POLICE PRACTICE AND RESEARCH
https://doi.org/10.1080/15614263.2021.1948848

Routledge
Taylor & Francis Group

ARTICLE

The association between participant characteristics and perceptions of the effectiveness of law enforcement tactical simulator training

John Comiskey[a], Brian Lockwood[a], Shannon Cunningham[b] and Julia Arminio[a]

[a]Lockwood Department of Criminal Justice, Monmouth University, West Long Branch, United States; [b]Department of Criminal Justice, Monmouth University, West Long Branch, United States

ABSTRACT

This study is among the first to examine the perceptions of police officers who complete virtual firearms and tactics simulator training for purpose of improving relations between citizens and law enforcement officials. The results of our analysis identified two main findings. First, it showed that the vast majority of participants perceive the simulator training that they completed to be of value, as evidenced by the high mean values of positive perceptions of the simulator. Second, we identified participant characteristics related to both increased and decreased odds that participants perceive the simulator training as effective. Specifically, possessing a bachelor's degree and employment with a municipal police department are related to an increased likelihood of perceiving the training as more effective than other training methods. Police departments and researchers should consider the possible implications of these subtle predictors and develop strategies and policies that will enhance the experiences of all trainees and, ultimately, more favorable training outcomes.

ARTICLE HISTORY
Received 4 February 2021
Accepted 22 June 2021

KEYWORDS
police-citizen encounters; police decision making; use of force; firearms and tactics simulators

The death of George Floyd while in police custody in May 2020 in Minneapolis, Minnesota rejuvenated longstanding national discussions about police use of force, racism, and systemic inequalities in the criminal justice system. Floyd's death stirred the nation's conscience and resulted in massive protests and civil disturbances calling for justice and police reform throughout the nation and worldwide. This incident is the latest in several high-profile incidents involving a perceived use of excessive force, including the fatal police shootings of Walter Scott in North Charleston, South Carolina (President's Task Force on 21st Century Policing, 2015), Michael Brown in Ferguson, Missouri (2014), Tamir Rice in Cleveland, Ohio (2014), and Laquan McDonald in Chicago, Illinois (2014). The deaths led to widespread protests and civil unrest, as well as expansive media coverage, and calls for police reform, enhanced accountability, oversight, and training. The aftermath of these incidents has also shed light on the precarious nature of policing and the decision-making processes that police officers must make in high-risk and life-threatening situations.

The President's Task Force on Policing in the 21st Century (2015), the Police Executive Research Forum (2016a), the Department of Justice (2017), and the U.S. Commission on Civil Rights (2018) called for sweeping changes in American policing that included building trust and legitimacy, clear and comprehensive policies for citizen-police encounters and use of force, as well as effective training that prepares officers for a wide range of challenges including active shooters, changing laws, evolving technologies, a growing mental health crisis, homelessness, new cultural mores,

CONTACT John Comiskey jcomiske@monmouth.edu Monmouth University, West Long Branch, United States

rising immigration, and terrorism. The overarching goals of the policies and training should (a) help build positive police-citizen relationships, and (b) prepare police officers for the challenges of policing in the 21st century. The training should include realistic scenario-based platforms that include procedural justice, implicit bias, crisis intervention, de-escalation, situational awareness, decision making, and the use of force,

One of the most effective methods by which to reduce the use of force, and especially deadly force, is to provide effective training to recruits (Davies, 2015; Lee & Vaughn, 2010; Lim & Lee, 2015). Understanding how police officers prepare for and are trained to make decisions during stressful and potentially dangerous citizen encounters is critical to advancing the police profession. This exploratory study examines a relatively new and still evolving training platform that is being increasingly utilized to prepare law enforcement officers for potentially violent police-citizen encounters, virtual firearms and tactics simulators. Rather than focus on the more commonly studied officers' decision-making, skills/tactics development, physiological responses, racial/implicit bias, and response time outcomes of the use of force and citizen complaints after completing this type of training, we examine how training participants perceive the value of the simulator training. In doing so, we identify correlates of police officers' perceptions of the utility and effectiveness of the training to put forth recommendations for agencies currently using and considering the use of such training tools. This article begins with an overview of scenario-based and simulation training and the characteristics and officers' perceptions of police training. The next section explains our survey and data analysis methodology followed by the results sections describing police officers' perceptions of firearms and tactical simulators and a discussion of the article's findings.

Scenario-Based and Simulation Training

Scenario-based and *simulation training* may be traced to ancient civilizations' use of wooden swords for training and the game of chess which was used for military and diplomatic planning. Scenario-based training refers to knowledge and skills development training predicated on contextual hypothetical situations that require students to work through problems/situations (Werth, 2011; Wollert & Quail, 2018). Simulation training refers to methods for implementing *models* over time, models being logical representations of systems, entities, or phenomena or processes. Models aid us in understanding complex concepts and processes because they can help simplify and explain them (Hayes, 2006).

The modern use of simulation training ranges from eighteenth-century obstetrics training to the U.S. Army's use of flight simulators to train new pilots without the hazards of actual flight during World War II. Since that time, simulators have been used to train air traffic controllers, bus drivers, doctors, fire officers, soldiers, police officers, and others in a myriad of occupations where failures can lead to fatal consequences. The rationale for scenario-based and simulation training is that humans learn best by doing. This is especially the case for police officers when the training is engaging, applicable to their everyday duties and responsibilities, and provides opportunities for social interaction (Birzer & Tannehill, 2001; Oliva & Compton, 2009; Police Executive Research Forum, 2016b).

Simulation training provides opportunities for the commission and remediation of misguided actions, which in real-world contexts might result in fatal consequences (Andersen et al., 2016; Holbrook & Cennamo, 2014). This builds on Dewey's (1938) and Kolb's (2014) *experiential learning* and Schon's (1983) *reflective practice* pedagogies, whereby learners and practitioners reflect on their experiences and actions to modify/adjust future actions. Reflection is about connecting past experiences and their outcomes to future activity. The goal is active learning and *training transfer* – a process by which trainees learn something in one setting and then can apply it, albeit in a modified form, in real-world settings (Baldwin & Ford, 1988). The most recent data culled from the Bureau of Justice Statistics indicates that the vast majority (81%) of police academies, and by implication police departments, have or have access to a firearms scenario simulator (Reaves, 2016).

