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Discussion of Findings

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70RDAD20FR0000208
Law Enforcement Use of Force SIMEX
DHS Office of Partnership and Engagement, Office for State and Local Law Enforcement.

This document provides and overview of the results from the Law Enforcement Use of Force Simulation Experiment (SIMEX) conducted under HSSEDI Task 70RDAD20FR0000208: Law Enforcement Use of Force SIMEX. The purpose of the task is to provide law enforcement organizations evidence-based data analysis that may be used to revise law enforcement practices to reduce arrest-related fatalities.

The results presented in this report do not necessarily reflect official DHS opinion or policy.

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Introduction

Officer training, multi-disciplinary coordination, and engagement in community-oriented relationship building are vital to deter and reduce arrest-related fatalities and injuries. Findings from the LE UoF SIMEX 21-3, conducted between April 5 and April 16, 2021, confirm many recommendations from former President Obama's 2015 21st Century Policing Task Force,[1] the National Organization of Black Law Enforcement Executives (NOBLE) Reimagining Public Safety Task Force,[2] the National Consensus Policy on Use of Force,[3] and statistics from the Bureau of Justice regarding arrest-related fatalities.[4]

The two-week SIMEX, conducted jointly with HSSEDI™ and George Mason University (GMU), used advanced virtual reality technology to test several performance measures (responses) and decision-making capabilities of Law Enforcement Officers (LEOs) during arrest and detention-related encounters with subjects. The overarching goal of the SIMEX stakeholders was to provide data-informed recommendations to all levels of LE that support the deterrence and reduction of arrest-related fatalities and injuries due to applied force by LEs.

De-escalation and crisis intervention techniques build community trust and offer an alternative to arrest and detainment. Findings from the LE UoF SIMEX underscore the importance of careful planning and coordination with community partners, including mental health professionals, to support civilian and officer safety. In alignment with recommendations 2.1 and 2.2. of former President Obama's 2015 21st Century Policing Task Force and VI.A of the NOBLE Reimagining Public Safety Task Force Report, planning efforts must be designed based on unique community needs and largely focus on identifying areas where additional resources, trainings, police-mental health collaborations,[5] and policies are needed prior to law enforcement intervention. Community partnership and collaboration should not be limited to municipal resources, but also focus on law enforcement policy and trainings on situations that warrant crisis intervention. Collaboration between LE agencies, mental health services, and members of the community, particularly communities and neighborhoods disproportionately affected by crime, is central to developing strategies for deploying mental health and social support resources that aim to improve relationships, increase community engagement, and foster positive relationships among LE and civilians.

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[1] Office of Community Oriented Policing Services. (2015). President's Task Force on 21st Century Policing. Washington, DC: U.S. Department of Justice.
[2] National Organization of Black Law Enforcement Executives. (2021). Report of the Reimagining Public Safety Task Force. Alexandria, VA: NOBLE.
[3] International Association of Chiefs of Police. (2020). National Consensus Policy and Discussion Paper on Use of Force. Alexandria, VA: IACP.
[4] Banks, D., Couzens, L., Brooks, C., & Whyde, A. (2019). Arrest-Related Deaths Program: Pilot Study of Redesigned Survey Methodology. Washington, DC: Bureau of Justice Statistics.
[5] Police-mental health collaborations are partnerships between law enforcement agencies and mental health service providers aimed at ensuring safety for all individuals and improving access to services and supports for people with mental illness and intellectual and developmental disabilities.

Public understanding and transparency regarding use of force is deficient. In combination with increased officer training on UoF alternatives and police-mental health collaborations, community partnerships aimed at increasing the public's understanding of legal standards and UoF policies is needed. Additionally, as outlined in the NOBLE Reimagining Public Safety Task Force Report, LE organizations must carefully listen to the public's expressed needs, rely on evidenced-based recommendations, and reform policies that perpetuate over-policing and police violence within racial and ethnic communities. A collective effort, guided by a commitment to transparency and accountability, of LE and civilian understanding of UoF allows for policy-informed civilian advocacy and oversight. As evidenced in SIMEX 21-3, individuals who are armed or physically combative are more likely to sustain a fatal injury and, while UoF may be necessary and permitted under some circumstances, public understanding of officer decision-making and UoF evaluations in these circumstances is deficient. These deficiencies erode public trust, particularly within racial and ethnic communities. These findings echo general guidance provisions outlined in the National Consensus Policy on Use of Force, which emphasizes agency transparency as a requirement for engendering public trust, and the 21st Century Policing Task Force[1] recommendation 1.2, which calls for LE organizations to acknowledge injustices of past and present policing as a barrier to community trust.

