Ranger Athlete Warrior Assessment Performance in a Reserve Officer Training Corps Training Environment

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ABSTRACT

Muscular strength, power, and aerobic capacity are vital to Army Reserve Officer Training Corps (AROTC) Cadets as well as active-duty Soldiers, especially when lifting heavy objects, traveling long distances, or moving with maximum speed and agility. The purpose of this study was to examine the change (after a pre/post intervention) of 5 weeks of resistance strength training and aerobic capacity training on a Ranger Athlete Warrior (RAW) assessment. Twelve (males, n = 10; females, n = 2) college-aged AROTC Cadets volunteered for this study during their train-up for the annual Ranger Challenge Competition. Each training week consisted of two resistance, two aerobic, and one tactical training session lasting about 90 minutes. The RAW assessment consisted of the following: 5-10-5 shuttle, standing broad jump, 3–repetition maximum (RM) trap bar deadlift, pull-ups, metronome push-ups, heel claps, and two 300-yard shuttles. Paired samples t tests produced statistically significant differences (pre vs post): 5-10-5 (p = .04), 3-RM trap bar deadlift (p = .01), and metronome push-ups (p = .01). The results suggest that combining resistance strength and endurance and aerobic capacity training at a set volume with a self-selected intensity improved the Cadets' agility, lower-body strength, and upper-body muscular endurance. Implementing a program similar to this in other AROTC programs could also improve Cadet performance in the field. This study also showed the benefit of an AROTC program collaborating with human performance professionals to optimize Cadets' human performance capabilities.

KEYWORDS: *RAW assessment; muscular strength; aerobic capacity; human performance optimization*

Introduction

The human is the most important weapon within the military, and "a culture that emphasizes human performance optimization (HPO) is critical to the health and well-being and future effectiveness of our war fighters."[1] Therefore, HPO should be at the foundation of training and assessment. However, difficulties arise when trying to define and assess performance.[2] Without quantifying a Soldier's physical performance, the ability to objectively determine the change in performance from one time point to the next is greatly decreased.

Traditionally, active-duty Soldiers live on base and are constantly in a military environment. They participate in physical training (PT) up to 5 days a week.[3] In contrast, AROTC Cadets lead a college lifestyle and train approximately 3 mornings per week. Historically, PT has included bodyweight calisthenics, running, and rucking with a focus given to the Army Physical Fitness Test (APFT).[4] While most Soldiering tasks are not maximal, a blend of muscular strength and endurance, power, speed and agility, and aerobic capacity are still necessary for operational readiness.[5]

This shift in training is more in line with the high-performance model that began in the 1990s in private sports performance training center[2] and is more proactive, focusing on performance versus that of a solely health-focused paradigm, which tends to be more reactive.

One program under the US Special Operations Command's (USSOCOM) Preservation of the Force and Family (POTFF) that focuses on this high-performance model is the RAW program, which exists to optimize the physical/mental development and sustainment of the individual Ranger.[6] To assess physical performance, RAW assessments were conducted to identify individual and team/squad areas needing improvement.[6] The RAW assessment consists of seven tasks: 5-10-5 shuttle run, standing broad jump, 3-RM trap bar deadlift, pull-ups, metronome push-ups, heel claps, and two 300-yard shuttle runs (separated by 1 minute of rest) that must be completed during a 90-minute period.[6]

Therefore, the purpose of this study was to determine the change in RAW assessment performance (after a pre/post intervention) AROTC Cadets could make when assessments were separated by 5 weeks of resistance strength and endurance and aerobic capacity training. It was hypothesized that the duration of the training program may have been too short and the training volume too low (due to Ranger Challenge Competition training schedule) to cause statistical changes in performance. However, these constraints are similar to those experienced by active-duty Soldiers during their training.

Methods

Participants

Participants (males, n = 10; females, n = 2) in this study were members of the Liberty University AROTC Ranger Challenge team (Figure 1). After approval by the university's institutional review board, procedures of this study were explained and informed consent was obtained from each participant. Risk stratification was conducted according to American College of Sports

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FIGURE 1 *Participants during the 5 weeks of muscular strength and endurance training combined with aerobic capacity training.*

Medicine guidelines.[7] Participants stratified as "low risk" were allowed to participate in this study. Combined (male and female) descriptive characteristics were age 19.9 ± 1.3 y, height 69.7 ± 3.6 cm, weight 72 ± 6.8 kg, and body fat 14 ± 4.7%, obtained within 1 week of the pretraining RAW assessment.

Procedures

For both assessments (pretraining and posttraining), Cadets performed the following seven tasks in the order listed: 5-10-5, broad jump, 3-RM deadlift, pull-ups, metronome push-ups, heel claps, and two 300-yard shuttle runs separated by 1 minute of rest.

