EVALUATION OF THE TEST PILOT PROGRAM OF BODY-WORN CAMERAS WITHIN THE HALLANDALE BEACH (FLORIDA) POLICE DEPARTMENT

Submitted to

Chief Dwayne Flournoy
Major Stuart Shook
Hallandale Beach Police Department

Submitted by

Andrea M. Headley, M.S.
Auzeen Shariati, Ph.D.
Rob T. Guerette, Ph.D.
Florida International University

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Acknowledgments and Disclosures

This research was initiated at the request of the Hallandale Beach Police Department to better understand the operational impact of the use of body-worn cameras by their officers. The research was conducted on a pro bono basis by doctoral students in the Public Affairs and Criminal Justice Departments at Florida International University with oversight and guidance by one faculty member. The researchers would like to acknowledge the unfettered support and assistance that the Hallandale Beach Police Department provided to the research team in gathering the necessary data to perform the evaluation. The research team has no standing affiliation nor other business or contractual relationship with the Hallandale Beach Police Department or the City of Hallandale Beach. Nor does the research team have any relationship or affiliation with any of the technological vendors involved herein. The research team received no compensation in the performance of this evaluation and has no other conflicts of interest to report.

Executive Summary

Context and Purpose

In response to increased concern within the city of Hallandale Beach regarding the nature of interactions between police officers and citizens, The Hallandale Beach Police Department (HBPD) launched a body-worn camera (BWC) pilot program to better understand the implications of their use to mediate police-citizen encounters. The purpose of the test pilot program was to understand how body-worn cameras might impact officer job performance and officer perceptions and ultimately whether their adoption offered the possibility to improve police-community relations. To assist in this endeavor, the Hallandale Beach Police Department solicited the services of researchers at Florida International University to conduct an evaluation of the BWC test pilot program.

Methodology

The evaluation utilized a multi-staged, quasi and randomized experimental design. In the first stage, the police department allowed officers to volunteer to participate in the body camera pilot program, apart from all sergeants who were required to wear body cameras. The second stage included officers being randomly assigned to wearing BWCs within operational areas and shifts. There was a total of 28 officers wearing body cameras which comprised the treatment group (16 volunteers and 12 randomly assigned). A control group of 25 officers who never received BWCs were included in the analysis.

Data were collected in two parts. The first before BWCs were implemented during the pre-period to establish a baseline, and the second after BWCs had been in use by officers in both the volunteer (T_1) and random (T_2) treatment groups. The first phase (pre) was completed before the BWC program launched in 2015 and the second phase (post) was done after treatment officers began to wear body cameras in 2016.

In each pre-and post-period, two sources of data were collected. To measure the impact of BWCs on officers' behavior, a series of secondary data were collected from HBPD administrative records for officers wearing cameras and those not wearing cameras from January 2015-December 2016. The data derived from administrative records included information on 1) police use of force, 2) external complaints, 3) arrests, 4) citations/tickets, 5) field contacts, 6) assaults against officers, and 7) non-violent resistance. The second data source entailed survey questionnaires which were administered to gauge officers' perceptions and attitudinal changes. Survey respondents were officers in the road patrol division since they were the ones eligible to wear and/or already wearing the body cameras. This survey data allowed for comparisons between treatment group and control group officers to determine whether firsthand experience with the cameras altered officers' impressions of their usefulness.

Key Findings

Officer Behavior

In examining how the use of body-worn cameras impacted officer job performance and behavior, using administrative data, it was found that officers wearing body cameras appeared to rely less on arrests and more on the issuance of citations. Those officers with BWCs also exhibited greater field contacts with citizens. While there were slight increases and decreases for the other outcomes (force, complaints, assaults against officer, and non-violent resistance), the aggregate numbers were exceptionally low which makes any determinations of BWC impact inconclusive. Notable and more specific findings include the following:

- *The number of arrests decreased.* The number of arrests among officers wearing cameras (treatment group) decreased 16% from 409 to 343. The control group, officers not wearing cameras, experienced a more modest reduction of nearly 9%.

- *The number of field contacts substantially increased.* Officer and citizen contacts increased from 284 to 359 (27.3%) among officers wearing BWCs compared to a decrease of nearly 10% among control group officers.

- *The number of citations issued noticeably increased.* Officers wearing cameras exhibited an increase of approximately 16% in citations from 2015 to 2016, whereas the officers without cameras had a decrease of about 10% in the number of citations issued.

- *The level of non-violent resistance significantly decreased for officers in the control group.* When analyzing non-violent resistance patterns, officers not wearing BWCs experienced a decrease of 41% from 39 to 23 incidents compared to a decrease of only 7.4% for officers wearing body cameras.

Officer Perceptions

Officer perceptions did change over time, however overall, they were consistently negative and resistant to the idea of body-worn cameras. Notable and more specific findings include the following:

- *Use of BWCs appeared to increase officer dislike of the cameras.* When compared to the control group, the officers wearing body-worn cameras often exhibited greater negative sentiments following the implementation of the BWCs.

- *While some officers noted the positive impacts of BWCs, such as helping with officer compliance and better reporting, others expressed concerns regarding BWCs.* These concerns included officer safety, proactivity, usability issues, issues relating to comfort and health, and the use of BWCs by upper administration/management.

Implications for Continued Use of BWC

The behavioral findings that officers relied on less intrusive methods to deal with citizens, provides evidence which justifies the continued use of BWCs. While officer perceptions towards body-worn cameras portrayed more resistance after the implementation of the program, the administrative data indicated that the concerns initially raised regarding a potential "de-policing effect" were not supported. Specifically, when examining officer job performance, officers continued to perform their duties regularly and less intrusively, irrespective of the slight increases and/or decreases in perceptions overtime.

Study Limitations

There are four primary limitations which should be considered when using these findings: 1) There is the possibility for contamination effects between officers wearing cameras and those not wearing cameras; 2) the survey mediums changed from pre- and post- time periods which could have impacted officer responses; 3) citizen perceptions were not assessed; and 4) the small numbers of officers in the study groups impeded the ability to determine statistical significance.[1]

[1] The words "statistically significant" or "significant" are used interchangeably to indicate that the finding is not due to chance or a random effect, but rather a result of the body-worn camera implementation. Whereas when there are increases and/or decreases that are not statistically significant the possibility of changes occurring due to chance or unobserved factors cannot be ruled out. The small sample sizes in this study, however, impede the ability to achieve statistical significance in many of the analyses and because of this the presentation of results is not limited to only those reaching significance.

I. Introduction

Emergence and Use of Body-worn Cameras Nationally

The recent increased attention in body-worn cameras across police departments has been attributed to tensions in police-community relations, specifically that of minority communities (Hedberg, Katz, and Choate, 2016; Katz et al. 2015; Lum et al. 2015). There have been notable killings and use of force incidents of unarmed minorities across the United States, with some captured by citizens' cameras or dash cameras and some not captured at all. This has raised questions concerning the utility of cameras regarding use of force incidents. Thus, advocates and policy makers have pushed for body cameras as an accountability and transparency mechanism, as well as a solution to use of force issues.

In 2013, it was estimated that about a third of local police departments had already been using body-worn cameras (Reaves, 2015). By 2015, at least 30 state legislators were contemplating policies regarding the use of these cameras (BJA, 2016b). While body-worn cameras can be court ordered due to problematic police practices (e.g. New York Police Department), the rapid diffusion of body-worn cameras was encouraged by the federal government. In addition to the President's recommendation of body-worn cameras as an effective policing strategy (President's Task Force on 21st Century Policing, 2015), the U.S. Department of Justice led an initiative to fund the implementation of body-worn cameras for local police departments. The federal government provided $20 million in grants in 2015 alone with plans to increase funding to $73 million (BJA, 2016a, 2016b).

It has been posited that body-worn cameras can provide a plethora of benefits, including increased transparency and accountability, reductions in officer use of force, citizen complaints, and crime, officer and citizen compliance, enhanced police legitimacy, better evidence collection and documentation, training benefits, and assistance in court processes (see Ariel, Farrar, and Sutherland, 2015; Gaub et al. 2016; Miller and Toliver, 2014; White, 2014). However, concerns about privacy, health, excessive costs, and the possibility of police occupational culture thwarting implementation benefits have been raised (see Gaub et al. 2016; Hedberg, Katz, and Choate, 2016; Katz et al., 2015; White, 2014).

Although recent studies have been conducted on the implementation, effectiveness, and utility of body-worn cameras, this research is limited yet growing (Lum et al., 2015). Thus, this is in part the impetus for the evaluation of the Hallandale Beach Police Department's pilot program.

