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Effectiveness and Social Costs of Public Area Surveillance for Crime Prevention

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Abstract

Video surveillance, or closed-circuit television (CCTV), has become a highly popular and prevalent method of preventing crime in public space in many countries across the world. Although it often dominates the policy focus, questions have been raised about its effectiveness and social costs, as well as how it compares to alternative surveillance measures. A theoretical and programmatic understanding of surveillance draws attention to other widely used surveillance measures that perform a crime prevention function in public places. These include improved street lighting, security guards, place managers (e.g., bus drivers and parking lot attendants), and defensible space (i.e., changes to the built environment). This article reviews the research evidence on the effectiveness of the full range of public area surveillance measures and examines related social costs. It also serves to broaden the view of public area surveillance beyond the current narrow focus on CCTV.

INTRODUCTION

Surveillance measures designed to prevent crime in public space are commonly understood to involve some form of video or camera technology, often referred to as CCTV (closed-circuit television). There is good reason for this view. In the past decade, the United States has experienced a rather dramatic growth in the use of CCTV cameras in a wide array of public places, including city and town centers, public transportation systems, public housing communities, parks, and schools (Dailey 2013, La Vigne & Lowry 2011). In the United Kingdom, the widespread use of CCTV cameras to address crime in public places began a full decade earlier, in the 1990s (Williams & Johnstone 2000). The latest research estimates that there are approximately 1.85 million public CCTV cameras operating in the United Kingdom, with the average Briton caught on camera approximately 70 times each day (Gerrard & Thompson 2011). Other countries, including Canada, Australia, Japan, China, and many European countries, have also embraced this surveillance technology in public places (see, e.g., Cerezo 2013, Hier 2010, Welsh & Farrington 2009a).

Despite the pervasiveness of CCTV and its popularity among decision makers and the public (e.g., Angiesta 2007, Dailey 2013), there are other widely used surveillance measures that perform a crime prevention function in public places. These include improved street lighting, security guards, place managers (e.g., bus drivers and parking lot attendants), and defensible space (i.e., changes to the built environment). According to the taxonomy of situational crime prevention (Cornish & Clarke 2003), each of these measures falls under one of three types of surveillance: formal surveillance, surveillance by employees, and natural surveillance. Like CCTV, each is designed to increase offenders' perceived risks associated with committing a crime.

This article has two main aims. One is to review the state of research evidence on the effectiveness of public area surveillance in preventing crime. Importantly, the article also examines the literature on related social costs. All too often the general discussions and evaluations of surveillance measures do not include any meaningful analysis of social costs. The other main aim is to broaden the view of public area surveillance techniques beyond the current narrow focus on CCTV. To put it more bluntly, there exist other forms of surveillance that may be equally as effective as, if not more effective than, CCTV, and they may impose lower social costs on society.

The article begins with an overview of theoretical perspectives on how surveillance measures might be able to prevent crime. The next part reviews the evidence on the effectiveness of the major forms of surveillance that are designed to prevent crime in public places. This is followed by a review of social costs and other potential benefits associated with public area surveillance. The final part explores future directions in the use of these public area surveillance methods.

THEORETICAL PERSPECTIVES

Explanations of the way these different forms of surveillance could prevent crime can be grouped into two main theoretical perspectives. The first perspective is that of situational crime prevention, which refers to interventions designed to prevent the occurrence of crimes by reducing opportunities and increasing the risk and difficulty of offending. This may be viewed as having a specific effect on crime. The second perspective holds that these different forms of surveillance could reduce crime by strengthening informal social control and community cohesion, by improving the physical environment and increasing investment in neighborhood conditions (Taub et al. 1984, Taylor & Gottfredson 1986). This second approach may be viewed as having a more general effect on crime. Painter & Farrington (1999) concluded that both mechanisms contributed to the decrease in crime that followed improved street lighting in Stoke-on-Trent in the United Kingdom.

Situational Crime Prevention

Situational crime prevention has been defined as "a preventive approach that relies, not upon improving society or its institutions, but simply upon reducing opportunities for crime" (Clarke 1992, p. 3). Reducing opportunities for crime is achieved essentially through some modification or manipulation of the physical environment to directly affect offenders' perceptions of increased risks and effort, decreased rewards, and provocations (Cornish & Clarke 2003).[1]

The theoretical origins of situational crime prevention are wide-ranging (see Garland 2000, Smith & Clarke 2012) but are largely informed by opportunity theory. This theory holds that the offender is "heavily influenced by environmental inducements and opportunities and. . .highly adaptable to changes in the situation" (Clarke 1995, p. 57). Opportunity theory includes several more specific theories. One of these is the rational choice perspective, which appears to have had the greatest influence on situational crime prevention.

The situational 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 deterrents 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.

Lighting improvements, for instance, may encourage increased street usage, which intensifies natural surveillance. This 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 & Felson 1979). From the potential offender's perspective, the proximity of other pedestrians acts as a deterrent because 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 CCTV (especially if well publicized), 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. Armitage et al. (1999, p. 226) refer to this mechanism as "you've been framed." In the context of CCTV, the authors identify several other mechanisms by which it (as well as other surveillance measures) may prevent crime, including

1. effective deployment; CCTV directs security personnel to ambiguous situations, which may head off their development into real criminal acts.
2. publicity; CCTV could symbolize efforts to take crime seriously, and the perception of those efforts may energize law-abiding citizens and/or deter others.
3. time for crime; CCTV may be perceived as reducing the time available to commit crime, preventing those crimes that require extended time and effort.
4. memory jogging; the presence of CCTV may induce people to take elementary security precautions, such as locking their car, by jogging their memory about the possibility of being victimized.
5. anticipated shaming; the presence of CCTV may induce people to take elementary security precautions, for fear that they will be shamed by being shown on CCTV as being careless.

