Behavior Analysis in Practice (2019) 12:353–372
https://doi.org/10.1007/s40617-018-00317-2

RESEARCH ARTICLE

Police Academy Training, Performance, and Learning

John O'Neill[1] · Dawn A. O'Neill[1] · Katelyn Weed[2] · Mark E. Hartman[3] · William Spence[1] · William J. Lewinski[1]

Published online: 18 December 2018

Abstract

We conducted empirical analyses of training at 3 large regional police academies in the United States. We objectively examined the performance and learning of 3 classes, a total of 115 cadets, across 3 representative training approaches to defensive and control tactics. Experiment 1 examined the content and effects of single-session or block training across 8 weeks during the academy. Experiment 2 examined the content and effects of spaced sessions with small-group practice and scenario-based feedback across 8 weeks during the academy. Experiment 3 examined the content and effect of block training with scenario-based feedback across 15 weeks during the academy. Experiment 3 also demonstrated the impact of performance feedback on instructor behavior and cadet performance during the academy and 16 weeks after graduation. We provide recommendations and a call for research based on the performance and learning literature, grounded in behavioral science.

Keywords Law enforcement · Learning · Performance · Police · Training

Police officers are tasked with apprehending and detaining subjects involved in criminal activity. This can involve the use of a variety of defensive and control tactics. Controversial use-of-force incidents have resulted in initiatives calling for changes in training and education to focus on de-escalation and less lethal tactics (Presidential Task Force on 21st Century Policing, 2015). The Presidential Task Force on 21st Century Policing (2015) recommended federal funding for regional training facilities to "promote consistent standards for high quality training" and to "develop rigorous training practices, evaluation, and development of curricula based on evidence-based practices" (p. 53).

Researchers have called for empirical evaluation of tactics and training methods to determine the most efficient and cost-effective approach while maintaining the integrity of techniques (Kaminski & Martin, 2000, p. 149). Research has assessed traditional classroom procedures in relation to a community-oriented policing curriculum (Chappell, 2008) and problem-based learning (Vander Kooi & Palmer, 2014) but has not assessed specific training procedures for defensive and control tactics. In fact, information about the composition and effectiveness of police training is sparse (Lum, Koper, Gill, Hibdon, Telep, & Robinson, 2016).

The Bureau of Justice Statistics (see Reaves, 2016) tracked general information about police training sites, such as duration of academies (M = 21 weeks) and hours spent on self-defense and use-of-force (M = 81), nonlethal weapons (M = 16), and firearms training (M = 71). Anecdotal evidence (i.e., personal correspondence with use-of-force instructors across the United States) suggested that variation in the content of training across academies is largely influenced by state requirements. Training typically begins with traditional didactic procedures (e.g., classroom instruction) before moving to interactive training. Academies often conduct "block training" for each mandated skill. A block consists of a single session of training (e.g., 60 min) in group format for a particular skill, colloquially referred to as a "block of instruction" within a "check-the-box" curriculum (Bennett, 2009; Hardesty, 2012). Approximately half of academies reported using a stress-inducing approach, which involves "intensive physical demands and psychological pressure" (Reaves, 2016, p. 1). The remaining academies reported either a nonstress model or a balanced approach. Objective analyses of said approaches are not available.

The original version of this article was corrected to use the correct version of Figure 2.

✉ John O'Neill
john.oneill@forcescience.org

[1] Division of Research, Force Science® Institute, Ltd., Mankato, MN 56001, USA

[2] Human Performance Department, Minnesota State University, Mankato, MN 56001, USA

[3] Department of Kinesiology, Iowa State University, Ames, IO 50011, USA

Nonlethal tactical skills, such as pressure-point control, ground fighting, and weapon retention, are widely taught across 85%, 94%, and 99% of North American police academies, respectively (Reaves, 2016). Nonlethal skill proficiency is important because officers are far more likely to deploy nonlethal options (e.g., empty-hand control, blunt impact, chemical spray, or conducted-energy devices) than lethal tactics (e.g., discharging a firearm) when using force (Hyland, Langton, & Davis, 2015; International Association of Chiefs of Police, 2001). Cadet performance is assessed through skill proficiency exams at 93% of academies (Reaves, 2016), but there is no evidence to suggest that such examinations are performed in a standardized or objective manner. Anecdotal evidence (i.e., correspondence with instructors) suggested the widespread use of subjective scoring during evaluations. Instructors typically observe cadets engaged in a skill, may ask a cadet to repeat a skill for closer examination, and then assign a pass/fail if mandated.

Defensive and control tactics research primarily consisted of indirect assessment through the opinions of instructors and cadets without direct measurement of performance (Kaminski & Martin, 2000; Morrison, 2006). When direct measurement was employed, it involved a 5-point Likert-type scale with descriptors (Nieuwenhuys, Calijouw, Leijsen, Schmeits, & Oudejans, 2009; Renden, Landman, Geerts, Jansen, Faber, Savelsbergh, & Oudejans, 2014; Renden, Landman, Savelsbergh, & Oudejans, 2015; Renden, Savelsbergh, & Oudejans, 2017) or the overall number of tasks, without further specification (Atkins & Norris, 2004). This research demonstrated that arrest and defense tactics are adequate under innocuous conditions, but performance suffered under shorter response windows and stress. Instructors and agencies rated tactical and decision-making skill proficiency lower than overall skills for newly trained cadets (Morrison, 2006). Such skills may be improved with continued training via field training officer programs, in-service programs, annual qualifications, and lived experience (Caro, 2011). Yet, officers indicated high levels of dissatisfaction with continuing defensive and control tactics training (Kaminski & Martin, 2000). It is possible that academy performance will not result in learning or generalization to fieldwork and that skills are not improved upon after academy graduation. Without fluency in their ability to employ nonlethal forms of force (e.g., pressure-point manipulation and disarming), officers might be more likely to rely on less lethal (e.g., chemical spray, conducted-energy device, or baton strikes) and lethal force (e.g., firearms).

Behavior analysis offers procedures that are effective, efficient, and amenable to operation within the various resource (e.g., time, staffing, and financial) constraints of police academies. If methods that approximate behavior-analytic procedures (e.g., behavioral skills training) are already in place, it is important to document how such procedures converge and diverge from best practices. Behavior-analytic methods and procedures have not been applied to police tactical skills, yet behavior analysts have conducted research involving other types of dynamic skill performance (Alstot, Kang, & Alstot, 2013; BenitezSantiago & Miltenberger, 2015; Luiselli & Reed, 2015; Luiselli, Woods, & Reed, 2011). Luiselli and Reed (2015) suggested that behavioral assessment serves a fundamental role in identifying skills, objectives, and functional influences on skill performance.

If police academy training is to change, the onus falls on the behavioral sciences to provide foundational evidence for the necessity of said change and to provide methodological and procedural recommendations based on the extant skill performance and learning literature. Of equal importance is to build trust and respect between researchers and police officers. We began by conducting preliminary empirical investigations of current training practices at three large regional police academies in different time zones across the United States.

Experiment 1

The purpose of Experiment 1 was to objectively examine the effect of a representative approach to police academy training (i.e., single-session or block training) by employing a multiple-probe design and objective measurement by task analysis of two defensive and control skills that are widely taught across police academies. Follow-ups were conducted at 1, 2, 4, and 8 weeks during the academy. A booster training was conducted at the close of the experiment.

Method

Site, Participants, and Setting The experiment was conducted at a large, 28-week (cf. Reaves, 2016) regional police academy in the Central time zone of the United States. Over 100 variations of defensive and control tactics are taught using the model (i.e., block training) described in the following sections.

Participants ($N = 28$) were male ($n = 21$) and female ($n = 7$) cadets recruited from a class of 30. Two cadets did not complete the majority of testing sessions, and their data were excluded. Participants were both White (75%) and non-White (25%) and varied in age ($M = 26$; range 21–37 years). Seven participants reported that they received formal policing-related training in the past (range 0.5–4 years), and 22 participants reported that they received formal training in martial arts, boxing, wrestling, or other sports (range 1–15 years). The academy conducted training for several classes of cadets each year. The present sample was representative of the academy's typical class size and demographics.

Testing sessions lasted approximately 2 min each and were conducted within a designated research area at the beginning of the normal training hours. The total time

commitment for each participant was approximately 19 min of testing distributed over a 2-month period. The research area was a well-lit, padded (i.e., walls and floor), open training space that measured approximately 10 m by 30 m. The space contained a 2-m tall solid Numb John® training dummy that is used to practice skills such as kicks and baton strikes (Pomona, California, Dummies International, Inc.). The investigators provided all other experimental equipment and data collection materials. All procedures were approved by an institutional review board, and all participants provided informed consent to participate.

Target Behaviors and Data Collection The independent variable was the preexisting and site-approved training procedure delivered by experienced instructors (M = 18, range 13–24 years in the field; M = 11, range 5–17 years as instructors). The investigators did not make any modifications to the training procedures, as the initial purpose was to build trust and mutual respect while determining the effects of a representative approach to academy training. The training consisted of (a) a rationale for the training, (b) instruction, (c) modeling, (d) practice/individual feedback, and (e) group feedback (see Procedures for more details).

The investigators consulted with the experienced instructors to identify two defensive or control tactics that would be exposed to a minimal amount of posttraining practice opportunities during the academy. This precaution served to control for potential practice effects. The instructors were asked to identify, based on their experience, one skill that could be considered relatively simple (i.e., five or fewer steps) and another that could be considered relatively complex (i.e., 10 or more steps) in comparison to other defensive and control tactics. *Defensive and control tactics* are defined as physical skills that enable an officer to defend him- or herself from an attack and control an individual to be taken into custody (e.g., disarming and handcuffing; Kaminski & Martin, 2000). To maintain consistent and valid measurement of skills, the investigators created a task analysis based on direct observation of the initial training session for each skill. Appendix 1 contains the task analyses for the mandibular angle pressure point (pressure point), rear disarming of a firearm (disarming), and front snap kick (kick). Kick served as a control skill that was not exposed to training during the experiment. The dependent variable was the percentage of correctly completed steps of the task analysis for each skill.

