

POLICY ESSAY**RESEARCH ON BODY-WORN CAMERAS****Promise of police body-worn cameras***

Aili Malm

California State University, Long Beach

Correspondence

Aili Malm, School of Criminology, Criminal Justice and Emergency Management, California State University, Long Beach, 1250 Bellflower Blvd., Long Beach, CA 90803.

Email: Aili.Malm@csulb.edu

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As Cynthia Lum, Megan Stoltz, Christopher Koper, and Amber Scherer (2019, this issue) point out, the amount of research on police body-worn cameras (BWCs) has dramatically increased in the last 5 years. This upsurge culminated in the President's Task Force on 21st Century Policing's (2015) focus on BWCs and increased funding for research. And although politics and money definitely played a role, another factor driving the increase in the number of studies was the air of skepticism surrounding the technology. Critics warned that any benefit of BWCs might be outweighed by costs, such as loss of privacy, excessive financial burden, tension between officers and management, and reduced police activity. This tone of caution continues to pervade police and academic discussions of BWCs.

The rush of research opportunities has run counter to traditional academic caution. This caution originates in scientific skepticism, where claims lacking sufficient empirical evidence are subject to rigorous scrutiny, tested, and re-tested using the scientific method. This is not a bad thing—scientific skepticism has fueled progress and debate, and it has led to groundbreaking discoveries throughout history. Even the most ardent promoters of the scientific method, however, have argued that too much skepticism can hinder progress;

Too much openness and you accept every notion, idea, and hypothesis—which is tantamount to knowing nothing. Too much skepticism [...] and you're not only unpleasantly grumpy, but also closed to the advance of science. A judicious mix is what we need.
(Sagan, 1995: 30)

Finding that “judicious mix” has been the challenge to date. In their comprehensive narrative review, Lum et al. (2019) state that, “BWCs have not had statistically significant or consistent effects on most measures of officer and citizen behavior or citizens’ views of police,” and they go on to illustrate the inconsistent results and research gaps. It may be worth examining the potential reasons for these results in greater depth.

1 | ASSESSING BWC EVIDENCE USING THE EMMIE FRAMEWORK

Policing has long been considered a craft in which experience outweighs all else (Willis, 2013). With the emergence of evidence-based policing (EBP), however, science is starting to play a greater role in

the field. Under an EBP approach, police create, review, and use the best available evidence to inform policy and practice (U.K. College of Policing, 2017). This definition is grounded in the realization that police officers are at the coalface of changes to the policing environment. How they perceive innovations in their environment can significantly change the outcome. Sound scientific evidence has many advantages over experience; as stated by Ratcliffe, “science and research can distinguish between good intentions and good programs” (2019: 185).

One particularly useful tool for disaggregating scientific evidence is the EMMIE (effect, mechanism, moderators, implementation, economic cost) framework (Johnson, Tilley, & Bowers, 2015). The EMMIE framework was developed by British academics as a tool to “present evidence from systematic reviews of research on crime reduction interventions in a format that helps users to access and understand it quickly” (The Crime Reduction Toolkit). The rapid diffusion of BWCs into law enforcement, and the fact that “many agencies will continue to adopt them” (Lum et al., 2019), emphasizes just how important it is to translate the rapidly growing body of BWC research to practitioners. Here, I adapt the EMMIE framework to examine the Lum et al. (2019) narrative review on four key outcomes of BWCs.

EMMIE goes beyond presenting the effect of interventions to also summarize their mechanism, moderators, implementation, and economic costs. In Table 1, I summarize the key findings in each of these five factors.

