

Spring 4-21-2024

The Influence of Strength and Power Training on the Performance of U.S. Marines

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CONCORDIA UNIVERSITY, ST. PAUL

ST. PAUL, MINNESOTA

COLLEGE OF KINESIOLOGY

The Influence of Strength and Power Training on the Performance of U.S. Marines

A GRADUATE PROJECT

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements

for the degree of

MASTERS OF EXERCISE SCIENCE

by

KRISTOPHER J. KLEIN

St. Paul, Minnesota

JANUARY 2024

Acknowledgements

Raymond Anderson, Jessica Kelderhouse, Stacey Lafferty, Andy Zalauskalns, and the staff at Concordia University St. Paul. The biggest professional influences on me that inspire me to continue learning.

Dedications

My wife, Becky and my children, Logan and Savannah, who have been with me through so much fun along with so much frustration.

Abstract

U.S. Marine Infantry conducts a job that requires strength, speed, and endurance; however military fitness training relies mainly on the endurance aspect. With numerous studies showing the correlation between an endurance mainstay within military organizations, and musculoskeletal and joint overuse injuries, this study seeks to understand the performance value in training the anaerobic energy systems. Specifically, we aim to determine whether strength and power training may be more beneficial to the tactical athlete than traditional training. Over a period of 12 weeks, 150 members of the U.S. Marine Infantry will participate in training five days a week with three days focused on strength and power and two days focused on active recovery/conditioning. Marine Corps fitness testing consisting of the Physical Fitness test and Combat Fitness Test will be conducted during the final week. Significant potential outcomes involve increased strength and power, an increase in anaerobic capacity, improved score on two Marine Corps physical performance tests, and improved movement under an external load. The physical performance tests are directly related to both job performance and career progression, while movement under an external load is directly related to combat related job and task performance.

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Chapter 1: Introduction

Members of the Infantry are at the forefront of combat in all types of environments and terrain. They must move swiftly and efficiently. Their job requires speed, strength, and endurance under high stress and external loads. It is well accepted that these individuals need to be healthy and possess high levels of physical conditioning, yet there remains a significant and singular reliance on endurance training. This high-volume training has been shown to correspond with overuse injuries (Jensen et al., 2019; Ojanen et al., 2020) while negatively impacting the strength and speed of military athletes (Drain et al., 2015; Vaara et al., 2015).

Previous studies, such as Ojanen et al. (2020) and Jensen et al. (2019), have recorded the deleterious effects endurance training can have when it is used as the primary tool for conditioning military personnel. These studies have highlighted the nature of a servicemember's job consisting of carrying heavy loads for extended periods of time with circumstances requiring repeated occurrences of both strength and speed. Research was further supported when strength training was implemented into periods of military training cycles. When given a pretest and post-test in strength protocols, it was found that gains in strength were limited due to conflicting exercise that called for higher aerobic demands (Drain et al., 2015; Vaara et al., 2015). Again, Whittle (2020), found the running distance that military recruits covered during basic training was a considerable risk factor for lower body injuries. However, overuse injuries are not only limited to the lower limbs. Waterman et al. (2016) noted anterior shoulder injuries were at a higher risk within military populations due to a combination of young age, high activity level and contact/collisions. The risk factor was documented at 3% of the military population per year and can imply a possible need for strengthening of the shoulder joint to reduce the likelihood of anterior shoulder injuries (Waterman et al., 2016).