Evidence-based approaches for understanding disparities in threat perception and implicit bias are needed. A major theme in the current national discussion of excessive UoF by LE is the subject's race. According to 2015 data from the Bureau of Justice Statistics, 64% of arrest-related homicides involved White/European American decedents, 24.3% were Black/African American, 1.2% were American Indian/Alaska Native, and 9.3% unknown.[6] Considered within the current demographic distribution percentages for the general US population,[7] this data indicates non-White Americans were more likely than White persons to be victims of arrest-related homicides. Comparatively, between 2017 and 2018, the Bureau of Justice Statistics (BJS)[8] reported White/European Americans (26%) were more likely than Black/African Americans (21%), Latino(a) Americans (19%), or persons of other racial groups (20%) to experience at least one police contact.[9] There was no statistically significant difference in the percentage of Whites (12%) and Blacks (11%) who experienced police-initiated contact. Surveys by the Pew Research Center highlight the overall perceptions of LE and the perception of LE after recent protests.[10] Both Black and White Americans perceive (84% and 63%, respectively) that Black individuals are treated less fairly than White individuals by police. Findings from SIMEX 21-3 stress the complexity surrounding racial disparities and applied force by LE. The results also highlight that the current data regarding fatal force incidents, which are predominately based on demographic indicators of race, are insufficient to evaluate systemic racial inequities and police bias. To address competing narratives by community members and LE organizations, a stronger evidence-based approach that moves beyond racial group

[6] Banks, D., Couzens, L., Brooks, C., & Whyde, A. (2019). Arrest-Related Deaths Program: Pilot Study of Redesigned Survey Methodology. Washington, DC: Bureau of Justice Statistics.
[7] United States Census Bureau. (2021, December 20). Quick Facts. Retrieved from United States Census: https://www.census.gov/quickfacts/fact/table/US/PST045219
[8] Harrell, E., & Davis, E. (2020). Contacts between police and the public, 2018–statistical tables. Bureau of Justice Statics Report, NCJ, 255730.
[9] Police contact includes being stopped in a public place or parked vehicle by an officer, being stopped while driving or riding in a motor vehicle, or other reasons for being stopped or approached by police (Harrell & Davis, 2020).
[10] Desilver, D., Lipka, M., & Fahmy, D. (2020, June 3). 10 things we know about race and policing in the U.S. Retrieved from Pew Research Center: https://www.pewresearch.org/fact-tank/2020/06/03/10-things-we-know-about-race-and-policing-in-the-u-s/

membership is required. Such an approach would be aimed at increasing the amount and quality of data provided by police departments and strict national standards for reporting and maintaining use of force data.

Overarching recommendations. Findings from SIMEX 21-3 offer four overarching recommendations intended to serve as evidence-based insights for the LE community and associated stakeholders to supplement the establishment of best practices relevant for their unique jurisdiction. These include: (1) reductions in use of lethal force require further investment in training and non-lethal options to improve proficiency levels across a highly complex and demanding profession; (2) LE agencies must take steps to foster an organizational culture that values transparency and communication about common sources of internalized stress, such as the constant risk of grave consequences including loss of life, subject/bystander non-compliance, public scrutiny, and UoF decision making; (3) LE organizations should fund and continue investigating collaboration models between LEOs and clinical mental health service providers that allow all participants to utilize their strengths in working with the community without increasing the risk to any individuals; and (4) LE organizations should invest in future research regarding cognitive process of officer decision making regarding UoF, implicit bias, and threat detection disparities for historically marginalized and vulnerable populations.

Experiment Overview

The LE UoF SIMEX explored five experimental factors hypothesized by SIMEX stakeholders as relevant in deterring and reducing arrest-related fatalities and injuries due to applied force by LEOs during arrest and during detention-related encounters. The objective was to provide LE organizations and the public with evidence-based data to: (1) inform current UoF policies, procedures, and training efforts; (2) support evidence-informed policies, procedures, and tactics for LEO UoF; (3) improve situational awareness between arresting officers, LE organizations, mental health service providers, and the public regarding LE UoF; and (4) identify additional areas of research regarding LE applied force and related tactics.