TABLE 1 EMMIE applied to BWCs

Factor	Question Posed	BWC Application
Effect	What is the impact on key outcomes?	<p>Promising results:</p> <ul style="list-style-type: none"> - Reduced citizen complaints - Reduced officer use of force - Improved detection and prosecution of crimes <p>Inconclusive results:</p> <ul style="list-style-type: none"> - Officer activity
Mechanism	How is the intervention supposed to work?	<ul style="list-style-type: none"> - Civilizing effect - Increased data collection with cameras
Moderators	Where will it work and not work?	<ul style="list-style-type: none"> - Activation compliance - Department starting point
Implementation	What do you need to consider to make it work?	<ul style="list-style-type: none"> - Stakeholder priorities and needs - Citizen privacy concerns - Officer privacy concerns - Internal policy considerations
Economic cost	How much will it cost?	<ul style="list-style-type: none"> - Substantial costs associated with equipment, storage, and resources - Limited evidence that costs offset by savings in citizen complaints and improved case outcomes

1.1 | Effect

Lum et al. (2019) do an excellent job of organizing existing BWC research, and all I seek to do here is condense the findings into a few simple tables that can illustrate the challenges involved when interpreting BWC results across numerous studies. I will limit this response to four outcomes of particular interest to the police (Bureau of Justice Statistics, 2018; Police Executive Research Forum, 2018) that were also backed by a sizable body of research.¹ These key outcomes are as follows: complaints, use of force, detection and prosecution of crimes, and officer activity (which combines officer discretion related to arrests and citations and officer proactive behavior). The tables shown here have been adapted from White and Malm (2019) and include basic information about each study: the agency, the state, the researchers, the year of the publication, and the rigor of the study as determined by its rating on the Maryland Scale of Scientific Methods (SMS; Sherman et al., 1997). The SMS rates the internal validity of a study on a 5-point scale with 1 being the weakest and 5 being the strongest. Level 5 studies are randomized, controlled trials (RCTs), which are widely considered the gold standard in research. The next column provides a visual indicator of the study's summary findings: a down arrow for a decline, an up arrow for an increase, and a null sign for no statistical *or* substantive change. White arrows indicate changes, and a black arrow indicates when the change is statistically significant at the $p < .05$ level. The final column illustrates the sample size per group.

Table 2 summarizes research on BWCs and complaints against police officers. As Lum et al. (2019) point out, this area provides the most consistent results in support of BWC efficacy. Findings from 17 of the 22 studies show a reduction in complaints, with 6 being statistically significant. The studies are rigorous, with only two falling below a 3 on the MSM. The story here is at least fairly clear: If an agency wants to reduce complaints against officers, it should consider a BWC program.

Table 3 summarizes research on BWCs and police use of force. Although not as consistent as the results from the complaint research, half of the studies have findings that reveal a reduction in use of force with BWCs. Most studies are methodologically rigorous, with 11 of the 16 being RCTs. Considering difficulties of power resulting from low base rates, and methodological challenges (particularly contamination²), the positive results (and noticeable lack of negative results) over several sites is still a promising finding for police departments.

Table 4 illustrates the research on the impact of BWCs on criminal investigations. This is reported as one of the main reasons departments choose to buy BWCs (Bureau of Justice Statistics, 2018; Police Executive Research Forum, 2018). Compared with the amount of research on complaints and use of force, research in this area is still lacking, with only seven published studies. The research is also notably less rigorous, with only two of the seven studies being RCTs. The seven studies are focused on a couple of different evidentiary benefits: the effect on detection of crime and whether BWCs influence case outcomes. Findings from six of the seven studies show that BWCs increase detection of crime and guilty pleas; however, findings from only one study showed statistically significant results. Taken en masse, however, the results are again promising and suggest that a BWC program can positively affect case outcomes.

