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Body-Worn Cameras Improve Law Enforcement Officer Report Writing Accuracy

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ABSTRACT

With cameras becoming ubiquitous in society, it is becoming more important for law enforcement officers (LEOs) to have video recordings of civilian contacts recorded from their own perspectives. This was a prospective study of a convenience sample of LEOs who completed several scenarios and wrote a use-of-force report on one of the scenarios from memory. The LEOs then reviewed their body-worn-camera (BWC) recording of the scenario and amended their reports, as they felt necessary. The 11 LEOs had an average of 2.63 minor errors (range 0-7), 5.4 moderate errors (0-14), and 0.9 major errors (range 0-3) corrected by their BWC recording review in our study. This included 21 errors related to miscounting, mis-sequencing, or omitting force, warnings, compliance, or other important descriptors of the use of force. Point-of-view BWC recording review improved the accuracy of the LEOs' report writing, leading to the correction of important errors from the LEO's original reports.

Keywords: *Body-worn camera, BWC, law enforcement, point-of-view, POV, use of force, report writing, memory*

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Introduction

With cameras becoming ubiquitous in our society, smart phones and surveillance cameras, public and private, are increasingly recording the actions of law enforcement officers (LEOs). Last year alone, 120 million smart phones were sold in the U.S. (Hughes, 2014). Furthermore, an estimated 30 million surveillance cameras in the U.S. were used to record 4 billion hours of video per week (Vlahos, 2009). LEOs often lack the benefit of reviewing the recordings of an incident prior to writing reports and often rely on their memory of events that often take place quickly and under stress. In use-of-force reporting, there is an expectation of increased scrutiny, and specific incident details are required, especially related to the force used and the justification for each use of force. When reports do not match the available recording, (often obtained during judicial proceedings), it can be used to impeach the LEO's testimony at trial on specific, relevant details or on general credibility by exploiting inconsistencies between the LEO's report and the recording. LEOs have used patrol-car dash cameras since introduced in Texas in the 1980s, with more widespread use in the 1990s with federal funding. Body-worn cameras (BWC), offer LEOs a point-of-view (POV) recording of an incident, whether in front of the vehicle or elsewhere, are a newer phenomenon and have not been extensively studied.

Memory Science

Memory is encoded in a complex and dynamic pattern of neuron synaptic connections (Lacy and Stark, 2013). There is a robust literature on the reconstructive nature of memory retrieval and how errors are introduced. The common misconception is that memory retrieval is similar to playing back a digital recorder, when, in fact, memory retrieval is a reconstructive process and has been likened to paleontology: "'out of a few stored bone chips, we remember a dinosaur'" (Lacy & Stark, 2013, p. 650). What is encoded is determined by many factors, and the pattern of neuron synaptic connections is shaped by our prior body of knowledge and experience, and can be shaped by experiences that occur later. In the article by Lacy and Stark (2013), in discussing the inaccuracy of memory, and specifically the introduction of schematic errors, put simply, if we believe an event should have happened in a certain way on the basis of our previous experiences, we are likely to think that the event did happen this way. There is a natural bias for people to fill in the gaps' of a memory (Lacy & Stark, 2013). This schematic memory error is likely to occur in law enforcement or other settings in which a person experiences similar circumstances (e.g., "call") routinely. As stated by Lacy and Stark (2013), memory is an adaptive process based on reconstruction it is not infallible and therefore should not be treated as such.

Law enforcement use-of-force situations can be stressful, and stress has been established to impair memory. The authors of this article have previously conducted a study examining the neurocognitive effects of arrest scenarios, with one scenario simulating a fight between the subject "officer" and a suspect (Dawes, 2014). In this prior study, the authors found subjects had the greatest cognitive deficits after the arrest stressors in the testing of working memory. These deficits had not returned to baseline by one hour (Dawes, 2014). Morgan, et al. also found stress-induced deficits in working

memory in a study of special operations soldiers (Morgan, 2006). These memory deficits are related in part to catecholamine effects. In another study, the authors measured catecholamine release after arrest scenarios, where it was found that a simulated fight between the subject "officer" and "suspect" led to the greatest release of catecholamines (Ho, 2010). Some have described the relationship of stress on memory to be an inverted U-shaped dose-response curve (Yerkes-Dodson law), where some optimal level of stress may lead to better memory for an event, but higher levels will impair memory. However, peripheral details, even when memory is better, may not be well remembered (Lacy & Stark, 2013). In a study of Federal Law Enforcement Training Center (FLETC) law enforcement trainees subjected to a stressful scenario, the trainees had problems with recall: only 43% could accurately recall their shot placement, and only 57% could remember when in the scenario the situation justified lethal force (Meyerhoff, 2004).

Fatigue has also been shown to impair memory. Studies have demonstrated decrements in memory following sleep deprivation (Goel, 2009). Blagrove (1996) noted the "general 'cognitive slowing'" in sleep deprived individuals, and discussed an increased suggestibility, whether it be due to actual cognitive deficits or having a decreased motivation, and "attempts to avoid confrontation" (p. 55). This latter concept could be extrapolated to the schematic errors in memory. If a LEO is writing a report while sleep deprived and has a poor memory of the events, a tendency may exist to block memories not consistent with prior schema.