The experimental design was developed in collaboration with multiple stakeholders from varying disciplines, including DHS Components; national organizations and associations; and federal, state, local, tribal, and territorial LE entities.

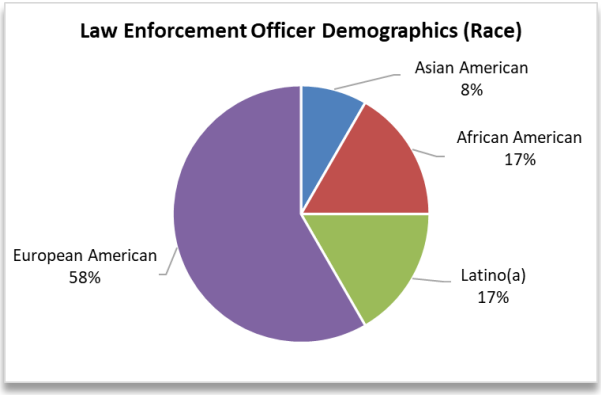
SIMEX utilized virtual reality technology to model several scenarios aimed at evaluating five categorical factors (each with two values) hypothesized by SIMEX sponsors and stakeholders to highlight critical areas of concern regarding applied UoF. Factorial experimental design, spanning 32 scenarios, included randomized combinations of the following five experimental factors: (1) whether the subject was armed with a handgun or unarmed, (2) whether the subject appeared to be exhibiting symptoms of psychosis or asymptomatic, (3) whether the subject was physically combative or not physically combative, (4) whether a mental health professional (MHP) was available for LEO dispatch or unavailable, and (5) whether the skin tone of the subject avatar was light colored (White) or dark colored (Black). The experiment collected data on multiple performance measures (responses) for each scenario, such as the number of fatalities

	Experimental Factors	Factor Description
1	Subject Armed	Level 1: Subject is not armed. Level 2: Subject has a handgun.
2	Altered Psychological State	Level 1: Subject is not exhibiting signs of psychosis. Level 2: Subject is exhibiting signs of psychosis.
3	Subject Resistance	Level 1: Subject is not physically combative. Level 2: Subject is physically combative.
4	Mental Health Professional	Level 1: The LE department does not have MHPs on staff. Level 2: The LE department has MHPs on staff; an MHP is dispatched immediately following the dispatch of officers.
5	Subject Race	Level 1: Subject has white/lighter-colored skin. Level 2: Subject has black/darker-colored skin.

and the number of times a weapon was drawn and discharged. Each scenario included two LEOs, one subject, and up to four bystanders. In some runs, LEOs could request an MHP. To ensure a high level of fidelity in measuring the five factors, components of each scenario were tightly controlled and held constant during record runs.

Participants

Twelve LEOs, four MHPs, four subjects, 10 bystanders, and three scenario evaluators (SEs) participated in the SIMEX. Four LEOs also served as dispatch operators and SEs. To the extent possible, LEOs were selected to reflect the real-world diversity of gender, race, and organization size. In alignment with +/-10% of national distribution percentages for LEOs,[11] the majority of officers in the sample were male (83%%, *n*=10). Mean officer age was 44, ranging from 22 to 57 years old. Regarding race, 58% (*n*=7) of officers identified as European American, 16.67% (*n*=2) as African American, 16.67% (*n*=2) as Latino/a, and 8.33% (*n*=1) as Asian American. Ten officers (83%) had 10 or more years' experience in law enforcement, with two officers reporting three or fewer years' experience. Most officers (50%, *n*=6) were currently working in a suburban[12] area, with other geographical classifications of rural (16.67%, *n*=2) and urban (33.33%, *n*=4) represented. Eight (66.67%) officers were affiliated with state or local LE agencies, one with a U.S. territory, and three officers were employed by a federal LE organization. Students and civilians affiliated with GMU served in the role of designated subjects and bystanders. All subjects were male, with equal distribution (50%, *n*=2) of participants identifying as African American or European American. Mean subject age was 28.5 and bystander was 29.6. All subjects and bystanders were currently enrolled in or had completed college. MHPs came from a local Community Services Board and all were Crisis Response Trained.



All participants followed role-specific rules of engagement to maintain scientific rigor and ensure consistency of data collected across runs. Subjects were trained to accurately portray scripted behaviors related to psychosis in the VR environment. Dispatch operators read a pre-configured script to dispatch officers. Specific information on scenarios, including constants, timeline, and the concept of operations for operators, can be found in Section 3 of the LE UoF SIMEX 21-3 Final Report.

