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EXPERT FINDINGS ON SURVEILLANCE CAMERAS:

What Criminologists and Others Studying Cameras Have Found

Noam Biale, Advocacy Coordinator, ACLU Technology and Liberty Program

EXECUTIVE SUMMARY

An increasing number of American cities and towns are currently investing millions of taxpayer dollars in surveillance camera systems. But few are closely examining the costs and benefits of those investments, or creating mechanisms for measuring those costs and benefits over time. There is extensive academic literature on the subject—studies carried out over many years—and that research strongly indicates that video surveillance has no statistically significant effect on crime rates.

The principle studies on video surveillance have been conducted in the UK, where surveillance cameras are pervasive. Those studies, which have been commissioned by the British Home Office, have found varying results when they look at individual camera sites in isolation. However, the best studies combine results from multiple camera sites in a meta-analysis, which eliminates anomalies. The two main meta-analyses conducted for the British Home Office show that video surveillance has no impact on crime whatsoever.

Video surveillance systems are more disparate and at various levels of operability in the United States. As such, fewer independent studies of their efficacy exist. However, preliminary studies of surveillance cameras in California show similar results to studies conducted in the UK: Cameras having little to no effect on crime reduction.

This White Paper is based on a literature review of major studies of video surveillance from 2000 to 2008. It examines the key meta-analyses from the UK, discusses the major difficulties in determining the impact of video surveillance on crime, and describes preliminary studies conducted in the US. The major findings of these studies should, at a minimum, be part of the debate around surveillance cameras.

INTRODUCTION

An increasing number of American cities and towns are currently investing millions of taxpayer dollars in surveillance camera systems. But few are closely examining the costs and benefits of those investments, or creating mechanisms for measuring those costs and benefits over time. There is extensive academic literature on the subject—studies carried out over many years—and that research strongly indicates the following:

- Meta-analyses (studies that average the results of multiple studies) in the UK show that video surveillance has no statistically significant impact on crime.
- Preliminary studies on video surveillance systems in the US show little to no positive impact on crime.

This White Paper is based upon a literature review of independent studies on the effect of video surveillance on crime rates from 2000 to 2008, particularly meta-analyses that aggregate data from several studies. It surveys what these meta-analyses have found, the methodological difficulties of

studying video surveillance systems in isolation, and preliminary results from studies in the US. The major findings of these studies should, at a minimum, be part of the debate around surveillance cameras.

DIFFICULTIES OF STUDYING SURVEILLANCE SYSTEMS

Measuring the success of public video surveillance systems is complex, because there are always innumerable factors that can explain a rise or fall in crime rates. Simply showing an increase or decrease in reported crime in an area under surveillance does not take into account general trends in crime and crime reporting, additional police in the areas under surveillance, better lighting, and perhaps most importantly, the possible displacement of crime to other areas not under surveillance.

Several factors in particular make it difficult to assess the effectiveness of surveillance cameras:

- **Displacement.** Displacement complicates attempts to measure the impact of surveillance cameras on crime rates, because it means that the control area cannot be too close in proximity to the cameras. For example, in looking at a downtown district and comparing the number of muggings on particular blocks, one might reasonably assume that if the rate of muggings increase near an area that is being monitored by cameras, and decrease in the area being directly monitored, then the cameras have been effective in reducing muggings. However, it could also be reasonably assumed that the placement of the cameras on a particular block in fact pushed the muggings into surrounding areas, and did not reduce crime overall. This is really a problem of interpretation, not data, and as a result, displacement can be extraordinarily difficult to show.
- **Confounding variables.** It can be inaccurate to extrapolate success from specific locations to general areas. For example, enclosed places such as parking lots tend to produce better outcomes than outdoor areas. In addition, other factors such as increased police presence and better lighting in areas under surveillance make it difficult to conclude which intervention is most effective. It is unclear in many studies that appear to show success whether surveillance cameras had a positive impact in combination with improved lighting, or whether the improved lighting might accomplish the positive outcome on its own. Studies vary on the degree to which they take confounding factors into account.