United States Marines are required to run a three-mile fitness test which factors into their promotions and evaluations from superiors. Among the occupational specialties, Infantry is regarded as

physically demanding, as it requires hiking long distances while under heavy load and continuing to perform various aspects of their job. Some examples of their job include setting up a defense, obtaining a target objective, patrols, or entering buildings. Each of these scenarios involves a risk of combat with an enemy force, which requires swift action that includes repeated efforts of running and moving the body into a kneeling or prone position and returning to the feet. Even when Infantry has the luxury of riding in a transport vehicle, exiting the vehicle is often done at a sprint as they transition to performing a task similar to the above-mentioned aspects of their job. Marine infantry is a prime example of needing strength, power, and endurance, leaving individuals repeatedly exposed to highly intense physical exertion. This is highlighted by Stein et al. (2022), which evaluated the importance of these factors as they relate to susceptibility to enemy fire. Stein et al. (2022) noted that a servicemember who is able to move with speed, while under a load, is able to decrease both their exposure to enemy fire and risk of being wounded in combat.

Muscle fibers are split into two main categories: Type I and Type II muscle fibers; Type II muscle fibers then have two sub-categories: fast glycolytic and fast oxidative. The fast oxidative type II muscle fibers are more fatigue resistant than their glycolytic counterparts. Picard et al. (2012) explored whether the different muscle fiber types, Type I slow twitch and Type II fast twitch, can co-adapt when required to perform functions with different energy demands. Additionally, Polczyk and Marek (2015), found biochemical improvements that resulted in an increase in power output and work capacity of soccer players after conducting training that stressed the anaerobic energy systems. They noted that during the soccer game, the soccer players performed endurance activities in conjunction with repeated bouts of sprinting. Here, the focus was on the muscles ability to train for capacity and perform repeated high intensity movements over time and distance. During the study the author noted the shortest distance covered in the final post-test was 300% further than the shortest distance during the initial test. Amateur endurance runners have also been seen to benefit from training that targeted the work capacity of Type II muscle fibers (Marek & Michalik, 2015). The significance of this co-adaptation in regards to Infantry

personnel lies in long slow movements such as a patrol, that suddenly necessitates the ability to repeatedly perform explosive muscle actions for an undetermined amount of time during enemy contact.

Previous research has explored the importance of strength within a military program. Kollock et al. (2016) evaluated whether overuse knee injuries could be reduced through strengthening the muscles surrounding the knee joint. However, these studies do not tackle the issue of whether or not high-volume endurance training could be replaced by low volume, high-intensity (anaerobic) training while maintaining or improving the performance in more aerobic centric training evolutions. Is it possible that strength and power training could produce the desired results on performance of US Marine Infantry? The purpose of this study is to conduct a 12-week program exploring performance benefits of strength, power, and muscular work capacity of U.S. Marines with the infantry occupation, aboard Marine Corps Base Camp Lejeune, compared to traditional endurance focused methods. It is the hypothesis of this study that a program focused on the Marine's necessity for anaerobic conditioning and work capacity would improve performance and effectiveness to a higher degree than the standard approach. The major significance of the expected outcome is in the life and death situation of combat when members of a unit must be able to move and function under load in a high stress environment.

Chapter 2: Methods

This study was designed for data collection to determine if a strength and power focused program translates into higher performance of U.S. Marine Infantry personnel in the Physical Fitness Test (PFT) and Combat Fitness Test (CFT). These two tests are the standard markers for which the U.S. Marine Corps (USMC), has set to determine an individual Marine's physical fitness for duty. Every Marine has performed each test once a year since 2009, and the USMC has been performing the PFT for more than two decades. The PFT is an endurance test, and the CFT is an anaerobic endurance test.

For this study, the participants will report to the Human Performance Center on Marine Corps Base Camp Lejeune five days a week for 12 weeks. Prior to Day 1, the participating Marines will be given a brief of the program they will be following, in addition to expectations of the study, and nutritional recommendations. The participants will be encouraged to ask questions at any time to stimulate trust, motivation, and their best effort. As an agreement with the participating command to help ensure compliance, during the Marine's designated session time, the Human Performance Center is their appointed place of duty. Each Monday, Wednesday, and Friday session will cover acceleration, upper and lower body strength and power, and a work capacity circuit. Each Tuesday and Thursday session will be an active recovery workout. All efforts during each workout will be conducted with a rate of perceived exertion (RPE) method on a scale of one to ten and recorded to track progress and provide information concerning the participant's performance levels.

