Original Article

Reconceptualizing public area surveillance and crime prevention: Security guards, place managers and defensible space

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Abstract It is important to assess the effectiveness of the full range of surveillance measures that are used to prevent crime in public places. Closed-circuit television and improved street lighting are the most well developed measures that are in current use, at least in terms of the evaluation literature. Other widely used public area surveillance measures include security guards, place managers and defensible space. This paper reports on a systematic review of the effects on crime of these other forms of public area surveillance. Twelve evaluations met the inclusion criteria. There is fairly strong and consistent evidence that the defensible space technique of street closures or barricades is effective in preventing crime in inner-city neighborhoods. In the case of security guards, the weight of the evidence suggests that it is a promising technique of formal surveillance when implemented in car parks and targeted at vehicle crimes. The surveillance technique of place managers appears to be of unknown effectiveness in preventing crime in public places. Implications for policy and research are discussed.

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Introduction

In their classification of situational crime prevention, Cornish and Clarke (2003) differentiate three types of surveillance that are used to prevent crime in public places: formal surveillance, natural surveillance and place managers (or surveillance by employees).¹ In the parlance of situational crime prevention, each is aimed primarily at increasing offenders' perceived risks of committing a crime. Formal surveillance aims to produce a 'deterrent threat to potential offenders' (Clarke 1997a, p. 20) through the deployment of personnel whose primary responsibility is security (for example, security guards) or through the introduction of some form of technology, such as closed-circuit television (CCTV) cameras, to enhance

or take the place of security personnel. Place managers (Eck, 1995) are persons such as bus drivers, parking lot attendants, train conductors and others who perform a surveillance function by virtue of their position of employment. Unlike security personnel, however, the task of surveillance for these employees is secondary to their other job duties.

Natural surveillance shares the same aim as formal surveillance, but involves efforts to 'capitalize upon the 'natural' surveillance provided by people going about their everyday business' (Clarke, 1997a, p. 21). Examples of natural surveillance include the installation or improvement of street lighting and defensible space (Newman, 1972). The latter involves changes to the built environment, as well as more mundane techniques such as the removal of objects from shelves or windows of convenience stores that obscure lines of sight in the store and the removal or pruning of bushes in front of homes so that residents may have a clear view of the outside world.

CCTV and improved street lighting are the most well developed surveillance measures that are in current use. This is true at least in terms of the body of work that has been carried out over the years to evaluate these measures. In our updated systematic reviews of these two interventions, we obtained and analyzed a total of 57 evaluations of high methodological quality (that is, involving before-and-after measures of crime in experimental and mostly comparable control areas); another 66 less rigorous evaluations were also obtained and analyzed (Farrington and Welsh, 2007; Welsh and Farrington, 2009) for our earlier reviews, see Farrington and Welsh, 2002; Welsh and Farrington, 2004). And in recent years, there has been a marked and sustained growth in the use of public area CCTV in many Western nations, especially in the United Kingdom and United States (Norris and McCahill, 2006; Savage, 2007).

Other widely used surveillance measures that perform a crime prevention function in public places include security guards, place managers and defensible space. Security guards in particular represent a growth industry. In the United States, the most recent estimates suggest that there are more than one million security guards, or about three for every two sworn police officers (Cunningham *et al*, 1990).² A substantial and growing number of these security guards work in public settings (Sklansky, 2006, 2008).

There are some signs that the use of place managers is also on the rise in the United States. This secondary function of surveillance that these employees perform as part of their everyday duties is seemingly taking on greater priority (Eck, 2006). Although more difficult to gauge than security guards and place managers, the use of the natural surveillance technique of defensible space to prevent crime in public places is still of interest today (Cozens *et al*, 2005).

However, little is known about the effectiveness of these other major forms of surveillance in preventing crime in public places. This paper reports on the first systematic review of the effects on crime of security guards, place managers and defensible space. It focuses on public area surveillance. By public areas we mean those places that individuals can make use of or visit in a free and unencumbered way. Typical public places include city and town centers, public transportation facilities like subway systems, parking lots or car parks that are available for public use and public housing communities. Our focus on public places is not meant to diminish the importance of efforts to reduce crime in private space. Instead, our focus on public places allows for a more comprehensive examination of one aspect of the current debate on surveillance and crime prevention. Our focus is also driven by the growing use of surveillance measures to reduce crime in public places.

Theoretical Perspectives

Explanations of the way these different forms of public area surveillance could reduce crime can be found in situational approaches that focus on reducing opportunity and increasing perceived risk through modification of the physical environment (Clarke, 1995), and in perspectives that stress the importance of strengthening informal social control and community cohesion by improving the physical environment and greater investment in neighborhood conditions (Taub *et al*, 1984; Taylor and Gottfredson, 1986).

The situational approach suggests that crime can be prevented by environmental measures that directly affect offenders' perceptions of increased risks and effort and decreased rewards. This approach is also supported by theories that emphasize natural, informal surveillance as a key to crime prevention. For example, Jacobs (1961) drew attention to the role of good visibility combined with natural surveillance as a deterrent to crime. She emphasized the association between levels of crime and public street use, suggesting that less crime would be committed in areas with an abundance of potential witnesses.

Some defensible space practices, for instance, may encourage increased street usage, which intensifies natural surveillance. The change in routine activity patterns works to reduce crime because it increases the flow of potentially capable guardians who can intervene to prevent crime (Cohen and Felson, 1979). From the potential offender's perspective, the proximity of other pedestrians acts as a deterrent as the risks of being recognized or interrupted when attacking personal or property targets are increased. From the potential victim's perspective, the perceived risks and fears of crime are reduced.

A more classical situational perspective suggests that security personnel and place managers may prevent crime because potential offenders are deterred by their increased subjective probability of being detected. These forms of surveillance may also increase the true probability of detection.

Natural surveillance such as defensible space and lighting may reduce crime by improving visibility. This deters potential offenders by increasing the risks that they will be recognized or interrupted in the course of their activities (Mayhew *et al*, 1979). In addition, enhanced visibility and increased street usage may interact to heighten possibilities for informal surveillance. Pedestrian density and flow and surveillance have long been regarded as crucial for crime control because they can influence potential offenders' perceptions of the likely risks of being apprehended (Newman, 1972; Bennett and Wright, 1984).

Other theoretical perspectives have emphasized the importance of investment to improve neighborhood conditions as a means of strengthening community confidence, cohesion and social control. Sampson *et al* (1997) argued that a low degree of 'collective efficacy' in a neighborhood (a low degree of informal social control) causes high crime rates. Important to the construct of weak social control is an unwillingness of neighbors to intervene on behalf of the 'common good.'

As highly visible signs of investment, security guards, place managers and some defensible space practices might reduce crime if they were perceived to improve the environment and to signal to residents that efforts were being made to invest in their neighborhood. In turn, this might lead residents to have a more positive image of their area and increased community pride, optimism and cohesion. This might lead residents to exert greater informal social control over potential offenders in an area, even going so far as to intervene on behalf of their neighbors or for the common good.