Because of these problems, individual video surveillance studies may not be reliable on their own. In evaluating the merits of video surveillance it is important to look at the overall trend of multiple studies and place particular reliance on studies with rigorous methodology. For this reason, the UK Home Office has adopted the meta-analysis as the best statistical tool for studying the efficacy of surveillance cameras.

META-ANALYSES OF UNITED KINGDOM SURVEILLANCE SYSTEMS

The efficacy of public video surveillance as a crime-fighting tool has been analyzed in a wide range of studies over the last decade. The majority of research has been conducted in the United Kingdom, which more than any other country has embraced the widespread use of cameras. The UK's network of public surveillance cameras is the largest in the world (although China is quickly outpacing it).¹ The number of surveillance cameras in England and Wales increased from 100 in 1990 to 40,000 in 2002,² and now stands above 4.2 million, or one for every 14 persons.³ The center of London is surrounded by a "ring of steel," a networked video surveillance system that is intended to allow law enforcement to track individuals moving through the city, observe patterns of behavior and respond immediately to threats. The British Home Office, the agency in charge of security, spent 78% of its criminal justice budget in the 1990's on surveillance cameras,⁴ and is estimated to have spent over £500 million (approximately a \$1 billion) in between 1995 and 2005.⁵

The Home Office has commissioned several key studies on the effectiveness of these systems around the UK using meta-analysis. Meta-analysis combines the results of multiple studies that all have similar hypotheses and methodological criteria. This is important because it weeds out anomalies. For example, one installation of a video surveillance system might coincide with a sharp drop in crime, but we cannot know whether it *caused* the drop without comparing it to other scenarios (further explanation of the difficulty of measuring success from isolated studies is below). A meta-analysis can provide a clearer sense of the impact of surveillance cameras by taking a variety of studies and averaging their results.

The individual studies show moderate successes in some sites, usually in parking lots, and for certain types of crimes, usually vehicle crimes. However, the majority of studies show no effect on overall crime, and when combined in a meta-analysis, CCTV is shown to have no statistically significant impact on crime rates at all.

The following is a summary of the Home Office studies.

Home Office Study, 2002

In the first Home Office study in August 2002, Brandon C. Welsh and David P. Farrington⁶ surveyed 22 studies of CCTV (both in the UK and the USA) for a meta-analysis, and found that, taken together, the cameras had no significant impact on crime.

Welsh and Farrington began with 46 studies, but whittled the number down to 18 based on the criteria for inclusion in the meta-analysis.⁷ Of the 18 studies, half showed some reduction in crime in the area under surveillance, about a quarter showed an increase in crime, and the remaining studies showed a null effect. Welsh and Farrington then created a meta-analysis for the included studies, by determining an odds-ratio for each study and then combining these ratios. An odds-ratio is a numerical expression of the net effect of an intervention, calculated by comparing results in the experimental area with the control. An odds-ratio of 1 shows that there is no difference in crime rates between the experimental (surveilled) area and the control. An odds-ratio greater than 1 shows that the areas with cameras are experiencing less crime than the control areas. An odds-ratio of less than 1 shows that the areas with cameras are experiencing more crime than the control.

When Welsh and Farrington combined odd-ratios for all 18 studies included in the meta-analysis, they found that the average was just over 1, showing a very small impact on crime, and when measured against the standard deviation, this impact was shown to be statistically insignificant. The areas with cameras did not perform better than the areas without.

It is worth noting that the two areas included in which cameras were the only intervention used (no added police presence, increased lighting, etc.) showed no effect on crime in one case,⁸ and an increase in crime in the other.⁹ Five of the eleven studies that showed reductions in crime looked at camera systems located in enclosed parking lots. These studies showed an overall odds-ratio of 1.7, but included other interventions, such as improved lighting, fencing, notices about CCTV, and increased security personnel. This suggests that cameras can be effective when used in specific environments and combined with other preventative measures.

