Public Surveillance Cameras and Crime

The Impact of Different Camera Types on Crimes and Clearances

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In 2016, the Urban Institute received funding from the National Institute of Justice to help the Milwaukee Police Department (MPD) optimize its surveillance system. Improvements included doubling the number of MPD public surveillance cameras across Milwaukee, integrating video analytic technologies, and other software and hardware upgrades. The department also strategically installed two types of cameras—pan-tilt-zoom (PTZ) and panoramic—at intersections across the city. This brief explains how PTZ and panoramic cameras work and how they differentially impact crime and support criminal investigations.

Over the past several decades, dozens of studies have examined the relationship between surveillance cameras and crime. Though findings are mixed, they indicate cameras can reduce crime, particularly property crimes and vehicle crimes in parking lots (Piza et al. 2019; Welsh and Farrington 2009). Research suggests police departments can maximize cameras' effectiveness by strategically placing them where they are most likely to capture criminal activity or generate evidence, such as footage of people or cars fleeing crime scenes (La Vigne et al. 2011). It also recommends that staff actively and continuously monitor camera feeds and that cameras be paired with other crime prevention interventions (e.g., signage notifying the public of surveillance cameras, directed police patrols near surveillance cameras, or integration of cameras with analytic technologies) (La Vigne et al. 2011; Piza et al. 2019; Shukla, Lawrence, and Peterson 2020).

Despite this growing body of research, gaps in our understanding of public surveillance systems remain. First, although research indicates that cameras can impact crime, few studies have specifically examined whether they improve *crime clearance rates*. For cameras to prevent or reduce crime, they

must either deter would-be criminals or be actively used by the police to detect and stop crimes. However, this is often not feasible because cameras are commonly placed discretely near intersections or city centers—settings that research suggests are not optimal for reducing crime (Piza et al. 2019). Thus, departments should know how cameras can combat crime in other ways. Many departments use camera footage to quickly identify possible suspects, witnesses, victims, and vehicles of interest. Such surveillance is generally considered reactive or passive because it involves using footage to investigate crimes after the fact. Cameras used in this way can generate valuable evidence, support investigations, and increase crime clearances (Jung and Wheeler 2019; Morgan and Dowling 2019).

Second, research has rarely explored whether different types or combinations of surveillance cameras reduce crime or improve clearance rates better than others. In this brief, we focus on the following two common surveillance cameras:

- **Pan-tilt-zoom cameras** are fixed cameras typically controlled by remote operators, programmed with preset movements, and/or programmed to respond to triggering events (e.g., motion or nearby gunshots). They typically have viewsheds of 35 degrees and zoom optically and digitally.
- **Panoramic cameras** do not move but have wider viewsheds (180 degrees or more) that constantly monitor large areas, preventing operators from missing important details. They typically have higher resolutions with a single lens, allowing for digital zooming.

These cameras serve different but complementary purposes. Operators can use PTZ cameras to track and zoom in to particular areas, allowing departments to follow people and cars in real time, strategically position cameras to provide tactical and investigative support to field officers, and program cameras to pan toward areas where crimes are likely to occur (i.e., camera "tours"). Because PTZ cameras can view street activity at multiple intersections, departments can maximize their benefits by identifying clusters of high-crime intersections and blocks (Ratcliffe, Taniguchi, and Taylor 2009). Panoramic cameras, on the other hand, minimize blind spots at particular locations and increase the likelihood of capturing criminal events. Panoramic cameras may therefore be more useful for supporting reactive criminal investigations than PTZ cameras. Used together, panoramic cameras' wide viewsheds allow officers to scan large areas for incidents that they can investigate further by zooming in with PTZ cameras. This combination also enables operators to easily refer back to panoramic cameras' wide viewsheds while using PTZ cameras to focus on specific locations.