In addition, the renovation of a highly noticeable component of the physical environment combined with changed social dynamics may act as a psychological deterrent against crime. Potential offenders may judge that the image of the location is improving and that social control, order and surveillance are increasing (Taylor and Gottfredson, 1986). In the case of security guards, they may deduce that crime in the protected location is riskier than elsewhere and this can influence their behavior in two ways. First, potential offenders living in this area may be deterred from committing offenses or escalating their activities in this area. Second, potential offenders living outside the area may be deterred from entering it to commit crimes (Wilson and Kelling, 1982; Kelling and Coles, 1996).

It is important to acknowledge that these public area surveillance measures might also cause crime to increase. Some defensible space practices could give potential victims a false sense of security and make them more vulnerable if they relax their vigilance or stop taking precautions such as walking in groups at night and not wearing expensive jewelry. Also, these practices could, in certain circumstances, increase opportunities for crime. They may bring a greater number of potential victims and potential offenders into the same physical space. Increased visibility of potential victims may allow potential offenders to make better judgments of their vulnerability and attractiveness (for example, in terms of valuables). Increased social activity outside the home may increase the number of unoccupied homes available for burglary.

The effects of each of the surveillance methods are also likely to vary in different conditions. In the case of security guards and place managers, the effects are likely to be greater if they are more widespread. Furthermore, the effects may vary according to characteristics of the area or the residents, the design of the area, the delivery of the intervention and the places that are targeted. Their effects may also interact with other situational crime prevention measures such as CCTV cameras or improved street lighting. They may have different effects on different types of crimes (for example, violence vs. property). Each of these surveillance measures may also cause crime to be displaced to other locations, times or victims.

Methods

This paper presents a systematic review of the effects of security guards, place managers and defensible space on crime in public places and follows closely the methodology of this review technique. Systematic reviews use rigorous methods for locating, appraising and synthesizing evidence from prior evaluation studies, and they are reported with the same level of detail that characterizes high quality reports of original research. According to Johnson *et al* (2000, p. 35), systematic reviews ‘essentially take an epidemiological look at the methodology and results sections of a specific population of studies to reach a research-based consensus on a given study topic.’ They have explicit objectives, explicit criteria for including or excluding studies, extensive searches for eligible evaluation studies from all over the world, careful extraction and coding of key features of studies and a structured and detailed report of the methods and conclusions of the review. All of this contributes greatly to the ease of their interpretation and replication by other researchers. It is beyond the scope of this paper to discuss all of the features of systematic reviews, but

interested readers should consult key volumes on the topic (see Petticrew and Roberts, 2006; Welsh and Farrington, 2006).

Criteria for inclusion of evaluation studies

In selecting evaluations for inclusion in this systematic review, the following criteria were used:

- (a) The surveillance measure in question was the main focus of the intervention. For evaluations involving one or more other interventions, only those evaluations in which the surveillance measure in question was the main intervention were included. The determination of what was the main intervention was based on the author identifying it as such or, if the author did not do this, the importance the report gave the primary intervention compared to any other interventions.
- (b) There was an outcome measure of crime. The most relevant crime outcomes were violent and property crimes.
- (c) The evaluation design was of high methodological quality, with the minimum design involving before-and-after measures of crime in experimental and (mostly) comparable control areas. According to Cook and Campbell (1979) and Shadish *et al* (2002), this is the minimum design that is interpretable. Control areas are needed to counter threats to internal validity.

Search strategies

In order to locate studies meeting the above criteria, four search strategies were employed:

- (a) Searches of electronic bibliographic databases. The following databases were searched: Criminal Justice Abstracts, National Criminal Justice Reference Service Abstracts, Sociological Abstracts, Educational Resources Information Clearinghouse, Social, Psychological, Educational, and Criminological Trials Register, Google Scholar and Medline. These databases were selected because they had the most comprehensive coverage of criminological, criminal justice and social science literatures. They are also among the top databases recommended by the Campbell Collaboration Crime and Justice Group.
- (b) Searches of literature reviews on the effectiveness of the interventions in preventing crime. The key reviews we searched included: Casteel and Peek-Asa (2000), Clarke (2003, 2004), Cozens *et al* (2005), Eck (2006), Poyner (1993), and Smith and Clarke (2000), as well as Clarke's (1992, 1997b) book on effective situational crime prevention practices.
- (c) Searches of bibliographies of evaluation reports of applicable studies.
- (d) Contacts with leading researchers.

Both published and unpublished reports were considered in these searches, and the searches were international in scope. These search strategies resulted in the identification of

25 evaluations (nine for security guards, seven for place managers and nine for defensible space). Of these 25 evaluations, 12 met the criteria for inclusion (five for security guards, two for place managers and five for defensible space) and 13 did not (four for security guards, five for place managers and four for defensible space) and thus were excluded from the systematic review.³

Findings

An analysis of the findings of the effects on crime of security guards, place managers and defensible space involved a two-step process. First, each of the included evaluations was rated on their effectiveness in reducing crime. Each evaluation was assigned to one of the following four categories: desirable effect (marked decrease in crime), undesirable effect (marked increase in crime), null effect (evidence of no effect on crime) or uncertain effect (unclear evidence of an effect on crime). This was based on reported effects; for example, the percentage change in crimes in experimental areas compared with control areas. In some cases, it was possible to calculate an odds ratio (OR) effect size. The OR is intuitively meaningful because it indicates the relative change in crimes in the control area compared with the experimental area. An OR that is greater than 1.0 indicates a desirable effect of the intervention, and an OR less than 1.0 indicates an undesirable effect.⁴ Table 1 presents ORs for those evaluations that provided the requisite data.

Second, an assessment was made of the accumulated evidence for each of the three forms of public area surveillance. We drew upon the rules for accumulating evidence that were first articulated in a report to the US Congress by Sherman *et al* (1997) and substantially revised and updated by Sherman *et al* (2006). The program types are classified into one of four categories: what works, what does not work, what is promising and what is unknown.⁵

Table 1: Odds ratio effect sizes

<i>Author, date and type of surveillance</i>	<i>Odds ratio</i>	<i>95% Confidence interval</i>	<i>Z</i>	<i>P</i>
Laycock and Austin (1992), security guards	3.17	1.52–6.65	3.06	0.002
Hesseling (1995), security guards	1.05	0.93–1.17	0.80	NS
Barclay <i>et al</i> (1996), security guards	4.21	2.75–6.43	6.64	0.0001
Poyner (1991), place managers	1.03	0.48–2.19	0.07	NS
Atlas and LeBlanc (1994), defensible space	1.22 (violent crime, E v C1)	1.06–1.41	2.75	0.006
	1.46 (property crime, E v C1)	1.30–1.64	6.31	0.0001
	1.01 (violent crime, E v C2)	0.87–1.18	0.15	NS
	1.33 (property crime, E v C2)	1.18–1.50	4.72	0.0001
Lasley (1998), defensible space	1.37	1.01–1.84	2.03	0.042

Notes: See Tables 2, 3 and 4 for more details on the evaluations.

Abbreviations: E = experimental area; C = control area; NS = not significant.

In our other systematic reviews on the effects of CCTV and improved street lighting on crime, we were able to use meta-analytic techniques for this purpose. This was not possible in this systematic review. The small numbers of studies, along with a couple of other issues that we discuss below, made the use of meta-analysis undesirable. This does not, however, hamper our ability to draw conclusions about the effectiveness of these different forms of public area surveillance. Importantly, our conclusions here are based on the best available scientific evidence.

