and Gaston, 1995; U.S. Department of Justice, 1976; Wekerle and Whitzman, 1995; White and Sutton, 1995).

Some practitioners combine these principles in different ways (for example, access control is often separated from territoriality).

Some of these principles are appropriate only at one physical scale, so the scale of measurement that was developed applied the principles differently at the individual dwelling level, the street level, and the neighborhood or community level. A distinction was also made between multiple dwellings and single dwellings.

The approach to operationalizing the principles into a system by the degree to which the principle had been applied in practice in a particular location, involved working down through a hierarchy from

TABLE 1. Example of derivation of CPTED scale measures.

CPTED Principle	CPTED Measure	Performance Measures	Scale Measure
Surveillance	Clear visibility	Clear route from gate to door	1 - None of route visible from street 3 - 5 - Whole route visible from street
		Doors and windows visible from street	1 - No doors or windows visible from street 3 - 5 - All doors and windows visible from street
		Doors and windows visible to neighbors	1 - No doors or windows visible to any neighbor 3 - 5 - All doors and windows visible to adjacent neighbors
		No concealment by planting or fences	1 - Places for people to hide in yard 3 - 5 - No places to hide or conceal
		Open space between houses	1 - Spaces between houses cluttered and view obstructed 3 - 5 - Spaces between houses clear and open

principles to measures to performance measures to scale measures. For each CPTED *principle*, more concrete CPTED *measures* were developed, where the measures identified what the principle meant in practice. For example, “defensible space” at the dwelling scale meant, in practice, that there should be a clear distinction between public and private (or defensible) areas, as well as some form of access control. Again, the measures were derived from a more detailed analysis of the relevant literature, especially where examples of application of CPTED principles were described (e.g., Bell, 1992; Bell Planning Associates and Gaston, 1995).

For each CPTED *measure*, one or more *performance measures* were then developed to which specific measurable indicators could be attached. For example, a clear distinction between private and public areas should be able to be seen in (i) visible boundaries or distinctions between public and private spaces and (ii) visible buffers or barriers to people’s movement from public to private areas.

Each CPTED *performance measure* was then operationalized through a series of *scale measures*. Each scale was standardized so that it ranged from 1 (lowest) to 5 (highest). Some measures could not appropriately be recorded by such a scale and so were given as either a yes/no response (for example, whether or not there was a Neighborhood Watch sign visible) or by a number (for example, the number of external doors in a dwelling). If the measure was inappropriate or not applicable, a response of “0” was recorded. In the later analysis of the responses, a “yes” response was re-coded as a 5, a “no” as 1.

The progression through this hierarchy is illustrated in Table 1 using the principle of “surveillance” for a detached house.

The proposed scale was circulated to a number of researchers working in the CPTED area for comment and modified on the basis of their input. It was then pilot tested and ambiguities were removed using a group of five researchers.

RESULTS

In the final analysis, the results from the scale measures were collapsed into a single measure of level of CPTED. Dwellings, streets, or neighborhoods with a “high” level CPTED were those that fell into

the highest quartile of the CPTED scale; those having "low"/"moderate" levels of CPTED were those in the remaining three quartiles. The results from the application of the CPTED scale were then combined with the results of the parallel victimization and fear survey.

The area of Gold Coast City in which the survey was completed does not generally see household safety as a major problem. Some 96 percent either feel completely safe or fairly safe during the day while at home alone. During the night, 85 percent feel either completely or fairly safe. However, out of eight listed issues, crime is ranked as that of most critical concern before education, unemployment, and the economy. About one-eighth (12 percent) of respondents report having a firearm or other weapons in their home. Of these, 41 percent possess a firearm, while 46 percent say they possess a weapon because of the danger of crime.

About 15 percent of households had experienced attempted (but unsuccessful) break-ins during the past three years, while a further 18 percent of households had experienced actual break-ins during that period. However, some 50 percent of those who had experienced attempted break-ins had not reported the matter to the police, and 12 percent of those experiencing actual break-ins had not reported the incidents. This is a similar level of non-reporting to that identified in other crime studies.