[1]Note that situational prevention is equally concerned with products (e.g., installation of immobilizers on new cars in some parts of Europe) and to some extent with large-scale systems (e.g., improvements in the banking system to reduce money laundering) (Clarke 2009). In this article, we have purposely limited our coverage of situational prevention to its focus on places or facilities (for an excellent review, see Ekblom 2008).

6. appeal to the cautious; cautious people may, for example, migrate to the areas containing CCTV to shop or leave their cars. Their caution and security-mindedness reduce the risk of victimization (Armitage et al. 1999, p. 227).

Natural surveillance, such as lighting and defensible space, 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). Armitage et al. (1999, p. 226) refer to this mechanism as "caught in the act." Security personnel and place managers also act as visible deterrents.

In addition, enhanced visibility and increased street usage may interact to heighten possibilities for informal surveillance. Pedestrian density, pedestrian flow, and surveillance have long been regarded as crucial for crime prevention because they can influence potential offenders' perceptions of the likely risks of being caught (Bennett & Wright 1984, Newman 1972). Or to take a more colloquial expression, this is the "nosy parker" syndrome at work: More people frequent the watched-over place, thus increasing the extent of natural surveillance by these "newcomers" to deter potential offenders (Armitage et al. 1999, pp. 226–27).

Community Investment

Other theoretical perspectives have emphasized the importance of investment to improve neighborhood conditions as a means of strengthening community confidence, cohesion, and social control. In the present context of surveillance for crime prevention in public spaces, two theories are most applicable: social (or community) disorganization and community disorder.

Social disorganization theory attributes crime and disorder in a community to poor neighborhood controls. According to Bursik & Grasmick (1993), the most important causes of social or community disorganization are poverty, high residential mobility, racial or ethnic heterogeneity, and high population density. These factors lead to poor neighborhood controls, including poor supervision and surveillance by the residents and a low willingness to intervene to prevent crime and disorder. In socially disorganized neighborhoods, there are weak ties between residents, few social networks, a low consensus on values and norms, and low community interaction and shared obligations.

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. This more contemporary view of community or social disorganization theory stresses the importance of such structural influences on offending as family disruption and weak social cohesion. Important to the construct of weak social control is an unwillingness of neighbors to intervene on behalf of the "common good."

Under the general framework of community disorganization theory, the scope for the prevention of crime, at least during the first half of the twentieth century, was seen to rest "in a program of the physical rehabilitation of slum areas and the development of community organization" (Burgess 1942, p. xi). In more recent decades, community disorganization theory has given rise to programs emphasizing the empowerment or mobilization of community residents to take preventive action to reduce crime in their neighborhoods (Rosenbaum et al. 1998).

Community disorder theory has its roots in the "broken windows" perspective of Wilson & Kelling (1982; see also Kelling & Coles 1996), who suggest that improved neighborhood conditions will result from a specific focus on social and physical disorder (Skogan 1990, 2012). This view postulates that disorder is a precursor to more serious street crime and decay, as it engenders fear among community members and produces a spiral of decline and weakened social

control.[2] The scope for crime prevention rests largely on tackling disorderly behavior when it is minor, tackling the precursor conditions that encourage such behavior to take root in the community, or both. Failing to repair the figurative and literal broken window signals that an area is deteriorating and encourages further disorder, whereas intervening early to repair the broken window prevents this view (and its consequences) from developing.

As highly visible signs of investment, CCTV and improved street lighting 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 experience 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. It should be noted that increased social control and community cohesion should cause a reduction in both daytime and nighttime crime. Consequently, attempts to measure the effects of improved street lighting on crime should not concentrate purely on nighttime crime. The same holds true for evaluations of CCTV because infrared and other night-vision technology can allow CCTV to operate just as effectively during the nighttime as during the daytime.

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 & Gottfredson 1986). In the case of improved lighting, they may deduce that crime in the relit location is riskier than elsewhere. 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 (Kelling & Coles 1996, Wilson & Kelling 1982).

Other Considerations

It is important to acknowledge that these surveillance measures might also cause crime to increase. In the case of CCTV, for example, its visible presence 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. CCTV may also encourage increased reporting of crimes to the police and increased recording of crimes by the police. If an offender is detected through CCTV, the offense may be recorded and detected at the same time, leading to an increase in police clearance rates as well as in crime rates. Hence, to disentangle criminal behavior from reporting and recording, both surveys and recorded crime measures are needed in any evaluation.

Street lighting improvements could also, 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 (e.g., in terms of valuables). Increased social activity outside the home may increase the number of unoccupied homes available for burglary. Increased illumination may make it easier for offenders to commit crimes and to escape.

[2]For objections to the broken windows theory, see Harcourt (2001), Harcourt & Ludwig (2006), Sampson & Raudenbush (2001), and Taylor (2006).

