

Evaluating the Impact of Officer Worn Body Cameras in the Phoenix Police Department

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December 2014



Suggested citation:

Katz, Charles M., David E. Choate, Justin R. Ready, & Lidia Nuño. (2014). Evaluating the Impact of Officer Worn Body Cameras in the Phoenix Police Department. Phoenix, AZ: Center for Violence Prevention & Community Safety, Arizona State University.

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EXECUTIVE SUMMARY

The Bureau of Justice Assistance (BJA), through the SMART Policing Initiative (SPI), awarded the Phoenix Police Department \$500,000 to purchase, deploy and evaluate police body worn cameras. The design and implementation of the project included the purchase of 56 Body Worn Camera (BWC) systems and deploying them in the Maryvale Precinct. The implementation of the BWC's occurred in one of the two Maryvale Precinct squad areas (aka target area). All officers assigned to the target area were issued the equipment and were provided training in its use, maintenance, and related departmental policy. This evaluation was conducted to examine the effect of implementing police worn body cameras on complaints against the police and domestic violence case processing and outcomes.

Our analysis of the camera meta-data indicated that only 13.2 to 42.2 percent of incidents were recorded by and BWV camera. Domestic violence incidents were the most likely to be recorded (47.5%), followed by violent offenses (38.7), back-up (37%), status offenses (32.9%), and subject/vehicle stops (30.9%). Other offense types were recorded less often. While in general the technology was found to be comfortable and easy to use, officers were dissatisfied with long down load times, increased amount of time that it took to complete reports, and the possibility that video recordings might be used against them by the department. We also found that video submitted to the court was difficult to process because of logistical problems associated with chain of custody and the length of time that it took the prosecutors to review video files. While many of the problems were addressed by the precinct commander by assigning a police officer to serve as a court liaison officer, prosecutors still maintained that they did not have enough time to review video footage.

Regardless, the officer worn body cameras were found to be beneficial to the officers and the court in a number of ways. First, officer productivity as measured through the number of arrests increased significantly. For instance, the number of arrests increased by about 17% among the target group compared to 9% in the comparison group. Second, complaints against the police declined significantly. Complaints against officers who wore the cameras declined by 23%, compared to a 10.6% increase among comparison officers and 45.1% increase among patrol officers in other precincts. Third, our data showed that those officers who wore cameras and received a complaint were significantly less likely to have the complaint sustained when compared to the comparison group and other patrol officers throughout the PPD. This suggests that even if a complaint was made against a camera wearing officer the video file was likely to provide support to the officer. Fourth, and related, the officer self-report data suggested that a significant number of complaints were not pursued because of video recordings. BWC did not appear, however, to have an impact on suspect behavior as measured through resisting arrest charges.

Additionally, we examined the impact of body worn cameras on domestic violence case processing. Analysis of the data indicated that following the implementation of body cameras, cases were significantly more likely to be initiated, result in charges filed, and result in a guilty plea or guilty verdict. The analysis also determined that cases were completed faster following

the implementation of body cameras, however, we believe that this finding was largely a product of the addition of a court liaison officer who facilitated case processing between the PPD and city prosecutors office.

SECTION 1: INTRODUCTION

The Bureau of Justice Assistance (BJA) awarded funding to the Phoenix Police Department (PPD) to purchase, deploy and evaluate on-person video cameras that record the interactions between community members (e.g., the public, suspects and victims) and officers. The camera is worn on the officer's uniform, placed optionally on the shoulder lapel or upper placket, with a forward-facing viewable area. The camera captures events and interactions that take place between suspects, victims, and the officer. The video recordings can be used by the police to document statements, observations, behaviors and other evidence; and can simultaneously be used to prevent and deter unprofessional, illegal, and inappropriate behaviors by both the police and the public. Accordingly, this technology can be used to resolve disputes and build trust with the community by preserving a record of critical events.

The technology for the present project was primarily selected for two purposes: 1) to increase police accountability; and 2) increase the effectiveness of the police in their response to crime in general and domestic violence specifically. First, the technology might deter officers from engaging in unprofessional behavior or misconduct, and similarly, deter members of the public from inappropriate, aggressive or resistant behavior. Furthermore, with respect to police accountability the technology has the potential to record misconduct, use of force, and other problem behavior or unprofessional conduct; and, conversely it has the potential to be used by an officer to disprove an allegation of misbehavior and may defuse potentially violent interactions between the police and the community. As a consequence, we believed that such technology might increase accountability among the public and the police, decrease citizen complaints, and result in increased perceptions of legitimacy, trust, and public satisfaction with the police. We believe that an ancillary benefit of the technology is that it might reduce civil judgments against the city as a result of injuries or damage that might occur as a consequence of police misconduct or false claims about police misconduct.

Second, the technology has the potential to increase the effectiveness of the police response to crime in general and domestic violence specifically. Regular recording of officer-involved incidents might improve the level of recollection of the incidents when the officer is completing their field reports, and later during court proceedings. The video can be entered into evidence as further proof of the incident, which has the potential of leading to higher rates of arrest, charging, prosecution, and conviction. We were also interested in determining whether the technology increased public cooperation with the police. Cooperation was measured by examining the use of the technology and its effect on deterring individuals from committing secondary violations such as resisting arrest, assaulting a police officer, and trying to escape.

Cameras and Policing

The television show *Cops* first aired in 1989, and continues as one of the longest running shows on television. The American public's familiarity with seeing police work on video is engrained, but this is still an external observer with a camera, recording events for the purpose of producing

a television show. As video recording technology advanced sufficiently to allow for compact devices that could fit on a patrol car's dashboard without significantly interfering with ordinary responsibilities, police departments began to adopt dashboard cameras. Through the 1990's and early 2000's the U.S. Department of Justice's Office of Community Oriented Policing Services (COPS) In-Car Camera Program provided millions of dollars in grants to purchase and deploy dashboard cameras to law enforcement agencies across the country (Fiumara, 2012). Dashboard cameras have been demonstrated to improve officer safety and accountability. In part because of this, they have been widely adopted and accepted by law enforcement agencies and officers over the past few decades (International Association of Chiefs of Police [IACP], 2004).

More recent technological developments in the portability of devices with video recording capability have renewed the discussion about cameras in policing. On-officer, body worn video (BWC) camera devices are an emerging technology, lauded for their contribution to police accountability and transparency, as well as their evidentiary value, an increasing number of police departments are deploying them, if not wholesale, in a limited capacity (White, 2014). Critics of BWC cite privacy concerns and unnecessary expenses. Despite the exponential growth in the number of agencies purchasing and deploying BWC, there is still little empirical evidence to support the claims of their supporters, or understand their unintended consequences. To date, only five (5) empirical studies have examined the impact of BWC and the process of their implementation.

In 2006, the constabulary in Plymouth, UK conducted a 17-month study using 50 BWC (Police and Crime Standards Directorate, UK Home Office, 2007). The BWC relied on a headband to mount the camera just above the officer's left ear. More than 300 officers were trained for the use of the BWC, and were allowed to voluntarily checkout and use the system at their convenience. Key findings of the study included: increased evidentiary quality; 22.4% less time spent on paperwork; substantial support in domestic violence cases; advantages in professional development and officer accountability; and cost constraints. Improvement in the quality of evidence was demonstrated by increases in charges/summons (10.2% to 15.0%), increases in sanction detections (29.0% to 36.8%), and increased conversion of a violent incident into a chargeable crime (71.8% to 81.7%). In one domestic violence case, the video evidence received international press attention following its use in the conviction of the suspect. Complaints against officers declined by 14.3% overall, and none were filed against officers who wore the cameras. Despite these advantages, the BWC systems proved to be too costly to continue and expand.

Another BWC evaluation was conducted in Victoria, British Columbia, Canada from July 1, 2009 through October 30, 2009 (Victoria Police Department (VPD), 2010). The department used four head-mounted BWC, available for voluntary use primarily by foot and bicycle patrol officers. Similarly to the Plymouth, UK study, no officers wearing the cameras in Victoria had a complaint filed against them. Unlike Plymouth, Victoria officers reported spending more time completing paperwork where video evidence was included. The majority (80%) of Victoria PD officers reported that the BWC evidence provided a more accurate account of the incident and 87% felt that the video improved the quality of evidence. While the evidence was usable in court, the study recommended the use of a liaison with the court to address processing concerns. The study further found that the approval rate for submitted charges increased from 84% to 93%. Officers' awareness of their environment also improved with the use of the camera. One of the

concerns cited by the study was data security, but also determined that this was a surmountable problem. As a feasibility study for the VPD, it was determined that the benefits of BWC outweigh their limitations, and that the adoption of the technology was appropriate and desirable for the agency.

Two communities in Scotland conducted studies in the use of BWC. In Renfrewshire, 38 cameras were deployed for eight months in 2008-2009 and in Aberdeen 18 cameras (later increased to 30) were studied over a three month period beginning June 1, 2010. The study found substantial declines in crime in the areas where the BWC were deployed. Specifically, the study reported that breach of peace offenses declined 19%, vandalism 29%, minor assaults 27%, and serious assaults declined 60%, for an overall decline in crime of 26% (ODS Consulting, 2011). Additionally, the study found that in Renfrewshire BWC cases were processed to guilty pleas/verdicts faster than those outside the study period. About 39% of BWC cases were settled at the earliest possible stage, compared to 37% and 29% among all other (non-BWC) cases in the two relevant court jurisdictions, and only 4% of BWC cases advanced to trial, compared to 14-20% of non-BWC cases. In Aberdeen the results were more pronounced. BWC cases in Aberdeen were settled by guilty plea at the earliest possible stage 85% of the time, compared to 18% of non-BWC cases. Furthermore, the remaining 15% of BWC cases ended in guilty pleas, with none proceeding to trial. The BWC also demonstrated effectiveness in addressing citizen complaints against officers. Among the two sites, there were only seven complaints made against officers wearing a BWC, among more than 5,000 contacts during the study period. Three of the seven were unfounded after an initial review of the video, requiring no further action, and the other four substantiated the officer accounts and cleared them of any misconduct or unprofessional behavior. Finally, the study reported declines in assaults against officers wearing BWC. In Aberdeen for example, about 30% of officers at any given time would have been wearing a BWC during the study period. During that time, there was only one assault against an officer wearing a BWC, compared to 61 assaults on officers who had not worn the device.

In the Rialto, California Police Department (RPD), BWC were deployed for 12 months beginning in February 2012. At the time of the study, the RPD identified 54 frontline officers who would be eligible to wear the BWC. The officers were randomly assigned by shift to either wear (i.e. treatment) or not wear (i.e. control) the BWC on a weekly basis. Over the course of the study period, this method yielded 489 treatment shifts and 499 control shifts were observed. The results were favorable for the use of BWC. The study found that citizen complaints dropped by 88%, from 28 complaints in the year prior to just 3 complaints during implementation. There were 61 use of force incidents before implementation, which declined by 60% to 25 incidents during the implementation period. Additionally, control shifts saw double the number of use of force incidents than treatment shifts during the same period. Finally, the cameras did not have an adverse impact on the frequency of police-public contacts. The RPD recorded 40,111 police-public contacts in the year prior to implementation, and 43,285 during the year of implementation. (See Ariel, Farrar & Sutherland, 2014).