Also important in our review are the issues of displacement of crime and diffusion of crime prevention benefits. Displacement, often considered the Achilles heel of situational crime prevention, can be defined as the unintended increase in crimes following from the introduction of a crime reduction scheme.⁶ This is the notion that offenders simply move around the corner or resort to different methods to commit crimes once a crime prevention project has been introduced. Reppetto (1976) identified five different forms of displacement: temporal (change in time), tactical (change in method), target (change in victim), territorial (change in place) and functional (change in type of crime).

Diffusion of benefits, on the other hand, can be defined as the unintended decrease in non-targeted crimes following from a crime reduction scheme, or the 'complete reverse' of displacement (Clarke and Weisburd, 1994). Here, instead of a crime prevention project displacing crime, the project's crime prevention benefits are diffused to the surrounding area, for example. Clarke and Weisburd (1994) contend that diffusion occurs in one of two ways: by affecting offenders' assessment of risk (deterrence) or by affecting offenders' assessment of effort and reward (discouragement).

Bowers and Johnson (2003) developed an empirical technique – the weighted displacement quotient (WDQ) – to measure the geographical displacement and diffusion of benefit effects of crime prevention schemes. This requires the use of at least two comparison areas: one adjacent to the treatment area that serves as a buffer to determine displacement/diffusion effects, and one non-adjacent area that is immune from treatment contamination. It also requires calculations of measurements that can assess the size of displacement or diffusion in relation to any gains achieved in the treatment area.

Security guards

The five evaluations of security guards were carried out in four different countries: two in the United States and one each in Canada, the Netherlands and the United Kingdom (see Table 2). Two of these five evaluations (Kenney, 1986; Pennell *et al*, 1989) are more correctly referred to as urban citizen patrols. Although both security guards and citizen patrols perform a formal surveillance function, this is where their similarities end. For this reason, we discuss them separately. We begin with the results of our review of the three evaluations of security guards in car parks.

Each of the security guard studies were carried out in car parks that were experiencing high rates of vehicle crimes. In two cases, security guards were supplemented with other (secondary) interventions. In the Basingstoke study (Laycock and Austin, 1992), fencing was installed around a good portion of the car park and a number of defensible space practices were implemented, including the pruning of trees in front of some houses that bordered the car park and the building of a public footpath alongside it. In the Vancouver (Canada)

Table 2: Evaluations of security guards

<i>Author, publication date and location</i>	<i>Type of intervention and context</i>	<i>Sample size</i>	<i>Other interventions</i>	<i>Outcome measure and data source</i>	<i>Research design and before-after time period</i>	<i>Results and diffusion/displacement</i>
Kenney (1986), New York, NY	Urban citizen patrols (Guardian Angels); subway stations	E = 14 patrolled subway stations, C = 14 non-patrolled subway stations	None	Crime (total and multiple offenses); police and transit authority records	Before-after, experimental-control Before=NA After=NA	Data (NA) (null effect) Diffusion/displacement not measured
Pennell <i>et al</i> (1986, 1989), San Diego, CA	Urban citizen patrols (Guardian Angels); city redevelopment area	E = 1 city area, C = secondary non-patrolled city area	Police foot patrol	Violent and property crimes; official records	Before-after, experimental-control Before=6 months After=30 months	E vs. C: violent crime: +91%; property crime: -40% (desirable effect for property crimes) Diffusion/displacement not measured
Laycock and Austin (1992), Basingstoke, UK	Security guards; car parks	E = 1 parking lot, C = 3 parking lots and surrounding area	Fencing, defensible space	Theft of vehicles; police records	Before-after, experimental-control Before=1 year After=1 year	EB=38, EA=13, CB=152, CA=165 (desirable effect)
Hesseling (1995), Rotterdam, the Netherlands	Security guards; car parks	E = 10 hot spot areas and 1 car park, C = 5 surrounding police precincts	None	Theft from vehicles; police records	Before-after, experimental-control Before=4 years After=2 years	No displacement EB=25 981, EA=16 494, CB=41 982, CA=27 924 (null effect) Displacement occurred (in 4 of 5 control areas)
Barclay <i>et al</i> (1996), Vancouver, Canada	Security guards; commuter car park	E = 1 parking lot, C = 2 non-adjacent areas, C2 = 1 adjacent area	Media campaign	Theft of vehicles; police records	Before-after, experimental-control Before=8 months After=4 months	EB=192, EA=40, C1B=348, C1A=305 (desirable effect) Little or no displacement

Abbreviations: E = experimental area; C = control area; EB = experimental before; EA = experimental after; CB = control before; CA = control after; NA = not available.

study (Barclay *et al*, 1996), a media campaign preceded the implementation of the security patrols. All three of the evaluations measured vehicle crimes, and the length of follow-up ranged from a low of 4 months to a high of 2 years.

The Basingstoke and Vancouver schemes were highly effective in reducing vehicle thefts, and in both schemes the researchers reported little or no displacement of vehicle thefts into surrounding areas. For the Vancouver scheme, it was possible to assess displacement/diffusion effects using Bowers and Johnson's (2003) WDQ technique. Using the formulas set out in their paper, we found that WDQ equaled 0.12. This means that no geographical displacement occurred and there was a slight diffusion effect. This is consistent with Barclay *et al*'s (1996) time-series analysis findings.

The implementation of security guards in a number of car parks in the inner city of Rotterdam produced no measurable change in thefts from vehicles over a 2-year period. Evidence of spatial displacement was recorded in four of the five control areas. From interviews with offenders and an analysis of the deployment of the security guards, Hesselting (1995) concluded that the Rotterdam scheme was not intense enough to deal with the volume of motivated offenders.

The program evaluated by Barclay *et al* (1996) is particularly noteworthy. Bicycle-mounted security guard patrols were introduced in Vancouver's largest 'park-and-ride' commuter car park to deal with increased rates of vehicle thefts. An analysis of the layout of the car park and surrounding area revealed that formal surveillance was the most viable option. Poor visibility into the car park and no nearby shops or other establishments with a regular flow of pedestrians limited the use of natural surveillance measures. The security patrols operated for 1 month and, as noted above, were preceded by a media campaign to inform the public about the program. Three months after the program ended, there was an average of 14 fewer vehicle thefts per month in the experimental area compared to an average of 4.5 more vehicle thefts per month in the surrounding area and 33 fewer vehicle thefts per month in the non-adjacent control areas. An analysis of displacement showed that little if any of this increase in vehicle thefts in the control area was a result of it being displaced from the experimental area.

Urban citizen patrols

Like their security guard counterparts, urban citizen patrols seek to furnish a deterrent threat to potential offenders and can be classified as a technique of formal surveillance (Cornish and Clarke, 2003). Citizen dissatisfaction with the police response to escalating crime problems in their immediate neighborhood or wider community or even city is often the main reason for the development of these groups. The best known of these groups is the Guardian Angels. It is also the only known urban citizen patrol group that has been rigorously evaluated to assess its impact on crime.

The two evaluations of the Guardian Angels took place in New York City and San Diego in the mid-1980s (see Table 2). Kenney (1986) found that they had no appreciable effect on crime in New York City's subway system over an unspecified follow-up period. The author noted that the evaluation was severely hampered by the overall small number of criminal incidents that occurred on the subway.⁷ Displacement was not measured.