Researchers assessing firearms and tactics simulator training firearms and tactics simulator training have found that the training: appears to be beneficial in developing skills that are arguably the most important for the safety of the officer and others, i.e. accuracy, effective use of cover, avoiding the unintentional shooting or endangering of innocents and ensuring the shooting is justified (Justice and Safety Centre, 2003); could be used to assess the relationship between officers' personality traits and shooting behavior (Aadland, 1981; Howard, 1991; Scharf et al., 1978); could be used to assess police officers physiological responses to high-stress situations (Andersen et al., 2016; Oudejans, 2008; Roy et al., 2019; Thomasson et al., 2014; Winser et al., 2014); effectively developed marksmanship skills (Kratzig, 2013; White et al., 1991); effectively promoted preventive action tactics, i.e. tactics that eliminate the need to use force (Helsen & Starkes, 1999); helped develop officers' self-efficacy (Holbrook & Cennamo, 2014); helped officers built a reference library of realistic experiences for moments of decision in real life shoot/don't shoot incidents (Davies, 2015); helped develop officers' decision-making skills (Soderstrom et al., 2018); improved officer's situational awareness (Johnsen et al., 2016; Saus et al, 2006); improved officers' motor and cognitive skills (Boyd, 1992; Helsen & Starkes, 1999; Scharr, 2001); provided cost-saving training opportunities (Seymour et al, 1994); and provided insights into officers' shooting response times during armed confrontations (Blair et al., 2011). In addition, police officers reported that firearms and tactics simulator training was more effective than traditional firearms training. The training made them more confident, increased their situational awareness, improved their decision-making abilities, and they felt more adequately prepared for critical incidents (Boyd, 1992; Davies, 2015; Justice and Safety Centre, 2003; Scharr, 2001; Seymour et al, 1994).

Other researchers voiced concerns about the validity and fidelity of the firearms and tactics simulator training. Analyses of the Metro-Dade Police Department's use of the Simulated Media Environment Program (SME-24) met with mixed reviews. A preliminary study indicated that police officers who had been through the training demonstrated an increased understanding on police procedures and the proper use of deadly physical force (Meers, 1985). However, the Office of Dade County Criminal Justice Council (1983) found the validity of the technique was questionable. Specifically, the SME-24 did not provide the interactions necessary to achieve the desired results or measure performance in the broad spectrum of police work. At a public demonstration of the SME-24 simulator, members of People United to Save a social justice and civil rights organization, walked out of the demonstration saying that it would not work. (United Press International, 1983, August 4) A Dade County Judge, also in attendance at the demonstration, disagreed with the PUSH comments about the scenario not working but also found that the simulations were not life-like (Office of Dade County Criminal Justice Council, 1983).

Moreover, Bennell et al.'s (2007) examination of the Canadian police officers found that training on the Firearms and Tactics Simulator (FATS) did not provide adequate practice time or instructor-trainee feedback or adequately address retraining needs and lacked fidelity. Similarly, Rostker et al.'s (2008) examination of the New York City Police Department's (NYPD) FATS' training found that the scenarios and equipment were generally designed for one or two trainees to participate at the same time. Bennel and Jones (2004) and Rostker et al. (2008) recommended that police departments conduct a cost-benefit analysis to determine the optimal training time for desired performance gains; implement open simulation practice; ensure that trainees master basic responses; schedule retraining sessions as needed; increase instructor-feedback time; and complement instructor feedback with trainees' self-assessments. In 2015, the NYPD revamped its training curriculum to focus on scenario-based training. The department's new police academy features a simulated tactical village complete with storefronts, a subway car, vehicles, and bank windows. However, as noted in a 2015 training memorandum, only 10 to 20 officers actively participated in the tactical village training, leaving the remaining officers to watch the training (New York City Police Department, 2015). Police use of firearms and tactical simulators, virtual reality (VR) platforms, and scenario-based training are evolving to include de-escalation, crisis intervention, mental illness, and inter-agency terrorism response training (Department of Homeland Security, 2018; Harris, 2020; Lewis,

2020; Meminger, 2019, January 23; VirTra, 2020; Wheatly et al., 2020; Wollert & Quail, 2018; Zoch, 2020, July 13).

Trainee characteristics and perceptions of police training

One aspect of police training that has received relatively little empirical attention considers how the characteristics of training participants might be related to their perceptions of the quality and value of the training. As described above, the majority of research on simulator

training for law enforcement officers has focused on skills development and the assessment of personality traits and shooting behavior. The perceptions of training participants are important to consider if those who perceive training more favorably might retain and utilize the curriculum more effectively. Similarly, the perceptions of training participants will likely impact the degree to which agencies continue to use training simulator programs.

Few studies of law enforcement training have examined how the characteristics of trainees can impact how they perceive the value of the training. While some of this research has determined that demographic characteristics do not seem to impact participants' perceptions of law enforcement training (Finnimore, 2005), Walling (2007) analyzed the views of individuals at multiple ranks in law enforcement agencies in southern Nevada to determine that several factors influence perceptions of training for patrol officers. Specifically, Walling (2007) concluded that statistically significant differences existed between the topics that patrol officers and top administrators felt were most important for the training of new patrol officers. Similarly, Stroupe's (2003) analysis of the perceptions of West Virginia State Police Academy graduates indicated that factors such as level of education and age were related to differing perceptions of the effectiveness of their agency's training curricula, while gender was not. Other researchers have noted the importance of this avenue of inquiry by suggesting that future studies should examine how the perceptions of training participants might have important implications for the improvement of law enforcement training (Chappell, 2008; King Stargel, 2010; Lettic, 2016; Sedevic, 2005; Vander-Kooi, 2006).