Most recently, an evaluation of BWC was conducted on their use in Mesa (AZ) Police Department (MPD). The MPD purchased 50 cameras, deployed to 25 officers who volunteered for the study and 25 randomly selected officers. Additionally, another 50 officers were tracked as a control group for the BWC intervention. During the first six months, officers were directed to

activate the cameras during contacts with the public and when practical. During the second six months of the study, officers were encouraged to use the BWC, but were permitted to use them at their discretion. During the required use period, there were 2,327 BWC activations, which declined 42% (n=1,353) during the discretionary use period. The study found 60% fewer citizen complaints among officers wearing the BWC, when compared to the non-BWC control officers. Some BWC problems were also identified in the Mesa study. Specifically, there were 3 to 4 requests for video redaction over the study period, which required an average of 10 hours of labor per request. This was a largely unanticipated resource cost above the approximate \$67,000 spent on buying the BWC units (at ~\$800-\$1,000 each) and affiliated operational costs for the one-year study period. By the end of the study period, still only 23% of MPD BWC users believed that the cameras should be permanently adopted department-wide. (See Mesa Police Department, 2013).

The Present Study

The camera technology for the project, as initially proposed, was primarily intended for two purposes: 1) to increase police accountability; and 2) increase the effectiveness of the police in their response to domestic violence. The present study sought to assess each of these originally intended goals, but also sought to examine the potential impact on officer performance, both in the adoption of, and adaptation to the body worn camera technology, and to assess the impact of cameras on officer job performance and satisfaction. The present study thus examined the effect of the body worn camera technology in six principal areas: 1) officer camera activation compliance; 2) utility and use of body worn cameras; 3) impact on officers' job performance; 4) impact on public compliance and cooperation; 5) impact on officer accountability; and 6) impact on domestic violence case processing and outcomes.

SECTION 2: METHODOLOGY

Setting

The Phoenix Police Department (PPD) is a large municipal police agency, with more than 3,000 authorized sworn personnel, and serves a community of more than 1.5 million people; making it the sixth largest city in the U.S. The PPD is organizationally divided into precincts and beat areas for principal patrol services. At the time of the study, the PPD's patrol division was divided into eight precincts. Most precincts were divided into three beat areas, the Maryvale Precinct was one of three which was divided into two areas. The Maryvale Precinct is approximately 15 square miles, and is operationally and geographically divided into two similarly sized patrol areas. Each of the two areas is assigned six patrol squads to provide first response coverage to calls for service on a twenty-four hour basis, seven days a week. While small changes in staffing occurred throughout the study, generally there were between 100 and 110 patrol officers equally divided between Areas 81 (comparison) and 82 (target).

The community characteristics of the study setting were important to the site selection for the study. The community served by the precinct has a population of about 105,000 residents, and is primarily comprised of Hispanic residents who are poorer and more likely to be unemployed than residents living in other areas in the city. Maryvale has historically been and continues to be a location for a high-volume of police activity, calls for service, and elevated crime rates, particularly for violent crime, relative to other areas in the city. In 2010, the UCR violent crime rate for Maryvale was approximately 85 crimes per 10,000 residents, compared to 55 per 10,000 for the rest of the city. Domestic violence is also a recurring problem in this precinct. In 2010, there were more than 3,300 calls for service that were initially dispatched as domestic violence incidents in Maryvale Precinct. The organizational structure, combined with the historically higher than citywide average crime rates lead to the Maryvale Precinct being selected as the site for the proposed quasi-experimental design for the body worn camera project.

Project Design and Analytical Approach

The design and implementation of the project included the purchase of 56 camera systems and deploying them in the Maryvale Precinct. The implementation of the VIEVU camera system occurred in one of the two Maryvale Precinct squad areas, Area 82. This group was referred to as the target group, or as the camera officers. The equipment provided for simultaneous coverage (using the system) seven days of the week, during all three shifts, by all deployed officers, and allowed for all officers to download data prior to next shift. All officers assigned to the six squads in the target area were issued the equipment and were provided training in its use and maintenance through a coordinated effort led by the precinct commander and VIEVU. Departmental policy involving the use of the cameras was formulated prior to implementation and was also an integral part of the training by the PPD.

Analysis of data for the present study relied on a pre-post comparison between target and comparison groups. The pre-post camera deployment analyses typically relied on data from January 1, 2012 through July 31, 2014. The cameras were deployed in the field on April 15, 2013. The study period covered about 134 total weeks, or 67 weeks pre camera deployment and 67 weeks post camera deployment, generally truncated in text to 15 months. We also compared officers in one area (Area 82) who were assigned to wear BWC, to officers in another area (Area

81) who were not assigned to wear BWC. As discussed previously, the Maryvale Precinct is divided into two patrol areas. Given this organizational structure, the two areas had the same command structure, and the same shift assignment and schedule. During the project planning phase the two areas were examined for differences in the community's they served. As observed below we found some differences between the two with respect to population, socio-economic characteristics, domestic violence, and crime.

Exhibit 1: Characteristics of target and comparison areas

Characteristic	Target Area Area 82	Comparison Area Area 81
Total Population	56,630	71,676
Age		
% Under 18 years	43.13	39.45
Ethnicity		
% Hispanic	82.5	71.1
% Native American	1.3	1.3
% African American	3.9	6.4
Poverty		
Mean household income	\$44,895	\$53,646
% owner occupied	52.8	63.7
Number of Officially Reported Crimes (UCR)-Jan-Nov.2011		
Violence	412	479
Property	2082	2718
Total	2,494	3,197
Domestic violence		
CFS	105	162
Geographic size (Square miles)	7.9	7.4

Data

Data for the present study relied on stakeholder interviews, project planning documents, camera metadata generated by camera activation, officer self-report surveys, official police computer-aided dispatch and record management system (CAD/RMS) data, official complaints and reports of misconduct reported to the PPD, and official case processing data from the City of Phoenix Police Department and Prosecutor's Office. Each of the data sources used for the present study is discussed below.

Project meeting minutes and notes. Project meetings were held during the planning of the project, camera acquisition, project implementation and ongoing activities. A critical review of these meetings' minutes provided data for the evaluation. The meetings involved the discussion of the final assignment of the target and comparison areas, technology procurement and selection process, development of camera use policy, and the handling and use of the audio-video data created as evidence for prosecutors. These observations and documents were used to assess project activity, planning, implementation and policy development. By the end of the study period several dozen meeting minutes and notes had been collected.

Key stakeholder interviews. Interviews with key stakeholders were conducted to better describe and understand the process of camera acquisition, selection, policy development and actual use and utility of the technology across the criminal justice system. The open-ended interview approach allowed for stakeholders to provide information most important or relevant from their individual perspective, without limiting it through a bounded set of survey questions. Key stakeholders included PPD finance and budget personnel, PPD and City of Phoenix information technology staff, police-court evidence liaisons, PPD command staff, patrol officers, officers who field-tested the technology, and city and county prosecutors. More than 24 interviews with key stakeholders were conducted over the study period

CAD/RMS data. CAD/RMS data from January 1, 2012 through July 31, 2014 were obtained from the PPD for the purpose of evaluating the project. Data included all unique incident reports from the Maryvale precinct to determine crime and disorder events pre and post camera implementation, by target and comparison area. These data included officer activity logs, which are obtained through dispatch records when officers report status changes. These data were used to analyze camera activation compliance by matching police activity with the camera meta-data (described below) and calculating the ratio of the number of incidents to the number of BWC records. These data included 81,257 incident entries for the Maryvale Precinct, about 48% (n=38,094) of which were attributed to a camera-wearing officer as the primary responding unit.

The CAD/RMS data included records of all arrests made by officers assigned to the Maryvale Precinct at some point during the analysis period. Due to data limitations, the date range for the arrest analysis was from January 1, 2012 through January 10, 2014, allowing 470 days pre and 270 days post BWC deployment for analyses. These data were provided in their original form as both incident-based and officer-based, and were converted for analysis within our research design focusing on pre-post deployment and camera/comparison assignment. The data were analyzed to assess the impact of the technology on arrest. These same data were used to analyze changes in the public's willingness to cooperate with an officer through analysis of resisting arrest (i.e., flight, passive and use of force resistance, and aggravated assaults against officers during the incident). The original arrest data contained information on 10,591 arrests, reduced to 4,586 for analysis following removal of ineligible arrests (due to date, officer or area restrictions). The data included the arrest charges, arresting officer(s) serial numbers and date and time of event. These data were converted into an average daily arrest rate for each officer according to their specific assignment at the time of the event, as related to camera or comparison group assignment.

Camera metadata. Camera metadata was automatically generated by the camera technology. These data included the camera serial number, the officer to whom it was assigned, date/time stamps of activation and deactivation, length of recordings, and freeform data entered by users that briefly described the nature or important details of the recording (e.g. departmental report number, accidental activation, relevant information about the recording). The camera metadata generated by the VIEVU system was made available in its entirety, and included 17,023 individual video files created over an 11-month period; beginning with the first day of active deployment, April 15, 2013, through March 12, 2014, which was the most recently available data at the time of request. Measures used for analyses included the description of the type of activation (e.g. incident recording, accidental activation, testing), the length of the recording, and

whether the video file was attributed to a particular incident number. Additionally, those video files tagged with an incident number were linked to official CAD/RMS incident data to measure rates of compliance, and activations by incident type.

Official complaint data. Department wide official complaint data were gathered from PPD's Professional Standards Bureau (PSB) for all sworn officers from January 1, 2012 through July 31, 2014. These data included all complaints, regardless of the source of the complaint's initiation (e.g. citizen, officer's supervisor, complaint hotline). The data identified the officer, the officer's assignment at the time of complaint, the disposition of the investigation (e.g. founded, unfounded, suspension), and a narrative of the incident. Included in the narrative was whether body-camera video was reviewed as part of the investigation. The complaint data were used to examine the mean change in the number of complaints, and disposition of the complaints, pre-post test by target and comparison group.

The complaint data initially included 2,919 cases. We first removed 496 cases from the analysis file because no name or identifying information was known to PSB (e.g. some cases reported to PPD concerned non-PPD police officers). We next removed 160 cases from the dataset because they were only associated with internal inspections (e.g. uniform policy violations). Finally, another 123 cases were removed from the analysis because they were related to personnel other than patrol officers, who were the focus of the present study. In the end, the final dataset contained 2,140 complaints. The measures created from these data were the number of complaints made against each officer, whether or not the complaint was "founded" or not, and any disciplinary action taken against the officer. The PPD uses "founded" and "unfounded" to classify complaints into one of two categories that essentially delineates whether or not any misconduct occurred based on the accusation.

