Data-Driven Improvements to Public Safety: Leveraging Intelligent Systems to Evaluate Complex Social Interactions in Policing.

Complex Social Interactions Lab, Washington State University

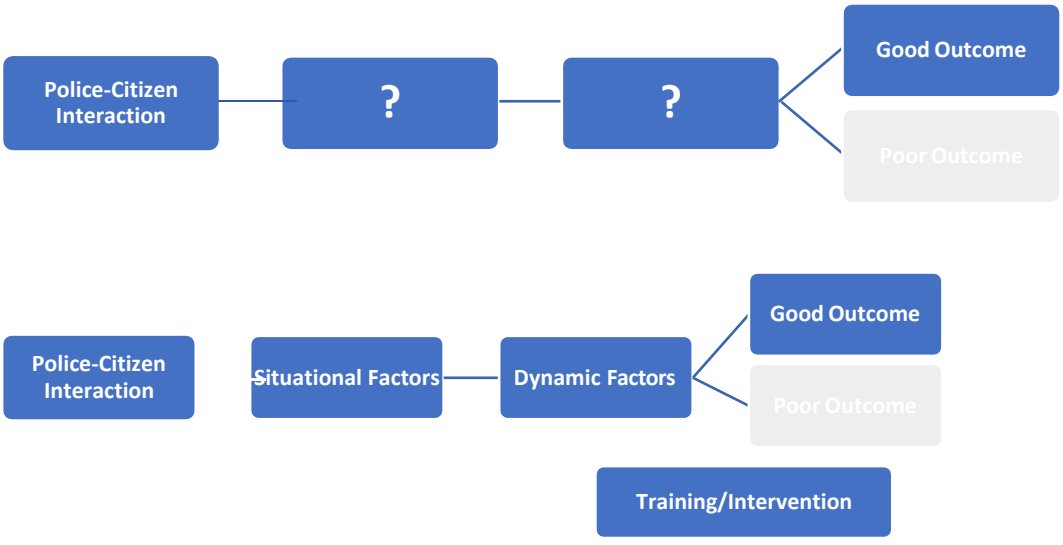
The Problem: Ongoing research in the Complex Social Interactions (CSI) Lab together with published work, indicates that police agencies review less than 5% of body-worn camera (BWC) footage among the thousands of hours generated daily. While this footage provides intelligence and has evidentiary value, it is vastly underutilized to identify strengths and weaknesses of police officer activities to inform training, reduce agency risk, and improve police-community interactions. highlighted the need to operationalize BWC footage (see Lum et al., 2019; Babin et al., 2018). Police officers' value BWCs as a tool for their protection (against false accusations), for evidence collection, and for accurate reporting. Yet, BWCs have not produced dramatic changes in police behavior and have not improved citizens' satisfaction with police encounters. In fact, BWCs likely exacerbate challenging relationships between citizens and the police in many cases, where citizens see cameras used to increase the accountability of citizens, but not the accountability of officers. Substantial changes in police behavior and performance can be produced by training and supervision, yet resources for these activities are limited. BWCs may hold the key for real changes in police-community relations, specifically to improve police performance and community relations; and to provide for a safer community. Analysis of BWC data can assist with the identification and prioritization of department-wide strengths and weaknesses as well as individual officer strengths and weaknesses and situational and environmental protective and risk factors for officer and community wellbeing. The potential knowledge collected every day through BWCs can and will enable departments to make more informed decisions to best utilize their limited resources, provided it is utilized to its fullest extent.

This inability to operationalize BWC footage is an issue of sparse resources, and a lack of assistive technologies and standardized methodologies. A hallmark of data science is that for data to be useable, it must be capable of categorization. Existing BWC technologies create important metadata (i.e., time, location, accelerometer readings). However, absent from these efforts are attempts to structure the content within this footage – *that is the nature of the interaction*. Despite decades of research attempting to improve police interactions through employment screening and standards, academy and in-service training, and targeted interventions, research has failed to identify what works. As evidence of this alarming state, consider knowledge on implicit bias training. The City of New York allocated $4.5 million to an Implicit Bias training program and at-present there is no research indicating the training influences how officers interact or make decisions in the field. A similar pattern exists within the state of training on de-escalation techniques. Do these techniques maintain existing emotional states, thus preventing them from escalating, or work to decrease the emotional state of the community member? At present, we have no generalizable research in support of either implicit bias or de-escalation techniques to improve the nature of the interaction. Yet, these approaches have immense popularity and will continue to draw police resources, despite a lack of evidence regarding their efficacy.

