TEMPLE UNIVERSITY

CCTV Camera Evaluation

The crime reduction effects of public CCTV cameras in the City of Philadelphia, PA installed during 2006

Crime in the vicinity of CCTV cameras is examined using two different evaluation techniques. A multilevel model that considers long-term trends and seasonality finds that the introduction of cameras is associated with a 13 per cent reduction in crime. A site-specific examination of each camera location finds that while some cameras reduced reported crime and spread a benefit to the surrounding area, other cameras failed to prevent reported crime or appeared to displace more crime to surrounding streets than they prevented.

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Executive Summary

Between July 2006 and November 2006 the City of Philadelphia installed 18 CCTV cameras at various locations in the city. Two types of cameras were installed. Phases I and II saw the installation of 10 police-monitored cameras at four locations. These cameras are monitored by Philadelphia Police Department (PPD) officers, and have the capacity to pan, tilt and zoom (PTZ). Phase III took place during November 2006 and saw the installation of a total of 8 PODSS cameras at 8 locations in the city. These cameras are not monitored at police headquarters, but officers can monitor video feeds wirelessly from within patrol cars in the vicinity of a camera. Furthermore the PODSS cameras record the street scene continuously on a digital hard drive. If a crime is known or suspected to have been committed within the view of a camera, police officers retrieve the hard drive manually from the camera and review the recording.

Across a range of serious and public disorder crime types that CCTV is expected to influence, this evaluation measures the impact of the cameras on recorded crime in two ways. Hierarchical linear modeling is used to evaluate the general impact of all of the cameras, and is able to allow for different camera implementation dates, any seasonal variation in crime, and any general trends in crime at each site. This technique finds that the introduction of CCTV cameras is associated with a 13 per cent reduction in crime through to the end of August 2007.

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For each individual camera site, weighted displacement quotient (WDQ) analysis is used to explore the impact of the camera on serious and public disorder crime. WDQ analysis does not incorporate sensitivity for seasonality but it is able to measure any displacement to the surrounding streets and neighborhood and it can account for general crime trends in the surrounding police districts. The WDQ analysis finds significantly different results for cameras. With regard to serious crime, four camera sites did not reduce crime in the target area, while four not only reduced crime but were also associated with a diffusion of benefits out to the surrounding streets beyond the cameras' vision.

The evaluation suggests that while there appears to be a general benefit to the cameras, there were as many sites that showed no benefit of camera presence as there were locations with a noticeable impact on crime. Discussions with police commanders and camera operators may explain the disparity between the various sites. An in-depth study of the dynamics of individual camera locations and the arrest patterns at these sites may also explain the findings. These conversations and research will inform a greater understanding of the best locations to place cameras, and potentially help the city get a better cost-benefit return on the city's future investment by deploying forthcoming cameras in locations that provide the best potential crime prevention benefit.

CAMERA TYPES, LOCATIONS, AND IMPLEMENTATION DETAILS

PTZ cameras

The 8 PTZ cameras were installed in Phases I and II between July 2006 and October 2006. These cameras have the capacity to tilt up and down, pan around the surrounding area, and zoom. Examination of the zoom capacity by the researchers indicates that the camera allows the police officer to read a car license plate more than a block away, and observe street activity up to three blocks distance if the view is unobstructed. The video feed is routed directly to police headquarters where a police officer is able to monitor cameras in real time. Hard drive storage capacity is 12 days.

PODSS cameras

The PODSS cameras, as implemented in Phases III in Philadelphia, provide a moveable, self-contained digital camera and recording system that is housed in a bullet-resistant unit with flashing strobe lights to draw the attention of the public and potential offenders. As implemented in Philadelphia, these cameras are not monitored by at police headquarters; however, nearby patrol officers with the correct equipment in 2-officer cars can view the feed from cameras over a wireless link. The system is also able to record up to five days of street activity on a digital hard drive. When a crime is suspected to have occurred within the view of the camera, a police officer meets street engineering personnel from the city and the digital video record hard drive in retrieved from the unit with the aid of a crane.