Exertion has been implicated in memory deficits. In a study by Hope, et al (2012) of LEO volunteers, the exertion group displayed impaired recall and recognition performance compared to controls. The authors point to a "limited attentional capacity at encoding as a consequence of competing processing goals" (Hope, 2012, p. 389). The interesting part about this study is that the exertion group also had decrements in their ability to recall information encoded *before* the exertion. Hope (2012) noted that "witnesses may be required to justify or rationalize deficits or inconsistencies in their accounts…. the current findings have important forensic, legal and other operational contexts by providing a…. relevant demonstration of impaired eyewitness memory following physical exertion" (p. 389).

Memory is not infallible, and stress, fatigue, and exertion, all factors commonly encountered by LEOs during arrest, can further impair memory. These factors, when coupled with a report that is missing or contains erroneous important use-of-force details, may lead to important, and possible catastrophic consequences for LEOs in legal proceedings that can occur years after the event.

Literature Review

The authors of this article were unable to find any published prospective studies on the use of incident recordings, whether BWCs or other cameras, to improve LEO use-of-force report writing. An International Association of Chiefs of Police (IACP) survey study found that officers replayed dash cameras for report writing: "They reported that the video record of each incident allows them to rely less on memory when writing reports afterwards" (Westphal, 2015, para. 12). A survey study by Fouche (2014) involving fielded BWCs with the University of Georgia Police Department found that its LEOs showed a high level agreement with the hypothesis that BWC improved incident documentation. Neither this study, nor the IACP study examined whether or not BWCs

actually improved incident documentation. The available literature, some of which is discussed below, focused on the impact of BWCs on other metrics, such as use of force incidents, "civilizing effect," complaints and complaint resolution, and effect on successful prosecutions, which may be indirectly related to improved documentation, but this was not the focus of the available studies.

Purpose

Given the understanding of the limitations of memory, particularly under the stress of a use-of-force scenario, and given the paucity of studies on the effect of incident recordings on report writing accuracy, the purpose of this study was to determine whether concurrent LEO review of BWC recordings would lead to more accurate use-of-force reporting. The study physicians hypothesized that study subjects would improve the accuracy of their report with concurrent review of the BWC recording. To our knowledge, this is the first of such study and it is believed that it will help LEOs better understand personal report writing limitations and understand how emerging technologies might help improve such skills; it may help administrators in decisions about how to reduce liability in their departments; and may help researchers in the field by suggesting a novel mechanism to study such problems.

Methods

Participants

This was a prospective, observational study using a convenience sample of LEOs from the Phoenix, Arizona area. The institutional review board of Hennepin County Medical Center (HCMC) approved the study as an exempt study. The study was conducted at TASER International, Inc. (Scottsdale, AZ) on a weekend when no employees were in the building other than study support personnel and security.

Study subjects were required to have recent LEO patrol experience and full duty status in their respective departments. Subjects provided informed consent and completed a screening questionnaire that included basic demographics data. In addition, to reduce confounders, subjects were recruited who had not just completed a night shift and who were not working on the day of the study. Subjects were asked on the day of the study whether they had any conditions that would limit participation in a use-of-force scenario that would involve moderate exertion and use of force on a training dummy. Any subject who answered in the affirmative was to be excluded from the study. No subjects were excluded.

Subjects were provided with a duty belt that had a CO_2 charged simulation pistol (empty magazine and chamber), inert pepper spray, a live TASER® X26™ conducted electrical weapon (CEW) with an expended cartridge, an expandable baton, empty magazines, and handcuffs. Subjects were also fitted with an AXON® (TASER, Scottsdale, AZ) BWC. The BWC in this instance was worn attached by a magnet to a pair of Oakley™ (Foothill Ranch, CA) glasses specifically manufactured for this purpose. The camera was attached on the "gun side" of the subject. This vantage point allowed the camera to be generally in line with the officer's field of vision. Attaching it on the "gun side" allowed the camera to "see" the field of view if an officer were peaking around a corner, for example. The available systems are discussed in more depth in the

Discussion section below. Two separate safety checks by separate moderators were conducted prior to the start of each scenario. Subjects were advised to do a safety pause prior to using the expandable baton so the area could be cleared. Participants were also advised that the firearm muzzle had to be more than three feet from a live target when fired. Scenario moderators were responsible for scenario safety and advised subjects and actors regarding stopping the scenario for safety violations. All subjects were provided with a note pad and pen to take notes as needed, as they would on calls for service.

Subjects read an instruction sheet that outlined the rules of the scenarios. All use-of-force, if necessary, was to be used on training dummies that would be substituted for the live actors at the time force was used. All persons present in the scenarios, except those wearing yellow vests, were actors and were "in-play" for the subject. Subjects also read a use-of-force policy that applied to the scenarios. The policy was generally consistent with standard law enforcement use-of-force policies and was modelled after the Los Angeles (CA) Sheriff's Department (LASD) policy that was adapted to the specific force issues in our study (http://shq.lasdnews.net/content/uoa/EPC/force-policy.pdf.). Subjects were to use their hands to simulate radio communications and were advised to use their radio as they normally would in the field. A moderator played the role of dispatch for the subject.

Interventions

The subjects were "dispatched" to three, back-to-back scenarios: 1) domestic disturbance, 2) vehicle stop, and 3) theft report. At each scenario, a moderator acted as dispatch and recorded the scenario with a BWC. There was also a moderator who acted as the referee to ensure the scenario played out according to the script. Both moderators were responsible for participant safety during each scenario. The second and third scenarios were distraction scenarios in that they were not part of the study evaluation. They were meant to create time, stress, and distraction prior to writing the report for the first scenario. Study participants were not aware that Scenario 2 and 3 were unevaluated.

