

CCTV in Amsterdam – Lessons Learned

Author: Sander Flight, senior researcher at DSP-groep (www.dsp-groep.nl), Amsterdam/Rotterdam, The Netherlands
October 2007

E-mail: sflight@dsp-groep.nl

Abstract

The number of surveillance-cameras in open street settings in The Netherlands has increased rapidly between 1997 and 2003. In nearly one hundred Dutch cities, which amounts to one in five, CCTV was introduced to tackle crime and anti-social behaviour. This article first discusses two Dutch meta-evaluations, concluding that the effects of CCTV appear to be, on average, positive, but that there is a lack of robust evaluations making it impossible to develop transferable lessons for good practice. In the second part of the article, the evaluations of five CCTV-schemes in Amsterdam are discussed in more detail. These studies show that in two out of five schemes, a significant decrease in recorded crime was found. The results of surveys are then discussed, showing the effect of CCTV on different types of crime. In addition to this impact evaluation, a process evaluation was conducted, that looked at mechanisms, contexts and the operation of the schemes. This suggests that the success of CCTV depends more on the design and operation, than on the context or the type of crime in the area under surveillance.

CCTV in the Netherlands – an overview

The first Dutch city using surveillance cameras in an open-street setting was Ede. This city introduced surveillance-cameras in its city centre in 1997 to tackle problems with violent crime in the nightlife area. In just six years time, nearly one hundred cities, or one in five of all Dutch cities, followed this example and introduced CCTV in public spaces to promote safety and to fight crime and anti-social behaviour. Since then, this trend has continued at a slower pace. Still the number of cities using CCTV is increasing and the number of cameras per city is rising. In short, CCTV plays an important part in the safety policy of many Dutch cities and will very likely continue to grow in importance in the near future.

As in other countries that have embraced CCTV, its popularity is largely unrelated to the results of studies that have tried to assess the impact of CCTV on crime and anti-social behaviour. The question 'Does CCTV work' remains unanswered. One of the reasons for this is the lack of robust research: over half (55%) of Dutch cities using CCTV did not conduct an evaluation at all. The rest did evaluate their CCTV-system, but this has produced mixed findings. Sometimes it works, sometimes it doesn't and sometimes we don't know. It may seem logical to conclude that more

research is needed to establish the impact of CCTV. But the opposite might actually be true: the more evaluations are being published, the more unclear things become. The reason for this is that CCTV is introduced in completely different settings: entertainment districts, shopping centres, car parks, residential neighbourhoods, industrial areas and stations. The context is never the same. Moreover, CCTV-schemes themselves are never identical. Some schemes consist of just one camera, while others use several hundreds of cameras. Also, the way the cameras are used varies considerably: in some schemes, police-officers or other staff watch the monitors 24 hours a day, seven days a week and react to incidents as they occur. In others, images are not being monitored but stored for later use. Sometimes images are not even recorded in camera systems that only aim at a deterrent effect. In other words: CCTV is not a simple, single or straightforward measure that can be evaluated in the way that, for instance, a new medical remedy against the flu could be evaluated. CCTV is not something that can be given to a random sample of patients (cities) and the results cannot be easily aggregated. The patient is different each time as is the cure administered. A much more interesting question than 'Does CCTV work?' is 'How does CCTV work?'

What we do know

As mentioned above, less than half of Dutch cities using CCTV has performed an evaluation. Most of these evaluations have not been published and are therefore immune to scientific scrutiny. The evaluations that have been published, consisted for the most part of a comparison of police-recorded crime figures in the target area for a twelve month period (or the year) preceding introduction and a twelve month period (or the year) following introduction. In addition to these quantitative analyses, most evaluations involved interviewing stake-holders, such as police-officers, politicians, control room staff, et cetera, asking them to describe the impact of CCTV.

Seventeen cities (or 46%) of the cities that published an evaluation of CCTV, concluded that property crimes, such as vehicle crime and burglary, were reduced. Thirteen (35%) cities reported a reduction in violent crimes. Ten cities (27%) claimed more crimes were solved with the help of CCTV-footage. All in all, most cities using CCTV reported one or more positive effects (Homburg and Dekkers, 2003). Most also decided to increase the number of areas with CCTV or to increase the number of cameras per scheme.

