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Evaluation of Courses of Fire for Law Enforcement Firearms Training

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14. ABSTRACT *(Maximum 200 words)*:
In response to active shooter threats, the U.S. Army Military Police School (USAMPS) identified current best practices for weapons skills training as employed by various civilian and military law enforcement authorities. That information was then used to construct a new set of pistol training exercises which focus on dynamic shooting engagements and the development of skills like smooth weapons handling, successful target transitioning, and rapid weapon reloading. To identify an effective, efficient approach for training these skills, Active and Reserve Military Police (MPs) were trained on a common set of pistol exercises in either a Dry, Engagement Skills Trainer 2000 (EST 2000), Live, or Live Plus (i.e., identical to the Live condition but with additional practice rounds). Baseline (i.e., pre-training) and post-training shooting performance was measured. Results indicated that the Dry and Live Plus conditions were consistently the most effective at improving MP performance.

15. SUBJECT TERMS
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EVALUATION OF COURSES OF FIRE FOR LAW ENFORCEMENT FIREARMS TRAINING

EXECUTIVE SUMMARY

Research Requirement:

In response to active shooter threats, the U.S. Army Military Police School (USAMPS) identified current best practices for weapons skills training as employed by various civilian and military law enforcement authorities. That information was then used to construct a new set of military police (MP) pistol exercises which focus on dynamic shooting engagement and the development of skills in successful target transitioning and rapid weapon reloading—the types of skills required for success in active shooter situations. To identify an effective, efficient approach for training these skills, the Army Research Institute was asked by USAMPS to aid in the experimental design and analysis of data resulting from the Law Enforcement Firearms Training Validation Research effort.

Procedure:

Active (N = 134) and Reserve (N=230) MPs were trained on a new set of pistol exercises in a Dry, Engagement Skills Trainer 2000 (EST 2000), Live, or Live Plus (a live fire conditions with more live practice rounds) condition. Baseline and post-training shooting performance was measured via scores on a newly developed course of fire.

Findings:

For Active MPs, only the Dry and Live Plus conditions significantly improved qualification scores. For Reserve MPs, all four training conditions were equally effective at improving qualification scores. Therefore, the results indicated that the Dry and Live Plus conditions were the most consistently effective at improving MP qualification scores.

Utilization and Dissemination of Findings:

The findings provide decision makers with relevant information regarding resource allocation and training strategy implementation. For example, to the extent that the MP samples are representative of their respective populations, then different training recommendations are appropriate for Reserve versus Active MPs. These findings were disseminated and briefed to USAMPS personnel at Fort Leonard Wood, MO.

EVALUATION OF COURSES OF FIRE FOR LAW ENFORCEMENT
FIREARMS TRAINING

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EVALUATION OF COURSES OF FIRE FOR LAW ENFORCEMENT FIREARMS TRAINING

Introduction

Responding to an active shooter threat is a critical responsibility of the military police. A recent evaluation of current military police training in response to the Fort Hood shooting incident, however, indicated that the current training at the U.S. Army Military Police School (USAMPS) does not adequately incorporate successful models of active shooter response from civilian and military law enforcement authorities (Finding 4.3; Fort Hood Internal Review Team, 2010). In response to this finding, the USAMPS completed an analysis of civilian law enforcement firearms training programs to identify current best practices for weapon skills training. The results indicated the need to shift away from a qualification-centered training regime to one emphasizing skill development for more dynamic shooting engagements. These tasks include smooth weapons handling, successful target transitioning, and rapid weapon reloading in the appropriate visual "workspace."

For this transition in training focus to succeed, it was necessary to identify an effective, efficient training approach for military law enforcement personnel. Perhaps the most basic decision was whether to use live rounds for marksmanship training. At the broadest level, there are three available options: live fire training, dry fire training, and simulation training (e.g., Engagement Skills Trainer 2000 [EST2000]).

There are numerous advantages to live fire training. Fundamentally, training with live rounds most closely approximates the task demands of marksmanship qualification performance and active shooter responses. These demands include anxiety management, which may impact psychomotor skills (Chung, Delacruz, de Vries, Bewly, & Baker, 2006), as well as recoil management, natural lighting conditions, and the full range of target distances. Previous research suggests that incorporating live ammunition throughout training produces better training outcomes (McGuigan, 1953). However, live fire is also associated with important limits, such as range availability, ammunition costs, and safety considerations especially for initial entry MPs and novice firers.