All analyses were conducted on a frame-by-frame basis using commercial video analysis software (Dartfish, 2011). All training and testing sessions were video recorded using two tripod-mounted Sony Handycam CX405 cameras recording in 1920 by 1080 pixels at 60 frames per second (please contact authors for camera position details).

Initial scoring was performed by the primary observer through post hoc video analysis using the task analyses in Appendix 1. A secondary trained independent observer scored 33% of trials, for all three skills, at all testing points (i.e., pretests; posttests; 1, 2, 4, and 8 weeks; and booster training). Interobserver agreement (IOA) was calculated by dividing the number of agreements per trial by the number of agreements plus disagreements and multiplying by 100%. Average IOA across all testing points was 93% (pressure point = 93%, disarming = 90%, kick = 97%).

Design A concurrent multiple-probe design (Horner & Baer, 1978) was employed for measurement and visual analysis of training effects. This behavior-analytic design allowed for staggered exposure to training across two skills (i.e., pressure point and disarming) while controlling for major threats to internal validity. The control skill (i.e., kick) was also tracked to provide additional evidence of experimental control. The control skill was not exposed to training during the experiment. At the investigators' request, follow-up tests were conducted at 1, 2, 4, and 8 weeks after training, and a booster training occurred before conclusion of the experiment.

Procedures Each participant was assigned a random number upon enrollment. Each testing session consisted of three trials, one for each skill (i.e., kick, pressure point, and disarming). To control for testing sequence effects, trial sequence for odd-numbered participants was (a) kick, (b) pressure point, and (c) disarming and trial sequence for even-numbered participants was (a) disarming, (b) pressure point, and (c) kick. The only exception was Session 2, which, due to time constraints, did not include a pretest for kick.

- ***Pretest.*** Each participant was tested on all three skills prior to the onset of training. The following script was read to each participant prior to the onset of each session:

> I'm going to ask you to perform a few skills that you may or may not know how to perform. It's OK to attempt the skill or to say that you don't know how to perform the skill. You may start any time after I clap the clapboard.

The sound of the clapboard signaled the onset of each trial and instruction by the investigator to "reset" signaled the end of each trial.

– *Front snap kick.* The investigator then positioned the participant behind a line, 1 m in front of and facing the training dummy. The investigator instructed the

participant to "please perform a front snap kick" and signaled trial onset. The end of the first trial was signaled when (a) the participant stated that he or she did not know how to perform the skill or (b) the kicking foot returned to the ground.

- *Mandibular angle pressure point*. The investigator positioned the participant behind a line, 3 m behind and facing a suspect (i.e., played by an experienced instructor) seated on the floor of the training space. The investigator instructed the participant to "please perform a mandibular angle" and signaled trial onset. The end of the trial was signaled when the participant (a) stated that he or she did not know how to perform the skill, (b) gained compliance (i.e., the subject put his or her hands behind his or her back), or (c) failed to gain compliance after three verbal requests for the subject to "put your hands behind your back." The allowance of three attempts to command compliance was deemed appropriate by the site training supervisor.
- *Rear disarming of firearm.* The investigator positioned the participant behind a line, 1 m in front of and facing away from a suspect (i.e., played by an experienced instructor) who stood behind the participant and pointed a red gun (i.e., plastic training firearm) at the participant's back and between the shoulders. The investigator instructed the participant to "please perform a rear disarming" and signaled trial onset. The end of the trial was signaled when the participant (a) stated that he or she did not know how to perform the skill or (b) did not give further verbal commands to the subject for at least 3 s after the end of his or her last verbal command.

The investigators did not provide cues or corrective feedback for any of the three skills. The criterion for moving pressure point from pretest to training was low stable data across two pretests. The criterion for moving disarming from pretest to training was low stable data across three pretests and a marked training effect for pressure point. Kick served as a control skill and remained at pretest throughout the experiment.

- ***Training.*** Four experienced instructors conducted training for pressure point and disarming using the preexisting methods and procedures approved by the academy. The training procedures used for pressure point and disarming were representative of all defensive and control technique trainings at the academy. The instructors implemented a combination of instruction, modeling, practice, and corrective feedback. Each skill was trained independently of the other and was conducted in a group format with all students trained at the same time. Table 1 displays the distribution of time and repetitions dedicated to each component for pressure point and disarming initial and booster trainings.
  - *Mandibular angle pressure point.* Training began with instructor rationale for teaching the skill. Pressure point was described as a useful tool that could be implemented with a passive-aggressive suspect engaged in noncompliance with commands. The lead instructor provided instruction as two other instructors modeled the skill in a step-by-step fashion. Two repetitions were performed for a total of 3 min of instruction/modeling. Participants were split into pairs and completed approximately 10 repetitions of the skill per participant (i.e., 20 repetitions per pair) for a total of 17 min. All four instructors observed and provided feedback on an individual basis throughout practice. Finally, the lead instructor provided 2 min of group feedback that addressed common errors observed during practice. The total duration of pressure point training was 22 min.
  - *Rear disarming of firearm.* This skill was introduced as one of two different types of weapon-disarming techniques that are used, depending on whether a subject is holding the officer at gunpoint with the gun pointed low (e.g., lower torso) or high (e.g., upper torso), when the officer is facing away from the armed individual. This skill is used as a last resort and is a high-risk procedure. The lead instructor provided instruction as two other instructors modeled the skill in a step-by-step fashion. Two repetitions were performed for a total of 7 min of instruction/modeling. Participants were split into pairs and completed approximately 10 repetitions of the skill per participant (i.e., 20 repetitions per pair) for a total of 37 min. All four instructors observed and provided feedback on an individual basis throughout practice. Finally, the lead instructor provided 5 min of group feedback that addressed common errors observed during practice. The total duration of disarming training was 49 min.
- ***Posttest.*** Posttests were identical to pretests and were conducted immediately following the completion of training for each skill.
- ***Follow-up.*** Follow-up tests were identical to pretest and posttest. They were conducted at 1, 2, 4, and 8 weeks posttraining for all skills.
- ***Exit questionnaire.*** After the last follow-up, participants completed a survey aimed at assessing the participants' frequency of practice and confidence in performing each skill. To assess frequency of practice, participants were asked, "On average, how often did you practice mandibular angle pressure point/rear disarming of firearm/front snap kick outside of your regular training hours?" (0 = *never*, 1 = *less than 15 min every 2 weeks*, 2 = *0 to 15 min per week*, 3 = *15 to 30 min per week*, 4 = *30 min to 1 h per week*, 5 = *1+ hr per week*). To assess confidence in performing each skill, participants were asked, "How confident are you in your ability to perform mandibular

angle pressure point/rear disarming of firearm/front snap kick?" (1 = *not at all confident*, 4 = *somewhat confident*, 7 = *very confident*). Participants were also asked to provide a brief description of the type of practice they engaged in. Furthermore, instructors tracked the number of times the skills were practiced or repeated outside of the experimental parameters using a binder containing weekly practice-tracking forms.

- ***Booster.*** At the 17-week mark, the same experienced instructors conducted booster trainings for pressure point and disarming using the same preexisting methods and procedures approved by the academy and employed during initial training. The duration for each training was approximately 20 min.

Results

The group demonstrated a large training effect at posttest on pressure point and disarming, whereas performance on kick (i.e., the control skill) remained at a low level with stable data. At follow-up for pressure point across 1, 2, 4, and 8 weeks, the group demonstrated a gradual decline in overall performance of the skill. Disarming performance decreased at the 1-week follow-up and maintained at a similar level across 2, 4, and 8 weeks.

Mandibular Angle Pressure Point Figure 1 (top tier) displays the group accuracy minimum, first quartile, median, third quartile, and maximum values for pressure point. During pretests, the group demonstrated a low and stable overall performance mean of 1% (range 0%–27%) across two sessions. Following pressure point training, the group demonstrated a large training effect with an 80% increase in average performance to 81% (range 45%–100%). Following disarming training, the group demonstrated a small increase in average performance to 87% (range 36%–100%) for pressure point. Group performance decreased by 1% at 1 week (M = 86%, range 45%–100%) and 2 weeks (M = 85%, range 55%–100%). Group performance further decreased by 5% at both 4 weeks (M = 80%, range 45%–100%) and 8 weeks (M = 75%, range 45%–100%). Following pressure point booster training, the group demonstrated an increase in performance to 86% (range 55%–100%).

Rear Disarming of Firearm Figure 1 (middle tier) displays the group accuracy minimum, first quartile, median, third quartile, and maximum values for disarming. During pretests, the group demonstrated a low and stable overall performance mean of 2%–3% (range 0%–23%) across three sessions. Following disarming training, the group demonstrated a large training effect with an increase in average performance to 71% (range 31%–88%). At 1 week, the group demonstrated a 10% decrease in average performance to 61% (range 20%–88%). At 2 weeks, the group demonstrated a 2% increase in average performance to 63% (range 31%–85%). At 4 weeks, the group demonstrated a 4% decrease in average performance to 59% (range 8%–81%). At 8 weeks, the group demonstrated a 1% increase to 60% (range 38%–77%). Following disarming booster training, the group demonstrated an increase in average skill retention to 74% (range 38%–88%).

Exit Questionnaire Less than half of participants reported using means outside of regular training to practice pressure point (46%), disarming (48%), and kick (19%). On average, participants reported practicing pressure point and kick for 0–15 min per week and disarming for 0–30 min per week. Practice reportedly involved other trainees, friends, family, and independent imagining. Participants reported being somewhat to very confident in their ability to perform pressure point (M = 5.6, range 2–7) and disarming (M = 5.8, range 4–7), whereas they were somewhat to not confident in their ability to perform kick (M = 3.5, range 1–7). There were no significant correlations between confidence and performance.

Experiment 2

The purpose of Experiment 2 was to objectively examine the effect of a second representative approach to police academy training (i.e., spaced sessions with scenario-based feedback) and a maximum of a 1:10 instructor-to-student ratio on one subject-control tactic at a different academy. Follow-ups were conducted at 1, 2, 4, and 8 weeks during the academy.