Data Collection and Analysis

To measure scenario outcomes, quantitative data was collected by automated event logging and survey data. Qualitative data collection included open-ended survey responses from participants, LEO interviews, and recorded observations. Quantitative measurements used to evaluate each run included: number of fatalities, incidences of weapons (gun and taser) drawn and discharged,

[11] American Community Survey Office. (2021). American Community Survey, 2020 1-Year Experimental PUMS File. Washington, DC: United States Census Bureau.
[12] United States Census Bureau. "2010 Census Urban and Rural Classification". United States Census Bureau, Washington DC, 2012.

and whether the subject was handcuffed and the time it took to handcuff the subject. Post-run qualitative measurements included standardized assessments of situational awareness,[13] workload,[14] fear and distress,[15] and confidence in officer actions.[16]

Additional qualitative data was gathered to add to the narrative of each run and to facilitate understanding of contextual circumstances and factors influencing participant actions for each run. These self-report evaluations asked participants whether a LEO applied force, whether UoF was "objectively reasonable,"[17] and if they had concerns for their own personal safety or the safety of others. Role-specific questions included motivation for drawing and firing weapon (subjects/LEOs), motivation for recording (bystanders), compliance or non-compliance with LEOs (subjects/bystanders), whether the LEO appropriately engaged with subject and bystanders (SEs), and whether the LEO determined and engaged in the appropriate amount of force (SEs). Additional qualitative findings from survey responses are indicated by the frequency in which a participant responded "*yes*" to a closed-ended question regarding an action they took or a behavior they witnessed. Sample closed-ended questions include, "*Did you fire your weapon?*" "*Did a law enforcement officer apply force to the suspect?*" and "*Was force used in an objectively reasonable manner?*" Sample qualitative questions asked of SEs include, "*Was the overall response by LE objectively reasonable? If no, why?*" and *"Did the LE determine and engage in the appropriate amount of force. If no, why?*"

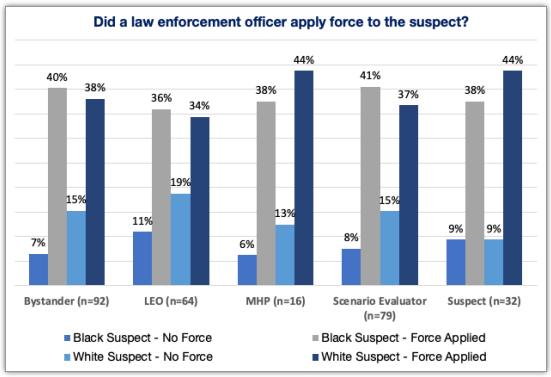
Key Findings

SIMEX 21-3 explored how and when LEOs apply force during interactions with potential or perceived subjects. The combination of a controlled experiment design and qualitative research methods allowed researchers to distinguish which factors impacted scenario outcomes and offered insight into how and why the impact occurred. The quantitative findings that follow are statistically significant, which refers to findings in which it would be unlikely for the effect found to be caused by chance. Qualitative closed-ended questions are based on frequency, and questions that included an open-ended response are coded for explicit and implicit themes using thematic analysis.[18]

Variability in evaluations of applied force and whether force was "objectively reasonable" was evident. Public understanding regarding UoF is limited, pointing to a need for transparency and increased awareness in how UoF is evaluated. Based on SIMEX 21-3 findings, UoF

[13] Self-reported situational awareness (SA) was captured by the Situational Awareness Rating Technique (SART), which measures SA as a combination of the impact of an individual's supply of attentional resources, their understanding of a situation, and the demands of a given situation on their attentional resources. Taylor, R. M. (2017). Situational Awareness Rating Technique (SART): The Development of a Tool for Aircrew Systems Design.
[14] Self-reported workload was calculated via the NASA Task Load Index (TLX), which measures an individual's workload based on their self-reported mental demand, effort, temporal demand, performance, and frustration. Hart, S. G., & Staveland, L. E. (1988). Development of NASA-TLX (Task Load Index): Results of Empirical and Theoretical Research. Advances in psychology, 139-183.
[15] Self-reported fear and distress was measured via the Subjective Units of Discomfort Scale (SUDS), which provides subjective information regarding an individual's level of discomfort and/or distress. Wolpe, J. (1969). The Practice of Behavioral Therapy, New York: Pergamon Press, Ltd.
[16] Confidence in actions was measured using the within-subjects confidence-accuracy (W-S C-A) method. Adams-White, J. E., Wheatcroft, J. M., & Jump, M. (2018). Measuring Decision Accuracy and Confidence of Mock Air Defense Operators. Journal of Applied Research in Memory and Cognition, 60-69.
[17] International Association of Chiefs of Police. (2020). National Consensus Policy and Discussion Paper on Use of Force. Alexandria, VA: IACP.
[18] Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. International Journal of Qualitative Methods, 1-13.