Dry fire training is training in which individuals train without live or simulated rounds. Anecdotal evidence suggests that dry fire can compose up to 70% of training time for competitive marksmen and is a critical component of maintaining and enhancing fundamental marksmanship training skills, especially sight alignment, trigger control, and weapons handling (e.g., drawing the weapon from the holster). Neurocognitive research on skill learning and habit formation indicates that practice in psychomotor tasks leads to a representational shift from deliberate processing to more automatic response execution (Poldrack, et al., 2005; Yarrow, Brown, & Krakauer, 2009). To the extent that the actions practiced reflect appropriate movements and facilitate shooting performance, they would be expected to transfer to live round contexts and improve shooting performance. There are several advantages of dry fire practice. First, because it requires no additional equipment beyond the weapon and (for pistol shooting) a holster, dry fire training can be extremely cost effective. Second, dry fire training can be executed virtually anywhere, i.e., indoors or outdoors. This ease of execution means that dry fire training can be undertaken at the shooters convenience. It is also comparatively safe, provided

standard safety procedures are followed. Third, dry fire training also supports the training of weapons draw and magazine loading, which are crucial for the execution of time-limited shooting tasks and fundamental weapon control. Improvement in such tasks can reduce task execution time and increase shooter confidence. Despite these advantages, however, there are limitations to dry fire training. First, dry fire does not provide feedback on round location. Second, dry fire training is of limited use for teaching recoil management.

Computer-based simulators offer a viable alternative to both live fire and dry fire marksmanship training. Previous research suggests that performance with laser based training systems can be highly predictive of live fire qualification performance for both rifle and pistol (Smith & Hagman, 2000). In addition, previous work suggests that laser-based simulation systems may in some ways be more effective than training emphasizing dry fire practice (Hagman, 2000). One major benefit of simulated training is that, like live fire training, it offers feedback about round location. In addition, like dry fire training, simulation training does not require the use of live rounds. Further, computer simulations, such as the EST2000, offer a wide variety of shooting options (e.g., variety of targets and target locations and scenarios (e.g., active shooter, robbery, hostage) that are simply not feasible for a live fire range. As with any training system, there are drawbacks to computer-based simulations for law-enforcement marksmanship. First, the simulated recoil is not identical to the recoil experienced with live rounds, impeding the acquisition of recoil management skills. Second, unlike dry fire training, simulation training requires specialized equipment, buildings, and personnel that are not always available. Third, while simulated training systems are remarkably flexible, some systems such as the EST2000 cannot incorporate extremely close range shooting (less than 3 meters from target). Fourth, simulation-based training is typically carried out in dark, indoor facilities with light-emitting screens, and, thus, simulation-based training cannot replicate natural shooting environments.

The goal of this research was to empirically assess the relative effectiveness of the three broad approaches in training MPs active-shooter scenario skills. To that end, Active and Reserve Component MPs were trained in one of four conditions (dry, simulation, and two versions of live training).

Method

Participants

The sample consisted of 134 Active Component MPs and 230 Reserve Component MPs. The reported ranks of the participants ranged from E1 to O4. Participating units were selected on the basis of projected MP numbers and MP type (i.e., Reserve vs. Active). Units were assigned to the different training conditions according to the availability of the required facilities. Each individual provided informed consent prior to participation.

Materials and Procedure

The training pilot lasted a total of three days. On Day 1, participants completed standard unit Preliminary Marksmanship Instruction (PMI), including weapons safety training. This instruction was consistent with established unit-specific practices and was not altered to

accommodate the training pilot assessment. After completing PMI, all individuals completed the baseline training pilot qualification course of fire for pistol (see Appendix A) using a standard Omaha Q target. This score served as the measure of baseline (i.e., pre-training) pistol performance.