The effects of each of the surveillance methods are also likely to vary in different conditions. Again considering street lighting improvements, the effects are likely to be greater if the existing lighting is poor and if the improvement in lighting is considerable. Furthermore, the effects may vary according to characteristics of the area or the residents, the design of the area, the design of the lighting, and the places that are illuminated. For example, improved lighting may increase community confidence only in relatively stable, homogeneous communities, not in areas with a heterogeneous population mix and high residential mobility. The effects of improved lighting may also interact with other environmental improvements, such as CCTV cameras, security patrols, place managers, or changes to the built environment. In particular, CCTV may be more effective in combination with improved lighting. Improved street lighting may have different effects on different types of crimes (e.g., violence versus property) and different effects on daytime as opposed to nighttime crime.

CRIME PREVENTION EFFECTS

In recent years, CCTV, improved street lighting, and the other major forms of public area surveillance have been the subject of several reviews to assess their unique as well as comparative effectiveness in preventing crime. For example, Clarke (2008) and Welsh & Farrington (2008) reviewed the effects of improved street lighting on crime. Ratcliffe (2006) and Welsh & Farrington (2009b, 2014) reviewed the effects of public area CCTV on crime. Eck (2006) assessed the effectiveness of place managers and security guards, and Welsh et al. (2010) reviewed the effectiveness of place managers, security guards, and defensible space.

Most of these reviews draw conclusions based on the highest-quality evaluation studies (i.e., experimental and rigorous quasi-experimental designs). Some of these reviews can be classified as narrative reviews, whereas others employ the methodology of systematic reviews. In this article, whenever possible, we consider the results of systematic reviews of the literature. These 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. As noted by Petrosino et al. (2001, p. 20), "the foremost advantage of systematic reviews is that when done well and with full integrity, they provide the most reliable and comprehensive statement about what works."

Summary of Key Findings

Drawing upon this research, several conclusions can be made about the specific conditions under which surveillance measures are most effective in preventing crime in public places. The reviews found that CCTV is effective in car parks, improved street lighting is effective in city and town centers and residential/public housing communities, and the defensible space practice of street closures or barricades is effective in inner-city neighborhoods. The reviews also found some evidence of the effectiveness of combining different forms of public area surveillance (e.g., CCTV and improved lighting; see Welsh & Farrington 2004, 2009a).

Also of importance is evidence that shows that CCTV and improved street lighting are more effective in reducing property (and especially vehicle) crimes than in reducing violent crimes. Street closure or barricade schemes are effective in reducing both property and violent crimes. The weight of the evidence suggests that security guards are promising when stationed in car parks and targeted at vehicle crimes. In contrast, place managers appear to be of unknown effectiveness in preventing crime. These less-than-conclusive statements about the effectiveness of security guards and place managers have everything to do with the small number of high-quality evaluations that have been carried out on these measures.

CCTV

The latest systematic review of CCTV, which incorporated meta-analytic techniques, found that the intervention had a significant desirable effect on crime, with an overall 16% reduction in crime (Welsh & Farrington 2009b). Altogether, the review included 44 studies, and 41 of them provided the requisite data to be included in the meta-analysis. **Figure 1** summarizes the results of these 41 studies in a forest graph. It shows the odds ratio (OR) effect size for total crime measured in each study plus its 95% confidence interval. The studies are ordered according to the magnitude of their ORs. More than one-third ($n = 15$) showed significant evidence of a desirable effect of CCTV on crime, with ORs of 1.34 or greater (from City Outskirts upward, not including City Hospital). Of the 15 effective studies, 14 were carried out in the United Kingdom; the other was carried out in Sweden (Malmö). Three other studies showed a significant undesirable effect (Oslo, Cambridge, and Dual Estate), and the remaining 23 studies showed no significant effect.

This aggregate finding may be useful to give a snapshot of the state of the effectiveness of CCTV, but it tells us next to nothing about how, when, or where it can be most effective. Importantly, this systematic review was able to investigate some of these key questions. Of the 44 CCTV evaluations, 41 were carried out in four main settings: city and town centers, public housing, public transport, and car parks (or parking lots). The remaining three CCTV evaluations were carried out in residential areas ($n = 2$) and a hospital.