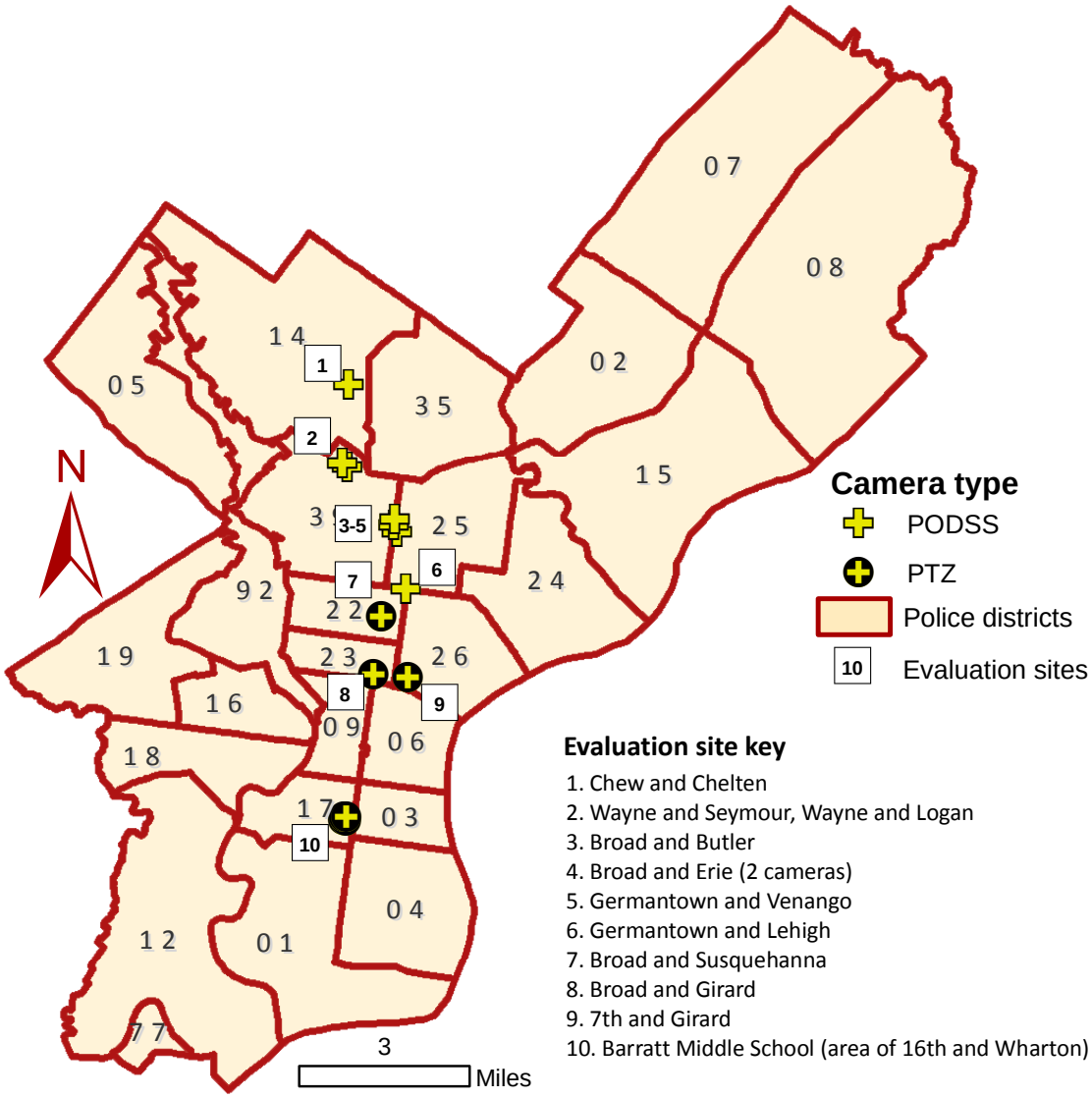
Implementation details

Although there are 18 cameras at 12 locations, some cameras are located so close to other cameras (within a block's distance) that the decision was made to evaluate sites rather than individual cameras. The situation is further complicated by cameras 3 to 5 in the map on the following page, which are not co-located but are close enough that any potential displacement would likely be to overlapping areas. Therefore there are 8 different evaluation areas, labeled 1, 2, 3-5, 6, 7, 8, 9, 10 on the map. The table shows the evaluation site details.

Site	Type	Cameras	Implementation	Location
1	PODSS	1	11/30/06	Chew and Chelten
2	PODSS	2	11/30/06	Wayne and Seymour, Wayne and Logan
3-5	PODSS	4	11/21/06	Broad and Butler Broad and Erie (2 cameras) Germantown and Venango
6	PODSS	1	11/30/06	Germantown and Lehigh
7	PTZ	2	10/06/06	Broad and Susquehanna
8	PTZ	2	10/06/06	Broad and Girard
9	PTZ	2	July 06	7th and Girard
10	PTZ	4	09/29/06	Barratt Middle School (area of 16th and Wharton)

Locations

The map below shows the evaluation sites against a backdrop of PPD districts. Evaluation sites are numbered and relate to the first column of the table on the preceding page.