Home Office Study, 2005

Criminologists Martin Gill and Angela Spriggs published a comprehensive analysis of fourteen individual sites in the UK for the Home Office in 2005,¹⁰ which found, again through the use of meta-analysis, that the cameras had “no overall effect” on crime rates.

Gill and Spriggs concluded that only one of 13 sites showed a statistically significant reduction in crime (one site was excluded for failing to meet the crime statistics recording criteria). This site showed a reduction far larger than any others—an odds-ratio of 3.34, indicating a reduction in crime of over 300%,

compared with the second-largest odds-ratio of 1.38, or just under 40%—and was also the most expensive site, at a cost of over £3 million (about \$6 million) for the camera system. This area also experienced several confounding factors including increased fencing and improvements to security, though these were implemented once the video surveillance system was fully installed and thus may not have had a distorting impact on the outcome.

Although Gill and Spriggs' analysis found "that CCTV schemes produced no overall effect on all relevant crime viewed collectively,"¹¹ the study did show overall better outcomes for vehicle crimes in seven of the sites. Violent crimes were different. In the four urban city centers included in the study, violence against persons increased in three sites. Gill and Spriggs hypothesize that these crimes may be impulsive and more often influenced by alcohol.¹² They also acknowledge that changes to parking regulations in at least one site may have contributed to the reduction in vehicle crime, by simply reducing the number of vehicles on the street.¹³ In addition, burglary, a property crime that did show reductions in one site, showed the highest rate of displacement in an area adjacent to the target area.¹⁴

Gill and Spriggs additionally found that fear of being victimized by crime did not change significantly from before the cameras were installed and after, though 69-96% of individuals surveyed in the 14 sites responded favorably to plans to install camera systems.

PRELIMINARY USA STUDIES SHOW LITTLE POSITIVE IMPACT

Fewer studies of video surveillance have been conducted in the United States, where cameras have been erected in a piecemeal manner, and have not undergone an extensive process of networking (though Chicago¹⁵ and New York¹⁶ are beginning this process). Studies are, at this point, insufficient to conduct meta-analyses based solely on studies in the US. However, Welsh and Farrington's 2002 meta-analysis compared UK and US sites, and the two revisited this comparison in a 2004 follow-up.¹⁷

The American studies that met the criteria for the meta-analysis generally showed worse outcomes than those in the UK, showing an undesirable or null effect on crime. Welsh and Farrington point out a few key differences between the UK and US systems that might explain this. One possibility is a difference in reporting time, with the UK studies generally taking longer to report findings. However, as Welsh and Farrington report, what is likely an even more important factor, is that the surveillance sites in the US *lack* the confounding elements of the British sites. While nine of the 14 UK sites used several different interventions simultaneously, such as improved lighting and increased foot patrols, none of the US schemes used any intervention besides cameras. Thus, these studies provide a more unadulterated look at the effect of surveillance cameras on crime rates than their UK counterparts and show that cameras on their own have virtually no impact on crime.¹⁸

The following are two initial independent studies of small-scale systems, both in California,¹⁹ that offer a preliminary view of the impact of video surveillance on crime in US cities.

UC Berkeley Preliminary Study

The city of San Francisco's 68 cameras appear to have had a small impact on property crimes, but no impact on violent crimes.

Jennifer King and colleagues at Center for Information Technology Research in the Interest of Society (CITRIS) and the Samuelson Clinic at the University of California, Berkeley, are currently in the process of studying the impact of San Francisco's small video surveillance system. In March 2008, they published preliminary findings.²⁰ Looking at aggregate statistics on serious violent crime and serious property crimes before and after installation of cameras in high-crime neighborhoods, King's group found a 22% decline in property crime occurring within 100 feet of the cameras, but no statistically significant changes between 100 and 500 feet from the cameras. This would seem to suggest that the cameras are,

in fact, working to reduce property crimes. However, without the benefit of aggregated multiple studies in a meta-analysis, we cannot know whether this reduction is a fluke or not.