A second meta-evaluation summarised the size, costs, and effects of CCTV in twelve Dutch cities, using twelve evaluations that were accessible to the public (Geelhoed, 2005).

The average number of cameras in the cities included in this research was 45. In Amsterdam, Rotterdam and Den Haag, more than one scheme is in operation. The average initial, or start-up, costs of the twelve cities investigated, was roughly half a million Euros. These costs include the CCTV-system itself (camera's, hardware and software) and the infrastructure necessary to bring the images to the control room or recorder. The returning, or yearly, costs involve maintenance of the system and labor cost for the control room staff and amount to roughly one hundred thousand Euros per year.

[See Table 1]

The effects reported in these evaluations were, again, mixed. Fear of crime went down in six of the twelve cities, with different results for different groups of people (residents, visitors, businesses). In six other cities, fear of crime remained more or less constant. The effect of CCTV on police-recorded crime was mixed as well: in six cities recorded crime went down, in four cases it went up, and one report found no change at all. In one evaluation, recorded crime was not analysed at all. The conclusions drawn on the basis of these mixed results were, however, for the most part positive.

Even in cities where recorded crime went up, this was sometimes regarded as a positive outcome, because CCTV apparently led to the recording of crimes that previously would have remained unnoticed.

The possibility of geographical displacement of crimes to other areas (or a diffusion of benefits) was addressed in eight of twelve evaluations. Four schemes showed partial displacement and four schemes showed no displacement.

Both meta-evaluations point to the need for more robust research if we want to be able to assess the impact of CCTV. Researchers are becoming aware of the fact that they need to develop an understanding of the *mechanisms* through which and the *contexts* in which CCTV *could* operate (Pawson and Tilley, 1993, Gill and Spriggs, 2005). This is much more interesting than simply asking whether CCTV works or not.

CCTV in Amsterdam

In Amsterdam, six open street CCTV-schemes are currently in operation: three schemes are located in shopping-areas (38 cameras, installed between 2000 and 2003), one scheme is in a residential area (5 cameras; 2001), one scheme covers the prostitution or 'Red Light' district (16 cameras; 2003) and the most recent scheme is around the main train station (16 cameras; 2005). The goals of these six schemes are very different. In two schemes, the main aim is to tackle problems associated with anti-social behaviour of (groups of) youngsters and, to a lesser degree, pick-pocketing, robberies and assaults. The other schemes were mainly targeted at drug dealing, drug use and pick-pocketing, but hoped to reduce antisocial behaviour and fear of crime as well.

For five of these six CCTV-schemes, an evaluation has been carried out that tried to avoid the pitfalls of evaluation discussed earlier. The research design consisted first of a quasi-experimental model with the aim of achieving Level 3 of the Maryland Scientific Methods Scale (Sherman et al. 2002). This entails a pre-post measurement in the target area and in a control area. The police division was used as the control.¹ Data were collected pre- and

¹ Gill and Spriggs (2005, p. 20) state that the results in their study 'give little indication that a control area provides a better comparison than the division. (...) Examination of trends in crime data indicated that in some instances the division was a better control than a control area, as crime trends in the

post introduction using surveys among residents, visitors and small businesses. Police recorded crime was analysed and stakeholders, police-officers, control room staff, residents and shop-owners were interviewed. A substantial portion of research budgets was allocated to research aimed at detecting geographical displacement or diffusion of benefits.

In addition to the measurement of effects, interviews were held to explicitly discuss the mechanisms people hoped to fire and contexts present that could influence the way in which CCTV would work. Also, other measures that were introduced alongside CCTV were discussed, for instance improved street-lighting or extra police surveillance. Finally, the way the system was designed, managed and operated was discussed.

Recorded crime

Though not very reliable, due to the fact that a lot of crime goes unrecorded, police figures for five types of crime (street robbery, assault, hold-up, burglary and car crime) were analysed. This showed a marked decrease after the introduction of CCTV.

[See Table 2]

Aggregating the results of the five schemes, recorded crime has decreased from 751 incidents a year to 541 a year; a drop of 28 per cent.² The corresponding figures for the control areas (the police division) showed an average drop of 12 per cent. Using the Relative Effect Ratio³ developed by

division more closely matched those in the intervention (or target) area than those in the control area’.