First Scenario: Domestic disturbance (Tested scenario). The first scenario took place in a room simulating an apartment located on the fourth floor of an apartment building. The study participant (referred to as LEO in the rest of the paper) was advised of a domestic disturbance in the apartment with persons arguing. The LEO had to climb four flights of stairs and encountered a partially open apartment door. The LEO found a male and female subject arguing inside the apartment and a third person sitting quietly in the apartment drinking a beer. The lighting was medium to medium-low, but not dark. The lighting level was meant to create stress but not obscure visualization. As soon as the LEO entered the apartment, the female subject in the corner drinking a beer proceeded to throw an empty beer can at the male subject and the male pushed the female to the couch. The male subject was instructed to slowly back away from the female subject. The male subject was instructed to verbally challenge the LEO as the LEO approached and when was next to the training dummy, in an attempt to provoke a use-of-force. If the LEO did not respond to a verbal challenge, the male subject was to move the dummy towards the LEO simulating an assault. The male subject "animated" the dummy during the struggle. This was a variable with each LEO but included making the dummy try to get up, kick the LEO, roll around, etc. The dummy's hands were tied in the front in

order to simulate a subject who would not release his hands (known as "turtling"), requiring the LEO to use force to get the subject to release his clasped hands. At the discretion of the referee, in terms of the timing, the scenario was paused momentarily and the dummy's hands were released. The scenario ended when the LEO handcuffed the dummy, radioed his status to dispatch, and took no further action while waiting for back up. The scenario included several evidence "plants" including: alcohol, drug paraphernalia (i.e., a bag simulating marijuana and pill bottles), items which could have been used as weapons (i.e., hammer, scissors, broom, and handgun) that were all in plain view. During the struggle with the male subject, the female subject concealed the drugs and handgun (the latter in her waistband) and then provided a distraction to the LEO both verbally and by her actions. She was advised per the scenario to approach the LEO while throwing beer can at the male subject. The female subject was instructed to be a minor distraction but not to provoke an action to move the LEO away from the male subject.

Second Scenario: Vehicle Stop (Distraction scenario). The second scenario took place in a parking lot simulating a roadway. Immediately after being cleared from the first call, dispatch requested the LEO stage at an intersection to intercept a reported reckless driver whose last known direction of travel was coming towards the LEO at the intersection. The LEO staged in a live vehicle with the engine running as a vehicle fitting the description of the subject vehicle approached. The LEO observed what appeared to be a water bottle being thrown from the subject's vehicle, giving the LEO probable cause (PC) to make a traffic stop. The LEO conducted the traffic stop and found the vehicle occupied with two male subjects who were mildly uncooperative. The two "actors" were instructed to annoy the LEO (e.g., not immediately getting off a cell phone, loud music, delays in producing documents, making the LEO repeat himself) but not to provoke a use-of-force or the LEO ordering the subjects out of the vehicle. The moderator serving as the referee was instructed to end the scenario if either of these occurred. A training dummy was present in the vehicle to make the LEO believe it could be a use-of-force scenario. The LEO was advised the driver of the vehicle had an out-of-state, non-extraditable warrant, which heightened the stress of the scenario. The scenario was designed to conclude with the LEO citing the truck's passenger for littering.

Third Scenario: Theft Report (Distraction scenario). The third scenario took place in a parking lot. A theft victim waited for over an hour for an officer to respond, as all department LEOs were occupied. The theft subject had repeatedly called the department requesting a LEO to respond. After being cleared from the second call, the LEO was dispatched to take the theft report. The victim was in the parking lot next to his vehicle where several items had been taken. The actor was instructed to act visibly upset about the theft and to list several stolen items including the detail of some of the stolen items such as serial numbers. The LEO was forced to take notes about the missing items. After the final scenario the LEO was cleared and could return to the "station" to write the report for the first scenario.

Measures

After the completion of all three scenarios, the LEO sat at a computer and filled out a use-of-force reporting form (template) and an arrest report, the latter being a free text narrative of the arrest. There was no time limit for LEOs to complete the free text narrative. The BWC recording was uploaded to Evidence.com, a cloud-based system, where the officer could review the recording. Once the LEO completed the free text narrative, he was given his BWC recording to review and told the recording could be used to make any changes to the original documents that may be needed. The recording player was a standard player that included the usual review functions (including frame-by-frame review). The LEO's changes to the report were tracked by the Microsoft Word™ track changes function (Microsoft, Redmond, Washington). There was no time limit for the review and changes. Unlimited time was allowed, despite not being practical in a "real world" setting, because a lack of familiarity with the specific word processor and recording player used in the study may to create pressure and lead to a lesser review.

Grading criteria for the study, derived beforehand by the study authors, are shown in Figure 1. The authors chose such a grading system since simply counting the number of changes from the track changes function, while yielding quantifiable results, may not have yielded meaningful results. Errors were categorized as minor, moderate, or major as related to their importance in the scenario. The importance was related to such things as safety (i.e., LEO and involved parties), recognizing criminal activity, or to the policy and constitutional justification for use-of-force. For example, inaccurate subject description or inaccurate sequencing of non-force events, while possibly having a bearing on the case were considered minor errors, whereas inaccurate sequencing of use-of-force, which could have a bearing on the policy or constitutional basis for the use-of-force was considered a moderate error. Omitting a use-of-force, for example, was considered a more egregious error and likely to have significant legal proceeding consequences, and was considered a major error. The moderator's video, as well as details known about the scenario, was used as the "gold standard." Two of the study authors are physicians/researchers, as well as LEOs, and these authors did all scenario grading. Grading was by consensus and not separately reviewed.