evaluations are inconsistent and likely skewed by public perception and increased public scrutiny of officer actions. The results indicated bystanders and SEs most frequently reported applied force in runs when the subject was Black.[19] Conversely, mental health professionals and subjects most frequently reported applied force for White subjects. LEOs had the highest reports of not applying force.



Determinations of force were dependent on participant background and role. SEs with LEO experience had procedural observations regarding force. Following an indicator that force applied was not reasonable, SE 805 stated, "*I do not believe they should have gotten that close and went hands on with an armed subject, less lethal or even deadly force could have been used.*" SEs who currently participate in civilian review activities expressed greater concern for subject safety/rights. SE 804 noted, "*It is not reasonable to prevent property damage by exposing a subject to a high degree of risk of serious injury or even death by tasing them.*"

Bystanders, and to some extent SEs and dispatch, did not fully trust LEO actions regarding objective and reasonable UoF. Excerpts from bystanders note this skepticism, "*I was worried the officers would end up hurting him in order to detain him*" (Bystander 705) and "*...two cops rolled up on scene. Next thing you know the suspect was tazered [sic] for no reason*" (Bystander 707). Mistrust was particularly evident when bystanders were asked their reason for recording police/suspect interactions, "*I started to record the interaction between the police and the civilians over a black lady to see how the officers are going to play this out*" (Bystander 706).

Despite reports of mistrusting police, across all runs, bystanders more frequently reported force was "objectionably reasonable." In runs with Black suspects, LEOs always reported UoF was objectively reasonable (100%). However, in four runs with White suspects (13%), LEOs noted force was not objectively reasonable. For subjects, when asked if force was used in an objectively reasonable manner, Black subjects confirmed force was objectively reasonable in 12 out of 15, or 80%, of runs in which the subject confirmed force was used. Comparatively, White subjects confirmed force as reasonable in only 10 out of 17, or 59%, of runs in which they confirmed force was used.

- "*The police officers immediately drew they firearms towards me. I was not doing anything wrong. It is my 2nd amendment right to bear arms*" (Subject 903 [White])
- "*The bystanders and me played basketball and tag...I believe I was tazed*" (Subject 901 [Black])

Consistent with literature on public fear regarding policing, behaving in a way that was incongruent with one's sense of self was the most frequently reported stressor for subjects, particularly for Black subjects. When asked to expand on the most stressful part of the scenario, 41.2% of Black subjects reported interactions with LEOs as stressful, compared to 15% of White subjects. Subject aggression toward LEOs (e.g., pointing a weapon at LE) remained equal based

[19] "Black" and "White" subjects references indicate light skin-tone (White) and dark skin-tone (Black) avatars. Due to limitations of current virtual reality technology to accurately portray racial and cultural variations, a decision was made by stakeholders to investigate subject race only by light and dark skin-tone.

on race. This finding implies cognitive dissonance[20] related to subject aggression, regardless of subject race, was constant. However, non-specific encounters, such as being approached by police or talking with police, were different based on subject race; 100% of responses from Black subjects indicated non-specific encounters, such as talking with LEOs, as the most stressful moments of the run. White subjects never reported (0%) non-specific LE encounters as stressful, indicating the absence of perceptual conflicts in non-aggressive interactions with police. These findings are consistent with the literature on public mistrust of police, discriminatory police practices, racial and ethnic disparities in arrest and detainment, and highly publicized UoF encounters between individuals and LEOs.

As evidenced by LEO interviews and open-ended survey responses, increased perceptual conflicts, particularly in highly unpredictable and unusual situations, cause individuals to take cognitive shortcuts. While useful in responding quickly and efficiently based on training and experience, cognitive shortcuts can lead to biased decisions and actions that are incompatible with the current state of a dynamic situation. Cognitive shortcuts are also associated with implicit bias and threat perception errors. Interestingly, LEOs and bystanders were more likely to report the subject as being compliant when the subject was White, despite increased frequency of weapons being drawn and discharged more frequently and higher fatalities in runs with White subjects. Thus, the need for future research investigating implicit bias and automatic threat reactions in arrest and detention-related encounters and policy changes to prevent racial disparities in UoF decision making cannot be understated.

