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Effects of Closed Circuit Television Surveillance on Crime

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Colophon

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Campbell Systematic Reviews

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Cover sheet

Title

Effects of Closed Circuit Television Surveillance on Crime

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Text of Review

Synopsis

Closed circuit television (CCTV) surveillance cameras serve many functions and are used in both public and private settings. The prevention of personal and property crime is among the primary objectives in public space, which is the main focus of this review. CCTV is viewed as a technique of "formal surveillance" and in this regard it is seen to enhance or take the place of security personnel. Results of this review indicate that CCTV has a modest but significant desirable effect on crime, is most effective in reducing crime in car parks, is most effective when targeted at vehicle crimes (largely a function of the successful car park schemes), and is more effective in reducing crime in the United Kingdom than in other countries. These results lend support for the continued use of CCTV to prevent crime in public space, but suggest that it be more narrowly targeted than its present use would indicate. Future CCTV schemes should employ high-quality evaluation designs with long follow-up periods.

Abstract

Background

In recent years, there has been a marked and sustained growth in the use of CCTV to prevent crime in public space in the U.K., United States, and other Western nations. In the U.K., CCTV is the single most heavily funded crime prevention measure operating outside of the criminal justice system. A key issue is how far funding for CCTV has been based on high quality scientific evidence demonstrating its efficacy in preventing crime. There is concern that this funding has been based partly on a handful of apparently successful schemes that were usually evaluated with less than rigorous designs, done with varying degrees of competence, and done with varying degrees of professional independence from government. Recent reviews that have examined the effectiveness of CCTV against crime have also noted the need for high quality, independent evaluation research.

Objectives

The main objective of this review is to assess the available research evidence on the effects of CCTV surveillance cameras on crime in public space. In addition to assessing the overall impact of CCTV on crime, this review will also investigate in which settings, against which crimes, and under what conditions it is most effective.

Search strategy

Four search strategies were employed to identify studies meeting the criteria for inclusion in this review: (1) searches of electronic bibliographic databases; (2) searches of literature reviews on the effectiveness of CCTV in preventing crime; (3) searches of bibliographies of CCTV studies; and (4) contacts with leading researchers. Both published and

unpublished reports were considered in the searches. Searches were international in scope and were not limited to the English language.

Selection criteria

Studies that investigated the effects of CCTV on crime were included. For studies involving one or more other interventions, only those studies in which CCTV was the main intervention were included. Studies were included if they had, at a minimum, an evaluation design that involved before-and-after measures of crime in experimental and control areas. There needed to be at least one experimental area and one reasonably comparable control area.

Data collection & analysis

Narrative findings are reported for the 44 studies included in this review. A meta-analysis of 41 of these 44 studies was carried out; the requisite crime data was missing in other 3 studies. The "relative effect size" or RES (which can be interpreted as an incident rate ratio) was used to measure effect size. Results are reported for total crime and, where possible, property and violent crime categories using (mostly) official data. In the case of studies that measure the impact of CCTV programs on crime at multiple points in time, similar time periods before and after are compared (as far as possible). The review also reports on displacement of crime and diffusion of crime prevention benefits.

Main results

The studies included in this systematic review indicate that CCTV has a modest but significant desirable effect on crime, is most effective in reducing crime in car parks, is most effective when targeted at vehicle crimes (largely a function of the successful car park schemes), and is more effective in reducing crime in the U.K. than in other countries.

Reviewers' conclusions

We conclude that CCTV surveillance should continue to be used to prevent crime in public space, but that it be more narrowly targeted than its present use would indicate. Future CCTV schemes should employ high-quality evaluation designs with long follow-up periods.

Background

Closed circuit television (CCTV) surveillance cameras serve many functions and are used in both public and private settings. The prevention of personal and property crime is among the primary objectives in public space. As an intervention targeted at crime, CCTV is a type of situational crime prevention (Clarke 1995). According to Cornish and Clarke's (Cornish 2003) classification of situational crime prevention, CCTV is viewed

as a technique of "formal surveillance." In this regard, CCTV cameras are seen to enhance or take the place of security personnel.

It is argued that CCTV (especially if well publicized) may prevent crime because potential offenders are deterred by their increased subjective probability of detection. Also, CCTV may increase the true probability of detection, may increase pedestrian usage of places and hence further increase the subjective probability, may encourage potential victims to take security precautions, and may direct police and security personnel to intervene to prevent crime (Armitage1999, 226-227). Another possibility is that CCTV could signal improvements in the area and hence increase community pride, community cohesion, and informal social control.

CCTV could also cause crime to increase. For example, it could give potential victims a false sense of security and make them more vulnerable because they relax their vigilance or stop taking precautions, such as walking in groups at night and not wearing expensive jewelry. It may encourage increased reporting of crimes to the police and increased recording of crimes by the police. CCTV may also cause crime to be displaced to other locations, times, or victims.

In recent years, there has been a marked and sustained growth in the use of CCTV surveillance cameras to prevent crime in public places in many Western nations. This growth in CCTV has come with a huge price tag. In the U.K., CCTV continues to be the single most heavily funded crime prevention measure operating outside of the criminal justice system. It is estimated that more than £250 million (approximately $500 million) of public money was spent on CCTV over the ten-year period of 1992 to 2002 (McCahill 2002). This figure could very well be an underestimate. For example, between 1999 and 2001 alone, the British government made available £170 million (approximately $340 million) for "CCTV schemes in town and city centres, car parks, crime hot-spots and residential areas" (Home Office Policing and Reducing Crime Unit 2001, 8). Over the last decade, CCTV accounted for more than three-quarters of total spending on crime prevention by the British Home Office (Koch 1998, 49; Reuters 2007).

During this time there has been much debate about the effectiveness of CCTV to prevent crime and, hence, on the wisdom of spending such large sums of money. A key issue is how far funding for CCTV in the U.K. has been based on high quality scientific evidence demonstrating its efficacy in preventing crime. There is concern that this funding has been based partly on a handful of apparently successful schemes that were usually evaluated using simple one group (no control group) before-after designs, done with varying degrees of competence (Armitage 1999, 226), and done with varying degrees of professional independence from the Home Office (Ditton 1999, 202). Recent reviews that have examined the effectiveness of CCTV against crime (Eck 2006; Nieto 1997; Phillips 1999; Poyner 1993; Ratcliffe 2006) have also noted the need for high quality, independent evaluation research.

Objectives

The main objective of this review is to assess the available research evidence on the effects of CCTV surveillance cameras on crime in public space. In addition to assessing the overall impact of CCTV on crime, this review will also investigate in which settings (e.g., city and town centers, car parks), against which crimes, and under what conditions it is most effective.

Criteria for considering studies for this review

Types of studies

Studies were included if they had, at a minimum, an evaluation design that involved before-and-after measures of crime in experimental and control areas. There needed to be at least one experimental area and one reasonably comparable control area. The unit of interest is areas.

Types of interventions

CCTV is the focus of the intervention. For studies involving one or more other interventions, only those studies in which CCTV was the main intervention were included. The determination of the main intervention was based on the study author identifying it as such or, if the author did not do this, the importance of CCTV relative to the other interventions.

Types of outcome measures

Studies had to include at least one outcome of crime. Where applicable, crime outcome data is reported separately for two main categories: official records (police reports or emergency department records) and unofficial measures (victim survey or self-report survey).

The total number of crimes in each area before the intervention needed to be at least 20. The main measure of effect size (see below) is based on changes in numbers of crimes between the before and after time periods. A minimum of 20 crimes in the before period was set because it was considered that a measure of change based on an N below 20 was potentially misleading. Also, any study with less than 20 crimes before would have insufficient statistical power to detect changes in crime. (The criterion of 20 is probably too low, but we are reluctant to exclude studies unless their numbers are clearly inadequate.)

Search strategy for identification of studies

Four search strategies were employed to identify studies meeting the criteria for inclusion in this review: (1) searches of electronic bibliographic databases; (2) searches of literature

reviews on the effectiveness of CCTV in preventing crime; (3) searches of bibliographies of CCTV studies; and (4) contacts with leading researchers.

Both published and unpublished reports were considered in the searches. Searches were international in scope and were not limited to the English language.

The search strategies were carried out in two waves. In the first wave, search strategies (1) to (4) were completed in January 2001 and reflect material published or known up to December 31, 2000. In the second wave, search strategies (1) to (4) were completed in April 2007 and reflect material published or known between January 2001 and December 2006.

In the first wave, the following electronic bibliographic databases were searched:

Criminal Justice Abstracts
NCJRS (National Criminal Justice Reference Service) Abstracts
Sociological Abstracts
SocialSciAbs (Social Science Abstracts)
ERIC (Educational Resources Information Clearinghouse)
GPO Monthly (Government Printing Office Monthly)
PsychInfo (Psychology Information)
PAIS International (Public Affairs Information Service)
Dissertation Abstracts
CINCH (Australian Criminology Database)
C2-SPECTR (Campbell Collaboration Social, Psychological, Educational & Criminological Trials Register)

In the second wave, the following electronic bibliographic databases were searched:

Criminal Justice Abstracts
NCJRS (National Criminal Justice Reference Service) Abstracts
Sociological Abstracts
ERIC (Educational Resources Information Clearinghouse)
GPO Monthly (Government Printing Office Monthly)
PsychInfo (Psychology Information)
Dissertation Abstracts
C2-SPECTR (Campbell Collaboration Social, Psychological, Educational & Criminological Trials Register)
Google Scholar
Medline

In the second wave, three databases, Social Science Abstracts (SocialSciAbs), Public Affairs Information Service (PAIS) International, and the Australian Criminology Database (CINCH), which were used in the first wave, were not used because they were no longer available to the researchers. In their place, two new electronic databases were searched: Google Scholar and Medline.

In both waves the following terms were used to search the databases: 'closed circuit television', 'CCTV', 'cameras', 'social control', 'surveillance', and 'formal surveillance'. When applicable, 'crime' was added to each of these terms (e.g., 'CCTV and crime') to narrow the search parameters.

The following literature reviews on the effectiveness of CCTV in preventing crime were consulted: Eck (1997; 2006), Gill (2006), Nieto (1997), Phillips (1999), Poyner (1993), Ratcliffe (2006), and Wilson (2003).

Method of the review

SELECTION OF EVALUATION STUDIES

The search strategies (over the 2 periods of time) resulted in the identification of 94 evaluations. Two of these studies (Berkowitz 1975; Northumbria Police n.d.), which may or may not have met the criteria for inclusion, could not be obtained. Repeated attempts were made to obtain these studies. Of the 92 evaluation studies, 44 met the criteria for inclusion and 48 did not and thus were excluded. Forty-one of the 44 studies could be used in the meta-analysis. Effect sizes could not be calculated for 3 studies because numbers of crimes were not reported in Squires (1998a), Williamson (2000), and (for the control area) Sarno (1996). Repeated attempts were made to obtain the needed data.

Table 1 lists the 48 evaluations that did not meet the criteria for inclusion in this review, summarizes their key features, and identifies the reasons for exclusion. The reasons for discussing these evaluations here are two-fold: first, it conforms with the widely-held practice in systematic reviews of listing excluded studies and second, it allows readers to judge for themselves the strength of observed effects in excluded evaluations compared with those included.

As shown in Table 1, the majority of the 48 evaluations that were excluded from the review were because no control area was used in evaluating the impact of the intervention. Many suggested that CCTV was followed by a decrease in crime, but the low level of internal validity of these studies (together with other methodological problems) means that we cannot have confidence in their results.