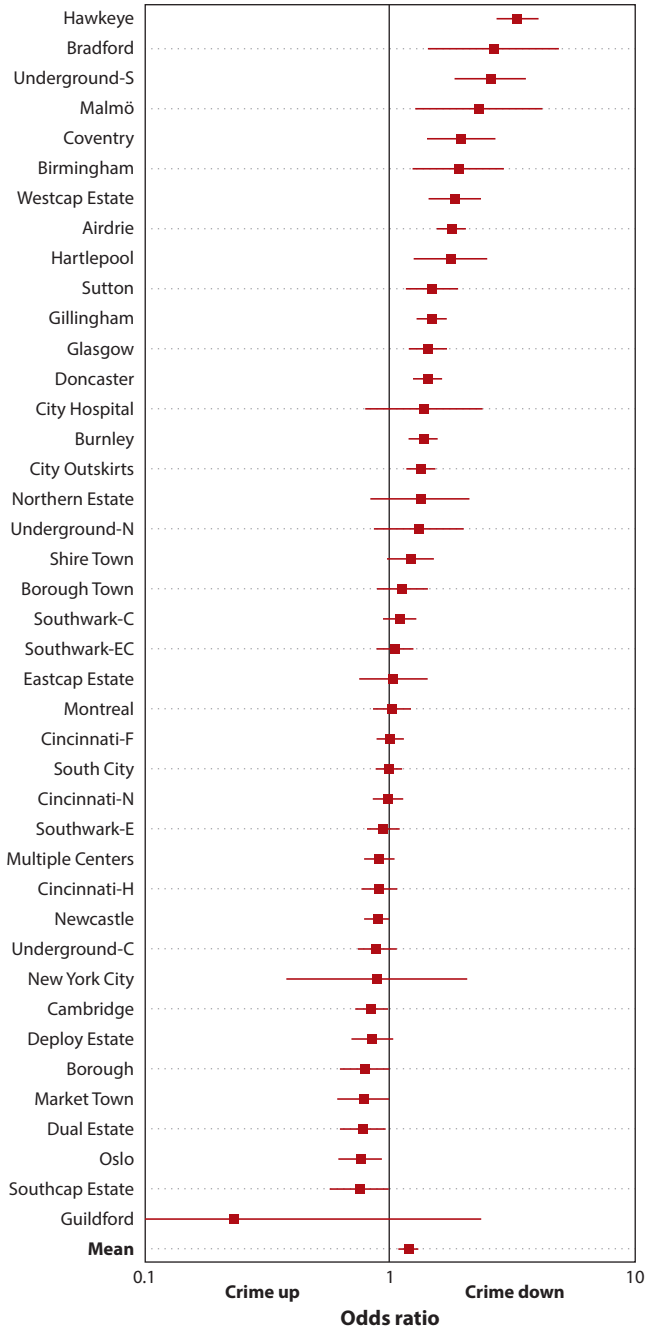
Across the four main settings, it was found that CCTV was effective in reducing crime only in car parks, with a rather large 51% decrease. CCTV projects in city and town centers and public housing showed small and nonsignificant effects on crime, whereas CCTV projects in public transportation systems (three in the London Underground and one in the Montreal Metro) showed a sizeable but nonsignificant effect on crime.

All of the car park projects ($n = 6$) were implemented in the United Kingdom between the early 1980s and early 2000s. Important to the success of CCTV in this setting was that each of the programs supplemented CCTV with other interventions, such as improved lighting, fencing, payment schemes, and security personnel. In each program, however, CCTV was the main intervention. Also, and importantly, the success of CCTV in car parks was mostly limited to a reduction in vehicle crimes (the only crime type measured in five of the six projects), and camera coverage was high for those evaluations that reported on it. In the national British evaluation of CCTV, Farrington et al. (2007) found that its effectiveness was significantly correlated with the degree of coverage of the CCTV cameras, which was greatest in car parks.

To return to the full complement of CCTV studies, the major crime types that were reported were violence (in 23 studies) and vehicle crimes (in 22 studies). Overall, there was no effect of CCTV on violent crimes (approximately a 3% reduction), but there was a modest and significant effect on vehicle crimes (approximately a 26% reduction). For example, in one study Tilley (1993) evaluated three CCTV programs in car parks in the UK cities of Hartlepool, Bradford, and Coventry. Each was part of the British Government's Safer Cities Programme, a large-scale crime prevention initiative that operated from the late 1980s to the mid-1990s. In Hartlepool, CCTV cameras were installed in several covered car parks, and the control area included several non-CCTV covered car parks. Security personnel, notices of CCTV, and payment schemes were also part of the package of measures employed to reduce vehicle crimes. Two years after the program began, thefts of and from vehicles had been substantially reduced in the experimental compared with the control car parks. A 59% reduction in thefts of vehicles was observed in the experimental car parks, compared with a 16% reduction in the control car parks. Another CCTV car park project carried out in Vancouver, Canada, reported mixed effects on vehicle crimes (Reid & Andresen 2014).

Improved Street Lighting

Clarke (2008) and Welsh & Farrington (2008; see also Welsh & Farrington 2009a) found rather substantial support for the desirable effects of improved street lighting on crime. Clarke (2008) concluded that improvements in street lighting can be highly effective in preventing crime, especially in high-crime neighborhoods. Writing also from the vantage of problem-oriented policing,



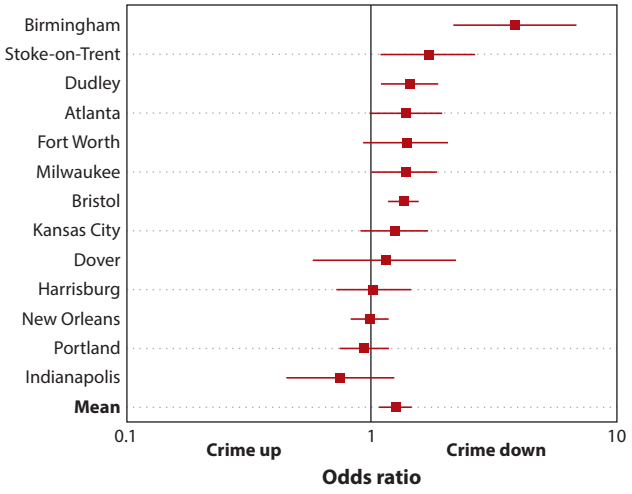


Figure 2

Results of improved street lighting evaluations (odds ratios). Odds ratios on logarithmic scale. Data sources for each location follow. Birmingham (Poyner & Webb 1997); Stoke-on-Trent (Painter & Farrington 1999); Dudley (Painter & Farrington 1997); Atlanta (Atlanta Reg. Comm. 1974); Fort Worth (Lewis & Sullivan 1979); Milwaukee (Dep. Intergov. Fiscal Liaison 1974); Bristol (Shaftoe 1994); Kansas City (Wright et al. 1974); Dover (Poyner 1991); Harrisburg (Harrisburg Police Dep. 1976); New Orleans (Sternhell 1977); Portland (Inskeep & Goff 1974); Indianapolis (Quinet & Nunn 1998).

which sometimes involves street lighting projects, Clarke (2008) noted that the available research is not fully helpful in addressing some of the practicalities of implementation and evaluation.