Results of the analysis regarding a subject being armed and physically combative were consistent with current literature.[4,21,22] The original hypothesis for subject armed and physically combative was that these factors would increase the likelihood of LEO use of fatal force. While seemingly intuitive, the lack of reliable data on circumstances regarding UoF incidents[23] and claims that increased public scrutiny has led to a decrease in the number of unarmed UoF incidents,[24,25] a close look at factors that may be deemed "an imminent threat" was required. Moreover, given the variability in civilians understanding UoF and the lack of a consensus definition, clear evidence on these factors can support public education, organizational transparency, and public understanding of UoF. Well established within extant literature is that UoF can have a negative effect on how the public perceives policing, legitimacy of policing, and willingness to trust LE.

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[20] Harmon-Jones, E., & Mills, J. (2019). An introduction to cognitive dissonance theory and an overview of current perspectives on the theory. In E. Harmon-Jones, Cognitive dissonance: Reexamining a pivotal theory in psychology (pp. 3-24). Washington, DC: American Psychological Association.
[21] DeGue, S., Fowler, K. A., & Calkins, C. (2016). Deaths due to use of lethal force by law enforcement: Findings from the national violent death reporting system, 17 US states, 2009–2012. American journal of preventive medicine, 51(5), S173-S187.
[22] Barber, C., Azrael, D., Cohen, A., Miller, M., Thymes, D., Wang, D. E., & Hemenway, D. (2016). Homicides by police: comparing counts from the national violent death reporting system, vital statistics, and supplementary homicide reports. American journal of public health, 106(5), 922-927.
[23] Jackman, T. (2021, June 9). For a second year, most U.S. police departments decline to share information on their use of force. Retrieved from Washington Post: https://www.washingtonpost.com/nation/2021/06/09/police-use-of-force-data/
[24] Engel, R., McManus, H., & Herold, T. (2020). Does de-escalation training work?: A systematic review and call for evidence in police use-of-force reform. Criminology & Public Policy, 721-759.
[25] Nix, J., Campbell, B. A., Byers, E. H., & Alpert, G. P. (2017). A bird's eye view of civilians killed by police in 2015: Further evidence of implicit bias. Criminology & Public Policy, 309-340.

Results demonstrate that in runs with an armed subject, both LEOs drew their weapon 100% of the time. In runs when the subject was not armed, a single LEO drew his/her weapon twice. Taser discharge, considered a less lethal option, was more frequent in runs when the subject was physically combative and applied force was higher. In both cases, more fatalities occurred (*n*=6). It follows that when the subject was not armed or physically combative, UoF decreased, and subject fatalities were lower (*n*=2). This pattern, in combination with reports from LEOs, indicated LEO actions are consistent for UoF in situations when the perceived threat is imminent.

Qualitative findings indicated that when LE is presented with a scenario in which they have a clear concept of operations (CONOPS) or training, their actions are consistent with what they are trained to do. Conversely, when subject behavior is deemed unpredictable by the officer or there is more room for the scenario to escalate, there is a greater chance of variability in officer decision making. Interestingly, despite clear protocols regarding UoF in cases when a subject is armed or physically combative, workload[26] and levels of fear/distress[27] were higher for the LEO. When cognitive workload increases, executive functioning tasks such as working memory, sensemaking, problem solving, anticipating, and planning are compromised.[28] Variety, ambiguity, and unpredictability of the situations add layers of complexity that escalate the cognitive demands. Increased workload on LEOs is further confirmed by bystander reports of rapid escalation in runs where the subject was physically combative. All participants also reported lower subject compliance with armed or physically combative conditions, which could be a contributing factor to increased LEO workload and stress.

Consistent with variations in applied force, bystanders did not perceive an armed subject as their biggest concern. Instead, subject threats, force being used on a subject, or fear that the subject would harm the LEOs were reported. When asked if they had concerns about their safety or the safety of others bystanders noted, "*When the [subject] pulled out a knife I was worried about the officers as well as the family involved*" (Bystander 709). In alignment with the National Consensus Policy of UoF, bystanders were least concerned with an armed suspect because they deemed applied force in these instances as objectively reasonable.