Milwaukee Camera Program

We began working with the MPD in 2016 as part of a National Institute of Justice grant to optimize and evaluate the department's public surveillance system. Before this project, the MPD's system had 42 cameras (40 PTZ cameras, 1 panoramic camera, and 1 fixed bullet camera) at 40 intersections across Milwaukee. Many of these cameras were antiquated, had poor image quality, and offered limited operational support. We worked with the MPD to acquire and install 24 panoramic cameras, 12 PTZ cameras, and 9 automatic license plate recognition (ALPR) cameras by January 2018 at intersections

across Milwaukee (some of which were already equipped with older cameras). At some intersections, the department installed complementary combinations of PTZ and panoramic cameras; at others, it installed one or the other depending on needed surveillance support.

In addition to expanding its camera coverage, the MPD also integrated two analytic technologies into its surveillance system (Shukla, Lawrence, and Peterson 2020). First, it linked the city's gunshot detection technology to several PTZ cameras so that they would automatically turn toward the middle of their respective intersections after detecting nearby gunfire. Second, it used new ALPR cameras to identify license plate numbers and check them against its list of wanted vehicles.

Current Study

To address the gaps identified above, this brief presents an exploratory analysis of PTZ and panoramic cameras' impacts on crimes and crime clearances. *Our goal was to determine the degree to which PTZ cameras, panoramic cameras, and combinations of the two affect crimes and clearances at metropolitan intersections.* We believe this information will benefit police departments operating or planning public surveillance programs. This brief draws on two data sources: (1) interviews with and observations of MPD personnel occurring during the department's surveillance expansion, and (2) geo-locational data on crimes and arrests.

Interview and Observational Data

Throughout this four-year project, the Urban research team worked closely with MPD personnel to identify ways to improve their public surveillance program, plan to optimize the system, and oversee that plan's implementation. We met regularly with the MPD and the vendor it selected to install the equipment. We also conducted multiple site visits to see the department's cameras, shadow camera operators, and observe trainings and other activities related to the camera program. Finally, we conducted semistructured interviews with MPD staff who work with cameras or frequently use camera footage. Interviewees included camera operators in the MPD's fusion center (the department's real-time crime investigations division) who actively monitor camera feeds and fulfill requests for camera footage, as well as camera program supervisors and shift commanders, crash reconstruction unit officers, and detectives. We asked interviewees about a camera operator's average day, how the department used different cameras and other technologies, how other officers used the footage, the camera program's successes and challenges, and lessons learned for other cities implementing camera programs.

Crime and Arrest Data

We also collected data on crimes and arrests in Milwaukee from January 2017 to December 2018 to inform our evaluation. We aggregated these events to within 500 feet of intersections in the city to assess the cameras' impacts on crime trends and clearance rates (defined as crimes for which arrests were made). We categorized crimes and clearances into the following outcome variables:

- crime
  - » total violent crimes (homicide, aggravated assault, robbery, rape)
  - » total property crimes (burglary, larceny/theft, motor vehicle theft)
  - » total simple assault crimes
  - » total drug crimes
  - » total group B offenses (minor offenses)
- crime clearances (arrests)
  - » total violent crime clearances
  - » total property crime clearances
  - » total simple assault crime clearances
  - » total drug crime clearances
  - » total group B offense clearances

Methods

We worked with the MPD to install 12 new panoramic and 24 new PTZ cameras across Milwaukee. Some were installed in intersections that already had cameras, whereas others were installed in new intersections based on an analysis of high-crime and high-traffic areas. Of the 17 intersections that had not had cameras, 6 received PTZ cameras, 8 received panoramic cameras, and 3 received a combination. We then grouped these intersections into three "treatment groups" to determine how each camera type or combination might impact the crime and clearance outcomes described above.