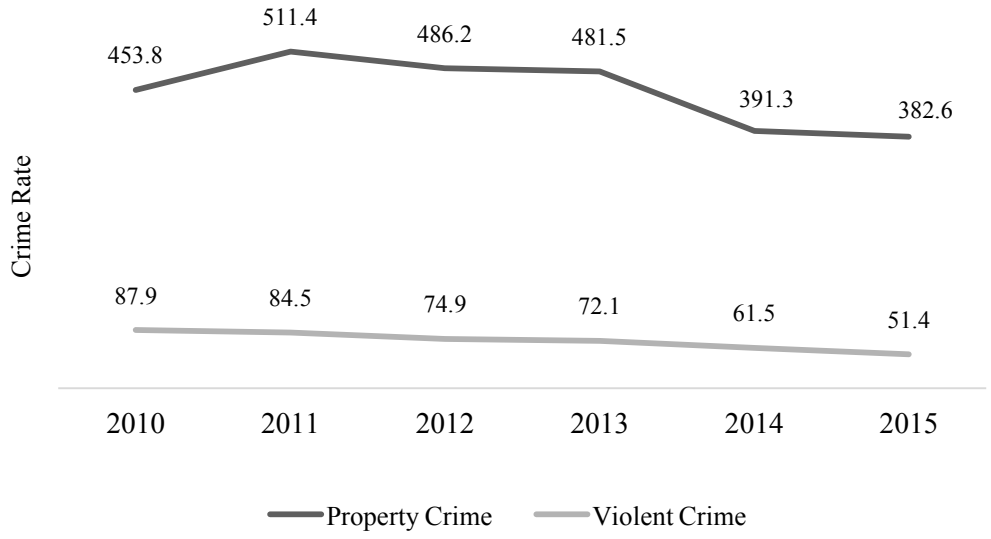
Context of Police Department

Hallandale Beach Police Department, located in Broward County, FL, has primary jurisdiction for the city of Hallandale Beach. The police department has approximately 144 employees with 60 sworn officers on road patrol, responsible for serving approximately 5 square miles. According to the U.S. Census's American Community Survey 2015 population estimates, Hallandale Beach has a population of about 35,000, with a median age of about 46 years and median income of $34,216. The racial and ethnic breakdown for the city of Hallandale Beach is 34.0% Hispanic or Latino, 46.1% White, 17.0% Black or African American, and 1.5% Asian.

Whereas the racial breakdown, as of April 2017, for the police department (sworn and non-sworn employees) is 27.8% Hispanic or Latino, 46.5% White, 23.6% Black or African American, and 1.4% Asian.[2]

Between 2010 and 2015 violent crime and property crime rates for the city of Hallandale Beach decreased (see Figure 1). In comparison to neighboring cities, Hallandale Beach experienced some similar trends in crime rate overtime. Overall Hallandale Beach had similar violent crime rates to Dania Beach and Pembroke Park, yet higher violent crime rates than Miramar, Aventura, and Hollywood. The city had similar property crime rates as Dania Beach and Hollywood, which was lower than Aventura and Pembroke Park, but higher than Miramar.

Figure 1. Hallandale Beach Crime Rate Per 100,000 Population



Source: Hallandale Beach Police Department

Motivation for the Project: Police-Community Relations in Hallandale

In anticipation of and resistant to Hallandale Beach Police Department's pilot body-worn camera program, the Broward County Police Benevolent Association conducted its own survey of Hallandale police officers in June 2015. Their report showed an unwelcoming attitude towards body-worn cameras. Moreover, in 2015, the police department conducted an independent performance assessment of use of force, accountability and oversight processes, and technological needs. This assessment came about due to a series of officer-involved shootings experienced by the police department as well as a desire to transform the police department. Of note, this review highlighted community members' desire for better police-community relations and requests of body-worn cameras. However, there was a sentiment in the police department and by the police union that body cameras would lead to de-policing, thus negatively impacting

[2] As of April 2017, the racial breakdown for officers specifically on uniformed patrol is 30.0% Hispanic or Latino, 48.3% White, 18.3% Black or African American, and 1.7% Asian.

officer job performance by inhibiting their undertaking of normal duties. Hence, investigating the possibility of any de-policing effect was of interest during the pilot program.

Background and Implementation of the Program

Planning for the body-worn camera evaluation began in October 2015 with the purpose of understanding its utility for the Hallandale Beach Police Department specifically. The apparatus used was Taser International's Axon Flex. There was a mandatory activation policy set forth by the police department, which removed officer discretion in turning on/off cameras, except in certain sensitive situations (e.g. sexual battery, issues with minors, in hospitals due to HIPAA laws, etc.). In attempts to establish a culture of trust and integrity within the police department, the general order mandated that supervisors could not watch camera footage without notifying the specific officer involved. Additionally, supervisors could only watch specific footage when identifying training concerns, as a follow up to complaints or reviewing evidence in criminal matters. Officers could review their own footage for writing reports, preparing for court, disciplinary matters, or training purposes.[3]

II. Overview of Prior BWC Research

The implementation of police body-worn cameras rapidly increased across the United States and United Kingdom during the past decade. It has been theorized that BWCs are perceived to bring a civilizing effect by improving the behavior of both police officers and citizens as they understand their actions are reviewable. Despite this growing interest in the use of BWCs, research has only begun to evaluate the impact of body camera technology on officer performance and perceptions as well as citizen behavior, with little to no research on citizen perceptions.

Officer Performance

When trying to understand the impact of BWCs on officer performance, studies have primarily examined three outcome measures: arrest, use of force, and citizen complaints. Two seminal studies conducted in the U.K.: Plymouth Head Camera Project England (Goodall, 2007) and Renfrewshire/Aberdeen Studies in Scotland (ODS Consulting 2011), are the pioneers of empirical research on body-worn cameras. In 2006, the Plymouth Police Department initiated a seventeen-month BWC pilot program using fifty cameras. This evaluation relied on a quasi-experimental design comparing officers who wore cameras to those who did not. The findings indicated a reduction in citizen complaints against officers wearing cameras and an increase in evidentiary quality (Goodall, 2007). Two police agencies in Scotland: Renfrewshire (2008) and Aberdeen (2010), launched the BWC program with thirty-eight and eighteen body cameras,

[3] It is important to note that since the police department was not monitoring the body camera recordings routinely, the intended impacts of the body cameras may not be as strong because the accountability mechanism associated with monitoring behavior is further removed. For instance, if officers are recording, but know that their video will not be viewed by supervisors unless a complaint happens or a serious incident (which is reported relatively rare for Hallandale Beach), then the body camera may not impact officer behavior in the theorized way (e.g. through fear of consequences, notions of being watched, etc.).

respectively. This evaluation also reported an improvement in addressing citizen complaints (ODS Consulting, 2011).

Rialto Police Department in California was the first police agency in the United States to experiment and evaluate the BWC technology in 2012 (Ramirez, 2014). Utilizing a time-series randomized control design, fifty-four officers were randomly assigned to two groups, those wearing cameras versus those not wearing cameras, on a weekly basis. The results showed that police use of force dropped by 50% and complaints against officers reduced by 88% (Ariel et al., 2015).

In 2013, Mesa (AZ) Police Department conducted a one-year BWC evaluation program using a quasi-experimental design with fifty officers wearing body cameras (25 volunteers and 25 randomly assigned) (MPD, 2013; Roy, 2014). Following the BWC implementation, citizen complaints against officers wearing BWCs dropped by 60%, whereas the analysis revealed a 36% increase in complaints against officers not wearing BWCs. In the same year, Phoenix (AZ) Police Department conducted a fifteen-month quasi-experimental study with fifty-six officers with body-worn cameras and fifty comparison officers. The analysis revealed results like Mesa Police Department, with a 22% decline in citizen complaints for the officers with body cameras and a 10% increase in citizen complaints against the officers without cameras (White, 2013; Katz et al., 2015). In a randomized control trial conducted by the Orlando (FL) Police Department, forty-six officers were assigned to wear body cameras and forty-three officers were assigned without a body camera. The findings showed reductions in both use of force and citizen complaints for the officers wearing cameras following the implementation of the program (Jennings et. al, 2014).