The latest systematic review of improved street lighting, which incorporated meta-analytic techniques, found that the intervention had a significant desirable effect on crime, with an overall 21% reduction in crime (Welsh & Farrington 2008). The review included 13 studies, each of which provided the requisite data to be included in the meta-analysis. **Figure 2** summarizes the results of these 13 studies in a forest graph. As with the previous forest graph, it shows the OR for total crime measured in each study plus its 95% confidence interval. Only three studies (Portland, New Orleans, and Indianapolis) had ORs less than 1, meaning that improved street lighting was followed by an increase in crime, and in no case was this increase significant. The other ten studies showed desirable effects on crime, and in six cases this decrease was significant (or very nearly so, in the case of Atlanta).

Figure 1

Results of closed-circuit television (CCTV) evaluations (odds ratios). Odds ratios on logarithmic scale. Data sources for each location follow. Hawkeye, Westcap Estate, City Hospital, City Outskirts, Northern Estate, Shire Town, Borough Town, Eastcap Estate, South City, Deploy Estate, Borough, Market Town, Dual Estate, and Southcap Estate (Gill & Spriggs 2005); Bradford, Coventry, and Hartlepool (Tilley 1993); Underground-S (Burrows 1980); Underground-N and Underground-C (Webb & Laycock 1992); Malmö (Blixt 2003); Birmingham and Newcastle (Brown 1995); Airdrie (Ditton & Short 1999); Sutton (Sarno 1996); Gillingham (Griffiths 2003); Glasgow (Hood 2003); Doncaster (Skinns 1998); Burnley (Armitage et al. 1999); Southwark-C, Southwark-EC, and Southwark-E (Sarno et al. 1999); Montreal (Grandmaison & Tremblay 1997); Cincinnati-F, Cincinnati-N, and Cincinnati-H (Mazerolle et al. 2002); Multiple Centers (Sivarajasingam et al. 2003); New York City (Musheno et al. 1978); Cambridge (Farrington et al. 2007); Oslo (Winge & Knutsson 2003); Guildford (Poyner 1991).

With only thirteen studies, this aggregate finding is somewhat more meaningful. For example, it shows that a larger proportion of British projects (four of five) were effective compared with American projects (four of eight). Moreover, a meta-analysis of all eight US studies yielded a nonsignificant 7% decrease in crime, whereas a meta-analysis of all five British studies yielded a significant 38% decrease in crime (Welsh & Farrington 2009a). Also of importance is that all of the US studies (except Indianapolis; Quinet & Nunn 1998) were carried out in the 1970s, whereas all of the British studies were carried out in the 1990s. Some scholars have suggested that the British studies represent a second generation of improved street lighting projects, drawing on the lessons learned from the American experience (Painter 1996, Ramsay & Newton 1991).

Two other important findings stand out from the reviews of improved street lighting. First, lighting improvements were followed by a modest and significant reduction in property crimes (approximately 17%) but only a small and nonsignificant reduction in violent crimes (approximately 9%). Second, there was no evidence that nighttime crimes decreased more than daytime crimes. For example, in the case of the American studies, the key dimension on which the eight effect sizes differed seemed to be whether they were based on data for both night and day or for night only. For the four night/day studies, the average reduction in crime was modest and significant (approximately 22%). For the four night-only studies, the average reduction in crime was negligible and nonsignificant. The British studies also did not find that nighttime crimes decreased more than daytime crimes. This suggests that a theory of street lighting focusing on its role in increasing community pride and informal social control may be more plausible than a theory focusing on increased surveillance and deterrence.

For example, Painter & Farrington (1997) evaluated an improved street lighting scheme in the British town of Dudley. Lighting upgrades were made along more than 1,500 meters of roadway in a local authority housing estate (public housing community). A near-identical housing estate served as the control area. Substantial crime reduction benefits were achieved after one year of the lighting improvements. In the experimental area, the prevalence of all crime decreased by one-quarter (23%), whereas only a marginal decrease (3%) in the prevalence of all crime occurred in the control area. Also, the incidence (average number of victimizations per 100 households) of all crime decreased in both the experimental and control areas: 41% and 15%, respectively. The decrease in the experimental area was found to be significantly greater than the decrease in the control area.

Other Forms of Public Area Surveillance

As noted above, other widely used surveillance measures that perform a crime prevention function in public places include security guards, place managers, and defensible space.[3] To return to Cornish & Clarke's (2003) taxonomy of situational crime prevention, each of these measures falls under one of three types of surveillance: formal surveillance, surveillance by employees, and natural surveillance. Security guards, like CCTV, are a technique of formal surveillance. Here, the aim is to produce a "deterrent threat to potential offenders" (Clarke 1997, p. 20). Place managers refer to 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 for security personnel, however, the task of surveillance for these employees is secondary to their other job duties. Defensible space involves changes to the built environment. Like improved street lighting, it is a technique of natural surveillance. This type of surveillance involves efforts to "capitalize

[3] Neighborhood watch programs are not reviewed here because they are most often used to prevent crimes at private residences.

upon the 'natural' surveillance provided by people going about their everyday business" (Clarke 1997, pp. 20–21).