Next, we used 3:1 nearest-neighbor propensity score matching to identify three appropriate comparison intersections for each of the 17 intersections in the three treatment groups. Propensity score matching is a rigorous method that is widely used in outcome evaluations to identify comparison groups that are statistically indistinguishable from their matched treatment groups on important variables. For this study, we matched our treatment intersections to those among the 8,245 Milwaukee intersections that lack any surveillance cameras and are outside a 500-foot radius of intersections with cameras. We based matching on the intersections' crime and arrest trends, as well as on socioeconomic indicators that may be related to crime.[1] Overall, treatment and comparison groups were similar on the preselected characteristics (and other characteristics and crime trends) in the year before the camera installations, although some variables differed significantly. Table A.1 shows these differences and the descriptive statistics of every group included in this study.

After creating the treatment and comparison groups, we developed analytic models to assess how types and combinations of cameras impacted the outcomes. We used difference-in-differences estimation, allowing us to compare trends in crime and clearances at the treatment and comparison intersections before and after the cameras were installed. In other words, we examined whether the new cameras changed the trends in these outcomes relative to intersections that never received cameras.

We used Poisson panel regression models for our difference-in-differences analyses. These models were appropriate because the outcomes we selected were counts (i.e., numbers of crimes and clearances) measured over a two-year period divided into eight quarters (MacDonald and Lattimore 2010). We also used census data to control for demographic and socioeconomic factors including *population size*, *residential mobility*, *renter status*, *age*, *race/ethnicity*, *whether households were female-headed*, *and poverty* (see table A.1 for descriptive statistics of these variables).

Use and Impact of Camera Types

Again, the MPD's camera program uses panoramic and PTZ cameras, which fulfill different purposes. Figure 1 shows screenshots of panoramic and PTZ camera feeds from the same intersection pointing in the same general direction. If an incident (e.g., a passing pedestrian or an auto accident) occurred on the sidewalk nearest the cameras, the panoramic camera would catch it, whereas the PTZ camera would not. However, if an incident occurred at the gas station, the PTZ camera, which can zoom in, would catch it in much greater detail.

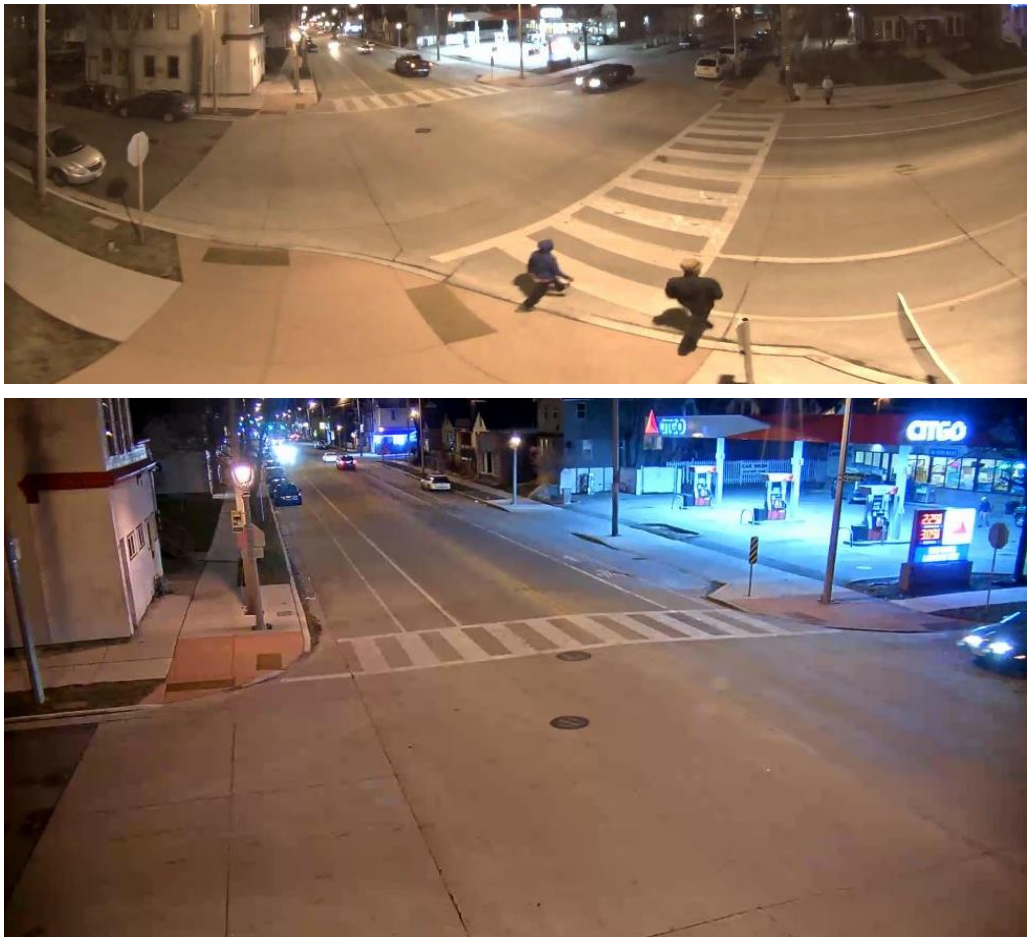
Some intersections have both panoramic and PTZ [cameras]—that's really helpful.
—Crash reconstruction unit officer