Method

Site, Participants, and Setting The experiment was conducted at a large, 26-week (cf. Reaves, 2016) regional police academy in the Pacific time zone of the United States. Over 100 variations of defensive and control tactics are taught using the model described in the following sections.

Participants (N = 34) were male (n = 29) and female (n = 5) cadets recruited from a class of 40. Six cadets declined participation in the experiment and received the same training as the rest of the class. Participants were both White (88%) and non-White (12%) and varied in age (M = 28, range 22–43 years). Fifteen participants reported that they received formal policing-related training in the past (range <1–15 years), and 22 participants reported that they received formal training in martial arts, boxing, wrestling, or other sports (range <1–20 years).The present sample was representative of the academy's typical class size and demographics.

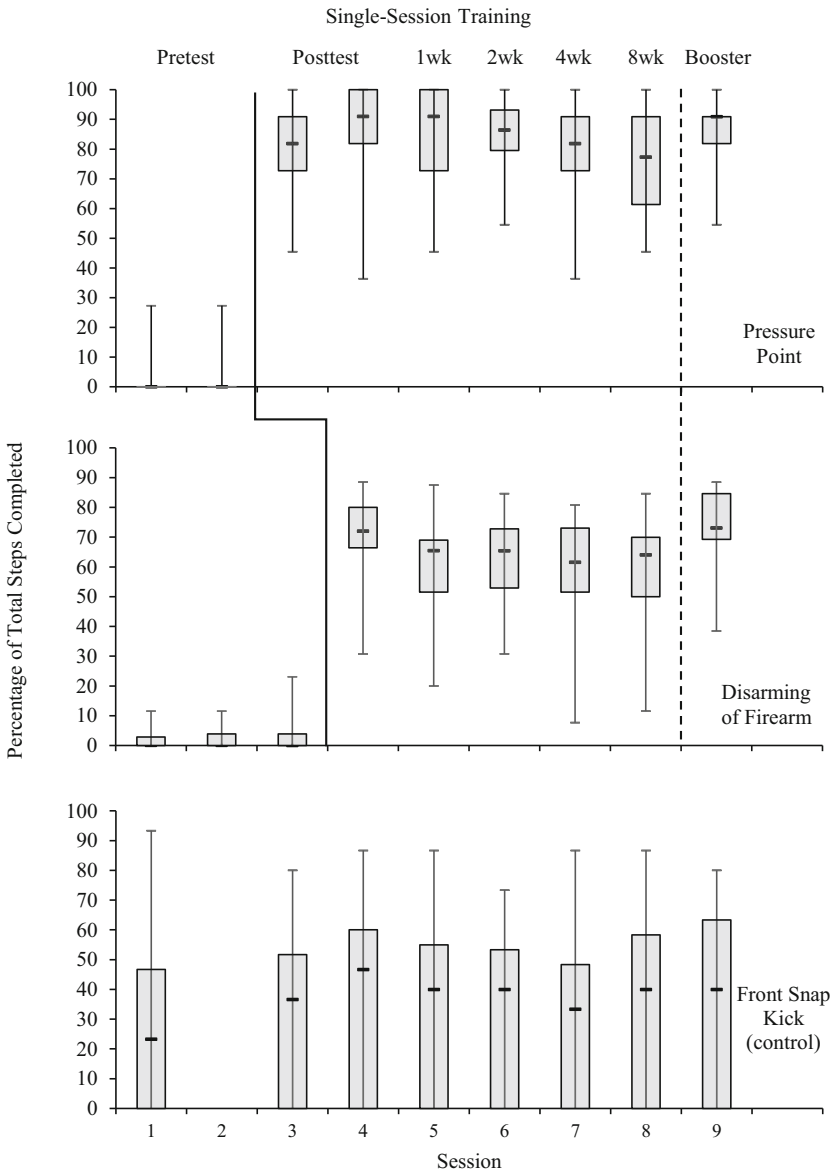

Fig. 1 Data for Experiment 1. Skill performance by group (N = 28) minimum, first quartile, median (closed circles), third quartile, and maximum values at pretest, posttest, and follow-up tests at 1, 2, 4, and 8 weeks, and booster training for mandibular angle pressure point, rear disarming of firearm, and front snap kick. The solid vertical staggered line represents initial training, and the dashed vertical line represents booster training

Testing sessions were of similar duration and dimensions to that of Experiment 1. The total time commitment for each participant was approximately 28 min of testing distributed over a 3-month period.

Target Behaviors and Data Collection The independent variable was the preexisting and site-approved training procedure delivered by two experienced instructors (M = 15, range 13–17 years in the field; M = 8.5, range 6–11 years as instructors for defensive tactics). See Experiment 1 for information on training components and the development of task analyses. Appendix 2 contains the task analyses for rear-approach kneeling handcuff (handcuffing) and front snap kick (kick). Kick served as a control skill. The dependent variable was the percentage of correctly completed steps of the task analysis for each skill.

See Experiment 1 for equipment, camera position, and observer information. The average IOA across all testing points was 91% (handcuffing = 94%, kick = 90%).

Design A partial-reversal design (Kazdin, 1982) was employed for measurement and visual analysis of performance across testing points. Pretests and posttests were conducted for initial training and three booster trainings. The control skill (i.e., kick) was also tracked but was not exposed to training. Follow-up tests were conducted at 1, 2, 4, and 8 weeks.

Procedures Each participant was assigned a random number upon enrollment. Each testing session consisted of two trials, one for each skill (i.e., kick and handcuffing). To control for testing sequence effects, trial sequence was reversed for odd- and even-numbered participants.

- ***Pretest.*** See Experiment 1.
- *Front snap kick.* See Experiment 1.
- *Rear-approach kneeling handcuff.* The investigator positioned the participant behind a line, 6 m in front of and facing a suspect (i.e., played by an experienced instructor) who stood in front of the participant. The investigator instructed the participant to "please perform a rear-approach kneeling handcuff" and signaled trial onset. The end of the trial was signaled when the participant (a) stated that he or she did not know how to perform the skill, (b) stated that he or she completed the skill, or (c) completed the skill's final step.

The investigators did not provide cues or corrective feedback for either skill. See Experiment 1 for the criterion for moving from pretest to training.

- ***Training.*** Two experienced instructors conducted training for handcuffing using the preexisting methods and procedures approved by the academy. Table 2 displays the distribution of time and repetitions dedicated to each component of handcuffing during initial training and three booster sessions. See Experiment 1 for additional details.

Handcuffing was trained during the second half of a block of training for various handcuffing techniques (i.e., standing, kneeling, resisting) that lasted 80 min. Participants were assigned to one of four groups of 10 trainees (including nonparticipants). The skill was introduced as one of a variety of handcuffing techniques. The instructor reviewed the basic mechanisms of handcuffs and how to properly store handcuffs in their case. The instructor provided instruction/modeling in a step-by-step fashion as another instructor role-played a suspect. Participants were split into pairs and completed approximately two to three repetitions of the skill per participant (i.e., four to six repetitions per pair). Both instructors observed and provided feedback on an individual basis throughout practice. After training, there was a 9-day period during which trainees received no formal handcuffing training.

A pretest was conducted before each of the three subsequent booster training sessions. Participants were assigned to one of two groups of 20 trainees (including nonparticipants). As with initial training, the instructor provided instruction/modeling in a step-by-step fashion as another instructor role-played a suspect. For the first and second booster training sessions, participants were split into pairs and completed approximately two repetitions of the skill per participant (i.e., four repetitions per pair). After the first and second booster training sessions, there were 11- and 9-day periods, respectively, during which trainees received no formal handcuffing training. The third booster consisted of only instruction and modeling. In sum, participants were exposed to an average of 38 min of training for handcuffing.

- ***Posttest.*** Posttests were identical to pretest and were conducted immediately following the completion of initial training and all booster sessions.
- ***Follow-up.*** Follow-up tests were identical to pretest and posttest. They were conducted at 1, 2, 4, and 8 weeks after the fourth training session.
- ***Exit questionnaire.*** See Experiment 1.

Results

The group demonstrated a large training effect at posttest on handcuffing with smaller effects evident for the first two booster sessions. The group demonstrated stable performance across 1, 2, 4, and 8-week follow-ups for handcuffing. Performance remained at a low level throughout testing for kick (i.e., the control skill).

Figure 2 (top tier) displays the group accuracy minimum, first quartile, median, third quartile, and maximum values for handcuffing. During pretests, the group demonstrated handcuffing at a low and stable overall performance of 23%–30% (range 0%–71%). Following handcuffing training, the group demonstrated a large training effect with a 44% increase in average performance to 74% (range 7%–96%). During a 9-day return to pretest conditions, the group demonstrated a 7% decrease in average performance to 67% (range 29%–89%).

Following the first booster session (T_2), the group demonstrated an 11% increase in average performance to 78% (range 46%–93%). During an 11-day return to pretest conditions, the group demonstrated a 6% decrease in average performance to 72% (range 46%–93%). Following the second booster session (T_3), the group demonstrated a 6% increase in average performance back to 78% (range 61%–96%). During a 9-day return to pretest conditions, the group did not demonstrate a decrease in average performance and remained stable at 78% (range 39%–96%). Following the third booster session (T_4), the group demonstrated a 2% increase in average performance to 80% (range 57%–96%).

Follow-Up At 1 week, the group demonstrated a 2% decrease to 78% (range 57%–93%). At 2 weeks, the group demonstrated a 1% decrease to 77% (range 50%–93%). At 4 weeks, the group demonstrated a 1% decrease to 76% (range 57%–93%). At 8 weeks, the group demonstrated a 4% increase to 80% (range 57%–96%).