On Day 2, participants completed group exercises in either Dry, Simulation, Live, or Live Plus firing conditions depending on which training condition they were assigned. With a few minor exceptions, the training conditions differed only in terms of method—the exercises were largely the same (see Appendix B). However, the 'Live Plus' condition merits a fuller description. In essence, the Live Plus condition was identical to the Live condition but for the use of additional live rounds which were used to complete a practice round of the pilot pistol qualification course of fire (again, see Appendix A).

On Day 3, individuals completed the baseline training pilot qualification course of fire for pistol once again. Thus, the course of fire shown in Appendix A served as the measure of both baseline and post-training pistol performance.

Results

Separate analyses for the Active Component MPs and Reserve Component MPs were conducted to determine the training conditions that best matched the unique characteristics of the MPs. This was done because there were differences in the baseline marksmanship scores of the Active and Reserve Component MPs.

All analyses were conducted on SPSS 21.0 for Windows, and the alpha level for statistical significance set at .05 for all tests. As this was an exploratory analysis, all p values should be treated with caution. Each analysis used a 2 (scores on baseline and post-training qualification) x 4 (training condition) mixed-factor analysis of variance. If the interaction term was statistically significant, then post-hoc analyses were used to clarify the nature of the interaction.

Active Component MPs

The interaction term was significant (F (3, 130) = 7.65, $p < .05$, MSE = 24.20). The nature of the interaction can be gleaned by examining Figure 1, which contains error bars indicating 5% confidence intervals. The Dry and Live Plus conditions significantly increased qualification scores from baseline to post-training, while qualification scores were statistically equivalent in the EST2000 and Live conditions.

