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Understanding Body-Worn Camera Diffusion in U.S. Policing

Justin Nix
University of Nebraska at Omaha, jnix@unomaha.edu

Natalie Todak
University of Alabama, Birmingham

Brandon Tregle
University of Nebraska at Omaha

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Justin Nix
School of Criminology & Criminal Justice
University of Nebraska Omaha

Natalie Todak
Department of Criminal Justice
University of Alabama Birmingham

Brandon Tregle
School of Criminology & Criminal Justice
University of Nebraska Omaha

Abstract

By 2016, approximately one-half of American police agencies had adopted body-worn cameras (BWCs). Though a growing body of research has examined the impact of BWCs on outcomes such as use of force, complaints, and perceptions of police, few have considered how and why some agencies adopted BWCs, while others have not. With guidance from the diffusion of innovations paradigm, the current study explores variation in BWC adoption by police agencies. Drawing on a survey administered to a national probability sample of 665 municipal police executives in the spring of 2018, we found agency size, region, and the demographic composition of municipalities were associated with BWC usage. We then examined executives' support for (or opposition to) legislation that would require BWC footage to be released publicly. Results suggest (1) a variety of environmental factors were associated with support, and (2) the correlates of support varied across agencies of different sizes.

Keywords: body-worn cameras, innovation, technology, law enforcement, institutional theory

Introduction

American police agencies have faced enormous pressure to embrace and deploy body-worn cameras (BWCs) in recent years (President's Task Force on 21st Century Policing, 2015; White & Malm, 2020). This pressure stems from the belief that close-up footage of police-citizen encounters can shed light on whether officers' actions are constitutional and necessary, and enhance accountability when misconduct occurs (White, 2014a). Explaining the fervor for BWCs, Lum and colleagues (2019, p. 19) said there may be "a growing expectation among the public that adopting BWCs is a marker of a responsive, transparent, and legitimate police organization." BWCs are also supported by officers as they protect against frivolous complaints and disciplinary investigations, offer more realistic depictions of police work, and assure the courts and public when proper procedures are followed (Gaub et al., in press). To date, more than seventy unique studies have tested these claims (Lum et al., 2019). While the evidence is mixed, it suggests that in some contexts BWCs offer benefits for both police and citizens (Malm, 2019).

BWCs gained national attention following two pivotal events – Manhattan Federal District Court Judge Scheindlin's recommendation that the New York Police Department (NYPD) wear cameras to prevent racial profiling in 2013, and the fatal shooting of Michael Brown by a Ferguson (MO) police officer in 2014 (White & Malm, 2020). By 2014, between one quarter and one third of U.S. police agencies were using cameras on at least some of their patrol officers (Miller et al., 2014; Reaves, 2015). In 2015, the two largest manufacturers—TASER (now Axon) and VieVu—reported selling devices to 41% of U.S. departments (Mearian, 2015). Most recently, the Bureau of Justice Statistics found nearly one-half of agencies in 2016 – approximately 9,000 in total – had adopted the technology, including 80% of agencies

employing 500 or more officers (Hyland, 2018). Note these estimates are already four years old, so the number of agencies using BWCs may now be higher.

BWCs are part of an ongoing tradition in law enforcement to leverage advanced technologies to improve the distribution of police services, the effectiveness of crime control strategies, and the efficiency and fairness of case processing (see, e.g., Manning, 1996 on cellular phones; Weisburd et al., 2003 on CompStat; and White, 2014b on TASERs). Criminal justice scholars have pointed to Wejnert's (2002) diffusion of innovations framework as a useful tool for understanding why certain innovations – such as BWCs – take root, spread, and become normalized in criminal justice (Klinger, 2003; Morabito, 2010; Skogan & Hartnett, 2005; Weiss, 1997; White, 2014b; White & Malm, 2020). Wejnert (2002) identified three groups of factors – characteristics of the innovation (BWCs), the adopter (police agencies), and the larger environment (the served community) – which influence whether an innovation diffuses in a social system. In criminal justice, understanding this process can inform our broader understanding of how change occurs in the system, the specific social forces driving demands for new innovations and reforms, and the roles these innovations will play moving forward (Klinger, 2003). Thus far, BWC research has focused on the characteristics of the innovation (BWCs) and its impact on adopters and stakeholders (Lum et al., 2019). Few have tried to trace or explain the diffusion of the technology, or examine what agency and environmental factors are related to its adoption, usage, and support (see Nowacki & Willits, 2018; Smith, 2019 for exceptions). As such, our understanding of how and why BWCs have diffused in U.S. law enforcement is incomplete.

Guided by the diffusion of innovations paradigm, the current study explores variation in BWC usage at the agency level. Drawing on a survey administered to a national probability

sample of 665 municipal police chiefs in the spring of 2018, the paper first examines the relationship between BWC usage and agency size, as well as the geographic, political, and cultural conditions of the agency's environment (Wejnert, 2002). To assess how transparent respondents are willing to be with BWCs, we further explore whether these factors are related to support for legislation that would require releasing BWC video upon request as public information.

The Innovation – Body-Worn Cameras

Wejnert's (2002) summary of the diffusion of innovations literature identified three groups of factors affecting whether an innovation becomes established and spreads in a social system: characteristics of the innovation, the innovator, and the environment. With respect to the innovation, the anticipated benefits and consequences of adoption can affect diffusion. There may be both private and public consequences, reflecting the impact of the innovation on adopters and external stakeholders. Innovations tend to be viewed more favorably by stakeholders when potential benefits outweigh the risks and costs. Throughout police history, there are examples of innovations that have and have not taken root. For example, DNA evidence may only be used by police homicide detectives as a last resort, because the analysis process is expensive and onerous (Schroeder & White, 2009). COMPSTAT, on the other hand, diffused widely because it meshed well with the existing values and operations of policing (Crank & Langworthy, 1992; Weisburd et al., 2003).