More recently, an evaluation of the Denver (CO) Police Department found that body cameras are associated with decreases in complaints of officer use of force as well as arrests, but increases in complaints of officer misconduct (Ariel, 2017), whereas in Spokane (WA) overall complaints decreased dramatically because of BWCs (White et al., 2017). There are several studies which provide support for the civilizing effect of the BWC implementation: Rialto Police Department BWC program (Ariel et al., 2015), the Isle of Wright BWC project, England (see: Ellis et al., 2015), and more recently in the British context as well (see: Henstock and Ariel, 2017). However, despite these positive findings, there are still studies which have produced negative or mixed findings, suggesting that body cameras lead to no significant change in use of force (Edmonton Police Service, 2015; Ariel, 2017), no reduction in complaints (Grossmith et al., 2015), and even an increase in arrest (Katz e. al, 2015; Morrow et. al, 2016).

Officer Perceptions

Several evaluations have explored officer perceptions concerning the BWC technology (MPD, 2013; Owens et al., 2014; Katz et al., 2015; and Guab et al., 2016). Two major themes arise in these studies. The first theme relates to the evidentiary value of body cameras: 78-80% of the officers surveyed in the Mesa (AZ), Phoenix (AZ), Tempe (AZ), and Spokane (WA) evaluations suggest that BWCs increase the quality of evidence (MPD, 2013 and Guab et al., 2016). Similar results were found in the Essex (England) Police Department (Owen et al., 2014). The second theme relates to changes in officers' perceptions: in three BWC evaluations (Phoenix, AZ,

Spokane, WA, and Tempe, AZ) officers' opinions changed over time. The results of the Phoenix BWC study revealed that officer perceptions of the ease of use and benefits of BWCs significantly enhanced, however their concerns regarding the evidentiary value of the technology also increased (Katz et al., 2015). The Tempe (AZ) and Spokane (WA) evaluations, however, showed greater improvements in officer perceptions regarding the positive impact of BWCs for officers and citizens (Gaub et al., 2016).

Citizen Behavior

The research assessing the impact of BWCs on citizen behavior is much more limited. Nonetheless, a few studies have looked at crime trends and assaults against officers. The studies done in Renfrewshire and Aberdeen Police Departments showed reductions in crime as well as in the likelihood of assaults against officers (ODS Consulting, 2011). Similarly, the Spokane (WA) Police Department found no relationship between the likelihood of officer injuries and the presence/use of BWCs (White et al., 2017). However, the results of a multi-site study found that BWCs increase the chance of officers being assaulted by citizens (Ariel et al., 2016). Due to the limited and mixed results found regarding citizen behavior, more rigorous research is needed to understand the impact of BWCs on citizens, specifically as it pertains to violence against police officers.

Despite the growing popularity of BWCs, there is much to learn about this innovative technology. Given the reviewed literature, there are several major gaps in the BWC research. Thus far, arrest, use of force, and complaints have been considered as the key performance outcomes of BWCs. Yet, traffic citations and field contacts have not been examined in previous published research. In terms of police officer perceptions, research needs to better track changes in officers' opinions before and after body camera utilization to fully understand the factors impacting the change of perceptions.

IV. Methods

Research Objectives

This study evaluates the impact of using body-worn cameras on police officer perceptions and behavior (namely if there was a de-policing effect of body cameras on officer behavior). First, a survey was conducted to measure officers' receptiveness and satisfaction of the BWC implementation over time. Subsequently, a series of secondary administrative data of officer behavior was obtained from the police department to see if the deployment of BWCs changed officer performance over time.

Research Questions

Given the gaps in previous literature and our research objectives, four questions were addressed in this study:

1) In what ways do body-worn cameras impact officer job performance?
2) Does the use of BWCs result in any decreases in officer job performance (e.g. de-policing effect)?
3) How do officers feel about body-worn cameras?
4) How do officer perceptions change over-time?

Research Design and Methodology: Establishing the Pilot Program

During the pilot program, 28 body-worn cameras were disseminated in two stages over a year. During stage one, referred to as the volunteer stage, some officers were given the option to volunteer to be a part of the pilot program. However, during this stage, all Patrol Sergeants were required to sign up, totaling 8 sergeants and an additional 8 officers who volunteered to participate. Training for participants during this stage began in December 2015, with implementation mid-December. During stage two, referred to as the randomized stage, officers were randomly selected to participate in the pilot program through a stratified sampling method. The stratification was necessary to ensure that the total number of officers with body-worn cameras were proportionately dispersed across the various work shifts. There was a total of 12 officers randomly chosen during this stage, and training began in February 2016, with implementation mid-February. The two-staged deployment of body-worn cameras produced a quasi-randomized experimental design. The initial sample consisted of 28 officers wearing body cameras (treatment group), and a total of 25 officers not wearing body cameras (control group). Thus, the design took on the following arrangement (see Table 1):

Table 1: BWC Evaluation Research Design

	Pre	**Phase 1**	**Phase 2**	**Post**
T_1 (n=16; Volunteer)	O_1	X		O_2
T_2 (n=12; Random)	O_1		X	O_2
Control (n = 25)	O_1			O_2

Notes: O = Data observation; X = BWC introduced.

Data Collection

The collection of data was conducted in two phases using a multi-method analysis to fully understand the impact of the body-worn cameras. The first phase was completed prior to the implementation of the BWC program (pre) and the second phase was done after officers began wearing body cameras (post). A survey instrument was used to gauge perceptions and attitudinal changes over time (both before and after the implementation of the pilot program). This included approximately 20 categories of statements and questions, using a mixture of Likert scales, open ended questions, and closed ended demographic questions. The pre-survey was collected in-

person via BWC training days and roll call meetings. Most pre-survey data collection spanned from December 2015 to January 2016, with a total response rate of 90.2%[4]. The post-survey was collected using an online survey distribution platform, Qualtrics,[5] approximately 8 months after the implementation of the cameras. The post-survey data collection occurred between September 2016 and October 2016, with a response rate of 84.3%. Additionally, secondary data were collected for both the pre- and post-time periods which assessed officer performance outcomes. The key measures included: arrests, citations, field contacts, external complaints, use of force, assaults on officer, and non-violent resistance. This data was collected for each month in the pre-time period (January 2015-December 2015) and post-time period (January 2016-December 2016). The data collected was at the individual officer level and it was aggregated for treatment and control groups accordingly.

V. Findings of Officer Behavior using Administrative Data

The secondary data analysis provided insight into whether the implementation of BWCs had affected the actual behavior of police officers. Due to the context of this police department, of keen interest was to investigate if there was a de-policing effect associated with body cameras.

Sample Size

While there was a total of 28 officers who wore body cameras during the study period, the final sample size for the analysis purposes consisted of 26 officers wearing BWCs. Two officers were removed because they did not have sufficient data prior to the implementation of body-worn cameras (during the pre-time period). For those two officers, the only data available for the key outcome measures was for the year 2016, which was the post-time period after officers began wearing BWCs.

Analytical Approach

Officers' behavioral data were collected at the individual level and aggregated by treatment and control groups across both time periods. The analysis assessed for temporal changes in outcome variables following the use of BWCs as well as for differences between the treatment and control groups. For each outcome variable, the percent change from 2015 (pre-period) to 2016 (post-period) was measured for both officers who wore the BWCs and those who did not. Finally, t-tests were conducted to see if there was a significant difference before and after the implementation of BWCs for each outcome variable. Because the low sample sizes were also accompanied with high levels of missing data within monthly figures, the ability to detect statistical significance was limited. To account for this, a multiple imputation procedure was

[4] The dates for the pre-period spanned until January to encompass both the volunteer and random stages which each had different start dates (volunteer officers began in December and randomly selected officers began in February). Additionally, for the pre-survey, there were four surveys retained where the officers were in the overall treatment group (wearing body cameras) yet completed surveys after the implementation of the cameras. For these four officers, they completed surveys within 2-3 weeks following the implementation of the body-worn camera program. One officer was in the volunteer officer group and the remaining three were in the randomly selected group.

[5] Qualtrics aids research by providing an online platform that enables people to conduct surveys, feedback, and polls using a variety of distribution methods. It also performs preliminary analysis of results.

used for the variables with the least amount of missing information. These variables included arrests, field contacts, and citations. Imputations were not carried out for the remaining outcome measures since the extent of the missing information was too high, with more than 75 percent being absent. The statistical significance levels reported for those three variables (arrests, field contacts, and citations) are based on the imputed data (see Appendix for more on the multiple imputation).