Perceptions of crime are a different matter. About 34 percent of respondents thought property crimes, such as burglary and breaking and entering, had been at about the same level in their neighborhood during the past 12 months, while 31 percent thought this kind of crime had increased a lot. However, 54 percent thought property crime had increased a lot in the whole Gold Coast City area during that period, and 52 percent thought it had increased a lot around Australia. The pattern is similar for perceptions of violent crime, such as assault and rape. Some 17 percent thought these had increased a lot in their neighborhood (while 57 percent thought the level had remained much the same), but 43 percent thought such crimes had increased in Gold Coast, and 47 percent thought they had increased across Australia.

The tendency to rationalize perceived crime levels, identifying the home territory as less affected than the wider society, occurs frequently in crime studies (see, for example, Minnery, 1986, 1988; Minnery and Veal, 1981). However, it should be noted that 41 percent of respondents had been victims of crime at some time during their lives, although not specifically as a result of living in Gold Coast, and 56 percent had family or friends who have been victims of crime. These experiences of crime, many of which are vicarious, help to explain why 18 percent of respondents had a high level of fear of crime and 27 percent had a concern about crime.

Fear of Crime and Concern About Crime

The survey questionnaire asked separately about both fear of crime and concern about crime as an issue of importance. Responses to the two sets of questions were used to create variables that identified high and low/medium fear of crime and high and low/medium concern about crime. Around 18 percent of respondents fell into the "high fear" category and some 26 percent fell into the "high concern" category. However, no statistically significant relationship was found between victimization and either fear of crime ($p = 0.165$) or concern about crime ($p = 0.177$).³

The next two sections discuss the relationship between CPTED measured at the scales of the individual dwelling, the street near the dwelling, and the neighborhood with the results from the household interviews.

Victimization and Dwelling CPTED

There was a weak negative relationship between victimization and dwelling CPTED. Although 23 percent of those who had been victimized lived in dwellings with high levels of CPTED, around 29 percent of victims lived in dwellings with low to moderate CPTED. However, the relationship was not

TABLE 2. Concern about crime and dwelling CPTED—All respondents (%).

	High		Concern About Crime Low		Mean (Row)
High Dwelling CPTED	31.77	33.72	68.23	26.10	28.12
Low Dwelling CPTED	24.44	73.41	75.56	71.55	71.88
Mean (Column)	26.50		73.50		100.00

Note. N = 985; $\chi^2 = 0.5498$; $df = 1$; $p = 0.019$.

TABLE 3. Victimization and street CPTED—All respondents (%).

	Victim		Victimization Not Victim		Mean (Row)
High Street CPTED	21.46	20.66	78.54	28.47	26.34
Low/Moderate Street CPTED	29.45	79.34	70.55	71.53	73.66
Mean (Column)	27.35		72.65		100.00

Note. N = 991; $\chi^2 = 6.18$; $df = 1$; $p = 0.013$.

statistically significant at the five percent probability level for the total group of respondents ($p = 0.053$), for the Mermaid Beach area ($p = 0.052$), or for the Robina area ($p = 0.063$).

There was almost no statistical relationship between the level of dwelling CPTED measures and respondents' fear of crime. This applied at the aggregate level as well as in the two suburbs surveyed ($p = 0.622$ for all respondents; $p = 0.595$ for Robina; $p = 0.816$ for Mermaid Beach).

It was an entirely different matter where concern about crime is the issue, however. There was a significant relationship between dwelling CPTED measures and concern about crime at the two percent level (see Table 2). In this case, the higher concern about crime was related to higher CPTED measures, normally reflecting the degree of anti-crime action taken in and around their dwelling by those concerned about crime. The CPTED measure scale included measures such as "target hardening."

Victimization and Street CPTED

A statistically significant relationship existed between measures of street-level CPTED and victimization. There was a direct relationship between higher levels of victimization and lower levels of street-level CPTED and vice versa, but the pattern was statistically significant only for the overall group of respondents and for those in the lower socioeconomic level area of Mermaid Beach (see Tables 3 and 4). There was no significant relationship for the variables in Robina ($p = 0.992$).