BWC research has thus far focused on testing the consequences, costs, and benefits of the innovation (Lum et al., 2019). Police agencies began adopting BWCs in hopes they would enhance transparency, improve perceptions of police, civilize police-citizen encounters, offer evidentiary value, and provide opportunities for training (White, 2014a). Many studies show

BWCs can improve police working conditions by reducing citizen complaints (see, e.g., Ariel et al., 2015; Braga et al., 2017; Hedberg et al., 2017; Jennings et al., 2015), improving citizen perceptions of and interactions with police (Crow et al., 2017; Demir et al., online first; Sousa et al., 2018; White et al., 2017), and reducing court case processing time (Morrow et al., 2016; White, Todak, et al., 2018). Further, BWCs may reduce police-citizen violence in some contexts (Gaub & White, in press).

White and Malm (2020) argue BWC diffusion was facilitated by support from diverse groups of stakeholders who are normally at odds with each other: police leadership organizations, civil rights groups, police unions, and citizens. However, there are still concerns among stakeholders. The most significant is the immense cost of storing video footage which, for large agencies, can add up to millions of dollars per year (Bakst & Foley, 2015; Phillips, 2015). Agencies must also dedicate human resources to training, reviewing and redacting footage, auditing videos for officer behavior, technological support, and order maintenance (White & Malm, 2020). Yet, despite the up-front costs, BWCs have the potential to generate a net reduction in costs to an agency over time. Braga and colleagues (2017) calculated a savings of $4 million per year after the Las Vegas Metropolitan Police Department adopted BWCs, mostly due to the reduced time spent investigating citizen complaints.

Also using a diffusion of innovations framework, Todak and colleagues (2018) conducted focus groups and interviews with a range of stakeholders impacted by the adoption of BWCs in Spokane (WA) and Tempe (AZ). Stakeholders voiced reservations about BWCs based on their positions in the community. Victims' advocates, for example, were concerned with their clients' worst moments being preserved on BWC video, which could damage reputations and hurt future employment prospects. Prosecutors were overwhelmed with the amount of video evidence they

now had to process for each case. Similarly, some agencies are less enthusiastic about BWCs following high profile research studies that produced nonsignificant findings, raising questions about whether the financial costs are justified (Greenfieldboyce, 2017). For example, White and colleagues (2017) discovered few citizens (28%) who were recorded on a BWC were actually aware of it, raising questions about the hypothesized "civilizing effect," while Yokum and colleagues (2017) found no impact on police use of force in Washington, D.C.

This is by no means an exhaustive review of studies that have explored the real and/or perceived costs and benefits of BWCs (for that, see Lum et al. [2019]). Yet, it demonstrates that chief among concerns with the innovation are high costs and questions about effectiveness. Certainly, concerns about the innovation figure prominently when agencies consider adopting BWCs (Hyland, 2018), but the diffusion of innovations literature suggests characteristics of the adopter and external environment matter, too.

The Innovator – Police Agencies

With respect to the innovators, size matters, as "rates of adoption typically vary according to whether an entity is an individual, a small group, or a large conglomerate" (Klinger, 2003, p. 462). In policing, large agencies are more apt to adopt new innovations (Walker, 2008), and this has indeed been the case with BWCs (Hyland, 2018). One theory for this pattern is larger agencies simply have larger budgets and are able to cover the high costs of BWC implementation and video storage (Reaves, 2015). Countering this point, Nowacki and Willits (2018) found agencies with larger budgets were less likely to have BWCs. They speculated "the cost to test and implement BWCs is still prohibitively high for large agencies" (p. 848). High budget agencies may also be better insulated from external pressures to conform to public demands (Smith, 2019).

Another theory is larger agencies tend to be more familiar with adopting new strategies (Morabito, 2010; Roberts et al., 2012) and technologies (Darroch & Mazerolle, 2013; Willits & Nowacki, 2016), which could translate to less fear of uncertainties. Indeed, agencies that had adopted innovations in the past were more likely to be using BWCs in a recent study (Nowacki & Willits, 2018). Furthermore, large agencies hold positions of higher status in policing (White, 2014b). These high status actors tend to adopt innovations first, with lower status actors following suit (Weiss, 1997). Finally, because large cities can afford to pay their chiefs higher annual base salaries (Reaves, 2015), they may attract more qualified and experienced candidates. Outside candidates may be motivated to implement new reforms because doing so was an underlying factor in their hire, or they may have been selected for their reputation as an innovator (Borins, 2002). As a result, large agencies may be more likely to adopt BWCs in part due to the personal characteristics of their chiefs.

Nowacki and Willits (2018) also found police departments with collective bargaining were less likely to use BWCs, while agencies making greater use of technology in general and those operating more specialized units were more likely to have cameras. Noting that their study focused only on organizational measures, the authors called for future research examining the relationship between environmental factors and BWC adoption.

The Environment

Policing researchers have long recognized the importance of the environment in shaping the organization and functions of police agencies (Crank & Langworthy, 1992; Katz, 2001; Klinger, 2004; Reiss & Bordua, 1967). These factors may also shape agencies' decisions to implement new innovations, including BWCs (see also Smith, 2019's application of institutional

theory to this issue). Among the environmental factors identified by Wejnert (2002) that shape the diffusion of innovations are *geography*, *political conditions*, and *culture*.

Geography

Relevant geographical features include an agency's size and physical location. As noted, the largest agencies serving the most populous cities (e.g., Los Angeles, New York, Washington, D.C.) tend to hold high status positions in the field and are more likely to seek out new innovations (Weiss, 1997; White, 2014b). Less populated jurisdictions – particularly those in rural areas – often cover larger physical spaces with fewer officers per capita. Because these agencies have unique responsibilities, priorities, and challenges, they may feel less pressure from their communities to explore new innovations like BWCs (Gaub et al., 2017).