Data Analysis

The limited numerical data were compiled in an Excel spread sheet (Microsoft Corporation, Redmond, Washington). The analysis was very basic and was comprised counting and categorizing by two-person consensus, changes in the reports according to the grading criteria, and as well as counting and categorizing "missed" items. The statistics were limited to basic functions.

Results

Participants

Eleven commissioned LEOs enrolled in the study. None were excluded. One LEO was working the day of the study. Since he had self-recruited, he was allowed to participate, as he was halfway through a scheduled day shift. The LEOs came from five different law enforcement agencies in the Phoenix, Arizona area. The average age of LEO participants was 37 (range 28 to 43). The average number of years on the job was

12 (range 7 to 17.5), and average number of years on patrol was eight (range 4 to 12). Thus, the LEOs had reasonable experience in patrol-type calls and report writing. No LEO had previously used BWCs, and only one LEO had worked in the prior 24 hours (the LEO who self-recruited). Reported LEO health histories included: orthopedic surgeries (3), abdominal surgeries (2), hypertension (1), hypothyroid (1), and a history of meningitis (1).

Adverse events

Adverse events were limited. One LEO suffered a minor hand abrasion while applying handcuffs to the training dummy. The BWC failed to record for one LEO, so he was allowed to use the moderator's recording of the scenario. The BWC fell off during the struggle with the dummy with one LEO.

Report Writing

Although there was slight variability in the time from the end of the first scenario to the start of report writing between the LEOs, it generally fell between 15 and 20 minutes. The same moderator acted as the referee for all three scenarios and for all 11 LEOs, so timing was relatively consistent.

Table 1 shows the results for the LEOs with regards to changes from the initial report based on their BWC recording review. The LEOs had an average of 2.63 minor errors (range 0-7), 5.4 moderate errors (0-14), and 0.9 major errors (range 0-3). The moderate errors included 3 errors related to the sequence of the use of force, 7 errors related to miscounting the uses of force, and 4 errors related to some description of the use-of-force (e.g., location of the force). The largest number of errors was with quotations and other statements important to the case, such as commands from the LEO. This accounted for 27 errors. Omitting important subject behaviors accounted for 10 errors. There were 2 major errors related to omitting a use-of-force in the report, and 4 errors with regard to verbal warnings.

Table 2 shows errors that persisted even after the BWC recording review (with the moderator's recording or what was known about the scenario as the "gold standard"). Errors that should have been corrected with the BWC recording review, but were not corrected, are marked with an asterisk. None of the LEOs reported the bag of marijuana (or pill bottles, although the latter were not counted as evidence since they could have been valid prescriptions). None of the LEOs reported the other potential weapons in the scene, including the gun that was on the ottoman in plain view in front of the male and female actors. In one instance, the gun was obvious on the LEO's BWC recording. Eight of the 11 LEOs failed to report the third person in the room. Two LEOs did not report uses of force clearly seen on their BWC recording. Between these two LEOs, there were 9 individual uses of force not reported. There were more than 3 uses of force miscounts that persisted which should have been seen on their recordings. In one case, the actual number was not clear on the LEO's recording but it was clear it was more uses of force than reported. Six of the LEOs also failed to report on important subject actions that were seen on their recordings.

The LEOs answered questions using a 5-point Likert scale about perceived accuracy of their reports. Eight of the 11 LEOs (73%) ranked confidence in their initial report at a 3 ("there may be some minor details that are inaccurate but it is mostly all

accurate"). Nine of the 11 LEOs (82%) ranked their second report a 4 ("I feel very confident in the detail of the report"); and (70%) had at least a 1-point improvement in their Likert scale rating of their confidence in their report writing. Two LEOs had a 2-point improvement. One LEO had a lower confidence in the initial report and corrected report after viewing the recording.

Survey

The LEOs answered a brief survey after the study regarding personal opinions of the use of BWCs in report writing. The average wearability of the BWC on a 10-point Likert scale received a rating of 8. The average usefulness for report writing on a 10-point Likert rating was 8.2. All of the LEOs reported that the recording improved their report writing ability. Ninety-one percent (10) reported that the recording should be viewed concurrently to writing the report. Only one LEO reported the recording should be watched after writing the report.

Comments generally included the BWC recording would help capture details, such as quotes and sequences of events. One LEO commented that reviewing the BWC helped make observations after the fact that would have been missed otherwise, including behaviors of the second subject. Concerns included: the BWC falling off during a struggle (which occurred with one LEO), having to reconcile observations with the recording, potentially making report writing take longer, and the recording being overused for administrative and civilian complaints.

Discussion

According to Bureau of Justice statistics from 2008, in 776,000 uses or threatened uses of force, 74.3% (447,000) of persons who had force used or threatened against them felt LEOs acted "improperly" and 13.7% (61,249) filed a complaint (Eith & Durose, 2011). The 11 LEOs in this study had multiple errors corrected after review of the BWC recording, including 21 errors in our 11 LEOs related to miscounting, mis-sequencing, omitting force, warnings, compliance, or other important descriptors of the use of force. Given that the criminal prosecution of a suspect or the defence of an allegation of excessive force could hinge on the credibility of the LEO, any important errors in a report, but especially use-of-force errors, may represent trial outcome determinative important errors.

