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# **An Assessment of Security and Survivability in a Decisive Action Training Environment**

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**United States Army Research Institute for the Behavioral and Social Sciences**

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# AN ASSESSMENT OF SECURITY AND SURVIVABILITY IN A DECISIVE ACTION TRAINING ENVIRONMENT

## EXECUTIVE SUMMARY

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### Research Requirement:

The research described in this report was conducted by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) in collaboration with the Joint Readiness Training Center (JRTC) Warrior Leadership Council (WLC). The primary goal of this research was to evaluate and then potentially improve unit security and survivability during JRTC rotations. A pocket checklist of security and survivability was developed in accordance with Army Field Manual 3-90 (FM 3-90), *Tactics*, Army Techniques Publication 3-20.98 (ATP 3-20.98), *Scout Platoon*, Army Techniques Publication 3-90.1 (ATP 3-90.1), *Armor and Mechanized Infantry Company Team*, Army Techniques Publication 3-37.34 (ATP 3-37.34), *Survivability Operations*, Army Techniques Publication 3-21.10 (ATP 3.21.10), *Infantry Rifle Company*, Training Circular 3-21.76 (TC 3-21.76), *Ranger Handbook*, and Training Circular 3-20.31 (TC 3-20.31), *Gunnery Skills Test*. That doctrine also provided the basis for the development of a guide to improve security and survivability at JRTC.

### Procedure:

Observer/Coach/Trainers (OCTs) completed checklists to assess rotational units in four areas: planning, preparation, execution, and overall performance. The checklists were collected at the end of each rotation. Data were collected from 595 checklists over eight training rotations, with four rotations in the control group and four rotations in the experimental group. Based on the performance of four initial/baseline rotations, a *Leader's Guide for Security and Survivability* was developed and distributed to the remaining four rotations (the experimental group). The effectiveness of the guide was evaluated based on differences between the performance of units in the control condition and units in the experimental condition.

### Findings:

The guide had little to no significant effect on unit performance, as rated by OCTs. The size of the differences between the control and experimental groups on various indicators of their performance were small in most cases, and nonexistent in others. However, additional analyses indicated that units that established formal planning practices—a common operational picture, a logistical support plan, and a casualty evacuation plan—outperformed those that did not, regardless of whether or not they received a guide.

### Utilization and Dissemination of Findings:

Researchers from ARI provided the WLC with periodic summaries of unit performance according to the *Security and Survivability Checklist*. The *Leader's Guide for Security and Survivability* appears to have minimal to no effect on improving unit performance on the measured behaviors. Nevertheless, the primary impact of this collaborative research effort is in

providing the WLC and OCTs with information about how rotational units are performing at JRTC. Accurate measurement of rotational unit performance is a necessary step toward the ultimate goal of improving upon that performance.

AN ASSESSMENT OF SECURITY AND SURVIVABILITY IN A DECISIVE ACTION TRAINING ENVIRONMENT

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# AN ASSESSMENT OF SECURITY AND SURVIVABILITY IN A DECISIVE ACTION TRAINING ENVIRONMENT

## Introduction

Units participate in various training exercises at the Joint Readiness Training Center (JRTC), a Combat Training Center (CTC), in preparation for combat deployment. The JRTC provides Soldiers with an opportunity to practice synchronized combined arms operations. The primary goal of the JRTC Warrior Leadership Council (WLC) is to measure operational unit performance during those exercises and to improve upon that performance (Dasse et al., 2017a, 2017b; Keiser et al., 2023; Scroggins et al., 2018, 2019; Vowels et al., 2014; Vowels et al., 2017). The present research was conducted by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) in conjunction with the JRTC WLC. This is the final iteration of this collaboration, consisting of two primary components: a checklist and a guide that focus on unit security and survivability. Observer/Coach/Trainers (OCTs) at JRTC completed the checklists to measure unit performance. Some of those units were provided with an educational guide ahead of their rotation.

Previous iterations of this collaborative research effort included checklists and guides on force protection, sustainment operations, defensive operations, command post operations, and leader duties and responsibilities (Dasse et al., 2017a, 2017b; Keiser et al., 2023; Vowels et al., 2017). A review of the previous research indicates that the first aim to develop checklists of rotational unit performance that are interpretable to OCTs has been largely successful. This is an impactful contribution due to inconsistency in how and when Army units are evaluated and because effectively measuring unit performance is necessary to improve that performance. However, the second aim has been unsuccessful. There is little empirical evidence to suggest that units that receive a guide outperform those that do not.

Notably, the WLC controlled the creation and implementation of the checklist and guide in each of the project's iterations. The WLC held final decision authority regarding all aspects of the checklist, guide, and implementation of the procedures. The ARI was primarily involved to provide support and analyses of the findings. As noted in the Limitations section, the design of the project did not allow ARI the opportunity to improve upon each iteration of the project or confirm that the checklist and guide were utilized correctly.

## Security and Survivability

The present research encompasses the same two broad aims of this ongoing collaboration, with security and survivability serving as the focal topic of interest, in accordance with Army Field Manual 3-90 (FM 3-90), *Tactics*, Army Techniques Publication 3-20.98 (ATP 3-20.98), *Scout Platoon*, Army Techniques Publication 3-90.1 (ATP 3-90.1), *Armor and Mechanized Infantry Company Team*, Army Techniques Publication 3-37.34 (ATP 3-37.34), *Survivability Operations*, Army Techniques Publication 3-21.10 (ATP 3.21.10), *Infantry Rifle Company*, Training Circular 3-21.76 (TC 3-21.76), *Ranger Handbook*, and Training Circular 3-20.31 (TC 3-20.31), *Gunnery Skills Test*. The checklist includes questions applicable to a given

unit's approach to executing security and survivability, while the guide seeks to improve upon that performance by providing pertinent information in a brief and easy to reference format.

Security and survivability operations are essential to the performance of deployed units. The fundamentals of security operations are performed by Commanders, who issue early and accurate warning of enemy actions, provide the force with reaction time and maneuver space, orient the force to be secured, perform continuous reconnaissance, and maintain enemy contact (FM 3-90-2). Security operations focus on the force, area, or facility as a supplemental means of supporting the unit's fight (FM 3-90-2). When successfully enforced, security operations help units maintain their initiative and thwart enemy information collection efforts (FM 3-90-2). Survivability operations involve specific activities to avoid or withstand hostile actions or environmental conditions while maintaining and driving the mission forward (ATP 3-37.34). The fundamentals of security and survivability constitute various behaviors such as using observation posts, designating patrols for perimeters and dead space, implementing stand-to, practicing and enforcing proper communication procedures, exercising appropriate noise and light discipline, and employing camouflage (ATP 3-20.98; ATP 3-90.1).

The purpose of the present research was to test the effectiveness of a guide designed to improve unit leaders' understanding of security and survivability. This guide was evaluated based on the *Security and Survivability Checklist*, developed and implemented by the WLC. The associated *Leader's Guide for Security and Survivability*, also created by the WLC, was aimed at articulating the core duties and responsibilities of Army leaders in ensuring the security and survivability of their units. We evaluated the effectiveness of the guide according to differences in the performance of units that received the guide (i.e., the experimental group) and units that did not (i.e., the control group). Consistent with previous iterations of this project, we expected that units in the experimental condition would outperform units in the control condition.

## **Method**

### **Sample**

The sample for this research includes eight Brigade Combat Teams (BCTs) observed during rotational unit exercises at JRTC. OCTs completed 595 *Security and Survivability Checklists* at the echelon in which they were embedded over the course of the eight rotations. A majority of the checklists were from Active Component units (479 checklists), but checklists were also completed for Reserve Component units (10 checklists) and for a single (1 checklist) National Guard Component unit. OCTs did not report the type of component unit that they observed on 105 checklists.

The sample included four analogous rotations each for the control (306 checklists) and treatment (289 checklists) groups (Table 1). The most common units in the control group were Active Component (78%), Infantry (28%), and companies or platoons (76%), and were observed completing Decisive Action Training Environment (DATE) rotations (66%). Likewise, the most common units in the treatment group were Active Component (83%), platoons or companies (78%), and Infantry (38%), and were observed completing DATE rotations (79%).

**Table 1**

*Crosstabulations of Rotation, Component, Size, and Type of Units in the Control and Treatment Group*

		Control group		Treatment group	
		<i>n</i>	%	<i>n</i>	%
Rotation Type	Mission Readiness Exercise (MRE)	10	3%	3	1%
	Decisive Action Training Environment (DATE)	201	66%	227	79%
	Hybrid (MRE & DATE)	17	6%	9	3%
	Command Post Exercise (CPE)	8	3%	-	-
	Multiple	12	4%	-	-
	Other/Missing	58	19%	50	17%
Component	Active	238	78%	241	83%
	Reserve	6	2%	4	1%
	National Guard	0	-	1	<1%
	Other/Missing	62	20%	43	15%
Unit Size	Squad	-	-	3	1%
	Section	1	<1%	1	<1%
	Platoon	88	29%	116	40%
	Company/Battery/Troop	145	47%	109	38%
	Battalion	32	10%	27	9%
	Brigade	1	<1%	-	-
	Other/Missing	62	20%	33	11%
Type of Unit	Artillery	7	2%	5	2%
	Aviation	31	10%	37	13%
	Cavalry	19	6%	26	9%
	Chemical	4	1%	1	<1%
	Engineering	31	10%	34	12%
	Field Artillery	34	11%	20	7%
	Infantry	87	28%	109	38%
	Military Intelligence	2	<1%	-	-
	Military Police	5	1%	1	<1%
	Ordinance	5	1%	3	1%
	Quartermaster	2	<1%	7	2%
	Signal	4	1%	2	<1%
	Security Force Assistance Brigade	44	14%	12	4%
	Transportation	1	<1%	1	<1%
	Other	13	4%	12	4%
	Multiple	17	6%	19	7%

## Security and Survivability Checklist

The *Security and Survivability Checklist* was developed by ARI and the WLC and is available in its entirety in Appendix A. Major areas of interest include specific aspects of planning, preparation, and execution of security and survivability. The first section contains general information about the rotation and type of unit, as reported in Table 1. The second, third, and fourth sections of the checklist contain questions about security and survivability planning (e.g., “*Did the unit plan and integrate obstacles?*”), preparation (e.g., “*Did the unit conduct a security/engagement area rehearsal?*”), and execution (e.g., “*Were survivability positions continually improved throughout the operation?*”). In the final section, OCTs provided an overall assessment of a respective unit’s planning, preparation, and execution.