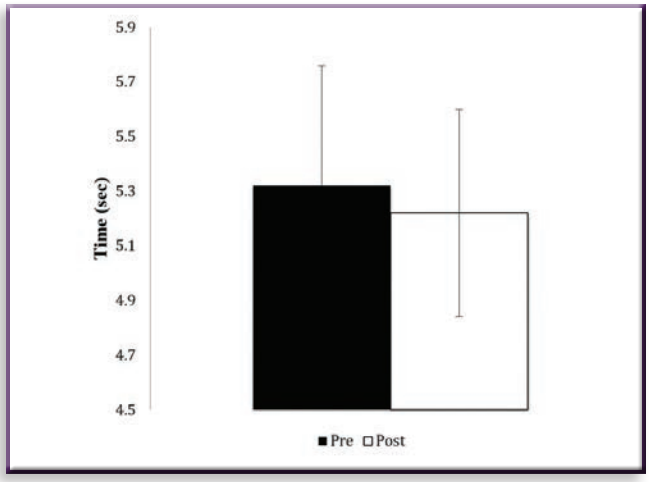
After the pretraining RAW assessment, participants began 5 weeks of muscular strength/endurance training combined with aerobic capacity training. Each week consisted of five 90-minute training sessions that occurred at approximately 0500-0730 each day. Aerobic capacity training was conducted on Mondays and Wednesdays and consisted of sprints, jogging, and ruck marches. Resistance training was conducted on Tuesdays (muscular strength) and Thursdays (muscular endurance) and included a combination of the following movements: deadlift, shoulder press, lunges, pull-ups, push-ups, sit-ups, power cleans, squats, heel claps, and grip strength (pinch and crush versions). The volume of the resistance training sessions was standardized, while the intensity was self-selected. Last, a combination of tactical and technical training was conducted on Fridays.

After 5 weeks, the posttraining RAW assessment was administered and data were analyzed.

Statistical Analyses

Paired-samples *t* tests were conducted to determine statistically significant differences between the pretraining and posttraining mean scores for each RAW assessment task. Alpha level was set at $p < .05$.

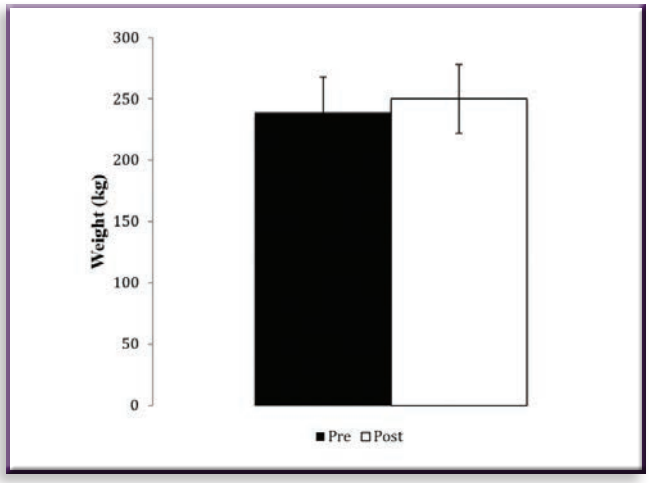
FIGURE 2 *Average (left and right) 5-10-5 shuttle run pre/post training (5.32 ± 0.44 vs 5.22 ± 0.38 second; p = .04).*



Results

The results listed below are pretraining vs posttraining for each test of the RAW assessment. Cadets statistically improved their performance in the 5-10-5, as described in Figure 2. There was no statistically significant change in the standing broad jump (225 ± 29.9 cm vs 227.8 ± 29.1 cm; $p = .32$). Cadets were statistically stronger in the 3-RM deadlift (Figure 3). There were no statistically significant improvements for pull-ups (10.1 ± 6.95 repetitions vs 10.8 ± 8.2 repetitions; $p = .43$). Cadets were able to perform statistically more Metronome push-ups (Figure 4). Performance on the heel claps were not statistically changed (8 ± 5.1 repetitions vs. 9.2 ± 5.2 repetitions; $p = .13$). Cadet averages on the 300-yard shuttle run (68.4 ± 6.3s vs. 70.1 ± 4.3 s; $p = .16$) were not statistically changed over the course of this study.

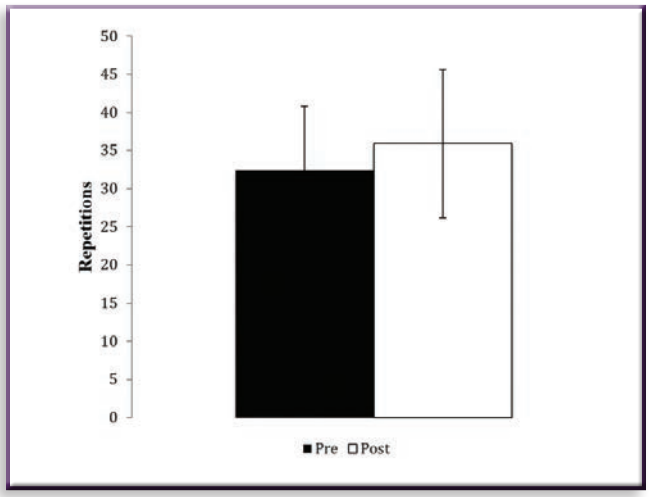
FIGURE 3 *3-RM trap bar deadlift pre/post training (106.3 ± 28.6 vs 111.1 ± 27.8 kg; p = .01).*