Moving to officer activity, as Lum et al. (2019) show, in 13 studies, researchers have examined the impact of BWCs on arrests (see Table 5).³ In four studies, an increase (two were insignificant) was reported, a significant decrease was reported in another four, and no effect was reported in another five. The four studies in which citations are examined are more consistent in their reported results: An increase (one was insignificant) was reported in three, and an insignificant decrease was reported in another one. In six studies, researchers looked at the impact of BWCs on proactive policing such as field encounters, traffic stops, and officer-initiated calls for service. The findings from three show

TABLE 2 Research on BWCs and complaints

Agency	Location	Authors	Year	SMS	Finding ^a	Size ^b
Anonymous	USA	Koen et al.	2018	2	▽	1
Arlington PD	Texas	Goodison & Wilson	2017	5	▽	1
Boston PD	Massachusetts	Braga, Barao, et al.	2018	5	⊙	2
DC Met PD	District of Columbia	Yokum et al.	2017	5	⊙	3
Denver PD	Colorado	Ariel	2016	3	▼	2
Edmonton PS	Canada	Edmonton PS	2015	3	⊙	1
Hallandale Beach PD	Florida	Headley et al.	2017	4	⊙	1
Isle of Wight Constabulary	England & Wales	Ellis et al.	2015	3	▽	2
Las Vegas Met PD	Nevada	Braga et al.	2017; 2018	5	▼	2
London Met PD	England	Grossmith et al.	2015	5	▼	3
Mesa PD	Arizona	Mesa PD	2013	4	▽	1
Milwaukee PD	Wisconsin	Peterson et al.	2018	5	▽	2
Multi-Site	International	Ariel et al.	2017	5	▽	3
Orlando PD	Florida	Jennings et al.	2015	5	▼	1
Phoenix PD	Arizona	Hedberg et al.	2016	4	▼	1
Phoenix PD	Arizona	Katz et al.	2014	4	▼	1
Plymouth Constabulary	England	Goodall	2007	2	▽	2
Rialto PD	California	Sutherland et al.	2017	5	▽	2
Rialto PD	California	Ariel et al.	2015	5	▽	2
Rialto PD	California	Farrar & Ariel	2013	5	▽	2
Spokane PD	Washington	White et al.	2017	5	▽	1
Toronto PS	Canada	Toronto PS	2016	3	▲	1

^a▲ sig incr.; △ increase; ▼ sig decr.; ▽ decrease; ⊙ null.

^b1 < 100 per group; 2 100–500 per group; 3 > 500 per group.

significant increases in proactive policing activities, a significant decrease is reported in another, and no effects were reported in two.

The mixed findings to date suggest that agencies implementing a BWC program should not automatically expect specific benefits (or costs for that matter) regarding officer activity as the evidence is far from clear.

We should not be disheartened by some of these varied findings. Mixed findings will likely be the continuing story that emerges from BWC research for various reasons. First, there are no absolutes. After all, what social science program or strategy is effective 100% of the time? Medications approved by the U.S. Federal Drug Administration (FDA) rarely cure everyone afflicted with a disease, and many medications produce a host of side effects. Programming in criminal justice is no different. Even programs that are considered to have a robust evidence base, such as hot-spots policing, are still vulnerable to implementation issues, dosage concerns, and vagaries of reporting mechanism. We should not expect any difference with police BWC studies. BWCs come with an extremely high degree of difficulty, require considerable money and resources, and touch nearly every aspect of a police department's operations. I elaborate on these considerations in the next four factors of EMMIE.

TABLE 3 Research on BWCs and use of force

Agency	Location	Authors	Year	SMS	Finding ^a	Size ^b
Birmingham South PD	England	Henstock & Ariel	2017	5	⊙	2
Boston PD	Massachusetts	Braga, Barao, et al.	2018	5	⊙	2
DC Met PD	DC	Yokum et al.	2017	5	⊙	3
Denver PD	Colorado	Ariel	2016	3	⊙	2
Edmonton PS	Canada	Edmonton PS	2015	3	⊙	1
Hallandale Bch PD	Florida	Headley et al.	2017	4	⊙	1
Las Vegas Met PD	Nevada	Braga et al.	2017; 2018	5	▼	2
Milwaukee PD	Wisconsin	Peterson et al.	2018	5	⊙	2
Multi-Site	International	Ariel et al.	2016	5	⊙	3
Orlando PD	Florida	Jennings et al.	2015	5	▼	1
Rialto PD	California	Sutherland et al.	2017	5	▽	2
Rialto PD	California	Ariel et al.	2015	5	▼	2
Rialto PD	California	Farrar & Ariel	2013	5	▼	2
Spokane PD	Washington	White et al.	2017	5	▽	1
Tampa PD	Florida	Jennings et al.	2017	3	▼	1
Toronto PS	Canada	Toronto PS	2016	3	▽	1