The ubiquitous presence of recordings from civilian cell phones or from surveillance cameras from public entities, businesses, or other civilian entities are capturing LEO-civilian interactions more frequently. This may be helpful in resolving conflicting accounts of incidents, as the courts tend to weigh heavily on recordings. In *Scott v. Harris*, the U.S. Supreme Court stated that in deciding whether a LEO is entitled to qualified-immunity in a plaintiff's 42 U.S.C. § 1983 federal civil rights lawsuit for an alleged unconstitutional use-of-force, the court usually must adopt the plaintiff's version of the facts. However, "[w]hen opposing parties tell two different stories, one of which is blatantly contradicted by the [video] record, so that no reasonable jury could believe it, a court should not adopt that [contradicted] version of the facts for purposes of ruling on a motion for summary judgment." In *Scott*, the Court stated that the fleeing suspect's "version of events is so utterly discredited by the [video] record that no reasonable jury could have believed him. The Court of Appeals … should have viewed the facts in the

light depicted by the videotape," and not plaintiff's "visible fiction" version (*Scott v Harris*, 2007).

Possible issues

Despite the weight recordings may be given by the courts and jurors, recordings do not necessarily reflect what the LEO *saw, heard or perceived*, particularly when recorded from a different vantage point. This may particularly be true when the recording captures only a part of the interaction, or, if there is selective editing of the recording. It may better reflect the LEO's perspective when it is a point-of-view (POV) BWC that is unedited and captures the entire interaction. But even then, it cannot tell us with certainty what the LEO saw, heard, or perceived. According to *Graham v. Connor*, "The reasonableness of a particular use of force must be judged from the perspective of a reasonable officer on the scene, rather than with the 20/20 vision of hindsight" (*Graham v. Connor*, 1989, U.S. 396). In other words, in judging the reasonableness of a use-of-force, we have to put ourselves in the POV of the LEO who used the force. In this study, there were many errors where the LEO did not "see" certain scene details, hear certain statements, or see certain subject actions that were "seen" and "heard" clearly on their POV BWC. Or, the LEO was not able to accurately articulate, or failed to accurately articulate the details. In addition, there were things the LEO did not "see" which were not in his field of vision or that of the BWC that could be very obviously "seen" from the moderator's (extrapolate to bystander's) POV. Thus, it is important to recognize the various levels of LEO "blindness" in this setting. Some of it is the well-recognized inattention blindness (similar to tunnel vision) in which a LEO focuses on what is perceived as the immediate threat (in our scenario with each LEO it was the male subject). Here the LEO is so focused on the perceived threat that his vision, hearing, and other senses are inattentive to everything other than the threat. The next level of blindness is the POV BWC. The BWC may have a slightly different field of "view" than the LEO. One LEO in our survey data was concerned that the field of view of the BWC is different from the LEO's field of view. The BWC can be mounted in various locations that may affect the field of view. For the purpose of this study the BWC was worn on the gun-hand side on a glasses mount. Some systems mount on the chest, which "sees" only what is in front of the torso, not where the head is directed. In addition, the BWC in this study had a 75-degree field of view. Human binocular view is wider than this, although central vision, our sharp, well-defined vision, is less, ± 20 degrees from the fovea. In addition, the LEO is processing the visual input real time. The brain ignores some of the incoming data as it prioritizes the visual data (this does not factor in the complexity of what we "see" or perceptions may be determined by our prior knowledge and experiences). This is quite different from a recording review frame-by-frame, with the ability to pause and rewind. Lastly, recordings from other perspectives may "see" things that were never in the LEO's field of view. In this study, the LEOs routinely missed the female subject picking up the gun off of the ottoman and placing it in her waistband, which was done in plain view. In some of the LEO videos, suspicious activity could be seen, but in some, it was never in their view, but well caught on the moderator's (again, extrapolate to bystander) recording. With the introduction of BWCs, "reasonableness" needs to factor in these issues.

In the surveys, some of the LEOs commented that they would be concerned about having to reconcile their observations with the recordings if they did not match. LEOs would have to be taught to plainly explain inconsistencies they could not reconcile in their report. As previously discussed, the BWC does not necessarily show what the LEO saw, heard, or perceived and it would be important for the LEO to explain this in the report, since that is the constitutional standard. With cameras becoming ubiquitous, it is the opinion of the authors that it would be better for the LEO to have the opportunity to address any inconsistencies in the original report rather than years later in a federal civil-rights trial when memory is even more likely to be rife with errors. As pointed out by Lacy and Stark (2013), memory can degrade and change with time as new information is introduced (misinformation effect) (Lacy & Stark, 2013). This latter effect is important even with the initial recording review and would need to be part of report writing training and/or policy so that LEOs use the recording to enhance their memory but not to change their memory. In the IACP study previously referenced, there was concern that officers might be writing their reports around the recording rather than using the recording to "verify and enhance their observations and notes" (Westphal, 2015, para. 16). Most of the LEOs, 91% (10), felt that the recordings should be available concurrently to report writing. However, one officer felt the recordings should be reviewed after the original report is written which would ostensibly reduce a "misinformation effect." The optimal strategy may require additional study.