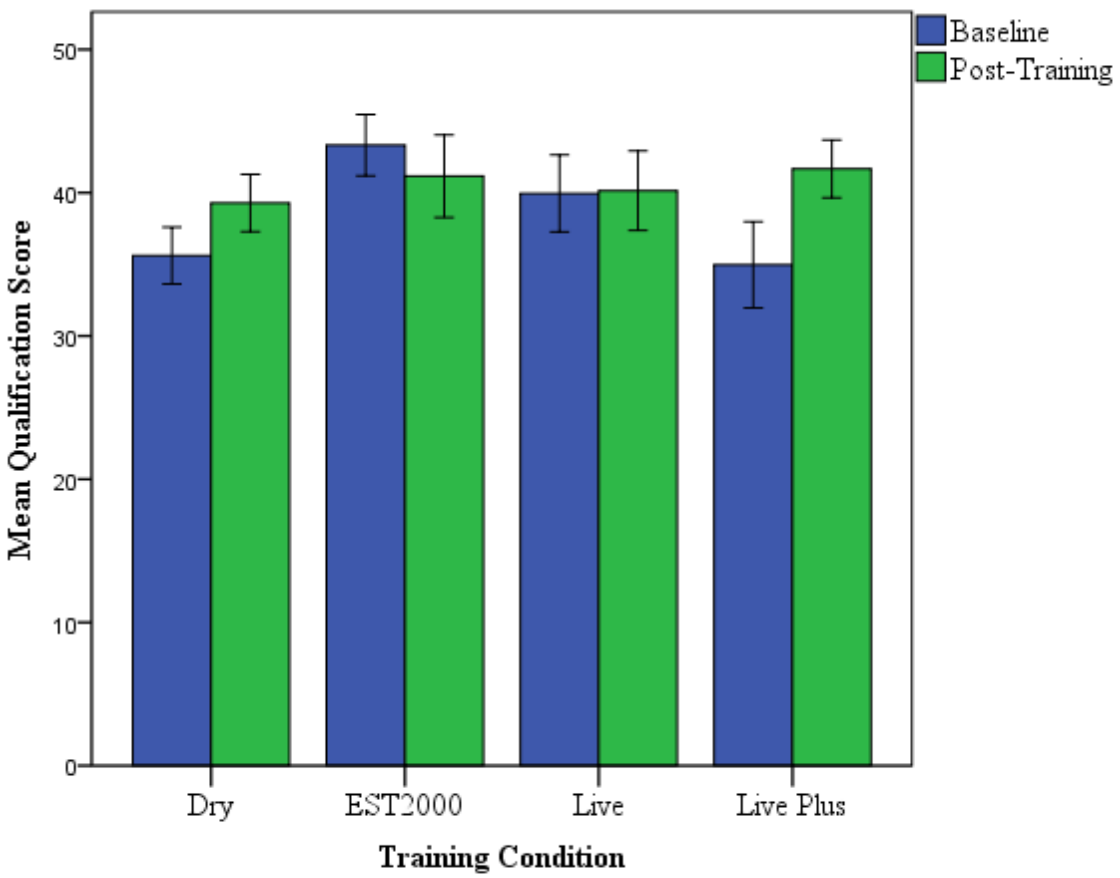

Figure 1. Mean Marksmanship Qualification Scores for Active Component MPs. Error bars indicate 95% confidence intervals.

Reserve Component MPs

The interaction term was not significant (F (3, 226) = .43, p < .05, MSE = 22.84) nor was the main effect for training condition (F (3, 226) = .34, p > .05, MSE = 31.22). However, the within-subjects effect was significant (F (1, 226) = 189.00, p <.05, MSE = 22.84). As presented in Figure 2, all four training conditions resulted in a statistically significant and statistically equivalent increase in
performance.

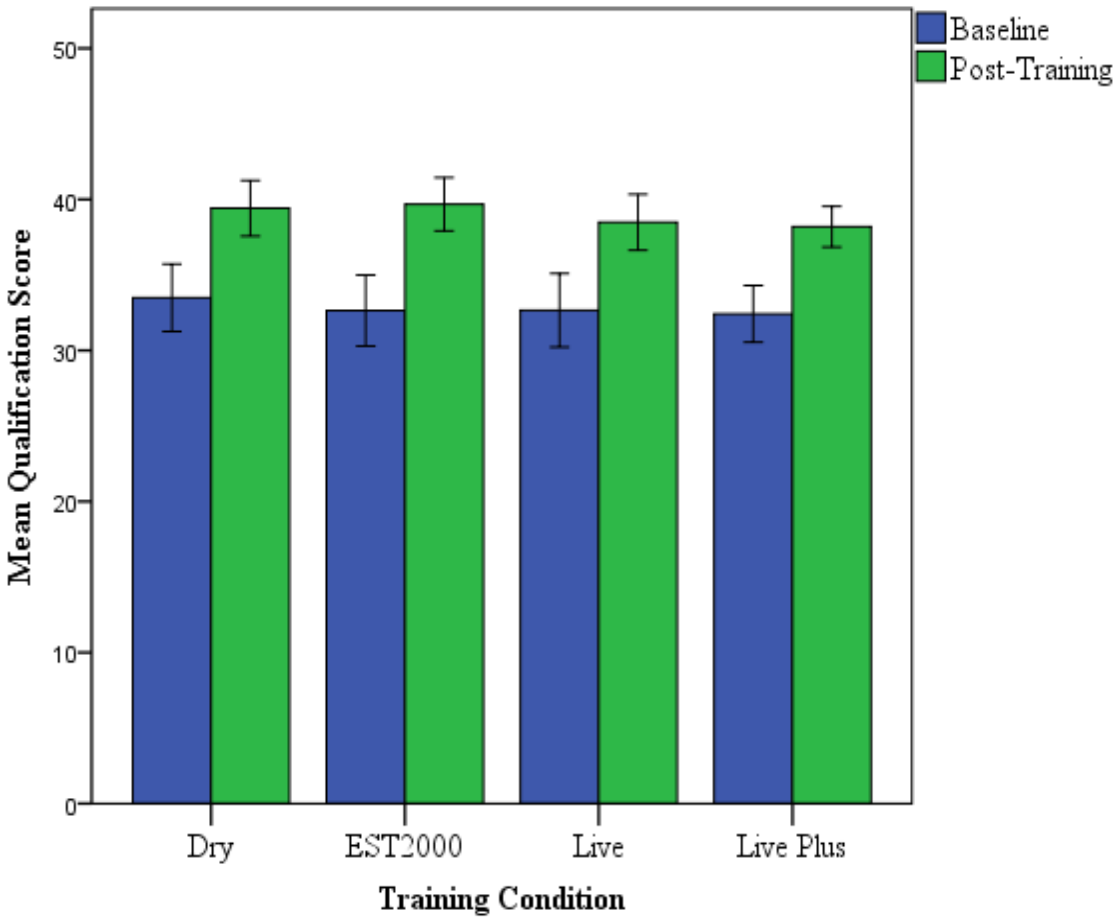

Figure 2. Mean Marksmanship Qualification Scores for Reserve Component MPs. Error bars indicate 95% confidence intervals.