Exit Questionnaire Approximately one third of participants reported using other means outside of regular training to practice handcuffing. Those participants reported practicing handcuffing for 15 min per week. Only two participants (6%) reported using other means to practice kick. Practice was reported to have involved repetitions with

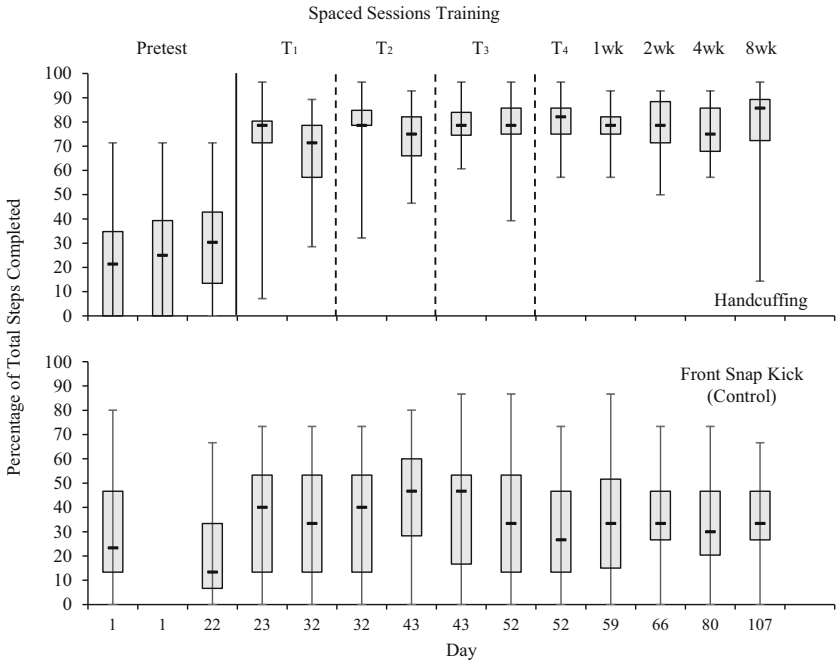

Fig. 2 Data for Experiment 2. Skill performance accuracy by group ($N = 34$) minimum, first quartile, median, third quartile, and maximum values at pretest, posttest, booster trainings, and follow-up tests at 1, 2, 4, and 8 weeks for handcuffing and front snap kick. The solid vertical line represents initial training, and the dashed lines represent booster trainings

others and independent imagining. Participants reported being somewhat to very confident in their ability to perform handcuffing ($M = 6.2$, range 4–7), whereas they were not confident at all to very confident in their ability to perform kick ($M = 4.2$, range 1–7). There were no significant correlations between confidence and performance.

Experiment 3

The purpose of Experiment 3 was to objectively examine the effect of a third representative approach to police academy training (i.e., block training with scenario-based feedback) at a third academy. Follow-ups were conducted at 7 weeks and 15 weeks during the academy. We then examined the effect of performance feedback on instructor behavior and cadet performance. Finally, a follow-up was conducted 16 weeks after graduation.

Method

Site, Participants, and Setting The experiment was conducted at a large, 26-week (cf. Reaves, 2016) regional police academy in the Eastern time zone of the United States. Over 100 variations of defensive and control tactics are taught using the model described in the following sections.

Participants ($N = 53$) were male ($n = 45$) and female ($n = 8$) cadets recruited from a class of 54. One cadet declined participation in the experiment and received the same training as the rest of the class. Participants were both White (87%) and non-White (13%) and varied in age ($M = 30.2$, range 21–52 years). Thirteen participants reported that they received formal policing-related training in the past (range 0.5–18 years), and 37 participants reported that they received formal training in martial arts, boxing, wrestling, or other sports (range 1–25 years). The academy conducted training for several classes of cadets each year. The present sample was representative of the academy's typical class size and demographics.

Testing sessions were of similar duration and dimensions to that of Experiment 1. The total time commitment for each participant was approximately 30 min of testing distributed over a 9-month period.

Target Behaviors and Data Collection The independent variable was the preexisting and site-approved training procedure delivered by experienced instructors ($M = 23$, range 16–28 years in the field; $M = 15$, range 7–23 years as instructors). See Experiment 1 for information on training components and the development of task analyses. Appendix 3 contains the task analyses for rear disarming of a firearm (disarming), common peroneal baton strike (baton strike), and infraorbital pressure point (pressure point). Pressure point served as a control skill. The dependent variable was the percentage of correctly completed steps of the task analysis for each skill.

See Experiment 1 for equipment, camera position, and observer information. The average IOA across all testing points

was 90% (disarming = 91%, baton strike = 87%, pressure point = 94%).

Design A concurrent multiple-probe design (Horner & Baer, 1978) was employed for measurement and visual analysis of training effects. A scenario-based training was conducted, and at the investigators' request, follow-up tests were conducted at 7 and 15 weeks during the academy. Performance feedback and subsequent training occurred before conclusion of the experiment at 16 weeks after graduation.

Procedures Each participant was assigned a random number upon enrollment. Each testing session consisted of three trials, one for each skill (i.e., disarming, baton strike, and pressure point). To control for testing sequence effects, trial sequence for even-numbered participants was (a) pressure point, (b) baton strike, and (c) disarming and trial sequence for odd-numbered participants was (a) disarming, (b) baton strike, and (c) pressure point. Scenario-based training addressed disarming only. To minimize test-retest effects, one half of the participants were tested at 7 weeks whereas the entire class was tested at 15 weeks. A random number generator selected participants at 7 weeks.

- ***Pretest.*** See Experiment 1.
- *Infraorbital pressure point.* See instructions for pressure point in Experiment 1.
- *Common peroneal baton strike*. The investigator positioned the participant behind a line, 1 m in front of and facing a suspect (i.e., played by an experienced instructor) standing on the floor of the training space, holding a protective training pad. The investigator instructed the participant to "please perform a common peroneal baton strike" and signaled trial onset. The end of the trial was signaled when the participant (a) stated that he or she did not know how to perform the skill or (b) ceased movement contributing to the baton strike (i.e., the officer rested the baton on his or her shoulder and stopped moving his or her feet).
- Rear disarming of firearm. See Experiment 1.

The investigators did not provide cues or corrective feedback for any of the three skills. See Experiment 1 for the criterion for moving from pretest to training.

- ***Training.*** Table 3 displays the distribution of time and repetitions dedicated to each component for disarming and baton strike initial, scenario-based (disarming only), and performance feedback–informed trainings. See Experiment 1 for additional details.
- *Rear disarming of firearm.* Disarming training included three experienced instructors. The skill was introduced as a type of weapon-disarming technique that is used when a subject is holding the officer at gunpoint with the gun pointed high (e.g., upper torso) while the officer is facing away from the armed individual. This skill is used as a last resort and is a high-risk procedure. The lead instructor provided instruction as two other instructors modeled the skill in a step-by-step fashion. Instructors modeled a total of four repetitions and provided 16 min of total instruction/modeling. Participants were split into pairs to practice disarming and completed approximately two to three repetitions of the skill per participant (i.e., four to six repetitions per pair) for a total of 10 min. Three instructors observed and provided feedback on an individual basis throughout practice. Instructors provided 3 min of group feedback to address common errors observed during practice. The total duration of disarming training was 29 min.

A scenario-based training was conducted 3 weeks after initial training for disarming. The training reiterated disarming components and took place prior to participants completing a scenario that involved disarming. Training began with instructor rationale and instruction of the scenario. The lead instructor then modeled the skill and emphasized instruction of disarming for 6 min. Participants were split into pairs and completed approximately two to three repetitions of the skill per participant (i.e., four to six repetitions per pair) for a total of 3 min. One instructor was involved in providing feedback to participants. Instructors provided 2 min of group feedback to address common errors observed during practice. The total duration of the scenario-based disarming training was 11 min. Participants completed the scenario and received corrective feedback from the lead instructor. A posttest was performed immediately following the scenario and feedback.

- *Common peroneal baton strike.* Baton strike training included six experienced instructors. Training began with instructor rationale for training the skill. Baton strike was described as a useful tactic that could be implemented to control a violently resisting suspect by applying force to target striking areas while minimizing potential injury. The lead instructor then modeled the skill in a step-by-step fashion as one other instructor performed as the suspect. Participants were split into pairs and completed approximately 17 repetitions of the skill per participant (i.e., 34 repetitions per pair) for a total of 28 min. Six instructors were involved in the training to provide participants with instruction

and modeling during practice time. Instructors modeled a total of six repetitions and provided 20 min of total instruction/modeling. Instructors provided 6 min of group feedback to address common errors observed during practice. The total duration of baton strike training was 54 min.

- ***Posttest.*** Posttests were identical to pretest and were conducted immediately following the completion of training for each skill.
- ***Follow-up.*** Follow-up tests were identical to pretest and posttest. They were conducted for approximately half of the class (n = 25) at 7 weeks and for the entire class at 15 weeks after scenario-based disarming training. During the same sessions, half of the class was tested at 10 weeks and the entire class was tested at 18 weeks after initial baton strike training.
- ***Exit questionnaire.*** See Experiment 1.
- ***Performance feedback.*** At the lead instructor's request, the first author provided a 1-h educational presentation for the instructors. The presentation included (a) the rationale and purpose of the experiment, (b) visual analysis of group data from pretest through follow-up, (c) task analyses of disarming and baton strike using still frames extracted from training videos, (d) identification of commonly missed steps and critical steps, and (e) a review of best-practice training procedures including low instructor-to-student ratios, exemplar/nonexemplar modeling, differential reinforcement (i.e., praise for correct steps), shaping, corrective feedback, and training to criterion.

The first author provided a separate 30-min presentation to the class of cadets. This presentation included Steps a–d of the presentation to instructors.

In consultation with the investigators, the instructors revised disarming and baton strike trainings based on the presented recommendations. Four instructors were each assigned 12 to 14 cadets and were responsible for providing their groups with instruction, modeling, corrective feedback, and differential reinforcement during training. Cadets practiced in pairs and completed approximately four repetitions of disarming per participant (i.e., eight repetitions per pair) for a total of 9 min and approximately 11 repetitions of baton strike per participant (i.e., 22 repetitions per pair) for a total of 10 min. The total duration was 20 min for the disarming training and 22 min for the baton strike training.

- ***Postacademy follow-up.*** After graduation, approximately half of the class was tested on disarming and baton strike after having worked in the field as police officers for 16 weeks.