We build upon this fledgling body of literature to examine how the characteristics of simulator training participants might be associated with their perceptions of the effectiveness, fidelity, and transferability of firearms and tactical simulation training to the field (operational environment). If the individuals receiving simulator-based training do not believe that this training has merit or that it is not more effective than traditional teaching techniques regarding the proper use of force, then it is vital to identify factors that might influence those beliefs. Through an exploratory analysis, we hope to learn more about how participants perceive simulator training and then identify the characteristics of simulator participants that might be related to those perceptions. In doing so, we hope to uncover valuable information for agencies that currently utilize simulator training for the proper use of force during encounters with the public, and those that are considering this type of training tool, to improve the effectiveness of the training.

Methodology

This study analyzed data from questionnaires to determine police officers' perceptions of the effectiveness of the VirTra-300 firearms and tactics simulation training. The study sought to identify the officers' perceptions of the transferability of the training to the field and its impacts on their awareness of their threat environments (situational awareness); firearms proficiency; tactics, decision-making skills, state of preparedness, as well as how the training compared to other law enforcement training, how the training might impact the outcomes of police-citizen encounters in the future, and to what extent the officers would recommend the training to their colleagues.

Research participants were invited to complete a questionnaire during their pre-simulator training brief and completed the questionnaires immediately following the VirTra-300 firearms

and tactics simulation training. The study's population and the sample include 417 training participants that were undertaking VirTra-300-based firearms and tactics simulator training either as part of their recruit (n = 220) or in-service (n = 178) training.[1] The 417 participants were from approximately 50 different local police departments in one county in the Northeast region of the United States, as well as 26 law enforcement officers from other federal, state, and local law enforcement agencies that completed the training at the County's training facility. Prior to participating in the simulator training, the police recruits had completed 11 weeks of a 21-week County police academy curriculum that included: courtroom testimony, decision making, law, de-escalation tactics, emergency medical response, emergency vehicle operations, history of policing, physical wellness and nutrition, rules and regulations, unarmed defense, water safety, water safety, and use of force courses. In-service officers were graduates of the County police academy or law enforcement officers who had satisfactorily completed all police academy/other required entry-level training for their agency.

The survey was administered anonymously as part of the VirTra exercise de-brief training session. Survey participation was voluntary. The purpose of the survey was explained to the students via a verbal script, as well as a Letter of Consent that prospective participants were asked to read. Participants were instructed to not write their names on the surveys and to submit their surveys into a secured dropbox. To maintain anonymity, the Letters of Consent were not collected. Participants were asked to acknowledge that they had read the Letter of Consent and understood the purpose of the study and the attendant risks by filling in a circle on an Informed Consent question at the top of the survey. The survey was administered to simulator participants between February 2019 and November 2019 by the VirTra trainers and completed surveys were subsequently collected by the researchers. Notably, the surveys were completed before the in-police custody death of George Floyd and the police shooting death of Breonna Taylor in 2020.

The VirTra-300 provides five screens and a 300-degree immersive training platform. The judgmental use-of-force training mode supplies a library of 13 realistic scenarios including active shooter, ambush, court/jail, disturbance, domestic violence, emotionally disturbed person, high-risk entry, hostage situation, off-duty, suicidal subject, suspect(s) contact, suspicious subject(s), and traffic stops, and one skills drill exercise. VirTra-300 is equipped with an audio system and transducers that simulate sounds and movement. Participants step onto a platform surrounded by the five screens, onto which the high-definition video is played, and respond to the scenarios accordingly (VirTra, 2019, 2013). In this study, participants fired a Glock 9 MM Model 17 pistol. The OC-spray (oleoresin capsicum) element was used on a department-by-department basis and was not used for recruits, as OC-spray was not standard equipment for some departments. The simulation scenario was operated by an instructor who could change the response from the screen characters dependent on the actions of the officer.

The post-training questionnaire was broken into two parts. The first part included 15 multiple choice and two short answer questions that asked research participants to identify the extent to which they believed that: (a) the training was transferable to the field (real-world operational environment); (b) impacted their awareness of their threat environment (situational awareness), firearms proficiency, use of force and de-escalation tactics, decision-making skills, and state of preparedness; (c) how the training compared to other law enforcement training; (d) how the training might impact the outcomes of police-citizen encounters in the future; and (e) to what extent the officers would recommend the training to their colleagues.

To evaluate the training, participants were asked to respond on a scale of 1 (strongly disagree) to 5 (strongly agree) to the following statements that the VirTra simulator training has: reinforced firearm tactics, reinforced decision-making skills, provided experience determining the use-of-force continuum, reinforced de-escalation tactics, and prepared for physical force/deadly physical force situation. On the same scale, participants were asked to remark on their level of agreement with the following statements: the training may result in fewer law enforcement officer injuries and fatalities during police-citizen encounters, the training may result in fewer civilian injuries and fatalities

during police-citizen encounters, I am now more likely to use contact and cover tactics because of the VirTra simulator training, I am now more aware of the threats inherent to my work environment, I am more likely to take those threats into account in the field, and, I felt the need for tactical training before attending the Virtra simulator training today.

Respondents were also asked to indicate their agreement with the following statements: I am confident that the knowledge I gained from the VirTra simulator training today can be transferred to the field (completely disagree – completely agree), and I am now more aware of the threats inherent to my work environment and am more likely to take those threats into account in the field because of the VirTra simulator training (strongly disagree – strongly agree). Finally, respondents were asked to answer the following questions: How would you rate the VirTra simulator training with respect to its effectiveness in preparing law enforcement officers to handle police-civilian encounters? (less effective, as effective, more effective), and How would you rate the VirTra simulator training with respect to its effectiveness in preparing law enforcement officers to handle police-civilian encounters? below average, average, above average)? The short answer questions asked participants to identify and describe anything else they learned during the VirTra-300 firearm and tactical training and how the training might be improved.