Officer self-report survey. Perception surveys were anonymously completed by target and comparison group officers, and were collected eight times throughout the course of the study: four times prior to camera deployment (October 2012, December 2012, January 2013 & March 2013) and four times following camera deployments (April 2013, July 2013, October 2013 & June 2014). Officers were surveyed during briefings immediately prior to the start of their shift. Officers were only surveyed if available on the selected day, during the briefing. Officers who were absent were not eligible for participation. Response rates were high throughout each data collection period, with a 98.3% overall participation rate, that ranged from 96.5% to 100.0% per round of data collection.

The instrument included 33 questions about the officer's perceptions of body worn cameras. These items were clustered into eight subjects: 1) accuracy and speed completing incident reports; 2) use as evidence; 3) reactions of the public to the body worn cameras; 4) police-community relations; 5) police officer behavior; 6) comfort and ease of use; 7) general perceptions of body worn cameras; and 8) overall opinions of the value and expansion of body worn cameras. As part of the survey officers were also asked to provide self-reported estimates of the number of complaints made and threatened against them in the past 30 days. We used these items to create measures of the mean number of complaints made and/or threatened, whether a video was present, and the nature of the complaint (e.g. unprofessional conduct, use of force). Last, the instrument also included measures related to the officer's socio-demographic

characteristics, such as: age, race/ethnicity, sex, rank, unit assignment, years employed and in sworn service, and educational attainment.

Domestic violence pocket card data. Data on domestic violence related incidents were provided by the PPD through domestic violence pocket card data collected in the Maryvale Precinct from January 1, 2012 through July 31, 2014. The DV pocket cards are a specialized form of Field Interview (FI) card, designed specifically for domestic violence incidents. All phoenix officers are required to complete a DV pocket card for each domestic violence incident, regardless of whether or not an arrest is made. Data from 2,063 incidents were collected through the DV pocket cards over this time. These data were used to track domestic violence cases from incident initiation through prosecutorial disposition and sentencing.

Official Phoenix City court data. Official court processing data from January 1, 2012 through July 31, 2014 were collected from the City of Phoenix Prosecutor's Office. All police contacts involving domestic violence in Maryvale were identified (through Domestic Violence Pocket Cards) and were then tracked through the City of Phoenix Prosecutor's Office case processing system. We then determined whether or not: the incident was forwarded to the city prosecutor's office, the case was declined, whether charges filed, the outcome of the case (e.g. dismissal, conviction, sentencing), and the amount of time that it took to process the case. We then linked this data to our dataset on the assignment of officer worn body cameras. These data were used to examine the impact of the assignment of body cameras on the case processing of domestic violence cases.

Limitations

At least three potential limitations should be noted before we present the findings below. First, the findings from the present study should not necessarily be generalized to other communities. A number of studies have demonstrated that police behavior is unique and may not be similar to another community's. Accordingly, a police agency's and community's response to the implementation of BWC may be a reflection of the scope and nature of issues in that department and community. Second, we employed a nonequivalent control group design that inherently possesses a number of limitations. The most important of which includes the interaction of selection with other sources of invalidity (Campbell, Stanley & Gage, 1963). Specifically, officers transferred in and out of the Maryvale Precinct throughout the study period as a consequence of natural attrition and replacement processes. Additionally, the precinct experienced substantial turnover (about 39%) among patrol officers during our pre-deployment period (January 2013), due to a departmental re-bid process. The planned implementation of body cameras in the Maryvale precinct was well known among officers throughout the department and it is possible that some officers transferred out of the precinct, or avoided transfer into the precinct, to avoid having to wear a body camera. A brief review of the transfer process suggested that there was no major difference in the number of transferred officers to and from Maryvale compared to other precincts, but data on the motivations for transfer during this rebid process was not collected. Therefore, our findings might be influenced by a selection effect. Third, we believe that another limitation to the present study is contamination of our treatment to the comparison group. Our camera and comparison groups shared patrol responsibilities in the Maryvale Precinct. As a consequence, target and comparison group officers communicated often with one another before, during, and after shift; and were

sometimes deployed to the same location as one another. The presence of an officer with a camera might have impacted the behavior of those around them (e.g., officers, citizens), as well as influenced their perceptions of the technology.

SECTION 3: PROCURMENT AND ACQUISITION OF THE TECHNOLOGY

The working group for the Phoenix Smart Policing initiative played a central role in acquiring official data for the evaluation, coordinating survey data collection in the field, posting the solicitation (i.e. RFP) for the hardware and data storage, testing and selecting the body-worn cameras, setting up the training for camera officers, and monitoring the intervention in the field. The working group met on a monthly basis during the early project development stage, from November 2012 through August 2013, to discuss and make decisions about the on-officer video technology and fieldwork on the research project. The group met less frequently once the cameras were implemented in the field.

The participants of the working group meeting typically consisted of two to three members of the research team from ASU; the Commander who oversaw the PPD side of the initiative; a PPD grants manager who coordinated the RFP process; civilian employees from city procurement who were the contract specialists; an officer who managed training and policy development; and two civilians from the city's IT and fiscal departments. During the period when the different camera products were being vetted and tested in the field, the working group also included a number of patrol officers from the Maryvale Precinct who provided insights about the process from the line officers' perspective.

The timeline for the testing, acquisition of hardware, field training, and implementation was slightly delayed compared to the proposed timeline. This occurred because of a leadership change in the PPD (i.e. a new chief of police), a department-wide rebid, in which officers were relocated across the department, and because the police union (as anticipated) played an active role in providing feedback on policy guidelines for when and how the cameras would be used in the field.

The advertisement for the request for proposals (RFP) was posted in September 2012 and required that submissions from camera vendors were due on October, 26, 2012. The PPD also scheduled a pre-proposal conference a few weeks before the proposal was due, where vendors could ask questions about the Department's needs, the solicitation, and the process for evaluating the bids.

The PPD explained that they had little discretion in the procurement process, and that they were required to obtain the camera system through a competitive process because the technology was being paid for with federal grant money. The RFP provided several opportunities for greater department wide inclusiveness in the project and provided increased education to the working group about the strengths and weaknesses of each camera product. For example, it allowed the working group to develop a more detailed understanding of how the video footage was created and how to manage the recording and storage process. This was particularly important for IT, which would have to evaluate many of these functions, and PPD's current capacity to address them. The RFP also provided an opportunity for the officers to review and rate each camera.

For instance, the officers tested the device in a controlled environment, which allowed them to evaluate the camera system based on officer needs.

The Solicitation

In September 2012, the City of Phoenix posted a solicitation inviting camera vendors to submit proposals for an on-officer video camera system that would be implemented in 2013. The solicitation provided additional background, noting that the city plans to adopt and implement 50 on-officer video cameras to be worn by the patrol division. The cameras would be worn on a full-time basis, outside of the officers' uniform. The RFP stated that the need for the body cameras arose out of the Community Engagement and Outreach Task Force, which recommended in 2010 that the Phoenix Police Department begin pilot testing an on-person video camera system. The department subsequently piloted one camera system for three months in 2011. Following the pilot program, which involved testing 18 units, the Department applied for and was awarded the current BJA grant under the Smart Policing Initiative to obtain, evaluate, and report on the results of the program to implement a body worn camera system on a broader scale.

Camera vendors who bid for the contract were expected to demonstrate their expertise in designing and maintaining body worn cameras, as well as back-end server solutions for labeling and storing video footage. The goal of the request for proposals was to identify the system that best suited the PPD's needs in terms of ease of use, functionality, recording, and storage capabilities. More specifically, the solicitation provided a series of specifications that would serve as the minimum requirements for the on-officer camera system that the Department would adopt. The minimum requirements were divided among four main categories: 1) the physical characteristics of the camera, 2) display and access capabilities, 3) vendor qualifications and experience, and 4) storage. In addition, the manufacturer was expected to provide a one-year minimum warranty for all hardware, software and upgrades, as well as technical support for the devices, the docking/charging stations, and the data storage and retrieval software.

In terms of the physical characteristics of the camera, the device could not weigh more than a total of five ounces. Also, it had to be able to record and store at least four hours of video, with a battery life of eight hours. The PPD was also insistent that the recording indicator was visible to officers in the field, and that police would have the ability to view the recently recorded video footage on the scene of an incident. The field of vision of the device needed to be at least 50 degrees. The Department also wanted officers to have the ability to turn off the night vision function, if there was one, and to be able to change the placement of the device to several locations, including the ear, shoulder and lapel. Finally, there could not be more than two wires on the device, and it would need to have the capacity to automatically label video files with the date and time of the recording.

The display and access capabilities listed in the solicitation were equally detailed. The first requirement in this category was that it must be possible to view camera footage remotely using a web-based interface, which could only be accessed through password verification. Another requirement was that personnel access to video files would need to be hierarchical, with a log showing when a video was reviewed and/or copied. The length of video retention would need to be controlled by a system administrator in order to stay in compliance with state law regulating

the storage of evidence. Finally, the size of exported video files must be in 10 minute increments, and the equipment must have the capacity to search for video files by officer badge number, date of recording, report number and type of crime.

The third category of requirements was related to the vendor's qualifications and experience. The camera manufacturer was required to provide a history of their business, including when they were established, the type of ownership (public/private), and the length of time the business has been providing on-officer video services and technology. They also needed to identify their area of expertise and resources available for providing the requested services. And finally, the vendor was also required to list key staff members, any litigation and investigations into the company that could impede their delivery of services, and the ability to handle contracts with large agencies such as the PPD.

The last category was related to storage capacity. The PPD would only entertain proposals where the storage program allowed at least 15 camera units to upload video simultaneously, and also allow for indexing of each video file with a tag for the officer badge number, date of recording, report number (i.e. DR number), and type of crime. The video was required to be exported using an industry-standard file format. The company must also describe the order in which video files are uploaded (e.g. by size of file or order of recording) and the anticipated download time. The backend retrieval system must comply with PPD data storage and protection standards and the storage facility must be located in the United States. Finally, upon request the manufacturer must be able to provide all data in a searchable format on an external hard drive with an audit trail.

During the November 2012 working group meeting, the PPD revealed that three firms submitted bids for the contract and two manufacturers, VIEVU and Taser International, met all of the above criteria and were selected to participate in the testing stage of the procurement process.

Testing the Device

On November 6, 2012 the working group held the first of a series of meetings to identify criteria for testing the two products that made it to the final round of the selection process. During these selection committee meetings, we also developed a scoring system for quantifying the performance and functionality of the camera products. The working group determined that both IT and police personnel would conduct the field testing of the equipment in a controlled environment at the training academy for two reasons. The first was that the captured video does not need to be kept for evidentiary purposes. The second reason is that they can run officers through a variety of training scenarios that they might not otherwise encounter in the field during the brief window of the testing period. The first camera system was scheduled to be tested on two days in mid-November (15 and 16), which was followed by a meeting on November 28th for testers only to poll and finalize the scoring. The second product was tested in early December using an identical testing format.