U.S. regions also tend to reflect different patterns in political culture, attitudes, and beliefs, which can in turn influence local legislation. Agencies in the Western U.S., for example, operate under more liberal laws surrounding police use of BWCs and the public release of information. If police agencies view their state's laws as overly lenient or open – providing unrestrained public access to BWC video footage – they may be less willing to adopt the technology (Gaub et al., in press). Alternatively, White and Malm (2020, pp. 94–95) argued "the west and southwest tend to be more progressive in terms of city and political governance, compared to the more traditional northeastern and southern regions of the country." Agencies located in these more traditional regions may be less likely to seek out state-of-the-art innovations in policing, instead preferring the status quo.

Political Conditions

Institutional theory suggests organizations like police departments cultivate and maintain their legitimacy in the eyes of the public through the "incorporation of powerful myths into

[their] structure and activities" (Crank & Langworthy, 1992, p. 338; see also Meyer & Rowan, 1977). In other words, agencies often do what they believe is expected of them by various institutional sovereigns, including professional organizations, elected officials, the media, and community groups, to name just a few (Donaldson, 1995; Mastrofski & Uchida, 1993; Matusiak et al., 2017; Wilson, 1968). Each of these entities can exert pressure on police departments to adopt new innovations or engage in greater transparency (Smith, 2019). In the case of BWCs, it is possible that perceptions of (non)support from elected officials and/or courtroom personnel would factor into the decision to adopt. For example, police executives who do not feel supported by their institutional sovereigns might be drawn to the potential evidentiary value of BWC footage, which documents officer behaviors during official encounters, and can often aid in the investigation of citizen complaints (e.g., Ariel et al., 2015; Jennings et al., 2015; White, Gaub, et al., 2018). Accordingly, research is needed that can shed light on whether perceived support from various institutional sovereigns is associated with a police department's adoption of BWCs or how transparent they are willing to be with the resulting footage.

Research also suggests conservatives are more supportive of the police (Brown, 2017; Silver & Pickett, 2015) and police use of surplus military equipment such as computers and surveillance tools (Moule et al., 2019). In December 2014 (just four months after the Michael Brown shooting), the Pew Research Center surveyed a random sample of 1,507 U.S. adults and found that 14% of Republican respondents believed putting more BWCs on police officers would be a bad idea, versus only 8% of Democratic respondents (Doherty et al., 2014). Thus, in predominantly conservative- or Republican-leaning jurisdictions, we might expect to see less demand for BWCs, since they are frequently touted as an accountability tool for monitoring law enforcement. However, Crow et al. (2017) found a positive relationship between satisfaction

with police performance and perceived benefits of using BWCs among citizens in two Florida counties, and theorized that "community members who believe the police are doing a good job and treating people fairly are more likely to support BWCs, not as a mechanism to correct bad police behavior, but as a tool to combat negative views of the police" (p. 605). While they did not control for respondents' political ideology or party identification, their reasoning suggests conservatives may be more supportive of BWCs than the more left-leaning members of the public. We thus anticipate that the political ideology of an agency's community is relevant to their decision to adopt (or not adopt) BWCs.

Culture

With respect to the culture of an agency's external environment, at least three factors may be relevant to the diffusion of BWCs: racial composition, officer-involved shooting rates, and violent crime rates. The police have historically enjoyed lower levels of support from the Black and Hispanic communities (Decker, 1981; Pew Research Center, 2016; Walker, 1977; Weitzer & Tuch, 2005), who express greater concern about police misconduct (Weitzer & Tuch, 2004), and discriminatory tactics (Tyler & Wakslak, 2004). In their national survey of 599 U.S. residents, Sousa et al. (2018) found Black respondents were significantly more likely than White respondents to support policies requiring police officers to wear BWCs. Similarly, an evaluation study in Prince George's County, MD found that Black and Latino citizens had more positive atttiudes toward BWCs than White citizens (Ray et al., 2017). In light of such findings, agencies serving cities where a larger share of the population is Black or Hispanic/Latino might sense more pressure from their communities to adopt BWCs (Graham et al., 2019).

Relatedly, police agencies operating in environments that experience higher rates of deadly force may perceive a greater need for BWCs to capture these critical incidents on camera.

White and Malm (2020, pp. 95–96) argued "police killings of mostly minority citizens continued to draw national-level attention [between 2014 and 2019]…and interest in police BWCs was shaped by this crisis in police-community relations." Concurrently, there is accumulating evidence that police shootings can have "spillover" effects on communities (Alang et al., 2017; Galovski et al., 2016; Yimgang et al., 2017). It is feasible that one such spillover effect is pressure for nearby agencies to adopt BWCs. For example, other agencies in Missouri might have been more inclined to adopt BWCs in the aftermath of Michael Brown's shooting in Ferguson. Similarly, agencies operating in states with higher rates of officer-involved shootings might face more pressure to adopt BWCs than those in states with lower rates.

Finally, BWCs have been touted as a tool for furthering criminal cases due to the available video evidence (White, 2014a). A few studies have concluded that cases involving BWC video are more successful and likely to result in convictions (Ellis et al., 2015; Goodall, 2007; Morrow et al., 2016; ODS Consulting, 2011; Owens et al., 2014), though Lum and colleagues (2019) cautioned that many employed weak methodological designs. No research has examined how BWCs affect investigations into officer actions, because they are primarily being used to prosecute citizens (Merola et al., 2016). Nevertheless, given perceptions that BWCs may be useful for reducing crime and prosecuting cases, agencies serving cities with high crime rates may be more likely to adopt the technology. Further, residents of these cities may be more concerned about the crime problem and vocal about the need for BWCs (Crow et al., 2017).