During interviews, we asked MPD personnel how they used each camera type and whether types had unique advantages and disadvantages. Camera operators shared that panoramic cameras catch car accidents well. One operator mentioned that detectives often request crash footage after accidents, making it necessary to pull, label, and store accident footage from panoramic cameras. Crash reconstruction unit officers find the panoramic cameras more useful for their work but noted that "some intersections have both panoramic and PTZ [cameras]—that's really helpful."

Unlike panoramic cameras, PTZ cameras can be moved or programmed in "tour modes." Interviewees noted that although this allows officers to see more of an intersection, it also produces video feeds that capture only parts of incidents before cameras continue their tours. Although this makes PTZ cameras less optimal for catching car crashes, they can be moved and zoomed to provide detail of other incidents.

FIGURE 1

Panoramic and PTZ Camera Feeds of a Milwaukee Intersection



Source: Milwaukee Police Department.
Notes: Panoramic camera feed screenshot (above) and PTZ camera feed screenshot (below).

Having PTZ and panoramic cameras at the same intersection also has benefits. One operator noted that when a panoramic camera catches an incident, a PTZ camera at the same intersection can be used to "zoom in and get details." For example, if an operator viewing the panoramic feed in figure 1 saw something happening at the gas station, they could direct the PTZ camera toward the station, zoom in to the incident, and possibly record license plate numbers or faces of persons of interest.

Camera operators in the MPD often rely on tips from field officers (or on their experience and knowledge of crime in Milwaukee) to focus PTZ cameras on houses, gas stations, or other locations known for frequent criminal activity. This can help operators catch crimes in progress, provide video support to ongoing tactical operations, or capture footage of incidents for later investigations.

Pan-tilt-zoon cameras can also be cheaper to install and operate than panoramic cameras. Because of their wide fields of view and high-definition recording, panoramic cameras require a lot of bandwidth and substantially more storage for recordings than PTZ cameras. In addition, PTZ cameras can be

integrated with other systems, such as gunshot detection technology, which can turn cameras toward areas where gunfire is detected. The MPD did this as part of its overall surveillance optimization. Although it involved several technical challenges, that integration has promising implications for maximizing PTZ cameras' benefits (Shukla, Lawrence, and Peterson 2020).

Crimes and Clearances

Table 1 shows the results of our Poisson panel regression models on crimes and clearances (table A.2 provides more complete results). Our findings are mixed. Overall, intersections with PTZ cameras had 15 percent more crimes than matched intersections without cameras, 40 percent more violent crimes (marginally significant), and 62 percent more group B offenses (i.e., minor crimes). We also found that intersections with panoramic cameras had 26 percent more group B offenses than matched intersections without cameras. There were no other statistically significant impacts of cameras on crime.