² The evaluation period for each of the five schemes differs with the date of introduction. Data have been collected for a period of twelve months prior to installation of CCTV and a period of twelve months after. For the two schemes in the city-centre (Nieuwendijk and Wallen), police- and survey data were collected for three years (one before and two after).

³ The relative effect ratio compares the change in recorded crime levels in a target area with that in the control to provide a relative measure of the difference between the two. Where this is greater than one, there was either a greater reduction in recorded crime levels in the target area relative to the control, or a smaller increase in the target relative to the control, so that in effect the relative crime levels in the target area are lower than the

Gill and Spriggs (2005), four out of five schemes performed better than the control area (ratio > 1). However, only in two cases was the difference statistically significant.

[See Figure 1]

Based on these findings, we can conclude that two of the five CCTV-schemes in Amsterdam showed a significant decrease in the number of police-recorded crime, compared to the control area. In three other areas, the changes in police-recorded crime did not differ significantly from the trends in the control area and have to be attributed to chance.

Surveys

Because a lot of crime goes unrecorded, police records may not be the best source of information to establish whether a change in crime levels has occurred. Especially ‘small’ crime, such as vandalism and bicycle-theft, and antisocial behaviour are hardly ever found in police records. Surveys are better suited to measure these phenomena. The same is true for fear of crime – this can only be measured using surveys. Looking at the number of crimes, surveys conducted before and after the introduction of CCTV, confirm the results of the analysis of police-recorded crimes. If we limit the analysis to the five crime types discussed above, we find a reduction of 21 per cent (from 458 to 361 incidents). If antisocial behaviour is included, the reduction is 31 per cent (from 809 to 555 incidents).

[See Table 3]

According to these results, two types of crime were most affected by CCTV: trouble caused by groups of youngsters and verbal aggression. This suggests that CCTV might be more effective in fighting anti-social behaviour than crime. This may come as a surprise to some researchers in the field, but the reason for this could well be that a lot of evaluations have relied completely on an analysis of police-records where these types of offences are absent.

Fear of crime

Fear of crime has also been measured in the surveys. The proportion of residents stating that they felt unsafe in ‘their’ CCTV area, did not

crime levels in the control. The larger the number, the greater the difference between the two. See: Gill and Spriggs, 2005, p. 22)

change significantly in four of the five schemes. A significant improvement was found in one of the schemes, where the percentage of people that (occasionally) felt unsafe in their neighborhood decreased from 91 per cent to 82 per cent. Overall, CCTV was not as effective in reducing fear of crime as it was in tackling crimes and incivilities.

Displacement

Displacement of offenders is an issue of continued debate among practitioners and researchers of CCTV. In the Amsterdam evaluations, displacement and diffusion of benefits formed an important part of the research (see: Flight, Van Heerwaarden and Van Soomeren, 2003). The conclusion was that some offences were partially displaced: theft from cars, assault, and mugging. However, the total number of crimes and anti-social behaviour in the target area *and* the displacement area was reduced, which lead to the conclusion that the net effect was positive. Moreover, a diffusion of benefits was found for verbal aggression and bicycle theft. For these crimes, the reduction was not limited to the CCTV-area itself, but reached out beyond the immediate boundary of the areas under surveillance. These results again show that it is necessary to look closely at different types of crime and locations in order to understand the impact of CCTV on the behaviour of offenders, inside and outside target areas.

Mechanism, context and operation

Despite the fact that several evaluations have become available, the question whether CCTV works has not been answered definitively. On the contrary, the more attempts are being made to summarize and aggregate findings from different evaluations, the more difficult it becomes to draw general conclusions. A meta-analysis of 22 evaluations of CCTV conducted by Welsh and Farrington (2002) showed that sometimes the effect is positive, sometimes negative and sometimes neutral (quoted from Gill and Spriggs, 2005). We will have to accept that more meta-evaluations such as these will not improve this situation: CCTV is a complex measure that will work in different ways and will have different effects in different contexts. If we want to be able to come up with transferable lessons, we need to shift attention from the question 'Does CCTV work?' to 'How does CCTV work?'. Some research has been done in this field, using the scientific realism approach, instead of the 'classical' quasi-experimental design. The question is how mechanisms, such as CCTV, work in contexts to produce outcomes (see Pawson and Tilley, 1997 and Gill and Spriggs, 2005).