Regarding violent crime, there appeared to be no statistically significant change in the level of crime anywhere in the 500 foot range around the cameras. When violent crimes were disaggregated, a decline in homicide was observed within 250 feet of the cameras, however this reduction was offset completely by an equal increase in homicides between 250 and 500 feet from the cameras, suggesting displacement.

The study also did preliminary analysis of crime statistics 500-1000 feet away from the cameras, and thus, based on information available from the San Francisco Police Department, out of the range of surveillance, and found an increase in property crime between 500 to 750 feet from the cameras. This might suggest displacement from the areas directly monitored by the cameras, though an off setting decline in property crimes in the area 750 to 1,000 feet away makes a determination of displacement inconclusive.

Notably when the preliminary findings of the UC Berkeley study were reported in the *San Francisco Chronicle*, Supervisor Ross Mirkarimi, who heads the board's public safety committee, responded to the apparent null effect on violent crime by asserting that the cameras provided "psychological relief" to citizens, and were thus justified.²¹ The city has so far spent \$900,000 on the 68 cameras currently up and has budgeted an additional \$200,000 for 25 more cameras intended to target violent gang activity.²²

USC Study

Preliminary studies of camera systems in Los Angeles show no impact on crime.

Students at the University of Southern California School of Policy, Planning and Development released a report to the California Research Bureau in May 2008 on the effects of video surveillance on crime in two areas of Los Angeles.²³ The group looked at five out of 14 cameras along a high-traffic section of Hollywood Blvd. and six cameras at the Jordan Downs Public Housing Project in Watts. The study notes that, unlike San Francisco's public video surveillance system, cameras in Los Angeles have not been analyzed by the city or some other official body to determine their efficacy. This may be because while San Francisco has incurred substantial costs for installation and upkeep of the cameras, many of LA's cameras, including the clusters that the USC group examined, were installed through private donations (on Hollywood Blvd, for example, the cameras were donated to the city by the film industry) or federal grants through the US Department of Homeland Security's Grant Program. Another important distinction between the camera systems in Los Angeles and those in San Francisco is active monitoring of LA's cameras "in real time," vs. a decision by the San Francisco City Council to allow only passive monitoring of the cameras for the purposes of safeguarding citizens' privacy.

Looking at the LAPD's COMPSTAT figures to determine pre and post installation crime rates, as well as arrest records, the study found no significant impact on crime in either area. Violent crime went down in both areas, but that reduction was offset by an overall crime reduction in surrounding control areas (though in the case of the Jordan Downs Housing Project, the group hypothesized that the cameras may have played a role in preventing a substantial escalation of crime relative to surrounding areas, since the housing project was the site of a gang war during the period of the study). The group was not able to find statistically significant evidence of displacement in either area.

CONCLUSION

Meta-analyses from the UK, along with preliminary findings from the US, indicate strongly that video surveillance has little to no positive impact on crime.