The second part of the survey included demographic questions that asked participants to identify their gender (male or female), ethnicity (collapsed into White or Other for this analysis), age (30 and younger, 31–40, 41 and older), and level of education (less than a bachelor's degree or bachelor's degree or higher). They were also asked about their current position, including the type of agency (municipal police department or other), the number of employees at their agency (1–10, 11–25, 26–49, 50 or more), their current rank (officer or other), and years of experience (recruit, 0–10 years, 11 years or more).

To understand these data and how participants felt about the simulator training experience, we began with a univariate analysis of the survey items described above. Then, once we learned about the characteristics of the participants and their perceptions of the simulator, we proceeded with

Table 1. Descriptive statistics of participant characteristics.

Participant Characteristics	n	%
Gender	390	
Male		86.7
Female		13.3
Race	397	
White		75.6
Other		24.4
Age	388	
30 and younger		71.6
31–40		17.0
41 and older		11.3
Education	395	
Less than a Bachelor's Degree		45.8
Bachelor's Degree or Higher		54.2
Rank:	392	
Police/Corrections/Court Officer		73.0
Other		27.0
Department:	416	
Municipal Police		76.4
Other		23.6
Department Size:	402	
1–10		5.2
11–25		30.6
25–49		13.4
50 or More		50.7
Experience:	398	
Recruit		55.3
0–10 Years		27.4
11 Years or More		17.3

Table 2. Descriptive statistics of participant perceptions of simulator.

Perceptions of Simulator	n	Mean	SD
Need for tactical training	417	4.46	0.83
Situational threat awareness and contact and cover	417	4.80	0.46
Contact and cover tactics	417	4.72	0.52
Reinforced firearm techniques	417	4.72	0.56
Reinforced decision-making skills	417	4.84	0.37
Provided experience determining use-of-force continuum	417	4.76	0.46
Reinforced de-escalation tactics	417	4.73	0.49
Prepared for physical force/deadly physical force situation	417	4.68	0.55
Simulator will result in fewer LEO injuries and fatalities	417	4.65	0.59
Simulator will result in fewer civilian injuries and fatalities	417	4.67	0.55
Recommend training to fellow officers	414	4.93	0.26
Compared to other law enforcement training:	416	%	
Less effective		0.5	
As effective		16.3	
More effective		83.2	
Preparation for police-civilian encounters:	416		
Below average		0.0	
Average		9.9	
Above average		90.1	

a bivariate analysis to ensure that no issues of multicollinearity between the predictor variables would preclude their inclusion in subsequent multivariate analyses. Finally, we utilized binary logistic regression to examine the relationship between the predictor variables and two important, dichotomous outcomes: whether participants felt that the simulator training was 'more effective' compared to other law enforcement training that they had experienced and whether they felt that it was 'above average' in preparing them for police-civilian encounters.

Results

The analysis began with an examination of descriptive statistics for each of the variables to be included in the subsequent multivariate models. Table 1 reports the descriptive statistics of participant characteristics and shows that 86.7% of the simulator participants were male, 75.6% were White, 71.6% were 30 years old or younger and 54.2% had a bachelor's degree or higher. Regarding their position, 73% identified as an Officer, 76.4% worked in a municipal police department, 50.7% worked in a department with 50 or more employees, and 55.3% were in the recruit stage of their position.

Table 2 presents the descriptive statistics of the participants' perceptions of the simulator training. These perceptions were generally very positive. As shown in the top half of Table 2, the mean scores for all survey items asking respondents to rate the effectiveness of the simulator were well above 4.0, with most above 4.6 (a 5 indicates that they Strongly Agree with the statement). The participants largely agreed that there is a need for tactical training (mean of 4.46) and, most important, they would recommend the training to fellow officers (mean of 4.93). Compared to other law enforcement training, 83.2% of participants indicated that the simulator was 'more effective', while less than one percent responded that it was 'less effective.' Similarly, 90.1% of participants reported that the simulator training provided preparation for police-civilian encounters that were 'above average.'

While the participants reported very positive views of the effectiveness of the simulator training, the subsequent multivariate analyses were conducted to identify characteristics of the participants that were statistically significantly linked with perceptions that the simulator training was 'more effective' compared to other law enforcement training that they had experienced and whether they felt that it was 'above average' in preparing them for police-civilian encounters. Although each of those survey items had three possible responses, we have dichotomized those outcomes because few

Table 3. Logistic regression models predicting perceptions of simulator value.

	Model 1 Training More Effective	Model 2 Improve Police-Citizen Relations
Constant	4.75	846.72***
Male	0.77 (0.34–1.77)	1.02 (0.31–3.34)
White	0.98 (0.49–1.96)	1.04 (0.44–2.49)
Age	0.78 (0.42–1.45)	0.19 (0.09–0.42)***
Education Level	1.91 (1.04–3.52)*	2.61 (1.18–5.76)*
Officer	0.53 (0.24–1.13)	0.40 (0.15–1.12)
Municipal Police	3.11 (1.61–6.00)**	0.39 (0.13–1.11)
Experience	0.85 (0.49–1.47)	1.58 (0.76–3.31)
Agency Size	1.04 (0.76–1.41)	0.60 (0.38–0.94)*
Model $\chi 2$	21.81**	41.43***
Nagelkerle R^2	0.10	0.226

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

individuals responded that they found the training to be either 'less effective' or 'as effective' compared to other law enforcement training, or 'below average' or 'average' as preparation for police-citizen encounters. As a result, we ran logistic regression models to estimate the relationship of the participant characteristics on their views about the value of the training. Before estimating these models, we calculated bivariate correlations in to identify potential issues of multicollinearity between the items to be included in the logistic regression models. No issues of multicollinearity were observed, and so we proceeded with the logistic regression models.