ASSESSMENT OF METHODOLOGICAL QUALITY

For each study, we assessed methodological quality against one main characteristic: the presence of a reasonably comparable control area. In addition, the study had to report the number of crimes before and after in experimental and control areas.

DATA SYNTHESIS

The following characteristics of the 44 included studies were retrieved and retained for examination as potential moderators of study outcomes and are listed in tables of included studies (Tables 2, 3, 4, 5, and 6):
1) author, publication date, and location: the authors and dates of relevant evaluation reports and the location of the program are identified
2) context of intervention: this is defined as the physical setting in which the CCTV intervention took place
3) CCTV cameras: the number of CCTV surveillance cameras in operation and any special technological features of the cameras (e.g. infrared, pan, tilt, or zoom capability) are identified
4) monitoring: how (i.e. active or passive) and by whom (e.g., police, private security) the CCTV cameras are monitored is identified
5) duration of intervention: the length of time the program was in operation is identified
6) sample size: the number and any special features of the experimental and control areas is identified
7) coverage: the coverage area of CCTV surveillance cameras is identified
8) other interventions: interventions other than CCTV that were employed at the time of the program are identified
9) outcome measure and data source: crime is the main outcome measure of interest to the review. The specific crime types and the data source of the outcome measure (e.g. police records, victim survey) are identified. Other (secondary) outcomes are also examined if reported
10) research design: the type of evaluation design used to assess the program's impact on crime is identified. If matching or other statistical analysis techniques are used as part of the evaluation of program effects, these are noted
11) before-after time period: the before and after time periods of the evaluation are identified

As noted above, the main outcome measure of interest to this review is crime, specifically, property and violent crimes. In summarizing results, the focus is on the main outcome of interest to this review and comparisons between experimental and control areas (see below for more details). Results are reported for total crime and, where possible, property and violent crime categories. In the case of studies that measure the impact of CCTV programs on crime at multiple points in time, similar time periods before and after (e.g. 12 months) are compared (as far as possible).

The review also reports on displacement of crime and diffusion of crime prevention benefits. Displacement is often defined as the unintended increase in crimes in other locations following from the introduction of a crime reduction scheme. Six different forms of displacement have been identified: temporal (change in time), tactical (change in method), target (change in victim), territorial (change in place), functional (change in type of crime), and perpetrator (Reppetto 1976; Barr 1990). Diffusion of benefits is often defined as the unintended decrease in crimes in other locations following from a crime reduction scheme, or the "complete reverse" of displacement (Clarke 1994). In order to investigate territorial displacement and diffusion of benefits, the minimum design involves one experimental area, one adjacent area, and one non-adjacent control area. If

crime decreased in the experimental area, increased in the adjacent area, and stayed constant in the control area, this might be evidence of displacement. If crime decreased in the experimental and adjacent areas and stayed constant or increased in the control area, this might be evidence of diffusion of benefits.

DATA SYNTHESIS

A meta-analysis is carried out in order to estimate the average effect size in evaluations of the effects of CCTV on crime. In order to complete a meta-analysis, a comparable effect size is needed in each evaluation, together with its variance. This has to be based on the number of crimes in experimental and control areas in time periods (most commonly of 12 months) before and after the intervention, because this is the only information that is regularly provided in all the evaluations.

While studies based on police records can present time series data, studies based on victim surveys usually have data only for one time period before the intervention and one time period after. Because of the problem that the intervention may cause more reporting to police and recording by police, it is important to analyze both police and victim survey data.

The "relative effect size" or RES (which can be interpreted as an incident rate ratio) is used to measure effect size. The RES is calculated from the following table:

	Before	After
Experimental	a	b
Control	c	d

Where a, b, c, d are numbers of crimes

RES = a*d/b*c

In calculating the weighted mean effect size for all or a subset of the studies, the effect size is inversely weighted according to the variance of each study, as specified in Lipsey and Wilson (Lipsey 2001). Also, in calculating an average effect size for all or a subset of the studies, statistical tests are carried out to assess if the individual effect sizes were randomly distributed around the average effect size (or if there is heterogeneity). Moderators that predict effect sizes are investigated (where available).

The RES is intuitively meaningful because it indicates the relative change in crimes in the control area compared with the experimental area. RES = 2 indicates that d/c (control after/control before) is twice as great as b/a (experimental after/experimental before). This value could be obtained, for example, if crimes doubled in the control area and stayed constant in the experimental area, or if crimes decreased by half in the experimental area and stayed constant in the control area, or in numerous other ways.

The variance of the RES is usually calculated from its natural logarithm LRES:

$$VAR(LRES) = 1/a + 1/b + 1/c + 1/d$$

In this review, we use LRES, the natural logarithm of RES, and refer to VAR (LRES). This calculation of VAR (LRES) is based on the assumption that crimes occur at random, according to a Poisson process. This assumption is plausible because 30 years of mathematical models of criminal careers have been dominated by the assumption that crimes can be accurately modeled by a Poisson process (Piquero 2003). In a Poisson process, the variance of the number of crimes is the same as the number of crimes. However, the large number of changing extraneous factors that influence the number of crimes may cause overdispersion; that is, where the variance of the number of crimes VAR exceeds the number of crimes N.

$$D = VAR/N$$

specifies the overdispersion factor. Where there is overdispersion, V(LRES) should be multiplied by D. Farrington (2007b) estimated VAR from monthly numbers of crimes and found the following equation:

$$D = .0008 * N + 1.2$$

D increased linearly with N and was correlated .77 with N. The mean number of crimes in an area in the CCTV studies was about 760, suggesting that the mean value of D was about 2. However, this is an overestimate because the monthly variance is inflated by seasonal variations, which do not apply to N and VAR. Nevertheless, in order to obtain a conservative estimate, V(LRES) calculated from the usual formula above was multiplied by D (calculated from the above equation) in all cases. Specifically,

$$V(LRES) = Va/a^2 + Vb/b^2 + Vc/c^2 + Vd/d^2$$

where $Va/a = .0008 * a + 1.2$

This is our best available estimate of the degree of overdispersion in area-based crime prevention studies. This adjustment corrects for overdispersion within studies but not for heterogeneity between studies.

Description of studies

Forty-one of the 44 CCTV evaluations were carried out in 4 main settings: city and town centers; public housing; public transport; and car parks. The remaining 3 CCTV evaluations were carried out in residential areas (n=2) and a hospital.

City and town centers

Twenty-two evaluations met the criteria for inclusion and were carried out in city and town centers. Seventeen of these were carried out in the U.K., 3 in the U.S., 1 in Sweden, and 1 in Norway (see Table 2). Only some of the studies reported the coverage of the CCTV cameras. For example, in the Newcastle-upon-Tyne and Malmö studies, camera coverage of the target or experimental area was 100%. Many more studies reported the number of cameras used and their features (e.g., pan, tilt, zoom). Information on camera coverage is important because if a large enough section of the target area or even high crime locations in the target area are not under surveillance the impact of CCTV may be reduced.

Most of the evaluations that reported information on the monitoring of the cameras used active monitoring, meaning that an operator watched monitors linked to the cameras in real time. Passive monitoring involves watching tape recordings of camera footage at a later time. In some of the schemes, such as Newcastle and Birmingham, active monitoring was carried out by police, but more often it was carried out by security personnel who had some form of communication link with police (e.g., by a one-way radio, direct line telephone).

On average, the follow-up period in the 22 evaluations was 15 months, ranging from a low of 3 months to a high of 60 months. Six programs included other interventions in addition to the main intervention of CCTV. For example, in the Doncaster program 47 'help-points' were established within the target area to aid the public in contacting the main CCTV control room. Four other studies used notices of CCTV to inform the public that they were under surveillance, but CCTV notices do not necessarily constitute a secondary intervention. A couple of the evaluations used multiple experimental areas (e.g., police beats), meaning that the CCTV intervention was quite extensive in the city or town center. Multiple control areas (e.g., adjacent police beats, the remainder of the city) were used in many more of the evaluations. Where control and adjacent areas were used, we analyzed control areas.

Public housing

Nine evaluations were carried out in public housing. Seven were carried out in the U.K. and 2 in the U.S. (see Table 3). Camera coverage ranged from a low of 9% (in Dual Estate) to a high of 87% (in Northern Estate) in the 6 evaluations that reported this information. Active monitoring was used in all of the schemes, with monitoring in the Brooklyn evaluation conducted by police. In the 6 British schemes evaluated by Gill and Spriggs (Gill 2005) security personnel who monitored the cameras had some form of communication link with police (i.e., a one-way or two-way radio). On average, the follow-up period in the 9 evaluations was 12 months, ranging from a low of 3 months to a high of 18 months. Only 3 schemes included other interventions in addition to the main intervention of CCTV. These involved improved lighting and youth inclusion projects.

Public transport

Four evaluations were carried out in public transportation systems. All of them were conducted in underground railway systems: 3 in the London Underground and 1 in the Montreal Metro (see Table 4). None of the studies reported on the percentage of the target areas covered by the cameras, but most did provide information on the number of cameras used. For example, in the Montreal program a total of 130 cameras (approximately 10 per station) were installed in the experimental stations. Each of the schemes involved active monitoring on the part of police; in the London Underground this meant the British Transport Police.

With the exception of the Montreal program, each evaluation included other interventions in addition to CCTV. In the first Underground scheme, special police patrols were in operation prior to the installation of CCTV. For the 2 other Underground schemes, some of the other interventions included passenger alarms, kiosks to monitor CCTV, and mirrors. For each of these 3 Underground schemes, CCTV was, however, the main intervention. The follow-up periods ranged from a low of 12 months to a high of 32 months.

Car parks

Six CCTV evaluations met the criteria for inclusion and were conducted in car parks. All of the programs were implemented in the U.K. between the early 1980s and early 2000s (see Table 5). Camera coverage was near 100% in the 2 schemes that reported on it. All of the schemes, with the exception of one that did not provide data, involved active monitoring on the part of security staff. The large-scale, multi-site Hawkeye scheme also included a radio link with the British Transport Police.

Each of the programs supplemented CCTV with other interventions, such as improved lighting, painting, fencing, payment schemes, and security personnel. In Coventry, for example, improved lighting, painting, and fencing were also part of the package of measures implemented to reduce vehicle crimes. In each program, however, CCTV was the main intervention. The follow-up periods ranged from a low of 10 months to a high of 24 months.

Other settings

As noted above, 3 of the 44 included evaluations took place in other public settings: 2 in residential areas and 1 in a hospital. It was considered necessary to categorize these 3 schemes separately from the others because of the differences in the settings in which these 3 schemes were implemented as well as their small numbers. Table 6 provides information on the key characteristics of these CCTV evaluations (all of which took place in the U.K.).

There were some notable differences between the 2 residential schemes. The City Outskirts scheme was implemented in an economically depressed area on the outskirts of a Midlands city, while the Borough scheme was implemented throughout a southern borough of mixed affluence. Camera coverage was quite good in City Outskirts (68%),

but not so in Borough. Gill and Spriggs (Gill 2005) noted that this was due in large measure to the use of redeployable cameras in Borough, while fixed cameras were used in City Outskirts. Other interventions were used in City Outskirts, but not in Borough.

Some of the city hospital's distinguishing features included camera coverage being quite good (76%), active monitoring was used, there was a direct line between the camera operators and police, and other interventions were implemented, including improved lighting and police operations.