The *Security and Survivability Checklist* includes both dichotomous (Yes/No) and continuous items. For dichotomous items, OCTs reported whether or not a given unit performed the respective task/behavior. For the continuous items, OCTs reported the degree to which a given unit accomplished the respective task/behavior on a scale from 0 (*Unsatisfactory/not at all*) to 4 (*Exceeds standard/performed all tasks and prepared for contingencies*). The checklist also includes categorical items (e.g., “*What level rehearsals by the unit did you witness?*”), as well as items regarding the number of hours blade teams<sup>1</sup> were available and used. The advantage to the continuous items is that they offer a more nuanced and accurate assessment of performance, thereby providing greater potential variability to observe differences between conditions (Hays, 1994; Vowels et al., 2014).

## Leader’s Guide for Security and Survivability

The *Leader’s Guide for Security and Survivability* was developed by members of the WLC following the first four (control group) rotations. The guide is reported in its entirety in Appendix B, which was designed to be easily accessible during exercises at JRTC. The topics covered in the guide were based on Army doctrine, coupled with issues and challenges identified in initial rotations, and feedback and input from the WLC.

The *Planning* section notes the importance of enforcing discipline, understanding and employing subordinates according to their duties and responsibilities, providing subordinates with timely access to a decision maker, and communicating the purpose of subordinates’ action. The *Prepare* section includes an acknowledgement of leader duties relevant to maintaining accountability of personnel, weapons, and equipment, emplacing, and directing security measures, coordinating with adjacent units, and conducting rehearsal. The *Execute* section directs leaders to provide timely and accurate information, communicate a clear task and purpose, continuously coordinate with adjacent units, and communicate an understanding of the mission to their subordinates.

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<sup>1</sup> A blade team consists of the Soldiers operating the digging machinery that excavate the fighting positions for a vehicle to operate from during the fight (ATP 3-37.34).

## Procedure

This research was accomplished in two broad steps. First, the JRTC Operations Group issued *Security and Survivability Checklists* to the OCTs prior to each rotation. The WLC task force leaders were responsible for ensuring that the OCTs completed the checklists correctly and for collecting the checklists at the completion of each rotation. Second, the WLC met following the first four rotations to discuss and reflect on OCT observations and to compile a draft version of the guide, which was completed iteratively based on feedback from members of the WLC. The guide was then issued to company/platoon/squad leaders in the treatment group approximately one month ahead of their JRTC rotation. Only those units in the latter four rotations received the guide (i.e., experimental group). Given the constraints of rotational unit exercises at JRTC, we were unable to confirm that every unit leader in the experimental group was issued a guide, or how often the leaders referenced the guide if they received one. This limitation is consistent with the nature of this collaborative effort. The WLC had the final decision-making authority in determining the content of the checklist and guide and the implementation of both. It is also important to acknowledge that the OCTs were aware of the purpose of this research, including which rotations were in the control and treatment conditions, as well as the aim of the guide.

## Results

The *Security and Survivability Checklist* data were analyzed to assess the potential effect of the *Guide for Security and Survivability* on rotational unit performance at JRTC. Additional analyses were conducted to examine potential differences in performance based on four considerations relevant to unit preparation: (a) units that had and had not completed a Field Training Exercise (FTX) in the past 12 months, (b) units with and without a Common Operational Picture (COP), (c) units that developed a logistical support plan, and (d) units that developed a casualty evacuation (CASEVAC) plan (see also Keiser et al., 2023; Scroggins et al., 2018, 2019; Vowels et al., 2017). These comparisons were followed by an exploratory assessment of the effects of the guide on subsets of units that were less prepared and emplaced fewer formal planning practices.

The analyses described in this report follow the same structure to examine potential differences between groups for each of the *Security and Survivability Checklist* items. Differences in dichotomous items (Yes or No responses) were assessed using chi-square tests. We reported the *phi coefficient* as the effect size estimate for these tests, which reflects the relationship between conditions and the respective dichotomous item (Kotrlík & Williams, 2003). Differences in continuous items were assessed using Mann-Whitney *U* tests because the continuous items did not meet the assumption of normality based on the Shapiro-Wilk normality test ( $W = 0.12, p < .01$ ). We reported the standardized mean difference (Cohen's *d*) as the effect size estimate for these comparisons (Cohen, 1988). The chi-square tests and Mann-Whitney *U* tests were deemed statistically significant using an alpha level of  $p < .01$ . A more conservative alpha level was used in this case to reduce possible capitalization on chance due to the large number of comparisons in this report.

## Control versus Treatment Condition

The primary comparison in this research was between rotational units in the control and treatment conditions on each of the *Security and Survivability Checklist* items. The findings from these comparisons were consistent with analogous previous research of rotational unit performance at JRTC (Keiser et al., 2023; Scroggins et al., 2018, 2019; Vowels et al., 2017). Fourteen of the chi-square tests comparing the control and treatment units on each of the 45 dichotomous items were statistically significant (Table 2). However, the pattern of results was inconsistent, suggesting that the effects of the guide were only applicable to specific aspects of rotational unit performance. Seven of the significant comparisons were opposite of expectation, such that units in the control condition outperformed those in the treatment, especially in the coordination of targets down ( $\chi^2[1] = 52.77, p < .01, \phi = -.41$ ). However, the other significant comparisons supported the expectation that those units that received the guide perform better, especially in the preparation and improvement of survivability positions,  $\chi^2(1) = 20.39, p < .01, \phi = .19$ . Comparisons of units in the treatment and control condition on the continuous checklist items based on Mann-Whitney *U* tests were less supportive of the expected differences (Table 3). There were small and nonsignificant differences between the control and treatment groups on these items.

**Table 2**

### *Non-Parametric Tests of Dichotomous Items: Control versus Treatment Condition*

Checklist Item	Sample Size	Pearson's $\chi^2$	Phi Coefficient
Section II – Planning			
II 1 Avenues of Approach	500	0.34	-.03
II 2 Enemy Scheme of Maneuver	498	0.46	.03
II 3a Where to Engage	488	5.42	.11
II 3b Recon	414	0.90	.05
II 4 Emplace Weapon Systems	467	5.56	.11
II 5a Integrate Obstacles	488	14.53*	.18
II 5b Effectiveness of Obstacles	200	0.81	.07
II 6 Integrate Indirect Fires	499	0.10	-.02
II 7 Rehearse Engagement	490	0.22	.03
II 8a Air Guard Identified	476	5.22	-.11
II 8b Air Guard Planned & Rehearsed	232	4.69	-.15
II 9 Common Operating Picture (COP)	492	0.11	-.02
II 10 COP Maintained/Updated	343	7.52	.15
II 11 Assets for Planning	492	3.60	.09
II 12a Logistical Support Plan	489	0.02	.01
II 12b Casualty Evacuation (CASEVAC) plan	469	4.98	-.11
II 13a Identify Defensive Shortfalls	490	3.77	.09
II 13b Defensive Shortfalls Mitigated	297	0.73	.06
Section III – Preparation			

III 1a Time	404	23.01*	-.24
III 1b Force	430	26.70*	-.25
III 1c Resources	396	30.53*	-.28
III 2a Emplace & Direct Security Operations	580	6.96*	.11
III 2b Emplace & Direct Security Measures	553	1.45	.06
III 3a Survivability Positions Prepared & Improved	575	20.39*	.19
III 3b Engineer Assets for Survivability Positions	467	0.28	-.03
III 7 Liaison	563	0.19	-.02
III 8 Security Area Rehearsal	578	0.00	.00
III 9 Revise and Refine Plan	464	0.03	.01
III 10a Rehearse CASEVAC	581	4.47	-.09
III 10b Synchronize CASEVAC	502	3.13	-.08
III 11a Establish Targets	575	0.19	-.02
III 11b Targets Coordinated Up	346	48.58*	-.38
III 11c Targets Coordinated Down	330	52.77*	-.41
III 11d Targets Coordinated Laterally	300	34.13*	-.35
III 12 Range Cards	567	12.63*	.15
III 12a Level Consolidated – Squad	272	2.09	.10
III 12b Level Consolidated – Platoon	272	3.74	.13
III 12c Level Consolidated – Company	272	2.61	-.11
III 12d Level Consolidated – Battalion	272	0.00	-.01
III 13a Rehearsals – Squad	468	0.00	-.01
III 13b Rehearsals – Platoon	468	0.29	-.03
III 13c Rehearsals – Company	468	3.16	.09
III 13d Rehearsals – Battalion	468	0.49	.04

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Section IV – Execution

IV 1 Support Commander’s Intent	574	1.49	.05
IV 2 Plan Tactically Sound	579	0.00	.01
IV 3 Shared Graphic Control Measures	575	0.24	.02
IV 4 Officers/NCOs Patrol	571	3.62	.08
IV 5 Survivability Positions Improved	558	5.10	.10
IV 6 Security Adjusted	579	7.71*	.12
IV 7a Direct Weapon Systems	561	8.86*	.13
IV 7b Effectiveness of Direct Weapon Systems	415	10.52*	.16
IV 8a Communication – Runner	595	0.00	.00
IV 8b Communication – Radio	595	0.85	-.04
IV 8c Communication – Digital	595	0.53	-.03
IV 8d Communication – Wire	595	8.06*	-.13
IV 8e Communication – Visual	595	2.70	-.07
IV 8f Communication – Audio	595	4.67	-.09
IV 8g Communication – Other	595	1.92	-.07
IV 9 Communications Effective	550	1.03	-.05
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	431	1.96	.07

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Note. *Phi* coefficients range from .00 to .01 for negligible associations, .02 to .19 for small associations, .20 to .40 for moderate associations, and .80 to 1.00 for very strong associations (Kotrlík & Williams, 2003). A positive *phi* coefficient indicates that the treatment condition performed better than the control condition.

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table 3**

*Non-Parametric Tests of Continuous Items: Control versus Treatment Condition*

Checklist Item	Group	<i>N</i>	Mean	<i>SD</i>	<i>U</i>	Cohen's <i>d</i>
III 4 Blade Team (Hours Available)	Control	145	13.62	44.78	9400	-0.06
	Treatment	131	9.21	29.36		
III 5 Blade Team (Hours Used)	Control	145	4.20	13.67	9124	0.00
	Treatment	133	4.23	12.85		
III 6 Stage of Fighting Position	Control	180	1.64	0.82	18905	0.01
	Treatment	213	1.64	0.77		
Overall Ratings						
Plan	Control	302	2.25	0.93	44364	-0.08
	Treatment	279	2.18	0.89		
Prepare	Control	301	2.21	0.92	41376	0.05
	Treatment	280	2.25	0.87		
Execute	Control	301	2.21	0.90	41748	0.02
	Treatment	279	2.23	0.90		

Note. For Cohen's *d*, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).