Evaluation site key

1. Chew and Chelten
2. Wayne and Seymour, Wayne and Logan
3. Broad and Butler
4. Broad and Erie (2 cameras)
5. Germantown and Venango
6. Germantown and Lehigh
7. Broad and Susquehanna
8. Broad and Girard
9. 7th and Girard
10. Barratt Middle School (area of 16th and Wharton)

EVALUATION

Offender perception or camera viewshed?

A theoretical perspective suggests that cameras may work to prevent crime if two criteria are met; the offender is aware that the camera may be watching their activity, and secondly that the offender perceives that the risk of capture by police may outweigh the benefits of the crime they are considering[1]. As crime prevention is therefore a feature of offender perception, it may be that although the cameras may only be able to see a certain amount of public space, offenders perceive that the cameras can observe their activity to a greater or lesser range. The choice is therefore to define evaluation areas based on possible offender perception of camera range, or on the actual area that the camera can view. In this research we took the approach of mapping the actual areas that the cameras can see. This is because offender perception is not possible to measure without extensive and expensive interviewing, and secondly because offender perception will vary from person to person. Fortunately, the weighted displacement quotient analysis is able to incorporate a measure for diffusion or displacement, in the event of a misspecification of the surveillance zone.

We designated two areas around each camera site. The first area was designated the **target area** - the area where the cameras are expected to have a positive effect. Because we were unable to view the video feed from PODSS cameras, we designated these areas as simply the junction where the camera was located. For the PTZ cameras, we worked with PPD officers to map the individual viewsheds of the cameras by panning and zooming the cameras and discussing active viewing areas with the officers.

We then designated **buffer areas** around each camera. These areas were designed to be likely places in the surrounding neighborhood of the cameras where crime activity could potentially be displaced. The buffer area is also a zone where potential diffusion of benefits could occur. This can happen when the cameras exert a benefit to surrounding areas beyond their target area, and happens when offenders move out of the general area of the camera, or offenders at unviewed areas curtail their activity because they think the camera can still see them. The buffer areas were generally designated as a block or two out from the target area.

Finally, as a control on general trends in the surrounding areas beyond the target and buffer area, we designate the surrounding police district(s) as the **control area**. The control area varies for each camera.

Displacement or diffusion?

CCTV cameras may or may not have an impact in the target area; however, it is possible that cameras may also have an impact on neighboring areas that are not directly under the surveillance of a camera. The term **displacement** is used to indicate when cameras displace crime activity out of their view and into nearby areas. This can happen when offenders decide the risk of operating within the sight of a camera is too great, and move criminal activity to a nearby location. Displacement is therefore a negative outcome of the introduction of a camera.

[1] See Ratcliffe, J. H. (2006). *Video Surveillance of Public Places* (Problem-Oriented Guides for Police number 4). Washington DC: Center for Problem Oriented Policing.

It is also possible that a **diffusion of benefits** can occur. This happens when the beneficial effect of a crime prevention initiative spills over into surrounding areas. While many crime prevention practitioners assume that displacement is the most likely outcome, research suggests that diffusion of benefits is a more likely outcome from a successful crime prevention initiative.

Crime types

This evaluation limits crimes examined in the study to those that could be expected to be influenced by CCTV cameras. This means that only crimes that generally occur on the street are included. In other words, theft from a vehicle is included while theft by shoplifting (because it would happen inside a store away from the view of the camera) is not. The crimes are aggregated into three categories; **serious crime** (UCR Part 1 offenses), **disorder crime** (UCR Part 2 offenses), and **all crime** (the sum of the serious and disorder categories).

The appendix contains a detailed list of these crime classifications. Data were made available through to the end of August 2007.

HIERARCHICAL LINEAR MODEL

Hierarchical linear modeling (HLM) is a type of statistical analysis that recognizes nested data structures. At the most basic level this can be thought of, for example, as individuals nested within a neighborhood or police beats nested within police districts. This analysis also applies to repeated observations across individuals or locations. In this report, the analysis looks at time nested within camera locations.