The testing process involved allocating 30% of the total score to the camera characteristics, 10% to storage, 30% to display and access capabilities, 15% to the proof of concept, and 15% to the system warrantee. Individual officers scored each item within these subcategories on an ordinal scale in which E = Exceeds Requirement, M = Meets Requirement, and D = Does not meet requirement. A perfect score on this training academy component of the testing would result in

500 points being assigned to that particular product. The IT personnel scored the items using the same ordinal ranking system, but a perfect score for the IT testers was valued at 300 points. And finally, the cost of the on-officer camera system was scored last. A perfect score on cost was valued at 200 points. The academy-based field testing, the technical component, and the score for cost were added together for an overall score that could not exceed 1000 points.

After the field testing, the working group noted that this process brought to light a number of insights about the products. One common sentiment by the officers was an acknowledgement that the Taser Axon Flex System was considerably more complex than the VIEVU, which was widely appreciated by line officers for its simplicity and ease of use. One of the complexities of the Taser product, which was viewed with skepticism, was the 30 second back-recording option. The Taser camera's back recording options begins retaining the recording 30 second *before* the officer presses the activation button. The technology is essentially always simultaneously taking in and discarding information in a constant loop, but nothing is actually recorded until the officer presses the activation button. The advantage of this option is that an officer can watch an event such as a car accident occur in the field, and then press the activation button 15 seconds after watching the accident occur, and still capture the event. This provides additional context that might help explain how police-citizen contacts were initiated. The Phoenix officers viewed this feature as a liability. Some officers mistakenly thought they were always being recorded, while others were concerned that the back-recording option would accidentally capture officers engaging in behaviors that they didn't want or expect to be caught on film.

Another issue discussed by the testers was the importance of lighting. The officers noted that it was impossible to know what the camera footage would look like until you test the products under different lighting. On a related note, the advantages and disadvantages of night vision quickly emerged as a major issue. The Taser product provided a night vision recording option while the VIEVU did not. There was concern among Phoenix officers that the night vision option could cause police managers and lawyers to judge officers' behavior unfairly. They were worried that the night vision would provide superiors and the courts with a much clearer picture than what they were able to actually see at the scene of the incident. Like the back-recoding option, the night vision function was seen as a personal risk to the officers in terms of how their conduct might be judged. The other issues that came to light were the problems of wind noise, a flashing light on the VIEVU device, and the differences in how video evidence was tagged and uploaded. Ultimately the PPD decided to go with the VIEVU camera over the Axon Flex. Interviews with the officers indicated that in the end they were not really concerned about differences in the technical capabilities of the cameras other than how each feature might reflect on their behavior.

SECTION 4: TRAINING AND IMPLEMENTATION

A working team led by the Commander developed a draft of the policy for using the body-worn cameras in the field, which included guidelines on training, charging the cameras, downloading data, when to activate the device, prohibited recordings, and a serious incident protocol. This on-officer video camera policy was finalized in April 2013. This was followed by a train-the-trainers session and then a series of training sessions for the patrol officers in the 81 and 82 squads. These occurred from April 8-15, 2013. During the training sessions instructions were provided on recording and storing video footage as well as policy guidelines for their use in the field. The training sessions went well. The officers voiced few concerns about the hardware, software, and how to use it; but they did voice a number of concerns about when they or their superiors could access the data, and the back-end processes relating to burning video for the courts, and policy issues surrounding when to activate the device.

The operational guidelines note that prior to each shift, officers must ensure that the VIEVU device is sufficiently charged. The camera must be worn vertically on the shirt placket at the center of the shirt pockets on the outside of the Class C uniform shirt. The device must be worn at all times. Sergeants in the target areas are required to wear and use the on-officer video cameras as well as patrol officers. Activation of the camera is fairly intuitive, involving a sliding panel that uncovers the lens, which is outlined in green when the video camera is recording. The PPD policy states that safety of the patrol officers and citizens is the first priority and always comes before any considerations relating to when to activate the camera. *“Bearing this in mind, all officers and supervisors who arrive on a scene or engage in an enforcement contact must place their VIEVU camera in the on/record mode as soon as it is safe and practical to do so.”* Enforcement contacts include, vehicle stops, pedestrian stops, consensual encounters that are investigative in nature, calls for service, on-view events requiring enforcement activities, suspect and witness statements and interviews, vehicle and foot pursuits, and emergency response to critical incidents.

Once the VIEVU camera is turned on, officers must continue to record the event or encounter until either the completion of the event or until they leave the scene. Officers and supervisors are allowed to view the video footage once the data have been uploaded from the camera in order to refresh their memory prior to completing a departmental report or while preparing for court. After the videos are uploaded, officers must tag the video file with the appropriate incident number, citation number, or department report number. The PPD policy strictly prohibited surreptitiously recording fellow officers, or activating the device in dressing rooms or locker rooms. Finally, the precinct Inspection Lieutenant is to randomly inspect six videos each calendar month, one from each squad participating in the evaluation. The Department also has the ability to review video to ensure officer compliance with policy and to investigate citizen complaints.

Activation Compliance and Use of Body Worn Video Cameras

An analysis of camera meta-data was conducted to assess the activation characteristics of the video files produced, and the data associated with each file. Our analysis relies on 17,023 individual video files created over an approximate 11-month period, beginning with the first day

of active deployment, April 15, 2013, through March 12, 2014 (most recent date of availability at time of request).

More than 91% (n=15,519) of video files were attributed to an incident number in the camera meta-data. There were a total of 15,943 valid video files. We define “valid video files” as those attributed to an officer’s activity and/or possible interaction with the public, thus excluding test and accidental activations and various file creation errors. See Exhibit 2 below.

Exhibit 2: Camera Activation by Type of Activation		
	n	%
Type of Activation		
Video attributed to an incident	15,519	91.16
Valid video w/o incident number	424	2.49
Accidental Activation	419	2.46
Test Activation	224	1.32
Duplicate File	23	0.14
Malfunction	13	0.08
Download Error	7	0.04
Unspecified Error	6	0.04
No Categorization / Description	388	2.28
TOTAL	17,023	100.00

Exhibit 3 shows the average length of each video file by activation type. The mean recorded incident was about 9 to 10 minutes.

Exhibit 3: Average Length of Camera Activation by Activation Type			
	n	mean	SD
Type of Activation			
Video attributed to an incident	15,519	0:09:32	0:11:15
Valid video w/o incident number	424	0:05:39	0:07:23
Accidental Activation	419	0:05:36	0:20:14
Test Activation	224	0:00:36	0:02:45
Duplicate File	23	0:10:07	0:11:23
Malfunction	13	0:30:58	0:50:57
Download Error	7	0:12:03	0:10:48
Unspecified Error	6	0:07:27	0:06:34
No Categorization / Description	388	0:07:24	0:13:14
TOTAL	17,023	0:09:11	0:11:37

Mean and standard deviation reported in hh:mm:ss format.

Exhibit 4 below shows the mean number of camera activations per user. Among valid files, there was tremendous variation, with a minimum of 21 activations and a maximum of 1,079 over the study period.

Exhibit 4: Camera Activations by User		
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All video files		
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Mean	404.88
Standard Deviation	244.08
Median	353
Minimum	0
Maximum	1,079

Only valid video files		
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Mean	414.73
Standard Deviation	242.55
Median	400
Minimum	21
Maximum	1,079

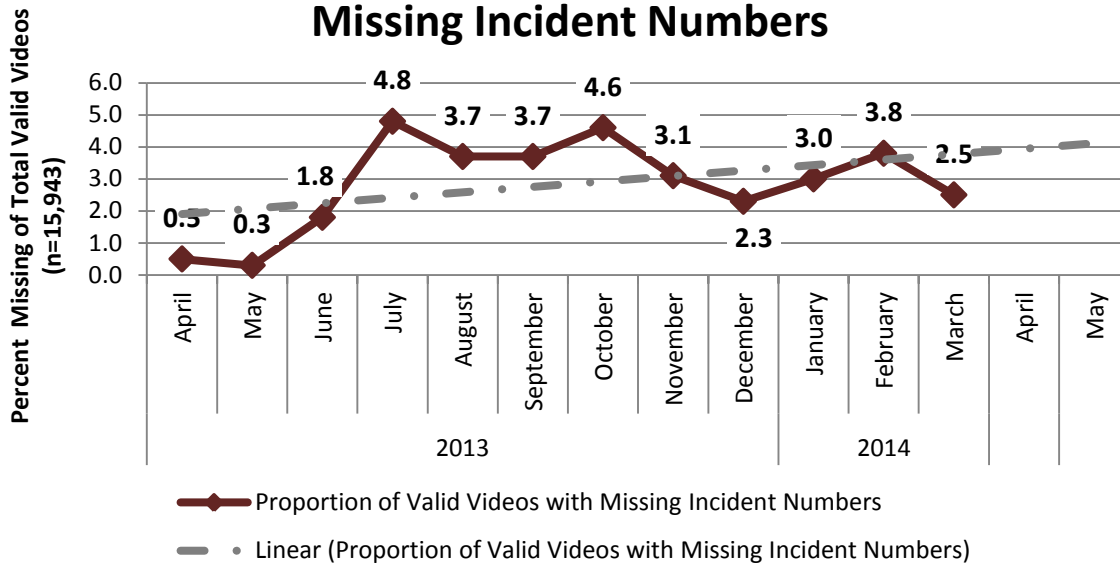
Use of Body Worn Video Cameras by Incident Type

The cameras generated automatic meta-data for all camera activations that captured date and time of activation, duration of activation, and date and time of file upload. It then directly linked these automated data elements to user input during the file upload process. These user input fields required officers to input the call/incident type of the event tied to the file, and the incident number, where applicable. Test, accidental and malfunction files were not considered activations associated with a valid police activity. Exhibit 5 shows the proportion of video files by incident type.

Exhibit 5: Proportion of Video Files Tagged with an Incident Number by Call Type		
	n	%
Generic Arrest	50	0.3
Traffic Citation	733	4.6
Contact / Interview	74	0.5
Subject / Vehicle Stop	2,397	15.0
Civil Matter	923	5.8
Check Welfare	924	5.8
Violent Offense	3,314	20.8
Officer Involved Shooting	8	0.1
Domestic Violence	421	2.6
Sex Offense	30	0.2
Drug or Alcohol Offense	889	5.6
Property Offense	3,401	21.3
Public Disorder Offense	1,566	9.8
Other	1,044	6.5
Juvenile Status Offense	147	0.9
Not Identified	15	0.1
Missing	7	0.0
TOTAL	15,943	100.0

We first examined the frequency in which videos were linked to an incident number. Some previous reports have suggested that linking and findings videos by incident number has been difficult. As seen in Exhibit 6, during the first two months of implementation – April and May 2013 – valid video files were appropriately attributed to an Incident Number, with just 0.5% and 0.3% missing, respectively. During June, the proportion of valid files with missing Incident Numbers increased to a maximum of 4.8% in July, and has not dropped below 2.3% since (through March 12, 2014).