In San Diego, Pennell *et al* (1989) found that the introduction of patrols by the Guardian Angels in a downtown redevelopment area was effective in reducing property crime but had no effect on violent crime over a 30-month follow-up period. Property crime went down

25 per cent in the experimental area compared to a 15 per cent reduction in the control area. Violent crime also went down in both areas, but the control area experienced a much larger reduction than the experimental area (42 per cent vs. 22 per cent). The authors speculated that factors other than the patrols might explain the reduction in violent crime in the experimental area. This view was borne out by the results of further analyses that showed that there was no significant association between the number of patrols and police-reported violent crime. Complicating matters further (for both property and violent crime reductions in the experimental area), police foot patrols were initiated in the redevelopment area at the same time as the Guardian Angels patrols. The authors did not measure displacement or diffusion.

Place managers

Only two evaluations of the effects of place managers on crime in public places could be included in our systematic review. Both of these were carried out in the United Kingdom some years ago (see Table 3). We found a number of other evaluations of place managers in our search for studies, but each was excluded because they did not meet the criteria for inclusion. By and large, this was because they used weak evaluation designs, often a simple before-and-after, no-control condition design.⁸ We now turn to a description of the two place manager studies.

High crime levels and generally poor security in the London Borough of Brent's South Kilburn public housing estate led to the introduction of a concierge system in one of its high rise residential towers. The concierge scheme, which operated from 0800 hours to 2300 hours, performed three main functions: receptionist services (for example, answering calls), general assistance to residents and maintenance of block security by controlling access through the main entrance (Skilton, 1988, p. 14).

Compared to a matched neighboring residential high rise housing block on the estate, the experimental site showed a number of benefits over a 1-year follow-up period, including fewer repairs to communal areas (5 vs. 131) and elevators (28 vs. 75) (from a reduction in vandalism) and less revenue lost due to vacant flats. Neither displacement nor diffusion of benefits was measured. A cost-benefit analysis showed that the financial savings from a reduction in vandalism and associated improvements exceeded the financial costs of the concierge scheme; that is, for each dollar (or British pound in this case) that was spent on the scheme, \$1.44 was saved to the Borough of Brent in 1 year.⁹

In the other study, carried out by Poyner (1991), place managers took the form of a taxi company operating out of a multi-level parking garage in the southeastern British city of Dover. The parking garage was experiencing a range of crime problems, most notably thefts of and from vehicles. City officials in consultation with a police crime prevention officer implemented a package of situational crime prevention measures. The major intervention involved constructing an office at the main entrance of the parking garage and leasing it to a taxi company that operated from the site. The taxi business was open most hours on the weekend and from 0800 hours to midnight on the other days. Other measures included lighting improvements at the main entrance and the installation of fencing at the ground level and an exit-only door to restrict access to customers of the parking garage.

Table 3: Evaluations of place managers

<i>Author, publication date and location</i>	<i>Type of intervention and context</i>	<i>Sample size</i>	<i>Other interventions</i>	<i>Outcome measure and data source</i>	<i>Research design and before-after time period</i>	<i>Results and diffusion/displacement</i>
Skilton (1988), London Borough of Brent, UK	Concierge system; public housing estate (South Kilburn)	E=169 flats (Gloucester House) C=136 flats (Hereford House)	None	Vandalism; police and housing estate records	Before-after, experimental-control Before=1 year After=1 year	E vs. C: -84% (desirable effect) Diffusion/displacement not measured
Poyner (1991), Dover, UK	Taxi business; parking garage	E=1 parking garage C=2 parking lots	Lighting, fencing, access control	Vehicle crimes; police records	Before-after, experimental-control Before=2 years After=2 years	EB=80, EA=40, CB=35, CA=18 (null effect) No displacement

Abbreviations: E=experimental area; C=control area; EB=experimental before; EA=experimental after; CB=control before; CA=control after.

To evaluate the effectiveness of this initiative, the author used as a control area two nearby open parking lots that had a similar number of parking spaces and also used the same payment system as the parking garage. The open parking lots had about half the number of vehicle crimes as the parking garage in the 2 years before the start of the program. Two years after the program began, police-reported vehicle crimes were down by half in both the experimental area (50 per cent) and the control area (49 per cent). Poyner found no evidence that vehicle crimes were displaced to the control parking lots.

Defensible space

Five evaluations of defensible space met the criteria for inclusion in our review. Four of these evaluations were carried out in the United States and the other in the United Kingdom (see Table 4). Each of the US studies involved street closures or other traffic modifications in mostly inner-city neighborhoods. The UK study involved building design changes on public housing estates. Two of the studies (Donnelly and Kimble, 1997; Armitage, 2000) used other interventions. For most of the studies effectiveness was measured with a range of violent and property crimes, and follow-up periods lasted between 1 and 3 years.

Each of the five evaluations reported a desirable effect on at least some of the crimes that were measured. In the Miami Shores study (Atlas and LeBlanc, 1994), 67 street closures and barricades were constructed across the city in an effort to curb crime and traffic problems. Two adjacent municipalities were selected as control areas: Metro Dade County and the City of Miami. Compared to the control areas, Miami Shores experienced a significant decrease in burglary, larceny and theft of vehicles 2 years after the program was implemented, but no change was observed in robberies and aggravated assaults over the same time frame (compared to Metro Dade County). Displacement was not measured. The authors offer the following view on how the barricades and street closures might have produced the observed crime reductions:

The reduction in crime may not have been a direct result of the fact that barricades reduced traffic and discouraged nonresidents from cruising Miami Shores' neighborhoods. Rather, the barricades may have made residents feel safer and more comfortable walking around their neighborhoods, thereby increasing natural surveillance. This natural surveillance may have, in turn, deterred would-be criminals from victimizing residents. (Atlas and LeBlanc, 1994, p. 144)

In an evaluation of a traffic barrier scheme in Los Angeles, Lasley (1998) found that violent crimes went down, but there was no change in property crimes. Known as 'Operation Cul de Sac' (because the barriers changed thru-roads into cul-de-sacs), the Los Angeles Police Department installed traffic barriers in a 10-block area of inner-city neighborhoods that were experiencing heightened levels of gang-perpetrated violence, including drive-by shootings, homicides and assaults. The remaining patrol division areas that surrounded the targeted site served as the control area. In the 2 years that the traffic barriers were in place, the experimental area, compared to the control area, experienced significant reductions in homicide and assault, but no changes were observed in property crimes (that is, burglary, vehicles crimes, larceny and bicycle theft). During this period of time, the author found no evidence of displacement of crimes to surrounding neighborhoods. The situation changed