TABLE 1

Impacts of Different Cameras on Crime and Clearances

	Percent Change from Expected		
	PTZ cameras (n = 192)	**Panoramic cameras (n = 256)**	**PTZ and panoramic cameras (n = 96)**
Crimes			
All crimes	**14.7%****	5.2%	4.2%
Violent	**40.4%***	-0.9%	21.1%
Property	22.8%	-6.4%	-1.4%
Simple assault	-0.4%	22.1%	18.9%
Drug	46.8%	6.4%	11.6%
Group B	**61.9%*****	**26.4%****	8.7%
Clearances			
All crimes	12.8%	8.7%	21.7%
Violent	**81.8%***	-9.7%	-15.4%
Property	-43.7%	72.5%	154.3%
Simple assault	-20.4%	26.6%	74.0%
Drug	17.5%	15.1%	5.6%
Group B	**51.5%***	10.2%	-10.8%

* = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$

It is worth noting that crimes were declining across Milwaukee from January 2017 to December 2018 because of other public safety initiatives, departmental leadership changes, and general declines in crime rates in jurisdictions across the US. It is therefore unlikely that crimes actually increased at intersections with cameras. Rather, it is possible that these cameras simply captured crimes that would otherwise have gone unreported. Our interviews and observations support this possibility. Camera operators provided several examples of instances where they used the cameras to detect and report on crimes, particularly drug dealings, loitering, disorderly conduct, and other minor crimes within these categories.

Intersections with PTZ cameras had 82 percent more violent crime clearances and 52 percent more group B offense clearances than matched intersections without cameras. Again, these findings agree with some of the information interviewees provided; respondents noted that the panoramic cameras were useful for investigating car crashes, and that PTZ cameras were useful during investigations for watching and reporting on areas known for certain types of crimes (e.g., drug dealing, loitering, and prostitution). Based on our interviews, we expected to see benefits from intersections with PTZ and panoramic cameras, but those impacts were not statistically significant in our models. This is likely because so few intersections had both PTZ and panoramic cameras. Additional research is needed to better understand the benefits of combining PTZ and panoramic cameras.

Conclusion and Recommendations

This study has some limitations worth mentioning. First, because we used data from one police department, our findings are not generalizable to all other departments. Second, the sample size was small: each treatment group only had three to eight intersections. We attempted to addressed this by employing a 3:1 matching procedure to boost our sample size. We also used panel analyses, which increased the sample by the number of time periods in each model (i.e., eight quarters).

There were also methodological constraints around identifying appropriate comparison intersections and controlling for outside factors that may have influenced crime and clearance rates. For instance, the MPD was involved in many other technological and operational interventions when and where it expanded camera coverage. In addition, the MPD chief resigned and a new chief took over within the same quarter that the new cameras were installed. It is difficult to discern the new cameras' impact from the impact of these other changes, which is why we used difference-in-differences estimation to control for citywide trends. Because of these limitations, the findings in this brief should be considered preliminary and exploratory.

Despite these limitations, our exploratory research shows that panoramic and PTZ cameras can benefit departments differently, and agencies should carefully consider their specific needs before choosing which cameras they want. For example, leadership in a city experiencing many car accidents might consider employing more panoramic cameras. However, if they prefer to focus on longer-term investigations of specific crimes or areas, PTZ cameras could be more beneficial. In Milwaukee, the officers and staff we interviewed felt that combining the two was optimal because they could use each for its intended purpose. We could not support this through our quantitative analysis, which was limited because few intersections had both camera types.

Our research, which provides insight into the benefits and drawbacks of two types of cameras, can aid law enforcement agencies deciding which cameras to use and how and where to implement them. However, our analyses were limited by small sample sizes and other methodological constraints. Thus, we cannot definitively say whether one type of camera is significantly better for combating crime or supporting investigations. *Future research should explore this question further, particularly in jurisdictions with larger camera programs and combinations of panoramic and PTZ cameras in particular areas.*

Note

[1] We used census data and examined the block group where the intersection was located. The variables included in propensity score matching models are shown in table A.1. To successfully identify comparison intersections, there is variation across models, and some census and crime trend variables are excluded.