But mechanisms and contexts are not the only aspects that determine the impact of CCTV: schemes are also being designed and operated in completely different ways. Gill and Spriggs (2005) illustrated this by a sporting analogy: if a horse fails to win a race, the post-race analysis will focus on both horse (CCTV) and rider (design, operation and management). Was the horse simply not as good as had been supposed, or did the jockey ride a poor race? In order to integrate these issues into our evaluation, we have looked at the design and management of CCTV projects as well as at control room operation.

The research done in Amsterdam confirms the importance of some of these issues, but not all. There are strong indicators that the impact of CCTV is only slightly determined by the number of cameras. There need to be enough cameras, but more is not necessarily better. The most successful scheme in Amsterdam consists of thirty cameras that cover a relatively large area that would require several hundreds of cameras in order to be able to track offenders throughout the area. In another scheme, which was not successful at all, eight cameras were installed to watch over just the four streets surrounding a shopping-mall. This effectively amounted to 'blanket coverage', but the cameras did not make a difference at all. Over all, the amount of money spent on the system itself (hardware, software and infrastructure) does not predict the impact a CCTV system will have on crime or anti-social behaviour.

If that is true, then what does determine the impact of CCTV? Our Amsterdam research shows that the success of a scheme depends heavily on the active involvement of the police in the design and operation of the scheme. In some schemes, the number of cameras and their positioning was decided upon by technical experts without specific knowledge of the area and its crime problems. In other schemes, the police actively participated in the discussion on where and how to install cameras. This resulted in better and more effective schemes, as the police knew where crime problems were most pressing and where cameras should be positioned in order to be able to deploy police effectively or gather useful evidence.

In addition to this, there needs to be a good connection between the control room and police on the street. Our research clearly shows that where police deployment is guided effectively and efficiently by staff in the control room, CCTV can have a deterrent effect on crime. In order for this to come about, offenders have to be made aware of the fact that their apprehension was a direct result of CCTV. Gill and Loveday (2003) have shown that offenders do not perceive CCTV to be a serious problem, until they have been caught on camera themselves. This suggests that, in schemes where

more offenders are confronted more often with an effective system in operation, the deterrent effect will increase. In the long run, the need for reactive and repressive action will then decrease.

Another important predictor of success, is the availability of resources to make changes in the CCTV-system after installation. Because cameras are supposed to change the behaviour of offenders, it is surprising to see that most cities do not change the number or the position of cameras once they have been installed. Several operators told us that it took them only a few days to find out which cameras were useful and which were not, but that it took over a year to make the necessary changes, if they were made at all.

Conclusion

Between 1997 and 2003, nearly one hundred Dutch cities introduced CCTV in open street settings. Two Dutch meta-evaluations confirm other research that concluded that CCTV produces mixed results: sometimes the results are positive, sometimes negative and sometimes neutral. This problem will not be solved by performing even more (meta) evaluations. On the contrary: the question 'Does CCTV work?' will become more difficult to answer if we simply aggregate more findings from different evaluations. There are several reasons for this. First of all, CCTV-schemes are never identical. The context in which these systems are introduced are never the same. Second, the active ingredients (mechanisms) that could make CCTV an effective instrument in fighting crime and anti-social behaviour, will be different in different locations or at different moments in time. Third, CCTV is designed, managed and operated in completely different ways. All this makes it impossible to develop transferable lessons by just looking at the impact of several CCTV-schemes.

In our research in Amsterdam, we have tried to take into account these problems by focussing on mechanisms and contextual factors that influence the working of CCTV. We wanted to increase our knowledge of *how* CCTV works. It is still too soon to answer all questions raised above, but the findings suggest that progress can be made by adopting a more realistic approach to evaluation. Five separate evaluations discussed in this article showed that the actual number of crimes decreased in four of the five schemes, even when compared to a control area. In two cases, the difference was statistically significant suggesting that CCTV can

indeed have a positive effect on the number of crimes recorded. Surveys among residents and visitors of the areas confirmed these results. These also showed that CCTV could be more effective in combating anti-social behaviour and 'small' crimes, than violent or property crimes. Fear of crime went down in one of the five schemes. Partial displacement did occur, but only for certain crimes and incivilities. This was matched, in some areas, by a diffusion of benefits where crime went down even in neighbouring areas that were not being monitored by the CCTV system. Another conclusion that could be drawn, was that evaluators should combine an analysis of police recorded crime and surveys, because certain crime types, anti-social behaviour and fear of crime will not receive enough attention if researchers focus exclusively on police-records.