The relationship between fear of crime and CPTED measures at the street level was not statistically significant ($p = 0.196$ for the whole sample; $p = 0.149$ for Mermaid Beach; $p = 0.676$ for Robina). There was also no statistically significant relationship between the degree of street-scale CPTED and concern about crime ($p = 0.191$ for all respondents). This is assumed to reflect the fact that, unlike the situation with individual dwellings, which are essentially private territory and so within the control of the household in question, the local street is public territory and is therefore an area where the household members have a more limited capacity to implement crime prevention measures.

Likewise, there was no statistically significant relationship between victimization and the level of neighborhood CPTED measures ($p = 0.567$ for all respondents).

TABLE 4. Victimization and street CPTED—Mermaid Waters (%)

	Victim		Victimization Not Victim		Mean (Row)
High Street	19.42		80.58		
CPTED		15.25		26.79	23.26
Low/Moderate Street	32.89		67.11		
CPTED		84.75		73.21	76.64
Mean (Column)	29.75		70.25		100.00

Note. $N = 595$; $\chi^2 = 9.249$; $df = 1$; $p = 0.002$.

CONCLUSIONS

In the areas surveyed, area crime ranks as one of the major social concerns of the population, but this appears to be a generalized concern rather than something specific to the areas themselves.

Within this general context, two sets of conclusion can be drawn. The first relates to the survey instruments themselves. It is clearly possible to obtain a level of differentiation among dwellings, streets, and neighborhoods using a measure of "incidental" CPTED, where the measures are related to the elements of house, street, and neighborhood design that coincide with identified elements of CPTED. These differences are clear enough to be compared with the results of household victimization surveys and surveys of people's concerns about and fear of crime. It is highly likely, however, that stronger measures enabling stronger comparisons would be obtained using specific elements of CPTED where these have been designed into an area's built environment. The results support the conceptual framework used in the development of the instrument for identifying the operationalization of CPTED.

The second set of conclusions relates to the outcome of the surveys and analyses. Fear of crime does not appear to be related to CPTED levels at the household, street, or neighborhood scales. In other words, fear of crime appears to be related mainly to factors other than CPTED. The nature of these factors is a matter for speculation, but they are likely to be mainly social and psychological, relating to the nature of social and personal relationships. There were, however, significant relationships between CPTED measures and victimization, particularly at the household and street levels, with higher levels of CPTED correlating with lower levels of crime victimization. The importance of high levels of CPTED at the individual dwelling scale is more noticeable when levels in the surrounding area are lower. In other words, CPTED does seem to be effective in reducing the incidence of crime in residential areas but not in reducing the fear of crime in these areas.

The survey instruments clearly were sensitive enough to identify differential levels of CPTED in the two areas and to enable links to be made between crime victimization and CPTED. A scale such as this, particularly if developed further, would appear to be a suitable instrument for further investigation of CPTED in other areas and settings.

NOTES

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2. Professor Bill Lim of the Queensland University of Technology passed away during the process of completing this article for publication. His contributions to the initiation and completion of the research reported here were considerable.

3. Note that tables are included only where the relationship between the two variables is significant at the two percent probability level.