A few of the LEOs were concerned that the recording review might make report writing take longer. However, some commented that they already listened to audio while report writing, and the average Likert rating for usefulness of the video for report writing was 8.2, and 100% of the LEOs said it improved report writing. It is the opinion of the authors, that with time and experience, the recording technology, especially with back-end solutions for editing and storage may actually lessen the time required by lessening the need for longer written narratives. The LEOs could simply annotate the recording with narrative that was important and not easily shown on the recording, or annotate what he actually saw, heard, or perceived if it was different than what was seen on the recording. In addition, policy could be written such that minor incidents could stand with only the recording with no narrative necessary (e.g., traffic violations). This could make report writing actually take less time. In addition, with compelling evidence offered by recordings, it might be anticipated that more arrestees will plea earlier, reducing total man-hours for LEOs (and prosecutors) involved in the case. Arguing the recorded field sobriety test might be much harder in an obvious driving under the influence case and lead to earlier pleas. Interestingly, in a small pilot study with limited data from the United Kingdom (U.K.), they did find a time savings of approximately 20 minutes per officer per 9-hour shift with the use of BWC recordings. There was also a time benefit in the overall time spent on criminal cases (Goodall, 2007).

There may be legal issues regarding BWCs, particularly in the few states that require two party or all party consent to recordings. Even in single-party states or where law enforcement has an exemption, there may be issues regarding a reasonable expectation of privacy. This expectation of privacy would apply to both civilians and law enforcement. Some subjects in our study were concerned that supervisors could use the recording to search for minor policy violations to bring administrative action against the LEO. Policies would have to address both the private conversations of LEO on duty and

such recording "trolling." Likewise, there could be sensitive situations such as interviewing a confidential informant, a sexual abuse victim, or young child that might require a more sensitive and flexible policy on BWC recording. There may also be reasonable expectations of privacy particularly with consensual encounters with civilians, and even more so in their own homes (e.g., an alarm call), which the courts protect earnestly. Officers may have to advise civilians that they are being recorded in cases where there may be a reasonable expectation of privacy. Questions about Freedom of Information Act (FOIA) requests and privacy, as well as recording retention durations, would need to be addressed. Many of these issues would have to be addressed by legislative actions, court rulings, and department policies.

Other uses of recordings

An issue alluded to above is that partial recordings or even edited recordings from civilians, especially with the pervasive use of social media, could be used to bias the public in a LEO-civilian interaction. When the only record of the incident is the civilian recording, law enforcement agencies may have difficulty in the "court of public opinion" combating claims of misconduct. Having an immediately available LEO POV BWC recording may be useful in combating such claims by early public release of the recording.

Review of the recording can be used during investigations to more closely examine the crime scene and make observations about the actions of the subjects that were missed. In one of the LEO's recordings, the firearm is clearly seen but was missed by the LEO (due to the definition of the video, 640x480, while the firearm was visible with other recordings, it was less clearly a firearm). In the first scenario, the female subject concealed the firearm in her waistband. If she were considered the "victim" and never searched (or she hid it elsewhere besides her waistband), the presence of the firearm and her concealment of it would never be known. In another recording of Scenario 1, the male is heard to threaten to kill the female. Details such as this could be picked up by an investigator to add to the criminal charges, assist with a restraining order request, etc. Another benefit to investigators might be that recordings may capture the statements, and, more importantly, other "body language" that may be useful in the analysis of jurors, particularly if the initial spontaneous statements are modified or recanted by a reluctant witness at trial. Body language may help the jurors decide which statement they find more truthful. Goodall (2007) found that evidence gathered using BWCs at the scene of a domestic abuse incident has assisted greatly in supporting reluctant witnesses through the court process. In providing an exact record of the demeanor and language of the accused, the disturbance throughout the scene and the emotional effect on the victim, the use of BWCs can significantly strengthen the prosecution case (Goodall, 2007).

An interesting study by Farrar pointed to an aspect of BWCs not addressed by the current study. Farrar's study found the wearing of the BWC led to a 50% reduction in use-of-force incidents and also noted that complaints were 10 times higher in the year before the BWCs were deployed (2013). The effect of BWCs on LEO and civilian behavior is an important effect. In 2013, a Manhattan Federal District Court ordered New York City Police Department (NYPD) officers in some precincts where a "stop, question, and frisk" program, found to be unconstitutional by the court, was heavily used to wear BWCs in an effort to prevent racial profiling. (*Floyd v City of New York,* 2013).

The author of this study found an improvement in use-of-force report accuracy, but a reduction in use-of-force is an even more important goal. In an Aberdeen, Maryland study, there was data to suggest decreased assaults on officers wearing BWCs (White, 2014). Fouche (2014) found LEOs showed a high level agreement with the hypotheses that BWC increased positive resolution of complaints against LEOs. An on-going Mesa, Arizona study preliminarily found fewer complaints in the group of officers wearing the BWC compared to the control group of officers (White, 2014). The U.K. pilot study also found a reduction in citizen complaints. In fact, although the data was limited, the pilot study found a reduction in crime itself and found an increase in successful prosecutions (Goodall, 2007). These metrics may have some relationship to improved documentation, but the authors of this study believe this is the first study to actually look specifically at this question.

Another aspect of this study, not actually part of the study objective but which became apparent is the utility of the BWC recordings for scenario-based training. Recordings with the study LEOs were not shared, but the LEOs could have been shown the "mistakes" they made if this had been a purpose of the scenarios. The authors believed this could be an excellent tool compared to overhead cameras in set training facilities or the traditional "round table" discussion that occurs between the moderators/trainers and participants in scenario-based training. The Miami Florida Police Department has used this technique since 2012 in their academy (White, 2014).