Methodological quality of included studies

ASSESSMENT OF METHODOLOGICAL QUALITY

1. Did the investigators report on the presence of a reasonably comparable control area?

In each evaluation study included in this review, the control area needed to be at minimum reasonably comparable to the area in which the intervention was implemented (experimental area). The term 'reasonably' is used because in some cases investigators did not provide sufficient detail to allow for a determination that the experimental and control areas were comparable on the most important dimensions (e.g. crime rates, age of population, unemployment rates, poverty rates), but there was enough information to conclude that the two areas were somewhat comparable (beyond the investigators saying so without providing data to support their assertion).

The control area could take the form of an adjacent or nonadjacent area, but ideally it would not be adjacent to the experimental area. This is because of the potential for program contamination, from the experimental area to the adjacent area. In those studies that reported multiple control areas, the nonadjacent area was used. In a few of the evaluation studies, statistical analyses were used to equate the experimental and control areas.

Results

NARRATIVE FINDINGS FROM THE STUDIES

City and town centers

As shown in Table 2, the city and town center CCTV evaluations showed mixed results in their effectiveness in reducing crime. Ten of the 22 evaluations were considered to have a desirable effect on crime, 5 were considered to have an undesirable effect, and 1, the multi-site British evaluation by Sivarajasingam (2003), was considered to have both (desirable effects according to emergency department admissions and undesirable effects according to police records). However, Sivarajasingam and colleagues argue that an increase in police recording consequent on CCTV installation was desirable because it was evidence that the police were finding out about a higher proportion of violence than previously, getting officers to the scene rapidly, and preventing injury serious enough to

require hospital treatment, which explains the very desirable intervention effect of less hospital treatment. The remaining 6 evaluations were considered to have a null (n=5) or uncertain (n=1) effect on crime. Schemes usually showed evidence of no displacement rather than displacement or diffusion of benefits.

In the program evaluated by Armitage (1999), an unknown number of cameras were installed in the town center of Burnley, England. The experimental area consisted of police beats in the town center with CCTV coverage. Two control areas were used. The first comprised those police beats that shared a common boundary with the beats covered by CCTV. The second control area consisted of other police beats in the police division. The first control area was more comparable to the experimental area. After 12 months, the experimental area, compared with the two control areas, showed substantial reductions in violent crime, burglary, vehicle crime, and total crime. For example, total incidents of crime fell by 28% in the experimental area compared with a slight decline of 1% in the first control area and an increase of 10% in the second control area. The authors found evidence of diffusion of benefits for the categories of total crime, violent crime, and vehicle crime, and evidence of territorial displacement for burglary.

In the program evaluated by Farrington (2007b), 30 cameras were installed in the city center of Cambridge, England. The control area was a secondary city center shopping area where there were no cameras on the streets. Comparing 11 months after the cameras were installed with the comparable 11-month period before, police-recorded crimes had decreased by 14% in the experimental area, but by 27% in the control area. Hence, there was an undesirable effect of CCTV on police-recorded crimes. Violent crimes (assault and robbery) also decreased more in the control area, while vehicle crimes (theft of and from vehicles) decreased equally in the experimental and control areas. Interviews were also carried out with quota samples of persons in the areas before and after the CCTV installation, asking them about their victimization (insulted or bothered, threatened, assaulted, or mugged) in the previous 12 months. The percentage victimized increased from 26% to 29% in the experimental area and from 11% to 14% in the control area, suggesting that the installation of CCTV had no effect on victimization. These results suggested that CCTV may have had no effect on crime but may have caused increased reporting to and/or recording by the police.

Public housing

As shown in Table 3, the public housing CCTV evaluations showed mixed results in their effectiveness in reducing crime. Three of the 9 evaluations were considered to have a desirable effect on crime, 2 had an undesirable effect, 3 had an uncertain effect, and 1 had a null effect. Only 5 schemes measured diffusion or displacement, and in each case it was reported that displacement did not occur.

Public Transport

Overall, CCTV programs in public transportation systems present conflicting evidence of effectiveness: 2 had a desirable effect, 1 had no effect, and 1 had an undesirable effect on

crime (see Table 4). However, for the 2 effective programs in the London Underground (southern sector and northern line), the use of other interventions makes it difficult to say with certainty that it was CCTV that caused the observed crime reductions, although in the first of these programs CCTV was more than likely the cause. In the second effective program, which included special police and Guardian Angels patrols, the words of the authors are instructive:

> it seems likely that robbery has been kept down by improved management and staffing of the system, including more revenue protection as well as station staff. The policing changes may also have been helpful. It is also possible that the substantial physical work involved in station modernisation and the introduction of automatic ticket barriers in central area stations contributed by creating the impression of a more controlled and safer environment. (Webb 1992, 11)

Only 2 of the studies measured diffusion of benefits or displacement, with one showing evidence of diffusion and the other showing evidence of displacement.

Car parks

Table 5 shows that 5 of the car park programs had a desirable effect and 1 had an undesirable effect on crime, with vehicle crimes being the exclusive focus of 5 of these evaluations. Tilley (1993) evaluated 3 CCTV programs in car parks in the following cities: Hartlepool, Bradford, and Coventry. Each scheme was part of the British Government's Safer Cities Programme, a large-scale crime prevention initiative that operated from the late 1980s to mid-1990s. In Hartlepool, CCTV cameras were installed in a number of covered car parks and the control area included a number of 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. Twenty-four months 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. Tilley (1993, 9) concluded that, "The marked relative advantage of CCTV covered parks in relation to theft of cars clearly declines over time and there are signs that the underlying local trends [an increase in car thefts] begin to be resumed". The author suggested that the displacement of vehicle thefts from covered to non-covered car parks may have been partly responsible for this.

In the program evaluated by Sarno (1996), in the London Borough of Sutton, CCTV cameras were installed in 3 car parks (the experimental area) in one part of the borough's police sector at high risk of vehicle crimes. Two control areas were established: the remainder of the borough's police sector and all of Sutton. The first control area was considered to be comparable to the experimental area. The program was evaluated after its first 12 months of operation. Total vehicle crimes ("theft of, theft from, criminal damage to, unauthorised taking of vehicles and vehicle interference") were reduced by 57% in the experimental area, with slightly smaller reductions (36% and 40%) reported in the control areas where CCTV was not implemented. It is important to note that vehicle

crimes were going down in the U.K. generally during this time period. Most studies, Sutton included, did not measure either diffusion of benefits or displacement.

Other settings

As shown in Table 6, evaluations of the 2 residential schemes found contrasting effects on crime: a significant desirable effect in City Outskirts (a 25% decrease) and a nearly significant undesirable effect in Borough (a 25% increase). The one evaluation of CCTV implemented in a city hospital showed that it produced a desirable but nonsignificant effect on crime.

META-ANALYSIS

Setting

City and town centers. In pooling the data from the 20 studies for which effect sizes could be calculated, there was evidence that CCTV led to a small but nonsignificant reduction in crime in city and town centers. The weighted mean effect size was an RES of 1.08, which corresponds to a 7% reduction in crimes in experimental areas compared with control areas. However, when these 20 studies were disaggregated by country, the 15 U.K. studies showed a slightly larger effect on crime (a 10% decrease), while the five others showed no effect on crime (see Table 7).

An analysis of heterogeneity showed that the 20 effect sizes were significantly heterogeneous ($Q = 143.9$, $df = 19$, $p < .0001$). This means that they were not randomly distributed about the average effect size. The 15 U.K. studies were also significantly heterogeneous ($Q = 118.6$, $df = 14$, $p < .0001$), as were the 5 other studies ($Q = 14.02$, $df = 4$, $p = .007$). Therefore, random effects models were used in calculating weighted mean effect sizes.

Public housing. In pooling the data from the 8 studies for which effect sizes could be calculated, there was evidence that CCTV led to a small but nonsignificant reduction in crime in public housing. The weighted mean effect size was an RES of 1.07, which corresponds to a 7% reduction in crimes in experimental areas compared with control areas (see Table 8). The 8 effect sizes were significantly heterogeneous ($Q = 47.94$, $df = 7$, $p < .0001$). Therefore, a random effects model was used to calculate weighted mean effect sizes.

Public transport. Table 9 shows the results of a meta-analysis of the CCTV evaluations in public transport settings. In pooling the data from the 4 studies, there was evidence that CCTV led to a sizeable but nonsignificant reduction in crime in public transport. The weighted mean effect size was an RES of 1.30, which corresponds to a 23% reduction in crimes in experimental areas compared with control areas. The substantial reduction in robberies and thefts in the first Underground evaluation (an overall 61% decrease) was the main reason for this large average effect size over all 4 studies. The 4 effect sizes were significantly heterogeneous ($Q = 30.94$, $df = 3$, $p < .0001$).

Car parks. As shown in Table 10, the RESs showed a significant and desirable effect of CCTV for 5 of the schemes. In the other scheme (Guildford), the effect was undesirable, but the small number of crimes measured in the before and after periods meant that the RES was not significant. When all 6 effect sizes were combined, the overall RES was 2.03, meaning that crime decreased by half (51%) in experimental areas compared with control areas. The 6 effect sizes were significantly heterogeneous ($Q = 31.93$, $df = 5$, $p < .0001$).

Crime type

The major crime types that were reported were violence (including robbery) and vehicle crimes (including thefts of and from vehicles). Violence was reported in 23 evaluations, but CCTV had a desirable effect in reducing violence in only 3 cases (Airdrie, Malmö, and Shire Town). Overall, there was no effect of CCTV on violence (RES = 1.03) (see Table 10). The 23 effect sizes were not significantly heterogeneous ($Q = 30.87$, $df = 22$, n.s.), so a fixed effects model was used to calculate weighted mean effect sizes.

Vehicle crimes were reported in 22 evaluations, and CCTV had a desirable effect in reducing them in 10 cases: in 5 of the 6 car park evaluations (all except Guildford), in 3 city or town center evaluations (Burnley, Gillingham, and South City), and in City Outskirts and City Hospital. As shown in Table 10, over all 22 evaluations CCTV reduced vehicle crimes by 26% (RES = 1.35). The 22 effect sizes were significantly heterogeneous ($Q = 115.1$, $df = 21$, $p < .0001$). The greatest effect was in the large-scale, multi-site Hawkeye study, but there was a significant effect even if this study was excluded (RES = 1.28, corresponding to a 22% decrease in crimes).

Country comparison

Of the 41 evaluations that were included in the meta-analysis, the overwhelming majority of them were carried out in the U.K. (n=34). Four were from the U.S. and one each from Canada, Norway, and Sweden. As shown in Table 10, when the pooled meta-analysis results were disaggregated by country, there was evidence that the use of CCTV to prevent crime was more effective in the U.K. than in other countries. In the British studies, CCTV had a significant desirable effect, with an overall 19% reduction in crime (RES = 1.24). The British studies were significantly heterogeneous ($Q = 350.5$, $df = 33$, $p < .0001$). In the other studies, CCTV showed no desirable effect on crime (RES = 0.97). The other studies were also significantly heterogeneous ($Q = 14.51$, $df = 6$, $p = .024$). Importantly, the significant results for the British studies were largely driven by the effective programs in car parks.