Carefully planned police-mental health collaborations support civilian and officer safety. Findings confirmed utilization of an MHP as a critical component of de-escalation and use of less-lethal force. A key theme across approaches to de-escalation was that all participants noted the importance of the MHP in attending to and engaging with the subject, namely supporting problem solving, offering practical resources, validation of the subject's experience, and showing respect. SE 801 noted, "*MHP maintained control of this entire run and used a host of de-escalation techniques (mirroring language, expressing openness and concern, offering flexible help, etc.)*" and Bystander 707 stated, "*A mental health professional was on call and seemed to have a good communication line with the suspect.*"

Emergent themes from LEOs regarding de-escalation followed a consistent operational, action-focused pattern, with verbal commands and tactical positioning most prominent. The use of less-

[26] Self-reported workload was calculated via the NASA Task Load Index (TLX), which measures an individual's workload based on their self-reported mental demand, effort, temporal demand, performance, and frustration.
[27] Self-reported fear and distress was measured via the Subjective Units of Discomfort Scale (SUDS), which provides subjective information regarding an individual's level of discomfort and/or distress.
[28] R. L. Triplett, J. M. Jaworski and K. Neville, "An Examination of Long-Term Working Memory Capacity," Journal of Aviation Technology and Engineering, vol. 3, no. 2, 2014.

lethal force (i.e., taser) was noted as a common de-escalation technique for LEOs. While SEs did not comment as frequently on tactical positioning, the use of less/non-lethal force and engagement of the MHP for de-escalation was noted. Officers who had a Crisis Intervention Team (CIT)-trained partner consistently deferred to that individual for de-escalation. CIT-trained officers utilized engaged understanding including establishing rapport, empathy, and negotiation, and frequently referenced taking cues from the subject and civilians to promote trust and compliance. When asked what de-escalation techniques were used, LEO 111 reported, "*We used CIT and verbal in attempt to reason and establish rapport with the subject. Mental health was also on scene and assisted with evaluation. We were able to use a family member to gain the trust of the subject and no force or arrests were taken*."

Despite the importance of the MHP in supporting officer and civilian safety, MHP operational engagement by LEOs was unexpected. It was hypothesized that the presence of an MHP would have a positive impact in de-escalation, resulting in a decrease of applied force and fatalities. While the use of the MHP in de-escalation was evident, the MHP was rarely dispatched in runs with armed and combative subjects. This resulted in the MHP having limited or no effect toward de-escalation in a majority of the runs. Moreover, when the MHP was engaged, LEO workload was significantly higher, there was more concern for the safety of others, and LEOs were more likely to apply force. Survey responses and observation data indicated LEOs were more concerned for the safety of others in runs with MHP present. LEO 104 reported, "*I thought of [MHP] as an innocent civilian. This means we have to do certain things to try to protect him just like everybody else around there. We may have to use force quicker if a subject addresses him."* While LEOs repeatedly expressed the need for mental health support services and the utility of co-responder models, analysis of LEO cognitive load relative to stress-impacted cognitive capacity shows that monitoring and protecting the MHP is demanding. LEOs and MHPs emphasized effective and pre-planned transition activities (i.e., engagement of MHP and disengagement of LEOs) are vital in maintaining safety.

Of particular importance is when a subject is exhibiting signs of mental illness. Findings indicated psychosis is a complicating factor for UoF response, particularly in combination with an armed or physically combative subject. As noted previously, the MHPs were typically not engaged in combative situations, and consequently not able to support de-escalation. In scenarios when the subject was exhibiting psychosis, LEOs were more likely to use lethal force and bystanders were more likely to be compliant with LEO commands. LEOs tended to view subjects who exhibited signs of psychosis as non-compliant, and participants noted that subject non-compliance led to situations escalating quickly. Given the interaction with LEOs being hesitant to deploy an MHP in circumstances in which the MHP may be perceived as being at risk, there was little opportunity for de-escalation or engagement with the MHP. LEOs perceived interactions with subjects exhibiting signs of psychosis as more stressful and challenging.

These findings indicate future investigations should explore interactions with an armed or combative subject exhibiting symptoms of psychosis. Universally, LEOs agreed additional training and/or police-mental health collaborations are needed to effectively engage with mentally ill subjects/civilians. Given the use of the taser as a de-escalation tactic, training on concrete ways in which officers cannot use applied force may be useful.