The results of the two logistic regression models are shown in Table 3. Model 1 regressed the participant characteristics on the perception that the simulator training was more effective when compared to other law enforcement training. Model 2 regressed the same items on the perception that the training was an 'above average' preparation for police-citizen encounters. For both models in Table 3, we present the odds ratios and confidence intervals for each predictor. Odds ratios are intuitive values that represent the degree to which a predictor is related to an increased or decreased odds of support for the outcome perception. For example, an odds ratio of 1.5 for an item in Model 1 of Table 3 would indicate that that characteristic is related to increased odds of 50% that sample participants believe that the simulator training was more effective than other training. In contrast, an odds ratio of 0.5 for the same item in the model would indicate that that characteristic is related to odds that are decreased by 50% for that same perception of the simulator training.

Looking at Model 1 in Table 3, it is observed that having a bachelor's degree or higher (OR = 1.91, $p < 0.05$) and being employed by a municipal police department (OR = 3.11, $p < 0.01$) increase the odds that participants will indicate that the simulator training is more effective than other training. Being employed by a municipal police department has a particularly strong relationship with believing that the simulator training is more effective, as the odds ratio of 3.11 indicates that participants from municipal police departments have an increased odds of more than 200%, compared to individuals who work elsewhere (Sherriff's Office, Prosecutor's Office, other). No characteristics were found to be significantly related with decreased odds of perceiving the simulator training as more effective.

The results presented in Model 2 show the odds ratios of the predictors on the outcome perception that the simulator training is an 'above average' method of preparing for police-citizen encounters. Model 2 indicates that having a bachelor's degree or higher (OR = 2.61, $p < 0.05$) increase the odds that participants will indicate that the simulator training is more effective than other training, while increased age (OR = 0.19, $p < 0.001$) and increased agency size (OR = 0.60, $p < 0.05$) decrease the odds of perceiving the simulator training as an 'above average' method of improving police-citizen relations. Relative to Model 1, the model fit statistics for Model 2 indicate that the independent variables are better able to explain the perception that the simulator training is an above average method of preparing for police-citizen encounters than they can predict whether a training participant will perceive the simulator as more effective than other training.

Discussion

This study is among the first to examine the perceptions of police officers who complete virtual firearms and tactics simulator training for purpose of improving relations between citizens and law enforcement officials. The results of our analysis identified two main findings. First, it showed that the vast majority of participants perceive the simulator training that they completed to be of value, as evidenced by the high mean values of positive perceptions of the simulator shown in Table 1. Although prior research on the effectiveness of simulator training is inconsistent and certainly still lacking (Bennell, Jones, & Corey, 2007; Holbrock & Cennamo, 2014; Justice and Safety Centre, 2003; Kase et al, 2017; Rostker et al, 2008; Saus et al, 2006; Timm, 1991) our analysis demonstrates that participants perceive its value at a high level. This finding is promising, as trainees who perceive training as useful are far more likely to apply that training to the workplace (Grossman & Salas, 2011; Jordan, 2014; Velada & Caetano, 2007). This result is consistent with numerous studies that found that perceptions of the learning experience is the most important predictor of successful training transfer (Colquitt et al., 2000; Velada & Caetano, 2007; Warr & Bunce, 1995).

Second, we identified participant characteristics that are related to both increased and decreased odds that participants perceive the simulator training as effective. Specifically, we found that possession of a bachelor's degree and employment with a municipal police department are related to an increased likelihood of perceiving the training as more effective than other training methods. Similarly, having a bachelor's degree is linked with increased odds of perceiving the simulator training as an "above average" method of preparing individuals for improving police-citizen relations, but being older and working at a larger agency decrease those odds. The finding that more educated participants are more likely to perceive the training as valuable is supported by analogous findings in other studies. For example, varying levels of a college education are related to lower rates in the use of force (Binder & Fridell, 1984; Carter & Sapp, 1990; Chapman, 2012; Gardiner, 2017; Paoline & Terrill, 2007; Vespucci, 2020) and college-educated police officers are generally more effective communicators (Vespucci, 2020) and are generally more cognizant of social problems and civil rights issues than their less-educated peers (Paynich, 2009). Prior academic experiences may make educated officers more amenable to different types of training in general. In addition, the finding that employment with a municipal police department was related to an increased likelihood of perceiving the training as more effective than other methods of training aligns with Edwards' (2019) study that found that municipal officers had a more positive general perceived value of higher education compared to officers employed by county sheriff's offices.

We have also found that older officers are less likely than their younger counterparts to perceive the simulator training as an 'above average' method of improving police-citizen relations. This is akin to the adage that it is difficult to teach an old dog new tricks and is supported by the limited research on law enforcement training that highlights how the age of participants can affect the effectiveness and perceptions of the effectiveness of such training (Etter & Griffin, 2011; White, 2016). Etter and Griffin (2011) focused on in-service training for current officers to show that changing technology necessitates continued training, but that that agencies often focus on the training needs of the agency, rather than the individual participants, and often to the detriment of older officers. Similarly, White (2016) examined the effects of demographic characteristics of law enforcement officers on learning preferences during training and concluded that younger officers (specifically those between the ages of 20 and 30) prefer a kinesthetic, or hands-on approach, of which the simulator is certainly an example.

Our findings suggest that police officers who perceive firearms and tactical simulator training as beneficial are more likely to apply their training to the field and that the following personal characteristics increase the likelihood that police officers will have a favorable attitude towards the training: having a bachelor's degree, being 30 years old and younger, and being employed by a municipal police department. Moving forward, police departments and researchers should

consider the possible implications of these subtle predictors and develop strategies and policies that will enhance the experiences of all trainees and, ultimately, more favorable training outcomes.

Some limitations should be discussed before delving into the potential practical implications that might stem from this research. First, it is important to note that our study represents an analysis of only one simulator training program with a sample of 417 training participants. Similarly, our sample was relatively homogenous regarding several characteristics, as most participants were young recruits who were training for officer positions with local police departments. A more robust sample that includes additional participants from additional types of agencies, and at different points in their careers, might further illuminate the differences that we detected between younger and older participants. We were also only able to examine the impact of participants' characteristics on perceptions of the value of the training. Future researchers should consider the longitudinal impact of the simulator and similar training (virtual reality and scenario-based) by evaluating its effectiveness by examining outcomes such as citizen complaints or incidents involving the use-of-force, to detect potential differences between law enforcement professionals who have completed simulator training and those who have not.