Current Study

The purpose of the current study was threefold. First, we aimed to generate a national estimate of the percentage of municipal agencies currently using BWCs, as an update to the 2016 iteration of the LEMAS survey (Hyland, 2018). Second, we sought a better understanding of the

factors associated with the adoption of BWCs. Based on our review of the literature, we expect characteristics of the innovators (e.g., agency size) and the environment (i.e., geography, political climate, culture) are relevant. Finally, we explored variation in police executives' commitment to transparency with BWC footage – again considering characteristics of the innovators and the environment. If executives are hesitant to release BWC footage to the public—for any number of reasons—this may erode their legitimacy in the eyes of the public (Sousa et al., 2018; Tyler, 1990, 2004). As such, it is imperative to understand the external factors that increase or decrease executives' willingness to release BWC footage. Before presenting our analyses and results, we now turn to a discussion of our data and methodology.

Data and Methods

Our data were obtained as part of a larger study of police-community relations that entailed surveying a national probability sample of municipal police chiefs in 2018. Using the National Directory of Law Enforcement Administrators (NDLEA), we obtained the mailing addresses of 12,039 municipal police departments and the names of their current chiefs. We placed each of these departments into one of four strata based on the number of sworn officers in their agency: 0 to 24, 25 to 49, 50 to 99, and 100 or more.[1] We then drew a random sample of 624 agencies from each stratum, resulting in a stratified random sample of 2,496 departments. Given the decline in response rates to police surveys over the last 10 years—especially among those not administered in person—we anticipated a modest at best response rate (Nix, Pickett, Baek, & Alpert, 2019). Thus, sampling 624 agencies from each stratum increased our likelihood of having adequate power to detect small to medium sized effects. We also oversampled large agencies, which are fewer in number than small agencies, but responsible for the bulk of police-

[1] The Bureau of Justice Statistics similarly stratifies by agency size for its *Law Enforcement Management and Administrative Statistics* (LEMAS) survey (see also Strom & Hickman, 2010).

citizen interactions each year. For four weeks beginning in February, we mailed pre-notification postcards, surveys, and follow-up surveys to the chief of each department (Dillman et al., 2009). We received 675 completed surveys by the time data collection ended in mid-April, resulting in an overall response rate of 27 percent. We removed ten surveys: one from a sheriff's department, one from a village department that contracts with a state police force, and eight that failed to provide enough information for us to determine the stratum from which they were sampled. This resulted in a final sample of N=665. Response rates varied slightly across each of our four strata (see Table 1).

[Table 1 here]

Dependent Variables

We considered two outcomes in this study. The first was whether agencies had adopted our innovation of interest, BWCs, at the time of the survey (1=yes, 0=no). The number of agencies in each stratum that indicated they were currently *using BWCs* is presented in Table 2, along with projected national estimates we generated based on our findings. Consistent with existing evidence (Hyland, 2018), respondents from agencies with 100 or more full-time sworn officers were more likely to indicate their agencies used BWCs than respondents from agencies in the other three strata (64% v. 47%, respectively; $t = -3.90$, $p < .001$).

[Table 2 here]

Our second outcome, *support releasing BWC footage*, was a measure of how transparent agencies reported they were willing to be with BWC footage. We asked respondents to indicate the extent they would "support or oppose a law that requires agencies to release body-worn camera footage upon request as public information" (1=strongly support to 5=strongly oppose;

reverse coded prior to analysis). Descriptive statistics for the dependent variables and all other variables included in the analyses are presented in Table 3.

[Table 3 here]

Independent Variables

Based on our review of the diffusion of innovations literature (Klinger, 2003; Wejnert, 2002; White, 2014b; White & Malm, 2020), we identified several geographic, political, and cultural characterstics of each responding agency's environment to model as covariates, which may shape an agency's decision to adopt BWCs.

Geography. Agencies serving more populous cities respond to a greater number of incidents on a daily basis (National Incident-Based Reporting System, 2016), resulting in more police-citizen interactions. The perceived need to record police-citizen interactions may be greater for these agencies and communities. To estimate the size of the served community, we calculated each city's three-year average *population* from 2014 to 2016 using the Uniform Crime Report (UCR).[2] Natural log transformations were used because this variable was highly skewed. We also measured region of the United States with three dummy variables: *South, Midwest,* and *West* (using Northeast as the reference category).[3]

Politics. First, consistent with police research on institutional theory (Donaldson, 1995; Mastrofski & Uchida, 1993; Matusiak et al., 2017; J. J. Smith, 2019; Wilson, 1968), respondents were asked to indicate how often (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always) they felt they had the support of four institutional sovereigns: the mayor, city council, the courts, and local prosecutors. Responses were averaged to generate a mean scale that indicated

[2] We averaged across three years to ensure fewer cases were listwise deleted for not reporting to the UCR in 2016. Population was measured using the UCR to ensure it was consistent with the manner in which we measured violent crime.
[3] Regions were defined as they are in the UCR.

acceptable internal reliability ($\alpha = .72$), with higher scores reflecting greater perceived *support from institutional sovereigns*. Second, to test our hypothesis that political conservatism would be related to our dependent variables, we acquired the percentage of each county that voted for Donald Trump in 2016 (Liep, 2018).[4] *Percent Trump Voters* is a continuous variable that ranged from a minimum of 12.95% to a maximum of 89.34%.

Culture. We used several measures to capture environmental culture. First, we measured each city's racial/ethnic composition with two continuous variables—*percent Black* and *percent Hispanic*—which we obtained from the American Community Survey's 2016 5-year estimates. These variables were highly skewed, so we used natural log transformations in our regression models. Second, using *The Washington Post's* "Fatal Force" database, we calculated the average *state OIS rate* associated with each jurisdiction in our sample. That is, for each year from 2015 to 2017, we divided each state's total number of officer-involved shootings (OIS) by its population and multiplied by 1 million to generate three yearly rates. We then summed the rates and divided by three to generate three-year average rates. Finally, we calculated each city's three-year average *violent crime rate* (i.e., number of violent crimes divided by population and multiplied by 100,000) from 2014 through 2016 from the UCR. Again, this variable was highly skewed, so we used natural log transformations in our regression models.