Exhibit 6: Proportion of Missing Incident Numbers



Examining the Computer-Aided Dispatch/Record management System (CAD/RMS) data for all incidents (i.e. dispatched and officer-initiated) attributed to Maryvale officers during the implementation period, the proportion of all incidents with a video file attributed to it shows a low percentage of compliance. As seen in Exhibit 7 below, in May 2013, 42.2% of all incidents were recorded with a BWC, and has declined since. Generally, about 20-39% of all incidents were linked to a video file, declining most recently (March 2014) to 13.2%.

Exhibit 7: Proportion of Incidents with Video

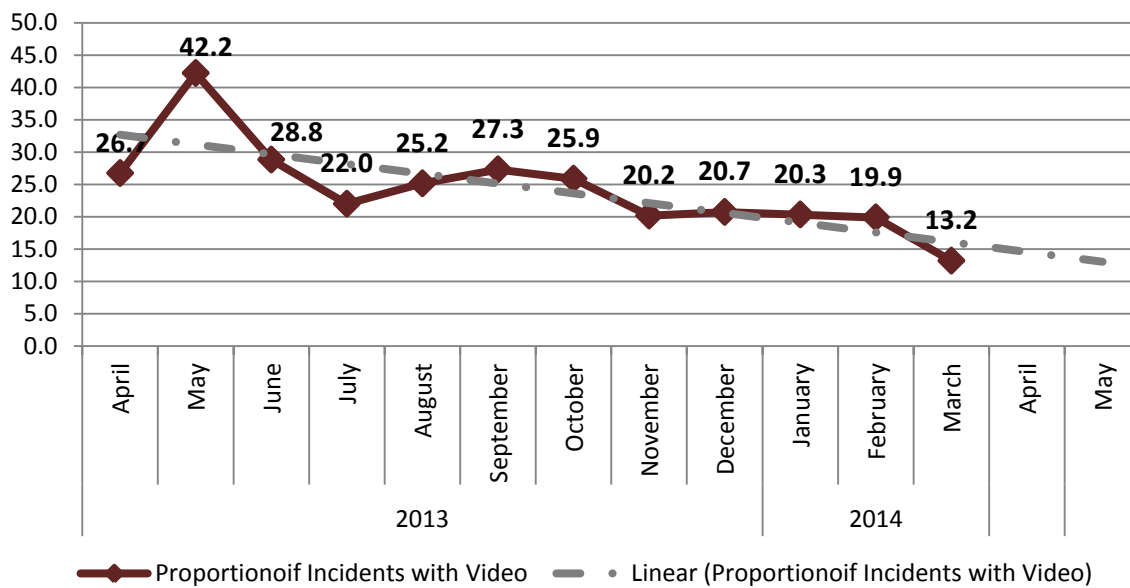
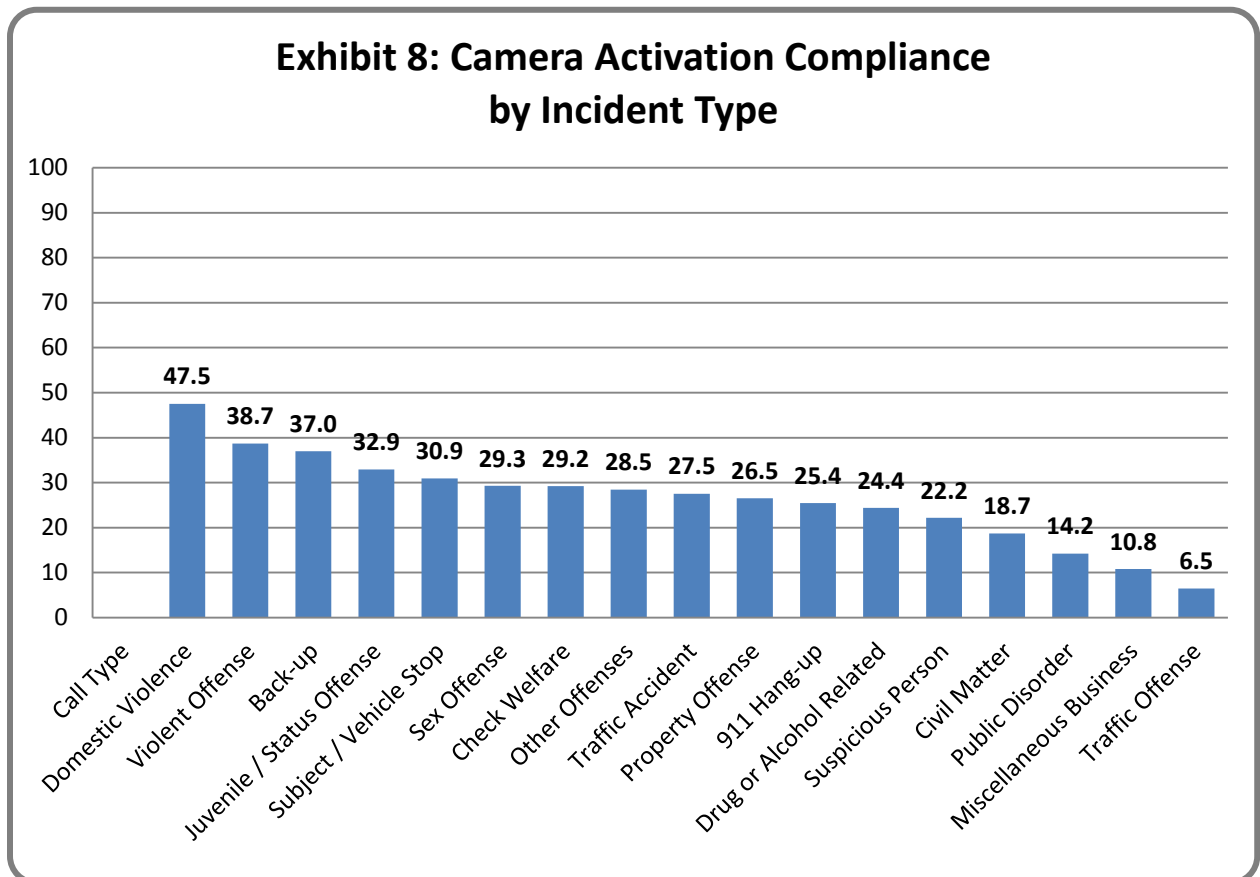


Exhibit 8 displays camera activation compliance by incident type using radio code entries from the incident data for the Maryvale Precinct from April 15, 2013 through March 12, 2014. Compliance was most frequent when the incident was identified as domestic violence (47.5%), violent offenses (38.7%) and serving as a back-up to another officer (37.0%). Only 6.5% of traffic stops were recorded.



SECTION 5: OFFICER PERCEPTIONS OF BODY WORN CAMERAS

In order to determine officers' perceptions of the use of cameras, they were asked a number of questions relating to the impact of BWC on: 1) comfort; 2) completion of incident reports; 3) evidence in court; 4) citizen behavior; 5) police officer behavior; and 6) other benefits and limitations to their use. For the sake of parsimony and space, below we broadly discuss a handful of the findings. Our discussion below is also limited for the most part to the target officers because of contamination (i.e., the results showed that comparison officer's perceptions mirrored those of the target group after a short period). For specific trends and details see Exhibits 9 through 15.

As seen in Exhibit 13, following the implementation of the body cameras target officers were much more likely to agree that the camera is easy to use (61.8%), comfortable to wear (57.6%), and that its battery life is adequate (65.6%). The officers were much less likely to agree that it is easy to locate and retrieve a video for a specific event (26.5%) and that it is easy to download data at the end of the shift (23.5%).

Exhibit 9 presents our findings related to the officers' perceptions of the impact of the BWC on completing incident reports. While camera officers agreed that BWC provides a more accurate account of an incident (58.8%) and improves the quality of evidence (52.9%), in the end only 2.9% of camera officers agreed that they spent less time completing paperwork and 11.8% believed that it makes the officer's job easier.

As noted above, we also examined officer's perceptions of the utility of BWC to enhance evidence for court. Exhibit 10 shows that prior to the cameras being implemented in the field officers were more likely to agree that BWC will make it: easier to work with the prosecutor's office when submitting evidence (41.2%), easier to prosecute domestic violence offenders (52.8%), and easier to help prosecute domestic violence cases when the victim is unwilling to testify (57.1%), than after the camera were implemented (20.6%, 32.4%, and 38.2% respectively).

In Exhibit 11 we present the results of the officers' perceptions of the impact of BWC on citizens. Interestingly our findings suggest that in some ways officers were disappointed with the impact of the BWC on the public's behavior, with their perceptions changing slightly toward being less positive over time. By the end of the study period, for example, only 25.7% of target group officers believed BWC result in citizens being more cooperative, 28.6% agreed that citizens will be more respectful, 11.8% agreed that suspects will be less likely to resist arrest, and 25.7% agreed that people will be generally less aggressive. However, at the same time officers appeared to become more positive about their potential impact on the department and officers. For example, in the beginning of the study 29.4% of officers agreed that cameras would hurt police community relations compared to 17.6% at the end of the study. Similarly, at Time 1, 20.6% of officers agreed that cameras will increase citizen complaints against officers compared to only 8.6% at Time 8.

Exhibit 12 displays the results of our analysis related to the officers' perceptions of the impact of BWC on police officer behavior. On the one hand, trends in our data suggest that the officer's beliefs about their being less likely to give warnings and feeling like they have less discretion did

not change substantially following the implementation of body cameras. On the other hand, officers' concerns about the cameras causing officers to have fewer contacts with citizens, being more cautious in making decisions, and affecting their decision to use force declined substantially. For example, at the beginning of the study nearly 63% of target group officers agreed that they would have fewer contacts with citizens because of the BWC compared to only 37.1% at the end of the study period.

Last, we asked the camera wearing officers about their general perceptions of body cameras. Exhibits 14 and 15 show that over the course of the study officers consistently stated that body cameras were not well received by coworkers and that they did not improve officer job satisfaction. They were also less likely to agree that BWC increase officer safety and improve officer training. At the same time, over the course of the study, officers were substantially more likely to believe that BWC should be expanded to other departments (24.2% vs. 32.4%), should be adopted throughout the city (18.8% vs. 32.9%), and that the advantages of BWC outweigh the disadvantages (12.5% vs. 35.3%). These figures still suggest, however, that the majority of officers who wear BWC are dissatisfied with the fact that they wear them.