Pooled effects

Figure 1 summarizes the results of the 41 studies in a forest graph. This shows the RES for total crime measured in each study plus its 95% confidence interval. The 41 studies are ordered according to magnitudes of their RESs. It can be seen that more than one-

third (n=15) showed evidence of a desirable effect of CCTV on crime, with RESs of 1.34 or greater (from City Outskirts upward, not including City Hospital). Fourteen of the 15 effective studies were carried out in the U.K.; 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. The overall RES of 1.19 indicates a modest but significant 16% reduction in the crime rate in these 41 studies. The 41 CCTV evaluation studies were significantly heterogeneous in their effect sizes (Q = 389.5, df = 40, $p < .0001$).

Moderator analysis

In order to test whether variations in effect size across categories are statistically significant, it is necessary to calculate the homogeneity between groups or QB (Lipsey 2001: 135-38). QB is distributed approximately as chi-squared.

CCTV was found to be more effective in reducing crime in car parks than in the other 3 settings (city and town centers, public housing, and public transport). For the 4 settings, QB = 121.12 (df = 3, $p < .0001$). Therefore, effect size varies significantly across the 4 settings.

CCTV was found to be more effective in reducing crime in UK city and town centers than in other country city and town centers. For UK versus non-UK in city and town centers, QB = 11.22 (df = 1, p = .0008).

CCTV was found to be more effective in reducing vehicle crimes than violent crimes. For vehicle versus violent crimes, QB = 55.54 (df = 1, $p < .0001$). As noted above, the greatest effect on vehicle crimes was in the large-scale, multi-site Hawkeye study. CCTV was still found to be more effective in reducing vehicle crimes than violent crimes when the Hawkeye study was removed. For vehicle (minus Hawkeye) versus violent crimes, QB = 28.13 (df = 1, $p < .0001$).

CCTV was found to be more effective in reducing crime in the UK than in other countries. For UK versus other countries, QB = 24.55 (df = 1, $p < .0001$).

Discussion

A number of targeted and comprehensive searches of the published and unpublished literature and contacts with leading researchers produced 44 CCTV evaluations that met our criteria for inclusion in this review; 48 evaluations did not meet the inclusion criteria (mainly because they had no control condition) and were excluded. The criteria for inclusion called for CCTV programs that employed rigorous evaluation designs to assess effects on crime, with the minimum design involving before-and-after measures of crime in experimental and comparable control areas.

The studies included in this systematic review indicate that CCTV has a modest but significant desirable effect on crime, is most effective in reducing crime in car parks, is

most effective when targeted at vehicle crimes (largely a function of the successful car park schemes), and is more effective in reducing crime in the U.K. than in other countries. Across the 44 studies, mixed results were found for territorial displacement of crime and diffusion of crime prevention benefits.

Limitations

Studies were included in this review if they had, at a minimum, an evaluation design that involved before-and-after measures of crime in experimental and (reasonably) comparable control areas. Most of the 44 included studies used a control area that was comparable to the experimental area. According to Cook and Campbell (Cook 1979) and Shadish, Cook, and Campbell (Shadish 2002), this is the minimum design that is interpretable. This design can rule out many threats to internal validity, including history, maturation/trends, instrumentation, testing effects, and differential attrition. The main problems with it center on selection effects and regression to the mean (because of the non-equivalence of the experimental and control areas).

The randomized controlled experiment is considered the "gold standard" in evaluation research designs. It is the most convincing method of evaluating crime prevention programs (Farrington 2006). There have been many area-based studies that have employed randomized experimental designs (e.g., on hot spots policing; Braga 2005), but no experiment has yet been conducted to investigate the effects of CCTV on crime.

Reviewers' conclusions

Implications for practice

Exactly what the optimal circumstances are for effective use of CCTV schemes is not entirely clear at present, and this needs to be established by future evaluation research (see below). But it is important to note that the success of the CCTV schemes in car parks was mostly limited to a reduction in vehicle crimes (the only crime type measured in 5 of the 6 schemes) and camera coverage was high for those evaluations that reported on it. In the national British evaluation of the effectiveness of CCTV, Farrington (2007b) found that effectiveness was significantly correlated with the degree of coverage of the CCTV cameras, which was greatest in car parks. Furthermore, all 6 car park schemes included other interventions, such as improved lighting and security guards. It is plausible to suggest that CCTV schemes with high coverage and other interventions and targeted on vehicle crimes are effective.

Conversely, the evaluations of CCTV schemes in city and town centers and public housing measured a much larger range of crime types and only a small number of studies involved other interventions. These CCTV schemes, as well as those focused on public transport, did not have a significant effect on crime.

Implications for research

Advancing knowledge about the crime reduction benefits of CCTV schemes should begin with attention to the methodological rigor of the evaluation designs. The use of a reasonably comparable control group by all of the 44 included evaluations went some way towards ruling out some of the major threats to internal validity, such as selection, maturation, history, and instrumentation. The effect of CCTV on crime can also be investigated after controlling (e.g. in a regression equation) not only for prior crime but also for other community-level factors that influence crime, such as neighborhood poverty and poor housing. Another possible research design is to match two areas and then to choose one at random to be the experimental area. Of course, several pairs of areas would be better than only one pair.

Also important is attention to methodological problems or to changes in 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) (see Farrington 2003). For some of the included evaluations, small numbers of crimes made it difficult to determine whether or not the program had an effect on crime. It is essential to carry out statistical power analyses before embarking on evaluation studies (Cohen 1988). 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. A long time series of observations is needed to investigate this. The contamination of control areas (that is, by the CCTV intervention) was another, albeit less common, problem that faced the evaluations.

There is also the need for longer follow-up periods to see how far the effects persist. Of the 44 included schemes, many were in operation for 12 months or less prior to being evaluated. This is a very short time to assess a program's impact on crime or any other outcome measure, and for these programs the question can be asked: Was the intervention in place long enough to provide an accurate estimate of its observed effects on crime? Ideally, time series designs are needed with a long series of crime rates in experimental and control conditions before and after the introduction of CCTV. 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, 29). Ideally, the same time periods should be used in before and after measures of crime.

Research is also needed to help identify the active ingredients of effective CCTV programs and the causal mechanisms linking CCTV to reductions in crime. Forty-three percent (19 out of 44) of the included programs involved interventions in addition to CCTV, and this makes it difficult to isolate the independent effects of the different components, and interaction effects of CCTV in combination with other measures. Future experiments are needed that attempt to disentangle elements of effective programs. Also, future experiments need to measure the intensity of the CCTV dose and the dose-response relationship, and need to include alternative methods of measuring crime (surveys as well as police records).

It would also be desirable for more evaluations to assess the effects of CCTV on crime using emergency department records. In the British study by Sivarajasingam (2003), the authors conclude that an increase in police recording consequent on CCTV installation was a desirable effect. This is because it was evidence that the police were finding out about a higher proportion of violence than previously, getting officers to the scene rapidly, and preventing injury serious enough to require hospital treatment, which explains the very desirable intervention effect of less hospital treatment (as measured by emergency department records).

In order to investigate displacement of crime and diffusion of crime prevention benefits, the minimum design should involve one experimental area, one adjacent area, and one nonadjacent comparable control area. If crime decreased in the experimental area, increased in the adjacent area, and stayed constant in the control area, this might be evidence of displacement. If crime decreased in the experimental and adjacent areas and stayed constant or increased in the control area, this might be evidence of diffusion of benefits. Unfortunately, few CCTV studies used this minimum design. Instead, most had an adjacent control area and the remainder of the city as another (noncomparable) control area. Because of this, any conclusions about displacement or diffusion effects of CCTV seem premature at this point in time.

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Potential conflict of interest

There is no conflict of interest on the part of either author. It is important to note that both authors were involved in one of the included evaluations (Cambridge).

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Notes

Published notes

Preliminary results of this review have been published in:

Welsh BC, Farrington DP. Crime Prevention Effects of Closed Circuit Television: A Systematic Review. Home Office Research Study No. 252. London, UK: Home Office, 2002.

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Table 1
CCTV Evaluations Not Meeting Inclusion Criteria

Author, Publication Date, and Location	Reason for Not Including Program	Other Inter-ventions	Sample Size	Follow-up and Results
James 1985, Melbourne, Australia	Numbers of crimes in before period too small	Security patrols	E=2 public housing estates, C=1 public housing estate	12 months; E vs. C: total victimization: -64.4% (45 to 16) vs. +38.5% (13 to 18)
Burrows 1991, UK	No control area	Changes in store design and procedures	1 store (Tescos -- large retailer)	n.a.; "unknown losses": approx. £12,000 to £5,000 per week; cash losses (from tills): approx. £500 to £20 per week
National Association of Convenience Stores 1991, multiple sites, US	No control area	n.a.	189 conven-ience stores	2 years; robbery: -15.2% (1.58 to 1.34 per store per year, ns)
Poyner 1992, North Shields, UK	No control area	Media publicity and school visits	5 buses	8 months; vandalism: -52.9% (51 to 24)
Carr 1993, State of Victoria, Australia	No control area	Multiple (e.g., improved lighting, police)	Train, tram, and bus systems of Public Trans-port System	2 years; crimes against persons: -42.2% (57.3 to 33.1 per month); vandalism: -483.6% (700 to 115 broken windows, weekly average)
Tilley 1993a, Salford, UK	No control area	None	3 businesses	12 months; total crimes: -14.3% (35 to 30)
1. Tilley 1993b, Lewisham, UK	No control area	Media publicity	1 station car park	4 months; vehicle crimes:

		and notices of CCTV		-75.0% (24 to 6)
2. Tilley 1993b, Hull, UK	No comparable control area	None	E=1 car park, C=city center as a whole	8 months; E vs. C: theft of vehicles: -88.9% (27 to 3) vs. -5.6% (430 to 406); theft from vehicles: -76.3% (38 to 9) vs. +2.8% (961 to 988)
3. Tilley 1993b, Wolverhampton, UK	No comparable control area	Notices of CCTV	E=1 car park, C= Sub-division as a whole	13 months; E vs. C: theft of vehicles: -18.2% (11 to 9) vs. +3% (data n.a.); theft from vehicles: -46.4% (28 to 15) vs. -3% (data n.a.)
Chatterton 1994, Merseyside, UK	No control area	Notices of CCTV	15 housing schemes ("shel-tered accommo-dation")	5-10 months; burglary (completions and attempts): -78.8% (4.25 to 0.9 per month)[a]
Davidson 1994, Mitchelhill Estate, Glasgow, UK	No control area	Multiple (e.g., target hardening, local manage-ment)	5 housing blocks	15 months; total crime[b]: -63.1% (28.7 to 10.6 average per quarter year)
Brown 1995, King's Lynn, UK	No crime data for experimental or control areas	None	E=car parks and adjacent streets, C=rest of police division	32 months; E vs. C: theft of vehicles: decline (data n.a.) vs. ? (data n.a.); theft from vehicles: decline (data n.a.) vs. decline (data n.a.); burglary (data n.a.) vs. ? (data n.a.)
Squires 1996, Brighton, UK	No comparable control area	None	E=police beats 1-4, C=rest of	12 months; E vs. C: total crimes: "under" -10% (data