^a ▲ sig incr.; △ increase; ▼ sig decr.; ▽ decrease; ⊙ null.

^b 1 < 100 per group; 2 100–500 per group; 3 > 500 per group.

TABLE 4 Research on BWCs and criminal investigations

Agency	Location	Authors	Year	Rigor	Finding ^a	Sample Size ^b
Aberdeen and Renfrewshire	Scotland	ODS Consulting	2011	2	△	1
DC Met PD	District of Columbia	Yokum et al.	2017	5	⊙	3
Essex Constabulary	England	Owens et al.	2014	5	▲	2
Isle of Wight Constabulary	England & Wales	Ellis et al.	2015	3	△	2
Phoenix PD	Arizona	Morrow et al.	2016	4	△	1
Phoenix PD	Arizona	Katz et al.	2014	4	△	1
Plymouth Constabulary	England	Goodall	2007	2	△	2

^a ▲ sig incr.; △ increase; ▼ sig decr.; ▽ decrease; ⊙ null.

^b 1 < 100 per group; 2 100–500 per group; 3 > 500 per group.

1.2 | Mechanism

The outcome of complaints against police demonstrated some of the challenges in understanding the specific mechanisms. Advocates argue that BWCs have a civilizing effect on both citizens and officers, which leads to fewer citizen complaints and less use of force by police (White, 2014). This mechanism is supported by the findings from most perception studies showing that citizens believe BWCs will improve police officers' behavior (Sousa, Miethe, & Sakiyama, 2018; White, Todak, & Gaub, 2017). Officers tend to be more skeptical about the impact of BWCs on citizen behavior (Gaub,

TABLE 5 Research on BWCs and officer activity

Agency	Location	Authors	Year	Rigor	Finding ^a	Size ^b
Anaheim PD	California	McClure et al.	2017	5	▼ Arrests	1
DC Met PD	District of Columbia	Yokum et al.	2017	5	⊙ Arrests	3
Denver PD	Colorado	Ariel	2016	3	▼ Arrests	2
Hallandale Beach PD	Florida	Headley et al.	2017	4	▼ Arrests ▲ Proactivity △ Citations	1
Las Vegas Met PD	Nevada	Braga, Sousa, et al.	2018	5	▲ Arrests+Citations ⊙ Proactivity	2
London Met PD	England	Grossmith et al.	2015	5	⊙ Arrests ⊙ Proactivity	3
Mesa PD	Arizona	Ready & Young	2015	3	▼ Arrests ▲ Citations ▲ Proactivity	1
Milwaukee PD	Wisconsin	Peterson et al.	2018	5	▼ Proactivity ⊙ Arrests	2
Phoenix PD	Arizona	Hedberg et al.	2016		⊙ Arrests	4
Phoenix PD	Arizona	Katz et al.	2014		▲ Arrests	4
Plymouth Constabulary	England	Goodall	2007	2	△ Arrests	2
Spokane PD	Washington	Wallace et al.	2018	5	⊙ Arrests+ ▲ Proactivity	1
Toronto PS	Canada	Toronto PS	2016	3	△ Arrests ▽ Citations	1

^a ▲ sig incr.; △ increase; ▼ sig decr.; ▽ decrease; ⊙ null.

^b 1 < 100 per group; 2 100–500 per grp; 3 > 500 per group.