Analytic Strategy

We analyzed each of our four strata (i.e., agency size) separately for two reasons. First, doing so is more straightforward than combining them, which would require a post-stratification weighting procedure because we oversampled larger departments. More important, simply

[4] We acknowledge this is an imperfect proxy for each city's level of political conservatism. Unfortunately, this is as close as we could get to city-level election results (see https://uselectionatlas.org/BOTTOM/store_data.php). Future research should continue to explore the relationship between community conservatism/liberalism and the diffusion of innovations in policing with more precise measures of the former.

controlling for agency size could mask meaningful *within-stratum* relationships between our covariates and the outcomes. Large agencies are more influential and more likely to be innovators in the police profession (Hyland, 2018; Smith, 2019; White, 2014b). They are also likely to be more familiar with incorporating cutting-edge technologies, given their larger budgets. It should come as no surprise, then, that large agencies in our sample were more likely to be using BWCs at the time of our survey than smaller agencies (see Table 2). Yet, the environmental forces that drove them to adopt BWCs might differ substantially from those that may have compelled small agencies to adopt. Analyzing the strata separately allows us to account for this possibility in a more straightforward fashion.

We estimated logistic regression equations to predict our first outcome, *using BWCs*, as it was a dichotomous variable. Our second outcome, *support releasing BWC footage*, was measured on a five-point ordinal scale. Accordingly, we estimated ordered logistic regression equations to model this outcome variable. For all models, we used robust standard errors clustered by county to relax the assumption of independence of observations, since agencies were nested within 380 counties. Analyses were performed using Stata version 15.1.

Results

Table 4 presents the results of four logistic regression models predicting BWC usage across each strata. Due to listwise deletion of item-missing data, the N for each model ranges from 113 to 157. The most consistent finding that emerged was that across all four strata, southern agencies were significantly more likely than northeastern agencies to be currently using BWCs. In the two largest strata, western agencies were also significantly more likely than northeastern agencies to be using BWCs. *Percent Black* was statistically significant (at $p < .10$) in all four models, but the direction of the coefficient varied. In jurisdictions with 24 or fewer

officers (Model 1), *percent Black* was inversely associated with BWC usage (b = -.502, p = .067, odds ratio = .605). In the three larger strata (Models 2 – 4), *percent Black* was positively associated with BWC usage (odds ratios ranged from 1.533 to 1.728).

Table 5 displays the results of four ordered logistic regression models predicting support for legislation that would require the release of BWC footage on request as public information across each strata. In these models, we also controlled for whether the agency reported using BWCs, as their increased familiarity with the technology might affect their support for such legislation. Here, the findings were much more nuanced, so we will discuss each stratum in turn. In the 0-24 stratum, state OIS rate was positively and significantly related to support for legislation that would require release of BWC footage upon request as public information (b = .366, $p < .05$, odds ratio = 1.442). Thus, among the smallest agencies, a higher state-level rate of OIS is associated with greater support for transparency. Percent Trump voters was significantly inversely related to support for releasing BWC footage. The relationship was rather weak (b = -.032, $p < .05$, odds ratio = .970), but suggests that among the smallest agencies, as county political conservatism increases, support for such legislation diminishes, net of the other factors we controlled. In the 25-49 stratum, state OIS rate was also significantly associated with support for releasing BWC footage, but the effect ran in the opposite direction (b = -.464, $p < .01$, odds ratio = .649). Among agencies of this size, higher state-level OIS rates are associated with opposition to legislation mandating release of BWC footage upon public information request. Percent Hispanic was also significantly and inversely related to the outcome (b = -.329, p = .086, odds ratio = .719), suggesting that among agencies of this size, as the relative size of the Hispanic population increases, agencies tend to be less supportive of such legislation. Finally,

perceived support from sovereigns was significantly and positively associated with the outcome (b = .572, p = .084, odds ratio = 1.772).

Turning attention to the third model of Table 5, we found that in the 50-99 stratum, state OIS rate was significantly and inversely associated with support for releasing BWC footage (b = -.489, $p < .05$, odds ratio = .584). Among agencies of this size, higher state-level OIS rates are associated with decreased support legislation mandating public release of BWC footage. Perceived support from sovereigns was significantly and positively associated with support for such legisliation (b = 1.111, $p < .01$, odds ratio = 3.037). In this model, we also uncovered significant regional variation in our outcome. Southern agencies (b = 1.894, $p < .01$, odds ratio = 6.649) agencies were significantly more supportive of such legislation than their similarly sized northeastern counterparts. Finally, the likelihood ratio chi-squared test for our fourth model (100+ stratum) was statistically nonsignificant (LR χ^2 = 10.394, p = .49), indicating that the inclusion of our covariates provided no greater explanatory power than would a constant-only model. Thus, the covariates do a poor job predicting variation in support for legislation requiring public release of BWC footage among the largest agencies.

Discussion

Approximately half of all municipal police departments are now using BWCs, with a greater share of large agencies using them compared to smaller agencies (see also Hyland, 2018). The literature on BWCs has focused on whether they affect attitudes and behaviors of officers and citizens (Lum et al., 2019). Yet, with a few exceptions (Nowacki & Willits, 2018; Smith, 2019), we lack evidence as to what drives agencies to adopt the technology, while others opt out, in light of mounting evidence of their benefits and cost effectiveness. Applying Wejnert's (2002)

diffusion of innovations framework, we examined whether environmental factors were related to the adoption of BWCs by municipal police departments.