The justification for grouping together these different forms of surveillance is twofold. First, compared with that for CCTV and improved street lighting, only a small body of research evidence is available on their effects on crime. For reasons that are less than clear (see, e.g., Cozens et al. 2003, Eck 2006), each of these forms of public area surveillance is limited by a small number of high-quality evaluations. Second, like improved street lighting, these other forms of public area surveillance represent an alternative approach to CCTV cameras. This alternative viewpoint has proven more important in light of the dramatic growth of CCTV in public space, its rather limited effectiveness in reducing crime, and concerns about its social costs to society (Welsh & Farrington 2009a).

Security guards. Various reviews have identified three high-quality evaluations of security guards, each one in a different country (Canada, the United Kingdom, and the Netherlands). All three projects were carried out in car parks that were experiencing high rates of vehicle crimes (see **Table 1**). In two cases, security guards were supplemented by other (secondary) interventions. In the Basingstoke study, conducted by Laycock & Austin (1992), fencing was installed around a good portion of the car park and several 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 study, conducted by Barclay et al. (1996), a media campaign preceded the implementation of the security patrols. All three of the evaluations measured vehicle crimes.

The Basingstoke and Vancouver projects were highly effective in reducing vehicle thefts, and in both the researchers recorded little or no displacement of vehicle thefts into surrounding areas. However, the introduction of security guards in several car parks in inner-city Rotterdam produced no measurable change in thefts from vehicles over a two-year period (Hesseling 1995). From interviews with offenders and an analysis of the deployment of the security guards, Hesseling (1995) concluded that the Rotterdam project was not intense enough to deal with the volume of motivated offenders.

Place managers. In one of the first reviews of place managers, Clarke & Bichler-Robertson (1998, p. 12) concluded that "there is little criminological research on the effectiveness of 'place managers' in preventing crime." Disappointingly, little has changed in the intervening years. The most recent review by Welsh et al. (2010) identified only two studies that measured the effects of place managers on crime in public places. Both of these were carried out in the United Kingdom some years ago (see **Table 1**). As reported by Skilton (1988), in the London Borough of Brent, high crime levels and generally poor security on a public housing estate led to the introduction of a concierge system in one of its high-rise residential towers. The concierge system performed three main functions: receptionist services (e.g., answering calls), general assistance to residents, and maintenance of block security by controlling access through the main entrance. Compared with a matched high-rise on the estate, the experimental site showed several benefits over a one-year follow-up period, including fewer repairs to communal areas and elevators (from a reduction in vandalism) and less revenue lost owing to vacant flats.

In the other study, carried out by Poyner (1991), place managers took the form of a taxi company operating out of a multilevel parking garage in Dover. The parking garage was experiencing a range of crime problems, most notably thefts of and from vehicles. Other (secondary) measures included lighting improvements and the installation of fencing at the ground level. Two years after the program started, police-reported vehicle crimes were down by half in both the experimental

Table 1 Evaluations of other forms of public area surveillance

Author, publication date, and location	Type of surveillance	Context	Other interventions	Outcome measure	Results and diffusion/ displacement
Laycock & Austin (1992), Basingstoke, UK	Security guards	Car parks	Fencing, defensible space	Theft of vehicles	Desirable effect; no displacement
Hesseling (1995), Rotterdam, Netherlands	Security guards	Car parks	None	Theft from vehicles	Null effect; displacement occurred (in 4 of 5 control areas)
Barclay et al. (1996), Vancouver, Canada	Security guards	Commuter car park	Media campaign	Theft of vehicles	Desirable effect; little or no displacement
Skilton (1988), London Borough of Brent, UK	Place managers: concierge system	Public housing estate	None	Vandalism	Desirable effect; not measured
Poyner (1991), Dover, UK	Place managers: taxi business	Parking garage	Lighting, fencing, access control	Vehicle crimes	Uncertain effect; no displacement
Atlas & LeBlanc (1994), Miami Shores	Defensible space: street closures and barricades	Citywide	None	Violent and property crimes	Desirable effect (for burglary, larceny, theft of vehicles); not measured
Donnelly & Kimble (1997), Dayton	Defensible space: street closures	Inner-city neighborhoods	Media campaign	Crime (total and multiple offenses)	Desirable effect; some evidence of displacement and diffusion
Wagner (1997), St. Louis	Defensible space: traffic modification	Inner-city neighborhood	None	Violent and property crimes (part I)	Desirable effect; not measured
Lasley (1998), Los Angeles	Defensible space: street barricades	Inner-city neighborhoods	None	Violent and property crimes (part I)	Desirable effects (for homicides, assaults); no displacement
Armitage (2000), West Yorkshire, UK	Defensible space: secured by design	Public housing estates	Physical security, access control	Crime (total and multiple offenses)	Desirable effect; not measured

area (50%) and the control area (49%). Because the author did not investigate if the control area's reduction in vehicle crime resulted from a diffusion of benefits from the targeted site, it is difficult to say if this scheme was indeed effective. Poyner (1991) found no evidence that vehicle crimes were displaced to the control parking lots.

Defensible space. Various reviews have identified five evaluations of defensible space in public places. Four of these evaluations were carried out in the United States and the other in the United Kingdom (see **Table 1**). Each of the American 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 (Armitage 2000, Donnelly & Kimble 1997) used other interventions. For most of the studies effectiveness was measured with a range of violent and property crimes.