Results

The group demonstrated a large training effect at posttest on disarming and baton strike, whereas performance on pressure point (i.e., the control skill) remained at a low level with stable data. Scenario-based training resulted in a further increase in disarming performance. At follow-up, substantial decreases in disarming performance were observed at 7 and 15 weeks. Baton strike performance was relatively stable across follow-up. Training revisions based on performance feedback resulted in large performance increases for both trained skills with substantial decreases observed again at 16 weeks after graduation.

Rear Disarming of Firearm Figure 3 (top tier) displays the group accuracy minimum, first quartile, median, third quartile, and maximum values for disarming. During pretests, the group demonstrated a low and stable overall performance mean of 5%–6% (range 0%–48%) across two sessions. Following disarming training, the group demonstrated a large training effect with a 50% increase in average performance to 56% (range 19%–84%). After the scenario-based training, the group demonstrated a 13% increase in average performance to 69% (range 50%–87%). Subgroup performance was similar to the rest of the group after the scenario-based training (69% and 70%, respectively). At 7 weeks, the subgroup demonstrated a 6% decrease in average performance to 63% (range 31%–85%). At 15 weeks, the group demonstrated a further 10% decrease in average performance to 53% (range 10%–81%), a combined 16% decrease in performance since scenario-based training. Subgroup performance was higher than the rest of the group (57% and 47%, respectively). Following performance feedback, the group demonstrated a 27% increase in average performance to 80% (range 58%–97%). Performance feedback resulted in a 11% average increase in performance over the scenario-based training posttest. Sixteen weeks after academy graduation, a subgroup of available participants (n = 27) demonstrated a 20% decrease in average performance to 60% (range 29%–77%).

Common Peroneal Baton Strike Figure 3 (middle tier) displays the group accuracy minimum, first quartile, median, third quartile, and maximum values for baton strike. During pretests, the group demonstrated a low and stable overall performance mean of 39% (range 0%–70%) across three sessions. Following baton strike training, the group demonstrated a training effect with an increase in performance to 65% (range 37%–95%). Subgroup performance was similar to the rest of the group after the scenario-based training (66% and 64%, respectively). At 10 weeks, the subgroup demonstrated a 3% decrease in average

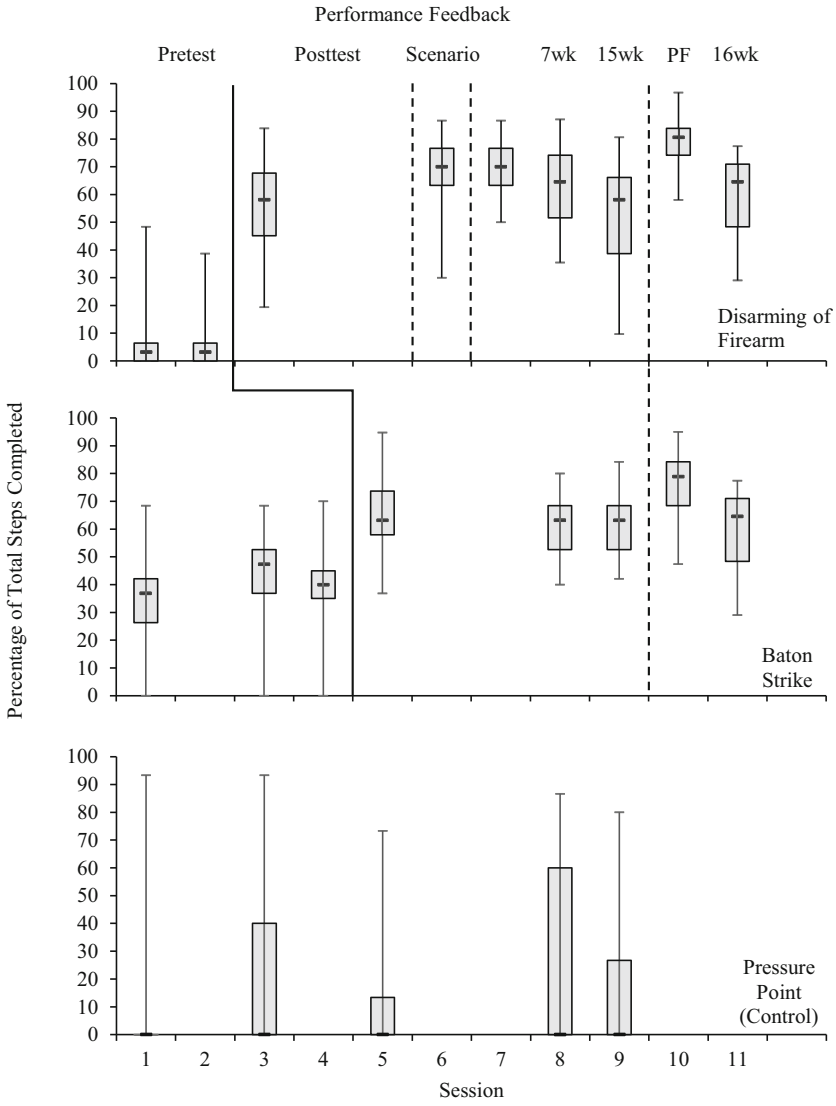

Fig. 3 Data for Experiment 3. Skill performance by group (N = 53) minimum, first quartile, median, third quartile, and maximum values at pretest, posttest, booster, and academy follow-up tests at 7 (half of class) and 15 weeks (full class), performance feedback (PF), and at 16 weeks after graduation for rear disarming of firearm, baton strike, and pressure point. The solid vertical staggered line represents initial training, and the dashed lines represent booster training

performance to 62% (range 40%–80%). At 18 weeks, the group demonstrated a 1% decrease in average performance to 61% (range 42%–84%). Subgroup performance was similar to the rest of the group (60% and 63%, respectively). Following performance feedback, the group demonstrated a 15% increase in average performance to 76% (range 47%–95%). Performance feedback resulted in a 12% average increase in performance over the initial training. After 16 weeks in the field, a subgroup of available participants (n = 27) demonstrated an 11% decrease in average performance to 65% (range 42%–84%).

Exit Questionnaire Less than half of participants reported using other means outside of regular training to practice baton strike (45%) and pressure point (2%), and just over half of participants reported using means outside of regular training to practice disarming (51%). On average, participants reported practicing disarming, baton strike, and pressure point for 0–1 h per week. Practice was reported to have involved other trainees, friends, family, and independent imagining. Participants reported being somewhat to very confident in their ability to perform baton strike (M = 5.06, range 2–7) and disarming (M = 6.6, range 4–7), whereas they were somewhat to not confident in their ability to perform pressure point (M = 2.4, range 1–7). There were significant positive correlations between confidence and performance at the 15-week follow-up for disarming, $r(45) = 0.317$, $p = 0.030$, and pressure point, $r(42) = 0.799$, $p < 0.0005$, but not at the 18-week follow-up for baton strike.

Discussion

All three experiments were conducted at large regional police academies in different time zones within the United States. The defensive and control tactics analyzed were representative of skills taught at other academies (Reaves, 2016) and were

taught in a similar manner to that used by many in police training (Bennett, 2009; Hardesty, 2012).

Experiment 1

This experiment was the first of its kind to (a) objectively examine the content and effects of a representative approach to police academy training (i.e., block training) and (b) incorporate empirically based behavior-analytic methods and procedures into police academy training. Specifically, we introduced a multiple-probe experimental design, task analysis (i.e., objective measurement of performance), follow-up tests to assess for learning, and booster training, none of which had been objectively employed in applied police research.

There are several socially valid implications for consideration by academy instructors and researchers. A typical mastery criterion of 80% or higher was demonstrated by some participants, but future research might use a similar objective scoring system (e.g., task analysis) during or immediately following a training session. This approach may help to identify steps that require additional training and aid in reducing within-group variability. For example, the turn toward the subject (Step 7) in disarming was correctly performed by only 17% of cadets after initial training and would likely benefit from additional modeling and feedback from instructors. This is particularly concerning when considering potential consequences of incorrect performance. Setting a criterion for the percentage of steps completed might motivate progress toward mastery of a skill. After mastery of a skill is demonstrated, consideration could be given to a schedule of refresher trainings and programming for learning. In fact, shorter but more frequent initial trainings might address suboptimally performed steps before steep declines in performance occur, such as those observed at 1 week for the complex skill and at 8 weeks for the simple skill.

Frequent follow-ups were conducted, as there was no precedent for police academy skill learning. As a result, test-retest effects may have influenced learning of both skills. For example, the simple skill (i.e., pressure point) involved inherent feedback as participants were aware of gaining compliance as the subject moved his or her arms behind his or her back. Second, a floor effect may have been present, as complex skill (i.e., disarming) performance maintained at a suboptimal level across follow-ups without further decline. Test-retest limitations, using a different simple skill, training to a mastery criterion, and providing multiple opportunities to practice throughout the remainder of an academy were addressed during the subsequent experiments.

Experiment 2

This experiment was the first of its kind to (a) objectively examine the content and effects of a second representative approach to police academy training (i.e., spaced sessions with scenario-based feedback) and (b) incorporate small-group practice into police academy training. Specifically, we used a partial-reversal experimental design, task analysis (i.e., objective measurement of performance), and a maximum instructor-to-student ratio of 1:10.

Participants demonstrated a large initial training effect for handcuffing with decreases in performance upon return to pretest conditions. Two booster sessions resulted in substantial increases in overall performance, again with decreases observed upon return to pretest conditions. A third booster session did not include practice/individual feedback and did not result in a substantial increase. Overall performance maintained across all follow-ups. Performance for substeps was highly variable across follow-ups, but a majority of handcuffing substeps were performed correctly by 80% or more participants after the final booster training. Task analyses were useful in the tracking of performance and identification of substeps that could be exposed to focused training. Overall performance might benefit from frequent booster sessions that focus on suboptimally performed steps after initial training.