Alongside the impact evaluation, a process evaluation was also conducted. This showed that, although it is still too early to draw firm conclusions, the success of any CCTV-scheme seems to be largely independent of the exact number of cameras installed or the amount of money spent on hardware and software. More important is the way in which the police are involved in the design of the system, in what way the control room is able to effectively guide police deployment on the street and whether resources are available to make changes in the system after it is installed.

Summarizing this, it seems that mechanisms and context are less important than design and operation. In theory, this could be caused by the fact that all schemes evaluated were located in Amsterdam and that therefore mechanisms and contexts might have been equal. This, however, was not the case: the crime problems in these five areas were completely different as were the relevant mechanisms and contexts. Despite these differences, the impact of CCTV was on the whole positive if the system was designed well and operated effectively. The opposite was also true: where design and operation were problematic, the impact was negative. An interesting subject for future research will be to test the hypothesis that CCTV is capable of tackling any crime-problem in any given context as long as it is designed and operated efficiently and effectively. Unfortunately, the opposite may also be true: if CCTV is not designed and operated efficiently and effectively, it will not tackle any crime-problem in any context.

Tables/figures

Table 1 – Summary of CCTV-schemes in 12 Dutch cities

| | Number | Initial costs (in 1.000 Euro) | Returning costs (in 1.000 Euro) |
|-----------------------|--------|----------------------------------|------------------------------------|
| Den Haag (2 schemes) | 164 | 682 | 30 |
| Rotterdam (4 schemes) | 79 | not available | 150 |
| Maastricht | 78 | 1.500 | 212 |
| Amsterdam (3 schemes) | 54 | 850 | 507 |
| Arnhem | 50 | 1.070 | 113 |
| Utrecht | 32 | 895 | 200 |
| Breda | 21 | 550 | 85 |
| Ede | 19 | 245 | 15 |
| Apeldoorn | 14 | 91 | 18 |
| Groningen | 14 | 205 | 150 |
| Zwolle | 11 | 114 | 10 |
| Bergen op Zoom | 6 | 173 | 21 |
| Average | 45 | 580 | 126 |

Table 2 – Changes in police recorded crime for five CCTV schemes in Amsterdam

| Location | Crime in target | | | Crime in control | | | Relative Effect Ratio |
|--------------------|-----------------|-------|------------|------------------|-------|------------|-----------------------------|
| | Before | After | Change (%) | Before | After | Change (%) | |
| August Allebéplein | 16 | 14 | -13 | 7.531 | 8.165 | +8 | 1.24 |
| Belgiëplein | 76 | 84 | +11 | 8.377 | 7.522 | -10 | 0.81 |
| Kraaiennest | 344 | 264 | -23 | 7.038 | 6.668 | -5 | 1.23* |
| Nieuwendijk | 159 | 105 | -34 | 6.343 | 4.537 | -28 | 1.08 |
| Wallen | 156 | 74 | -53 | 6.343 | 4.537 | -28 | 1.51* |

Significance level:

* $p < 0.05$

Table 3 – Survey results: victimization per type of crime in five CCTV-schemes in Amsterdam (N before = 647; N after = 629)