Choate, Todak, Katz, & White, 2016; White, Todak, & Gaub, 2018). The “civilizing effect” claim is grounded in two theoretical frameworks, deterrence and self-awareness, which indicate that people are more likely to behave in socially desirable ways if they know they are being observed (Farrar & Ariel, 2013; Munger & Harris, 2015; Van Rompay, Vonk, & Fransen, 2009; Wahl et al., 2010). But does the camera change officer behavior, or does it simply change the likelihood of a frivolous or otherwise unfounded complaint from the public? The emergent studies have, to date, not yet disentangled this result.

Similarly, by not referencing the organizational culture of the department implementing the camera, it is hard to understand the mechanisms that are driving the diverging findings on officer activity. Kyle and White (2017) noted perceptions of organizational justice affecting officer behavior. But we cannot explain the disparate results of officer activity through organizational culture if researchers have yet to agree on a common metric that would allow comparisons across different agencies. No research is conducted in a vacuum, and the prevailing organizational and front-line cultures may have a great deal to say about how officers adapt to wearing a camera.

1.3 | Moderators

The moderator factor of EMMIE considers where BWCs will work and where they will not. The deployment of police BWCs brings into play numerous issues that differ depending on the outcome of interest, but most agree BWCs will not be effective if they are not turned on. Therefore, camera activation compliance is arguably the most important moderator of BWC effectiveness. In a few studies that have been focused on activation rates, the results indicate activation compliance is challenging. McClure et al. (2017) reported substantial variation in officer activation rates, from less than 2% to more than 65%. Low activation compliance may be a form of implementation failure; however, it may also tell us something important about the prevailing organization culture. This may be at the agency level, the precinct, or even the individual shift.

This speaks to the role of the organization's pre-BWC starting point as a key moderator across a variety of outcomes. Why is the organization deploying cameras? Have they just experienced a scandal? Are BWCs ordered by a federal court as a remedy to overcome "pattern or practice" unconstitutional policing? Is the chief deploying cameras to defuse community tension after a controversial critical incident? Or is the department deploying cameras as part of its continuing efforts to ensure professional, evidence-based policing? Is the union supportive or in opposition? Researchers who have worked with frontline policing will immediately recognize that *why* an initiative is implemented can dictate *how* it is implemented. I expand on these implementation issues next.

1.4 | Implementation

A successful implementation through a policy that is sensitive to local context depends on a thorough review of stakeholder needs and priorities, citizen and frontline officer privacy concerns, and best practices. With this in mind, the Bureau of Justice Assistance (BJA), facilitated the development of the National Body-Worn Camera Toolkit, including within it the *Law Enforcement Implementation Checklist* (Body-Worn Camera Toolkit, n.d.). The checklist, based on principles drawn from program implementation research (Miller & Miller, 2015), is designed to assist police departments in designing a successful BWC program (Miller, Tolliver, & Police Executive Research Foundation, 2014).

The checklist includes steps based on six core principles: learn the fundamentals and develop a plan; form a working group; policy development; define the technology solution (procurement); communicate [with] and educate stakeholders; and execute phased roll-out/implementation (White et al., 2018). Given that each of these principles will increase the likelihood of positive outcomes, "police departments considering a BWC program would be well advised to pay close attention to the BJA implementation resources" (White et al., 2018: 672).

Many departments, however, have rushed to deploy BWCs without full consideration of the issues. As a result, all of the potential benefits of BWCs have fallen by the wayside. Officers may not use the cameras properly. Citizen behavior may not be positively affected by the cameras. And prosecutors may not integrate the video and audio footage into their cases. These are failures of implementation, not necessarily of the underlying mechanisms. But how do we distinguish the difference? Only when researchers and their police partners can establish agreed-to metrics for measuring implementation can we start to make better sense of the divergent results from BWC studies. The *Law Enforcement Implementation Checklist* would seem to be a strong contender to fulfil this role.