Regional variation in the adoption of BWCs was most evident, with southern agencies in our sample significantly more likely than northeastern agencies to have BWCs across all four strata. In the two largest strata, western agencies were also more likely to be using BWCs. It is possible that such regional effects are a function of the pervasiveness of police unions in the northeastern United States, and the lack of unionization in the south (Walker, 2008). Though contemporary research on police unions is nonexistent, Walker (2008, p. 96) noted "virtually all of the published items that express an opinion on the impact of police unions regard them as having a negative effect, particularly on innovation, accountability, and police–community relations." This may well be the case with BWCs, as Nowacki and Willits (2018) found agencies with collective bargaining were less likely to have cameras. Anecdotally, police unions have fought against the implementation of BWCs in some agencies. In Boston, for example, the police union filed an injunction to stop the department from requiring its officers to wear cameras (Levenson & Allen, 2016). Walker (2008) also points out, however, that most innovation in policing occurs within large police departments, which are also more likely to be unionized:

> We can assume, therefore, that some departments have been able to manage innovation better than others…An important but as yet unanswered question is the extent to which successful innovation is the result of different management strategies for relating to the local union and the terms of the collective bargaining contract (p. 101).

Unfortunately, our data only allow us to speculate on what the observed regional variation means with respect to the diffusion of BWCs. To better understand these findings, we recommend future research look closer at how regional, state-level, and agency-level factors shape this diffusion. In particular, research examining how police unions negotiate with

departments considering the adoption of BWCs, and how the presence of unions impacts the adoption of innovations in policing more generally, would be beneficial. This work may shed light on how some agencies, as Walker (2008) described, work along with the union to progress. At the state level, moreover, some states may have taken steps to encourage the diffusion of BWCs through legislation. This may be the case in areas where there have been controversial in-custody deaths that generated national attention, compelling states to show they are taking action towards police reform. For example, after a North Charleston police officer was recorded fatally shooting Walter Scott in the back as he fled in 2015, then-South Carolina Governor Nikki Haley signed a bill into law that purportedly required all police departments in the state to outfit officers with BWCs.[5] Future research should look to understand how state-level legislation has impacted the adoption and spread of BWCs.

We also found that BWC usage was correlated with the racial composition of an area. Percent Black was significant at the $p < .10$ level in every model, though the findings are not straightforward. In the smallest stratum the coefficient was negative, while in the larger three it was positive. The seemingly contradictory findings suggest that the racial makeup of cities on its own does not tell the whole story, but plays a role in the diffusion of BWCs. It may be that smaller agencies serving areas with higher concentrations of minorities simply do not have the resources to implement BWC programs, or do not prioritize spending on law enforcement and crime control expenditures. In larger police agencies, on the other hand, a higher representation

[5] An anonymous reviewer suggested that we remove respondents from South Carolina (SC) or any other state with laws requiring agencies to use BWCs from our analysis. There were 9 respondents from SC and they all indicated that their agency was using BWCs at the time of our survey. Other states, including California, Connecticut, Florida, and Nevada require some – but not all – agencies to use BWCs. We re-estimated each of the models presented in Tables 4 and 5 with SC respondents excluded. Results were substantively similar, with two minor exceptions. In Model 3 of Table 4, the *p*-value for %Black shifted from .097 to .127, and in Model 2 of Table 5, the *p*-value for %Hispanic shifted from .086 to .140. However, due to a loophole in SC's law (House Bill 47, 2015) which only required agencies to adopt BWCs *if* they were able to secure external funding, we opted to retain our original models. Full results of this supplemental analysis are available on request.

of minority community members, combined with public unrest surrounding police use of force, may leave high-profile police departments with no choice but to implement BWCs.

Given tremendous state-to-state variation in laws governing BWC data and public records requests, the second goal of our study was to examine executives' attitudes concerning the release of BWC footage.[6] Though there may be justifiable reasons to delay the release of footage (e.g., victims' identities and investigation integrity need to be protected), agencies risk eroding community trust when they do so (Lum et al., 2019). For example, after an officer fatally shot Keith Lamont Scott in 2016, Charlotte-Mecklenburg Police Chief Putney did not release footage for four days, until finally succumbing to pressure from local politicians and violent protests that resulted in 45 arrests, over 30 injuries, and one civilian death (Fausset et al., 2016; MacMillan & Blake, 2016). Prominent activists, including Deray McKesson of Black Lives Matter, expressed outrage at Chief Putney on social media, tweeting "no justice, no peace" to approximately 1 million followers.[7] Similar stories have cropped up across the country. Clearly the release of video footage is fundamental to being viewed as transparent by the community. If agencies decline to release videos to the community, particularly after critical incidents, the decision to adopt a BWC program may seem fruitless to members of the public and even fuel further suspicion and criticism of the police. Accordingly, our study also examined whether environmental factors were related to police executives' support for legislation requiring the public release of BWC video.

Our analysis produced different and sometimes conflicting results depending on agency size. For example, in the smallest agencies, state-level OIS rate was positively associated with

[6] Twenty-three states and the District of Columbia have passed open record laws pertaining to BWCs. Many states have built-in exemptions. See http://www.ncsl.org/research/civil-and-criminal-justice/body-worn-cameras-interactive-graphic.aspx#/.
[7] See https://twitter.com/deray/status/779789725016084482.

support for legislation, while percent Trump voters was negatively associated. In the middle two strata, state-level OIS rate was negatively associated with support. Also in the middle two strata, executives who felt supported by the mayor, city council, courts, and prosecutors were more supportive of such legislation. By and large, racial composition was not related to support for legislation, with the exception of percent Hispanic in the second stratum (25 to 49 officers). Among these agencies, as the Hispanic share of the population increased, executive support for BWC legislation declined.

Police executives may experience dramatically different pressures and hold different perspectives regarding the implications for releasing video footage, depending on the size and status of their agency. Larger agencies may be under greater scrutiny from their community and at the national level, and thus more familiar with social pressures to be transparent (Regoli et al., 1989). Larger agencies also deal with different crime problems and responsibilities, which could affect their attitudes towards publicly releasing videos. On the other hand, it may be that variables not captured in our analysis are better predictors, as suggested by our low model R-squared values. For example, our survey did not include measures of community trust or legitimacy. Agencies may be more inclined to adopt BWCs when legitimacy is low (Smith, 2019), and more inclined to release BWC videos to the public if legitimacy is high. The nature of legislation already in place may also play a role. Agencies that have been required by state law to publicly release videos for some time may be more comfortable doing so if releasing videos has not had a demonstrably negative effect. Broadly, future research should continue to investigate public and police attitudes toward the release of BWC footage to the public and search for an optimal policy that takes all competing stakeholder concerns into account.