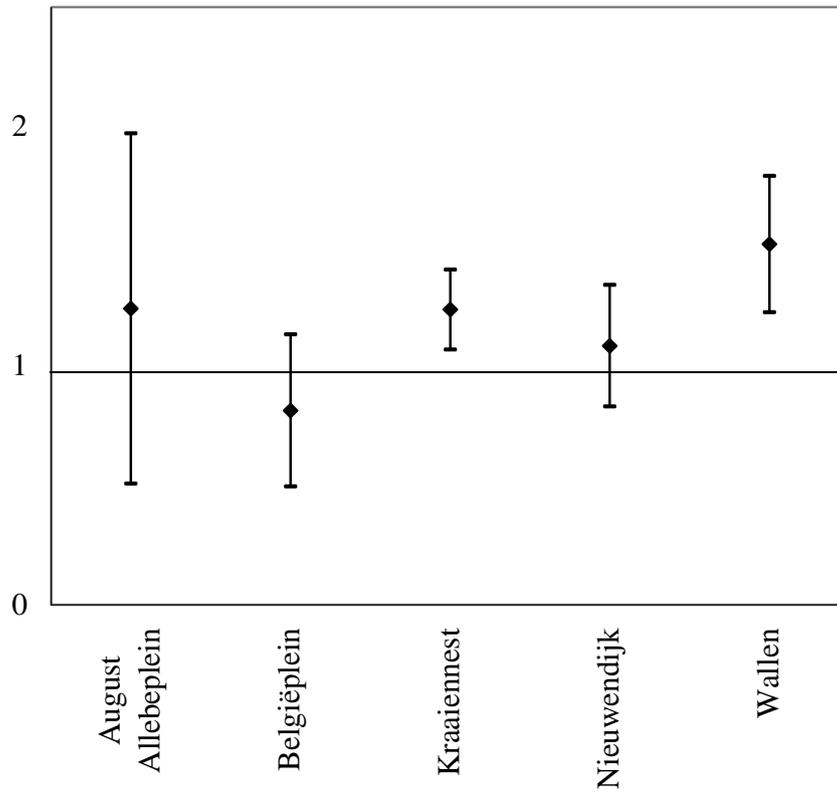
| | Before | After | Change (%) | |
|--|--------|-------|---------------|----|
| Mugging | 8% | 9% | +1% | |
| Burglary | 9% | 9% | 0% | |
| Theft from car | 18% | 16% | -2% | |
| Pick pocketing | 9% | 6% | -3% | * |
| Assault | 13% | 9% | -4% | * |
| Bicycle theft | 14% | 9% | -5% | ** |
| Trouble caused by groups of youngsters | 40% | 28% | -12% | ** |
| Verbal aggression | 40% | 25% | -15% | ** |
| Other offences/incivilities | 16% | 8% | -8% | ** |
| Total number of crimes/incivilities (absolute) | 809 | 555 | -31% | |

Significance level:

* $p < 0.05$

** $p < 0.01$

Figure 1 - Relative effect ratio and corresponding confidence interval



References

- Dekkers, S. and Homburg, G. (2006): *Evaluatie cameratoezicht op openbare plaatsen; nulmeting*, Amsterdam: Regioplan.
- Flight, S., Van Heerwaarden, Y. and Van Soomeren, P. (2003): 'Does CCTV Displace Crime? An Evaluation of the Evidence and a Case Study from Amsterdam', in M. Gill (ed.): *CCTV*, Leicester: Perpetuity Press.
- Geelhoed, F. (2005): 'Verbeelde Veiligheid: over Effecten van Cameratoezicht in het Publieke Domein', in *Tijdschrift voor Veiligheid en Veiligheidszorg*, 4/2: 3-27.
- Gill, M. (2003): *CCTV*, Leicester: Perpetuity Press.
- Gill, M. and Spriggs, A. (2005): *Assessing the Impact of CCTV*, Home Office Research Study 292.
- Homburg, G. and Dekkers, S. (2003): *Cameratoezicht in de openbare ruimte*, Den Haag: College Bescherming Persoonsgegevens.
- Homburg, G., Dekkers, S. and Koffijberg, J. (2007): *Evaluatie cameratoezicht op openbare plaatsen; éénmeting - eindrapport*, Amsterdam: Regioplan.
- Pawson, R. and Tilley, N. (1994): 'What Works in Evaluation Research?' in: *British Journal of Criminology*, 34/3: 291-306.
- Pawson, R. and Tilley, N. (1997): *Realistic Evaluation*, London: Sage Publications.
- Sherman, L., Farrington, D., Welsh, B. and MacKenzie, D. (2002): *Evidence-Based Crime Prevention*, London: Routledge.
- Welsh, B. and Farrington, D. (2002): *Crime Prevention Effects of Closed Circuit Television: A Systematic Review*, Home Office Research Study, no.252, London: HMSO.
- Wilson, D., Sutton, A. (2003): *Open-Street CCTV in Australia: a Comparative Study of Establishment and Operation*, Report to the Criminology Research Council, Department of Criminology/University of Melbourne.