The particular analysis completed has a number of practical benefits. First, it includes variables that statistically control for seasonal effects on crime. Failing to control for seasonal effects (i.e. the difference in crime between winter and summer) can limit the value of any findings. This could be especially true for the street crimes under analysis here, because people spend more time outside when the weather is warmer. Secondly, the analysis controls for preexisting temporal trends at each camera location. For example, if regeneration is taking place near a camera location, this can sometimes mean that crime is slowly falling, an additional effect to the seasonal variation. Failing to control for these pre-camera implementation trends could result in under- or over-estimating the cameras' effects on crime patterns.

Description of variables

In the analysis that follows, the ***length of month*** variable represents the number of days per month. It is reasonable to expect that longer months will have higher crime counts. The existing ***temporal trend*** variable represents the sequential position of the month in the data series. It captures the linear trend of crime around the cameras over time at each location. This variable can be positive if crime is generally increasing, negative if crime is decreasing or zero if the crime trend is showing no change over time. The ongoing effects of changes over time are tailored for each location. Each camera location is allowed to have its own unique linear crime trend over time.

This analysis controls for ***seasonality*** through the use of average monthly temperature. This value represents the monthly average of the average daily temperature. These figures were obtained from the historical archives provided by Weather Underground (available at www.wunderground.com/history).

The ***camera*** variable represents the effects of camera implementation. Because other variables are included, camera effects are net of these other factors (length of the month, pre-existing crime trends, and seasonal effects).

Limitations of HLM analysis

Perhaps the biggest limitation of the HLM analysis is its inability to disaggregate the effectiveness of each camera type. An attempt to control for the type of camera at each location is met with difficulty primarily because there are so few cameras to analyze. Disaggregating the analysis by the type of camera leaves too few cases for a robust statistical analysis. Any findings could be attributed to the location or placement of the camera rather than actual differences in camera effectiveness. This line of inquiry, however, is a worthy area of future investigation. In order to better understand the effects of different cameras at different locations a weighted displacement quotient analysis was utilized.

WDQ ANALYSIS

Bowers and Johnson's weighted displacement quotient[2] is employed to determine whether or not differences between the target and buffer areas are a result of displacement from the target area or a diffusion of benefits from the use of CCTV surveillance in the target area. The determination of a WDQ first requires the researcher to determine three operational areas; the target area where the crime reduction strategy has been deployed (in this case, CCTV camera viewsheds), a buffer area that is estimated to be the most likely location that crime would be displaced to, and a control area that acts as a check on general crime trends that are affecting the region in general. The equation for the weighted displacement quotient is as follows;

$$WDQ = (B_{t1}/C_{t1} – B_{t0}/C_{t0}) / (A_{t1}/C_{t1} - A_{t0}/C_{t0})$$

where *A* is the count of crime events in the target area, *B* is the count of crime events in the buffer area, *C* is the count of crime events in the control area, *t1* is the time since the camera(s) have been active, and *t0* is the pre-intervention time period (an equivalent number of months immediately prior to the installation of the cameras). The examination of the difference between the buffer and control areas from the pre-intervention to the intervention period provides the measure of displacement or diffusion into the buffer area, while the differences between the target and control area ratios at both times provides the measure of success for the intervention. The equation above is therefore comprised of both a **Buffer Displacement Measure** ($B_{t1}/C_{t1} - B_{t0}/C_{t0}$) and a **Success Measure** ($A_{t1}/C_{t1} - A_{t0}/C_{t0}$). A positive Buffer Displacement Measure is indicative of potential displacement, while a negative value indicates possible diffusion of benefits. A positive Success Measure indicates that crime levels did not improve as a result of the

[2] Bowers, K. J., & Johnson, S. D. (2003). Measuring the geographical displacement and diffusion of benefit effects of crime prevention activity. *Journal of Quantitative Criminology*, 19(3), 275-301.

introduction of CCTV cameras, while a negative Success Measure suggests the introduction of cameras was successful in reducing crime.

Limitations of WDQ analysis

Unlike the HLM approach, WDQ is not able to incorporate sensitivity to seasonality patterns or to control for subtle trends in changing crime patterns over time. It compensates for this by incorporating a control area measurement, used to adjust the result for differences in an area not related to the target or displacement zones of the cameras. In other words, the control area provides an indication of what was happening in unaffected areas, and is a broad indication of trends over the same period of time as the CCTV intervention. WDQ does, however, provide the opportunity to measure a general indication of the success of each evaluation site.