			Brighton	n.a.) vs. -1% (data n.a.)
Bromley 1997, Cardiff and Swansea, UK	No control area	Multiple (e.g., staff at exits, painting)	Different types of car parks	n.a. (no before measures); vehicle crimes: Cardiff (8.3/100 spaces) vs. Swansea (13.7/100 spaces)
Gill 1998, 1999, Leeds and Sheffield, UK	No control area	None	2 retail stores	n.a.; stock losses from theft (before-during phases and Leeds store only): £600 to £200 per week
Maguire 1998, Penarth, UK	No control area	None	1 town center	4 months; total crimes: -13% (48 to 42)
Squires 1998b, Burgess Hill, UK	No crime data for control area	None	E=town center (beat 1), C=beat 1 excluding surveill-ance area	8 months; E vs. C: total crime: -37.2% (data n.a.) vs. ? (data n.a.)
Squires 1998c, Crawley, UK	No comparable control area	None	E1=town center (beat 1), E2=E1 + 3 shopping parades; C=rest of Crawley	6 months; E1 vs. C: total crimes: -12% (data n.a.) vs. -3% (data n.a.)
Squires 1998d, East Grinstead, UK	No crime data for control area	None	E=town center (beat 1), C=beat 1 excluding surveill-ance area	8 months; E vs. C: total crime: -25.6% (data n.a.) vs. ? (data n.a.)
Beck 1999, multiple sites, UK	No control area	None	15 stores: E1=3 high level	6 months; theft (by staff and customers):[c]

			system; E2=6 medium level, E3= 6 low level	E1=+37.8% (1.96% to 2.70%), E2=-17.9% (2.40% to 1.97%) E3=-26.6% (2.63% to 1.93%)
Ditton 1999, Glasgow, UK	No control area	None	28 police beats in city center	12 months; total crimes: +9% (data n.a.)
1. Sivarajasingam 1999, Cardiff, UK	No control area	None	1 city center or town area	2 years; A&E recorded assault: -11.5% (7,066 to 6,251); police-recorded assault: +20.8% (677 to 818)
2. Sivarajasingam 1999, Swansea, UK	No control area	None	1 city center or town area	2 years; A&E recorded assault: +3.0% (3,967 to 4,086); police-recorded assault: -34.0% (486 to 321)
3. Sivarajasingam 1999, Rhyl, UK	No control area	None	1 city center or town area	2 years; A&E recorded assault: +46.0% (1,249 to 1,823); police-recorded assault: -24.0% (526 to 400)
1. Taylor 1999, Leicester (West End), UK	No control area	Multiple (e.g., silent alarm)	154 businesses	11 months; commercial burglary: decline (data n.a.)
2. Taylor 1999, Leicester (Belgrave), UK	No control area	Multiple (e.g., silent alarm)	n.a.	24 months; commercial burglary: decline (data n.a.)
Fairfield City Council 2002, multiple sites, Australia	No control area	Notices of CCTV, publicity campaign	2 central business districts	5 years; n.a.
Goodwin 2002,	No control area	None	1 city or	24 months;

Devonport, Australia			town center	total crime: +3.9% (205 to 213)
1. Blixt 2003, Helsinborg, Sweden	No comparable control area	Security guards	E=1 city park, C=city center	1 year; E vs. C: crimes against the person: -4.8% (14.7 to 14.0) vs. +16% (242.7 to 282)
2. Blixt 2003, small community, Sweden	No comparable control area	None	E=1 residential car park, C=surr-ounding area	2 years; E vs. C: vehicle crimes: -78% (40 to 9) vs. -17% (16.3 to 13.5)
3. Blixt 2003, city in Sweden	No comparable control area	None	E=public car park, C=surr-ounding area	2 years; E vs. C: vehicle crimes: -10% (29 to 26) vs. –10% (501.5 to 448.5)
Squires 2003, Brighton, UK	No control area	Multiple (e.g., additional policing, youth programs)	1 housing estate	14 months; burglary: +4.8% (data n.a.) vandalism: -3.9% (data n.a.), assault: -2.4% (data n.a.) theft: +6.1% (data n.a.) other: -.5% (data n.a.)
Gill 2004, Lewisham, UK	No comparable control area	None	E=1 city center, C=rest of city	2 years; assault: E vs. C: -26% (115 to 85) vs. +47% (1,696 to 2,498) burglary: E vs. C: -34% (70 to 46) vs. -17% (4,632 to 3,861) criminal damage: E vs. C: -37% (67 to 42) vs. +35% (1,485 to 2,008) robbery: E vs. C: -13% (53 to 46) vs. -23% (1,101 to 844)

				theft: E vs. C: -10% (77 to 69) vs. +3% (508 to 522)
Harada 2004, Tokyo, Japan	No comparable control area	None	1 city center: E=50m radius from CCTVs C=100-150m from CCTVs	1 year; E vs. C: larceny: -27.9% (409 to 295) (p. 4) vs. ? (data n.a.) E vs. C: violent offenses: -12.1% (58 to 51) (p. 4) vs. ? (data n.a.) E vs. C: total offenses: -21.8% (619 to 484) vs. -11.0% (data n.a.)
Coupe 2005, multiple sites, UK	No control area	Burglar alarms	9 police divisions	n.a.; "CCTV make[s] an important contribution to the detection of non-residential burglaries"
Eifler 2005, multiple sites, Germany	No control area	Notices of CCTV	n.a.	n.a.; "changes in crime rates are not clearly to be attributed to video surveillance"
Gill 2006, multiple sites, UK	No control area	None	1 borough, 1 rural area, 1 urban area	10 months; "virtually no impact"
1. Wells 2006, Surfer's Paradise, Queensland, Australia	No comparable control area	None	1 suburb: E=within range of cameras, C=near but not visible to cameras, away from cameras	44 months; total crimes: +36% (6940 to 9467)
2. Wells 2006, Broad Beach, Queensland, Australia	No comparable control area	None	1 suburb: E=within range of cameras, C=near but not visible	32 months; total crimes: -38% (1158 to 722)

			to cameras, away from cameras	
3. Wells 2006, Queensland, Australia	No control area	None	1 train station (Beenleigh)	3 years; "CCTV was associated with a slight increase in the number of reported offences"
4. Wells 2006, Queensland, Australia	No control area	None	1 train station (Bethania)	3 years; "CCTV was found to increase total offences"
5. Wells 2006, Queensland, Australia	No control area	None	1 train station (Brunswick Street)	3 years; "CCTV was found to increase the total number of offences"
6. Wells 2006, Queensland, Australia	No control area	None	1 train station (Indooroo-pilly)	3 years; "CCTV was associated with a slight increase in total offences"
7. Wells 2006, Queensland, Australia	No control area	None	1 train station (Ipswich)	3 years; "CCTV was found to be associated with an increase in reported offences"
8. Wells 2006, Queensland, Australia	No control area	None	1 train station (Moray-field)	3 years; "CCTV was found to have no impact on total offences"
9. Wells 2006, Queensland, Australia	No control area	None	1 train station (Nundah)	3 years; "CCTV was found to have no impact on reported offences"
10. Wells 2006, Queensland, Australia	No control area	None	1 train station (Southbank /Vulture Street)	3 years; "CCTV was found to have no impact on reported offences"
11. Wells 2006, Queensland, Australia	No control area	None	1 train station (Strath-pine)	3 years; "CCTV was found to have no impact on the extent of reported offences"

[a] The total number of offenses were 51 in the before period and 9 in the after period. "In 13 of the 15 schemes, no offenses of burglary were recorded for the period after CCTV was installed. One scheme had no burglaries in either period, and in another, there was a slight increase after camera installation" (Chatterton 1994, 136).
[b] The individual crimes and their before-after comparisons (average per quarter year) were as follows: burglary (19.0 to 5.4), theft of and from vehicles (4.7 to 1.4), theft other (2.0 to 2.2), vandalism (2.3 to 0.8), and crimes against the person (0.67 to 0.8). The before and after periods consisted of six quarters or 18 months and 5 quarters or 15 months, respectively.
[c] The figures in parentheses reflect the "value of goods lost expressed as a percentage of all goods sold" (Beck 1999, 257).

Notes: E = experimental area; C = control area; n.a. = not available; A&E = accident and emergency department.

Table 2
CCTV Evaluations in City and Town Centers (n=22)

Author, Publication Date, and Location	Camera Coverage or Number of Cameras	Monitoring and Duration of Inter-vention	Sample Size	Other Inter-ventions	Outcome Measure and Data Source	Research Design and Before-After Time Period	Results and Displacement/Diffusion
Brown (1995), Newcastle-upon-Tyne, UK	Full coverage of most vulnerable premises on streets	Active monitoring by police; 15 months	E=4 beats of central area, C=7 remaining beats of city center Note: There are 2 other C, but each is less comparable to E	None Note: 14 of 16 cameras are in E; remaining 2 are in C	Crime (multiple offenses); police records	Before-after, experimental control Before=26 months After=15 months	E vs C (monthly average): total crimes: -21.6% (343 to 269) vs -29.7% (676 to 475); burglary: -57.5% (40 to 17) vs -38.7% (75 to 46); theft of vehicles: -47.1% (17 to 9) vs -40.5% (168 to 100); theft from vehicles: -50.0% (18 to 9) vs -38.9% (106 to 65) (undesirable effect) Some displacement and diffusion occurred
Brown (1995),	14	Active	E=Area 1	None	Crime	Before-after,	E vs C1: total crimes:

Birmingham, UK	cameras (pan, tilt, zoom)	monitoring by police (24 hrs/ day); 12 months	(streets with good coverage), C1=Area 2 (streets with partial coverage), C2=Area 4 (other streets in Zone A of Div. F), C3= Area 5 (streets in Zones B-G of Div. F)		(total and most serious offenses); victim survey	experimental control Before=12 months After=12 months	-4.3% (163 to 156) vs +131.6% (19 to 44) E vs C2: total crimes: -4.3% vs +130.8% (26 to 60) E vs C3: total crimes: -4.3% vs +45.5% (33 to 48) (desirable effect) Displacement occurred
Sarno (1996), London Borough of Sutton, UK	11 cameras	n.a.; 12 months	E=part of Sutton city centre, C1=rest of Sutton city centre,	None	Crime (total and selected offenses); police records	Before-after, experimental control Before=12 months After=12 months	E vs C1: total crimes (not including vehicle crime): -12.8% (1,655 to 1,443) vs -18% (data n.a.) E vs C2: total crimes: -12.8% vs -30% (data

			C2=all of Borough of Sutton				n.a.) (undesirable effect) Displacement/diffusion not measured
Skinns (1998), Doncaster, UK	63 cameras	Active monitoring by police; 12 months	E=all or parts of streets in vision of cameras in comm-ercial area, C=comm-ercial areas of 4 adjacent townships	47 'help points' for public to contact CCTV control rooms	Crime (total and selected offenses); police records	Before-after, experimental-control Before=24 months; After=24 months Note: There were 2 Es and 6 Cs used. The C used here is because the author says it was the most comparable to E Note: This E has been used because it includes the other E	E vs C: total crimes: -21.3% (5,832 to 4,591) vs +11.9% (1,789 to 2,002) (desirable effect) No displacement occurred
Squires (1998), Ilford, UK	n.a.	n.a.; 7 months	E=city center, C=areas adjacent to city center	None	Crime (total, violent, and selected offenses); police records	Before-after, experimental-control Before=6 months After=7 months Note: 2 other Cs used, but less likely to be comparable to E	E vs C: total crimes: -17% (data n.a.) vs +9% (data n.a.) (desirable effect) Displacement occurred
Armitage (1999),	n.a.	n.a.; 20	E=police	None	Crime	Before-after,	E vs C1: total crimes:

Burnley, UK		months	beats with CCTV, C1=beats having a common boundary with CCTV beats, C2=other beats in police division		(total and multiple offenses) ; police records	experimental-control Before=12 months After=12 months[a]	-28% (1,805 to 1,300) vs -1% (6,242 to 6,180); violence: -35% (117 to 76) vs -20% (267 to 214); vehicle crimes: -48% (375 to 195) vs -8% (1,842 to 1,695); burglary: -41% (143 to 84) vs +9% (2,208 to 2,407) E vs C2: total crimes: -28% vs +9% (1,069 to 1,175); violence: -35% vs 0% (32 to 32); vehicle crimes: -48% vs -8% (309 to 285); burglary: -41% vs +34% (366 to 490) (desirable effect) Diffusion occurred
Ditton (1999), Airdrie, UK	12 cameras	Active monitoring by police; 24 months	E=6 police beats, C1= rest of 6 police beats (not in camera	None	Crime (total and multiple cate-gories); police records	Before-after, experimental control Before=24 months After=24 months	E vs C1: total crimes: -43.9% (3,007 to 1,687) vs +0.2% (3,793 to 3,802); total violent crimes: -10.8% (111 to 99) vs +43.5% (131 to 188); total property crimes: -50.4% (2,732 to

			vision), C2= rest of police sub-division, C3= rest of police division				1,356) vs –5.3% (3,455 to 3,273) (desirable effect) Diffusion occurred
Sarno (1999), London Borough of Southwark (Elephant and Castle), UK	34 cameras outside (6 pan, tilt, zoom), 15 cameras inside (12 pan, tilt, zoom)	Active monitoring by security personnel (24 hrs/ day); 24 months	E=shopping center area and subways, bus stops, streets around center, C1= Newington C2=BZ	Notices of CCTV	Crime (total); police records	Before-after, experimental-control Before=12 months After=24 months Note: 4 other Cs used, but less comparable to E	E vs C1 (yearly average): total crimes: -14.1% (491 to 422) vs -9.4% (4,814 to 4,360) E vs C2 (yearly average): total crimes: -14.1% vs -15.1% (2,090 to 1774) (null effect) Possible evidence of diffusion
Sarno (1999), London Borough of Southwark (Camberwell), UK	17 cameras (pan, tilt, zoom)	Active monitoring by security personnel and sometime	E=city center C1=rest of Cam-berwell C2=BZ	Notices of CCTV	Crime (total); police records	Before-after, experimental-control Before=24 months After=12 months Note: 2 other Cs	E vs C1 (yearly average): total crimes: -13.6% (913 to 789) vs -4.1% (3,915 to 3,755) E vs C2 (yearly average): total

		s police (24 hrs/ day); 12 months				used, but less comparable to E	crimes: -13.6% vs -2.8% (1,245 to 1,210) (desirable effect) No displacement occurred
Sarno (1999), London Borough of Southwark (East Street), UK	12 cameras (11 pan, tilt, zoom; 1 fixed)	Active monitoring by security personnel and sometimes police (24 hrs/ day); 12 months	E=city center (street market, adjacent streets, car parks) C1= Newington C2=BZ	Notices of CCTV	Crime (total); police records	Before-after, experimental-control Before=24 months After=12 months Note: 2 other Cs used, but less comparable to E	E vs C1 (yearly average): total crimes: -9.4% (791 to 717) vs -14.2% (4,277 to 3,671) E vs C2 (yearly average): total crimes: -9.4% vs - 22.1% (1,066 to 830) (uncertain effect) No diffusion; possible functional displacement occurred
Mazerolle (2002), Cincinnati (Northside), US	n.a. (pan, tilt, zoom)	No monitoring (video footage used); 3 months	E=1 site with CCTV, C=1,000 foot radius BZ	None	Calls for service (weekly average); police records	Before-after, experimental-control Before=23 months After=6 months Note: 2 other Cs of	E vs C (weekly average): +1.8% (901 to 917) vs 0.0% (36 to 36) (null effect) Little or no

						200 and 500 foot radii were used and are included in the 1,000 foot radius C	displacement occurred
Mazerolle (2002), Cincinnati (Hopkins Park), US	n.a. (pan, tilt, zoom)	No monitoring (video footage used); 3 months	E=1 site with CCTV, C=1,000 foot radius BZ	None	Calls for service (weekly average); police records	Before-after, experimental-control Before=23 months After=4 months Note: 2 other Cs of 200 and 500 foot radii were used and are included in the 1,000 foot radius C	E vs C (weekly average): +9.8% (1,062 to 1,166) vs 0.0% (22 to 22) (null effect) Displacement/diffusion not measured
Mazerolle (2002), Cincinnati (Findlay Market), US	n.a. (pan, tilt, zoom)	No monitoring (video footage used); 2 months	E=1 site with CCTV, C=1,000 foot radius BZ	None	Calls for service (weekly average); police records	Before-after, experimental-control Before=24.5 months After=3.5 months Note: 2 other Cs of 200 and 500 foot radii were used and are included in the 1,000 foot radius C	E vs C (weekly average): +16.9% (1,005 to 1,175) vs +17.1% (111 to 130) (null effect) Some displacement occurred
Blixt (2003), Malmö (Möllevångstorget or Möllevång Square), Sweden	100% coverage	Passive monitoring by security	E=city square C1=rest of city	Social improve-ment programs	Violent crime (assault, serious	Before-after, experimental-control Before=36 months	E vs C1 (yearly average): -50.0% (32 to 16) vs +15.8% (393 to 455)

		personnel	center C2= areas adjacent to city square	(begun years prior)	assault, robbery); police records	After=12 months	E vs C2 (yearly average): -50.0% vs -3.3% (91 to 88) (desirable effect) No displacement occurred
Sivarajasingam (2003), multiple city and town centers, UK	n.a.	Active monitoring by local council (with links to police) and police (in East-bourne only), operational all day; 24 months	E=5 centers (Ashford, East-bourne, Lincoln, Newport, Peter-borough) C=5 centers (Derby, Hunting-don, Poole, Chelms-ford, Scar-borough)	None	Assault with injury (total); emergency department records; Violent crime (total); police records	Before-after, experimental-control with matching Before=24 months After=24 months	E vs C (emergency dept.): -3.3% (8,194 to 7,923) vs +11.2% (9,724 to 10,817) (desirable effect) E vs C (police): +16.1% (1,629 to 1,892) vs +6.2% (1,770 to 1,880) (undesirable effect) Displacement/diffusion not measured
Winge (2003), Oslo, Norway	6 cameras	Active monitoring by security personnel	E=city center near central railway	Notices of CCTV	Crime (total and multiple categories); police	Before-after, experimental-control Before=12 months After=12 months	E vs C1: total crimes: +35.3% (1,102 to 1,491) vs +2.8% (388 to 399); violent crime: +26.0% (204

		(with links to police), operational all day; 12 months	station C1=rest of city center C2=areas adjacent to E		records (incident log data)		to 257) vs +14.3% (98 to 112); public order: +10.4% (402 to 444) vs +3.4% (145 to 150); robbery/theft from person: -26.3% (133 to 98) vs -3.3% (30 to 29); narcotics: +87.0% (269 to 503) vs -2.4% (41 to 42) E vs C2: total crimes: +35.3% vs +0.7% (410 to 413); violent crime: +26.0% vs +4.4% (137 to 143); public order: +10.4% vs +1.3% (156 to 158); robbery/theft from person: -26.3% vs +35.0% (20 to 27); narcotics: +87.0% vs -50.0% (16 to 8) (undesirable effect) No displacement occurred
Gill (2005), Borough Town, UK	70%	Active monitoring, 173-	E=town center C1=non-	None	Crime (total and multiple	Before-after, experimental-control	E vs C1: total crimes: +0.3% (334 to 335) vs +12.8% (549 to

		520 cameras per operator, one-way commun-ication with police; 12 months	adjacent comparable area C2= adjacent area		categories); police records	Before=12 months After=12 months	619) E vs C2: total crimes: +0.3% vs –5% (desirable effect) No displacement occurred
Gill (2005), Market Town, UK	34%	Active monitoring, 27 cameras per operator, direct line to police; 12 months	E=town center C1= adjacent area C2=rest of police division	Comm-unity wardens, car park	Crime (total and multiple categories); police records	Before-after, experimental-control Before=12 months After=12 months	E vs C1: total crimes: +18.4% (245 to 290) vs -7.0% (585 to 544) E vs C2: total crimes: +18.4% vs +3% (undesirable effect) No displacement occurred
Gill (2005), Shire Town, UK	76%	Active monitoring, 27 cameras per operator, retail radio; 12 months	E=town center C1= adjacent area C2=rest of police division	Comm-unity wardens	Crime (total and multiple categories); police records	Before-after, experimental-control Before=12 months After=12 months	E vs C1: total crimes: -4.0% (352 to 338) vs +16.8% (1,018 to 1,189) E vs C2: total crimes: -4.0% vs +3% (desirable effect) No displacement

							occurred
Gill (2005), South City, UK	72%	Active monitoring (24 hrs/ day), 65-86 cameras per operator, public house/retail radio, police in room; 12 months	E=town center C1= adjacent area C2=rest of police division	Comm-unity wardens, police operations	Crime (total and multiple categories); police records	Before-after, experimental-control Before=12 months After=12 months	E vs C1: total crimes: -10.2% (5,106 to 4,584) vs –11.2% (27,608 to 24,511) E vs C2: total crimes: -10.2% vs –12% (null effect) No displacement occurred
Farrington (2007a), Cambridge, UK	30 cameras	n.a.; 11 months	E=city center C= secondary center	None	Crime (total and multiple categories); police records Also victim survey data on crime and disorder	Before-after, experimental-control Before=11 months After=11 months	E vs C: total crimes: -13.8% (2,600 to 2,242) vs -26.9% (1,324 to 968); violent crimes: -6.0% (151 to 142) vs -33.8% (77 to 51); vehicle crimes: -53.1% (224 to 105) vs -54.0% (250 to 115); percentage victimized: +8.0% (26.4% to 28.5%) vs +19.3% (11.4% to 13.6%) (undesirable effect)

							Displacement/diffusion not measured
Griffiths (no date), Gillingham, UK	n.a.	Active monitoring by security personnel, operational all day; 60 months	E=city center (High Street and adjacent car parks) C=city center of Strood (borough of Rochester)	Improved lighting, neighbor-hood watch, "shop safe" network (radio link for shops to report crime)	Crime (total and multiple offenses); police records	Before-after, experimental-control Before=12 months After=60 months	E vs C (yearly average): total crimes: -35.6% (1,376 to 886) vs -5.0% (1,298 to 1,233); violent crimes: +47.9% (96 to 142) vs +59.5% (84 to 134); burglary: -21.7% (69 to 54) vs -33.3% (144 to 96); vehicle crimes (theft of and from): -50.0% (272 to 136) vs –17.9% (352 to 289); theft: -36.o% (239 to 153) vs +13.7% (131 to 149); criminal damage: -22.2% (180 to 140) vs +29.1% (206 to 266) (desirable effect) Displacement/diffusion not measured

[a] There was an additional eight months of follow-up, but the authors reported crime data as percentage changes relative to the 12-month before period, so it was not possible to accurately calculate the number of incidents for the additional eight months.
Notes: BZ = buffer zone (area surrounding experimental area); E = experimental area; C = control area; n.a. = not available. The location names for the four evaluations by Gill (2005) are pseudonyms.
Table 3
CCTV Evaluations in Public Housing (n=9)