Systems

There are already numerous companies entering the BWC market, including TASER International, VIEVU™, Watch Guard, Panasonic™, and Wolfcom™ Enterprises. While the results of our study apply to any BWC, there are additional benefits of systems such as the TASER AXON BWC used in this study, in the systems that accompany the BWC. With the AXON BWC, the data is contained on the BWC and automatically uploaded through a data port to a secure cloud-based network (Evidence.com). This means that LEOs cannot modify the recording, there are no disks or thumb drives to get lost (or "leaked"), and no local servers or hard drives to crash. It also means less information technology staff requirements. With the cloud-based network, recordings have an access audit trail and can be selectively shared easily with important persons or group such as district attorneys, medical examiners, courts, law enforcement oversight boards, or even media organizations. This can all be done securely without concern for electronic files being lost or misused. So, while the results of this study apply to any BWC, it is important for LEOs and administrators to consider the entire package offered by various competitors in the market. The United States Department of Homeland Security, Science and Technology Dictorate published a BWC system assessment specifically for law enforcement. The full assessment known as the System Assessment and Validation for Emergency Responders (SAVER) is a valuable tool for law enforcement agencies when considering the use of BWC's. The assessment in its entirety is located at http://www.firstresponder.gov/SAVER/Documents/Body-Worn-Cams-AR_0415-508.pdf

Limitations

As with any scenarios, it is impossible to completely recreate the stress of a real-life situation. Study authors believe that real-life situations, where the outcome is uncertain, the danger to the LEO is real. The real world use of force consequences would be more stressful and likely to lead to greater memory degradation.

This study did not address the effect of fatigue (e.g., length of time on shift, night shift, number of consecutive days, or nights, on). None of the study LEOs had completed a night shift, and only one had worked in the preceding 24 hours. Fatigue may have increased the number of errors in the study.

In this study, the LEOs had modest exertion between the climbing of the stairs and the use of force on the dummy. In real world scenarios, the exertion could be considerably greater. Heavier exertion may have increased the number of errors in our study.

Each scenario was allowed to play out at the discretion of the moderator serving as the referee, so there was not a set time interval from the end of the first scenario until the initiation of report writing. However, the times were roughly consistent and it was believed the minor variability did not affect study results. Study times may have actually been shorter than what might be realistic in the field. LEOs may have scene/transport/processing duties that may be prolonged, may have more calls to go to, and may have multiple reports to write that hold in their mind or with limited notes during a busy shift. LEOs may not write reports until the end of their shift that could be many hours after the use of force. We believe the results underreport the possible errors due to delayed report writing because of this. There is no standard for when a LEO has to write his report as it is all per individual department policy. But even the U.S. Department of Justice Consent Decree for the City of New Orleans only requires the report be written before the end of the LEO's shift (United States of America v. City of New Orleans, 2012).

Also, in real world use-of-force report writing, there may be more pressure than these test subjects faced since there could be administrative and legal consequences for inaccurate reports. This "pressure" could lead to more errors as the burden for details might challenge the LEO's memory and could lead to the introduction of more re-constructional errors such as schema or "fill in the gaps" errors. We had several reports that contained minimal details given the force used and we believed the LEOs would have done a more complete report in a real world setting. Additionally, because there were no real world legal consequences, there may have been less intensive review of the recordings than there otherwise would have been. LEOs missed many things that were readily apparent on their recordings that should have been used to amend their reports. Thus, it is believed in a real world setting, usual report writing would be fraught with more errors and the use of the recording may have picked up more errors.

There may have been more accuracy in this study than in a real world setting due to the subjects being very experienced LEOs who understood that part of the study included writing reports. While there were no real world consequences, as discussed above, there was some understanding about the purpose of the study even though it was not explicitly discussed. This understanding may have caused the LEOs to try to recall details for the report more than they would when in a real world setting.

No time limit existed for report writing in this study. LEOs did not have the

pressure of calls holding "on their beat." This may have given the subjects more time to think about their reports than they might have on a busy shift when dispatch needs units to clear to take calls. Time limits were not given in order to reduce undue pressure and rush.

Recordings were not reviewed with the LEOs. It was presumed if they did not comment on something (e.g., third person in the room), that they did not see it. Some of the LEOs did mention the third person in the room, for example, and it would be expected to include these details in a normal report, so we think this was a valid assumption.

Lastly, the study authors did the grading, rather than a blinded grader, and it was done by consensus. While pre-study derived criteria were used, some cases required judgment and the authors recognize the grading could introduce biases. Study limitations may lead to an important under-capture of errors in reports than might occur with BWC use in the real word.

Conclusion

The hypothesis was affirmed by the study results. Point-of-view BWC improved the accuracy of LEO report writing in this study, as hypothesized, leading to the correction of important errors from the LEO's original reports. This included 21 errors in our 11 LEOs related to miscounting, mis-sequencing, or omitting force, warnings, compliance, or other important descriptors of the use of force. Many of the errors could have led to, at a minimum, challenges to the officer's credibility, successful pursuit of an excessive force complaint, or dismissal of charges. The results were obtained in rested study subjects, under modest stress, with modest distractions. It is believed the true incidence of errors in a real-world population would be likely to be higher. Another secondary result from this study, which may be equally important to the primary hypothesis, is that what is seen on the BWC still may not be what the LEO saw, heard, or perceived. This result will be critical to consider in the post hoc analysis of an event using recording evidence. While this could be viewed as a negative consequence of the use of BWCs, the authors believe that the use of BWCs will actually be helpful for LEOs to reconcile the differences in their original reporting. With the pervasive nature of cameras in our society, LEOs are likely going to have to reconcile their reports with other videos at some point in judicial proceedings if there is a complaint or incident review.