Specification of the WDQ parameters

Site	Months camera operational	Camera type	Police district	Control area composition
1	9	PODSS	14	14th police district crime totals, minus target and displacement areas for camera at site 1
2	9	PODSS	39	39th police district crime totals, minus target and displacement areas for cameras at site 2
3-5	10	PODSS	25	25th and 39th police district crime totals, minus target and displacement areas for cameras at sites 2 - 5
6	9	PODSS	25	22nd, 25th and 26th police district crime totals, minus target and displacement areas for cameras at sites 3, 4, 5, 6, 7, and 9
7	11	PTZ	22	22nd police district crime totals, minus target and displacement areas for cameras at site 2
8	11	PTZ	23	6th, 9th and 23rd police district crime totals, minus target and displacement areas for cameras at site 8
9	14	PTZ	26	26th police district crime totals, minus target and displacement areas for camera at site 9
10	11	PTZ	17	17th police district crime totals, minus target and displacement areas for camera at site 10

RESULTS

This section describes the results of the analyses, starting with the HLM model.

The results of the hierarchical linear model (HLM) analysis are presented in the following three tables. Results are broken down by type of crime being analyzed (see appendix for definitions of serious and disorder crimes). The first table looks at the effects of cameras upon serious crimes. The second table demonstrates the effects of the cameras on disorder crimes. The third table demonstrates the effects of cameras on all crime. Statistically significant results (those findings that cannot be attributed to chance alone) are identified through either a single * or a double ** sign.

HLM results for serious crime

The *temporal trend* variable showed that there were, on average, no significant linear crime trends during the time period under analysis here. Across all camera locations, crime was neither rising nor falling during the time period (as explained above, the trend over time was different for each location). The HLM analysis of serious crimes finds that camera implementation had no significant impact upon the amount of crime in the target area. Serious crime decreased slightly, by about 5 per cent, but this drop in crime could have been due to random fluctuations.

Variable	Coefficient	Event Rate Ratio	Standard Error	Confidence Interval
Length of month	0.064	1.066	0.034	0.997 - 1.14
Temporal trend	0.002	1.002	0.006	0.989 - 1.015
Seasonality	0.003	1.003	0.002	1.000 - 1.007
Camera	-0.050	**0.951**	0.104	0.774 - 1.169

** p < 0.05, ** p < 0.001*

It is worth noting, however, that we would normally expect that *seasonality* and the *length of month* to be significant in any analysis of serious street crime. Because the coefficients for these variables were not statistically significant, this suggests that a possible cause for this 'non-finding' is that each month there were insufficient crimes in the target area for the technique to detect a statistically significant change. For example, serious crime in the target area for site 1 was 2 per month prior to and after camera installation. The values for the target area of site 2 were even lower. With this in mind, the lack of statistical significance in the serious crime category could probably be better interpreted as resulting from a lack of reported serious crime generally, rather than a failure of the CCTV initiative.

HLM results for disorder crime

The following table provides the results of the HLM analysis when investigating the impact of cameras upon disorder crimes (see appendix). As can be expected the *length of month* was a significant predictor of higher crime counts. The *temporal trend* variable showed that the number of disorder crimes was slightly increasing during the study period, on average, across all locations. The expected count of disorder crimes was going up on average about 1.3 per cent every month, across the evaluation sites. The significance of the *seasonality* variable suggests that there are more disorder crimes in warmer months.

The *camera* variable result shows that the **camera implementation significantly reduced disorder crime in the target area. After camera implementation the average expected disorder crime count for the target areas was 16 percent lower**, after controlling for the days per month, the average temperature that month, and the crime trend at that target location.

Variable	Coefficient	Event Rate Ratio	Standard Error	Confidence Interval
Length of month	0.052*	1.054	0.023	1.007 - 1.103
Temporal trend	0.013*	1.013	0.006	1.001 - 1.026
Seasonality	0.006**	1.006	0.070	1.004 - 1.009
Camera	-0.174*	**0.840**	0.001	0.733 - 0.963

** p < 0.05, ** p < 0.001*

HLM results for all crime

The following table provides the results of the HLM analysis when utilizing all crime (both serious and disorder). The temporal trend variable was not significant. Across all locations there was no average upward or downward trend. Crime counts were significantly higher when months were longer and warmer.

Camera implementation had a negative and significant impact. **The months following the implementation of the cameras saw a statistically significant 13.3% reduction** in expected crime counts after controlling for the other factors (days per month, the average monthly temperature, and the crime trend at each individual camera location).