Table 4: Evaluations of defensible space

<i>Author, publication date and location</i>	<i>Type of intervention and context</i>	<i>Sample size</i>	<i>Other interventions</i>	<i>Outcome measure and data source</i>	<i>Evaluation design and before-after time period</i>	<i>Results and diffusion/displacement</i>
Atlas and LeBlanc (1994), Miami Shores, FL	Street closures and barricades; city-wide	E=1 city C=2 adjacent municipalities (C1=Miami; C2=Metro Dade County)	None	Violent and property crimes; UCR crime statistics	Before-after, experimental-control Before=2 years After=2 years	E vs. C1: violent crime: EB=1558, EA=1669, CB=3010, CA=3947; property crime: EB=11 866, EA=9148, CB=12771, CA=14 388 E vs. C2: violent crime: CB=1580, CA=1713; property crime: CB=9616, CA=9870 (desirable effect for property crime) Diffusion/displacement not measured
Donnelly and Kimble (1997), Dayton, OH	Street closures; inner-city neighborhoods	E=1 neighborhood C=8 surrounding police sectors	Media campaign	Crime (total and multiple offenses); police records	Before-after, experimental-control Before=1 year After=2 years	E vs. C: total crime: -43% (desirable effect) Some evidence of displacement and diffusion
Wagner (1997), St. Louis, MI	Traffic modification; inner-city neighborhood	E=1 neighborhood C=1 neighborhood and surrounding city	None	Violent and property crimes (Part I); police records	Before-after, experimental-control Before=1 year After=5 years	E=+11%, C=+29% (desirable effect) Diffusion/displacement not measured
Lasley (1998), Los Angeles, CA	Street barricades; inner-city neighborhoods	E=1 ten-block area C=surrounding patrol division	None	Violent and property crimes (Part I); police records	Before-after, experimental-control Before=1 year After=2 years	Assault: EB=196, EA=301, CB=174, CA=365 Homicide: E=-93%, C=+17% (desirable effect for assaults and homicides) No displacement
Armitage (2000), West Yorkshire, UK	Secured by Design (SBD); public housing estates	E=25 SBD estates C=25 non-SBD estates	Physical security, access control	Crime (total and multiple offenses); NA	Before-after, experimental-control Before=NA After=NA	E vs. C: total crime: -16% (desirable effect) Diffusion/displacement not measured

Abbreviations: E=experimental area; C=control area; EB=experimental before; EA=experimental after; CB=control before; CA=control after; NA=not available.

once the traffic barriers were removed. In the following year, homicides and assaults increased in the experimental area, and in the control area homicides increased and assaults remained constant. At least for homicides, this provided further support that the program had a desirable effect (Lasley, 1998, p. 3).

Similar efforts to close streets and modify traffic were also judged to be effective in high crime neighborhoods in St Louis and Dayton, Ohio. Wagner (1997) found that the St Louis neighborhood that implemented traffic modifications had a lower rate of increase in the overall crime rate than the adjacent (control) neighborhood. Donnelly and Kimble (1997) found that the Dayton neighborhood that implemented street closures produced substantial reductions in both property and violent crimes compared to the control areas. Displacement was not measured in the St Louis study. In the Dayton study, the authors found some evidence that crimes were displaced to five of the eight control areas along with some evidence of a diffusion of crime prevention benefits in the other three control areas.

The most recent defensible space evaluation (Armitage, 2000) took a different approach from the others. Here, defensible space principles, along with other situational crime prevention techniques (for example, physical security, access control), were integrated in the building of public and other housing. The program is known as Secured by Design (SBD), a national award scheme run by the Association of Chief Police Officers in the United Kingdom, which aims to 'encourage housing developers to design out crime, with a particular emphasis on domestic burglary, at the planning stage' (Armitage, 2000, p. 1).

The evaluation design involved 50 matched public housing estates in West Yorkshire, 25 with the SBD program and 25 without it. Over an unspecified follow-up period, the prevalence of total crime (the proportion of homes that were victimized at least once) was almost statistically significantly lower on the experimental estates compared to the controls (37 per cent vs. 44 per cent). Displacement was not measured. Importantly, because the SBD program incorporated multiple measures and not one measure seemed to be more important than the other, it is difficult to isolate the effects of defensible space on crime. Subsequent research by the author (Armitage, 2006, 2007) investigated this issue and found that controlling access routes to the housing estates (for example, footpaths) and reducing the level of pedestrian and vehicular traffic through and around the estate, thereby reducing its 'permeability,' was associated with a decreased risk of crime.

Limitations

This systematic review found that there is fairly strong and consistent evidence that the defensible space technique of street closures or barricades is effective in preventing crime in inner-city neighborhoods. Less conclusive statements can be made about the effectiveness of security guards and place managers. This has everything to do with the small number of high quality evaluations that have been carried out on these measures. In the case of security guards, the weight of the evidence suggests that it is a promising technique of formal surveillance when implemented in car parks and targeted at vehicle crimes. The surveillance technique of place managers appears to be of unknown effectiveness in preventing crime in public places.

A small number of evaluations can be a limiting factor in arriving at conclusions about an intervention's effectiveness as well as being able to generalize results. This matter is not

unique to systematic literature reviews. Indeed, it is at the heart of the debate over the need for replication experiments. One view holds that until such time that there are a sufficiently large number of evaluations of an intervention, no conclusions should be drawn about its effectiveness. Another view recognizes that it is important that policymakers, practitioners and scholars have access to the best available information.

If one were to wait for a large number of evaluations of an important and widely used intervention (like the three under investigation here) before conducting a review, one could be waiting for many years, and in the meantime the intervention is being marketed and used, quite possibly in an inadequate or, worse yet, harmful way. As noted above, we drew upon well-established rules for accumulating scientific evidence. Important to these rules is that there exists a wider body of evaluation studies on the intervention in question. Just having two high-quality evaluations that report a significant reduction in crime is not enough to warrant the conclusion that something works. Consideration of the excluded studies is also relevant here.

One other limitation pertains to the use of other or secondary interventions alongside the main ones of security guards, place managers and defensible space. This can make it difficult to isolate the independent effects of the different components as well as interactional effects of the main measure in combination with others. This is a particularly important issue that we have encountered in all of our previous systematic reviews and meta-analyses of public area surveillance methods, and one that we have developed specific procedures to address. Of the 12 studies included in this review, half ($n=6$) used other interventions. Our first criterion for inclusion of evaluation studies concerns this: The surveillance measure in question has to be the main focus of the intervention. For evaluations involving one or more other interventions, only those evaluations in which the surveillance measure in question was the main intervention were included. In the coding of studies, we adopted a two-stage process. First, the determination of what was the main intervention was based on the author identifying it as such. In some cases this involved a direct statement to this effect or the reporting of a timeline on the implementation of the different measures. If the author did not identify the main intervention, then we made an assessment of the importance the report gave the primary intervention compared to any others. In almost all of the six studies that included other interventions, there were sufficient details reported by the authors that specified that the intervention in question was the main one. It is important to note that we excluded a number of studies from our review because they could not meet this criterion.

Another limitation concerns methodological problems or changes to programs that take place during and after implementation. Some of these implementation issues include: statistical conclusion validity (adequacy of statistical analyses), construct validity (fidelity) and statistical power (to detect change). Few studies attempted to control for regression to the mean, which happens if an intervention is implemented just after an unusually high crime rate period. Insufficient reporting of details on program implementation and follow-through information can also detract from an understanding of the conditions and mechanisms underlying a program's effect on crime. Interestingly, the adequacy of reporting of information (or descriptive validity) was very good for almost every one of the included studies.