A mastery criterion of 80% or higher accuracy was reached by the overall group but not by all participants. The entire group might have reached mastery if instructors provided corrective feedback to all participants during each session. Handcuffing was trained during the second half of an 80-min block of training for various handcuffing techniques (i.e., standing, kneeling, prone), so it is not clear if diffusion of training occurred. Training session duration decreased with each iteration, so it is possible that larger effects would have been observed given four sessions of equal duration and content. The experiment was conducted while academy training was in progress, and there were practice opportunities during the 8-week academy follow-up period via realistic scenario-based practice. Test-retest effects may have influenced follow-up learning. Based on the exit questionnaire, a fraction of the participants practiced handcuffing outside of regular training. Therefore, uncontrolled practice may have influenced pre- and post-booster testing results, although some unprogrammed practice might be expected to occur in all police academies. Regardless, those who practiced handcuffing spent an average of 15 min per week practicing the skill, which is relatively minimal considering training academies invest over 6 h per week on firearms and self-defense tactics skills alone (Reaves, 2016).

Experiment 3

This experiment was the first of its kind to (a) objectively examine the effect of a third representative approach to police academy training (i.e., block training with scenario-based feedback) and (b) examine the effect of performance feedback on instructor behavior and cadet performance. We conducted fewer academy follow-ups to address potential test-retest effects

and documented a substantial decline in performance after graduation.

Initial trainings did not result in criterion-level group performance of either skill, and although scenario-based training produced an effect, resulting performance remained suboptimal. A test-retest effect was observed for disarming but not baton strike. This finding provides some support for the notion that frequent or even intermittent testing during an academy might assist in skill learning. However, corrective feedback would be necessary to address recurrent errors in performance. Performance feedback resulted in substantial increases in group performance of both skills, but baton strike performance fell just short of mastery. This suggests that academy training can be improved through instructor education on basic behavioral principles and minor modifications to training procedures with no additional resources. However, similar decreases in group performance were observed for both skills at 16 weeks after academy graduation. This finding suggests that a quarterly retraining schedule might maintain mastery-level group performance. It is likely that individual requirements will vary.

Conclusion

The first experiment demonstrated the effect and limitations of single-session or block training, whereas the second experiment highlighted the effect of spaced sessions with scenario-based practice opportunities during the academy. The third experiment addressed test-retest effects, demonstrated the effect of performance feedback, and provided evidence that skills may not maintain long after academy graduation without practice. At all three academies, across five trained skills, the initial training sessions were not sufficient to promote mastery-level group performance. On average, academies dedicated a total of 1 h to the training of an individual skill, with fewer practice repetitions for more complex and time-consuming skills. The latter finding may be an important consideration in the design of police academy schedules.

The results present several considerations for police academy instructors and researchers. Behavioral assessment serves a fundamental role in identifying skills, objectives, and functional influences on skill performance (Luiselli & Reed, 2015). Task analyses were introduced and effectively used in the objective measurement of discrete steps for newly learned skills. We assert that objective and reliable measurement should be considered paramount in evidence-based police training of defensive and control tactics. This assertion is bolstered by a review of sports-performance research in behavior analysis (Luiselli et al., 2011). Academies could incorporate this technique by using an in vivo scoring system to identify and provide corrective feedback for suboptimally performed steps. Instructors might then fade feedback over time until cadets can critically examine their own performance and become less prompt dependent. Luiselli et al. (2011) found that goal setting, graphic/video feedback, and positive reinforcement were effective with athletes of various skill levels. Peer intervention, reinforcement procedures, public posting, behavioral packages (i.e., two or more behavioral principles), and goal setting all had moderate to high effect sizes in a meta-analysis spanning various sporting applications (Alstot et al., 2013). The provision of homework materials including visual task analyses, video modeling/feedback (e.g., BenitezSantiago & Miltenberger, 2015), and a tailored practice schedule might increase performance before, during, and following academy training. In fact, structured practice outside the academy might be the most underutilized tool available to instructors. Furthermore, variability in practice partners (e.g., partners of different height, weight, and skill level) and trials (e.g., AAA, BBB, CCC, or ABC, BAC, CBA) might result in increased learning and generalization. However, novice learners can benefit from a regimented block training schedule, and the present experiments provide support for this notion within the context of highly structured police academies. In support of Lum et al. (2016), the inclusion of realistic scenario-based training aided initial performance during the third experiment and skill learning during academy follow-up in the second experiment.

Limitations

We were unable to assess the same skills across experiments due to concerns about uncontrolled practice opportunities across the three sites. Relatively compliant confederates were used for training and testing to maintain the safety of both instructors and cadets. However, officers will likely face more combative and noncompliant subjects in the field. It is not yet known how skill performance during the academy will generalize to dynamic field encounters. This was a preliminary analysis of representative police academy trainings for a limited number of widely taught skills while training for a variety of other skills was in progress. Results should be interpreted with caution given limited generalizability to other academies that use similar training models. Finally, performance feedback was effective but did not result in long-term maintenance of skills. We used group performance data in all three experiments, so the results provide fairly coarse resolutions. Individual time-series data might provide a more fine-grained analysis but would be more intrusive and likely to interfere with training schedules. This limitation highlights the reality of conducting practice-based research in police academies.

Policy Implications

Recent initiatives have called for changes in training and have highlighted the need for consistent standards in high-quality training (Presidential Task Force on 21st Century Policing,

2015, p. 53). Given the large variation in departmental policies and procedures, it is unlikely that a "one-size-fits-all" solution will be found for the challenge of police academy training. In the absence of standardized training procedures across regional academies, each will require a tailored evidence-based approach to work within its schedule, class size, and availability of resources (i.e., number of instructors and technological aids).

In situ probes might identify skills that do not maintain or are found to be inefficient in the field. Before generalization to on-duty performance can be studied, it is important to understand the impact of current academy training and optimize skill performance and learning. We assert that without fluency (i.e., high accuracy and low duration) in their ability to employ defensive and control tactics, officers might be more likely to rely on tools such as chemical spray, conducted-energy devices, or firearms. For example, if an officer is not fluent in her ability to employ a pressure point manipulation with a kneeling protester, she might be more likely to use a chemical spray. Furthermore, an officer who is not fluent in his ability to control an aggressive assailant might be more likely to resort to a conducted-energy device or firearm. Finally, increasing skill fluency and programming for long-term learning and generalization may help instill confidence in an officer's defensive and control tactics. That is, fluency might reduce the likelihood of higher levels of force in the field, when appropriate. These experiments were preliminary investigations that support a call for applied research in police academy training.

Future Research

A number of behavioral principles and procedures remain untested in police academy training. These include (a) the isolated effects of instructions, modeling, guidance, prompts, and cues; (b) different schedules (i.e., blocked vs. distributed) and topographies (i.e., fixed vs. random) of variable practice; (c) different feedback modalities and timing; (d) an external focus of attention on the consequences of movement during practice; and (e) motivating operations through goal setting, peer intervention, public posting, and group contingencies. Research should determine the relative effects of these procedures through small-*n* single-case experimental designs and component analyses. In closing, the behavioral sciences are equipped to isolate effective and efficient procedures that result in optimal skill performance, learning, and generalization during police academy training and beyond.

Acknowledgements The authors thank the police academy cadets, instructors, and administration for their participation in research and dedication to their profession. The authors also thank Emily J. Novak for her contributions in data collection and inter-observer agreement.

Compliance with Ethical Standards

Conflict of Interest John O'Neill declares that he has no conflict of interest. Dawn A. O'Neill declares that she has no conflict of interest. Katelyn Weed declares that she has no conflict of interest. Mark E. Hartman declares that he has no conflict of interest. William R. Spence declares that he has no conflict of interest. William J. Lewinski declares that he has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Appendix 1

Task analyses for skills in Experiment 1 are shown in Tables 4 (pressure point), 5 (disarming), and 6 (kick).

Table 4 Mandibular angle pressure point steps and substeps

Step	Substep	Description
Approach	1	The officer demonstrates the correct approach and positioning toward the noncompliant suspect.
	2	The weighted knee is on the ground behind, but not touching, the suspect in a kneeling power stance with the stabilizing foot neither behind the weighted knee nor crossing the plane of the suspect's body.
Control	3	With the control arm, the officer secures the side of the head with the forearm and grasps the forehead with the palm of the hand.
Prepare free hand	4	The officer girds the thumb with the forefinger and fist for proper support, with the thumb protruding above the second knuckle of the index finger.
Apply pressure	5	The officer places the thumb just below/behind the earlobe on the back of the mandible.
	6	The officer applies pressure toward the neck and peels back out to the jawbone with force.
	7	The officer uses the end of the thumb bone (i.e., not the pad).
	8	Counterpressure is applied with the officer's opposite arm until the suspect complies.
Gain compliance	9	The officer uses loud verbal commands to provide clear instructions specific to what he/she wants the suspect to do (e.g., palms out, thumbs in the air).
	10	The officer gains compliance with the suspect placing hands behind his/her back.
	11	Upon compliance, the officer relaxes pressure applied with the applied thumb.
	12	The officer maintains control of the suspect's head with the opposite arm.