Variable	Coefficient	Event Rate Ratio	Standard Error	Confidence Interval
Length of month	0.055*	1.056	0.020	1.014 - 1.099
Temporal trend	0.010	1.010	0.005	0.999 - 1.020
Seasonality	0.006**	1.006	0.001	1.003 - 1.008
Camera	-0.142*	**0.867**	0.061	0.768 - 0.979

** p < 0.05, ** p < 0.001*

WDQ results for serious crime

The tables below show the site, and then the percentage change in crime level in the target area, the buffer area and the control area for that site. If these values are *positive* numbers, then this means that crime *increased* in the area during the time when the camera was functioning at that location, compared to an equivalent number of months before the introduction of the cameras.

The success measure is explained earlier, in the section starting on page 6. As described by Bowers and Johnson (2003), a *positive* number indicates that the camera implementation was *not successful* when compared to the control area. If the success measure is determined to be positive – indicating the camera implementation was unsuccessful in reducing crime – then no further results are reported.

The displacement measure is explained earlier, in the section starting on page 6. As described by Bowers and Johnson (2003), a positive number indicates that when the cameras were implemented, crime went up in the buffer area to a greater extent than in the control area, suggesting displacement. If the number is a negative value, this suggests a diffusion of benefits to the buffer area – a good finding.

The WDQ value is reported here in the table immediately below, after which the following table interprets the results in a more manageable format.

Site	Target	Buffer	Control	Success measure	Displacement measure	WDQ
1	0.0	17.0	-0.8	0.00004		
2	14.3	6.6	6.8	0.00040		
3-5	-28.9	-20.5	-2.4	-0.00163	-0.003	1.852
6	-18.2	-15.0	-10.9	-0.00021	-0.001	2.914
7	11.1	-7.7	1.3	0.00279		
8	14.6	7.1	-0.3	0.00398		
9	-15.0	5.4	9.4	-0.00583	-0.002	0.350
10	-21.4	-9.2	5.4	-0.00540	-0.010	1.832

Site	Camera type	Interpretation of WDQ (SERIOUS CRIME)
1	PODSS	Did not reduce crime in the target area
2	PODSS	Did not reduce crime in the target area
3-5	PODSS	**Camera reduced crime, and there was strong diffusion of benefits**
6	PODSS	**Camera reduced crime, and there was strong diffusion of benefits**
7	PTZ	Did not reduce crime in the target area
8	PTZ	Did not reduce crime in the target area
9	PTZ	**Camera reduced crime, and there was some diffusion of benefits**
10	PTZ	**Camera reduced crime, and there was strong diffusion of benefits**

WDQ results for disorder crime

The following tables follow the same format as explained for the serious crime results above.

Site	Target	Buffer	Control	Success measure	Displacement measure	WDQ
1	19.2	-20.2	-9.8	0.0023		
2	11.8	-8.8	-6.7	0.0017		
3-5	-1.1	9.4	3.8	-0.0002	0.001	-3.454
6	-3.0	-26.5	-16.7	0.0003		
7	0.9	0.0	-4.1	0.0008		
8	-16.4	10.9	5.4	-0.0072	0.001	-0.209
9	-35.9	-21.9	-6.7	-0.0107	-0.005	0.479
10	-2.7	21.0	8.1	-0.0040	0.009	-2.267

Site	Camera type	Interpretation of WDQ (DISORDER CRIME)
1	PODSS	Did not reduce crime in the target area
2	PODSS	Did not reduce crime in the target area
3-5	PODSS	Camera reduced crime, but displacement negated gains
6	PODSS	Did not reduce crime in the target area
7	PTZ	Did not reduce crime in the target area
8	PTZ	**Camera reduced crime, but there was slight displacement** (net gain)
9	PTZ	**Camera reduced crime, and there was some diffusion of benefits**
10	PTZ	Camera reduced crime, but displacement negated gains

WDQ results for all crime

The following tables follow the same format as explained for the serious crime results above.