References

Jung, Yeondae, and Andrew P. Wheeler. 2019. *The Effect of Public Surveillance Cameras on Crime Clearance Rates*. Dallas: The University of Texas at Dallas.

La Vigne, Nancy G., Samantha S. Lowry, Joshua A. Markman., and Allison M. Dwyer. 2011. *Evaluating the Use of Public Surveillance Cameras for Crime Control and Prevention*. Washington, DC: Urban Institute.

MacDonald, John M., and Pamela K. Lattimore. 2010. "Count Models in Criminology." In *Handbook of Quantitative Criminology*, edited by Alex R. Piquero and David Weisburd, 683–98. New York: Springer.

Morgan, Anthony, and Christopher Dowling. 2019. *Does CCTV Help Police Solve Crime?* Canberra, AUS: Australian Institute of Criminology.

Piza, Eric L., Brandon C. Welsh, David P. Farrington, Amanda L. Thomas. 2019. "CCTV Surveillance for Crime Prevention: A 40-Year Systematic Review with Meta-Analysis." *Criminology & Public Policy* 18 (1): 135–59. https://doi.org/10.1111/1745-9133.12419.

Ratcliffe, Jerry H., Travis Taniguchi, and Ralph B. Taylor. 2009. "The Crime Reduction Effects of Public CCTV Cameras: A Multi-Method Spatial Approach." *Justice Quarterly* 26 (4): 746–70. https://doi.org/10.1080/07418820902873852.

Shukla, Rochisha, Daniel S. Lawrence, and Bryce E. Peterson. 2020. *Lessons Learned Implementing Video Analytics in a Public Surveillance Network*. Washington, DC: The Urban Institute

Welsh, Brandon C., and David P. Farrington. 2009. "Public Area CCTV and Crime Prevention: An Updated Systematic Review and Meta-Analysis." *Justice Quarterly* 26 (4), 716–45. https://doi.org/10.1080/07418820802506206.

Appendix. Additional Statistics and Results

TABLE A.1

Descriptive Statistics of Treatment and Comparison Groups (Quarterly Averages)

	PTZ Cameras		Panoramic Cameras		PTZ + Panoramic Cameras	
	Treatment group mean	Comparison group men	Treatment group mean	Comparison group mean	Treatment group mean	Comparison group mean
Area (miles^2)[a]	0.08	0.07	0.10	0.09	**0.06**	**0.08*****
Population[a]	**1,112.33**	**960.67*****	**791.88**	**853.42***	**796.00**	**1,097.56*****
Diff. house past year	**12.18**	**17.06*****	23.20	22.25	18.03	17.84
Renting[a]	64.46	61.31	67.09	65.86	66.54	64.89
Female household[a]	28.18	27.57	39.22	36.91	23.61	24.46
Under poverty line[a]	35.29	32.77	40.55	42.41	26.80	26.84
On public assistance	**5.81**	**2.89*****	**10.35**	**8.62**†	5.21	4.90
Unemployed	7.84	8.91	**11.53**	**9.24*****	**5.29**	**7.12****
Under18[a]	28.94	30.03	34.94	35.96	**28.27**	**32.05****
Black[a]	44.06	46.31	69.62	74.50	36.45	38.85
Hispanic[a]	36.53	37.60	**21.89**	**9.32*****	44.83	47.22
Foreign born	**13.26**	**16.81***	6.97	8.18	16.65	20.02
Total crimes '17	31.33	25.94	37.13	37.51	30.17	25.11
Violent crimes[a]	3.29	3.50	4.88	4.84	2.58	2.44
Property crimes[a]	5.88	5.13	5.53	5.28	5.17	4.36
Simple assaults[a]	3.50	3.81	4.94	4.58	4.08	3.14
Drug crimes[a]	2.67	2.4	2.97	2.81	1.67	2.58
Group B offenses[a]	6.04	4.76	7.56	6.90	4.67	4.36
Total clearances '17	10.17	9.33	13.66	12.76	8.67	11.19
Violent clearances	1.04	1.47	1.91	1.90	1.17	1.03
Property clearances	0.50	0.25	**0.19**	**0.44****	0.33	0.47
Simp. aslt. clearances	1.71	1.86	2.19	2.15	2.17	2.17
Drug clearances	2.63	2.36	2.75	2.75	1.67	2.53
Group B clearances	2.21	1.46	**3.38**	**2.38**†	1.42	2.17