Author, Publication Date, and Location	Camera Coverage or Number of Cameras	Monitoring and Duration of Inter-vention	Sample Size	Other Inter-ventions	Outcome Measure and Data Source	Research Design and Before-After Time Period	Results and Displacement/Diffusion
Musheno (1978), Bronxdale Houses, New York City, US	n.a.	CCTV monitoring system (cameras in lobby and elevators; monitors in apart-ments); 3 months	E=3 buildings, C=3 buildings Note: project had 26 high-rises; 53 apartments in each	None	Crime (multiple offenses); victim survey	Before-after, experimental-control Before=3 months; After=3 months	E vs C: total crimes: -9.4% (32 to 29) vs -19.2% (26 to 21) (uncertain effect) Displacement/diffusion not measured
Williamson (2000), Brooklyn, New York, US	105 cameras	Active monitoring by police	E=9 buildings (1,220 apart-	None	Crime (total and multiple categorie	Before-after, experimental-control with matching	E vs C: change in total crimes inside projects: 0.0% vs -5.3%; change in total

		(24 hrs/ day); 18 months	ments; Albany project), C=no. of buildings n.a. (Rooseve lt project)		s) inside housing projects and inside zones of 0.1 to 0.5 miles radii around projects; police records	Before=18 months; After=18 months	crimes inside 0.1 mile BZ: 0.0% vs -4.0%; change in major felonies inside projects: -22.8% vs -14.5%; change in major felonies inside 0.1 mile BZ: -6.4% vs -8.6% (data n.a.) (null effect) Displacement and diffusion did not occur
Hood (2003), Greater Easterhouse Housing Estate, Glasgow, UK	n.a.	Active monitori ng by security personnel (10 am – 2 am); 12 months	E=Counc il Ward 5 C1=Easte r-house subdivisi on C2=D division	None	Violent and drug crimes; police records	Before-after, experimental-control Before=12 months After=20 months Note: 1 other C but, less comparable to E	E vs C1 (monthly average): total violent crimes: +30.8% (13 to 17) vs +15.4% (39 to 45); total drug crimes: -9.1% (33 to 30) vs +60.0% (92 to 147) E vs C2 (monthly average): total violent crimes: +30.8% vs +120.3% (79 to 174); total drug crimes: -9.1% vs +80.6% (186 vs 336) (desirable effect)

							Displacement/diffusion not measured
Gill (2005), Deploy Estate, UK	34%	Active monitoring (24 hrs/ day), 49-66 cameras per operator, one-way communcation with police; 12 months	E=housing estate C1= non-adjacent comparable housing estate C2= adjacent area	None	Crime (total and multiple categories); police records and victim survey	Before-after, experimental-control Before=12 months After=12 months	E vs C1: total crimes (police records): +20.7% (760 to 917) vs +2.6% (534 to 548); total crimes (victim survey): -2.5% (864 to 842) vs -10.0% (397 to 359) E vs C2: total crimes (police records): +20.7% vs +3% (undesirable effect) No displacement occurred
Gill (2005), Dual Estate, UK	9%	Active monitoring, 67 cameras per operator, 2-way communcation with police; 12 months	E=housing estate C1= non-adjacent comparable housing estate C2= adjacent area	None	Crime (total and multiple categories); police records and victim survey	Before-after, experimental-control Before=12 months After=12 months	E vs C1: total crimes (police records): +4.4% (799 to 834) vs -18.5% (464 to 378); total crimes (victim survey): -13.3% (732 to 635) vs -5.6% (414 to 391) E vs C2: total crimes (police records): +4.4% vs +11% (uncertain effect) No displacement

							occurred
Gill (2005), Southcap Estate, UK	73%	Active monitoring (24 hrs/ day), 148 cameras per operator, one-way commun-cation with police and police in room; 6 months	E=housing estate C= non-adjacent comparable housing estate	Youth inclusion project	Crime (total and multiple categories); police records and victim survey	Before-after, experimental-control Before=6 months After=6 months	E vs C: total crimes (police records): +13.8% (160 to 182) vs -13.4% (529 to 458); total crimes (victim survey): +20.0% (486 to 583) vs -47.1% (719 to 380) (undesirable effect) Displacement/diffusion not measured
Gill (2005), Eastcap Estate, UK	29%	Active monitoring (24 hrs/ day), 50 cameras per operator, 2-way commun-cation with police;	E=housing estate C1= non-adjacent comparable housing estate C2= adjacent area	Improved lighting	Crime (total and multiple categories); police records and victim survey	Before-after, experimental-control Before=12 months After=12 months	E vs C1: total crimes (police records): +2.2% (450 to 460) vs +5.4% (130 to 137); total crimes (victim survey): +2.4% (659 to 675) vs -23.4% (256 to 196) E vs C2: total crimes (police records): +2.2% vs -17% (uncertain effect)

		12 months					No displacement occurred
Gill (2005), Northern Estate, UK	87%	Active monitoring (24 hrs/ day), 25-40 cameras per operator, one-way commun-cation with police; 12 months	E=housing estate C1= non-adjacent comparable housing estate C2= adjacent area	None	Crime (total and multiple categories); police records and victim survey	Before-after, experimental-control Before=12 months After=12 months	E vs C1: total crimes (police records): -9.8% (112 to 101) vs +20.5% (73 to 88); total crimes (victim survey): +27.8% (151 to 193) vs +32.3% (214 to 283) E vs C2: total crimes (police records): -9.8% vs +10% (desirable effect) No displacement occurred
Gill (2005), Westcap Estate, UK	62%	Active monitoring (24 hrs/ day), 20-60 cameras per operator; 12 months	E=housing estate C= non-adjacent comparable housing estate	Youth inclusion project	Crime (total and multiple categories); victim survey	Before-after, experimental-control Before=12 months After=12 months	E vs C: total crimes (victim survey): -35.6% (649 to 418) vs +19.2% (266 to 317) (desirable effect) Displacement/diffusion not measured

Notes: BZ = buffer zone (area surrounding experimental area); E = experimental area; C = control area; n.a. = not available. The location names for the six evaluations by Gill (2005) are pseudonyms.

Table 4
CCTV Evaluations in Public Transport (n=4)

Author, Publication Date, and Location	Camera Coverage or Number of Cameras	Monitoring and Duration of Inter-vention	Sample Size	Other Inter-ventions	Outcome Measure and Data Source	Research Design and Before-After Time Period	Results and Displacement/Diffusion
Burrows (1979), "Underground" subway, London, UK	n.a. (fixed)	Active monitoring by BTP; 12 months	E=4 stations on southern sector, C1=15 other stations on southern sector, C2=228 other Under-ground stations	Notices of CCTV (also special police patrols preceded CCTV)	Personal theft and robbery; BTP records	Before-after, experimental-control Before=12 months; After=12 months	E vs C1: robbery: -22.2% (9 to 7) vs +23.1% (13 to 16); theft: -72.8% (243 to 66) vs -26.5% (535 to 393) E vs C2: robbery: -22.2% vs +116.3% (43 to 93); theft: -72.8% vs -39.4% (4,884 to 2,962) (desirable effect) Some displacement occurred
Webb (1992), "Underground" subway, London, UK	Expansion of cameras: 7-14 per	Active monitoring by BTP; 26	E=6 stations on south end of	Passenger alarms, visible kiosk to	Robbery; BTP records	Before-after, experimental-control Before=46 months;	E vs C1 (monthly average): -62.3% (5.3 to 2.0) vs -50.0% (7.8 to 3.9)

	E station (mix of fixed and pan, tilt, and zoom)	months	Northern line, C1=6 stations on north end of line, C2=236 other Under-ground stations	monitor CCTV, mirrors, and improved lighting		After=26 months Note: special policing used in E stations during first 3 years (1985-87) of before period (i.e., first 36 of 46 months of before period); in 1988 (remaining 10 months of before period), policing activity reduced in E stations	E vs C2: -62.3% vs -12.2% (69.6 to 61.1) (desirable effect) Note: for C2, Guardian Angels patrols began in May 1989 (7 months into 26 months of after period) Diffusion occurred
Webb (1992), Oxford Circus station, "Underground" subway, London, UK	30 cameras	Active monitoring by BTP; 32 months	E=1 station, C=1 station	Passenger alarms, visible kiosk to monitor CCTV, and BTP patrols	Personal theft, robbery, and assault; BTP records	Before-after, experimental-control Before= 28 months; After=32 months	E vs C (monthly average): robbery: +47.1% (1.7 to 2.5) vs +21.4% (1.4 to 1.7); theft: +11.0% (31.0 to 34.4) vs -1.9% (20.8 to 20.4); assault: +29.4% (1.7 to 2.2) vs +36.4% (1.1 to 1.5) (undesirable effect) Displacement/diffusion not measured
Grandmaison (1997),	130	Active	E=13	None	Crime	Before-after,	E vs C: total crimes:

“Metro” subway, Montreal, Canada	cameras (approx. 10 per E station)	monitoring by police; 18 months	stations, C=52 stations		(total and multiple offenses); police records	experimental-control with statistical analyses Before=18 months; After=18 months	-20.0% (905 to 724) vs -18.3% (1,376 to 1,124); robbery: -27.0% (141 to 103) vs -30.8% (312 to 216); assault: -27.5% (178 to 129) vs +5.6% (233 to 246); total theft and fraud: -15.5% (388 to 328) vs -16.0% (507 to 426) (null effect) Displacement/diffusion not measured

Notes: BTP = British Transport Police; E = experimental area; C = control area; n.a. = not available.

Table 5
CCTV Evaluations in Car Parks (n=6)

Author, Publication Date, and Location	Camera Coverage or Number of Cameras	Monitoring and Duration of Inter-vention	Sample Size	Other Inter-ventions	Outcome Measure and Data Source	Research Design and Before-After Time Period	Results and Displacement/Diffusion
Poyner (1991), University of Surrey, Guildford, UK	100% (almost)	Active monitoring by security personnel; 10 months	E=1 parking lot (no. 4), C=1 parking lot (no. 1)	Improved lighting and foliage cut back (for both E and C; only E received CCTV)	Theft from vehicles; private security records	Before-after, experimental-control Before=24 months; After=10 months	E vs C (monthly average): theft from vehicles: -73.3% (3.0 to 0.8) vs -93.8% (1.6 to 0.1) (undesirable effect) Diffusion occurred
Tilley (1993), Hartlepool, UK	n.a. (pan, tilt, zoom, infrared (most))	Active monitoring by security personnel; 24 months	E=CCTV covered car parks, C= non-CCTV covered car parks Note: no. of E and	Security officers, notices of CCTV, and payment scheme	Theft of and from vehicles; police records	Before-after, experimental control Before=15 months; After=30 months	E vs C: theft of vehicles: -59.0% (21.2 to 8.7 per quarter year) vs -16.3% (16.0 to 13.4 per quarter year); theft from vehicles: -9.4% (6.4 to 5.8 per quarter year) vs +3.1% (16.0 to 16.5

			C car parks or spaces n.a.				per quarter year) (desirable effect) Displacement occurred
Tilley (1993), Bradford, UK	n.a.	Active monitoring by security personnel; 12 months	E=1 car park, C1=2 adjacent car parks, C2= adjacent street parking	Notices of CCTV, improved lighting, and painting Note: C1 received some CCTV coverage for last 4 months	Theft of and from vehicles; police records	Before-after, experimental control Before=12 months; After=12 months Note: a third C is used, but is less comparable than C1 or C2	E vs C1: theft of vehicles: -43.5% (23 to 13) vs +5.9% (17 to 18); theft from vehicles: -68.8% (32 to 10) vs +4.5% (22 to 23) E vs C2: theft of vehicles: -43.5% vs +31.8% (22 to 29); theft from vehicles: -68.8% vs +6.1% (33 to 35) (desirable effect) Displacement/diffusion not measured
Tilley (1993), Coventry, UK	n.a.	Active monitoring by security personnel; various	E=3 car parks, C=2 car parks	Lighting, painting, and fencing	Theft of and from vehicles; police records	Before-after, experimental control Before and after = 8 months (E) and 16 months (C)	E vs C: theft of vehicles: -50.5% (91 to 45) vs -53.6% (56 to 26); theft from vehicles: -64.4% (276 to 101) vs -10.7% (150 to