Exhibit 9: Process by Collection Cycle and Area																	
Scale and Item		T-1, pre		T-2, pre		T-3, pre		T-4, pre		T-5, post		T-6, post		T-7, post		T-8, post	
		Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82
Completing Incident Reports																	
Officers spend less time completing paperwork	n=	40	35	39	44	41	45	37	43	47	38	39	37	39	37	34	34
	%	0.0	11.4	12.8	9.1	7.3	8.9	10.8	2.3	6.4	5.3	5.1	0.0	5.1	0.0	14.7	2.9
More accurate accounts of incidents	n=	41	34	38	45	42	46	37	43	47	37	40	37	39	36	34	34
	%	68.3	79.4	71.1	73.3	57.1	69.6	78.4	76.7	55.3	59.5	65.0	43.2	61.5	52.8	64.7	58.8
Improve quality of evidence	n=	39	34	38	44	42	46	36	44	47	37	40	38	40	36	34	34
	%	71.8	64.7	73.7	70.5	54.8	69.6	66.7	65.9	46.8	59.5	57.5	42.1	67.5	30.6	55.9	52.9
Makes officers' job easier	n=	41	35	38	44	41	46	36	44	47	38	40	38	40	37	34	34
	%	9.8	17.1	21.1	9.1	9.8	15.2	11.1	11.4	4.3	7.9	12.5	2.6	7.5	0.0	14.7	11.8

Significant at $p \leq .05$, using t-test comparisons

Exhibit 10: Use of Evidence by Collection Cycle and Area																	
Scale and Item		T-1, pre		T-2, pre		T-3, pre		T-4, pre		T-5, post		T-6, post		T-7, post		T-8, post	
		Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82
Use of Evidence in Court																	
Easier to work with the prosecutor's office when submitting evidence	n=	40	34	38	44	42	45	37	42	47	37	40	37	39	36	34	34
	%	42.5	41.2	39.5	31.8	19.0	28.9	21.6	21.4	12.8	24.3	25.0	13.5	15.4	8.3	23.5	20.6
Easier to prosecute DV offenders	n=	41	36	39	44	42	45	36	43	47	37	40	36	40	35	34	34
	%	36.6	52.8	43.6	38.6	26.2	35.6	36.1	55.8	27.7	40.5	30.0	8.3	27.5	14.3	23.5	32.4
Help prosecute DV cases when victim is unwilling to testify	n=	40	35	38	44	41	46	36	43	47	36	39	37	40	34	34	34
	%	42.5	57.1	42.1	52.3	36.6	45.7	38.9	58.1	27.7	55.6	25.6	18.9	30.0	23.5	29.4	38.2

Significant at $p \leq .05$, using t-test comparisons

Exhibit 11: Citizen Reaction by Collection Cycle and Area

Scale and Item		T-1, pre		T-2, pre		T-3, pre		T-4, pre		T-5, post		T-6, post		T-7, post		T-8, post	
		Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82
Citizen Reaction																	
Citizens will be more cooperative	n=	40	36	40	44	42	45	37	43	47	37	40	37	40	37	34	35
	%	35.0	33.3	37.5	34.1	33.3	35.6	48.6	34.9	19.1	35.1	32.5	18.9	20.0	5.4	38.2	25.7
Citizens will be more respectful	n=	40	36	40	44	42	45	37	42	47	37	40	38	40	37	34	35
	%	40.0	33.3	40.0	20.5	28.6	24.4	29.7	40.5	14.9	24.3	22.5	15.8	20.0	13.5	26.5	28.6
Suspects less likely to resist arrest	n=	40	36	39	44	42	45	37	43	47	38	40	37	40	37	34	34
	%	20.0	16.7	17.9	4.5	23.8	11.1	21.6	20.9	8.5	18.4	7.5	10.8	15.0	2.7	17.6	11.8
People will be generally less aggressive	n=	40	36	39	44	42	44	37	43	47	37	40	37	40	35	34	35
	%	32.5	30.6	23.1	25.0	16.7	25.0	37.8	32.6	17.0	29.7	25.0	18.9	22.5	14.3	20.6	25.7
Cameras hurt 'police-community' relations	n=	41	34	38	44	42	45	37	42	47	37	38	36	40	36	34	34
	%	39.0	29.4	31.6	50.0	45.2	31.1	37.8	28.6	48.9	32.4	36.8	27.8	42.5	36.1	47.1	17.6
Cameras will increase citizen complaints against officers	n=	40	34	38	44	41	45	37	41	47	36	40	37	40	36	34	35
	%	22.5	20.6	26.3	34.1	41.5	28.9	18.9	22.0	21.3	8.3	32.5	16.2	25.0	8.3	32.4	8.6

Significant at $p \leq .05$, using t-test comparisons

Exhibit 12: Police Officer Behavior by Collection Cycle and Area																	
Scale and Item		T-1, pre		T-2, pre		T-3, pre		T-4, pre		T-5, post		T-6, post		T-7, post		T-8, post	
		Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82
Police Officer Behavior																	
Officers will be less likely to give warnings	n=	40	35	38	44	42	44	36	42	47	38	40	37	39	36	33	34
	%	30.0	31.4	39.5	25.0	28.6	27.3	47.2	28.6	38.3	34.2	52.5	27.0	43.6	30.6	42.4	29.4
Officers will have fewer contacts with citizens	n=	40	35	40	44	42	46	37	42	47	38	40	38	39	37	33	35
	%	65.0	62.9	80.0	61.4	69.0	63.0	67.6	61.9	70.2	65.8	82.5	52.6	69.2	45.9	63.6	37.1
Officers will feel like they have less discretion	n=	40	35	40	44	42	46	37	43	47	38	40	38	40	36	32	35
	%	90.0	77.1	85.0	81.8	85.7	82.6	86.5	86.0	76.6	89.5	90.0	81.6	70.0	77.8	81.3	74.3
Officers will be more cautious in making decisions	n=	40	35	38	44	42	46	37	42	46	38	39	37	40	37	33	35
	%	85.0	82.9	86.8	70.5	76.2	69.6	70.3	78.6	76.1	73.7	69.2	43.2	60.0	67.6	63.6	65.7
Officers will act more professional	n=	40	35	37	44	42	46	37	42	47	38	40	38	39	36	33	35
	%	67.5	54.3	64.9	43.2	52.4	65.2	45.9	54.8	38.3	55.3	42.5	28.9	41.0	27.8	45.5	37.1
Affects an officer's decision to use force	n=	40	35	39	44	41	46	37	43	47	38	40	38	40	37	33	35
	%	75.0	60.0	74.4	56.8	75.6	69.6	59.5	65.1	70.2	57.9	62.5	39.5	70.0	51.4	72.7	45.7

Significant at $p \leq .05$, using t-test comparisons

Exhibit 13: Familiarity, Comfort, and Ease of Use by Collection Cycle and Area																	
Scale and Item		T-1, pre		T-2, pre		T-3, pre		T-4, pre		T-5, post		T-6, post		T-7, post		T-8, post	
		Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82
Familiarity, Comfort and Ease of Use																	
Easy to locate and retrieve video for a specific event	n=	30	24	25	39	31	34	34	36	45	37	37	38	37	36	30	34
	%	33.3	29.2	36.0	25.6	29.0	35.3	29.4	30.6	22.2	24.3	29.7	28.9	32.4	33.3	36.7	26.5
Equipment is easy to use	n=	28	23	24	37	32	34	34	35	43	37	36	37	35	36	30	34
	%	32.1	17.4	25.0	10.8	28.1	32.4	23.5	31.4	34.9	75.7	38.9	75.7	51.4	66.7	60.0	61.8
Equipment is comfortable to wear	n=	26	24	23	37	35	33	34	35	43	37	35	38	35	37	29	33
	%	3.8	8.3	8.7	10.8	17.1	21.2	17.6	25.7	34.9	67.6	40.0	65.8	48.6	56.8	55.2	57.6
Battery life of the camera is adequate	n=	23	19	21	35	31	33	33	34	41	37	32	37	35	35	31	32
	%	34.8	21.1	23.8	25.7	29.0	33.3	24.2	29.4	31.7	73.0	43.8	78.4	51.4	80.0	58.1	65.6
Easy to download data at the end of shift	n=	26	20	21	33	32	32	31	34	42	37	36	38	35	37	29	34
	%	26.9	20.0	19.0	18.2	21.9	34.4	12.9	26.5	9.5	21.6	16.7	18.4	20.0	27.0	27.6	23.5

Significant at $p \leq .05$, using t-test comparisons

Exhibit 14: General Perceptions by Collection Cycle and Area

Scale and Item		T-1, pre		T-2, pre		T-3, pre		T-4, pre		T-5, post		T-6, post		T-7, post		T-8, post	
		Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area
		81	82	81	82	81	82	81	82	81	82	81	82	81	82	81	82
General Perceptions																	
Body cameras are well received by coworkers	n=	39	32	39	44	41	44	37	44	47	39	40	37	40	37	33	35
	%	2.6	0.0	7.7	2.3	2.4	0.0	8.1	2.3	4.3	7.7	12.5	0.0	15.0	0.0	12.1	14.3
Police benefit more from body cameras than citizens	n=	40	33	38	43	40	43	37	43	46	39	38	36	40	37	33	35
	%	37.5	30.3	36.8	27.9	27.5	32.6	29.7	34.9	19.6	30.8	23.7	36.1	25.0	40.5	33.3	37.1
Wearing a body camera improves officers' job satisfaction	n=	37	33	38	43	41	44	37	43	47	39	39	37	40	37	32	35
	%	0.0	3.0	2.6	4.7	2.4	4.5	8.1	4.7	0.0	5.1	12.8	5.4	10.0	0.0	9.4	0.0
Cameras improve officer training	n=	39	34	37	44	39	45	37	43	47	39	40	38	38	36	33	35
	%	35.9	41.2	37.8	43.2	41.0	42.2	35.1	48.8	21.3	43.6	35.0	31.6	23.7	19.4	30.3	22.9
Cameras improve overall job performance	n=	37	35	38	44	40	44	37	43	47	39	40	37	40	36	33	34
	%	13.5	20.0	5.3	9.1	12.5	11.4	10.8	23.3	10.6	12.8	20.0	8.1	12.5	8.3	12.1	14.7
Cameras tend to increase office safety	n=	40	35	39	44	41	45	37	43	47	39	39	38	40	37	33	35
	%	15.0	20.0	5.1	20.5	9.8	8.9	16.2	11.6	6.4	12.8	10.3	5.3	12.5	2.7	12.1	2.9

Significant at $p \leq .05$, using t-test comparisons

Exhibit 15: Overall Perceptions by Collection Cycle and Area																	
Scale and Item		T-1, pre		T-2, pre		T-3, pre		T-4, pre		T-5, post		T-6, post		T-7, post		T-8, post	
		Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82	Area 81	Area 82
Overall Perceptions																	
Cameras should be expanded to other departments	n=	38	33	36	44	42	44	37	42	47	39	40	35	40	37	33	34
	%	18.4	24.2	13.9	22.7	9.5	15.9	16.2	19.0	4.3	17.9	15.0	8.6	12.5	8.1	24.2	32.4
Cameras should be adopted throughout the city	n=	39	32	39	44	42	45	37	42	47	39	40	36	40	36	32	35
	%	15.4	18.8	15.4	13.6	4.8	11.1	10.8	16.7	2.1	15.4	17.5	8.3	10.0	11.1	15.6	32.9
Advantages of body cameras outweigh the disadvantages	n=	38	32	38	44	41	43	37	42	47	39	40	37	39	37	33	34
	%	23.7	12.5	21.1	20.5	7.3	16.3	18.9	14.3	12.8	15.4	20.0	16.2	15.4	18.9	18.2	35.3

Significant at $p \leq .05$, using t-test comparisons

SECTION 6: IMPACT OF BODY WORN CAMERAS ON ARREST

One measure of the impact of body worn cameras examined was arrests made by both camera-wearing and comparison officers. The arrest analysis accounted for changes in officer assignment during the study period by method of a *camera-eligible* day. This procedure tracked all officers who at any time during the course of the study were assigned and required to wear a camera. This procedure allowed us to calculate the number of arrests any given day in the study period when a camera should or should not have been present.