Table 5 Rear disarming of firearm steps and substeps

Step	Substep	Description
Start position	1	The officer maintains a state of readiness and is balanced with feet shoulder-width apart.
	2	The officer looks over his/her shoulder to determine where the suspect is pointing the gun.
	3	The officer continually looks over his/her shoulder.
Arm position	4	If the gun is pointed high, the officer slowly raises his/her hands slightly above shoulder level, elbows pointed at approximately 45 degrees. If the gun is pointed low, the officer will not reposition his/her hands.
Adjust distance	5	The officer adjusts the distance between the officer and the suspect with one step.
	6	The gun is within reach as the officer turns around.
Turn toward the suspect	7	The officer quickly spins with three or less total steps in the direction he/she was looking, with the right foot stepping across the plane of his/her own left foot's beginning position.
	8	The officer makes initial contact with the suspect's arm using his/her forearm.
	9	The officer sweeps his/her own forearm across the suspect's body so that the barrel is no longer directed at the officer's body.
Control the firearm	10	The officer grabs the wrist of the suspect's gun hand with the palm down.
	11	The officer's thumb is placed on the back of the suspect's hand.
	12	With his/her other hand, the officer secures the barrel of the weapon from below with the palm on the bottom of the barrel and fingers wrapping up and around the barrel.
Free the firearm	13	The officer strongly pushes hands down to his/her waist.
	14	The officer pushes the weapon into the web of the suspect's hand with the barrel first going up and then down and over the suspect's hand in a tight circle with the barrel pointed up and away from the officer, strongly affecting the release.
Avoid the discharge	15	The officer should be aware that the firearm may be discharged and takes measures to avoid the muzzle blast by looking away and to his/her side.
Create distance	16	Once release is achieved, the officer pushes the suspect's hand toward the suspect's face/pushes the suspect away.
	17	The officer creates distance with two steps to the rear and one to the right/left.
	18	If needed, the officer switches the weapon to the non-firearm side of the officer's body.
	19	The officer points the suspect's firearm toward the ground.
	20	The officer draws his/her firearm and maintains a combat-tuck position.
Commands	21	The officer gives a loud verbal command to "get flat on the ground."
	22	The officer gives a loud verbal command to "put hands out to your side."
	23	The officer gives a loud verbal command to "place palms up."
	24	The officer gives a loud verbal command to "cross your legs."
	25	The officer gives a loud verbal command to "bring them up to your backside."
	26	The officer gives a loud verbal command to "look away from me."
Radio in	27	The officer radios in to provide location.
	28	The officer radios in that he/she needs assistance.
	29	The officer radios in that the suspect is at gunpoint.

Table 6 Front snap kick steps and substeps

Step	Substep	Description
Lower body stance	1	Stand with the strong leg back.
	2	The back foot is positioned at a 45-degree angle to the front foot, blading the body.
	3	The front foot is pointing toward the target.
	4	No portions of the feet overlap in the same plane.
	5	The front knee is slightly bent.
Upper body stance	6	The head is positioned directly toward the target.
	7	Arms are brought up in a defensive blocking posture with elbows bent between 45 and 90 degrees, each hand in front of the torso and no higher than eye level.
	8	Elbows support the defensive hand position by pointing toward the ground.
Chamber the kicking leg	9	The torso is brought over the front leg.
	10	Rotate the hips to generate power and raise the strong (back) leg until the knee is pointing toward the target and at or slightly above target level with the foot approximately parallel to the ground.
Snap the leg	11	The supporting foot remains planted on the ground throughout the kick, with the knee slightly bent.
	12	With force and speed, snap the lower leg up at the knee with the toes of the shoes pointed forward, toward the target.
	13	The path of the foot is approximately parallel to the ground.
	14	Deliver a strong blow to the target with the front half of the sole.
Return the kicking foot	15	Return the foot to the original position (same as the lower body stance step).

Appendix 2

Task analyses for skills in Experiment 2 are shown in Tables 7 (handcuffing) and 8 (kick).

Table 7 Rear-approach kneeling handcuff steps and substeps

Step	Substep	Description
Verbal commands	1	The officer identifies him/herself.
	2	The officer informs suspect he/she is under arrest.
	3	The officer commands the suspect to turn around/face away.
	4	The officer commands the suspect to move his/her arms straight out to his/her sides (airplane) or above his/her shoulders or head (arms cannot be resting by sides, perpendicular to floor).
	5	The officer commands the suspect to kneel.
	6	The officer commands the suspect to cross his/her ankles.
	7	The officer commands the suspect to bring his/her hands to the back area (either palms out and knuckles together or palms together with interlaced fingers).
Grasp hands	8	The officer stands behind the suspect in an "athletic stance"—one foot (right or left) positioned completely in front of the officer's body while the opposite foot is positioned completely behind the other foot with approximately equal weight distribution, with knees slightly bent.
	9	The officer reaches in and grasps the suspect's hands.
	10	The officer either grabs the top two to four fingers of the suspect's hands or grasps the suspect's interlocked fingers with the officer's thumb on top and fingers underneath (C-grip).
	11	The original correct grip should be maintained throughout.
Pull hands up and away	12	The officer obtains a firm grip on the fingers and pulls the suspect's hands away from the suspect's body.
	13	The officer clears the suspect's wrists by sweeping up and along the arm to the forearm.
Extract cuffs	14	The officer extracts cuffs after hand control.
	15	The officer maintains chain tension by a hand gripping the chain length throughout the entire process.
Attach the first cuff	16	The officer places the second bracelet at the base of the thumb or fifth digit on the ulnar notch (where the hand ends and the wrist begins).
	17	The officer applies the cuff, and the single bar swings completely around and attaches to the double bar.
	18	The officer maintains chain tension by a hand gripping the chain length throughout the entire process.
	19	The officer maintains original correct grip/control of the suspect's fingers throughout the entire process.
Attach the second cuff	20	The officer places the second bracelet at the base of the thumb or fifth digit on the ulnar notch.
	21	The officer applies the cuff, and the single bar swings completely around and attaches to the double bar.
	22	The officer maintains chain tension by a hand gripping the chain length throughout the entire process.
	23	The officer maintains original correct grip/control of the suspect's fingers throughout the entire process.
Check the cuffs	24	The officer commands the suspect to stand up.
	25	The officer assists the suspect in standing by grasping one arm (does not pull at the cuffs).
	26	The officer checks tightness by looking for an appropriate amount of space where the handcuffs fit on the widest part of the suspect's wrist.
	27	The officer tightens or loosens the bracelets as needed. Proper fit is on the ulnar notch.
Lock the cuffs	28	The officer double locks cuffs by engaging the double-lock mechanism of the handcuff.

Table 8 Front snap kick steps and substeps

Step	Substep	Description
Lower body stance	1	Stand with the strong leg back.
	2	The back foot is positioned at a 45-degree angle to the front foot, blading the body.
	3	The front foot is pointing toward the target.
	4	No portions of the feet overlap in the same plane.
	5	The front knee is slightly bent.
Upper body stance	6	The head is positioned directly toward the target.
	7	Arms are brought up in a defensive blocking posture with elbows bent between 45 and 90 degrees, each hand in front of the torso and no higher than eye level.
	8	Elbows support the defensive hand position by pointing toward the ground.
Chamber the kicking leg	9	The torso is brought over the front leg.
	10	Rotate the hips to generate power and raise the strong (back) leg until the knee is pointing toward the target and at or slightly above target level with the foot approximately parallel to the ground.
Snap the leg	11	The supporting foot remains planted on the ground throughout the kick, with the knee slightly bent.
	12	With force and speed, snap the lower leg up at the knee with the toes of the shoes pointed forward, toward the target.
	13	The path of the foot is approximately parallel to the ground.
	14	Deliver a strong blow to the target with the front half of the sole.
Return the kicking foot	15	Return the foot to the original position (same as the lower body stance step).

Steps are the same as those in Table 6

Appendix 3

Task analyses for skills in Experiment 3 are shown in Tables 9 (disarming), 10 (baton strike), and 11 (pressure point).

Table 9 Rear disarming steps and substeps

Step	Substep	Description
Start position	1	The officer maintains a state of readiness and is balanced with the hands up at shoulder level.
Assess and distract	2	The officer looks over his/her shoulder to determine where the suspect is pointing the gun and what type of gun it is.
	3	The officer talks to the suspect to create a distraction.
Turn toward the suspect	4	The officer quickly turns with the foot on same side as the suspect's weapon-holding arm across the plane of his/her own other foot's beginning position to turn 180 degrees, using no more than three total steps. The step should progress the officer's body toward the suspect so that the weapon can be controlled.
	5	The direction in which the officer turns should be to the same side as the suspect's arm.
	6	The officer keeps arms up with elbows pointing to the ground, forearms facing the suspect, and palms of hands facing each other.
Move suspect's weapon further off-line	7	The officer's forearms contact the suspect's arm that is holding the gun.
	8	The officer's forearms push the suspect's gun-holding arm out of line (off-line) from the officer's body.
Control the suspect's dominant arm/hand	9	The officer's elbow closest to the suspect's head rotates upward so that the officer's elbow swings across the suspect's head.
	10	The officer's arm closest to the suspect's head is secured on the medial side of the suspect's arm and locks into place.
	11	The officer's same arm securely grabs the suspect's wrist, with the officer's thumb on the medial side of the suspect's wrist.
	12	The officer bends his/her knees and changes levels to make the suspect unbalanced.
Control the firearm	13	The officer's other hand secures the suspect's gun, with the thumb on the top of the barrel.
	14	The suspect's firearm is controlled by the officer so that the barrel is no longer directed at the officer's body.
Strip/free the firearm	15	The officer's elbows are bent about 90 degrees, upper arms directed toward the ground, and one hand has control of the suspect's arm/wrist while the other has control of the weapon.
	16	The suspect's gun remains out of line from the officer.
	17	The officer twists the gun away from him/herself and toward the suspect while bracing the suspect's wrist with the officer's hand (which should create a fulcrum).
	18	The officer's arm that is securing the suspect's gun-holding arm releases from contact and the officer's elbow drives upward.
Create distance	19	Once release is achieved, the officer creates distance from the suspect by stepping back and away from the suspect.
	20	The suspect's gun remains pointed toward the ground and never toward the officer.
	21	The officer draws his/her own firearm.
Control the suspect	22	The officer provides commands to the suspect to become prone.
	23	The officer commands the suspect to put his/her arms out onto the ground.
	24	The officer commands the suspect face his/her palms upward.
	25	The officer commands the suspect to face away (to turn his/her face toward the opposite direction of the officer's location).
	26	The officer repositions his/her body to be 45 degrees behind the suspect.
	27	The officer controls the suspect's weapon (e.g., next to the officer, on the ground under the foot, or remaining in the officer's possession).
Radio for backup	28	The officer radios in.
	29	The officer requests assistance or backup.
	30	The officer provides location.
	31	The officer keeps the suspect at gunpoint with his/her duty weapon, controlling the suspect, through the remainder of the incident.