Site	Target	Buffer	Control	Success measure	Displacement measure	WDQ
1	14.3	-12.3	-6.9	0.0015		
2	12.2	-5.4	-3.8	0.0013		
3-5	-10.6	0.0	2.2	-0.0006	-0.0003	0.508
6	-6.8	-24.3	-15.6	0.0002		
7	4.7	-2.3	-2.9	0.0014		
8	-9.1	9.6	3.7	-0.0040	0.0017	-0.433
9	-34.0	-17.0	-4.9	-0.0102	-0.0043	0.424
10	-5.4	14.2	7.5	-0.0042	0.0047	-1.114

Site	Camera type	Interpretation of WDQ (ALL CRIME)
1	PODSS	Did not reduce crime in the target area
2	PODSS	Did not reduce crime in the target area
3-5	PODSS	**Camera reduced crime, and there was some diffusion of benefits**
6	PODSS	Did not reduce crime in the target area
7	PTZ	Did not reduce crime in the target area
8	PTZ	**Camera reduced crime, but there was some displacement** (net gain)
9	PTZ	**Camera reduced crime, and there was some diffusion of benefits**
10	PTZ	Camera reduced crime, but displacement negated gains

Discussion

Summary of findings

Overall, the introduction of the cameras was associated with a 13 per cent reduction in crime in the CCTV surveillance area around camera locations. The reduction was statistically significant, after controlling for general temporal trends at each camera site, seasonality, and the number of days in each month. This reduction was largely due to a decline in disorder offenses, as the frequency of serious crimes around each camera location was generally too low to detect a measurable impact in serious crime alone. This does not mean that serious crime was not impacted, just that the levels of serious crime were too low to detect a statistically significant effect.

The introduction of CCTV was associated with considerably different impacts on crime at each site. At half of the sites, crime did not reduce in the target area. At four sites, serious crime reduced and there was even evidence of a diffusion of positive benefits to surrounding streets. At some sites, crime reduced in the target area but there was apparent displacement to surrounding streets. Therefore the 13 per cent reduction in overall crime was comprised of very different behaviors at CCTV evaluation sites.

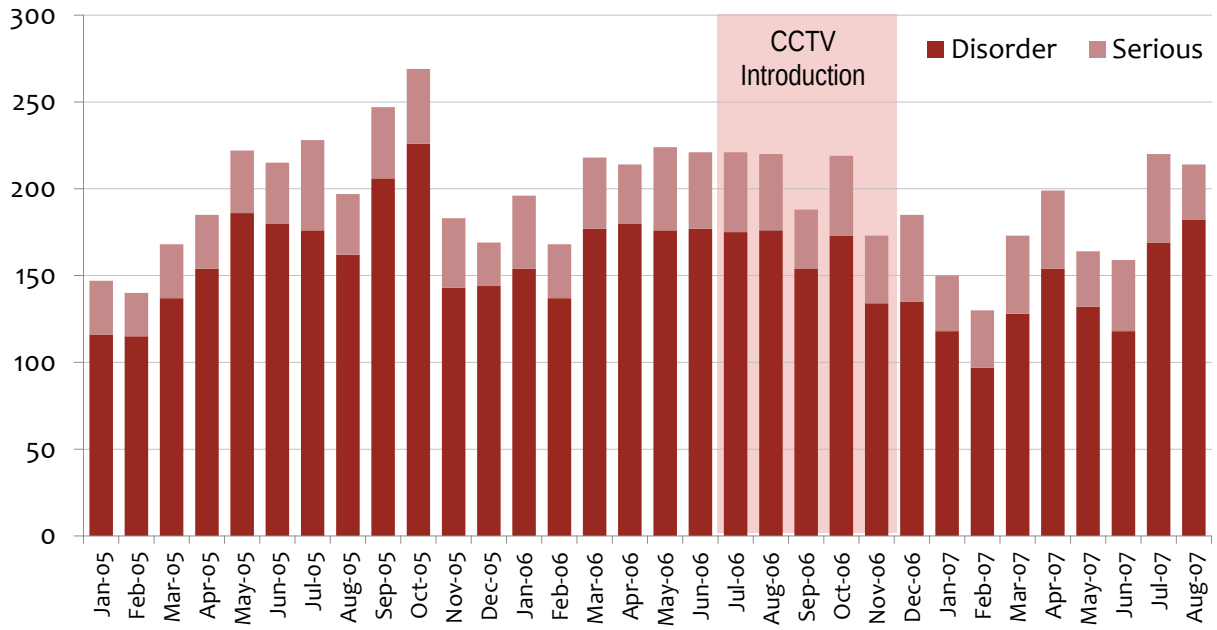


Chart showing monthly serious and disorder crime totals for all CCTV evaluation areas. Shaded area indicates the 5 month period during which cameras were introduced.