Summary of Findings

Table 2 presents the results of the analysis on officer performance. Overall, the analysis revealed that the use of body-worn cameras does have an impact on officers' behavior but it does not hinder their job performance. In other words, there is no de-policing effect, but rather officers are still performing their regular duties despite the use of cameras. Additionally, officers tended to rely on less intrusive methods of dealing with citizen encounters. The results for each outcome variable are presented below in Table 2. To observe the yearly trends, a monthly breakdown of each outcome measure for both years 2015 and 2016 is reported in the Appendix.

Table 2: Treatment and Control Group Comparisons: 12 Month SUM (2015-2016)

Outcomes	**Treatment** (n=26)			**Control** (n=25)		
	Pre-BWC (2015)	**Post-BWC (2016)**	**Percent Change**	**Pre-BWC (2015)**	**Post-BWC (2016)**	**Percent Change**
Arrests†	409	343*[1]	-16.1%	436	397*[1]	-8.9%
Field Contacts†	282	359**	27.3%	365	330	-9.6%
Citations†	2091	2433	16.4%	2197	1968	-10.4%
Use of Force	15	12	-20.0%	12	9	-25.0%
Complaints	4	2	-50.0%	4	6	50.0%
Assaults on Officers	3	7	133.3%	4	8	100.0%
Non-Violent Resistance	27	25	-7.4%	39	23*	-41.0%

*significant at the .05 level; **significant at .01 level; ***significant at .001 level.
† Significance test results reported based on multiple imputation data. See Appendix.
1. Significant difference between post treatment and post control found.

Arrest

There was a reduction in the number of arrests after the implementation of BWCs. Officers wearing body-worn cameras experienced a decrease of 16.1% in arrests, whereas officers not wearing cameras experienced only an 8.9% reduction. Thus, the reduction in arrests by officers wearing BWCs was almost twice that of officers not wearing the cameras. However, it is important to note that this change in arrest patterns did not reach statistical significance with the reported data, suggesting that the reduction could be attributed to chance. Given the dominant

sentiment in the police department that the use of body cameras would stop policing, one interpretation here is that non-significant differences may suggest that officers are performing their normal duties, including arrests. Following the multiple imputation for missing monthly values, an independent-samples t-test was again conducted to compare arrests between BWC wearing officers and the control sample. There was a significant difference in arrests for officers with BWCs (M = 27, SD = 4.9) and those without (M = 31, SD = 5.8) in the post evaluation period; t (42) = 2.51, p = 0.016. These results, in turn, suggest that the use of BWCs in fact reduce the likelihood that officers will utilize arrest to resolve incidents.

Field Contacts

The field contacts conducted by officers in both the treatment and control groups were included as a measure of officer proactivity. There was an increase of 27.3% in the total number of field contacts for officers wearing BWCs, while officers without cameras experienced a decrease of 9.6% in total field contacts. Albeit, both percentage changes failed to reach statistical significance in the sample with missing values. Field contacts may not be a reliable measure of officers' actual proactivity as they are self-reported, however, they can be a good measure of officers' willingness in reporting self-initiated activities. Thus, officers who wore body cameras were more likely to report field contacts following BWC implementation, while control officers were less likely to report such self-initiated activity.

After the multiple imputation for missing monthly values, an independent-samples t-test was again conducted to compare the number of field contacts between BWC wearing officers and the control sample. There was a significant increase in the number of field contacts for officers with BWCs in the pre (M = 12, SD = 10.9) versus post (M = 21, SD = 12.8) evaluation period; t (54) = -2.84, p = 0.006. There was no statistically significant change in the level of field contacts among officers not wearing BWCs. These results, in turn, suggest that the use of BWCs increases police activity with citizens.

Traffic Citations

The total amount of tickets given by officers wearing BWCs increased by 16.4%, while for officers not wearing BWCs the total amount decreased by -10.4%.[6] Thus, there was a 26.8 percentage point difference between the treatment and control group changes from pre- to post-periods. According to the statistical tests, the changes in citations from before and after the implementation of BWCs, for both treatment and control groups, were not statistically significant. Following multiple imputations of missing data, the differences approached statistical significance but fell short.

[6] Potential reasons for the increase in citations in the treatment group needs further exploration, however one possible explanation may be that cameras remove officer discretion. When an officer is giving a ticket to someone they have the option to let them off with a warning. Officers wearing cameras may feel that by doing so they are risking the chance of receiving a sanction by supervisors.

Use of Force

The analysis revealed that use of force by both treatment and control officers slightly decreased, however; this also was not a statistically significant reduction. The total number of use of force incidents by officers wearing body cameras dropped by 20% in the post-BWC period, whereas for officers not wearing body cameras there was a decrease of 25%. However, due to the low number of use of force incidents, the changes in use of force cannot be confidently assessed herein. Further investigations with data over longer periods of time are needed to better explain these changes.

External Complaints

The total number of external complaints against officers wearing cameras decreased by 50%; however, the total number of complaints for officers without cameras increased by 50%. Neither changes between pre- and post-periods for treatment nor control groups were significant. It is worth noting that the high percentage changes in both treatment and control groups are due to the low number of total external complaints in the years 2015 and 2016 and thus should be interpreted with caution.

Assaults on Officers

The total number of assaults against officers wearing cameras and those without increased by 133% and 100%, respectively. However, these differences between the pre-and post-periods for each group were not significant. Like the number of complaints and use of force incidents, the assaults against officers had low base numbers and thus should be interpreted with caution.

Non-Violent Resistance

The suspects' non-violent resistance towards police officers were also examined. The analysis indicated a 7.4% reduction in resistance towards officers wearing cameras, while there was a 41% decrease in resistance towards officers without cameras. While no significant difference was found in the treatment group before and after wearing BWCs, the difference between pre- and post for the control group was significant.

VI. Findings from Officer Perception Survey

Surveys were conducted to understand how officer perceptions regarding body-worn cameras changed over time. Overall, officer's perceptions did change following the implementation of body-worn cameras.

Survey Sample

The sample included only road patrol officers and sergeants (n=51), which accounted for all officers that had the potential to wear a body-worn camera in the future. The pre-survey time period lasted roughly from December 2015-January 2016, whereas the post-survey time period was from September-October 2016.

Distribution Method

The survey was distributed using two different mediums across the two time periods. The pre-survey, conducted prior to the implementation of BWCs, was distributed in person at the police department during BWC training days and officer roll calls. Although collecting surveys in person allowed for a higher response rate, due to the difficulties in tracking down officers to take surveys in person the distribution method changed for the post-survey. The post-survey, implemented after the implementation of BWCs, was distributed online, via Qualtrics, to all the officers on road patrol at the time.

Findings

The findings portrayed that perceptions by road patrol officers changed since the implementation of body-worn cameras. Overall, there was a downward trend in positive feelings about the use and effectiveness of BWCs. Generally, officers in the control group (not wearing body cameras) and the treatment group (wearing body cameras) exhibited this same trend in perceptual changes. Tables 3 through 7 each display findings for the treatment and control groups. For a detailed breakdown of all survey questions asked and perceptual changes by control and treatment groups see the Appendix.

Written Comments

In assessing the written comments by officers, both before and after the implementation of BWCs, there were key themes noted. Below there is a summary of all the comments provided by officers for each of the questions asked during the pre-survey and post-survey.

<u>Pre-Survey: Why did you decide to/not to volunteer for the BWC pilot program?</u>

There were a total of 37 comments by officers in response to why he or she either chose to or declined participation during the initial volunteer call to wear body cameras.

In 37.8% of the comments, officers expressed that they volunteered for the program. Most officers who volunteered sought to be an example for others, to help, to learn/understand about BWC usage, and/or to get hands on experience. Whereas less officers who volunteered felt body-worn cameras were inevitable and/or could provide positive benefits.

In 62.2% of the comments, officers expressed that they did not volunteer for the program. For those who did not volunteer, most officers simply did not agree with, want or need body cameras. Other often repeated comments were officers perceptions of the negative effects of BWCs, which included taking officer discretion away, adding stress by focusing officer attention on the camera and on how their actions will be interpreted, the legality of the program, and liability issues. Sparingly officers made other comments on BWCs diminishing officer privacy and integrity, wasting money, being hard to adjust to, and not understanding the reason for BWCs.

Pre-Survey: Do you think the police department should adopt BWCs for all front-line police officers? Why or why not?

There was a total of 37 comments by officers prior to the implementation of body cameras in response to whether he or she thought the police department should adopt body cameras for all front-line officers. In 21.6% of the comments, it was explicitly stated that the police department should adopt BWCs, whereas an additional 8.1% stated it could be adopted with some caveats. The reasons for adoption included evidence collection and officer protection during citizen complaints and investigations, assisting in the writing of reports, improving officer safety, uniformity of all officers, meeting public demand to improve police-community relations, and to be a leading police department in the implementation of the technology.