The measurement of displacement of crime and diffusion of crime prevention benefits also needs to be robust. Only half ($n=6$) of the included studies measured displacement or diffusion effects, but even fewer used the best approach. These issues should be studied by

comparing experimental areas with adjacent and non-adjacent control areas. If crime decreased in an experimental area, increased in an adjacent control area and stayed constant in a non-adjacent control area, this might be evidence of displacement. If crime decreased in an experimental area and in an adjacent control area but stayed constant or increased in a non-adjacent control area, this might be evidence of diffusion of benefits.

Adjacent and non-adjacent control areas are also needed to address the potential for contamination of control areas by the intervention. This has implications for the calculation of the OR effect size. If the control area is not contamination free, the magnitude of the OR could be underestimated. Wherever possible, we used the control area that was most comparable to the experimental area and was contamination free.

Discussion and Conclusions

Important to our conclusions here about the state of what works for these major forms of public area surveillance is the setting in which the intervention took place, the crime type targeted and the nature or characteristics of the intervention. This was particularly important for defensible space. A blanket statement that it works is not justified. With only one known high quality evaluation of SBD (Armitage, 2000), it is not possible at this time to make an assessment of its effectiveness. This was further hampered (and may be so in the future) by the multi-modal nature of the intervention – there were more than defensible space practices at work here. However, the other four evaluations of defensible space represent a largely uniform subset of this surveillance measure. Each implemented street closures or barricades, three of the four were carried out in high crime inner-city neighborhoods (the other was implemented across the city), and each produced desirable effects on overall crime or a specific crime type (violence in one case and property in the other).

One of the interesting points to emerge from the evaluations of street closures or barricades concerns an understanding of the mechanism that explains why this intervention has the effect it does. For some, the effectiveness of street closures or barricades to reduce crime depends on its physical presence. Cornish and Clarke (2003) refer to this as deflecting offenders away from crime targets. For others, the effect on crime is seen as a product of increased natural surveillance on the part of residents who now feel safer being outside. In each of the evaluations the authors argued that it was natural surveillance that caused the reduction in crime. Support for this position came from improvements in residents' perceptions of crime.

Our conclusion that security guards represent a promising technique of formal surveillance when implemented in car parks and targeted at vehicle crimes is based upon two evaluations, both of which produced sizable reductions in vehicle crimes in this public setting, as well as the larger body of research on this topic.

One potential drawback to this promising designation is that both of the effective programs used other (secondary) interventions: a media campaign in the study by Barclay and his colleagues (1996) and fencing and defensible space measures in the study by Laycock and Austin (1992). Another potential drawback is that the other security guard study included in our review (Hesseling, 1995) did not produce a desirable effect on vehicle crimes in car parks. Nevertheless, the promising nature of security guards still seems valid, if only because we are not recommending wider use but instead calling for further experimentation.

Unfortunately, the two urban citizen patrol studies do not add much to our knowledge base on the effectiveness of formal surveillance.

More straightforward is our conclusion that the surveillance technique of place managers appears to be of unknown effectiveness in preventing crime in public places. Only two evaluations met the criteria for inclusion in the systematic review, and they were carried out in different public settings (public housing estate or parking garage) and targeted at different crimes (vandalism or vehicle crimes). Furthermore, the study by Poyner (1991) in the parking garage produced a null effect on crime. This form of surveillance could also benefit from further experimentation. But given the state of the scientific evidence at this point in time, it may be more fruitful to give precedence to other surveillance measures such as security guards. It would seem that Clarke and Bichler-Robertson's summary of the evaluation literature a decade ago is equally applicable today: 'there is little criminological research on the effectiveness of 'place managers' in preventing crime' (1998, p. 12).

It is also important to investigate the potential social costs associated with public area surveillance techniques and weigh these costs against any crime reduction benefits (von Hirsch, 2000). The use of security guards in public places has been criticized on the grounds that it may result in the social exclusion of vulnerable populations such as unemployed youths and the homeless (Wakefield, 2003). The potential threat to privacy or other civil liberties associated with the presence of security guards may be less of a concern to the general public. This is because, unlike CCTV, for example, this technique of formal surveillance is not as invasive; it is not monitoring (and recording) every move one makes.

The natural surveillance technique of defensible space may have few, if any, social costs. It does not appear to violate anyone's privacy, infringe on civil liberties or contribute to the social exclusion of groups. It is conceivable that some of the more structural design changes (for example, construction of street barricades or closures, re-design of walkways, installation of windows) could evoke more resistance than some of the more mundane changes (for example, removal or pruning of bushes in front of homes, removal of objects from store shelves or windows). On balance, the crime reduction benefits of street barricades or closures in inner-city neighborhoods appear to outweigh any potential social costs.

Although it is our conclusion that place managers are of unknown effectiveness in preventing crime in public places, it seems worthwhile to sketch out a rough crime reduction-social cost analysis. One could certainly take issue with the increased use of place managers in public settings, viewing them as yet another set of eyes that are watching both potential offenders and law-abiding citizens alike. But unlike security guards (or CCTV), surveillance is a secondary function of place managers. This secondary surveillance function comes about from their presence and ability to intervene, thus presenting a deterrent threat to potential offenders. In this regard, the use of place managers may strike a fairly good balance between the public's interest in community safety and concerns over the erosion of privacy and civil liberties.

Advancing knowledge about the effectiveness of security guards, place managers and defensible space in preventing crime in public places should begin with attention to the methodological rigor of the evaluation designs. The use of a comparable control area in most of the included evaluations went some way toward ruling out some of the major threats to internal validity, such as selection, maturation, history and instrumentation. It is desirable in future evaluations to compare several experimental areas with several comparable control areas. If the areas were relatively small, it might be possible to randomly

allocate areas to experimental and control conditions or to have alternate periods with or without surveillance. In addition, future evaluations should include interviews with potential offenders and potential victims to find out what they know about the surveillance scheme and their views on associated social costs, to test hypotheses about mediators between the surveillance measure and crime, and to have measures of crime other than those from official sources.

It would be desirable to have a long time series of crime rates in experimental and comparable control areas before and after the intervention to investigate regression to the mean as well as the persistence of any effects on crime. In the situational crime prevention literature, brief follow-up periods are the norm, but 'it is now recognized that more information is needed about the longer-term effects of situational prevention' (Clarke, 2001, p. 29).

Cost-benefit analyses should be conducted to assess if the financial benefits of the surveillance measure outweighs its financial costs. It is also important to conduct cost-effectiveness analyses to assess how the surveillance measure compares with other alternatives in the cost of reducing crimes. Unfortunately, little can be said about the economic efficiency of any one of these three major forms of public area surveillance.

Future research should also investigate more fully the displacement of crime and diffusion of crime prevention benefits associated with these public area surveillance methods. This requires the use of both comparable adjacent and non-adjacent control areas. Wherever possible, Bowers and Johnson's (2003) WDQ technique should be used to investigate any displacement or diffusion associated with these methods.

Advancing knowledge about the effectiveness of these different forms of public area surveillance could also benefit from testing the main theories (that is, situational crime prevention vs. community investment) more explicitly. Surveys of youth in experimental and control areas could be carried out to investigate their offending, their opinions of the area, their street use patterns and factors that might inhibit them from offending (for example, informal social control by older residents, increased surveillance after dark). Household surveys of adults could also be carried out, focusing on perceptions of improvements in the community, community pride, informal social control of young people, street use and surveillance after dark. Systematic observations of areas would also be useful.