[a] Included as a match variable in at least one of the propensity score matching models.

* = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$ (t-test results)

TABLE A.2

Results from Poisson Regression Analyses

	Incident Rate Ratio					
	All crimes	**Violent crimes**	**Property crimes**	**Simple assaults**	**Drug crimes**	**Group B offenses**
Crimes						
PTZ cameras (n=192)						
Treatment site	1.27	1.14	1.12	1.19	0.97	**1.47****
Period	**0.58*****	**0.69*****	**0.70*****	**0.56*****	**0.31*****	**0.49*****
Treatment site × period	1.15**	**1.40***	1.23	0.99	1.47	**1.62*****
Wald χ2 (overall model)	**301.06*****	**50.07*****	**28.16*****	**73.60*****	**82.24*****	**91.09*****
Panoramic cameras (n=256)						
Treatment site	0.87	0.85	0.99	1.08	0.87	0.99
Period	**0.63*****	**0.76*****	**0.71*****	**0.53*****	**0.57*****	**0.58*****
Treatment site × period	1.05	0.99	0.94	1.22	1.06	**1.26****
Wald χ2 (overall model)	**381.22*****	**41.13*****	**52.31*****	**79.76*****	**49.37*****	**98.67*****
PTZ + panoramic cameras (n=96)						
Treatment site	1.18	1.08	1.37	1.37	0.49	1.01
Period	**0.54*****	0.78	**0.61*****	**0.57*****	**0.54*****	**0.62*****
Treatment site × period	1.04	1.21	0.99	1.19	1.12	1.09
Wald χ2 (overall model)	**164.86*****	4.43	**27.37*****	**23.25*****	**18.17*****	**17.28*****
Crime clearances						
PTZ cameras (n=192)						
Treatment site	0.91	**0.60****	1.22	0.79	0.79	**1.38***
Period	0.99	0.94	**2.03****	1.17	**0.58*****	1.16
Treatment site × Period	1.13	**1.81***	0.56	0.80	1.18	**1.51***
Wald χ2 (overall model)	**12.86***	10.06	10.96	**14.80***	**22.79*****	**43.16*****
Panoramic cameras (n=256)						
Treatment site	1.01	1.04	**0.35****	1.12	0.93	**1.29***
Period	**1.09***	1.16	1.35	1.00	0.87	1.16
Treatment site × period	1.09	0.90	1.73	1.27	1.15	1.10
Wald χ2 (overall model)	**23.24*****	11.88	**24.77*****	**15.72***	12.53	**27.44*****
PTZ + panoramic cameras (n=96)						
Treatment site	**0.67****	1.10	0.65	1.03	0.51	**0.52***
Period	0.97	1.36	0.87	0.74	1.02	**1.39***
Treatment site × period	1.22	0.85	2.54	1.74	1.06	0.89
Wald χ2 (overall model)	5.37	4.63	1.92	8.75	4.86	8.94

Notes: Models also controlled for several intersection-level demographic variables (not shown), including population, % living in different household from previous year, % renting, % under 18, % Black, % Hispanic, % female-headed household, and % under poverty.

* = $p < 0.10$, ** = $p < 0.05$, *** = $p < 0.01$

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