Each of the five evaluations reported a desirable effect on at least some of the crimes that were measured. Welsh et al. (2010) concluded 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. In one of these studies, in Miami Shores (Atlas & 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 with the control areas, Miami Shores experienced a significant decrease in burglary, larceny, and theft of vehicles two years after the program was implemented, but no change was observed in robberies and aggravated assaults over the same time frame. Displacement was not measured. The authors offered 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 & LeBlanc 1994, p. 144)

SOCIAL COSTS

Von Hirsch (2000, p. 61) argues that two major issues confront the "proper uses and limits" of surveillance for crime prevention in public places. His discussion takes place in the context of CCTV, but it is relevant to the other forms of public area surveillance. The first issue pertains to privacy concerns, or those that may infringe on public interests or violate legal or constitutional protections. The second issue concerns the matter of the "legitimising role of crime prevention," or to what extent the crime prevention ends justify the surveillance means (p. 61). Drawing upon this framework, we examine the key social costs of public area surveillance.

Privacy concerns are most apparent in the decision to install CCTV cameras in public spaces. In car parks, the one setting in which CCTV is effective in preventing crime (specifically, vehicle crime), there may be little resistance to the installation of CCTV cameras. In part, this is because this public space is used for one rather inconsequential purpose—parking vehicles. It is also the case that individuals can choose whether or not to park their vehicle in the car park. Whereas some may consider recording their presence in a car park as an invasion of privacy, others may find it to be a slight inconvenience for the added safety afforded their vehicle by the presence of the cameras.

In other public settings, such as city and town centers, public housing communities, and transportation facilities, CCTV evokes more resistance on the basis of threats to privacy and other civil liberties. These settings are often at the center of the debate over how best to strike a balance between the potential crime reduction benefits and social costs associated with CCTV (Savage 2007). In city and town centers, for example, the coverage of the cameras is much less than in car parks, but there is often a greater number of cameras extending over a larger area.

The effectiveness of CCTV in countries where the public is more accepting and less apprehensive of CCTV does not appear to be different than in countries where the public is less accepting (Welsh & Farrington 2009a). Some of the concern about the infringement of civil liberties lies in the lack of a clear protocol for CCTV implementation and use (Cameron et al. 2008). Setting guidelines and legislation limiting the reach of some cameras depending on the space being monitored may be a useful response to these concerns. Some communities are already making use of these context-based guidelines. For example, in San Diego, California, CCTV cameras stop

recording during protests in order to protect free political speech (Cameron et al. 2008). In Spain, legislation regarding CCTV implementation is written in a manner that both increases security levels and ensures that the "defense of public security is in compliance with Constitutional rights and freedoms" (Agustina & Clavell 2011, p. 171).

In city and town centers and public housing communities, in particular, the impact of heightened CCTV camera use is associated with a larger number of social harms, including the reinforcement of the notion of a fortress society and the social exclusion of marginalized populations (Clarke 2000). In major cities, CCTV cameras may capture vulnerable or marginalized populations, such as unemployed youths who are "hanging out" and the homeless, more often than others. The fear is that, instead of providing assistance for these groups to get off the street, being captured on CCTV may push them further away from available services and cause increased harm in the form of crime, victimization, or both. Though cameras cannot discriminate between criminals and noncriminals (von Hirsch 2000, p. 61), a person's regular appearance on screen may heighten the sensitivity of monitors (i.e., those doing the watching) to a particular individual. To many, the impact of these potential threats may outweigh the small reductions in crimes in these public spaces.

It is not clear whether residents are more or less supportive of CCTV in public housing communities than those who come in contact with it in other public settings. Some research suggests that CCTV may disproportionally affect different age groups, ethnicities, and genders. For example, in one study, 90% of those caught on camera were male, and most were teenagers. Further, African Americans were 1.5–2.5 times more likely to be targeted by the cameras (Norris & Armstrong 1999). These concerns are also raised in response to new advances in technology that allow cameras to fill in the blanks in facial recognition and analysis (Adams & Ferryman 2015). Unfortunately, only a few studies have investigated the effects of CCTV on reduced fear of crime and other social benefits of surveillance on different ethnicities and communities of different socioeconomic statuses (Lorenc et al. 2013).

Improved street lighting—by far the most effective surveillance technique in reducing crime in public space—has some advantages over other surveillance measures that have been associated with the creeping privatization of public space, the exclusion of sections of the population, and the move toward a fortress society (Bottoms 1990). Street lighting benefits the whole neighborhood rather than particular individuals or households. It has no adverse civil liberties implications, and it can increase public safety and effective use of neighborhood streets at night. It is also the case that improved street lighting does not appear to displace crime.

The one potential social harm associated with street lighting is that it may contribute to light pollution (Pease 1999). It is important to consider this social cost in decisions to implement lighting projects. However, for many, especially those who live in urban areas, this may be a small price to pay for the crime reduction benefits that have been shown to accrue from lighting improvements.

Like improved street lighting, the natural surveillance technique of defensible space may have few (if any) social costs. Defensible space involves design changes to the built environment to maximize the natural surveillance of open spaces afforded by people going about their day-to-day activities. It does not appear to violate anyone's privacy, infringe on civil liberties, or contribute to the social exclusion of groups. Some of the more structural design changes (e.g., construction of street barricades or closures, redesign of walkways, installation of windows) could evoke more resistance than some of the more mundane changes (e.g., removal or pruning of bushes in front of homes, removal of objects from store shelves or windows).