Our findings also underscore the need for more research on small police departments, which comprise the vast majority of agencies in the US. Researchers are heavily incentivized to study large police agencies so as to ensure larger sample sizes and, ultimately, increase the likelihood of publishing the results. However, our findings suggest that the diffusion of innovations may play out differently depending on agency size. Namely, the sign for %Black flipped from the first the second model of Table 4, as did the sign for State OIS Rate from the first to the second model of Table 5. In the smallest agencies, then, these variables are relevant just as elsewhere. However, theUntil the field begins to study a more diverse set of organizations, our knowledge of policing will be limited to what occurs in large, urban departments.

Limitations

Our study has several limitations. First, we only surveyed municipal police departments, and therefore cannot speak to BWC adoption by other types of law enforcement agencies, such as sheriff's offices. Relatedly, our measure of political conservatism was the percentage of the county that voted for Trump in the 2016 presidential election, and OIS rate was measured at the state level. While these do not perfectly capture the levels of conservatism or police violence in each specific municipality, we felt it necessary to include them as controls rather than omit them. Second, because these data were collected as part of a larger project, we were unable to include several relevant questions in the interest of space on the survey. For example, we simply asked respondents whether their agency uses BWCs – we did not follow up with questions about when they began using them, the extent they are using them (e.g., partial or full deployment), whether specialty units wear them, or what policies they have in place governing their use. Furthermore, we did not ask questions about the department's annual budget, availability of external funding

for BWCs, or collective bargaining agreements. Future studies should include measures such as these.

Similarly, with respect to our second outcome, we only asked individuals if they would support legislation pertaining to the public release of video – we have no objective measures of whether and when videos are in fact released. In the same respect, because our legislative support outcome was attitudinal, respondents' answers may not have been reflective of their agency as a whole. That said, approximately three-fourths of our respondents were police chiefs, and the vast majority of those who were not still held high ranking positions (e.g., deputy chiefs, commanders, majors). It is precisely these high ranking officers who would be in a position to decide (or weigh in on) whether BWC footage should be released publicly.

A third limitation of our study is the relatively small number of agencies surveyed within each stratum, which reduced the power of our statistical models. Future studies with larger samples can elucidate the generalizability and stability of our results. Finally, our survey achieved a 27% response rate. However, unless BWC usage was strongly correlated with propensity to respond to our survey, it is unlikely that our findings suffer from nonresponse bias (Nix et al., 2019; Pickett et al., 2018). We have no reason to believe it would be – recall that results reported in Table 2 closely resemble those reported by the Bureau of Justice Statistics as of 2016 (Hyland, 2018; see also supplemental appendices in Nix et al., 2020). As such, we believe the estimates derived from our sample are reliable.

Conclusion

Partially supporting Wejnert's (2002) diffusion of innovations framework, we find region and, to a lesser extent, the racial composition of cities are each important for the diffusion of BWCs across municipal police departments. The picture surrounding support for video release is

much less clear. The issue of video release should be a focus of conversation and future research moving forward, as the failure to release a controversial BWC video could worsen police-community relationships rather than improve them. Police unions may also play a key role in diffusion of innovations in policing – particularly BWCs and the handling of controversial footage (Nowacki & Willits, 2018). Future research should continue to investigate.

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Table 1. Response rates across strata.

Stratum	N	Response Rate
0 to 24 sworn	149	23.9%
25 to 49 sworn	172	27.6%
50 to 99 sworn	168	26.9%
100+ sworn	176	28.2%

Table 2. Prevalence estimates of BWC usage in municipal police departments as of 2018, by agency size.

	Sampled Agencies that Answered the BWC Question			Population of Municipal Agencies		
Agency Size	N	Using BWCs	Percent	N	Estimated N Using BWCs	[95% CI]
0 to 24	145	67	46.2%	8,940	4,131	[3,405 – 4,856]
25 to 49	162	72	44.4%	1,611	716	[593 – 839]
50 to 99	160	79	49.4%	834	412	[347 – 477]
100+	167	107	64.1%	654	419	[371 – 466]
Total	634	325	47.1%*	12,039	5,678	[4,717 – 6,639]

* Percentage is weighted to account for stratification procedure, which oversampled large departments.

Table 3. Descriptive statistics for variables included in multivariate analyses.