**Additional Analyses**

***FTX versus No FTX***

A consideration that was consistently acknowledged in previous reports is the impact of recent practice on performance, evident in those units that completed a Field Training Exercise (FTX) in the past 12 months (Keiser et al., 2023; Vowels et al., 2017). The primary aim of these FTXs is to prepare units for CTC rotational training through similar exercises at home station. FTXs offer an opportunity for units to practice tactics, techniques, and procedures (TTP) ahead of testing these TTPs in a CTC environment. So, the ultimate basis for this comparison is a potential practice effect, wherein units with a recent FTX have more practice and thus presumably perform better during their rotations at JRTC.

Comparisons of units with a recent FTX to those without offered minimal evidence to suggest that these FTXs have an impact on unit performance. Most of the effect sizes were small and not significant (Tables 4 and 5). Only one comparison supported the expected impact of FTXs; specifically, units with a FTX used range cards more than those without a recent FTX ( $\chi^2[1] = 9.69, p < .01, \phi = .13$ ). None of the independent sample's t-tests for the continuous items

were significant; however, the mean differences indicated that units with a FTX demonstrate better overall security and survivability, especially during execution ( $d = 0.13$ ).

**Table 4**

*Non-Parametric Tests of Dichotomous Items: FTX versus No FTX*

Checklist Item	Sample Size	Pearson's $\chi^2$	Phi Coefficient
Section II – Planning			
II 1 Avenues of Approach	500	0.02	-.01
II 2 Enemy Scheme of Maneuver	498	0.62	.04
II 3a Where to Engage	488	1.80	.07
II 3b Recon	414	0.19	.03
II 4 Emplace Weapon Systems	467	4.81	.11
II 5a Integrate Obstacles	488	0.09	.02
II 5b Effectiveness of Obstacles	200	0.09	-.03
II 6 Integrate Indirect Fires	499	0.02	-.01
II 7 Rehearse Engagement	490	1.82	.07
II 8a Air Guard Identified	476	0.06	.02
II 8b Air Guard Planned & Rehearsed	232	0.61	.06
II 9 Common Operating Picture (COP)	492	0.45	-.03
II 10 COP Maintained/Updated	343	2.20	-.09
II 11 Assets for Planning	492	0.02	.01
II 12a Logistical Support Plan	489	0.00	.00
II 12b Casualty Evacuation (CASEVAC) plan	469	4.84	-.11
II 13a Identify Defensive Shortfalls	490	0.55	-.04
II 13b Defensive Shortfalls Mitigated	297	0.41	-.04
Section III – Preparation			
III 1a Time	404	0.07	-.02
III 1b Force	430	0.00	.00
III 1c Resources	396	0.84	-.05
III 2a Emplace & Direct Security Operations	580	0.65	.04
III 2b Emplace & Direct Security Measures	553	0.07	.02
III 3a Survivability Positions Prepared & Improved	575	4.80	.10
III 3b Engineer Assets for Survivability Positions	467	0.00	-.01
III 7 Liaison	563	0.00	.01
III 8 Security Area Rehearsal	578	1.95	.06
III 9 Revise and Refine Plan	464	0.07	-.02
III 10a Rehearse CASEVAC	581	0.11	-.02
III 10b Synchronize CASEVAC	502	1.22	-.05
III 11a Establish Targets	575	0.57	-.04
III 11b Targets Coordinated Up	346	1.04	-.06
III 11c Targets Coordinated Down	330	3.43	-.11
III 11d Targets Coordinated Laterally	300	10.45*	-.19

III 12 Range Cards	567	9.69*	.13
III 12a Level Consolidated – Squad	272	0.03	.02
III 12b Level Consolidated – Platoon	272	0.26	.04
III 12c Level Consolidated – Company	272	7.13*	-.17
III 12d Level Consolidated – Battalion	272	0.00	.03
III 13a Rehearsals – Squad	468	0.46	.04
III 13b Rehearsals – Platoon	468	0.12	.02
III 13c Rehearsals – Company	468	0.00	.00
III 13d Rehearsals – Battalion	468	2.93	.09

Section IV – Execution

IV 1 Support Commander’s Intent	574	3.99	.09
IV 2 Plan Tactically Sound	579	0.00	.00
IV 3 Shared Graphic Control Measures	575	2.10	-.06
IV 4 Officers/NCOs Patrol	571	0.00	.00
IV 5 Survivability Positions Improved	558	0.31	.03
IV 6 Security Adjusted	579	0.00	.00
IV 7a Direct Weapon Systems	561	1.83	.06
IV 7b Effectiveness of Direct Weapon Systems	415	0.00	.01
IV 8a Communication – Runner	595	1.19	.05
IV 8b Communication – Radio	595	0.60	.04
IV 8c Communication – Digital	595	0.62	.04
IV 8d Communication – Wire	595	0.35	-.03
IV 8e Communication – Visual	595	2.75	-.07
IV 8f Communication – Audio	595	4.36	-.09
IV 8g Communication – Other	595	0.88	-.05
IV 9 Communications Effective	550	0.23	.02
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	431	0.00	-.01

*Note.* *Phi coefficients* range from .00 to .01 for negligible associations, .02 to .19 for small associations, .20 to .40 for moderate associations, and .80 to 1.00 for very strong associations (Kotrlík & Williams, 2003). A positive *phi coefficient* indicates that the FTX condition performed better than the no FTX condition.

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table 5**

*Non-Parametric Tests of Continuous Items: FTX versus No FTX*

Checklist Item	Group	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>U</i>	Cohen’s <i>d</i>
III 4 Blade Team (Hours Available)	FTX	96	14.21	48.19	8694	0.11
	No FTX	180	10.10	31.75		
III 5 Blade Team (Hours Used)	FTX	97	3.95	13.10	8975	-0.03
	No FTX	181	4.35	13.38		
III 6 Stage of Fighting Position	FTX	138	1.77	0.87	19634	0.25
	No FTX	255	1.57	0.74		

Plan	Overall Ratings				37448	0.10
	FTX	175	2.28	0.90		
	No FTX	406	2.19	0.91		
Prepare	FTX	175	2.29	0.82	37319	0.09
	No FTX	406	2.21	0.93		
Execute	FTX	175	2.30	0.87	37698	0.13
	No FTX	405	2.19	0.92		

*Note.* For Cohen’s *d*, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).

***Formal Planning Practices: COP versus No COP, Logistical Support Plan versus No Logistical Support Plan, and CASEVAC versus No CASEVAC Plan***

Three additional comparisons accounted for the degree to which units emplaced formal planning practices, specifically, units with and without a COP, a logistical support plan, and a CASEVAC plan. Previous research suggests that these types of formal planning practices are critical to successful performance of units at JRTC (Keiser et al., 2023; Scroggins et al., 2018, 2019; Vowels et al., 2017). Previous iterations of this project largely suggest that these formal practices are the most impactful consideration in the performance of units at JRTC, at least according to checklists completed by OCTs.

Overall, units that followed these planning practices perform better than those that did not on most of the checklist items (Tables 6-11). The COP is “a single identical display of relevant information shared by more than one command that facilitates collaborative planning and assists all echelons to achieve situational awareness” (DOD Dictionary of Military and Associated Terms, 2017, p. 46). The largest comparative differences for units with a COP on the dichotomous items (Table 6) were observed for the planning and rehearsal of air guard ( $\chi^2[1] = 487.74, p < .01, \phi = .99$ ), and the effective use of assets for planning ( $\chi^2[1] = 68.11, p < .01, \phi = .38$ ). Likewise, the comparisons for the continuous items (Table 7) indicated that units with a COP outperformed those without especially in their overall planning ( $d = 0.64$ ).

**Table 6**

*Non-Parametric Tests of Dichotomous Items: COP versus No COP*

Checklist Item	Sample Size	Pearson's $\chi^2$	Phi Coefficient
Section II – Planning			
II 1 Avenues of Approach	487	6.00	.12
II 2 Enemy Scheme of Maneuver	486	7.66*	.13
II 3a Where to Engage	478	12.60*	.17
II 3b Recon	405	2.03	.08
II 4 Emplace Weapon Systems	455	0.48	.04
II 5a Integrate Obstacles	476	0.39	.03
II 5b Effectiveness of Obstacles	486	12.69*	.17

II 6 Integrate Indirect Fires	478	10.65*	.15
II 7 Rehearse Engagement	465	0.01	-.01
II 8a Air Guard Identified	229	0.00	.00
II 8b Air Guard Planned & Rehearsed	492	487.74*	.99
II 11 Assets for Planning	482	68.11*	.38
II 12a Logistical Support Plan	481	27.18*	.24
II 12b Casualty Evacuation (CASEVAC) plan	460	34.67*	.28
II 13a Identify Defensive Shortfalls	480	3.14	.09
II 13b Defensive Shortfalls Mitigated	292	11.03*	.20
Section III – Preparation			
III 1a Time	310	8.08*	.17
III 1b Force	335	7.81*	.16
III 1c Resources	301	9.63*	.19
III 2a Emplace & Direct Security Operations	480	18.49*	.20
III 2b Emplace & Direct Security Measures	453	16.78*	.20
III 3a Survivability Positions Prepared & Improved	475	0.00	-.01
III 3b Engineer Assets for Survivability Positions	372	1.61	-.07
III 7 Liaison	468	27.63*	.25
III 8 Security Area Rehearsal	480	14.56*	.18
III 9 Revise and Refine Plan	368	45.97*	.36
III 10a Rehearse CASEVAC	482	10.65*	.15
III 10b Synchronize CASEVAC	404	18.21*	.22
III 11a Establish Targets	474	12.36*	.17
III 11b Targets Coordinated Up	257	20.57*	.29
III 11c Targets Coordinated Down	241	14.11*	.25
III 11d Targets Coordinated Laterally	212	10.98*	.24
III 12 Range Cards	469	2.27	-.07
III 12a Level Consolidated – Squad	218	4.73	.16
III 12b Level Consolidated – Platoon	218	0.09	-.03
III 12c Level Consolidated – Company	218	1.89	.11
III 12d Level Consolidated – Battalion	218	0.00	.00
III 13a Rehearsals – Squad	389	0.19	.03
III 13b Rehearsals – Platoon	389	1.50	.07
III 13c Rehearsals – Company	389	2.15	.08
III 13d Rehearsals – Battalion	389	0.74	-.05
Section IV – Execution			
IV 1 Support Commander’s Intent	475	16.64*	.19
IV 2 Plan Tactically Sound	481	24.41*	.23
IV 3 Shared Graphic Control Measures	476	69.42*	.39
IV 4 Officers/NCOs Patrol	472	9.42*	.15
IV 5 Survivability Positions Improved	465	1.70	.07
IV 6 Security Adjusted	481	5.99	.12
IV 7a Direct Weapon Systems	466	2.90	.08
IV 7b Effectiveness of Direct Weapon Systems	342	13.90*	.21

IV 8a Communication – Runner	492	4.71	.10
IV 8b Communication – Radio	492	1.69	.07
IV 8c Communication – Digital	492	5.01	.11
IV 8d Communication – Wire	492	0.37	.04
IV 8e Communication – Visual	492	1.22	.05
IV 8f Communication – Audio	492	0.94	.05
IV 8g Communication – Other	492	0.60	.05
IV 9 Communications Effective	477	13.90*	.18
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	345	0.45	.04

*Note.* *Phi* coefficients range from .00 to .01 for negligible associations, .02 to .19 for small associations, .20 to .40 for moderate associations, and .80 to 1.00 for very strong associations (Kotrlík & Williams, 2003). A positive *phi* coefficient indicates that the COP condition performed better than the no COP condition.