The Solution: Transitioning BWC from unstructured to structured data will transform the study of police interactions and revolutionize how agencies train and supervise police officers. Research in the CSI lab is the first to effectively demonstrate the operational utility of structured footage by transitioning the level of analysis beyond whether or not a given event in a police-community

interaction occurred, to how and when that event occurred. The earliest applications of the CSI methodology focused on officer use of force and, with over 10,000 hours of un-redacted police body-worn camera footage structured, the lab has examined how individual, situational, and dynamic factors associated with the interaction influence the odds of experiencing force, the level of force, and the duration of force (Willits & Makin, 2018). In a recent publication (Makin et al. 2019), the lab demonstrated the value of modeling negative emotionality, as a means of contextualizing police-community interactions. The CSI modeling approach has the ability to integrate any time-based measurement (i.e. biometric data) to inform performance outcomes and decision-making, allowing for an analysis of both static and dynamic factors using multi-modal measures. In support of this integration, the CSI lab captured BWC footage associated with in-service training, which overlay measures of psychological stress from worn instrumentation, to specific actions occurring within the footage, which is then connected to performance outcomes.

By structuring BWC footage at the micro-temporal and micro-social levels, these data become invaluable towards investigating decision-making on the part of both police officers and those they interact and the consequences of stress on decision-making. Importantly, the data provides contextually relevant feedback to stakeholders if specific interventions are effective in changing the nature of police-community interactions. At present, research in policing minimally considers the situational and dynamic factors leading up to the outcomes. Subsequently, stakeholders work under the assumption, as do their models, that actions leading up to a positive outcome, are commensurate with that positive outcome. However, as police supervisors and officers attest, an officer may operate within policy and the outcome of that interaction be deemed "bad", and likewise an officer may make considerable missteps throughout the interaction, and that interaction could result in a "good" outcome. By both contextually analyzing the situation, we are better able discover what works. The full realization of assistive technologies and standardized methodologies will allow agencies to make better use of this data and has clear implications for training, risk management, and improving officer safety and health.



Deconstructing Police Community Interactions into Micro-Social and Micro-Temporal Events.

Team and Impact: The research team of Washington State University's Complex Social Interactions (CSI) Lab, directed by Dr. David A. Makin, is emerging as a national leader in the efforts to investigate police officer decision-making and police-community interaction using un-redacted police body-worn camera (BWC) footage. Key researchers include co-principal investigator Dr. Dale Willits – a leading expert on situational violence and co-creator of the CSI lab, Dr. Wendy Koslicki an expert on police militarization and body-worn cameras, computational mathematician Dr. Bala Krishnamoorthy, lab manager Megan Parks, and undergraduate research assistants. Currently, the lab has trained and provided research opportunities to over 100 undergraduate students, helping them to develop important marketable skills, as well as experiential knowledge regarding policing. Collectively the efforts of this team are positioned to realize both data-driven improvements in policing and agency relevant, interdisciplinary research and teaching opportunities involving police-citizen interactions. In support of agency collaborations, the research lab has

-developed protocol and technologies to structure BWC footage;
-established partnering relationships with police agencies;
-coordinated with private industry to evaluate and validate in-field measurement devices (including biometrics measures of stress, object detection, and object classification);
-detection of behavioral signs of discrete emotional expression;
-and protocol for evaluating efficacy of training interventions designed to impart behavioral changes at the situational level.

The lab continues to expand the number of partnering agencies and interdisciplinary research collaborators to improve programmatic efficacy of training interventions, detection of risk, compliance irregularities, and assist agencies in early detection of problematic behaviors, which if unaddressed could pose direct health and safety issues to officers and community members.

Summary: Operationalizing video footage, by way of annotating resources, assistive technologies, and standardized methodologies, holds tremendous value in transforming policing, and more broadly any workforce where documenting interactions would be useful. Continued support of the CSI lab will provide stakeholders with interdisciplinary analytical tools, including classifiers and simulation modeling to better understand factors contributing to a range of outcomes - accounting for the situational, environmental, and dynamic factors within an interaction.

Sources

Babin, S., et al. 2018. Resilient communications project: body Worn Camera perception study phase 1: memorandum report. Department of Homeland Security Science and Technology Directorate, Washington D.C.

Lum, C., Stoltz, M., Koper, C. S., & Scherer, J. A. (2019). Research on body-worn cameras: What we know, what we need to know. *Criminology & Public Policy*, *18*(1), 93-118.

Makin, D. A., Willits, D. W., Koslicki, W., Brooks, R., Dietrich, B. J., & Bailey, R. L. (2019). Contextual determinants of observed negative emotional states in police–community interactions. *Criminal justice and behavior*, *46*(2), 301-318.

Willits, D. W., & Makin, D. A. (2018). Show Me What Happened: Analyzing Use of Force through Analysis of Body-Worn Camera Footage. *Journal of Research in Crime and Delinquency*. 55(1), pp. 51–77.