Discussion

This study investigated the effects of 5 weeks of muscular strength and endurance training combined with aerobic capacity training on RAW assessments during a train-up for a Ranger Challenge competition. Improvement in the 5-10-5

FIGURE 4 *Metronome push-ups pre/post training (32.5 ± 8.3 vs 35.9 ± 9.7 repetitions; p = .01).*



shuttle run indicated an increase in speed and agility. An increase in lower-body strength was seen via the 3RM deadlift. Upper-body strength was increased as seen by the metronome push-ups. These results suggest that combining muscular strength/endurance training and aerobic fitness training over 5 weeks can increase Cadets' performance on some RAW assessment tasks. Additionally, push-ups are a vital part of the APFT (and the newly approved for field testing ACFT).

Few studies have investigated how resistance strength and endurance combined with aerobic capacity impact total Cadet performance on a holistic physical performance test battery, let alone the RAW assessment. The current study improves the understanding of how AROTC Cadets perform on an assessment typically conducted by active-duty Soldiers.

With that said, the current study did have its limitations. Five weeks may not have been long enough to see significant changes in all RAW sssessment tasks, due in part to Cadets' varied levels of physical fitness and the time it takes for certain physiological adaptations. However, these circumstances may be similar to what active-duty Soldiers experience during their training. Additionally, a change in 300-yard shuttle run rest time from 1 minute to 2 minutes could not have been foreseen at the time of data collection. Due to participants being solely from the Ranger Challenge team, this was not a randomized study and cannot be applied to the general Cadet population.

Conclusion

The results of this study indicate that 5 weeks of resistance strength and endurance combined with aerobic capacity training significantly increased Cadet performance on certain RAW assessment tasks. A similar protocol might also result in improvements in the ACFT. This research can increase Cadets' knowledge of their capability to effectively incorporate strength and aerobic capacity training into a PT plan that trains the major components of physical performance. This study also shows the practical applications for the RAW assessment, such as its ability to measure each component of physical performance to determine if Soldiers have well-rounded physical attributes. The RAW assessment can also highlight certain areas of performance that Soldiers need to focus on for individual improvement. To narrow the large gap between Cadets and active-duty Soldiers, cadre/military science instructors need more contact time with the Cadets to allow similar training and assessment as active-duty Soldiers. This could be achieved by increasing the minimum number of mandatory PT sessions to 5 days a week, as well as providing more guidance on other aspects of human performance such as proper nutrition and sleep. If properly implemented and bought into by United States Army Cadet Command, a human performance program could be developed and implemented to train Cadets in a safe and effective manner to help close the HPO gap between Cadets and the active-duty Soldier. To begin this process, the comparison of Cadet performance to that of active-duty Soldiers on the RAW assessment would provide a snapshot of the gap between these two groups of military Servicemembers.

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Disclaimer

The opinions expressed in this manuscript are the private views of the authors and do not reflect the United States Department of Defense or the United States Army Cadet Command.

Disclosure

There were no conflicts of interest with this study. The participants received nothing of value, monetary or otherwise. Special treatment was not given in order for this study to be conducted.

Author Contributions

DPM and JH created the study design, conducted the data collection, edited the manuscript, and provided final approval of the manuscript. KH created the study design, conducted the data collection, and edited the manuscript. DS conducted the data collection and edited the manuscript. NO and NB edited the manuscript and provided substantive feedback about the study design and the study's results because they both have experienced the RAW program firsthand.

References

1. **US Army.** Army Physical Readiness Training (FM 7-22). Washington, DC: Headquarters, Department of the Army.
2. *ACSM's Guidelines for Exercise Testing and Prescription.* Philadelphia, PA: Lippincott Williams & Wilkins; 2013.
3. **Charles Stark Draper Laboratory, Inc.** *Non-discipline Specific Soldier Performance Framework, Soldier Systems Engineering Architecture.* Natick, MA: US Army Natick Soldier Research, Development and Engineering Center, 2017.
4. **Deuster PA, O'Connor FG, Henry KA, et al.** Human performance optimization: an evolving charge to the Department of Defense. *Mil Med*. 2007;72(11):1133–1137.
5. **Knapik JJ, Rieger W, Palkoska F, et al.** United States Army physical readiness training: rationale and evaluation of physical training doctrine. *J Strength Cond Res*. 2009;23(4):1353–1362.
6. **Kraemer WJ, Vescovi JD, Volek JS, et al.** Effects of concurrent resistance and aerobic training on load-bearing performance and the Army physical fitness test. *Mil Med*. 2004;169(12):994–999.
7. **75th Ranger Regiment.** *Ranger Athlete Warrior: Further, Faster, Harder.* 2014;4:3–69.

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