The present study is exploratory in nature and it would be premature to use the findings to inform policy at this juncture. However, our study adds to the growing body of literature identifying the benefits of hiring college-educated officers. Additionally, participants overwhelmingly indicated that they benefitted from simulator training and that it prepared them to better interact with civilians. These findings are especially important given the public's recent demand for police reform. As such, these preliminary conclusions support the continued exploration of such training tools and, certainly, support additional research efforts to evaluate their use.

Note

1. 19 participants did not respond to this question.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

John Comiskey, Ed.D. is an Associate Professor at Monmouth University. His research interests include climate security and homeland security, intelligence, and policing curricula development. Some of his recent publications include co-editor of Theoretical Foundations of Homeland Security: Strategies, Operations, and Structures textbook as well as peer reviewed articles in Homeland Security Affairs and the Journal of Human Security and Resilience. He is the Editor of the Journal of Security, Intelligence, and Resilience Education.

Brian Lockwood, Ph.D. is an Associate Professor and Graduate Program Director in the Department of Criminal Justice at Monmouth University in West Long Branch, New Jersey. He earned his MA and PhD in Criminal Justice at Temple University. His research interests include the correlates of juvenile delinquency, community-level factors of crime, and the use of GIS to investigate criminal behavior. Some of his recent publications have appeared in the Journal of Research in Crime & Delinquency, Environment & Behavior, and the Journal of Urban Affairs.

Shannon N. Cunningham, Ph.D., is an Assistant Professor of Criminology at Bradley University. Her research interests include official misconduct, wrongful convictions, and broader issues of social justice.

Julia Arminio is a graduate of Monmouth University, where she earned her Master of Arts in Criminal Justice. During her time at Monmouth, she served as a Graduate Research Assistant to Dr. John Comiskey of the Criminal Justice Department on several research projects including the present study. She also provided administrative and editorial support for the Journal of Security, Intelligence, and Resilience Education. Ms. Arminio now works in the private sector as an Analyst for a threat intelligence and analytics firm.

References

Aadland, R. L. (1981). *The prediction of use of deadly force by police officers in simulated field situations.* [Unpublished doctoral dissertation]. California School of Professional Psychology.

Andersen, J. P., Pitel, M., Weerasinghe, A., & Papazoglou, K. (2016). Highly realistic scenario-based training simulates the psychophysiology of real-world use of force encounters: Implications for improved police officer performance. *Journal of Law Enforcement. 5*(4). https://tspace.library.utoronto.ca/handle/1807/73822

Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology, 41*(1), 63–105. https://doi.org/10.1111/j.1744-6570.1988.tb00632.x

Bennell, C., & Jones, N. J. (2004). *The effectiveness of use of force simulation training: Final report. Canadian Police Research Centre.* https://www.laser-ammo.com/pdf/simulators-and-software/interpol-study.pdf

Bennell, C., Jones, N. J., & Corey, S. (2007). Does use-of-force simulation training in Canadian police agencies incorporate principles of effective training? *Psychology, Public Policy, and Law, 13*(1), 35–58. https://doi.org/10.1037/1076-8971.13.1.35

Binder, A., & Fridell, L. (1984). *Lethal force as a police response.* National Institute of Justice.

Birzer, M. L., & Tannehill, R. (2001). A more effective training approach for contemporary policing. *Police Quarterly, 4*(2). doi: 10.1177/109861101129197815

Blair, J. P., Pollock, J., Montague, D., Nichols, T., Curnutt, J., & Burns, D. (2011). Reasonableness and reaction time. *Police Quarterly, 14*(4), 323–343. https://doi.org/10.1177/1098611111423737

Boyd, S. (1992). *Training effectiveness of interactive video systems for the use of lethal force decision making.* [Unpublished doctoral dissertation]. University of San Francisco.

Carter, D. L., & Sapp, A. D. (1990). The evolution of higher education in law enforcement: Preliminary findings from a national study. *Journal of Criminal Justice Education, 1*(1), 59–85. https://doi.org/10.1080/10511259000082061

Chapman, C. (2012). Use of force in minority communities is related to police education, age, experience, and ethnicity. *Police Practice & Research, 13*(5), 421–436. https://doi.org/10.1080/15614263.2011.596711

Chappell, A. T. (2008). Police academy training: Comparing across curricula. *Policing: An International Journal of Police Strategies and Management, 31*(1), 36–56. https://doi.org/10.1108/13639510810852567

Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 85*(5), 678. https://doi.org/10.1037/0021-9010.85.5.678

Davies, A. (2015). The hidden advantage in shoot/don't shoot simulator exercises for police recruit training. *Salus Journal, 3*, 1. https://doaj.org/article/52bcefc80713497fa8b37512665aa45d

Department of Homeland Security. (2018). *FLETC strategic plan 2018-2020.*

Department of Justice. (2017). *The civil rights division's pattern and practice police reform work: 1994-present.*

Dewey, J. (1938). *Experience & education.* Kappa Delta.

Edwards, B. D. (2019). Perceived value of higher education among police officers: Comparing county and municipal officers. *Journal of Criminal Justice Education, 30*(4), 606–620. https://doi.org/10.1080/10511253.2019.1621360

Etter, G. W., & Griffin, R. (2011). In-service training of older law enforcement officers: An andragogical argument. *Policing: An International Journal of Police Strategies & Management, 34*(2), 233–245. https://doi.org/10.1108/13639511111148861

Finnimore, I. J. (2005). *The efficacy of police academy training: A study of the relationship between suburban police officers and their training at a regional police academy.* [Unpublished doctoral dissertation]. Wilmington College.