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Notes

- 1 Clarke and Homel (1997), in an earlier taxonomy of situational crime prevention, also identified three forms of surveillance: formal surveillance, informal surveillance and surveillance by employees. In the most recent iteration by Cornish and Clarke (2003), the last form of surveillance is renamed 'place managers,' but its meaning is not altered.

- 2 Sklansky (2006, p. 92) confirms that this is the most recent accounting of the private security industry in the United States. He does not offer a reason why there has not been a more recent study. We are left to speculate that this could be connected with the lack of public funding to pay for such a study. The *Hallcrest Report II*, by Cunningham *et al* (1990), was funded by a grant from the National Institute of Justice.
- 3 Information on the excluded evaluations is available from the first author.
- 4 For details on the calculation of the OR and its variance, see Welsh and Farrington (2009).
- 5 *What works*: These are programs that prevent crime in the kinds of social contexts in which they have been evaluated. Programs coded as working must have at least two high quality evaluations showing statistically significant and desirable results and the preponderance of all available evidence showing effectiveness. *What does not work*: These are programs that fail to prevent crime. Programs coded as not working must have at least two high quality evaluations with statistical significance tests showing ineffectiveness and the preponderance of all available evidence supporting the same conclusion. *What is promising*: These are programs where the level of certainty from the available evidence is too low to support generalizable conclusions, but where there is some empirical basis for predicting that further research could support such conclusions. Programs are coded as promising if they were found to be effective in significance tests in one high quality evaluation and in the preponderance of the remaining evidence. *What is unknown*: Any program not classified in one of the three above categories is defined as having unknown effects.
- 6 For a discussion of 'benign' or desirable effects of displacement, see Barr and Pease (1990).
- 7 At the time, criminal incidents on the subway accounted for about 2.7 per cent of all police-reported crime in New York City.
- 8 Mazerolle and Ransley (2005) refer to place managers in the context of third party policing. A search of the studies they included in their systematic review did not turn up any evaluations of place managers that involved surveillance for crime prevention in public space.
- 9 Capital costs were not included on the costs side of the ledger because these costs need to be spread over time, usually over the scheme's expected life span, along with corresponding debt charges (Safe Neighbourhoods Unit, 1993, p. 145). A reasonable estimate of the scheme's life expectancy was unclear.

References

- Armitage, R. (2000) *An Evaluation of Secured by Design Housing Within West Yorkshire*. London: Home Office, Policing and Reducing Crime Unit Briefing Note.
- Armitage, R. (2006) Predicting and preventing: Developing a risk assessment mechanism for residential housing. *Crime Prevention and Community Safety* 8(3): 137–149.
- Armitage, R. (2007) Sustainability Versus Safety: Confusion, Conflict and Contradictions in Designing Out Crime. In: G. Farrell, K.J. Bowers, S.D. Johnson and M. Townsley (eds.) *Imagination for Crime Prevention: Essays in Honour of Ken Pease*. *Crime Prevention Studies*, Vol. 21. Monsey, NY: Criminal Justice Press.
- Atlas, R. and LeBlanc, W.G. (1994) The impact on crime of street closures and barricades: A Florida case study. *Security Journal* 5(3): 140–145.
- Barclay, P., Buckley, J., Brantingham, P.J., Brantingham, P.L. and Whinn-Yates, T. (1996) Preventing Auto Theft in Suburban Vancouver Commuter Lots: Effects of a Bike Patrol. In: R.V. Clarke (ed.) *Preventing Mass Transit Crime*. *Crime Prevention Studies*, Vol. 6. Monsey, NY: Criminal Justice Press.
- Barr, R. and Pease, K. (1990) Crime Placement, Displacement, and Deflection. In: M. Tonry and N. Morris (eds.) *Crime and Justice: A Review of Research*, Vol. 12. Chicago, IL: University of Chicago Press.
- Bennett, T.H. and Wright, R. (1984) *Burglars on Burglary*. Farnborough, Hants, UK: Gower.
- Bowers, K.J. and Johnson, S.D. (2003) Measuring the geographical displacement and diffusion of benefit effects of crime prevention activity. *Journal of Quantitative Criminology* 19(3): 275–301.
- Casteel, C. and Peek-Asa, C. (2000) Effectiveness of crime prevention through environmental design (CPTED) in reducing robberies. *American Journal of Preventive Medicine* 18(4S): 99–115.
- Clarke, R.V. (ed.) (1992) *Situational Crime Prevention: Successful Case Studies*. Albany, NY: Harrow and Heston.
- Clarke, R.V. (1995) Situational Crime Prevention. In: M. Tonry and D.P. Farrington (eds.) *Building a Safer Society: Strategic Approaches to Crime Prevention*. Chicago, IL: University of Chicago Press.
- Clarke, R.V. (1997a) Introduction. In: R.V. Clarke (ed.) *Situational Crime Prevention: Successful Case Studies*, 2nd edn. Guilderland, NY: Harrow and Heston.