							134) (desirable effect) Displacement/diffusion not measured
Sarno (1996), London Borough of Sutton, UK	n.a.	n.a.; 12 months	E=3 car parks in part of Sutton police sector, C1=rest of Sutton sector, C2=all of Borough of Sutton	Multiple (e.g., locking overnight, lighting)	Vehicle crime; police records	Before-after, experimental control Before=12 months; After=12 months	E vs C1: -57.3% (349 to 149) vs -36.5% (2,367 to 1,504) E vs C2: -57.3% vs -40.2% (6,346 to 3,798) (desirable effect) Displacement/diffusion not measured
Gill (2005), Hawkeye, UK	95-100%	Active monitoring by security, link (one-way) with BTP, 123-153 cameras per operator;	E=57 train station car parks C=train station car parks in the whole country	Improved lighting, fencing, security	Total crime; police records	Before-after, experimental control Before=12 months After=12 months	E vs C: -73.0% (794 to 214) vs -10.0% (12,590 to 11,335) (desirable effect) Displacement/diffusion not measured

		12 months					

Notes: BTP = British Transport Police; E = experimental area; C = control area; n.a. = not available.

Table 6
CCTV Evaluations in Other Settings (n=3)

Author, Publication Date, and Location (context of intervention)	Camera Coverage or Number of Cameras	Monitoring and Duration of Inter-vention	Sample Size	Other Inter-ventions	Outcome Measure and Data Source	Research Design and Before-After Time Period	Results and Displacement/Diffusion
Gill (2005), City Outskirts, UK (residential area)	68%	Active monitoring (24 hrs/ day), 48 cameras/ operator, direct line to police; 12 months	E= residential area C1= adjacent residential areas C2=rest of police division	Improved lighting, anti-burglary schemes	Crime (total and multiple categories); police records	Before-after, experimental-control Before = 12 months After = 12 months	E vs C1: total crimes: -28.0% (1,526 to 1,098) vs -3.4% (16,696 to 16,062) E vs C2: total crimes: -28.0% vs +4% (desirable effect) No displacement occurred
Gill (2005), Borough, UK (residential area)	Low (8 re-deployable used)	n.a.; 12 months	E= residential area C1= adjacent residential areas C2=rest of police	None	Crime (total and multiple categories); police records	Before-after, experimental-control Before = 12 months After = 12 months	E vs C1: total crimes: +72.8% (257 to 444) vs +38.5% (421 to 583) E vs C2: total crimes: +72.8% vs +8% (undesirable effect) No displacement

			division				occurred
Gill (2005), City Hospital, UK (hospital)	76%	Active monitoring, direct line to police; 12 months	E=hospital C1= adjacent areas C2=rest of police division	Leaflets, posters, improved lighting, police operations	Crime (total and multiple categories); police records	Before-after, experimental-control Before = 12 months After = 12 months	E vs C1: total crimes: -36.6% (41 to 26) vs -12.2% (3,218 to 2,824) E vs C2: total crimes: -36.6% vs –9% (desirable effect) No displacement occurred

Notes: BZ = buffer zone (area surrounding experimental area); E = experimental area; C = control area; n.a. = not available. The location names are pseudonyms.

Table 7
Meta-Analysis of CCTV Evaluations in City and Town Centers

Evaluation	RES	95% Confidence Interval	P
Newcastle	0.90	0.79-1.01	.077
Birmingham	1.91	1.24-2.96	.004
Doncaster	1.42	1.24-1.63	.0001
Burnley	1.37	1.19-1.58	.0001
Airdrie	1.79	1.56-2.05	.0001
Southwark-EC	1.05	0.89-1.25	ns
Southwark-C	1.10	0.95-1.28	ns
Southwark-E	0.95	0.81-1.10	ns
Cincinnati-N	0.98	0.86-1.13	ns
Cincinnati-H	0.91	0.77-1.07	ns
Cincinnati-F	1.00	0.89-1.13	ns
Malmö	2.32	1.27-4.23	.006
Multiple Centers	0.91	0.79-1.06	ns
Oslo	0.76	0.62-0.94	.010
Borough Town	1.12	0.89-1.42	ns
Market Town	0.79	0.61-1.01	.060
Shire Town	1.22	0.98-1.51	.078
South City	0.99	0.88-1.12	ns
Cambridge	0.85	0.73-0.99	.038
Gillingham	1.48	1.28-1.71	.087
All 20 studies*	1.08	0.97-1.20	ns
15 UK studies*	1.11	0.98-1.27	ns
5 other studies*	0.97	0.83-1.13	ns

Notes: Southwark-EC = Elephant and Castle; Southwark-C = Camberwell; Southwark-E = East Street; Cincinnati-N = Northside; Cincinnati-H = Hopkins Park; Cincinnati-F = Findlay Market; Multiple Centers = multiple city and town center study by Sivarajasingam (2003); * random effects model used in analysis.

Table 8
Meta-Analysis of CCTV Evaluations in Public Housing

Evaluation	RES	95% Confidence Interval	P
New York City	0.89	0.38-2.07	ns
Glasgow	1.43	1.19-1.72	.0001
Deploy Estate	0.85	0.70-1.04	ns
Dual Estate	0.78	0.63-0.97	.023
Southcap Estate	0.76	0.57-1.02	.067
Eastcap Estate	1.03	0.75-1.42	ns
Northern Estate	1.34	0.84-2.12	ns
Westcap Estate	1.85	1.44-2.37	.0001
All 8 studies*	1.07	0.83-1.39	ns

* Random effects model used in analysis.

Table 9
Meta-Analysis of CCTV Evaluations in Public Transport

Evaluation	RES	95% Confidence Interval	P
Underground-S	2.58	1.84-3.61	.0001
Underground-N	1.32	0.87-2.01	ns
Underground-C	0.89	0.74-1.07	ns
Montreal	1.02	0.86-1.22	ns
All 4 studies*	1.30	0.87-1.94	ns

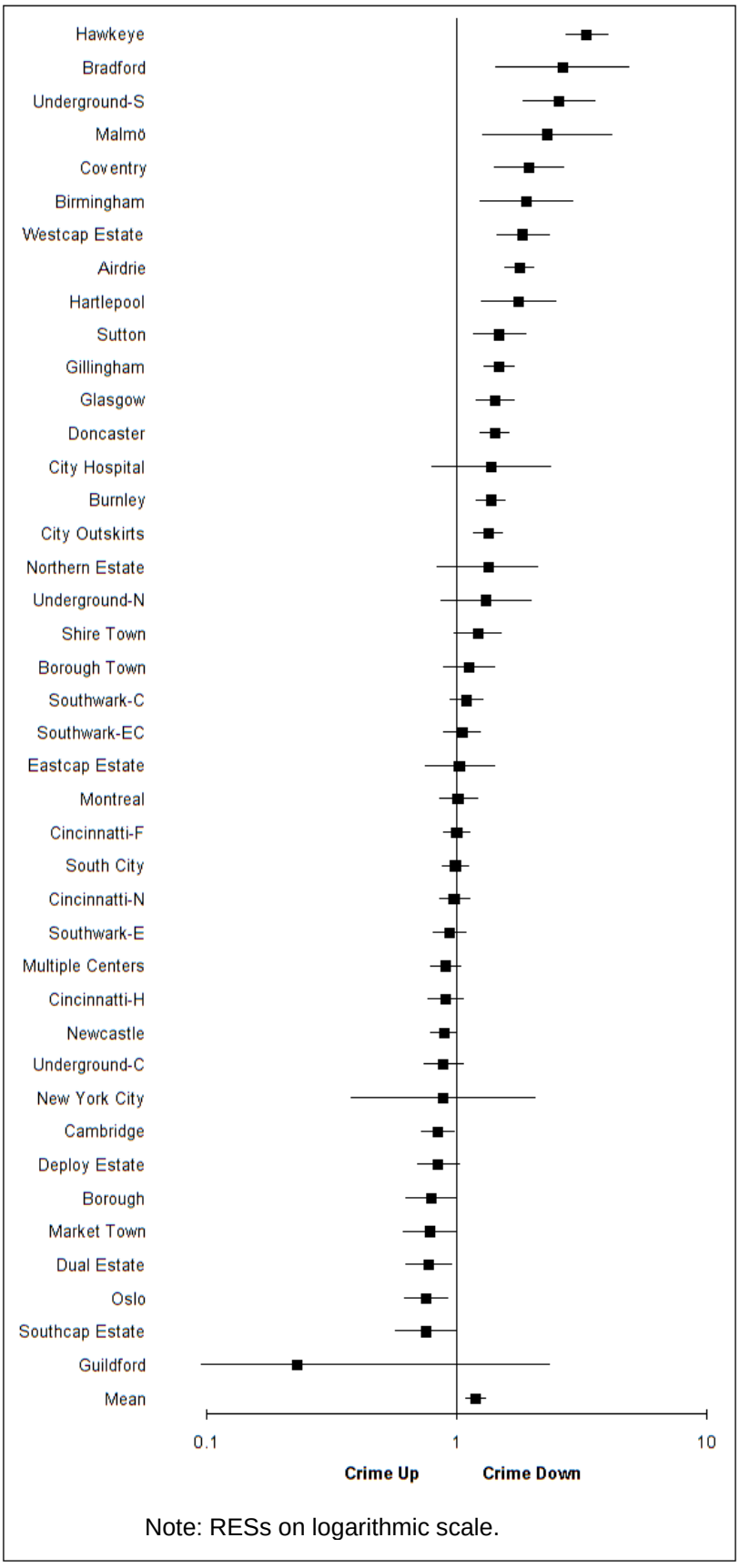
Notes: Underground-S = southern line; Underground-N = northern line; Underground-C = Oxford Circus; * random effects model used in analysis.

Table 10
Meta-Analysis of CCTV Evaluations in Car Parks and Other Places

Evaluation	RES	95% Confidence Interval	P
Car Parks			
Guildford	0.23	0.02-2.38	ns
Hartlepool	1.78	1.25-2.52	.001
Bradford	2.67	1.43-4.98	.002
Coventry	1.95	1.41-2.71	.0001
Sutton	1.49	1.16-1.91	.002
Hawkeye	3.34	2.73-4.08	.0001
All 6 studies*	2.03	1.39-2.96	.0003
Other			
City Outskirts	1.34	1.16-1.54	.0001
Borough	0.80	0.63-1.02	.075
City Hospital	1.38	0.80-2.40	ns
23 violence	1.03	0.96-1.10	ns
22 vehicle crimes*	1.35	1.10-1.66	.004
34 UK*	1.24	1.10-1.39	.0005
7 non-UK*	0.97	0.86-1.09	ns
All 41 studies*	1.19	1.08-1.32	.0008

Notes: * random effects model used in analysis.

Figure 1
RESs and 95% Confidence Intervals for Total Crime by Study



Note: RESs on logarithmic scale.