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table 7**

*Non-Parametric Tests of Continuous Items: COP versus No COP*

Checklist Item	Group	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>U</i>	Cohen's <i>d</i>
III 4 Blade Team (Hours Available)	COP	133	9.96	32.52	5746	-0.01
	No COP	92	10.15	31.78		
III 5 Blade Team (Hours Used)	COP	128	4.14	12.99	5816.5	0.04
	No COP	93	3.68	10.73		
III 6 Stage of Fighting Position	COP	193	1.63	0.72	12508	-0.08
	No COP	131	1.69	0.87		
Overall Ratings						
Plan	COP	302	2.43	0.84	36412*	0.64
	No COP	181	1.86	0.95		
Prepare	COP	301	2.41	0.83	34220*	0.52
	No COP	181	1.96	0.94		
Execute	COP	301	2.37	0.81	33362*	0.45
	No COP	180	1.97	0.98		

*Note.* For Cohen's *d*, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).

The same pattern of differences was observed for comparisons of units with and without a logistical support plan (Table 8 and 9). A logistical support plan specifies how units and leaders execute the movement and support of forces (Joint Publication 4-0, *Joint Logistics*). Findings from the dichotomous items indicated that units with a logistical support plan also often developed a CASEVAC plan ( $\chi^2[1] = 78.99, p < .01, \phi = .42$ ) and were effective at mitigating defensive shortfalls ( $\chi^2[1] = 24.05, p < .01, \phi = .30$ ). Understandably, units with a logistical

support plan were also rated higher in their overall planning ( $d = 0.60$ ), preparation ( $d = 0.58$ ), and execution ( $d = 0.53$ ).

**Table 8**

*Non-Parametric Tests of Dichotomous Items: Logistical versus No Logistical Support Plan*

Checklist Item	Sample Size	Pearson's $\chi^2$	Phi Coefficient
Section II – Planning			
II 1 Avenues of Approach	484	0.75	.04
II 2 Enemy Scheme of Maneuver	483	0.54	.04
II 3a Where to Engage	473	0.69	.04
II 3b Recon	402	0.05	.02
II 4 Emplace Weapon Systems	453	8.62*	.14
II 5a Integrate Obstacles	476	0.39	.03
II 5b Effectiveness of Obstacles	193	7.04*	.20
II 6 Integrate Indirect Fires	484	7.73*	.13
II 7 Rehearse Engagement	475	11.25*	.16
II 8a Air Guard Identified	464	0.05	-.02
II 8b Air Guard Planned & Rehearsed	225	1.11	.08
II 9 Common Operating Picture (COP)	481	27.18*	.24
II 10 COP Maintained/Updated	335	10.46*	.18
II 11 Assets for Planning	479	18.22*	.20
II 12b Casualty Evacuation (CASEVAC) plan	457	78.99*	.42
II 13a Identify Defensive Shortfalls	484	6.85*	.12
II 13b Defensive Shortfalls Mitigated	290	24.05*	.30
Section III – Preparation			
III 1a Time	307	11.76*	.20
III 1b Force	333	7.74*	.16
III 1c Resources	298	14.58*	.23
III 2a Emplace & Direct Security Operations	479	23.04*	.22
III 2b Emplace & Direct Security Measures	455	25.35*	.24
III 3a Survivability Positions Prepared & Improved	474	5.96	.12
III 3b Engineer Assets for Survivability Positions	373	0.00	.00
III 7 Liaison	466	10.55*	.16
III 8 Security Area Rehearsal	478	5.17	.11
III 9 Revise and Refine Plan	364	11.12*	.18
III 10a Rehearse CASEVAC	479	29.58*	.25
III 10b Synchronize CASEVAC	402	28.61*	.27
III 11a Establish Targets	473	0.39	.03
III 11b Targets Coordinated Up	257	3.10	.12
III 11c Targets Coordinated Down	240	1.24	.08
III 11d Targets Coordinated Laterally	211	3.38	.14
III 12 Range Cards	466	3.52	.09

III 12a Level Consolidated – Squad	215	0.42	-.06
III 12b Level Consolidated – Platoon	215	0.02	.02
III 12c Level Consolidated – Company	215	0.00	.00
III 12d Level Consolidated – Battalion	215	1.94	.13
III 13a Rehearsals – Squad	388	6.32	.13
III 13b Rehearsals – Platoon	388	0.02	.01
III 13c Rehearsals – Company	388	1.19	-.06
III 13d Rehearsals – Battalion	388	1.73	-.08

Section IV – Execution

IV 1 Support Commander’s Intent	473	19.88*	.21
IV 2 Plan Tactically Sound	477	5.31	.11
IV 3 Shared Graphic Control Measures	474	18.60*	.20
IV 4 Officers/NCOs Patrol	469	16.50*	.19
IV 5 Survivability Positions Improved	461	3.19	.09
IV 6 Security Adjusted	478	12.27*	.16
IV 7a Direct Weapon Systems	463	12.47*	.17
IV 7b Effectiveness of Direct Weapon Systems	339	6.73*	.15
IV 8a Communication – Runner	489	0.35	.03
IV 8b Communication – Radio	489	2.55	.08
IV 8c Communication – Digital	489	9.85*	.15
IV 8d Communication – Wire	489	1.70	-.07
IV 8e Communication – Visual	489	11.38*	.16
IV 8f Communication – Audio	489	12.31*	.16
IV 8g Communication – Other	489	2.03	.08
IV 9 Communications Effective	475	22.78*	.22
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	345	1.50	.07

*Note.* *Phi coefficients* range from .00 to .01 for *negligible associations*, .02 to .19 for *small associations*, .20 to .40 for *moderate associations*, and .80 to 1.00 for *very strong associations* (Kotrlík & Williams, 2003). A positive *phi coefficient* indicates that units with a logistical support plan performed better than those without a logistical support plan.

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table 9**

*Non-Parametric Tests of Continuous Items: Logistical versus No Logistical Support Plan*

Checklist Item	Group	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>U</i>	Cohen’s <i>d</i>
III 4 Blade Team (Hours Available)	Logistical	141	9.00	30.93	5181	-0.09
	No Logistical	81	11.89	34.57		
III 5 Blade Team (Hours Used)	Logistical	137	3.40	11.60	4915	-0.13
	No Logistical	80	4.99	13.09		
III 6 Stage of Fighting Position	Logistical	204	1.70	0.80	12695	0.15
	No Logistical	116	1.58	0.74		

Overall Ratings

Plan	Logistical	311	2.41	0.86	34404*	0.60
	No Logistical	169	1.87	0.95		
Prepare	Logistical	311	2.41	0.82	33726*	0.58
	No Logistical	168	1.91	0.95		
Execute	Logistical	310	2.38	0.82	32748*	0.53
	No Logistical	168	1.92	0.98		

*Note.* For Cohen's  $d$ , 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).

The final comparison was between units with and without a CASEVAC plan (Table 10 and 11). A CASEVAC plan specifies how causalities will be moved to and/or between medical treatment facilities (Joint Publication 4-02, *Joint Health Services*). The results supported the expectation that units with a CASEVAC plan performed better than those without a plan. Units with a CASEVAC plan were more likely to account for time ( $\chi^2[1] = 16.36, p < .01, \phi = .24$ ), force ( $\chi^2[1] = 17.26, p < .01, \phi = .24$ ), and resources ( $\chi^2[1] = 23.82, p < .01, \phi = .29$ ) in their preparation. Likewise, units with a CASEVAC plan were rated higher in their overall preparation ( $d = 0.63$ ).

**Table 10**

*Non-Parametric Tests of Dichotomous Items: CASEVAC versus No CASEVAC Plan*

Checklist Item	Sample Size	Pearson's $\chi^2$	Phi Coefficient
Section II – Planning			
II 1 Avenues of Approach	464	3.55	.09
II 2 Enemy Scheme of Maneuver	462	1.37	.06
II 3a Where to Engage	454	3.59	.09
II 3b Recon	392	0.01	.01
II 4 Emplace Weapon Systems	434	4.46	.11
II 5a Integrate Obstacles	454	5.73	.12
II 5b Effectiveness of Obstacles	191	10.92*	.25
II 6 Integrate Indirect Fires	464	3.56	.09
II 7 Rehearse Engagement	455	12.96*	.17
II 8a Air Guard Identified	444	7.08*	.13
II 8b Air Guard Planned & Rehearsed	228	4.59	.15
II 9 Common Operating Picture (COP)	460	34.67*	.28
II 10 COP Maintained/Updated	317	12.87*	.21
II 11 Assets for Planning	458	16.96*	.20
II 12a Logistical Support Plan	457	78.99*	.42
II 13a Identify Defensive Shortfalls	456	8.05*	.14
II 13b Defensive Shortfalls Mitigated	285	11.84*	.21
Section III – Preparation			
III 1a Time	294	16.36*	.24
III 1b Force	322	17.26*	.24

III 1c Resources	289	23.82*	.29
III 2a Emplace & Direct Security Operations	456	14.89*	.19
III 2b Emplace & Direct Security Measures	437	16.83*	.20
III 3a Survivability Positions Prepared & Improved	454	1.01	.05
III 3b Engineer Assets for Survivability Positions	362	2.99	.10
III 7 Liaison	444	14.00*	.18
III 8 Security Area Rehearsal	457	9.99*	.15
III 9 Revise and Refine Plan	350	20.62*	.25
III 10a Rehearse CASEVAC	460	68.53*	.39
III 10b Synchronize CASEVAC	389	52.84*	.37
III 11a Establish Targets	452	6.83*	.13
III 11b Targets Coordinated Up	250	10.53*	.21
III 11c Targets Coordinated Down	235	6.01	.17
III 11d Targets Coordinated Laterally	207	9.68*	.23
III 12 Range Cards	446	0.22	.03
III 12a Level Consolidated – Squad	214	0.08	-.03
III 12b Level Consolidated – Platoon	214	0.01	-.02
III 12c Level Consolidated – Company	214	0.18	-.04
III 12d Level Consolidated – Battalion	214	4.47	.18
III 13a Rehearsals – Squad	371	3.44	.10
III 13b Rehearsals – Platoon	371	0.50	.04
III 13c Rehearsals – Company	371	6.17	-.14
III 13d Rehearsals – Battalion	371	0.66	-.05

Section IV – Execution

IV 1 Support Commander’s Intent	453	17.46*	.20
IV 2 Plan Tactically Sound	457	9.89*	.15
IV 3 Shared Graphic Control Measures	452	17.64*	.20
IV 4 Officers/NCOs Patrol	448	8.49*	.14
IV 5 Survivability Positions Improved	442	1.17	.06
IV 6 Security Adjusted	457	7.64*	.13
IV 7a Direct Weapon Systems	445	1.87	.07
IV 7b Effectiveness of Direct Weapon Systems	325	0.13	.03
IV 8a Communication – Runner	469	0.12	.02
IV 8b Communication – Radio	469	4.13	.10
IV 8c Communication – Digital	469	7.13*	.13
IV 8d Communication – Wire	469	0.00	-.02
IV 8e Communication – Visual	469	3.21	.09
IV 8f Communication – Audio	469	3.93	.10
IV 8g Communication – Other	469	0.18	.03
IV 9 Communications Effective	454	23.85*	.23
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	328	1.65	.08

*Note. Phi coefficients range from .00 to .01 for negligible associations, .02 to .19 for small associations, .20 to .40 for moderate associations, and .80 to 1.00 for very strong associations*

(Kotrlík & Williams, 2003). A positive *phi coefficient* indicates that units with a CASEVAC plan performed better than units without a CASEVAC plan.