A necessary component for crime to occur, according to routine activities theory, is the absence of a capable guardian who can intervene (Cohen & Felson 1979). Security guards can provide the necessary guardianship by providing additional formal surveillance (Graham 2009). Like CCTV, however, the use of security guards in public places has also 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). Security guards cannot cover as large an area as CCTV cameras, which may act as both a benefit and a drawback to their use. The presence of a security guard can also signal to pedestrians that they are in an area that requires extra protection. However, the potential threat to privacy or other civil liberties associated with the presence of security guards may be somewhat less of a concern to the general public than CCTV, because security guards are not as invasive.

Some may express concern with parking lot attendants, bus drivers, concierges, and other place managers 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 function comes about from their presence and ability to intervene, thus presenting a deterrent threat to potential offenders. In this regard, the use of this surveillance technique may strike a fairly good balance between the public's interest in community safety and concerns over the erosion of privacy and civil liberties. More research is needed to investigate the effects of place managers on crime in public places.

Other Potential Benefits

Many of the surveillance measures examined in this article also serve other purposes in public places. For example, police may benefit from the increased apprehension of suspects who were caught on camera (Norris & McCahill 2006) or stopped on site by a security guard. Camera use in conjunction with street lighting or place managers can improve upon, or support, eyewitness accounts (Adams & Ferryman 2015).

Police safety is another potential benefit associated with CCTV. This has come about with the installation of CCTV cameras in patrol cars, and now body-worn cameras, to record the events of roadside stops, for example. These cameras provide protection to the officer but are also used to hold officers accountable to laws and department protocol (Hier & Walby 2014).

Importantly, surveillance may help increase the level of social control in communities, in addition to preventing crime. In the case of increased street lighting, more people may make use of public space because they feel safer and are less at risk of a surprise attack. This can improve the use of streets after dark, thus increasing the flow of natural surveillance (Painter 1996). These approaches provide a visible sign of investment in the community, which may further improve safety.

Finally, the use of surveillance measures is legitimized when a balance is struck between the benefits of crime reduction and the social costs associated with the techniques (Agustina & Clavell 2011, Hier & Walby 2014). It should not be assumed that only one strategy would work best in every context. Targeted surveillance strategies may be most effective in crime prevention, as well as in helping to minimize the potential social costs associated with more intensive surveillance methods.

Benefit-Cost Analysis

The monetary costs and benefits of some surveillance programs have been measured (for a review, see Welsh et al. 2015). In the most extensive analysis, Painter & Farrington (2001) compared the monetary benefits of improved street lighting, based on the reduced number of crimes, with the monetary costs. The benefits were calculated using Home Office estimates of the cost of each type of crime; these estimates took account of stolen and damaged property, pain and suffering of victims, criminal justice costs, victim and health services, and security and insurance costs. Comparing the full costs of the improved lighting with the savings in one year from fewer crimes,

the benefit-to-cost ratio was 6.2 in Dudley and 5.4 in Stoke-on-Trent. Amortizing the costs over the expected 20-year life of the lighting, and assuming that the reduced crimes in one year would be maintained in every year, the benefit-to-cost ratio was 121 in Dudley and 54 in Stoke-on-Trent.

Of course, the benefit-to-cost ratio will be greater than 1 only if the intervention is effective in reducing crimes. In the large-scale multisite CCTV evaluation by Gill & Spriggs (2005), the benefit-to-cost ratio was calculated in two effective projects. It was 1.24 in City Outskirts, based on comparing the full costs of the CCTV with the reduced crimes in one year. However, it was only 0.67 in the highly effective Hawkeye project in car parks (see **Figure 1**). This suggests that, even with an effective intervention, the monetary benefits may be less than the monetary costs. However, it must be pointed out that not only were the full costs of the CCTV compared with the benefits in one year, but also the benefits were based only on reductions in vehicle crimes. The only other benefit-cost analysis of a public surveillance program was carried out in the evaluation of place managers by Skilton (1988); the benefit-to-cost ratio in this effective project was calculated to be 1.44.

CONCLUSION

Video surveillance and CCTV cameras have moved well beyond the periphery of efforts to prevent crime in public space; they appear to be here to stay and seem likely to continue to expand in their reach and advance in their technological capabilities. This seems to be quite fine for most decision makers, as well as for a sizeable portion of Americans and citizens of other countries where cameras have gained a foothold. Reconciling this state of affairs with the research evidence on their effectiveness, as well as the social costs, may turn out to be an exercise relegated to researchers and parties concerned with privacy and constitutional protections. At least for now, there seems little appetite for considering the research evidence (see Welsh & Farrington 2009a).

This current situation takes on greater significance when one considers that there are other widely used surveillance measures that perform a crime prevention function in public places: improved street lighting, security guards, place managers, and defensible space. One of the aims of this article was to broaden the view of public area surveillance beyond the current narrow focus on CCTV; that is, these other forms of public area surveillance may be equally if not more effective than CCTV, and they may impose fewer social costs on society. This focus on alternatives should figure prominently in policy decisions on public area surveillance for crime prevention. As the best available research evidence shows, there are several sound alternatives to CCTV, conditions under which CCTV can be effective (and produce few social costs), and some instances where effectiveness is driven by some combination of different surveillance measures. This should bode well for supporters of public area surveillance and those concerned with preventing crime.

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