NOTES

- ¹ See Privacy International, "Leading Surveillance Societies in the EU and the World, 2007" at [http://www.privacyinternational.org/article.shtml?cmd\[347\]=x-347-559597](http://www.privacyinternational.org/article.shtml?cmd[347]=x-347-559597). See also Klein, Naomi, "China's All-Seeing Eye," *Rolling Stone*, May 29, 2008.
- ² Welsh, Brandon C. and Farrington, David P., "Evidence-based Crime Prevention: the Effectiveness of CCTV." *Crime Prevention and Community Safety: An International Journal* 2004, 6(2) 21-33.
- ³ A Report on the Surveillance Society for the Information Commissioner, September 2006. Available at http://www.ico.gov.uk/upload/documents/library/data_protection/practical_application/surveillance_society_full_report_2006.pdf.
- ⁴ Norris, C and Armstrong, G. (1999), *The Maximum Surveillance Society: The Rise of Closed Circuit Television*, Oxford: Berg, at 54.
- ⁵ Norris, C. (2006) *Closed Circuit Television: a review of its development and its implications for privacy*, paper prepared for the Department of Home Land Security Data Privacy and Integrity Advisory Committee quarterly meeting on June 7th, in San Francisco, CA.
- ⁶ Welsh, B. and Farrington, D., *Crime Prevention Effects of Closed Circuit Television: A Systematic Review* (2002), Home Office Research, Development and Statistics Directorate.
- ⁷ The UK Home Office studies have set several criteria for inclusion in their meta-analyses:
- They include studies in which CCTV is the main crime intervention, rather than one among many interventions.
 - They also select studies that delineate between different types of crimes, since the impact of CCTV tends to differ when measuring property crimes vs. violent crimes.
 - Finally, for a study to meet the criteria for inclusion, it must look at the area under CCTV surveillance as well as a control area. The control area must be comparable—a residential suburb would likely provide an inadequate control area for a downtown commercial area, for example.
- ⁸ Musheno, M.C. (1978) "Television surveillance and crime prevention: Evaluating an attempt to create defensible space in public housing." *Social Science Quarterly*, 58, 647-56.
- ⁹ Williamson, D. and McLafferty, F., (2000). "The effects of CCTV on crime in public housing: An application of GIS and spatial statistics." Paper presented at the American Society of Criminology meeting, November 15-19, 2000, San Francisco, California.
- ¹⁰ Gill and Spriggs, "Assessing the Impact of CCTV." (2005) Home Office Study. I relied primarily on Chapter 3: "Does CCTV Work: Its Impact on Crime and the Fear of Crime" for this section.
- ¹¹ *Ibid*, p. 33.
- ¹² *Ibid*, p. 35.
- ¹³ *Ibid*, p. 37.
- ¹⁴ *Ibid*, p. 42.
- ¹⁵ Kinzer, Stephen, "Chicago Moving to 'Smart' Surveillance Cameras," *New York Times*, September 21, 2004.
- ¹⁶ Buckley, Cara, "New York Plans Surveillance Veil for Downtown," *New York Times*, July 9, 2007.
- ¹⁷ Welsh B. and Farrington D., "Evidence-based Crime Prevention: the Effectiveness of CCTV." *Crime Prevention and Community Safety: An International Journal* (2004) 6 (2), 21-33.
- ¹⁸ Unfortunately, very few independent studies of US camera systems exist to include in a meta-analysis that would back up or refute this initial finding. Some Police Departments have conducted studies of their own, though these do not qualify as independent and in some cases have yielded results strikingly different from academic reviews. For example, in its 2007 annual report on CCTV, the District of Columbia Metropolitan Police Department found that its 48 cameras were responsible for a 19% reduction in violent crime within 250 feet of the cameras, compared with a 1% reduction in "comparable areas." The report did not offer non-aggregated crime statistics, so it is impossible to dispute these numbers without more information. However, it is worth noting that 250 feet is a substantially wider range used in, say, the San Francisco study. Further, the Department found a smaller desirable effect on property crime, though this number was compared to citywide statistics (which would include areas with much lower property crime rates by definition, such as parks, wooded areas and hiking trails). The contrast between these results and those of meta-analyses from the UK that look at the impact of cameras on different classes of crimes raises questions about the MPD's methodology.
- ¹⁹ For a full survey of video surveillance systems in California, see Scholsberg M. and Ozer, N, "Under the Watchful Eye: The Proliferation of Video Surveillance Systems in California," American Civil Liberties Union (2007).
- ²⁰ King, et al. "Preliminary Findings of the Statistical Evaluation of the Crime-Deterrent Effects of the San Francisco Crime Camera Program." March 17, 2008.
- ²¹ Heather Knight, "Crime Cameras Not Capturing Many Crimes," *San Francisco Chronicle*, March 21, 2008.
- ²² *Ibid*.
- ²³ Cameron, et al., *Measuring the Effects of Video Surveillance on Crime in Los Angeles*, May 5, 2008.