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table 11**

*Non-Parametric Tests of Continuous Items: CASEVAC versus No CASEVAC Plan*

Checklist Item	Group	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>U</i>	Cohen's <i>d</i>
III 4 Blade Team (Hours Available)	CASEVAC	146	10.29	31.68	4957	0.00
	No CASEVAC	64	10.22	35.87		
III 5 Blade Team (Hours Used)	CASEVAC	146	4.61	14.33	5173.5	0.19
	No CASEVAC	64	2.35	4.82		
III 6 Stage of Fighting Position	CASEVAC	213	1.66	0.73	10772	0.07
	No CASEVAC	94	1.61	0.83		
<b>Overall Ratings</b>						
Plan	CASEVAC	324	2.32	0.91	27390*	0.44
	No CASEVAC	136	1.93	0.90		
Prepare	CASEVAC	324	2.38	0.84	29086*	0.63
	No CASEVAC	135	1.84	0.88		
Execute	CASEVAC	323	2.33	0.82	27366*	0.51
	No CASEVAC	135	1.89	0.98		

*Note.* For Cohen's *d*, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).

***An Exploratory Assessment of the Effects of the Guide on Subsets of Units: No FTX, COP, Logistical Support Plan, or CASEVAC Plan***

Broadly, the findings offered little support for the positive effect of the guide on unit performance at JRTC; however, the prior results raised the possibility that the guide had an impact on subsets of units. Ideally, the guide is most impactful to those units with less preparation and those that failed to emplace formal planning practices. Accordingly, we include an exploratory assessment of potential differences between the control and treatment groups for units without a recent FTX, COP, logistical support plan, or CASEVAC plan.

The findings from this exploratory assessment are reported in the Appendices (Appendix C, D, E, and F). Overall, the results are inconclusive. First, the findings were inconsistent with the premise that units without a recent FTX see more benefits from the guide (Appendix C). Many of the comparisons suggested the opposite; notably, units in the control condition were rated higher in their overall planning ( $d = -0.16$ ). Second, a similar pattern of differences was observed for comparisons between the control and treatment group for units without a COP (Appendix D). However, units in the treatment group were rated higher in their preparation ( $d = 0.24$ ). Third, the results were also mixed for units without a logistical support plan (Appendix E). However, again, there was some indication that those in the treatment group were better prepared ( $d = 0.24$ ). Fourth, the results comparing the control and treatment group for units without a

CASEVAC plan were largely the same (Appendix F); specifically, the dichotomous checklist items were inconsistent, whereas OCTs rated that units in the treatment group were better in their overall planning ( $d = 0.22$ ).

## **Discussion**

This effort is embedded in a longstanding collaboration between the JRTC WLC and ARI to track and potentially improve rotational unit performance. The WLC chose security and survivability as the primary topic of interest for the present iteration of this collaboration, relying on a variety of existing doctrine on the topic (ATP 3-20.98, ATP 3-37.34, ATP 3-90.1, ATP 3.21.10, FM 3-90, TC 3-20.31, TC 3-21.76). The purpose of the present research was to evaluate the effects of a guide designed to improve leaders' understanding of their role in security and survivability based on an associated checklist.

The results from this research replicate the findings from previous iterations of this collaboration (Dasse et al., 2017a, 2017b; Keiser et al., 2023; Scroggins et al., 2018, 2019; Vowels et al., 2014, 2017). The *Security and Survivability Checklist* was largely successful in that it was well received and interpretable by OCTs at JRTC. However, also consistent with prior studies, the guide developed by the WLC to improve upon unit implementation of security and survivability had little to no effect on unit performance. Rather, regardless of whether or not they received a guide, units that emplaced formal planning practices consistently outperformed those that did not. An exploratory assessment of the effects of the guide for units without these formal planning practices did not support the expected positive impact of the guide.

At its broadest level, whereas the results from the present research do not offer empirical support for the impact of a guide on unit performance, the ultimate benefit of this research is providing a structured approach at measuring and tracking rotational unit performance at JRTC. Effectively measuring unit performance is a first step toward improving on that performance. Additionally, the results help to scope the feasibility of applied research projects with operational Army units that rely on traditional types of materials (i.e., handouts).

## **Limitations**

The limitations of the present research are consistently acknowledged in previous reports (Keiser et al., 2023; Scroggins et al., 2018, 2019; Vowels et al., 2014, 2017). These limitations broadly encompass the content of the checklist and guide and the approach to implementing each. Both products were developed by subject-matter experts and according to Army doctrine on security and survivability. However, they were not developed according to a standardized approach, nor did we empirically assess the potential deficiency of these products or the extent to which the products can have an impact on such complex operations as security and survivability. The WLC has the experience and expertise to identify critical aspects of security and survivability that are important to success in rotational unit exercises; however, without a more formal assessment of the content included in the checklist and guide, it is reasonable to question the potential deficiency of these products as encompassing of the plethora of behaviors relevant to security and survivability.

There are also some inherent limitations to the use of the checklist and guide. The first and most apparent limitation is that we were unable to confirm that every unit received the guide; moreover, even if they received the guide, we do not know the extent to which units reviewed it ahead of their rotation. The limited support that we observed for the guide is understandable given these considerations. OCTs were also given discretion over when during a given rotational unit exercise to complete checklists. Since the checklists were not given at different points in time throughout the exercises, we might be missing the gradual, albeit small, improvements in performance that many units do experience over the course of a rotation. Furthermore, OCTs typically completed their checklists at the end of the exercise. Rotational unit exercises at JRTC are aimed at testing the operational readiness of Army units; thus, they are very intensive for both the attending units and for OCTs. So, it is possible that fatigue affected the accurate assessment of unit performance because of when OCTs typically completed checklists.

### **Future Research Directions**

The first potential avenue for future research follows from some of the primary limitations of this effort. Specifically, there are a variety of ways to ensure that units review the guides ahead of their rotation. One potential effort involves a self-reported assessment of who reviewed the guide, how long it took to review, and how much time they spent reviewing it. Similar efforts might involve evaluating perceptions of the guide and the degree to which it is user-friendly. Ultimately, effectively evaluating the effectiveness of the guide is dependent on ensuring that those who are given the guide spend time reviewing it.

However, as previously mentioned, this is the final topic of study in a multi-year collaborative research effort between the JRTC WLC and ARI. Consequently, the most likely direction for future research is to rely on existing data from previous iterations of this effort. Each of the prior reports focused on a distinct aspect of rotational unit performance and an associated checklist and guide. However, in addition to topic-specific checklist items, each checklist includes a common set of items about unit characteristics (see Table 1) and an overall assessment of unit planning, preparation, and execution. So, there are opportunities to examine rotational unit performance longitudinally as a function of unit characteristics.

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## Appendix A

### Security and Survivability Checklist

<b>SECURITY AND SURVIVABILITY CHECKLIST</b>	
Disclosure: Data collected with this form will be used for routine research purposes only. Information will not be used in whole or part in making any determination about an individual or unit. Information gathered will be used for statistical control purposes only and will not be disclosed to any unit undergoing rotations at the Joint Readiness Training Center.	
<b><u>SECTION I: GENERAL INFORMATION</u></b>	
DATES OBSERVED: FROM _____ TO _____ ROTATION NUMBER: _____ ROTATION TYPE: MRE DATE HYBRID CPX COMPONENT: AC RC NG SIZE UNIT OBSERVED: _____ TYPE UNIT OBSERVED: IN AR SF MARSOC CAV FA EN OD ADA AVN SC MI MP MS RSTA CHEM QM TC CA PSYOP SFAB COMPOSITION: LIGHT/WHEELED/STRYKER/BRADLEY/ABRAMS/OTHER _____ ROTATION PHASE: FE DEF OF LF	
<b><u>SECTION II: PLANNING</u></b>	
<ol style="list-style-type: none"><li>1. Did the unit identify all likely enemy Avenues of Approach (AoA)? YES NO</li><li>2. Did the unit determine likely enemy scheme of maneuver? YES NO</li><li>3. Did the unit determine where to kill the enemy? YES NO 3A. Was recon used as early warning? YES NO</li><li>4. Did the unit emplace weapon systems/direct fire? YES NO</li><li>5. Did the unit plan and integrate obstacles? YES NO 5A. Were the obstacles effective? YES NO NA</li><li>6. Did the unit plan and integrate indirect fires? YES NO</li><li>7. Did the unit rehearse execution in the engagement area? YES NO</li><li>8. Was an air guard identified? YES NO 8A. Was it planned and rehearsed? YES NO NA</li><li>9. Did the unit have a Common Operating Picture (COP)? YES NO</li><li>10. Was the COP maintained (updated) to provide accurate assessments to the staff? YES NO NA</li><li>11. Did the unit have an accurate picture of what assets were available for planning purposes? YES NO</li><li>12. Did the unit have a logistical support plan? YES NO 12A. CASEVAC plan? YES NO</li><li>13. Did the unit identify any defensive shortfalls? YES NO 13A. Were they mitigated? YES NO NA</li></ol>	
<b><u>SECTION III: PREPARE</u></b>	
<ol style="list-style-type: none"><li>1. Did preparation for security include consideration for economy of time, force, and resources? (select all that apply)</li><li>2. Did the unit emplace and direct security operations? YES NO 2A. Security measures? YES NO</li><li>3. Were survivability positions prepared and improved? YES NO 3A. Were Engineer assets utilized to construct these positions? YES NO NA</li><li>4. How many hours were blade teams available for use? __</li><li>5. How many hours were they utilized? __</li><li>6. What stage of fighting position construction did the unit achieve? __1__2__3__4</li><li>7. Did the unit conduct liaison and coordinate with adjacent units and higher? YES NO</li><li>8. Did the unit conduct a security/engagement area rehearsal? YES NO</li><li>9. If required, did the unit revise and refine the plan? YES NO NA</li><li>10. Did the unit rehearse its CASEVAC plan? YES NO 10A. Did it synchronize the CASEVAC plan with higher to promote shared understanding? YES NO NA</li><li>11. Did the unit establish preplanned targets? YES NO 11A. Were they coordinated UP, DOWN, and LATERALLY? (select all that apply)</li><li>12. Were Range Cards utilized? YES NO 12A. What level(s) were they consolidated into sector sketches? __SQD__PLT__CO__BN NA</li></ol>	