Table 10 Common peroneal baton strike steps and substeps

Step	Substep	Description
Stance and draw	1	The officer transitions into a defensive posture stance with feet staggered, knees slightly bent, and both hands protecting his/her face.
	2	The officer grasps the baton holster with the hand closest to the holster.
	3	The officer twists his/her torso and hips toward the baton holster while bending both knees.
	4	The officer grasps the baton and removes it from the holster in one fluid motion.
	5	The officer snaps the baton out in one fluid motion, striking the suspect, to perform a clearance strike.
Body position	6	The officer brings the baton to the same shoulder as the baton-holding hand in a direct movement.
	7	The officer moves into a combat stance with feet shoulder-width apart and both knees bent.
	8	The officer commands the suspect to get back.
	9	The officer's other hand is up and bladed, to protect his/her head.
Strike	10	The officer's leg opposite the baton-holding hand takes a step toward the suspect.
	11	The baton drives forward at the suspect.
	12	The baton is directed at a downward angle.
	13	The officer pivots the back leg and the torso twists toward the suspect.
	14	The officer remains in an upright position, not bending at the hips.
	15	The officer's support hand is positioned up, protecting the head.
Impact	16	The baton makes impact with the suspect at each strike attempt.
	17	The officer strikes the suspect with the top third of the baton at each strike attempt.
	18	If the officer performs a secondary femoral strike, the baton must be reloaded under the support hand's elbow and the strike must be performed with the same strike impact technique as the common peroneal strike.
	19	The officer uses clear instructions specific to what he/she wants the suspect to do as the officer returns to combat stance.
Get off-line	20	The officer moves off-line of the original striking location to reassess the situation.

Table 11 Infraorbital pressure point steps and substeps

Step	Substep	Description
Approach	1	The officer demonstrates the correct approach and positioning toward the noncompliant suspect.
	2	The officer stands to the side of the suspect, behind the suspect's body plane.
Control	3	The officer bends at the knees with feet flat on the ground.
	4	With the control arm, the officer secures the side of the head with the forearm and with the palm of the hand grasping the forehead.
Prepare free hand	5	The officer prepares the application hand by keeping all fingers away from the mouth of the suspect.
Apply pressure	6	The officer places the side of the index or middle finger just below/under the nose, while keeping other fingers away from the pressure point area.
	7	The officer's elbow is bent and forearm is approximately parallel to the ground.
	8	The officer applies pressure inward and upward with force.
	9	The officer uses the bone of the finger (i.e., not the pad) to apply pressure.
	10	The officer applies counterpressure with the opposite arm until the suspect complies.
Compliance	11	Utilizing loud verbal commands, the officer provides clear instructions specific to what he/she wants the suspect to do (e.g., palms out, thumbs in the air).
	12	The officer gains compliance with the suspect placing his/her hands behind his/her back.
	13	The officer gains compliance on the first command after applying pressure.
	14	Upon compliance, pressure is relaxed.
	15	The officer maintains control of the suspect's head.

Table 1 Distribution of time and repetitions dedicated to each component of training for mandibular angle pressure point and rear disarming of firearm (Experiment 1)

Training Component Analysis						
Component	Pressure	Booster	Total	Disarming	Booster	Total
	Minutes (repetitions)					
Rationale/instruction/modeling	3 (2)	2 (1)	5 (3)	7 (2)	3 (2)	10 (4)
Practice/individual feedback	17 (10)	19 (15)	36 (25)	37 (10)	13 (5)	50 (15)
Group feedback	2 (1)	1 (1)	3 (2)	5 (1)	3 (1)	8 (2)
Total	22	22	44	49	19	68

Table 2 Distribution of time and repetitions (average across groups) dedicated to each component of training for rear-approach kneeling handcuff (Experiment 2)

Training Component Analysis					
Component	Initial	Booster 1	Booster 2	Booster 3	Total
	Minutes (repetitions)				
Rationale/instruction/modeling	3 (1)	3 (1)	2 (1)	2 (1)	10 (4)
Practice/individual feedback	12 (2)	8 (2)	7 (2)		27 (6)
Group feedback		1 (1)			1 (1)
Total	15	12	9	2	38

Table 3 Distribution of time and repetitions dedicated to each component of training for common peroneal baton strike and rear disarming of firearm during initial and performance feedback (PF) trainings (Experiment 3)

Training Component Analysis							
Component	Baton	PF	Total	Disarming	Scenario	PF	Total
	Minutes (repetitions)						
Rationale/instruction/modeling	20 (6)	8 (3)	28 (9)	16 (4)	6 (4)	10 (1)	32 (9)
Practice/individual feedback	28 (17)	10 (11)	38 (28)	10 (2)	3 (2)	9 (4)	22 (10)
Group feedback	6 (1)	4 (1)	10 (2)	3 (1)	2 (1)	1 (1)	6 (3)
Total	54	22	76	29	11	20	60

References

Alstot, A. E., Kang, M., & Alstot, C. D. (2013). Effects of interventions based in behavior analysis on motor skill acquisition: A meta-analysis. *The Physical Educator, 70,* 155–186. Retrieved from https://js.sagamorepub.com/pe/article/view/3110

Atkins, V. J., & Norris, W. A. (2004). *Survival scores research project*. FLETC Research Paper. Washington, DC: Department of Homeland Security. Retrieved from https://www.fletc.gov/sites/default/.../research-papers/survival_scores_research.pdf

BenitezSantiago, A., & Miltenberger, R. G. (2015). Using video feedback to improve martial arts performance. *Behavioral Interventions, 31*, 12–27. https://doi.org/10.1002/bin.1424.

Bennett, J. (2009). Creating, structuring, and maintaining an in-service training program [Walking This Walk column]. PoliceOne.com. Retrieved from https://www.policeone.com

Caro, C. A. (2011). Predicting state police officer performance in the field training officer program: What can we learn from the cadet's performance in the training academy? *American Journal of Criminal Justice, 36*, 357–370. https://doi.org/10.1007/s12103-011-9122-6.

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

Dartfish. (2011). *Dartfish prosuite (Version 6.0) [Computer software]*. Alpharetta: Author.

Hardesty, K. (2012). Blue on blue: How to prepare for the unthinkable [Excellence in Training column]. PoliceOne.com. Retrieved from https://www.policeone.com

Horner, R. D., & Baer, D. M. (1978). Multiple-probe technique: A variation of the multiple pretest. *Journal of Applied Behavior Analysis, 11*(1), 189–196. https://doi.org/10.1901/jaba.1978.11-189.

Hyland, S., Langton, L., & Davis, E. (2015). *Police use of nonfatal force, 2002–11.* (Special Report No. NCJ 249216). Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics. Retrieved from https://www.bjs.gov/

International Association of Chiefs of Police. (2001). *Police use of force in America.* Retrieved from http://www.theiacp.org/portals/0/pdfs/publications/2001useofforce.pdf

Kaminski, R. J., & Martin, J. A. (2000). An analysis of police officer satisfaction with defense and control tactics. *Policing: An International Journal of Police Strategies and Management, 23*, 132–153. https://doi.org/10.1108/13639510010333697.

Kazdin, A. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.

Luiselli, J. K., & Reed, D. D. (2015). Applied behavior analysis and sports performance. In H. S. Roane, J. E. Ringdahl, & T. S. Falcomata (Eds.), *Clinical and organizational applications of applied behavior analysis* (pp. 523–553). New York: Elsevier.

Luiselli, J. K., Woods, K. E., & Reed, D. D. (2011). Review of sports performance research with youth, collegiate, and elite athletes. *Journal of Applied Behavior Analysis, 44*(4), 999–1002. https://doi.org/10.1901/jaba.2011.44-999.

Lum, C., Koper, C. S., Gill, C., Hibdon, J., Telep, C., & Robinson, L. (2016). *An evidence-assessment of the recommendations of the President's task force on 21st century policing: Implementation and research priorities*. Fairfax, VA: Center for Evidence-Based Crime Policy, George Mason University. Alexandria, VA: International Association of Chiefs of Police.

Morrison, G. B. (2006). Police department and instructor perspective on pre-service firearm and deadly force training. *Policing: An International Journal of Police Strategies and Management, 29*, 226–245. https://doi.org/10.1108/13639510610667646.

Nieuwenhuys, A., Calijouw, S. R., Leijsen, M. R., Schmeits, B. A. J., & Oudejans, R. R. D. (2009). Quantifying police officers' arrest and self-defence skills: Does performance decrease under pressure? *Ergonomics, 52*, 1460–1468. https://doi.org/10.1080/00140130903287981.

Presidential Task Force on 21st Century Policing. (2015). Final report of the President's task force on 21st century policing. Washington, DC: Office of Community Oriented Policing Services. Retrieved from https://ric-zai-inc.com/Publications/cops-p311-pub.pdf

Reaves, B. A. (2016). *State and local law enforcement training academies, 2013 (Report No. NCJ249784)*. Washington, DC: U.S. Department of Justice.

Renden, P. G., Landman, A., Geerts, S. F., Jansen, S. E. M., Faber, G. S., Savelsbergh, G. J. P., & Oudejans, R. R. D. (2014). Effects of anxiety on the execution of police arrest and self-defence skills. *Anxiety, Stress, and Coping, 27*, 100–112. https://doi.org/10.1080/10615806.2013.810213.

Renden, P. G., Landman, A., Savelsbergh, G. J. P., & Oudejans, R. R. D. (2015). Police arrest and self-defence skills: Performance under anxiety of officers with and without additional experience in martial arts. *Ergonomics, 58*(9), 1496–1506. https://doi.org/10.1080/00140139.2015.1013578.

Renden, P. G., Savelsbergh, G. J. P., & Oudejans, R. R. D. (2017). Effects of reflex-based self-defence training on police performance in simulated high-pressure arrest situations. *Ergonomics, 60*(5), 669–679. https://doi.org/10.1080/00140139.2016.1205222.

Vander Kooi, G. P., & Palmer, L. B. (2014). Problem-based learning for police academy students: Comparison of those receiving such instruction with those in traditional programs. *Journal of Criminal Justice Education, 25*(2), 175–195. https://doi.org/10.1080/10511253.2014.882368.