1.5 | Economic cost

According to the Bureau of Justice Statistics (2018), economic costs are the primary reason police agencies give for not acquiring BWCs. The costs of BWCs go beyond the initial investment in cameras and

associated infrastructure. Agencies must maintain the technology and hire personnel to process videos. These costs can be substantial and ongoing, and there is limited evidence that costs are offset by savings from investigating and litigating fewer citizen complaints, or through improved case outcomes. As reviewed by Lum et al. (2019), the Toronto Police Service (2016) found that the time required to investigate complaints against officers reduced if BWC footage was available, implying a useful cost saving. Similarly, Braga, Coldren, Sousa, Rodriguez, and Alper (2017) found substantial cost savings associated with investigating complaints in the Las Vegas Metropolitan Police Department. They estimated BWCs save more than \$6,200 in officer time spent investigating an average complaint (Braga et al., 2017). But did those cost savings offset the significant investment in cameras and support personnel? Police departments across the country have varying levels of technological access, and BWCs are implemented into starkly different technological environments. Wirelessly uploading information is a much different proposition for a rural agency compared with an urban department. Equally, the choice of whether or not to outsource video storage can have huge implications that may differ depending on the particular size and activity of the agency. Again, the absence of an agreed-to framework for measuring economic costs hampers the research field's ability to make meaningful policy statements about cost implications.

2 | CONCLUSION

Criminology & Public Policy essays are intended to identify and discuss briefly specific and actionable next policy and research steps based on the current state of knowledge, with specific reference to the research article. As Lum et al. (2019) have expertly summarized the BWC research, there was no need to reiterate their efforts, although I have added some summary tables. To date, the interpretation of police BWC research has been skeptical, and for good reason. They are far from a panacea for all that ails contemporary policing. Part of the issue is the variety of situations that are described by “contemporary policing.” Suburban agencies with low crime and positive community relations are a marked difference from some urban policing environments plagued by high crime, low morale, scant resources, and tense relationships with the community. These starkly different contexts may be crucial in determining how BWCs are implemented, supported, deployed, and perceived by the community and the police. It may be that the context is the dominant factor in explaining the variable outcomes observed by Lum et al. (2019), but for now this is only a hypothesis.

To resolve these dilemmas, the future of BWC research may have to be a more thorough, and more standardized, approach to documenting implementation, organizational culture, technical support, and frontline motivations. Ideally, we would want to implement BWCs into numerous departments and retain a standardized set of metrics to evaluate these variables. The literature is, however, dominated by studies in individual departments. To overcome this challenge, researchers could start to agree on some universal metrics, so that the plethora of individual case studies from single departments could be better coalesced into a wider research framework, fulfilling the role usually performed by a multilevel study. To date, there are too many different outcomes measured in different ways in different individual departments, with too little agreement as to the critical dependent and independent variables. In the future, individual agency studies will have to make a less idiosyncratic contribution to the BWC canon.

NOTES

¹ This is not to discount the importance of other key outcomes of BWCs such as citizen and officer perceptions and police accountability. As Lum et al. (2019) discuss, there are findings from numerous perception studies that show

mostly positive results. Police accountability research is sparse with operationalization issues, but the results are also promising. Space simply did not allow for a complete review of all key outcomes in this policy essay.

² See Ariel, Sutherland, and Sherman (2018) for a full discussion on the effects of contamination in BWC studies.

³ Lum et al. (2019) review 14 studies in which officer activity is examined, but I removed Rowe, Pearson, and Turner (2018) as it was an ethnographic study and the methods were not commensurate with reporting an increase, decrease, or insignificant effect on officer activity. This does not negate the important context Lum et al. provide.

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AUTHOR'S BIOGRAPHY

Aili Malm is a professor in the School of Criminology, Criminal Justice and Emergency Management at California State University, Long Beach. She is interested in the assessment and evaluation of policing strategies and intelligence. She has worked as a principal investigator (PI) or co-PI for more than \$5 million in grants and has authored 40+ peer-reviewed publications.

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