13. What level rehearsals by the unit did you witness?    SQUAD    PLT    CO    BN

**SECTION IV: EXECUTE**

1. Did the security/survivability operations support the commander's intent and concept of the operations? YES NO
2. Given the circumstances of the operation, was the plan tactically sound? YES NO
3. Did all elements operate off of shared graphic control measures? YES NO
4. Did Officers/NCOs regularly patrol the line to ensure subordinates were actively performing priorities of work? YES NO
5. Were survivability positions continually improved throughout the operation? YES NO
6. Was security adjusted? YES NO
7. Did the unit direct weapon systems? YES NO 7A. Was that direction effective? YES NO NA
8. What means of communication(s) were employed?  
   Runner    Radio    Digital    Wire    Visual    Audio    Other
9. Were communications effective? YES NO
10. Were CBRN assets utilized correctly? YES NO

**SECTION V: OVERALL**

Rate (Circle) how well the unit executed Security and Survivability during the following phases?

**Planning:**

*Unsatisfactory Sub-standard Minimum Standard Standard Exceeds Standard*

**Prepare:**

*Unsatisfactory Sub-standard Minimum Standard Standard Exceeds Standard*

**Execute:**

*Unsatisfactory Sub-standard Minimum Standard Standard Exceeds Standard*

How Many SQUAD    SECT    PLT    CO    Field Training Exercises in which Security and Survivability were deliberately integrated into training did the unit conduct in the last 3 months?    6 months?   

OCT Initials            OCT Call sign            Division/Task Force  
          

Number of rotations OCT has observed           

**OCT COMMENTS:**



**Engagement Area Development:**

1. Identify likely enemy avenues of approach
2. Identify most likely enemy course of action
3. Determine where to kill the enemy
4. Position subordinate forces and weapon systems
5. Plan and integrate obstacles
6. Plan and integrate fires
7. Rehearse the execution of operations within the engagement area

Source: ATP 3-21.10 p. 3-37

**Direct Fire Control Measures:**

1. Destroy greatest threat first
2. Avoid target overkill
3. Mass effects of fire
4. Employ best weapon system for target
5. Minimize exposure
6. Plan/Implement fratricide avoidance measures
7. Plan for limited visibility
8. Plan for degraded capabilities

Source: ATP 3-90.1 p.6-5

**Threat Based Methodology:**

1. Near before far
2. Frontal before flank
3. Stationary before moving

Source: TC 3-20.31

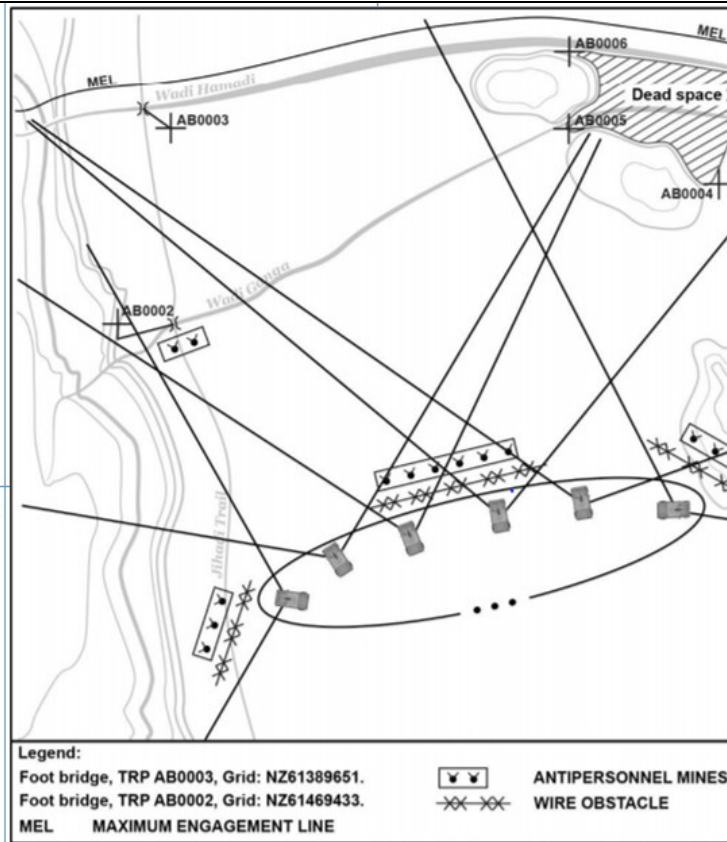


Figure 4-21. Platoon fire plan

ATP 3-20.98 p 4-50

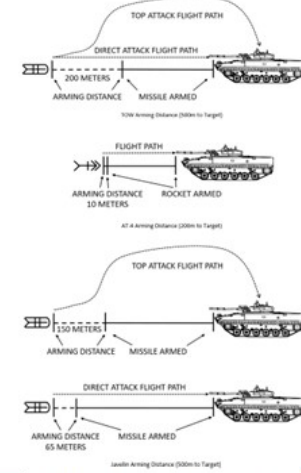


Table 4-3. Characteristics of crew-served weapons fighting positions

Type of Position	Estimated Construction Time* (minutes)	Estimated ROC, (MILES) Dig Time* (minutes)	Direct Small-Caliber Fire	Indirect-Air Blast and Fragmentation (Near Miss)*	Indirect-Air Blast and Fragmentation (Direct Hit)	Nuclear Weapons*
Jeepin position	4.0	75.5	12.7 mm	Medium artillery no closer than 30 feet no overhead protection	None	Fair
Cherry-bomb TOW missile position	11.0	52.5	12.7 mm	Medium artillery no closer than 30 feet no overhead protection	None	Fair
Machine gun position	7.0	19/10	12.7 mm	Medium artillery no closer than 30 feet no overhead protection	None	Fair
Machine gun position with 1 1/2 inch OHC	12.0	NA	12.7 mm	Medium artillery no closer than 30 feet	None	Good
Mortar position	14.0	17.5 (stage 1) 33 (stage 2-3) 30.5 (all stages)	12.7 mm	Medium artillery no closer than 30 feet no overhead	None	Fair

Notes: Source: Data from TM 3-34.85. ATP 3-37.34 p. 4-8

Table 4-6. Excavation capabilities of selected survivability equipment

Equipment	Excavator Capability (cubic yards per hour)	
	Rated Material	Loose Material
Armored vertical excavator: AVS	125	172
Scrap loader: 2 1/2 cubic yard	125	150
Tractor full track: D9	50	60
Tractor full track: D7 (Army/MC) (M3) (M4) (M5) (M6) (M7) (M8) (M9) (M10) (M11) (M12) (M13) (M14) (M15) (M16) (M17) (M18) (M19) (M20) (M21) (M22) (M23) (M24) (M25) (M26) (M27) (M28) (M29) (M30) (M31) (M32) (M33) (M34) (M35) (M36) (M37) (M38) (M39) (M40) (M41) (M42) (M43) (M44) (M45) (M46) (M47) (M48) (M49) (M50) (M51) (M52) (M53) (M54) (M55) (M56) (M57) (M58) (M59) (M60) (M61) (M62) (M63) (M64) (M65) (M66) (M67) (M68) (M69) (M70) (M71) (M72) (M73) (M74) (M75) (M76) (M77) (M78) (M79) (M80) (M81) (M82) (M83) (M84) (M85) (M86) (M87) (M88) (M89) (M90) (M91) (M92) (M93) (M94) (M95) (M96) (M97) (M98) (M99) (M100)	100	110
DDG Light Tracked Bulldozer: M3A2 (M3A3) (M3A4) (M3A5) (M3A6) (M3A7) (M3A8) (M3A9) (M3A10) (M3A11) (M3A12) (M3A13) (M3A14) (M3A15) (M3A16) (M3A17) (M3A18) (M3A19) (M3A20) (M3A21) (M3A22) (M3A23) (M3A24) (M3A25) (M3A26) (M3A27) (M3A28) (M3A29) (M3A30) (M3A31) (M3A32) (M3A33) (M3A34) (M3A35) (M3A36) (M3A37) (M3A38) (M3A39) (M3A40) (M3A41) (M3A42) (M3A43) (M3A44) (M3A45) (M3A46) (M3A47) (M3A48) (M3A49) (M3A50) (M3A51) (M3A52) (M3A53) (M3A54) (M3A55) (M3A56) (M3A57) (M3A58) (M3A59) (M3A60) (M3A61) (M3A62) (M3A63) (M3A64) (M3A65) (M3A66) (M3A67) (M3A68) (M3A69) (M3A70) (M3A71) (M3A72) (M3A73) (M3A74) (M3A75) (M3A76) (M3A77) (M3A78) (M3A79) (M3A80) (M3A81) (M3A82) (M3A83) (M3A84) (M3A85) (M3A86) (M3A87) (M3A88) (M3A89) (M3A90) (M3A91) (M3A92) (M3A93) (M3A94) (M3A95) (M3A96) (M3A97) (M3A98) (M3A99) (M3A100)	143	204
Tractor full track: D7 (Army/MC) (M3) (M4) (M5) (M6) (M7) (M8) (M9) (M10) (M11) (M12) (M13) (M14) (M15) (M16) (M17) (M18) (M19) (M20) (M21) (M22) (M23) (M24) (M25) (M26) (M27) (M28) (M29) (M30) (M31) (M32) (M33) (M34) (M35) (M36) (M37) (M38) (M39) (M40) (M41) (M42) (M43) (M44) (M45) (M46) (M47) (M48) (M49) (M50) (M51) (M52) (M53) (M54) (M55) (M56) (M57) (M58) (M59) (M60) (M61) (M62) (M63) (M64) (M65) (M66) (M67) (M68) (M69) (M70) (M71) (M72) (M73) (M74) (M75) (M76) (M77) (M78) (M79) (M80) (M81) (M82) (M83) (M84) (M85) (M86) (M87) (M88) (M89) (M90) (M91) (M92) (M93) (M94) (M95) (M96) (M97) (M98) (M99) (M100)	100	110
RAM: E600	125	150
DAKCE 06	100	110
HELE	60	60
ERS	30	40
Utility tractor	30	40

Notes: Rates are based on work performed at 100% efficiency. \* - 60 minutes work hour, and excavated and being transported to a...

