The impact of Philadelphia’s public CCTV cameras

PRELIMINARY FINDINGS FROM A TIME SERIES ANALYSIS

Over 200 public CCTV cameras have been erected across Philadelphia since late 2007. Here we report on a statistical analysis of the impact of these cameras on violence, disorder, burglary, vehicle crime, and drug incidents. These results are preliminary. Future analyses will examine the impact of the cameras taking into account control areas and displacement. At this point preliminary findings indicate that the cameras have had a modest impact on burglary, vehicle theft and violence.

In a 2006 referendum, about 80% of Philadelphia voters indicated a desire to change the city charter and to allow for CCTV cameras to be deployed within the city. That year a pilot project involving 10 pan, tilt and zoom cameras, and 8 static cameras was implemented. Researchers from Temple University’s Center for Security and Crime Science found that after building in controls for long-term trends and seasonality, the introduction of the cameras was associated with a 13% reduction in overall crime, though the violence rate near the cameras was too low to identify a reliable violence reduction. The evaluation suggested that while there appeared 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 positive outcome on crime.

Since 2006, the number of publicly funded CCTV cameras in Philadelphia has grown to over 200. On the invitation of the Philadelphia Police Department, and with grant support from the National Institute of Justice, we report here the preliminary results of a statistical evaluation of the impact of those cameras on various crime types. We say preliminary because we are still in the process of completing a range of other analyses, which when combined with the work reported here, will allow us to better determine the overall impact of the cameras. This further work will include propensity matching for control sites and a test for displacement to non-camera sites.

HOW WAS THE ANALYSIS CONDUCTED?

Temple’s research team constructed custom mapped areas using a Geographical Information System (GIS) to identify the exact portions of Philadelphia streets where working cameras could identify activity. Specifically, we mapped the streets where a camera operator could see well...
enough to read a street sign. This took into consideration areas where traffic lights, trees, and signage obstructed the camera view. We identified all cameras that were working during the summer of 2010 and were installed and live between the end of the pilot project (late 2007) and October 2010. There were 116 qualifying camera sites.

Crime within these 116 viewshed areas was extracted from the incident reporting system of the Philadelphia Police Department from 2004 to the end of 2010, and weekly counts of various crime types were collected. As the non-pilot cameras were installed from late 2007, we were able to model the crime for 200 weeks before the cameras were functioning. This enabled us to construct ARIMA time series models of the crime patterns in the areas.

Since the cameras were added incrementally over the study period, we modeled the impact in the same way. Each week the cumulative percentage of the overall viewshed area covered by installed cameras from late 2007 to mid-2010 was measured. At the start of the camera implementation the cumulative percentage grew slowly but increased dramatically near the end of 2008. The graph on this page shows implementation period spanning over two years.

**STATISTICAL FINDINGS**

The time series models indicated that on average 1.4 violent crimes per week were prevented after the installation of CCTV cameras. There was also a modest reduction in burglary (three-quarters of one burglary per week) and a reduction in a little over two vehicle crimes (theft of a car or theft from a car) after the introduction of the cameras. An identified slight reduction in disorder incidents was not statistically significant, nor was a slight increase in detected narcotics incidents. However, when a correction is made for having conducted multiple statistical tests, the positive results from violence and vehicle crime become less reliable and are only exploratory findings with less statistical rigor.

In summary:

- There was a **small but statistically significant reduction in burglaries** (.75 per week)
- **Violent crime reduction was significant at an exploratory level** (1.4 per week)
- **Vehicle crime reduction was significant at an exploratory level** (2.2 per week)
- No change in narcotics or disorder
<table>
<thead>
<tr>
<th>Crime type</th>
<th>ARIMA model</th>
<th>Weekly change</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Violence</td>
<td>(0,0,0)(0,1,0)$_{52}$</td>
<td>-1.372</td>
<td>0.030$^5$</td>
</tr>
<tr>
<td>Disorder</td>
<td>(0,1,1)</td>
<td>0.646</td>
<td>0.497</td>
</tr>
<tr>
<td>Narcotics</td>
<td>(0,1,1)(0,1,0)$_{52}$</td>
<td>+0.058</td>
<td>0.538</td>
</tr>
<tr>
<td>Burglary</td>
<td>(1,0,0)</td>
<td>-0.753</td>
<td>0.007$^*$</td>
</tr>
<tr>
<td>Vehicle</td>
<td>(1,0,1)</td>
<td>-2.143</td>
<td>0.018$^5$</td>
</tr>
</tbody>
</table>

$^5$ After correcting for multiple comparisons, these findings are only reliable at an exploratory level.

* A reliable statistical finding even after correcting for multiple comparisons (Holm-Bonferroni).

**QUESTIONS REMAIN**

While there are preliminary indications that show vehicle crime, burglary and violence were slightly reduced after CCTV cameras were installed, a number of questions still remain. For example, is this crime reduction offset by any displacement? Is the crime reduction cost-effective? Are there additional benefits to the cameras beyond crime prevention (such as investigative value)?

These questions will be addressed in the forthcoming months by the research team at Temple University’s Center for Security and Crime Science.

More details (as they are available) will be released at www.temple.edu/cj/cscs.

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This publication is supported by Award No. 2009-IJ-CX-0012 awarded by the National Institute of Justice (NIJ), Office of Justice Programs, U.S. Department of Justice. The opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.

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1 Source  