Exhibit 16 displays our findings of arrest activity. Analyses for both camera-wearing officers and comparison officers showed that average daily arrests increased significantly from the pre to the post camera deployment period. During both the pre and post deployment period, comparison officers made more arrests, about 0.11 pre to 0.12 post, compared to 0.08 pre to 0.12 post among camera-wearing officers. On the other hand, examining the percentage change in average daily arrests, officers with body worn cameras showed a significant increase (0.04 arrests per day on average) in the number of mean daily arrests when compared to officers without cameras (0.01). Put another way, the camera officers increased their average daily arrests by 42.6%, which was nearly triple the change among comparison group officers (14.9%), which was statistically significant.

Additional analyses examined trends in resisting arrest between the two groups (See Exhibit 17). This analysis was conducted by examining the arrest charges for each of the incidents, and identifying those that involved passive and forceful resistance, escape or flight and aggravated assault against the officer. Subsequently, these incidents were recoded into an “any form of resistance” category. The analysis showed that both groups of officers experienced a substantial increase in overall resisting arrest incidents. Camera-wearing officers experienced a 130.4% increase in any form of resistance from pre to post deployment, and comparison officers experienced a 135.7% increase. These increases are in part driven by increases in arrests for passive resistance. It is important to note that while these percentage increases appear substantial, arrests for resistance were rare events. Notably, none of the post-deployment differences between camera and non-camera officers were statistically significant.

Exhibit 16: Mean Number of Arrests per Day, by Target Group and Deployment Period

	Pre-Camera Period				Post-Camera Period				% Change Pre-to-Post	
	Target		Comparison		Target		Comparison		Target	Comparison
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.		
Average Daily Arrests *	0.08	0.047	0.11	0.060	0.12	0.068	0.12	0.068	42.6	14.9

* Significant at $p \leq .05$, using t-test comparisons.

Exhibit 17: Mean Number of Resisting Arrest Incidents per Day, by Target Group and Deployment Period

	Pre-Camera Period				Post-Camera Period				Change Pre-to-Post	
	Target		Comparison		Target		Comparison		Target	Comparison
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.		
Resist Arrest:										
Any Form	0.002	0.003	0.003	0.004	0.005	0.007	0.007	0.006	130.4	135.7
Flight	0.001	0.002	0.001	0.002	0.001	0.001	0.002	0.003	-28.6	216.7
Passive	0.000	0.000	0.000	0.001	0.002	0.003	0.001	0.002	1400.0	166.7
Resistance										
Forceful	0.001	0.003	0.002	0.003	0.003	0.004	0.004	0.005	114.3	180.0
Resistance										
Aggravated	0.001	0.002	0.001	0.002	0.001	0.002	0.002	0.003	40.0	81.8
Assault										

* Significant at $p \leq .05$, using t-test comparisons.

SECTION 7: IMPACT OF BODY WORN CAMERAS ON OFFICER MISCONDUCT AND COMPLAINT RESOLUTION

Officer accountability was measured using official police complaint data and self-reported complaints and use of force incidents from officers in the Maryvale Precinct. As noted above, our complaint data was provided through official records obtained from PPD's Professional Standards Bureau (PSB). These data included all reports of misconduct, regardless of source (e.g. citizen calls, supervisor initiated, direct contact to PSB/chief's office, etc.). Our analysis is limited to those assigned to patrol unit to avoid potential complaint-rate differences for officers assigned to non-patrol tasks (e.g. investigations, administrative services, other specialized units, etc.), as all officers assigned to Areas 81 and 82 are part of regular patrol units. As with prior analyses, the data covered 15 months pre and post camera deployment.

As seen in Exhibit 18, our analysis showed that from pre to post-deployment camera-wearing officers experienced a 22.5% decline in officially recorded complaints. This compared to a 10.6% increase in complaints among the comparison group officers and a 45.1% increase among remaining patrol officers in the PPD. These changes were statistically significant changes from pre to post within each group (i.e. target, comparison and citywide), and between the groups, as a whole.

Exhibit 18: Professional Standard Bureau Complaints/Misconduct Records by Group, From January 1, 2012 through July 15, 2014 †

Group	Period	Pre-Deployment	Post-Deployment	Pre-Post % Change	Total
		N	N	%	N
Target		40	31	-22.5*	71
Comparison		66	73	10.6*	139
Citywide Patrol		627	910	45.1*	1537
Total		733	1014	38.3	1747

† These dates represent 15 months pre- and 15 months post-deployment of body worn cameras.

* t-test significant at $p \leq .05$

Exhibit 19 shows our analysis related to the outcome of complaints investigated by the PPD Professional Standards Bureau. It shows that from pre to post deployment body worn camera officers experienced 53.1% reduction in their complaints being founded. This compared to a 56.5% reduction in complaints being founded among the comparison group, and a 4.2% reduction among patrol officers outside of Maryvale. The pre-post reductions in complaints being founded for target and comparison officers were both substantively substantial and statistically significant.

Exhibit 19: Resolution Founding/Unfounding of Reported Complaints/Misconduct Pre and Post Camera Deployment, by Target, Comparison and Citywide 1, with Pre/Post Percent Change

Result of Complaint	Pre-Camera Period						Post-Camera Period						Pre-Post % Change in Complaints		
	Target		Comparison		Citywide		Target		Comparison		Citywide		Target	Comparison	Citywide
	n	%	n	%	n	%	n	%	n	%	n	%	%	%	%
Unfounded	18	45.0	39	59.1	345	55.0	23	74.2	60	82.2	518	56.9	64.9*	39.1*	3.5
Founded	22	55.0	27	40.9	282	45.0	8	25.8	13	17.8	392	43.1	-53.1*	-56.5*	-4.2
TOTAL	40	100	66	100.0	627	100	31	100	73	100.0	910	100	-22.5*	10.6*	45.1*

*Statistically significant at $p \leq .05$

1 Citywide group consists of patrol officers assigned outside the study-area precinct.

2 Data for this analysis included complaints from January 1, 2012 through July 31, 2014, allowing for 15-month Pre and Post camera deployment (April 15, 2013).

Officers in the target and comparison groups were asked to report the number of complaints made or threatened against them in the preceding 30 days as well as the number of times they believed that an individual did not make a complaint because of the presence of a body camera. The number of self-reported incidents was low, particularly given that the modal frequency was “0” complaints, so we combined the mean score of each of the four pre-test periods and four post-test periods. As seen in Exhibit 20, we found that both groups reported declines, on average, in the number of complaints filed or threatened in the past 30 days. The observed differences were not statistically significant. We, however, did find that a small but significant proportion of officers self reported that a complaint was not pursued due to the presence of a body camera in the post-test period.

Exhibit 20: Mean Number of Self-Reported Complaints in the Past 30 Days, by Comparison and Target Officer, Pre/Post Camera Deployment

	Pre-Post Change					
	Pre-Test Mean		Post-Test Mean		% Change	
	Compar- ison	Target	Compar- ison	Target	Compar- ison	Target
Number of officers reporting	157	168	157	147	314	315
Complaints Filed or Threatened Past 30 Days (mean) *	0.57	0.55	0.33	0.24	-42.8	-56.9
Complaint not pursued due to recording (mean) *	0.01	0.01	0.00	0.03	-100.0	292.2

* Significant at $p < .05$

Officers were also asked to self-report the type of complaints they had received in the past 30 days using as they related to excessive force, abuse of authority, verbal misconduct, failure to act and other reason. The mean numbers of reported complaint types were combined for each of the four pre-test and four post-test survey periods. Exhibit 21 below shows these results. Camera officers reported a 47.7% decline in the proportion of complaints involving excessive force, compared to a 7.4% decline among comparison officers. Verbal misconduct complaints declined 35% among camera officers, compared to a 69% decline among comparison officers. Likewise, camera wearing officers reported a 20% decline in “other type of complaint” compared to a 63.8% decline among comparison officers. It should be noted that these changes were influenced by changes in the mean number of complaints filed or threatened. The significant declines in complaints, as reported above, thus influenced the proportional distribution of complaint type displayed below.

Exhibit 21: Mean Number of Self Reported Complaints in the Past 30 days by Complaint Type

	Pre-Test Mean		Post-Test Mean		Pre-Post % Change in Mean	
	Compar-ison	Target	Compar-ison	Target	Compar-ison	Target
Number of Officers Reporting	157	168	157	147	314	315
Type of Complaint						
Excessive force *	0.11	0.17	0.10	0.09	-7.39	-48.74
Abuse of authority	0.12	0.09	0.11	0.08	-5.71	-5.95
Verbal misconduct *	0.19	0.13	0.06	0.08	-69.16	-35.01
Failure to act	0.06	0.10	0.03	0.04	-50.00	-56.43
Other reason *	0.23	0.12	0.08	0.10	-63.75	-20.12

* Significant at $p \leq .05$ using ANOVA from Time 4 (last pre-test wave, March 2013) through Time 8 (June 2014).

SECTION 8: THE IMPACT OF BODY WORN CAMERAS ON DOMESTIC VIOLENCE CASE PROCESSING

We examined the impact cameras had on the disposition of domestic violence cases, the length of time required to process the case, and, when appropriate the length of jail sentence. As discussed above, the PPD requires officers to complete a brief, specialized Field interview (FI) card, referred to as domestic violence pocket cards (aka. DV cards) for all incidents involving domestic violence, and are to be collected regardless of whether or not an arrest is made. DV card data was collected from January 1, 2012 through July 31, 2014 and generated 2,063 unique incidents. Analyses were case-based, and conducted by comparing the case processing of three groups: a) pre-test domestic violence cases (n=878); b) post-test comparison cases (no video file, n=933); and c) post-test camera cases (video file available, n=252).

As Exhibit 22 illustrates there was little difference in case processing between those cases that were processed prior to the use of BWC and those cases that involved a BWC. Specifically, when comparing post-test camera cases to pre-test non-camera cases, post-test camera cases were slightly less likely to be initiated by the prosecutor's office (40.9% vs. 42%), slightly less likely to be further by the prosecutor's office (12.7% vs. 14.9%), but more likely to result in a guilty plea (4.4% vs. 3.1%) or to be found guilty at trial (4.4% vs. 2.8%).

We also examined differences in domestic violence case processing among post test cases with and without the presence of a body camera. Our analysis showed that when compared to post test non-camera cases, post test camera cases were more likely to be initiated by the prosecutor's office (40.9% vs. 34.3%), have charges filed (37.7% vs. 26%), have cases furthered (12.7% vs. 6.2%), result in a guilty plea (4.4% vs. 1.2%), and result in a guilty verdict at trial (4.4% vs. 0.9%).