## Appendix C

### Results Tables Comparing Control and Treatment Groups for Units without a Recent Field Training Exercise (FTX)

**Table C1**

*Non-Parametric Tests of Dichotomous Items: Control versus Treatment Condition for Units without a FTX in the Last 12 months*

Checklist Item	Sample Size	Pearson's $\chi^2$	<i>Phi</i> Coefficient
Section II – Planning			
II 1 Avenues of Approach	354	0.83	-.05
II 2 Enemy Scheme of Maneuver	354	0.44	.04
II 3a Where to Engage	344	3.73	.11
II 3b Recon	293	1.53	.08
II 4 Emplace Weapon Systems	325	2.53	.10
II 5a Integrate Obstacles	345	14.12*	.21
II 5b Effectiveness of Obstacles	139	0.16	.05
II 6 Integrate Indirect Fires	353	0.00	-.01
II 7 Rehearse Engagement	349	0.10	.02
II 8a Air Guard Identified	337	3.31	-.11
II 8b Air Guard Planned & Rehearsed	154	2.81	-.15
II 9 Common Operating Picture (COP)	347	0.21	-.03
II 10 COP Maintained/Updated	242	3.98	.14
II 11 Assets for Planning	347	0.47	.04
II 12a Logistical Support Plan	348	0.00	-.01
II 12b Casualty Evacuation (CASEVAC) plan	331	1.54	-.08
II 13a Identify Defensive Shortfalls	348	0.96	.06
II 13b Defensive Shortfalls Mitigated	211	0.60	.06
Section III – Preparation			
III 1a Time	273	22.96*	-.30
III 1b Force	293	28.30*	-.32
III 1c Resources	269	26.60*	-.32
III 2a Emplace & Direct Security Operations	407	0.43	.04
III 2b Emplace & Direct Security Measures	386	0.09	.02
III 3a Survivability Positions Prepared & Improved	405	6.00	.13
III 3b Engineer Assets for Survivability Positions	323	0.06	.02
III 7 Liaison	394	1.51	-.07
III 8 Security Area Rehearsal	404	0.68	-.05
III 9 Revise and Refine Plan	309	0.30	-.04
III 10a Rehearse CASEVAC	408	6.13	-.13
III 10b Synchronize CASEVAC	346	5.59	-.13
III 11a Establish Targets	402	0.14	-.02

III 11b Targets Coordinated Up	230	46.48*	-.46
III 11c Targets Coordinated Down	215	39.14*	-.44
III 11d Targets Coordinated Laterally	199	28.13*	-.39
III 12 Range Cards	396	5.68	.12
III 12a Level Consolidated – Squad	174	0.28	.05
III 12b Level Consolidated – Platoon	174	1.82	.11
III 12c Level Consolidated – Company	174	1.95	-.12
III 12d Level Consolidated – Battalion	174	0.00	-.03
III 13a Rehearsals – Squad	321	0.00	.01
III 13b Rehearsals – Platoon	321	0.35	-.04
III 13c Rehearsals – Company	321	0.00	.01
III 13d Rehearsals – Battalion	321	0.19	.03

---

Section IV – Execution

IV 1 Support Commander’s Intent	399	0.56	.04
IV 2 Plan Tactically Sound	404	0.72	-.05
IV 3 Shared Graphic Control Measures	400	0.06	-.02
IV 4 Officers/NCOs Patrol	399	1.03	.06
IV 5 Survivability Positions Improved	387	1.85	.07
IV 6 Security Adjusted	404	3.74	.10
IV 7a Direct Weapon Systems	389	6.98*	.14
IV 7b Effectiveness of Direct Weapon Systems	281	2.78	.11
IV 8a Communication – Runner	420	0.55	.04
IV 8b Communication – Radio	420	0.33	-.04
IV 8c Communication – Digital	420	1.73	-.07
IV 8d Communication – Wire	420	2.97	-.10
IV 8e Communication – Visual	420	1.90	-.07
IV 8f Communication – Audio	420	3.08	-.09
IV 8g Communication – Other	420	0.57	-.05
IV 9 Communications Effective	386	5.46*	-.12
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	290	3.42	.12

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*Note.* *Phi coefficients* range from .00 to .01 for *negligible associations*, .02 to .19 for *small associations*, .20 to .40 for *moderate associations*, and .80 to 1.00 for *very strong associations* (Kotrlík & Williams, 2003). A positive *phi coefficient* indicates that the treatment condition performed better than the control condition.

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table C2**

*Non-Parametric Tests of Continuous Items: Control versus Treatment Condition for Units without a FTX in the Last 12 months*

Checklist Item	Group	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>U</i>	Cohen's <i>d</i>
III 4 Blade Team (Hours Available)	Control	108	9.07	28.45	3605.5	0.08
	Treatment	72	11.64	36.31		
III 5 Blade Team (Hours Used)	Control	107	3.59	10.37	3651	0.14
	Treatment	74	5.46	16.82		
III 6 Stage of Fighting Position	Control	129	1.58	0.76	8170.5	-0.02
	Treatment	126	1.56	0.72		
Overall Ratings						
Plan	Control	228	2.25	0.92	22323	-0.16
	Treatment	178	2.11	0.89		
Prepare	Control	227	2.20	0.95	20478	0.01
	Treatment	179	2.21	0.91		
Execute	Control	227	2.22	0.91	21224	-0.08
	Treatment	178	2.15	0.93		

*Note.* For Cohen's *d*, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).

## Appendix D

### Results Tables Comparing Control and Treatment Groups for Units without a Common Operational Picture (COP)

**Table D1**

*Non-Parametric Tests of Dichotomous Items: Control versus Treatment Condition for Units without a COP*

Checklist Item	Sample Size	Pearson's $\chi^2$	<i>Phi</i> Coefficient
Section II – Planning			
II 1 Avenues of Approach	182	0.30	.05
II 2 Enemy Scheme of Maneuver	182	0.52	.06
II 3a Where to Engage	178	0.83	.08
II 3b Recon	152	3.85	.17
II 4 Emplace Weapon Systems	171	3.84	.16
II 5a Integrate Obstacles	177	0.49	.06
II 5b Effectiveness of Obstacles	79	0.03	.05
II 6 Integrate Indirect Fires	183	3.90	.16
II 7 Rehearse Engagement	184	0.73	.08
II 8a Air Guard Identified	176	4.40	-.17
II 8b Air Guard Planned & Rehearsed	95	4.08	-.24
II 10 COP Maintained/Updated	56	0.19	.20
II 11 Assets for Planning	182	3.91	.16
II 12a Logistical Support Plan	179	0.96	.08
II 12b Casualty Evacuation (CASEVAC) plan	173	0.62	-.07
II 13a Identify Defensive Shortfalls	180	4.26	.16
II 13b Defensive Shortfalls Mitigated	110	2.69	.18
Section III – Preparation			
III 1a Time	104	19.49*	-.46
III 1b Force	114	22.53*	-.47
III 1c Resources	106	27.39*	-.53
III 2a Emplace & Direct Security Operations	176	0.80	.08
III 2b Emplace & Direct Security Measures	166	1.01	.09
III 3a Survivability Positions Prepared & Improved	181	4.84	.17
III 3b Engineer Assets for Survivability Positions	146	0.11	-.04
III 7 Liaison	177	0.00	-.01
III 8 Security Area Rehearsal	179	0.00	-.01
III 9 Revise and Refine Plan	140	0.69	.09
III 10a Rehearse CASEVAC	181	0.31	-.05
III 10b Synchronize CASEVAC	154	0.01	.02
III 11a Establish Targets	179	0.52	.07
III 11b Targets Coordinated Up	82	22.37*	-.56
III 11c Targets Coordinated Down	84	34.42*	-.68

III 11d Targets Coordinated Laterally	74	16.13*	-.53
III 12 Range Cards	174	13.27*	.29
III 12a Level Consolidated – Squad	89	0.72	.11
III 12b Level Consolidated – Platoon	89	3.42	.22
III 12c Level Consolidated – Company	89	0.56	-.11
III 12d Level Consolidated – Battalion	89	0.00	.04
III 13a Rehearsals – Squad	134	0.00	-.02
III 13b Rehearsals – Platoon	134	0.01	-.03
III 13c Rehearsals – Company	134	1.70	.13
III 13d Rehearsals – Battalion	134	0.34	.08

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Section IV – Execution

IV 1 Support Commander’s Intent	176	3.10	.14
IV 2 Plan Tactically Sound	180	0.02	.02
IV 3 Shared Graphic Control Measures	178	1.67	.11
IV 4 Officers/NCOs Patrol	177	3.16	.15
IV 5 Survivability Positions Improved	174	0.01	.02
IV 6 Security Adjusted	179	0.85	.08
IV 7a Direct Weapon Systems	177	8.38*	.23
IV 7b Effectiveness of Direct Weapon Systems	129	8.48*	.27
IV 8a Communication – Runner	184	0.18	-.04
IV 8b Communication – Radio	161	0.06	.00
IV 8c Communication – Digital	78	0.05	.00
IV 8d Communication – Wire	5	1.80	.00
IV 8e Communication – Visual	40	0.10	.00
IV 8f Communication – Audio	41	0.02	.00
IV 8g Communication – Other	5	0.20	.00
IV 9 Communications Effective	177	2.13	-.12
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	119	0.02	-.03

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*Note. Phi coefficients range from .00 to .01 for negligible associations, .02 to .19 for small associations, .20 to .40 for moderate associations, and .80 to 1.00 for very strong associations (Kotrlík & Williams, 2003). A positive phi coefficient indicates that the treatment condition performed better than the control condition.*

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table D2**

*Non-Parametric Tests of Continuous Items: Control versus Treatment Condition for Units without a COP*

Checklist Item	Group	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>U</i>	Cohen's <i>d</i>
III 4 Blade Team (Hours Available)	Control	46	14.35	43.04	1068.5	-0.27
	Treatment	46	5.96	12.40		
III 5 Blade Team (Hours Used)	Control	46	5.20	14.92	1068	-0.28
	Treatment	47	2.19	2.82		
III 6 Stage of Fighting Position	Control	57	1.65	0.88	1989	0.09
	Treatment	74	1.73	0.86		
Overall Ratings						
Plan	Control	87	1.85	0.97	4123	0.02
	Treatment	94	1.87	0.94		
Prepare	Control	87	1.84	0.97	3601	0.24
	Treatment	94	2.06	0.89		
Execute	Control	87	1.90	0.99	3755	0.15
	Treatment	93	2.04	0.98		

*Note.* For Cohen's *d*, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).