Cognitive load and capacity are vital to understand situation assessment and decision making for law enforcement officers. LEOs are required to perform cognitive activities (e.g., situation assessment and decision making) in a compressed time period under high-stress conditions. Additionally, they are often under the influence of cumulative chronic stress

exposure. Cognitive activities for LEOs demand much more than the normal baseline (i.e., not increased by training or experience) of human cognitive capacity. This disparity is heightened by the reduction in capacity caused by stress. LEOs operate at a high risk of taking cognitive shortcuts that are not sufficiently responsive to a given situation. This risk is lowered by continuous training for performance in high-stress conditions.

In the interviews, LEOs often attributed their proficiency to experience rather than training. Experience is important, but a combination of experience and training is invaluable. Training accelerates the acquisition of proficiency and increases the level of proficiency beyond rates and levels achieved using experience alone. Training and associated feedback can reveal skill and knowledge gaps and misconceptions that can be difficult to recognize.

Based on LEO survey responses, subjects, bystanders, and SEs perceived LEOs trained in de-escalation techniques as more effective in soliciting compliance. Survey data point to the need for continued education in areas such as tactical assessment and response, including tools for de-escalation; mental health support services; and emotional and physiological self-regulation. Interview findings highlight the need for continuous training opportunities woven into workweek activities, including frequent high-fidelity training focused on the challenges of high-stress, high-demand situations to mitigate acute stress- and cognitive load-related risks to decision making.

Evidence-based approaches for understanding disparities in threat perception and implicit bias are needed. Consistent with findings that UoF evaluations widely vary, specifically regarding the perception of "reasonableness" regarding UoF and race, SIMEX 21-3 underscored the complexity of understanding race and officer decision making. A central question in this experiment was whether racial cues (as indicated by avatar skin-tone) bias LEO decision making. Establishing the presence or absence of racial bias in actual UoF incidents is highly problematic and findings from SIMEX 21-3 support this complexity. Social desirability,[29] national attention on race and LE, and LEO reticence in using force indicated there were many outside factors that impacted an investigation of race in the current investigation. In no responses did the SIMEX participants discuss the race of the subject or racially driven thoughts or behaviors. Participants never cited subject race as a motivating factor for actions, and the topic of subject race was never mentioned by LEOs in qualitative interviews. However, despite a high likelihood that outside events and internalized pressures had an impact on operator behavior, indicators of implicit bias and inaccuracies in threat perception are evident.

Data and the subsequent analysis indicate that the perception of events, including the reasonable application of force, varied between runs with Black and White subjects. During runs when the subject was Black, bystanders reported higher levels of situational awareness when the subject was unarmed compared to when the subject was armed. Bystanders were wary of LEOs using force. Even in situations where the intent was to keep civilians safe, bystanders did not trust LEOs to reasonably apply force, particularly in runs with Black subjects. However, except for the use of threatening verbal commands, which was higher in runs with Black subjects, the application of all levels of force was more likely to be reported during runs when the subject was White. While SIMEX 21-3 findings support the Bureau of Justice statistics on UoF, specifically that 25% of arrest-related fatalities involve African American males, these results raise significant questions about biased, subjective perceptions of operator evaluations of behavior based on race. Stated previously, the need for subsequent investigations aimed at countering

[29] Refers to the tendency of research subjects to give socially desirable responses.

implicit bias, building cultural competence, and increasing community engagement are vital to understanding and addressing racial inequities in UoF practices and procedures.

Conclusion

The purpose of the LE UoF SIMEX was to examine the impact of five experimental factors on arrest-related fatalities and injuries by placing LEOs, bystanders, subjects, MHPs, and scenario evaluators in a simulated environment. LEOs and MHPs were asked to respond to incidents in each run as they would in real-world situations. The overarching goal was to share evidence-based insights with the LE community and associated stakeholders to supplement the establishment of best practices relevant for each jurisdiction. As highlighted, findings from the LE UoF SIMEX stress the importance of de-escalation and crisis intervention training for officers, carefully planned police-mental health collaborations, and increased transparency regarding jurisdictional policies and evaluations related to UoF. While this summary provided only a highlight of key findings, results from the LE UoF SIMEX cannot be understood without careful consideration of the SIMEX experiment design and intent, outlined in the LE UoF (SIMEX 21-3) Final Report. The Final Report details the complexity regarding threat perception and implicit bias, stress-impacted cognitive demands, and shortcuts for LEOs, fear and safety concerns, and indicators of cognitive dissonance and subjective bias for SIMEX participants.

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