On the other hand, 54.0% of comments suggested that the police department should not adopt body-worn cameras. The main reasons that officers were against the adoption is due to the potential negative impacts of BWCs. These include inhibiting officer proactivity, limiting community interaction, limiting officer discretion, increasing officer hesitation, and preventing the community from providing necessary and/or confidential information. Likewise, officers commonly expressed that the police department does not have issues regarding misconduct, use of force, and complaints, and that there should be an investment in the empowerment of officers, better training, and proper community engagement/interaction. Other comments noted by fewer officers were that there could be potential long term medical effects, the cameras may be misused by the police administration and upper level management, and that BWCs do not entirely capture officer perception.

The remaining 16.2% of comments were neutral in that they did not explicitly state if the police department should adopt body cameras or not.

Post-Survey: How do you feel about BWCs?

Regarding how officers felt after the initial implementation of body-worn cameras, there was a total of 41 separate comments by 39 officers[7]. In 17.1% of comments, officers simply expressed a dislike for the cameras with no further reasoning and 7.3% of comments expressed a neutral or indifferent demeanor concerning BWCs. In 12.2% of comments, there was a positive tone expressing that the cameras are a good tool with proper use, and that they can be a benefit in certain situations (such as protecting officers in justifying use of force or preventing false allegations, helping officers in reviewing reports, and serving evidentiary purposes). However, the need for increased information about proper legal actions and physical training to decrease liability and increase officer safety was noted.

In a more negative light, in 17.1% of comments officers felt that BWCs restricted the officer in the performance of his or her duties, by limiting discretion, causing hesitation/doubt, decreasing productivity, and impacting officer attention span. In 12.2% of the comments it was explicitly stated that being required to mount body cameras on the head led to headaches, was uncomfortable, posed medical concerns, and impacted video quality. Further, in 9.8% of all comments it was noted that there is a lack of trust by administration towards officers. Herein,

[7] There were two comments that included extensive and multiple points and thus were split up.

cautions were noted about the misuse of the camera by the administration particularly regarding disciplinary actions. In 2.4% of the comments there was a focus on the financial implications of the BWC program. Lastly, in 22.0% of all the comments, officers noted that there were both positive and negative aspects to wearing body-worn cameras, for many of the reasons listed above.

Post-Survey: Do you think the police department should adopt BWCs for all front-line police officers? Why or why not?

In total, 39 comments were made after the implementation of BWCs regarding whether the police department should adopt this technology for all front-line officers. Approximately 28.2% of comments depicted a positive attitude towards the adoption of body cameras primarily because the benefits outweigh the costs, they help with officer compliance, provide better reporting, and assist in the identification of problematic officer behavior. However, amongst this group of comments there were also some caveats noted. First, there was a continuous concern for the discomfort and headaches caused by the head-mounted cameras, with suggestions to use the chest/body mounted version. Also, officers noted that BWCs take time to get used to and there could be a learning curve for officers without necessary technological expertise. Some of these comments also noted that instead of implementing it for all front-line officers it could be better served either on a volunteer basis, as a training tool for new officers, or only for officers who receive a certain amount of complaints or exhibit problematic behavioral patterns.

There were 15.4% of all comments that either displayed a neutral/indifferent tone or exhibited mixed feelings concerning BWC adoption. Some of these comments noted that it may be too short of a time to properly assess the positive and/or negative impacts.

The remaining 56.4% of comments were against the adoption of body-worn cameras. Repeated reasons included BWCs inhibiting police decision making/discretion, diminishing officer safety, stopping proactive police work and promoting reactive policing, usability problems pertaining to malfunctions, ease of use, comfort, and health, the desire for police personnel and administration wearing cameras as an example, problems relating to upper administration using it as a disciplinary tool, BWCs not impacting citizen behavior and not being cost effective. Other comments sparingly mentioned include that the use of BWCs shows minimal trust in officers by administration, promotes citizen aggression towards officers, inhibits the public's willingness to provide anonymous information/tips, lowers morale, does not promote trust, does not absolve liability, and is not relevant for the HBPD because of low complaints and use of force issues.

Table 3. Percentage of Agreement/Disagreement Before (Pre) and After (Post) the implementation of Body-Worn Cameras

		Strongly Agree		Agree		Neither Agree/Disagree		Disagree		Strongly Disagree	
		Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC
Increases transparency & accountability	Pre	10.0%	29.6%	35.0%	22.2%	35.0%	37.0%	15.0%	0.0%	5.0%	11.1%
	Post	14.3%	7.1%	28.6%	35.7%	28.6%	32.1%	21.4%	25.0%	7.1%	0.0%
Reduces citizen complaints	Pre	15.0%	22.2%	30.0%	33.3%	35.0%	33.3%	15.0%	7.4%	5.0%	3.7%
	Post	7.1%	0.0%	14.3%	3.6%	50.0%	42.9%	14.3%	46.4%	14.3%	7.1%
Improves police-community relations	Pre	0.0%	3.7%	20.0%	14.8%	40.0%	48.2%	15.0%	18.5%	25.0%	14.8%
	Post	0.0%	0.0%	14.3%	3.6%	35.7%	39.3%	28.6%	50.0%	21.4%	7.1%
Improves overall job performance	Pre	0.0%	3.7%	15.0%	18.5%	40.0%	14.8%	10.0%	37.0%	35.0%	25.9%
	Post	0.0%	0.0%	21.4%	7.1%	28.6%	21.4%	28.6%	53.6%	21.4%	17.9%
BWCS will not help at all	Pre	5.0%	0.0%	10.0%	22.2%	65.0%	40.7%	15.0%	22.2%	5.0%	14.8%
	Post	7.1%	21.4%	28.6%	25.0%	28.6%	35.7%	28.6%	17.9%	7.1%	0.0%
Reduces officers' use of force against citizens	Pre	5.3%	18.5%	21.1%	18.5%	57.9%	44.4%	15.8%	14.8%	0.0%	3.7%
	Post	0.0%	0.0%	14.3%	3.6%	64.3%	53.6%	7.1%	39.3%	14.3%	3.6%
Reduces the number of citizen complaints per officer	Pre	0.0%	3.7%	21.1%	14.8%	47.4%	63.0%	10.5%	14.8%	21.1%	3.7%
	Post	0.0%	0.0%	7.1%	3.6%	57.1%	42.9%	14.3%	50.0%	21.4%	3.6%
Reduces officers' contact with citizens	Pre	26.3%	25.9%	47.4%	29.6%	10.5%	29.6%	15.8%	14.8%	0.0%	0.0%
	Post	35.7%	28.6%	21.4%	46.4%	35.7%	3.6%	0.0%	17.9%	7.1%	3.6%
Suspects will be less likely to resist officers	Pre	0.0%	0.0%	10.0%	33.3%	20.0%	37.0%	35.0%	18.5%	35.0%	11.1%
	Post	0.0%	0.0%	7.1%	3.7%	21.4%	18.5%	42.9%	44.4%	28.6%	33.3%
Citizens will be more defensive to officers	Pre	10.0%	0.0%	35.0%	33.3%	40.0%	51.9%	15.0%	14.8%	0.0%	0.0%
	Post	21.4%	3.7%	28.6%	18.5%	42.9%	37.0%	7.1%	33.3%	0.0%	7.4%
Citizens will be less willing to cooperate	Pre	25.0%	18.5%	40.0%	48.2%	25.0%	25.9%	10.0%	3.7%	0.0%	3.7%
	Post	21.4%	14.8%	35.7%	29.6%	35.7%	33.3%	7.1%	18.5%	0.0%	3.7%

Table 4. Percentage Point Change Between Pre- and Post-Body-Worn Camera Time Periods