Exhibit 22: Domestic Violence Case Flow

	Pre-Test Case		Post-Test Comparison		Post-Test Camera	
	n	%	n	%	n	%
Number of DV-Related Contacts ^a	878	100.0	933	100.0	252	100.0
Cases Initiated	369	42.0	320	34.3	103	40.9
Charges Filed	333	37.9	243	26.0	90	37.7
Case Furthered (Not Dismissed)	131	14.9	58	6.2	32	12.7
Plead Guilty	27	3.1	11	1.2	11	4.4
Guilty at Trial [†]	25	2.8	9	0.9	11	4.4

^a The number of contacts is derived from the DV Pocket cards, which included data on 2,063 unique incidents from January 1, 2012 through July 31, 2014 from the Maryvale Precinct.

Additionally, we examined the average numbers of days it took to process domestic violence cases to completion. Beginning with 2,063 DV card incidents, we first excluded cases not forwarded to the prosecutor (n=1,156), or were still active (n=115). This resulted in 792 cases available for analysis. As Exhibit 23 shows we found that there were significant declines in the number of days it took to dispose of a case from the pre-test to the post-test period, with a pre-test case averaging 96 days to process compared to a post-test average of 44 (comparison) and 78 days (camera). We also found that following camera implementation there was a significant change in both time to dismissal and guilty pleas, each declining during the post-test period. It should be noted that case processing time declined the greatest among the non-camera wearing comparison group. This may be attributed to changes in the administrative management of cases after camera deployment.

Shortly after camera deployment, the police department assigned a detective as a dedicated court liaison officer to help process cases, particularly those with video evidence, from the police department to the city prosecutor's office. This administrative change alone may have accounted for the overall declines in processing times. While it appears from our analyses that cameras adversely impact case processing time (post-test comparison versus post-test camera differences), the assignment of a court liaison officer may overcome this issue.

Exhibit 23: Number of Days to Process Case to Disposition (N=792) †						
	Pre-Test Case		Post-Test Comparison		Post-Test Camera	
	mean	n	mean	n	mean	n
All Completed Cases *	95.8	369	43.5	320	78.1	103
SD	(124.3)		(77.50)		(105.10)	
Dismissed *	65.3	202	38.2	185	56.1	58
SD	(91.00)		(67.80)		(65.90)	
Plead Guilty *	167.7	104	71.3	47	131.9	21
SD	(157.57)		(100.44)		(156.40)	
Trial	74.4	27	114.2	11	105.5	11
SD	(90.61)		(125.06)		(126.07)	

* Significant at $p \leq .05$

† Original values ranged from 0 to 756. Values above the 98th percentile of 438 days (n=16) were truncated to 438 to control for outlier cases.

As presented in Exhibit 24, our last series of analysis examined the average length of jail sentence (in days) for those defendants who either plead guilty or were found guilty at trial.

Our analysis showed that there was no significant in the average sentence length for convicted offenders between pre-post camera implementation and between camera and non-camera wearing officers in the post-test period.

Exhibit 24: Number of Days Sentenced to Jail (n=217)

	Pre-Test Case			Post-Test Comparison			Post-Test Camera		
	mean	SD	n	mean	SD	n	mean	SD	n
All Sentenced Cases	26.5	41.26	129	32.4	45.94	56	34.4	32.00	48
Plead Guilty	22.1	38.20	104	25.2	36.41	47	15.0	15.18	21
Trial - Found Guilty	44.6	48.93	25	70.0	70.67	9	71.6	67.02	11

* Significant at $p \leq .05$

SECTION 9: CONCLUSIONS AND LESSONS LEARNED

The Bureau of Justice Assistance (BJA), through the SMART Policing Initiative (SPI), awarded the Phoenix Police Department \$500,000 to purchase, deploy and evaluate police body worn cameras. The design and implementation of the project included the purchase of 56 BWC systems and deploying them in the Maryvale Precinct. The implementation of the BWC's occurred in one of the two Maryvale Precinct squad areas (aka target area). All officers assigned to the target area were issued the equipment and were provided training in its use, maintenance, and related departmental policy. This evaluation was conducted to examine the effect of implementing police worn body cameras in the Phoenix Police Department. Specifically, it focused on six principal areas: 1) officer camera activation compliance; 2) utility and use of body worn cameras; 3) impact on officers' job performance; 4) impact on public compliance and cooperation; 5) impact on officer accountability; and 6) impact on domestic violence case processing and outcomes. Below we discuss the primary results of our evaluation and lessons learned.

MAJOR FINDINGS

Our analysis of the camera meta-data indicated that over the study period officers on average activated their BWC about 415 times; and the average length of each video file was about nine to ten minutes. The majority of the video files were associated with a vehicle stop, violent offense or property offense. The vast majority (95+%) of video files contained a valid incident number, suggesting that the video files were being appropriately tagged by officers. However, over the study period (varying by month) only 13.2 to 42.2 percent of incidents were recorded. Domestic violence incidents were the most likely to be recorded (47.5%), followed by violent offenses (38.7), back-up (37%), status offenses (32.9%), and subject/vehicle stops (30.9%). Other offense types were recorded less often.

Our surveys of the officers indicated that there was resistance among officers toward wearing the BWC's. While in general the technology was found to be comfortable and easy to use, officers were dissatisfied with a number of technological features related to the cameras. For example, officers reported that it took a long time to download data, that it lengthened the amount of time it took them to complete reports, and reported being concerned that the video might be used against them. These concerns were reflected in the low compliance rates for turning on cameras. We also found that video submitted to the courts was difficult to process because of the length of time that it took the prosecutors to review video files. Prosecutors also voiced concern about not having enough time to review video before court. While much of the problem was addressed by the precinct commander by assigning a police officer to serve as a court liaison officer, prosecutors maintained that attorneys still did not have enough time to review video footage.

Regardless, the officer worn body cameras were found to be beneficial to the officers and the courts in a number of ways. First, officer productivity as measured through the number of arrests increased significantly. For instance, the number of arrests increased by about 17% among the target group compared to 9% in the comparison group. Second, complaints against the police declined significantly. Complaints against officers who wore the cameras declined by 23%,

compared to a 10.6% increase among comparison officers and 45.1% increase among patrol officers in other precincts. It is important to note that we did not identify this same trend in our analysis of the police self-report complaint data. This inconsistency might be related to the low base rate of our self-report data (Hinkle et al., 2014) or due to its lack of reliability (Rojek, Alpert, and Smith, 2010) Third, our data showed that those officers who wore cameras and received a complaint were significantly less likely to have the complaint sustained when compared to the comparison group and others throughout the PPD. This suggests that even if a complaint was made against a camera wearing officer the video file was more likely to support officer actions than harm them. Fourth, and related, the officer self-report data suggested that many complaints were not pursued because of video recordings. For instance, officers self reported a 300 percent increase in the number of times that an individual was going to file a complaint but did not further pursue the complaint because of the presence of a body camera. BWC did not appear, however, to have an impact on suspect behavior as measured through resisting arrest charges.

Last, we examined the impact of body worn cameras on domestic violence case processing. Analysis of the data indicated that following the implementation of body cameras, cases were significantly more likely to be initiated, result in charges filed, and result in a guilty plea or guilty verdict. The analysis also determined that cases were completed faster following the implementation of body cameras, however, we believe that this finding was largely a product of the addition of a court liaison officer who facilitated case processing between the PPD and city prosecutor's office. In fact, when we examined the number of days it took to process a case, and compared our post-test comparison group to our post-test camera group our findings suggested that body cameras resulted in an increase in the amount of time that it takes to process a case to completion by about 80 percent.

LESSONS LEARNED

Our findings suggest that officer worn body cameras may increase officer productivity, reduce the number of complaints against officers, decrease the number of founded complaints against them, and increase the effectiveness in which criminal cases are processed in the courts. While our findings also suggested that there are a number of problems associated with the implementation of body cameras such as increased amount of time spent on paper work, increased IT needs, officer concerns about video files being used against them, and increased amount of time it takes to process criminal cases, our results combined with prior research suggest that the benefits of officer worn body cameras outweigh their weaknesses and limitations. This does not imply that police agencies in general and the Phoenix Police Department in particular should implement the technology throughout the department immediately; but that they should move forward purposely with the anticipation that police worn body cameras will be increasingly used in policing. Based on our findings, and research conducted elsewhere, there are several lessons learned that might be considered in the future.

1. Develop a city-wide strategic plan.

Our findings suggest that the deployment of BWC is a complicated, costly, and administratively complex process that requires a citywide strategic plan. Our research indicates that when

adopting BWC it might be useful to establish a citywide task force comprised of key stakeholders. The strategic plan should be led by the police and include members from the city manager's office, patrol, investigations, city and county attorneys, information technology, fiscal, and others as deemed appropriate. The strategic plan should include the necessary estimated budget and infrastructure to deploy body cameras across the agency and to prepare other agencies for the adoption of body camera technology. At a minimum, the strategic plan should include scope, nature, and timing of camera deployment, IT, training and policy needs, auditing procedures, and budgeting.

2. Increase attention on the needs of the city prosecutor's office.

Our analysis suggested that the city's prosecutor office does not have the necessary resources to receive and review video files from officer worn body cameras. Currently the Maryvale precinct allocates specially assigned personnel to work alongside the prosecutor's office to ensure the proper chain of custody of evidence and attend to logical issues pertaining to the camera data. While this strategy is effective in the short term, it is necessary to revisit the issue in the near future to ensure that resources are allocated appropriately. Aside from the citywide strategic plan, the police, prosecutors and city manager's office should discuss associated issues and identify a short, medium and long term sustainability strategy for addressing logistical issues associated with BWC video files.

3. Develop and deploy officer worn body camera training.

There appears to be resistance among officers about the acquisition and deployment of body worn cameras. This finding should not be surprising given the technology is new and has the potential to effect officers and community members in a variety of important (positive and negative) ways. It might be helpful if officers receive at least 30 minutes of training on the impact of body cameras on officers and the public. This would include a presentation about how body camera work, current policy, and findings from this project on the benefits and limitations to deploying body cameras. This information might blunt some officer resistance and might result in a more well-rounded understanding of the potential impact of the technology.

4. Increase officer camera activation compliance.

While there has been little research examining camera activation compliance, our findings suggest that police officers might not be in full compliance with departmental policy. Fewer than 50 percent of incidents were recorded by officers who had been assigned a body camera. This might be a consequence of the difficulties associated with body camera use such as long download times, increased amount of time that it takes to complete paper work, complexities associated with its use in court, and concern that it can be used against the police officer by the department. Camera activation compliance might in part be able to be increased by addressing some of these issues; however, even if the problems associated with the technology and evidence processing are effectively addressed activation compliance may remain relatively low until officers are held accountable for recording incidents as directed by departmental policy. PPD policy is to audit a small number of recordings per month. Instead, it might also be necessary to audit at the "incident" level to determine whether the incident resulted in the production of an accompanying video file. Agencies might consider producing an automated monthly compliance

report that informs the officer and their supervisors of the proportion of incidents that the officer fell out of compliance with respect to the production of a video file.

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