Discussion and Recommendations

Considered all together, the results indicated that the most effective conditions for training the new USAMPS course of fire were Dry and Live Plus. The Reserve MPs, benefited almost equally from all four training conditions. However, Active MPs only benefitted from the Dry and Live Plus training conditions. If a choice is to be made between Dry and Live Plus training conditions, the decision may depend on available resources. The Reserve Component MPs equally benefitted from both Dry and Live Plus. A cost savings could be realized for Reserve MPs by utilizing dry fire training. However, Live Plus resulted in a larger increase in qualification scores for Active Component MPs as compared to Dry. Thus, a decision would have to be made as to whether the greater effectiveness of Live Plus over Dry is large enough to justify the expenditure of extra resources.

Explaining why the Live Plus training condition led to increased performance for both the Reserve and Active Component MPs is a relatively straightforward affair. Namely, as noted in the Introduction, use of live most closely approximates the task demands of marksmanship qualification performance and active shooter responses. In addition, the Live Plus condition not only allowed for the use of additional live rounds (compared to the Live condition), but also afforded an additional practice trial on the course of fire. Less expected, perhaps, was the finding that Dry was so effective in increasing marksmanship performance. Given the different pre-training performance scores of the Reserve and Active Component MPs, the role that Dry training played may be quite different. For the Reserve Component MPs, the increase in performance may have resulted because Dry training focuses on fundamental behaviors associated with the shooter and the weapon (e.g., sight alignment, trigger control) rather than a strict focus on bullet placement. Such fundamental skills may be necessary conditions of accurate bullet placement. For the more experienced Active Component MPs, Dry may have resulted in successful reinforcement training of the fundamental behaviors.

Making a fully informed choice between Dry and Live Plus for Active MPs will require a consideration of a broader range of factors than this data alone-namely, the availability of range time, allocation of rounds, etc. Nor should the other methods of training be ruled unworthy of further consideration. As the data show, for the Reserve MPs all four training conditions were significantly and equally effective.

These findings were disseminated and briefed to USAMPS personnel at Fort Leonard Wood, Missouri.

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APPENDIX A

QUALIFICATION COURSE OF FIRE FOR PISTOL

DEPARTMENT OF THE ARMY

LAW ENFORCEMENT PISTOL QUALIFICATION SCORECARD

For use of this form, see ST 19-LEWQ; the proponent agency is USAMPS

ID: Date: Range Surface:

UNIT (Organization and Location): Weather: Temperature: Uniform:

Rank: Group: 1 2 3 4 Pistol Light: Yes No Type Holster:

Station	Task	Position	Distance (meters)	# Event Rnds	Time (seconds)	Hit Bdy 1	Hit Box 1	Miss 0	PTM	Head	Notes:	
1	Close in Ready	Standing, from holster	2	2	3							
1	Close in Ready	Standing, from holster	2	2	3							
2	Controlled Pair	Standing, Low Ready	5	2	1.5							
2	Controlled Pair	Standing, Low Ready	5	2	1.5							
3	Controlled Pair	Standing, from holster	5	2	3							
4	Failure Drill	Standing, from holster	5	3	4							
4	Failure Drill	Standing, from holster	5	3	4							
5	Reload	Standing, from holster	5	4	10							
6	Controlled Pair	Standing, from holster	7	2	3							
6	Controlled Pair	Standing, from holster	7	2	3							
6	Controlled Pair	Standing, from holster	7	2	3							
7	Reload	Standing, from holster	7	4	10							
8	Failure Drill	Standing, from holster	7	3	5							
8	Failure Drill	Standing, from holster	7	3	5							
9	Controlled Pair	Standing, from holster	10	2	4							
9	Controlled Pair	Standing, from holster	10	2	4							
10	Move and Shoot	Standing, from holster	15 to 5	2	2							
10	Move and Shoot	Standing, from holster	15 to 5	2	2							
11	Controlled Pair	Standing or Kneeling, from holster	25	2	8							
11	Controlled Pair	Standing or Kneeling,	25	2	8							
11	Controlled Pair	Standing or Kneeling,	25	2	8							
				50	Totals:						Score:	Expert SS Marksman Unqual Circle one