	Strongly Agree		Agree		Neither Agree/Disagree		Disagree		Strongly Disagree	
	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC
Increases transparency & accountability	4.3%	-22.5%	-6.4%	13.5%	-6.4%	-4.9%	6.4%	25.0%	2.1%	-11.1%
Reduces citizen complaints	-7.9%	-22.2%	-15.7%	-29.8%	15.0%	9.5%	-0.7%	39.0%	9.3%	3.4%
Improves police-community relations	0.0%	-3.7%	-5.7%	-11.2%	-4.3%	-8.9%	13.6%	31.5%	-3.6%	-7.7%
Improves overall job performance	0.0%	-3.7%	6.4%	-11.4%	-11.4%	6.6%	18.6%	16.5%	-13.6%	-8.1%
BWCs will not help at all	2.1%	21.4%	18.6%	2.8%	-36.4%	-5.0%	13.6%	-4.4%	2.1%	-14.8%
Reduces officers' use of force against citizens	-5.3%	-18.5%	-6.8%	-15.0%	6.4%	9.1%	-8.7%	24.5%	14.3%	-0.1%
Reduces the number of citizen complaints per officer	0.0%	-3.7%	-13.9%	-11.2%	9.8%	-20.1%	3.8%	35.2%	0.4%	-0.1%
Reduces officers' contact with citizens	9.4%	2.6%	-25.9%	16.8%	25.2%	-26.1%	-15.8%	3.1%	7.1%	3.6%
Suspects will be less likely to resist officers	0.0%	0.0%	-2.9%	-29.6%	1.4%	-18.5%	7.9%	25.9%	-6.4%	22.2%
Citizens will be more defensive to officers	11.4%	3.7%	-6.4%	-14.8%	2.9%	-14.8%	-7.9%	18.5%	0.0%	7.4%
Citizens will be less willing to cooperate	-3.6%	-3.7%	-4.3%	-18.5%	10.7%	7.4%	-2.9%	14.8%	0.0%	0.0%

Table 5. Will Body-Worn Cameras Be a Benefit?

	Pre		Post	
	Non-BWC	**BWC**	**Non-BWC**	**BWC**
BWCs will absolutely be a benefit	10.0%	3.9%	7.1%	0.0%
BWCs will take some time getting used to but will prove beneficial in the long run	5.0%	23.1%	14.3%	7.1%
BWCs will have some positive effects but also some negative effects	70.0%	61.5%	57.1%	64.3%
BWCs will not be useful at all	15.0%	11.5%	21.4%	28.6%

Table 6. Who Benefits the Most?

	Pre		Post	
	Non-BWC	**BWC**	**Non-BWC**	**BWC**
BWCs benefit the police more than the citizen	20.0%	20.0%	7.7%	7.4%
BWCs benefit the citizen more than the police	25.0%	20.0%	15.4%	14.8%
BWCS neither benefit the citizen nor the police	35.0%	36.0%	53.9%	63.0%
BWCS will be a benefit for all	20.0%	24.0%	23.1%	14.8%

Table 7. Threats of Complaints[8]

Have you received a threat of complaint or actual complaint in the past 90 days?	Pre		Post	
	Non-BWC	**BWC**	**Non-BWC**	**BWC**
Yes	23.5%	29.6%	8.3%	19.2%
No	76.5%	70.4%	91.7%	80.8%

[8] The threat of complaints declined from before the implementation of body-worn cameras to after the implementation of these cameras in both groups (those who wore body cameras and those who did not).

VII. Officer Compliance

Research has noted that officer activation of and compliance with BWCs is an important factor in determining effectiveness. If officers are not activating cameras, then the theorized linkage between cameras impacting officer behavior is absent due to the alleviated pressure of recording.[9] Moreover, research has found that higher officer activation rates are found under mandatory activation policies rather than discretionary policies (Young and Ready, 2016).
To assess officer compliance with the HBPD's mandatory policy, a sample of six officers was selected each month during 2016 (one month for each quarter of the year: March, June, September, and December). All six officers were randomly selected, however, three officers remained the same across all four months, whereas the other three officers were newly selected each month (see Table 8)[10]. During each month, all incidents that an officer was involved in as well as the total number of activations the officer had were assessed. Overall, when looking at the entire year, officer compliance averaged at a 70% activation (see Table 9). However, when assessing compliance at each of the time periods, it is apparent that compliance with the mandatory policy decreased overtime (see Table 10).

Table 8. Officer selection strategy

Randomly Selected Officers	March	June	September	December
Officer 1	X	X	X	X
Officer 2	X	X	X	X
Officer 3	X	X	X	X
Officer 4	X			
Officer 5	X			
Officer 6	X			
Officer 7		X		
Officer 8		X		
Officer 9		X		
Officer 10			X	
Officer 11			X	
Officer 12			X	
Officer 13				X
Officer 14				X
Officer 15				X

[9]There is a discrepancy in the research as to the impact that the presence of cameras has on citizens. It has been noted by researchers that the mere presence of a camera has an impact on citizen behavior irrespective of camera activation (Hedberg, Katz, and Choate, 2016). Other research suggests that officers need to inform citizens that the camera is on and recording to have the intended impact on citizen behavior, because often citizens are unaware that the camera is recording or don't pay attention to it.

[10] It was decided to have three of the same officers evaluated across the four months to see if activation changed overtime (a panel design), whereas the three new officers chosen each month allowed for a broader sample.

Table 9. Statistics for total compliance for the year

	Activations	Incidents	Activation
Minimum	18	36	22.5%
Maximum	113	160	100%
Mean/Average	63.3	90.2	70.3%
Standard Deviation	29.9	32.1	26.6%

Table 10. Average compliance over time

Month	Average Activation
March	81.8%
June	82.6%
September	61.6%
December	55.1%

VIII. Discussion and Conclusions

This study provided an evaluation of body-worn cameras for the Hallandale Beach Police Department's pilot program. Regarding officer performance, following the implementation of BWCs there were:

1) Reductions in arrests for all officers but slightly greater reductions for officers wearing BWCs;
2) Increases in field contacts and citations for officers wearing BWCs and decreases in both for those not wearing BWCs;
3) Reductions in use of force for all officers;
4) Decreases in complaints for officers wearing BWCs and increases for those not wearing BWCs;
5) Increases in assaults against all officers; and
6) Decreases in non-violent resistance for all officers, but greater reductions for officers not wearing BWCs.

It appears these changes could be the result of BWCs, however as noted the low numbers for some of these measures (use of force, complaints, assaults, resistance) poses difficulties in interpretation. Altogether, this could be a positive finding for the use of BWCs because officers are relying on less intrusive measures (i.e. arrests), having more proactive contact and giving more citations. This can also provide evidence against claims of the "de-policing effect," where officers are no longer doing their jobs and are less proactive because of BWCs. Nonetheless, the finding pertaining to increases in assaults against officers warrants further investigation as it pertains to officer safety. It is possible that officers are reporting citizen resistance more due to the BWCs.

Regarding statistical significance, the only finding that reached the statistical threshold with the originally supplied data was non-violent resistance for the control group, depicting that officers who did not wear body cameras reported significantly less incidents of non-violent resistance following the implementation of the BWC pilot program. While there was a decrease in incidents of non-violent resistance for officers wearing body cameras as well, the percentage decrease was much larger for officers not wearing cameras. This could be a reactivity effect by all officers who are recording more regularly citizen resistance as a response to the increased scrutiny the police department has received. However, once the monthly missing values were imputed with a multiple imputation procedure significant differences were observed for arrests and field contacts. Because the behavioral patterns found here are generally consistent with previous evaluation research on the impact of BWCs in other jurisdictions, more confidence can be placed in this study's validity, regardless of whether the figures achieve statistical significance.

Additionally, regarding officer perceptions, there was a persistent negative view towards the adoption and continued use of BWCs. However, it appears that perceptions and receptivity to the body-worn camera program could be dependent on the implementation of the program by upper administration. Survey findings portrayed that officers expressed displeasure with the process by which videos were used by administration to reprimand officers for what officers deemed as miniscule incidents. Thus, while the finding that officer perceptions became more averse to the idea of BWCs should be based on the effectiveness and usefulness of the cameras, it cannot be separated from how the police department implemented the program and used the footage. Lastly, the fact that compliance decreased over time even with a mandatory use policy suggests that there needs to be incentives for officer compliance with the policy and use of the cameras. These reductions in the actual use of the camera could have implications for the job performance findings documented above.

There are some possible limitations that should be considered in interpreting these findings. First, there is the possibility of contamination effects between officers wearing cameras and those not wearing cameras. It was not possible to restrict the interactions between control officers (not wearing camera) and treatment officers (wearing cameras), particularly when responding as back up to an incident. Thus, even officers not wearing cameras have the potential to be impacted because there is a camera present on scene. Second, the survey mediums changed from the pre-survey (in-person at the police department, primarily during roll call) to the post-survey (online). The setting in which the officer took the survey could have impacted the officer's responses and/or openness, particularly during the pre-survey.[11] Third, this evaluation focused solely on officer behavior and attitudes, thus it is unknown how citizen behavior and attitudes are impacted by BWCs. It would be an advantage for future research to study the community's perception of BWCs. Lastly, the small numbers of officers in the study groups impeded the ability to determine statistical significance in many of the analyses.