REFERENCES

- Angel S (1968) *Discouraging crime through city planning* (Working Paper No. 75). Berkeley: University of California, Institute of Urban and Regional Development.
- Atlas R (1986) Crime prevention through building codes. *Journal of Security Administration* 9(2):3-12.
- Bell W (1991) The role of urban design in crime prevention. *Australian Planner* December:206-210.
- Bell W (1992) *Crime prevention: A planning and urban design approach* (Research report). Adelaide: Crime Prevention Unit, SA Attorney General's Department.
- Bell Planning Associates, Gaston G (1995) *Crime, safety and urban form*. Canberra: Australian Government Publishing Service.
- City of Tempe (2001) Development services: CPTED General guidelines. www.tempe.gov/tdsi/Planning/CPTED/. Site accessed January 2004.
- City of Toronto (1990) *Planning for a safer city* (City Plan 91, Part 10). Toronto: Planning and Development Department.
- Clarke R, Mayhew P (Eds.) (1980) *Designing out crime*. London: Home Office Research and Planning Unit (HMSO).
- CPTED Ontario (2002) www.cptedontario.ca. Site accessed January 2004.
- CPTED Training (2004) www.cptedtraining.net. Site accessed January 2004.
- Crowe TD (1991) *Crime prevention through environmental design: Applications of architectural design and space management concepts*. Chicago: National Crime Prevention Institute and Butterworth-Heinemann.
- de Gruchy GF, Hansford GJ (1980) *Crime and architecture in Brisbane II*. Brisbane: Department of Architecture, University of Queensland.
- Designing Out Crime Association (DOCA) (2004) www.doca.org.uk. Site accessed January 2004.
- Dillon D (1994) Fortress America. *Journal of the American Planning Association* June:8-12.
- Geason S, Wilson P (1989) *Designing out crime: Crime prevention through environmental design*. Canberra: Australian Institute of Criminology.
- Hough M, Mayhew P (Eds.) (1982) *Crime and public housing: Proceedings of a workshop* (Research and Planning Unit Paper No. 6). London: Home Office.
- Howe DR (n.d.) Crime prevention through environmental design. www.cpted-watch.com/cpted_home_page.htm. Site accessed January 2004.
- Jacobs J (1961) *The death and life of great American cities*. New York: Random House.
- Jeffery CR (1971) *Crime prevention through environmental design*. Beverly Hills: Sage.
- Kelling GL, Coles CM (1996) *Fixing broken windows: Restoring order and reducing crime in our communities*. New York: Martin Kessler.

- McCamley PE (1992) Crime prevention through environmental design and crime prevention through social development: A discussion paper resulting from a personnel exchange between the NSW Police Service and the Royal Canadian Mounted Police (Unpublished report). Sydney: NSW Police Service.
- Minnery JR (1986) *Crime perception and victimisation of inner city residents*. Brisbane: Queensland Institute of Technology.
- Minnery JR (1988) *Crime perception and victimisation in inner city Brisbane*. Brisbane: Queensland Institute of Technology.
- Minnery JR, Veal G (1981) *Crime perception and residential mobility in an inner city suburb*. Brisbane: Queensland Institute of Technology.
- NACRO (1975) *Architecture, planning and urban crime (Proceedings of NACRO conference)*. London: NACRO.
- Newman O (1972) *Defensible space: Crime prevention through urban design*. New York: Macmillan.
- Newman O (1975) Community of interest — Design for community control. In *Architecture, planning and urban crime (Proceedings of NACRO conference)*. London: NACRO, pp. 7-35.
- Perlgut D (1982) *Crime prevention and the design management of public development in Australia: Selected case studies* (Research report). Canberra: Australian Criminology Research Council.
- Samuels R (1995) *Defensible design and security: University campuses*. Canberra: Australian Government Publishing Service (AGPS).
- Stimson RJ, Minnery JR, Kabamba A, Moon B (1996) *Sun-belt migration decisions: A study of the Gold Coast* (Research report). Canberra: Bureau of Immigration, Multicultural and Population Research, AGPS.
- U.S. Department of Justice, Private Security Advisory Council, Law Enforcement Assistance Administration (1976) *Potential secondary impacts of the Crime Prevention Through Environmental Design concept (CPTED): An issue paper*. Washington, D.C.: Private Security Advisory Council.
- Wekerle G, Whitzman C (1995) *Safe cities: Guidelines for planning, design and management*. New York: Van Nostrand Reinhold.
- White R, Sutton A (1995) Crime prevention, urban space and social exclusion. *Australian and New Zealand Journal of Sociology* 31(March)(1):82-99.
- Wilson P, Wileman B, Lim B, Minnery J, Lynch-Blosse M (1996) *Designing safer communities — Life on the coast: Reducing crime through environmental design, A preliminary analysis* (Research report). Canberra: Australian Criminology Research Council.

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