- Clarke, R.V. (ed.) (1997b) *Situational Crime Prevention: Successful Case Studies*, 2nd edn. Guilderland, NY: Harrow and Heston.
- Clarke, R.V. (2001) Effective crime prevention: Keeping pace with new developments. *Forum on Crime and Society* 1(1): 17–33.
- Clarke, R.V. (2003) *Thefts of and from Cars in Parking Facilities*. Washington DC: Office of Community Oriented Policing Service, US Department of Justice, Problem-Oriented Guides for Police, No. 10.
- Clarke, R.V. (2004) *Closing Streets and Alleys to Reduce Crime: Should You Go Down This Road?* Washington DC: Office of Community Oriented Policing Service, US Department of Justice Problem-Oriented Guides for Police, No. 2.
- Clarke, R.V. and Bichler-Robertson, G. (1998) Place managers, slumlords and crime in low rent apartment buildings. *Security Journal* 11(1): 11–19.
- Clarke, R.V. and Homel, R. (1997) A Revised Classification of Situational Crime Prevention Techniques. In: S.P. Lab (ed.) *Crime Prevention at a Crossroads*. Cincinnati, OH: Anderson.
- Clarke, R.V. and Weisburd, D. (1994) Diffusion of Crime Control Benefits: Observations on the Reverse of Displacement. In: R.V. Clarke (ed.) *Crime Prevention Studies*, Vol. 2. Monsey, NY: Criminal Justice Press.
- Cohen, L.E. and Felson, M. (1979) Social change and crime rate trends: A routine activity approach. *American Sociological Review* 44(4): 588–608.
- Cook, T.D. and Campbell, D.T. (1979) *Quasi-Experimentation: Design and Analysis Issues for Field Settings*. Chicago, IL: Rand McNally.
- Cornish, D.B. and Clarke, R.V. (2003) Opportunities, Precipitators and Criminal Decisions: A Reply to Wortley's Critique of Situational Crime Prevention. In: M.J. Smith and D.B. Cornish (eds.) *Theory for Practice in situational Crime Prevention*. *Crime Prevention Studies*, Vol. 16. Monsey, NY: Criminal Justice Press.
- Cozens, P.M., Saville, G. and Hillier, D. (2005) Crime prevention through environmental design (CPTED): A review and modern bibliography. *Property Management* 23(5): 328–356.
- Cunningham, W.C., Strauchs, J.J. and Van Meter, C.W. (1990) *Private Security Trends, 1970–2000: The Hallcrest Report II*. Boston, MA: Butterworth-Heinemann.
- Donnelly, P.G. and Kimble, C.E. (1997) Community organizing, environmental change, and neighborhood crime. *Crime and Delinquency* 43(4): 493–511.
- Eck, J.E. (1995) A General Model of the Geography of Illicit Retail Marketplaces. In: D. Weisburd and J.E. Eck (eds.) *Crime and Place*. *Crime Prevention Studies*, Vol. 4. Monsey, NY: Criminal Justice Press.
- Eck, J.E. (2006) Preventing Crime at Places. In: L.W. Sherman, D.P. Farrington, B.C. Welsh and D.L. MacKenzie (eds.) *Evidence-Based Crime Prevention*, Revised edn. New York: Routledge.
- Farrington, D.P. and Welsh, B.C. (2002) Improved street lighting and crime prevention. *Justice Quarterly* 19(2): 313–342.
- Farrington, D.P. and Welsh, B.C. (2007) *Improved Street Lighting and Crime Prevention: A Systematic Review*. Stockholm: National Council for Crime Prevention.
- Hesseling, R. (1995) Theft from cars: Reduced or displaced? *European Journal on Criminal Policy and Research* 3(3): 79–92.
- Jacobs, J. (1961) *The Death and Life of Great American Cities*. New York: Random House.
- Johnson, B.R., De Li, S., Larson, D.B. and McCullough, M. (2000) A systematic review of the religiosity and delinquency literature: A research note. *Journal of Contemporary Criminal Justice* 16(1): 32–52.
- Kelling, G.L. and Coles, C.M. (1996) *Fixing Broken Windows: Restoring Order and Reducing Crime in Our Communities*. New York: Simon and Schuster.
- Kenney, D.J. (1986) Crime on the subways: Measuring the effectiveness of the Guardian Angels. *Justice Quarterly* 3(4): 481–496.
- Lasley, J. (1998) 'Designing Out' Gang Homicides and Street Assaults, Research in brief, Washington DC: National Institute of Justice, US Department of Justice, November.
- Laycock, G. and Austin, C. (1992) Crime prevention in parking facilities. *Security Journal* 3(3): 154–160.
- Mayhew, P., Clarke, R.V., Burrows, J.N., Hough, J.M. and Winchester, S.W.C. (1979) *Crime in Public View*. London: Her Majesty's Stationery Office, Home Office Research Study, No. 49.
- Mazerolle, L. and Ransley, J. (2005) *Third Party Policing*. New York: Cambridge University Press.
- Newman, O. (1972) *Defensible Space: Crime Prevention Through Urban Design*. New York: Macmillan.
- Norris, C. and McCahill, M. (2006) CCTV: Beyond penal modernism? *British Journal of Criminology* 46(1): 97–118.

- Pennell, S., Curtis, C. and Henderson, J. (1986) *Guardian Angels: An Assessment of Citizen Response to Crime*. Washington DC: National Institute of Justice, US Department of Justice.
- Pennell, S., Curtis, C., Henderson, J. and Tayman, J. (1989) Guardian Angels: A unique approach to crime prevention. *Crime and Delinquency* 35(3): 378–400.
- Petticrew, M. and Roberts, H. (2006) *Systematic Reviews in the Social Sciences: A Practical Guide*. Oxford: Blackwell.
- Poyner, B. (1991) Situational crime prevention in two parking facilities. *Security Journal* 2(2): 96–101.
- Poyner, B. (1993) What Works in Crime Prevention: An Overview of Evaluations. In: R.V. Clarke (ed.) *Crime Prevention Studies*, Vol. 1. Monsey, NY: Criminal Justice Press.
- Reppetto, T.A. (1976) Crime prevention and the displacement phenomenon. *Crime and Delinquency* 22(2): 166–177.
- Safe Neighbourhoods Unit. (1993) *Crime Prevention on Council Estates*. London: Her Majesty's Stationery Office.
- Sampson, R.J., Raudenbush, S.W. and Earls, F. (1997) Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science* 277, 15 August 918–924.
- Savage, C. (2007) US doles out millions for street cameras: Local efforts raise privacy concerns. *Boston Globe*, 12 August. Available at: www.boston.com.
- Shadish, W.R., Cook, T.D. and Campbell, D.T. (2002) *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. Boston, MA: Houghton Mifflin.
- Sherman, L.W., Farrington, D.P., Welsh, B.C. and MacKenzie, D.L. (eds.) (2006) *Evidence-Based Crime Prevention*, Revised edn. New York: Routledge.
- Sherman, L.W., Gottfredson, D.C., MacKenzie, D.L., Eck, J.E., Reuter, P. and Bushway, S.D. (1997) *Preventing Crime: What Works, What Doesn't, What's Promising*. Washington DC: US Department of Justice, National Institute of Justice.
- Skilton, M. (1988) *A Better Reception: The Development of Concierge Schemes*. London: Estate Action and Department of the Environment.
- Sklansky, D.A. (2006) Private police and democracy. *American Criminal Law Review* 43(1): 89–105.
- Sklansky, D.A. (2008) *Democracy and the Police*. Stanford, CA: Stanford University Press.
- Smith, M.J. and Clarke, R.V. (2000) Crime and Public Transport. In: M. Tonry (ed.) *Crime and Justice: A Review of Research*, Vol. 27. Chicago, IL: University of Chicago Press.
- Taylor, R.B. and Gottfredson, S. (1986) Environmental Design, Crime and Prevention: An Examination of Community Dynamics. In: A.J. Reiss Jr. and M. Tonry (eds.) *Communities and Crime*. Chicago, IL: University of Chicago Press.
- Taub, R.P., Taylor, D.G. and Dunham, J.D. (1984) *Paths of Neighborhood Change: Race and Crime in Urban America*. Chicago, IL: University of Chicago Press.
- von Hirsch, A. (2000) The Ethics of Public Television Surveillance. In: A. von Hirsch, D. Garland and A. Wakefield (eds.) *Ethical and Social Perspectives on Situational Crime Prevention*. Oxford: Hart Publishing.
- Wagner, A.E. (1997) A study of traffic pattern modifications in an urban crime prevention program. *Journal of Criminal Justice* 25(1): 19–30.
- Wakefield, A. (2003) *Selling Security: The Private Policing of Public Space*. Cullompton, Devon, UK: Willan.
- Welsh, B.C. and Farrington, D.P. (2004) Surveillance for crime prevention in public space: Results and policy choices in Britain and America. *Criminology and Public Policy* 3(3): 497–526.
- Welsh, B.C. and Farrington, D.P. (eds.) (2006) *Preventing Crime: What Works for Children, Offenders, Victims, and Places*. New York: Springer.
- Welsh, B.C. and Farrington, D.P. (2009) Public area CCTV and crime prevention: An updated systematic review and meta-analysis. *Justice Quarterly* 26(4): 716–745.
- Wilson, J.Q. and Kelling, G.L. (1982) Broken windows: The police and neighborhood safety. *Atlantic Monthly* March: 29–38.