## Appendix E

### Results Tables Comparing Control and Treatment Groups for Units without a Logistical Support Plan

**Table E1**

*Non-Parametric Tests of Dichotomous Items: Control versus Treatment Condition for Units without a Logistical Support Plan*

Checklist Item	Sample Size	Pearson's $\chi^2$	<i>Phi</i> Coefficient
Section II – Planning			
II 1 Avenues of Approach	171	0.36	.06
II 2 Enemy Scheme of Maneuver	172	1.22	.10
II 3a Where to Engage	169	8.44*	.24
II 3b Recon	142	5.52	.21
II 4 Emplace Weapon Systems	162	0.91	.09
II 5a Integrate Obstacles	168	3.30	.15
II 5b Effectiveness of Obstacles	76	0.71	.07
II 6 Integrate Indirect Fires	172	5.25	.19
II 7 Rehearse Engagement	169	2.13	.13
II 8a Air Guard Identified	168	2.80	-.15
II 8b Air Guard Planned & Rehearsed	92	4.43	-.25
II 9 Common Operating Picture (COP)	172	0.21	.05
II 10 COP Maintained/Updated	106	10.04*	.33
II 11 Assets for Planning	169	3.66	.16
II 12b Casualty Evacuation (CASEVAC) plan	159	4.47	-.18
II 13a Identify Defensive Shortfalls	170	1.51	.11
II 13b Defensive Shortfalls Mitigated	88	4.29	.25
Section III – Preparation			
III 1a Time	90	17.05*	-.46
III 1b Force	105	24.96*	-.51
III 1c Resources	90	27.27*	-.58
III 2a Emplace & Direct Security Operations	168	2.13	.12
III 2b Emplace & Direct Security Measures	160	2.61	.14
III 3a Survivability Positions Prepared & Improved	168	3.52	.16
III 3b Engineer Assets for Survivability Positions	127	0.39	-.07
III 7 Liaison	167	0.00	-.01
III 8 Security Area Rehearsal	166	0.22	.05
III 9 Revise and Refine Plan	139	1.17	.11
III 10a Rehearse CASEVAC	169	3.81	-.17
III 10b Synchronize CASEVAC	139	0.52	-.08
III 11a Establish Targets	168	1.52	.11
III 11b Targets Coordinated Up	82	22.65*	-.56
III 11c Targets Coordinated Down	79	26.45*	-.61

III 11d Targets Coordinated Laterally	68	14.37*	-.52
III 12 Range Cards	163	3.97	.17
III 12a Level Consolidated – Squad	66	3.49	.27
III 12b Level Consolidated – Platoon	66	0.06	.06
III 12c Level Consolidated – Company	66	0.27	-.11
III 12d Level Consolidated – Battalion	66	0.07	.11
III 13a Rehearsals – Squad	130	1.88	.14
III 13b Rehearsals – Platoon	130	1.77	-.13
III 13c Rehearsals – Company	130	2.71	.17
III 13d Rehearsals – Battalion	130	1.57	.15

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Section IV – Execution

IV 1 Support Commander’s Intent	168	2.55	.14
IV 2 Plan Tactically Sound	170	0.00	-.01
IV 3 Shared Graphic Control Measures	170	0.29	.05
IV 4 Officers/NCOs Patrol	165	5.12	.19
IV 5 Survivability Positions Improved	161	0.33	.06
IV 6 Security Adjusted	169	5.90	.20
IV 7a Direct Weapon Systems	162	9.14*	.25
IV 7b Effectiveness of Direct Weapon Systems	115	7.37*	.27
IV 8a Communication – Runner	172	0.20	-.05
IV 8b Communication – Radio	172	0.00	.00
IV 8c Communication – Digital	172	2.08	-.12
IV 8d Communication – Wire	172	4.08	-.18
IV 8e Communication – Visual	172	0.00	-.02
IV 8f Communication – Audio	172	0.00	-.01
IV 8g Communication – Other	172	0.00	-.04
IV 9 Communications Effective	168	0.10	-.04
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	121	1.30	-.12

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*Note. Phi coefficients range from .00 to .01 for negligible associations, .02 to .19 for small associations, .20 to .40 for moderate associations, and .80 to 1.00 for very strong associations (Kotrlík & Williams, 2003). A positive phi coefficient indicates that the treatment condition performed better than the control condition.*

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table E2**

*Non-Parametric Tests of Continuous Items: Control versus Treatment Condition for Units without a Logistical Support Plan*

Checklist Item	Group	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>U</i>	Cohen's <i>d</i>
III 4 Blade Team (Hours Available)	Control	39	17.69	47.56	864	-0.33
	Treatment	42	6.50	13.17		
III 5 Blade Team (Hours Used)	Control	39	6.03	16.05	805	-0.16
	Treatment	41	4.00	9.57		
III 6 Stage of Fighting Position	Control	53	1.57	0.80	1598.5	0.03
	Treatment	63	1.59	0.69		
Overall Ratings						
Plan	Control	86	1.81	0.96	3368.5	0.12
	Treatment	83	1.93	0.93		
Prepare	Control	85	1.80	0.91	3065	0.24
	Treatment	83	2.02	0.98		
Execute	Control	85	1.85	0.94	3209	0.15
	Treatment	83	1.99	1.01		

*Note.* For Cohen's *d*, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).

## Appendix F

### Results Tables Comparing Control and Treatment Groups for Units without a Casualty Evacuation (CASEVAC) Plan

**Table F1**

*Non-Parametric Tests of Dichotomous Items: Control versus Treatment Condition for Units without a CASEVAC Plan*

Checklist Item	Sample Size	Pearson's $\chi^2$	<i>Phi</i> Coefficient
Section II – Planning			
II 1 Avenues of Approach	137	0.36	.01
II 2 Enemy Scheme of Maneuver	138	0.39	.07
II 3a Where to Engage	132	1.28	.11
II 3b Recon	119	0.16	.05
II 4 Emplace Weapon Systems	127	2.59	.16
II 5a Integrate Obstacles	131	0.00	.02
II 5b Effectiveness of Obstacles	60	0.00	-.03
II 6 Integrate Indirect Fires	138	2.84	.16
II 7 Rehearse Engagement	136	1.51	.13
II 8a Air Guard Identified	129	0.04	-.05
II 8b Air Guard Planned & Rehearsed	71	0.17	-.12
II 9 Common Operating Picture (COP)	137	0.12	.04
II 10 COP Maintained/Updated	80	18.45*	.51
II 11 Assets for Planning	133	2.92	.16
II 12a Logistical Support Plan	131	0.00	-.01
II 13a Identify Defensive Shortfalls	131	1.13	.11
II 13b Defensive Shortfalls Mitigated	72	0.43	.11
Section III – Preparation			
III 1a Time	85	12.05*	-.41
III 1b Force	90	11.78*	-.39
III 1c Resources	83	18.42*	-.51
III 2a Emplace & Direct Security Operations	130	5.75	.23
III 2b Emplace & Direct Security Measures	123	6.17	.24
III 3a Survivability Positions Prepared & Improved	133	4.37	.20
III 3b Engineer Assets for Survivability Positions	105	0.00	.02
III 7 Liaison	134	0.73	.09
III 8 Security Area Rehearsal	134	1.90	.14
III 9 Revise and Refine Plan	108	5.05	.24
III 10a Rehearse CASEVAC	137	0.05	-.05
III 10b Synchronize CASEVAC	109	0.10	-.07
III 11a Establish Targets	133	3.51	.18
III 11b Targets Coordinated Up	71	22.11*	-.60
III 11c Targets Coordinated Down	67	16.44*	-.54

III 11d Targets Coordinated Laterally	61	9.10*	-.48
III 12 Range Cards	130	11.26*	.31
III 12a Level Consolidated – Squad	60	0.00	.05
III 12b Level Consolidated – Platoon	60	0.66	.15
III 12c Level Consolidated – Company	60	1.97	-.24
III 12d Level Consolidated – Battalion	60	0.26	.14
III 13a Rehearsals – Squad	97	0.01	.03
III 13b Rehearsals – Platoon	97	0.58	-.10
III 13c Rehearsals – Company	97	3.68	.24
III 13d Rehearsals – Battalion	97	6.01	.30

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Section IV – Execution

IV 1 Support Commander’s Intent	134	5.02	.21
IV 2 Plan Tactically Sound	136	1.26	.11
IV 3 Shared Graphic Control Measures	134	1.08	.11
IV 4 Officers/NCOs Patrol	133	6.00	.23
IV 5 Survivability Positions Improved	130	2.94	.17
IV 6 Security Adjusted	134	7.51*	.25
IV 7a Direct Weapon Systems	130	13.76*	.34
IV 7b Effectiveness of Direct Weapon Systems	93	7.67*	.31
IV 8a Communication – Runner	138	1.95	-.13
IV 8b Communication – Radio	138	0.05	-.04
IV 8c Communication – Digital	138	0.00	.02
IV 8d Communication – Wire	138	0.22	-.08
IV 8e Communication – Visual	138	0.26	-.06
IV 8f Communication – Audio	138	0.69	.09
IV 8g Communication – Other	138	0.00	-.04
IV 9 Communications Effective	134	0.15	.05
IV 10 Chemical, Biological, Radiological, and Nuclear (CBRN) Assets	86	4.40	-.25

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*Note. Phi coefficients range from .00 to .01 for negligible associations, .02 to .19 for small associations, .20 to .40 for moderate associations, and .80 to 1.00 for very strong associations (Kotrlík & Williams, 2003). A positive phi coefficient indicates that the treatment condition performed better than the control condition.*

\* Indicates a statistically significant relationship ( $p < .01$ ).

**Table F2**

*Non-Parametric Tests of Continuous Items: Control versus Treatment Condition for Units without a CASEVAC Plan*

Checklist Item	Group	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>U</i>	Cohen's <i>d</i>
III 4 Blade Team (Hours Available)	Control	22	30.32	60.87	476	0.38
	Treatment	41	3.12	7.86		
III 5 Blade Team (Hours Used)	Control	22	9.55	20.76	467	0.26
	Treatment	39	2.15	2.99		
III 6 Stage of Fighting Position	Control	31	1.61	0.95	993.5	-0.11
	Treatment	57	1.49	0.57		
Overall Ratings						
Plan	Control	54	1.65	1.05	2100	0.10
	Treatment	81	1.93	0.88		
Prepare	Control	53	1.62	0.95	1903	0.22
	Treatment	81	2.04	0.91		
Execute	Control	53	1.77	1.03	2016	0.13
	Treatment	81	1.93	0.92		

*Note.* For Cohen's *d*, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect (Cohen, 1988).

\* Indicates a statistically significant difference ( $p < .01$ ).