50 rounds of pistol ammunition and 5 pistol magazines required. Mag 1 loaded with 8 rounds. Mag 2, 3, and 4 loaded w/10 rounds each. Mag 5 loaded with 12 rounds. Qualification standards do not change if local policy prohibits weapons from being loaded. Target is Omaha Q target. PTM = protimer misses. Full table alibis (reshoot entire table) are only granted if a proper transition drill is executed during any inturruption in the cycle of the rifle (malfunction, run dry, etc.), otherwise only hits fired during the table are counted during scoring. 48-50 is Expert (96%). 45-47 is Sharp Shooter (90%). 35-44 is Marksman (70%). Below 34 is unqualified. 3 of 4 head shots (above neck line) must hit head target to receive a go. Shots fired after time are subtracted from score. Alibi: Shooter must execute proper immediate action to get opportunity to refire tables where alibi is experienced. All rounds are marked where the alibi was experienced and the table is refired.

APPENDIX B

U.S. ARMY LAW ENFORCEMENT FIREARMS DAY 2 PILOT PISTOL MARKSMANSHIP INSTRUCTION

Training Event	Rounds	Time Standard	Training Condition: Dry	EST2000	Live	Live Plus
			Repetitions			
Trigger Reset, firing position, 5 meters, 2” bull target	1	NA	10	10	10	10
Single Shot, holster, 5 meters, 2” bull target	1	NA	5	5	5	5
Single Shot, holster, 10 meters, 4” bull target	1	NA	5	5	5	5
Single Shot, holster, 25 meters, 8” chest	1	NA	5	5	5	5
Controlled Pairs, holster, 5 meters, 2” bull target	2	2 sec.	6	6	**5/1	**5/1
Controlled Pairs, holster, 10 meters, 4” bull target	2	3 sec.	2	2	2	2
Controlled Pairs, holster, 25 meters, 8” chest	2	3 sec.	3	3	3	3
IA/Reload (2x2x2), holster, 5 meters, 4” bull target	6	10 sec.	3	3	3	3
Controlled Pairs, low ready, 7 meters, 8” chest	2	3 sec.	5	5	5	5
Close in Ready, controlled pair, Close in Ready, 2 meters, 8” chest	2	3 sec.	4	*4	4	4
Close in Ready, controlled pair, holster, 2 meters, 8” chest	2	3 sec.	5	*5	5	5
Bill Drill (6 round), holster, 5 meters, 4” bull	6	NA	3	3	3	3
Failure Drill, holster, 7 meters, 8” chest, 4” head	3	5 sec.	5	5	5	5

(continued)

(continued)

Training Event	Rounds	Time Standard	Training Condition: Dry	EST2000	Live	Live Plus
			Repetitions			
Pivots Rear, holster, 7 meters, 8" chest	2	4 sec.	8	8	*8	*8
Move and Shoot, controlled pairs, low ready, 10-3 meters, 8" chest	2	2 sec.	5	*5	5	5
One Hand (strong), controlled pairs, holster, 7 meters, 8" chest	2	3 sec.	3	3	3	3
One Hand (support), controlled pairs, holster, 7 meters, 8" chest	2	6 sec.	3	3	3	3
Barricade Standing, left, controlled pairs, holster, 15 meters, 8" chest	2	4 sec.	3	3	3	3
Barricade Kneel, left, controlled pairs, holster, 15 meters, 8" chest	2	4 sec.	3	3	3	3
Barricade Standing, Right, controlled pairs, holster, 15	2	4 sec.	3	3	3	3
Barricade Kneel, Right, controlled pairs, holster, 15 meters, 8" chest	2	4 sec.	3	3	3	3

Notes: * = Conducted as dry fire; ** = 5 Dry-fire repetitions and 1 live-fire repetition.