Variable	Mean	Std. Dev.	Min	Max
0 – 24 Sworn (N = 113)				
Currently Using BWCs	.447	—	0	1
Support for BWC legislation	2.596	1.217	1	5
Avg. Population [a]	5,327	4,862	348	27,066
Northeast	.316	—	0	1
South	.202	—	0	1
Midwest	.307	—	0	1
West	.175	—	0	1
Support from Sovereigns	4.017	.605	1.750	5
% Trump Voters	56.501	15.381	8.405	89.335
% Black [a]	5.122	11.398	0	69.339
% Hispanic [a]	10.182	15.641	0	93.663
Avg. State OIS Rate	2.857	1.721	.874	9.911
Avg. Violent Crime Rate [a]	222.736	255.519	0	1,780.498
25 – 49 Sworn (N = 140)				
Currently Using BWCs	.489	—	0	1
Support for BWC legislation	2.589	1.190	1	5
Avg. Population	19,034	8,609	3,047	46,976
Northeast	.220	—	0	1
South	.255	—	0	1
Midwest	.362	—	0	1
West	.163	—	0	1
Support from Sovereigns	4.035	.548	2.500	5
% Trump Voters	47.345	16.078	13.513	85.677
% Black [a]	12.843	19.492	0	94.321
% Hispanic [a]	13.673	18.799	0	91.564
Avg. State OIS Rate	2.792	1.429	.874	8.558
Avg. Violent Crime Rate [a]	308.300	296.840	21.919	2,193.467
50 – 99 Sworn (N = 145)				
Currently Using BWCs	.469	—	0	1
Support for BWC legislation	2.676	1.172	1	5
Avg. Population [a]	39,687	17,029	4,227	110,283
Northeast	.186	—	0	1
South	.359	—	0	1
Midwest	.276	—	0	1
West	.179	—	0	1
Support from Sovereigns	4.052	.503	2.750	5
% Trump Voters	47.406	16.502	8.405	81.794
% Black [a]	11.753	14.619	0	71.259
% Hispanic [a]	12.948	13.869	.544	75.550
Avg. State OIS Rate	2.850	1.466	.874	9.911
Avg. Violent Crime Rate [a]	340.486	332.555	30.622	2,802.152
100+ Sworn (N = 157)				
Currently Using BWCs	.643	—	0	1
Support for BWC legislation	2.790	1.193	1	5
Avg. Population [a]	180,485	219,819	33,345	1,561,737
Northeast	.134	—	0	1
South	.388	—	0	1
Midwest	.210	—	0	1
West	.268	—	0	1
Support from Sovereigns	3.990	.598	2.250	5
% Trump Voters	43.389	12.951	9.225	74.019
% Black [a]	15.220	16.594	.654	77.707
% Hispanic [a]	18.495	17.122	.473	81.820
Avg. State OIS Rate	3.160	1.568	.874	9.911
Avg. Violent Crime Rate [a]	465.702	347.897	6.531	1,708.384

[a] Natural log transformation used in regression models to reduce skewness.

Table 4. Logistic regression models predicting whether agency is currently using BWCs.

	0 – 24 Sworn			25 – 49 Sworn			50 – 99 Sworn			100+ Sworn		
Variable	b	SE	OR	b	SE	OR	b	SE	OR	b	SE	OR
Avg. Population	.276	.261	1.318	.228	.459	1.256	.725	.614	2.064	-.235	.309	.791
Northeast (ref.)	—			—			—			—		
South	2.827**	.987	16.889	1.977*	.887	7.224	2.688***	.797	14.710	1.914**	.746	6.778
Midwest	.252	.602	1.286	.076	.615	1.079	.750	.690	2.116	.999	.702	2.714
West	.198	.928	1.220	1.018	1.073	2.769	2.290*	.973	9.875	2.337*	.998	10.346
Support from Sovereigns	.148	.464	1.160	-.391	.426	.676	-.539	.446	.853	-.491	.350	.612
% Trump Voters	-.014	.017	.986	.021	.016	1.021	.023	.016	1.023	.006	.018	1.006
% Black	-.502^	.274	.605	.427^	.245	1.533	.456^	.275	1.578	.547^	.321	1.728
% Hispanic	-.031	.246	.970	-.151	.233	.860	.125	.260	1.133	-.054	.249	.947
Avg. State OIS Rate	.259	.193	1.296	.190	.221	1.209	-.200	.196	.818	.020	.171	1.020
Avg. Violent Crime Rate	-.027	.151	.974	.080	.300	1.084	-.058	.305	.944	.128	.262	1.137
Intercept	-3.007	2.929	—	-3.730	5.614	—	-8.596	7.153	—	1.646	3.923	—
N		113			140			145			157	
Likelihood χ^2		18.112^			33.771***			26.180**			22.027*	
Pseudo R^2		.169			.212			.206			.133	

NOTE: Entries are unstandardized regression coefficients (b), standard errors clustered by county (SE), and odds ratios (OR). Note that some of the odds ratios are unstable due to the small number of respondents in certain categories (e.g., agencies with 0-24 officers in the Northeast). They should be interpreted with caution.
^ p < .10; * p < .05; ** p < .01; *** p < .001

Table 5. Ordered logistic regression models predicting support for legislation that would require release of BWC footage upon public request.

	0 – 24 Sworn			25 – 49 Sworn			50 – 99 Sworn			100+ Sworn		
Variable	b	SE	OR	b	SE	OR	b	SE	OR	b	SE	OR
Currently Using BWCs	.405	.978	1.499	.393	.365	1.482	.452	.343	1.572	.346	.348	1.413
Avg. Population	-.278	.220	.757	-.569	.393	.566	.154	.571	1.167	.036	.226	1.037
Northeast (reference)	—			—			—			—		
South	-.247	.866	.781	-.291	.685	.748	1.894**	.700	6.649	.053	.722	1.055
Midwest	-.215	.524	.807	-.502	.439	.606	-.029	.538	.972	-.401	.719	.670
West	-.207	.716	.813	.769	.813	2.157	1.538	1.157	4.657	-.586	1.006	.557
Support from Sovereigns	.433	.368	1.541	.572^	.331	1.772	1.111**	.413	3.037	.162	.327	1.175
% Trump Voters	-.032*	.015	.969	.011	.011	1.011	-.009	.013	.991	-.026^	.016	.974
% Black	.186	.183	1.204	.211	.189	1.235	-.200	.198	.818	-.067	.281	.935
% Hispanic	.196	.184	1.216	-.329^	.192	.719	-.341	.249	.711	-.241	.243	.786
Avg. State OIS Rate	.366*	.170	1.442	-.464**	.165	.629	-.489*	.243	.613	-.029	.143	.972
Avg. Violent Crime Rate	-.085	.175	.919	.181	.173	1.198	-.256	.273	.774	.222	.227	1.248
N		113			140			145			157	
Likelihood χ^2		35.717***			22.407*			29.636**			10.394	
Pseudo R^2		.074			.051			.083			.022	

NOTE: Entries are unstandardized regression coefficients (b), standard errors clustered by county (SE), and odds ratios (OR). Note that some of the odds ratios are unstable due to the small number of respondents in certain categories (e.g., agencies with 0-24 officers in the Northeast). They should be interpreted with caution.
^ $p < .10$; * $p < .05$; ** $p < .01$