Gardiner, C. (2017). *Policing around the Nation: Education philosophy, and practice. California State University, Center for Public Policy and the Police Foundation.* https://www.policefoundation.org/wp-content/uploads/2017/10/PF-Report-Policing-Around-the-Nation_10-2017_Final.pdf

Grossman, R., & Salas, E. (2011). The transfer of training: What really matters. *International Journal of Training and Development, 15*(2), 2. https://doi.org/10.1111/j.1468-2419.2011.00373.x

Harris, S. (2020). *From driving to dogs, training simulators open a world of possibilities.* Police Chief Magazine. https://www.policechiefmagazine.org/product-feature-from-driving-to-dogs-training-simulators-open-a-world-of-possibilities/

Hayes, R. S. (2006). *The science of learning: A systems theory approach.* Brown Walker Press.

Helsen, W. F., & Starkes, J. L. (1999). A new training approach to complex decision making for police officers in potentially dangerous interventions. *Journal of Criminal Justice, 27*(5), 395–410. https://doi.org/10.1016/S0047-2352(99)00012-4

Holbrook, H. A., & Cennamo, K. S. (2014). Effects of High-Fidelity Virtual Training Simulators on Learners' Self-Efficacy. *International Journal of Gaming and Computer-Mediated Simulations, 6*(2), 38–52. https://doi.org/10.4018/ijgcms.2014040104

Howard, T. H. (1991). The relationship between selected personality and experiential variables on both shooting judgment and reaction time under simulated law enforcement shooting conditions. *Journal of Police and Criminal Psychology, 7*(1), 2–7.

Johnsen, B. H., Espevik, R., Saus, E. R., Sanden, S., & Olsen, O. K. (2016). Note on a training program for brief decision making for frontline police officers. *Journal of Police and Criminal Psychology, 31*(3), 182–188. https://doi.org/10.1007/s11896-015-9180-7

Jordan, E. B. (2014). *Comparison of entry-level police officers and training instructor's perceptions of the training environment as it relates to the transferability of training* [Doctoral dissertation]. Capella University.

Justice and Safety Centre. (2003). *The evaluation of a mobile simulation training technology - PRISim.* Justice and Safety Center, Eastern Kentucky University.

Kase, C. A., Osilla, K. C., Seelma. R., Woodbridge, M. W., & Stein, B. (2017). *A preliminary evaluation of interactive video simulation for campus law enforcement in California.* Rand Health Q. https://www.rand.org/pubs/research_reports/RR1389.html

King Stargel, T. M. (2010). *The perceived value of problem-based learning at a police training academy.* [Doctoral dissertation]. Seattle University.

Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development.* FT Press.

Kratzig, G. P. (2013). Simulated pistol training: The future of law enforcement training? *International Police Training Journal, 3*(5), 5–7. https://laser-ammo.com/pdf/simulators-and-software/international-police-training-journal.pdf

Lee, H., & Vaughn, M. S. (2010). Organizational factors that contribute to police deadly force liability. *Journal of Criminal Justice, 38*(2), 193–206. https://doi.org/10.1016/j.jcrimjus.2010.02.001

Lettic, S. (2016). *Problem based learning (PBL) in police training: An evaluation of the recruit experience.* [Doctoral dissertation]. Capella University.

Lewis, M. (2020). *Setting cops up for failure: The possible implications of police accountability through body-worn cameras.*[Doctoral dissertation]. Youngstown State University.

Lim, H., & Lee, H. (2015). The effects of supervisor education and training on police use of force. *Criminal Justice Studies, 28*(4), 444–463. https://doi.org/10.1080/1478601X.2015.1077831

Meers, J. (1985). Simulator brings crime into range. *Psychology Today.*

Meminger, D. (2019, January 23). *NYPD turns to virtual reality to improve relationship with teens.* Spectrum News NY1. https://www.ny1.com/nyc/all-boroughs/news/2019/01/23/nypd-turns-to-virtual-reality-to-improve-relationship-with-teens

New York City Police Department. (2015). *Training: Bringing the NYPD into the 21st century. Author.* http://www.nyc.gov/html/nypd/html/home/POA/pdf/Training.pdf

Office of Dade County Criminal Justice Council. (1983). *The synthesized media environment systems: An evaluation. Author.* https://www.ncjrs.gov/pdffiles1/Digitization/89755NCJRS.pdf

Oliva, J. R., & Compton, M. T. (2009). What do police officers value in the classroom?: A qualitative study of the classroom social environment in law enforcement education. *Policing: An International Journal of Strategies & Management, 33*(2), 321–338. https://doi.org/10.1108/13639511011044911

Oudejans, R. (2008). Reality-based practice under pressure improves handgun shooting performance of police officers. *Ergonomics, 51*(3), 261–273. https://doi.org/10.1080/00140130701577435

Paoline, E. A., & Terrill, W. (2007). Police education, experience, and the use of force. *Criminal Justice and Behavior, 34*(2), 179–196. https://doi.org/10.1177/0093854806290239

Paynich, R. L. (2009). *The impact of a college-educated police force: A review of the literature.* Curry College.

Police Executive Research Forum. (2016a). *Guiding principles on use of force.* http://www.policeforum.org/assets/30%20guiding%20principles.pdf

Police Executive Research Forum. (2016b). *Integrating communications, assessment, and tactics: A training guide for defusing critical incidents.* https://www.policeforum.org/assets/icattrainingguide.pdf

President's Task Force on 21st Century Policing. (2015). *Final Report of the President's Task Force on 21st Century Policing.* Office of Community Oriented Policing Services. https://www2.palomar.edu/pages/police/files/2020/07/FinalReport21stCenturyPolicing.pdf

Reaves, B. A. (2016). State and local law enforcement training academies, 2013 U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.

Rostker, B. D., Hanser, L. M., Hix, W. M., Jensen, C., Morral, A., Ridgeway, R., & Schell, G. (2008). *Evaluation of the New York City Police Department firearm training and firearm-discharge review process.* T. L.