RECOMMENDATIONS

This evaluation finds evidence of an overall benefit to surveillance areas after the introduction of CCTV cameras. However, that crime did not reduce in the surveillance areas of half the sites examined cannot be ignored.

Why did some sites perform well while others apparently failed? Questions such as this are not answerable without further study. An in-depth examination of the dynamics of individual camera locations may explain the findings. Measures of arrests in each area may indicate that a lack of crime reduction is due to increased police activity, informed by the CCTV footage. Discussions with local police commanders and camera operators may also explain the disparity between the various sites. These conversations and research will inform a greater understanding of the best locations to site cameras, and potentially help the city get a better cost-benefit return on future CCTV investment by placing forthcoming cameras in locations that provide the best potential crime prevention benefit.

Given the low volume of serious crime at each site (as measured on a monthly basis), it may be prudent to prioritize future CCTV sites based on an objective measure of the volume of crime at each intersection. Furthermore, given that the PTZ cameras are able to view activity at more than one street intersection, selection of future sites would be improved by attempting to find clusters of street intersections and blocks that have crime problems rather than single corners. If multiple locations can be viewed effectively from a single camera, this may be a more sustainable use of CCTV technology in the city.

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NOTES

The views expressed herein are those of the authors and do not necessarily reflect the views or opinions of Temple University, the City of Philadelphia, or the Philadelphia Police Department.

Crime data provided by the mapping unit of the Philadelphia Police Department. Although the crime data are geocoded to a high level of precision and completeness (in excess of 97 percent), the authors cannot guarantee that all recorded crime is accurately mapped and included in this analysis.

ABOUT THE AUTHORS

Dr Jerry Ratcliffe is a professor in the Department of Criminal Justice at Temple University. He is the author of ***Video Surveillance of Public Places***, the problem-oriented guide for police on the use of CCTV cameras for public safety, published by the Center for Problem Oriented Policing and the Department of Justice Office of Community Oriented Policing Services, Washington DC. It is available to download from www.popcenter.org. Further details are also available at www.jratcliffe.net.

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APPENDIX

Exact offenses and their UCR codes examined in this study. The categories are either '**serious**' (indicating a crime from the FBI UCR Part 1 list) or '**disorder**' from the (FBI UCR Part 2 list). Both categories are added together to create the '**all crime**' category.

UCR code	Crime	Category
111-116	Homicide	Serious
211, 231	Rape- stranger	Serious
300-305	Robbery- on the highway	Serious
306-308	Robbery- purse snatch (force or injury)	Serious
388-399	Robbery- of vehicle	Serious
411-416, 421-426, 471-476	Aggravated assault	Serious
510-517, 520-521, 530-537, 540-541, 591-592	Burglary- residential (including attempts)	Serious
550-567, 570-587, 593-594	Burglary- non-residential (including attempts)	Serious
610, 620, 630	Theft- pocket picking	Serious
611, 621, 631	Theft- purse snatching	Serious
614, 618, 624, 628, 634, 638, 640, 641, 642, 643, 649	Theft- from vehicle	Serious
720, 722, 724, 726, 728	Vehicle theft (including attempts)	Serious
710, 721, 723, 727, 730, 741, 743, 725	Recovery of stolen vehicle	Serious
801, 802, 813	Simple assault	Disorder
807, 817	Resisting arrest	Disorder
1402, 1403, 1404, 1405	Vandalism- public	Disorder
1406, 1407, 1408, 1409	Vandalism- private	Disorder
1420, 1421, 1422, 1423	Graffiti	Disorder
1501-1507, 1516-1518	Violation of the uniform firearms act (VUFA)- adult	Disorder
1519	Prohibited offensive weapon- adult	Disorder
1531-1534, 1541-1544	Violation of the uniform firearms act (VUFA)- juvenile	Disorder
1535, 1545	Prohibited offensive weapon- juvenile	Disorder
1601	Pandering	Disorder
1602	Solicitation	Disorder
1708	Public indecency	Disorder
1710	Statutory sexual assault	Disorder
1711	Open lewdness	Disorder
1713	Aggravated indecent assault	Disorder
1716	Luring	Disorder
1801-1807	Drug sales	Disorder
1811-1817	Drug manufacture, delivery, or possession w.i.to deliver	Disorder
1821-1827	Drug possession	Disorder
1907	Gambling on highway	Disorder
2404	Disorderly conduct	Disorder
2501, 2502	Loitering	Disorder
3302	Minor disturbance	Disorder
3306	Disorderly crowd	Disorder