This is the first study the authors are aware of that examined prospectively the effect of video/audio recording on LEO use-of-force report writing. It is believed that this study will help front-line LEOs better understand their own memory and report-writing limitations, understand the utility of BWCs to improve report writing accuracy, as well as some of the issues that BWCs will pose to them. This study suggests to administrators that point-of-view BWCs may help the liability posture of their law enforcement agencies, while at the same time may suggest issues that need to be addressed in training and policy. This methodology may offer other researchers a springboard to developing other methodologies for looking at these issues. Recommendations for additional study include using a larger sample size to validate results, as well as a similar study using fielded officers.

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Table 1

LEO Results to Changes from Initial Report Based on BWC Recording Review

Grading Guidelines	Study LEO Participant										
	1	2	3	4	5	6	7	8	9	10	11
Minor Errors											
• Inaccurate sequencing of events (no force)											
• Added quotations/misquotations	2	4	4	1	6	1	1		2	1	
• Dispatch communication error or add'1 info			1								
• Inaccurate description of physical attributes											
• Inaccurate scene description				1	1	1			1	2	
Total Minor Errors	2	4	5	2	7	2	1	0	3	3	0
Moderate Errors											
• Inaccurate sequencing of events (force)							1	2			
• Miscounting uses of force (+- 0-2)	1		1	2		2	1				
• Minor use-of-force change			2	1	1						
• Adding quotations/misquotations	4	3					2		6		
• Missing statements	1	2	1		1	1	2		4		
• Missing Evidence											
• Dispatch communication error, moderate											
• Added/inaccurate description behavior/actions					1			3	4		
• Omitting important subject behaviors	2	4	2		1	1					
• Missing possible weapons (other than gun)											
• Missing third person in the room											
Total Moderate Errors	8	9	6	3	4	4	6	5	14	0	0
Major Errors											
• Miscounting uses of force (>=3)											
• Omitting uses of force				2							
• Not giving warnings	2	1						1			
• Adding comply time/not giving time to comply					1						
• Missing significant statements				1							
• Missing gun											
• Omitting dangerous subject behaviors	1	1									
• Dispatch communication error, major											
• Falsely representing a UOF within policy											
Total Major Errors	3	2	0	3	1	0	0	1	0	0	0

Table 2

Errors Persisting After Recording Review by Subject

Grading Guidelines	Study LEO Participant										
	1	2	3	4	5	6	7	8	9	10	11
Minor Errors											
• Inaccurate sequencing of events (no force)											
• Added quotations/misquotations											
• Dispatch communication error or add'l info											
• Inaccurate description of physical attributes											
• Inaccurate scene description											1
Moderate Errors											
• Inaccurate sequencing of events (force)											
• Miscounting uses of force (+- 0-2)						1*					
• Minor use-of-force change											
• Adding quotations/misquotations							1*		1*		
• Missing statements											
• Missing Evidence	1	1	1	1	1	1	1	1	1	1	1
• Dispatch communication error, moderate											
• Added/inaccurate description behavior/actions							1*			1*	
• Omitting important subject behaviors				2*		1*	2*	1*	1*		2*
• Missing possible weapons (other than gun)	1	1	1	1	1*	1*	1*	1	1	1	1
• Missing third person in the room	1*	1*	1*	1*	1*	1*	1*				1*
Major Errors											
• Miscounting uses of force (>=3)	3									?	
• Omitting uses of force		3		?							
• Not giving warnings											
• Adding comply time/not giving time to comply											
• Missing significant statements										1*	
• Missing gun	1	1	1	1	1	1	1	1	1	1	1*
• Omitting dangerous subject behaviors				1							
• Dispatch communication error, major											
• Falsely representing a UOF within policy											

Subtable 2 Number of Errors Seen on Moderator's BWC.

Grading Guidelines	Study LEO Participant										
	1	2	3	4	5	6	7	8	9	10	11
Major Errors											
• Miscounting uses of force (>=3)	3 (5)*									? (6)*	
• Omitting uses of force		3 (5)*		? (4)*							

* = error could be seen on BWC recording.
The number of errors in parentheses is the number seen on the moderator's BWC.

Figure 1

Grading Criteria

Minor Errors
• Inaccurate sequencing of events (no force) • Added quotations/misquotations (minor – no meaning change/less important to case) • Dispatch communication error or additional information, minor (on scene, call details) • Inaccurate description of physical attributes • Inaccurate scene description
Moderate Errors
• Inaccurate sequencing of events (force) • Miscounting uses of force (+- 0-2) • Minor use of force change (location of force, distance) • Adding quotations/misquotations (moderate – meaning change/important to case) • Missing statements (admissions/complaints of crime/officer commands, not warning of force) • Missing evidence (drugs –both in plain view and that female hides them) • Dispatch communication error, moderate (one in custody, code 4, request supervisor) • Added or inaccurate description of subject/officer behavior/actions • Omitting important subject behaviors (male pushes female, female throws beer can first, female throws beer cans during struggle, female kicks male during struggle). If officer recognizes female concealing something but does not recognize it as drugs, it will count in this category. • Missing possible weapons – other than gun (scissors, broom, hammer) • Missing third person in the room
Major Errors
• Miscounting uses of force (>=3) • Omitting uses of force • Not giving warnings • Adding in compliance time or not giving time to comply • Missing significant statements (safety cues, threats to other person) • Missing gun (both in plain view and female concealing it in her waist band) • Omitting dangerous subject behaviors (concealing something in waistband) • Dispatch communication error, major (request back up) • Falsely representing a use of force as being within policy when it was not.