Roy, H., Wasylyshyn, N., Spangler, D. P., Gamble, K. R., Patton, D., Brooks, J. R., Garcia, J. O., & Vettel, J. M. (2019). Linking emotional reactivity between laboratory tasks and immersive environments using behavior and physiology. *Frontiers in Human Neuroscience, 13*(54), 1–14. https://doi.org/10.3389/fnhum.2019.00054

Saus, E., Johnsen, B., Eid, J., Riisem, P. K., Andersen, R., & Thayer, J. (2006). The Effect of Brief Situational Awareness Training in a Police Shooting Simulator: An Experimental Study. *Military Psychology, 18*(sup1), 3–21. https://doi.org/10.1207/s15327876mp1803s_2

Scharf, P., Linninger, R., Marrero, D., Baker, R., & Rice, C. (1978). Deadly Force: The Moral Reasoning and Education of Police Officers Faced With the Option of Lethal Legal Violence. *Policy Studies Journal, 7*(s1), .450–454. https://doi.org/10.1111/j.1541-0072.1978.tb01792.x

Scharr, T. M. (2001). Interactive video training for firearms safety. *Federal Probation*, *6*(2), 45–51. https://www.uscourts.gov/federal-probation-journal/2001/09/interactive-video-training-firearms-safety

Schon, D. (1983). *The reflective practitioner*. Temple Smith.

Sedevic, M. T. (2011). An evaluation of the Chicago Police Department's recruit curriculum in emergency response week relating to terrorism awareness and response to terrorism incidents. Olivet Nazarene University [Doctoral Dissertation]. https://digitalcommons.olivet.edu/cgi/viewcontent.cgi?article=1032&context=edd_diss

Seymour, G. O., Stahl, J. M., Levine, S. L., Ingram, J. L., & Smith, R. F.. (1994). Modifying law enforcement training simulators for use in basic research. *Behavior Research Methods. Instruments, & Computers*, *26*(2), 266–268. https://doi.org/10.3758/BF03204634

Soderstrom, T., Lindgren, C., & Neely, G. (2018). Tacit knowing: Implications for the design of computer simulation training in education. *Proceedings of the International Conference on Information, Communication, & Technology*. http://www.icicte.org/assets/6.3_soderstrm_et_al.pdf

Stroupe, W. E. (2003). *A study of West Virginia State Police Academy graduates' perceptions of their degrees of competence and the relevance of the Marshall University Community and Technical College Police Science Curriculum*. [Unpublished doctoral dissertation]. Marshall University.

Thomasson, J., Gorman, D. R., Lirgg, C. D., & Adams, D. J. (2014). An analysis of firearms training performance among active law enforcement officers in the USA. *The Police Journal: Theory, Practice and Principles*, *87*(4), 225–233. https://doi.org/10.1350/pojo.2014.87.4.685

Timm, H. W. (1991). The relationship between selected personality and experiential variables on both shooting judgement and reaction time under simulated law enforcement shooting conditions. *Journal of Police and Criminal Psychology*, *7*(2), 2–7. https://doi.org/10.1007/BF02832822

U.S. Commission on Civil Rights. (2018). *An examination of modern police practices.*

United Press International. (1983, August 4). *Black observers criticize new police training simulator*. https://www.newspapers.com/clip/24797176/police_training_simulator_criticism/

Vander-Kooi, G. P. (2006). Problem-based learning: An attitudinal study of police academy students. [Doctoral dissertation] Western Michigan University.

Velada, R., & Caetano, A. (2007). Training transfer: The mediating role of perception of learning. *Journal of European Industrial Training*, *31*(4), 283–296. https://doi.org/10.1108/03090590710746441

Vespucci, J. (2020). *Education level and police use of force: The impact of a college degree*. Springer.

VirTra. (2013). VirTra Base Scenario Library. Author. Tempe, Arizona.

VirTra. (2019). VirTra-300 brochure.

VirTra. (2020). *V-VICTA: Virtual coursework training academy*. [Webpage]. https://www.virtra.com/overview-le/v-victa-training/

Walling, N. A. (2007). *Perceptions of the training needs of law enforcement officers* [Doctoral dissertation]. University of Nevada.

Warr, P., & Bunce, D. (1995). Trainee characteristics and the outcomes of open learning, Personnel Psychology. *48* (2), 347–375. doi: 10.1111/j.1744-6570.1995.tb01761.x

Werth, E. P. (2011). Scenario training in police academies: Developing students' higher-level thinking skills. *Police Practice and Research*, *12*(4), 325–340. https://doi.org/10.1080/15614263.2011.563970

Wheatly, S., Hollingsworh, A. C., & Greaves, I. (2020). Responding to the marauding terror attack: The police perspective. *MJ Military Health*, *166*(80–83). https://doi.org/10.1136/jramc-2018-000960

White, C. R., Carson, J. L., & Wilbourn, J. M. (1991). Handgun Marksmanship Training: Evaluation of an Advanced Marksmanship Trainer. *Performance Improvement Quarterly*, *4*(3), .63–73. https://doi.org/10.1111/j.1937-8327.1991.tb00513.x

White, R. (2016). *Learning style preferences of law enforcement officers: A quantitative, non-experimental study* [Doctoral dissertation]. Northcentral University.

Winser, M. A., Hinson, J. M., James, S. M., Vila, B., Whitney, P., Hans, P. A., & Van Dongen, H. P. A. (2014). Fatigue during deadly force decision-making: Measuring skin conductance response during simulations. *Sleep-Wake Research in the Netherlands*, *25*, 81–84. https://www.researchgate.net/publication/272816634_Fatigue_During_Deadly_Force_Decision-Making_Measuring_Skin_Conductance_Response_During_Simulations

Wollert, T., & Quail, J. (2018). *A scientific approach to reality-based training*. Three Pistols Publishing.

Zoch, R. (2020, July 13). *How to train to safely de-escalate someone in crisis. Police1*. Police 1 By Lexipol. https://www.policeone.com/police-products/training/simulator/articles/how-to-train-to-safely-de-escalate-someone-in-crisis-mS3NbyUC21p0jwrl/