[11] During the pre-survey, it was observed that some officers did not want to fill out the survey inside the police department but preferred to take it home. Moreover, it was observed some officers jokingly asked each other what they were putting on their survey and/or put neutral for every answer. Thus, survey results should be interpreted with caution.

Other minor limitations include changes within the police department that are beyond the control of the researchers, which could impact the internal validity of the study. For instance, during the evaluation period and implementation of BWCs, management changes occurred which encouraged more officer self-initiated activity/proactivity (rather than merely responding to calls for service). Thus, the shift in officer behavior may be a consequence of that administrative change rather than the BWCs. However, if it were the case that such administrative changes could have impacted officer proactivity (i.e. field contacts), then increases in both officers wearing cameras and those not wearing cameras would be expected, which is not what was found. Thus, while this is a possibility, the quasi-randomized design used here gives more credibility to the idea that officer performance changes were in fact a result of the BWCs.

The findings herein are generally consistent with the growing body of research on BWCs across the United States which has found BWCs to be useful in improving the interactions which occur between officers and citizens. Additionally, per the Bureau of Justice Statistics' Census of State and Local Law Enforcement Agencies (2008), more than 90% of all local police departments in the United States employ 100 or less sworn officers. Therefore, due to the moderate size of the Hallandale Beach Police Department, this evaluation documents an experience that is more common to what other police departments around the country may face when implementing BWCs. The findings here offer evidence in support of the continued use of BWCs by the Hallandale Beach Police Department.

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Appendix

Multiple Imputation Procedure

To account for high levels of missing data a multiple imputation procedure was used in some of the analyses. Substantial levels of missing data impede the ability to detect statistical significance. Imputation is a general procedure which replaces missing values with some other determined figure. Multiple imputation is a specific procedure which relies on several iterations of regression analyses to identify the most probable value for the missing case based on the figures observed in the remaining data series. In this study, the multiple imputation procedure was performed using SPSS, a statistical processing software package. The automatic function was used to determine the nature of the missing data (i.e. random or systematic) and the accompanying relevant imputation procedure. Because the monthly series of data were totaled and independent samples t tests were computed comparing the pre-and post yearly totals as a distinct variable, the structure of the data did not allow for a pooled computation of test means within the SPSS framework. Thus, the fifth iteration of the multiple imputation series was totaled and used as the basis for the pre-post and treatment control mean comparisons.

Appendix

Monthly Breakdown of Officers' Administrative Behavior (Pre-Period: 2015)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Arrest (BWC)	37	33	23	31	41	31	33	40	32	39	36	33
Arrest (Non-BWC)	38	43	42	34	33	40	29	35	37	44	33	28
Field Contact (BWC)	25	15	18	25	17	17	12	14	43	41	35	20
Field Contact (Non-BWC)	23	27	34	22	27	25	23	30	41	43	48	22
Citations (BWC)	139	109	139	89	165	186	169	210	236	270	243	136
Citations (Non-BWC)	143	100	197	175	194	225	193	178	207	233	209	143
Use of Force (BWC)	2	1	1	1	0	0	3	2	1	0	2	2
Use of Force (Non-BWC)	1	0	1	3	0	1	3	0	0	0	3	0
Complaint (BWC)	0	1	1	1	0	0	1	0	0	0	0	0
Complaint (Non-BWC)	1	0	0	1	1	0	0	0	0	0	1	0
Assaults (BWC)	0	1	0	0	0	0	2	0	0	0	0	0
Assaults (Non-BWC)	0	1	1	2	0	0	0	0	0	0	0	0
Non-Violent Resistance (BWC)	5	2	1	3	1	3	1	3	4	1	1	2
Non-Violent Resistance (Non-BWC)	6	4	2	3	3	2	3	4	3	0	6	3

Monthly Breakdown of Officers' Administrative Behavior (Post-Period: 2016)

	Jan.	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
Arrest (BWC)	29	18	37	28	23	37	28	35	28	12	44	24
Arrest (Non-BWC)	32	41	32	45	35	41	33	32	21	31	28	26
Field Contact (BWC)	27	27	24	13	14	45	30	47	34	31	27	40
Field Contact (Non-BWC)	30	23	23	27	36	31	23	21	40	20	21	35
Citations (BWC)	198	230	267	197	224	287	223	211	184	119	154	139
Citations (Non-BWC)	146	178	173	154	156	208	144	159	188	146	155	161
Use of Force (BWC)	0	2	0	0	2	0	1	2	2	1	1	1
Use of Force (Non-BWC)	0	0	0	0	2	0	0	0	1	3	2	1
Complaint (BWC)	1	0	0	0	1	0	0	0	0	0	0	0
Complaint (Non-BWC)	0	1	0	1	0	0	1	1	0	2	0	0
Assaults (BWC)	0	2	1	0	0	1	1	0	1	1	0	0
Assaults (Non-BWC)	4	0	0	0	0	0	0	1	1	2	0	0
Non-Violent Resistance (BWC)	2	2	0	2	2	4	1	2	2	1	4	3
Non-Violent Resistance (Non-BWC)	1	2	3	3	1	3	0	0	0	1	6	3

Perception Trends for Officers (Pre-and Post-Period)

		Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
		Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC
Helps to gather evidence	Pre	20.0%	44.4%	45.0%	25.9%	35.0%	14.8%	0.0%	3.7%	0.0%	11.1%
	Post	14.3%	3.6%	42.9%	42.9%	28.6%	32.1%	7.1%	21.4%	7.1%	0.0%
Helps to identify criminals	Pre	15.0%	33.3%	55.0%	22.2%	20.0%	25.9%	10.0%	11.1%	0.0%	7.4%
	Post	7.1%	3.6%	28.6%	17.9%	50.0%	42.9%	7.1%	25.0%	7.1%	10.7%
Increases transparency & accountability	Pre	10.0%	29.6%	35.0%	22.2%	35.0%	37.0%	15.0%	0.0%	5.0%	11.1%
	Post	14.3%	7.1%	28.6%	35.7%	28.6%	32.1%	21.4%	25.0%	7.1%	0.0%
Increases officer safety	Pre	5.0%	14.8%	0.0%	7.4%	30.0%	30.0%	35.0%	25.9%	30.0%	25.9%
	Post	14.3%	0.0%	0.0%	7.1%	21.4%	7.1%	35.7%	46.4%	28.6%	39.3%
Increases citizen safety	Pre	5.0%	18.5%	5.0%	7.4%	35.0%	37.0%	20.0%	22.2%	35.0%	14.8%
	Post	14.3%	0.0%	7.1%	3.6%	35.7%	25.0%	21.4%	50.0%	21.4%	21.4%
Reduces citizen complaints	Pre	15.0%	22.2%	30.0%	33.3%	35.0%	33.3%	15.0%	7.4%	5.0%	3.7%
	Post	7.1%	0.0%	14.3%	3.6%	50.0%	42.9%	14.3%	46.4%	14.3%	7.1%
Provides a training tool for new recruits	Pre	10.0%	14.8%	45.0%	37.0%	20.0%	25.9%	15.0%	14.8%	10.0%	7.4%
	Post	0.0%	0.0%	21.4%	17.9%	42.9%	21.4%	28.6%	28.6%	7.1%	32.1%
Increases officer/city liability	Pre	20.0%	33.3%	40.0%	22.2%	15.0%	40.7%	20.0%	3.7%	5.0%	0.0%
	Post	35.7%	21.4%	35.7%	35.7%	14.3%	25.0%	14.3%	14.3%	0.0%	3.6%
Reduces community crime & antisocial behavior	Pre	0.0%	0.0%	15.0%	14.8%	15.0%	37.0%	20.0%	22.2%	50.0%	25.9%
	Post	0.0%	3.6%	0.0%	3.6%	28.6%	3.6%	28.6%	60.7%	42.9%	28.6%
Improves police-community relations	Pre	0.0%	3.7%	20.0%	14.8%	40.0%	48.2%	15.0%	18.5%	25.0%	14.8%
	Post	0.0%	0.0%	14.3%	3.6%	35.7%	39.3%	28.6%	50.0%	21.4%	7.1%
Decreases officer job satisfaction	Pre	30.0%	37.0%	30.0%	11.1%	35.0%	44.4%	5.0%	7.4%	0.0%	0.0%
	Post	28.6%	35.7%	35.7%	28.6%	21.4%	10.7%	7.1%	14.3%	7.1%	10.7%

		Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
		Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC
Improves overall job performance	Pre	0.0%	3.7%	15.0%	18.5%	40.0%	14.8%	10.0%	37.0%	35.0%	25.9%
	Post	0.0%	0.0%	21.4%	7.1%	28.6%	21.4%	28.6%	53.6%	21.4%	17.9%
BWCS will not help at all	Pre	5.0%	0.0%	10.0%	22.2%	65.0%	40.7%	15.0%	22.2%	5.0%	14.8%
	Post	7.1%	21.4%	28.6%	25.0%	28.6%	35.7%	28.6%	17.9%	7.1%	0.0%
Officers will be consciously aware of BWC & think twice	Pre	15.8%	44.4%	47.4%	33.3%	36.8%	22.2%	0.0%	0.0%	0.0%	0.0%
	Post	14.3%	14.3%	42.9%	35.7%	35.7%	35.7%	7.1%	10.7%	0.0%	3.6%
Reduces use of force against citizens	Pre	5.3%	18.5%	21.1%	18.5%	57.9%	44.4%	15.8%	14.8%	0.0%	3.7%
	Post	0.0%	0.0%	14.3%	3.6%	64.3%	53.6%	7.1%	39.3%	14.3%	3.6%
Reduces number of citizen complaints per officer	Pre	0.0%	3.7%	21.1%	14.8%	47.4%	63.0%	10.5%	14.8%	21.1%	3.7%
	Post	0.0%	0.0%	7.1%	3.6%	57.1%	42.9%	14.3%	50.0%	21.4%	3.6%
Reduces number of internal complaints against an officer	Pre	0.0%	3.7%	5.3%	18.5%	57.9%	59.3%	15.8%	14.8%	21.1%	3.7%
	Post	0.0%	0.0%	7.1%	0.0%	35.7%	50.0%	35.7%	46.4%	21.4%	3.6%
Reduces officers' willingness to interact w/ community	Pre	21.1%	11.1%	15.8%	29.6%	42.1%	33.3%	10.5%	25.9%	10.5%	0.0%
	Post	28.6%	32.1%	35.7%	32.1%	21.4%	14.3%	7.1%	21.4%	7.1%	0.0%
Limits officer discretion	Pre	36.8%	40.7%	36.8%	25.9%	21.1%	25.9%	5.3%	7.4%	0.0%	0.0%
	Post	35.7%	42.9%	42.9%	35.7%	7.1%	10.7%	14.3%	7.1%	0.0%	3.6%
Reduces officers' contact with citizens	Pre	26.3%	25.9%	47.4%	29.6%	10.5%	29.6%	15.8%	14.8%	0.0%	0.0%
	Post	35.7%	28.6%	21.4%	46.4%	35.7%	3.6%	0.0%	17.9%	7.1%	3.6%
Citizens will be more willing to chat informally	Pre	5.3%	0.0%	0.0%	3.7%	10.5%	29.6%	36.8%	37.0%	47.4%	29.6%
	Post	0.0%	0.0%	0.0%	0.0%	28.6%	18.5%	35.7%	48.2%	35.7%	33.3%
Citizens will be less verbally/physically aggressive	Pre	5.3%	7.4%	15.8%	29.6%	10.5%	33.3%	36.8%	18.5%	31.6%	11.1%
	Post	0.0%	0.0%	21.4%	3.7%	28.6%	18.5%	28.6%	44.4%	21.4%	33.3%

		Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
		Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC
Citizens will be less likely to provide incident information	Pre	31.6%	18.5%	31.6%	44.4%	26.3%	18.5%	5.3%	14.8%	5.3%	3.7%
	Post	14.3%	7.4%	28.6%	29.6%	50.0%	29.6%	7.1%	25.9%	0.0%	7.4%
Citizens will be more likely to comply	Pre	10.5%	3.9%	15.8%	30.8%	36.8%	38.5%	15.8%	19.2%	21.1%	7.7%
	Post	0.0%	0.0%	14.3%	11.1%	28.6%	29.6%	35.7%	44.4%	21.4%	14.8%
Suspects will be less likely to resist	Pre	0.0%	0.0%	10.0%	33.3%	20.0%	37.0%	35.0%	18.5%	35.0%	11.1%
	Post	0.0%	0.0%	7.1%	3.7%	21.4%	18.5%	42.9%	44.4%	28.6%	33.3%
Citizens will be more defensive	Pre	10.0%	0.0%	35.0%	33.3%	40.0%	51.9%	15.0%	14.8%	0.0%	0.0%
	Post	21.4%	3.7%	28.6%	18.5%	42.9%	37.0%	7.1%	33.3%	0.0%	7.4%
Citizens will be distracted by the camera	Pre	0.0%	11.1%	40.0%	25.9%	40.0%	48.2%	20.0%	11.1%	0.0%	3.7%
	Post	14.3%	0.0%	21.4%	44.4%	42.9%	29.6%	14.3%	22.2%	7.1%	3.7%
Citizens will find it easier to complain on officers	Pre	0.0%	7.4%	15.0%	18.5%	40.0%	44.4%	40.0%	22.2%	5.0%	7.4%
	Post	0.0%	0.0%	7.1%	7.4%	50.0%	51.9%	28.6%	33.3%	14.3%	7.4%
Citizens will be less willing to cooperate	Pre	25.0%	18.5%	40.0%	48.2%	25.0%	25.9%	10.0%	3.7%	0.0%	3.7%
	Post	21.4%	14.8%	35.7%	29.6%	35.7%	33.3%	7.1%	18.5%	0.0%	3.7%
Citizens will dislike being recorded	Pre	35.0%	44.4%	35.0%	37.0%	30.0%	7.4%	0.0%	11.1%	0.0%	0.0%
	Post	28.6%	11.1%	42.9%	51.9%	28.6%	22.2%	0.0%	14.8%	0.0%	0.0%
Citizen behavior will improve on camera	Pre	0.0%	11.1%	10.0%	25.9%	60.0%	33.3%	15.0%	22.2%	15.0%	7.4%
	Post	0.0%	0.0%	7.7%	3.7%	30.8%	44.4%	46.2%	48.2%	15.4%	3.7%
Improves the quality of evidence an officer submits	Pre	10.5%	29.6%	31.6%	25.9%	26.3%	29.6%	15.8%	7.4%	15.8%	7.4%
	Post	7.1%	3.7%	21.4%	18.5%	57.1%	44.4%	7.1%	33.3%	7.1%	0.0%
Produced more accurate accounts of an incident	Pre	15.8%	22.2%	52.6%	44.4%	31.6%	22.2%	0.0%	7.4%	0.0%	3.7%
	Post	14.3%	3.7%	42.9%	51.9%	28.6%	33.3%	14.3%	11.1%	0.0%	0.0%

		Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
		Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC	Non-BWC	BWC
Assists in the prosecutor's casework	Pre	10.5%	18.5%	42.1%	37.0%	26.3%	40.7%	10.5%	3.7%	10.5%	0.0%
	Post	7.1%	3.7%	50.0%	14.8%	35.7%	63.0%	7.1%	14.8%	0.0%	3.7%
Helps investigate & resolve citizen complaints/lawsuits	Pre	10.5%	18.5%	52.6%	59.3%	26.3%	22.2%	10.5%	0.0%	0.0%	0.0%
	Post	7.1%	7.4%	35.7%	29.6%	50.0%	55.6%	7.1%	7.4%	0.0%	0.0%
Increases the likelihood of conviction of offenders	Pre	10.5%	18.5%	5.3%	25.9%	63.2%	37.0%	5.3%	18.5%	15.8%	0.0%
	Post	7.1%	3.7%	14.3%	25.9%	50.0%	55.6%	14.3%	14.8%	14.3%	0.0%
Increases likelihood of officers' behavior aligning w/agency rules & procedures	Pre	0.0%	11.1%	36.8%	40.7%	57.9%	40.7%	0.0%	7.4%	5.3%	0.0%
	Post	0.0%	0.0%	21.4%	28.6%	57.1%	53.6%	14.3%	14.3%	7.1%	3.6%
Increases likelihood of officers' behavior aligning w/ citizen preferences	Pre	5.3%	3.7%	10.5%	29.6%	63.2%	51.9%	15.8%	14.8%	5.3%	0.0%
	Post	0.0%	0.0%	7.1%	10.7%	64.3%	46.4%	14.3%	35.7%	14.3%	7.1%