Participants:

One hundred fifty Marines within the Military Occupational Specialty (MOS) field of 0300 (Infantry) from 6th Marine Regiment will be enrolled in this study. Because Marines come from various backgrounds and are expected to perform their skill set, experience with resistance training will not be a deciding factor for inclusion. Criteria for inclusion is (a) 'Full Duty' status who do not report medical conditions that would hinder their participation in the study, (b) 0300 MOS field, (c) minimum PFT and CFT scores of 200, and (d) has a current PFT and CFT score from within the last year. Exclusion criteria will be (a) any restrictions in exercise 'Light Duty' or 'Limited Duty' status, (b) a Marine assigned to the

command's Body Composition Program (c) currently undergoing legal processes, and (d) need of counseling or other services that would prevent or disrupt their compliance with the program. All subjects will be voluntary participants and approved to participate in the study by the United States Marine Corps. This research will be conducted with the approval of an International Review Board.

Instruments:

Materials required for testing the PFT are digital stopwatches, Concept 2 row ergometer, pull-up bars, space for abdominal plank tests, measured 1.5-mile run route (run down and back) that is outdoors and relatively level, recording sheets with roster, pens, and sharpie markers. Materials required for testing the CFT are digital stopwatches, measured 400m running track, space for ammunition can overhead press, a 100-yard level field to conduct the 300 yd shuttle, (60) disc cones, measuring wheel, dummy grenades, (25) 5.56mm ammunition cans filled with sand weighing 30 pounds, scale, recording sheets with roster, pens, and sharpie markers.

Procedures:

Programming. The screening and selection process will begin six weeks out from the beginning of the study and will be finalized no later than ten days from the start of the study. During this time, each participant's most recent PFT and CFT scores from within the last year will be collected from the command training section. The Friday before the research begins, the participants will be introduced to the program and what will be expected from them. Weeks 1, 2, 4, 6, 8, and 10 are build weeks with Weeks 3, 5, 7, 9, and 11 as de-load weeks. Week 12 is the testing week with the PFT tested on Monday, a recovery and activation day on Wednesday, and the CFT conducted on Friday. There is no standardized time of day for testing the PFT or CFT; however, it is usually conducted in the mornings. Tests will be administered to no more than 50 participants at a time and will be administered in three 2-hour blocks beginning at 6 am.

Workouts on Monday, Wednesday, and Friday are designed with five sections beginning with a general warm-up with dynamic exercises, such as lunge variations, and ballistic exercises, such as skips, for approximately 10 minutes. Following the warm-up is the acceleration and change of direction (COD) portion consisting of sprints, cone, ladder, and hurdle drills. The third section will focus on strength and power movements for the upper and lower body. The fourth section is the most exhaustive focusing on work capacity. The final section is cool down and recovery, consisting of diaphragmatic breathing, self-myofascial release, and stretching variations. Tuesday and Thursday's active recovery workouts are designed with a similar layout, however, with four sections. These include a general warm-up for approximately 10 minutes, an acceleration and COD section, a cardiovascular portion consisting of lower impact/intensity training such as row ergometers, swimming, and light resistance. Tuesdays and Thursdays are completed with a cool down portion. Total time of each exercise session is approximately 60 minutes.

A 12-week program, shown in Enclosure 1, is used to move beyond neurological adaptations and highlight physiological adaptations to the greatest extent possible as discussed in Haff and Triplett (2016) and Sif (2003). The 12 weeks will be broken down into three 4-week blocks of progression:

- Block 1 (Weeks 1-4): This will consist of basic acceleration and change of direction drills and will have an eccentric focus on the strength portion during weeks one and two (Dietz & Peterson, 2012), paired with light load power exercises. The strength focus will change to isometric contractions for Weeks Three and Four (Dietz & Peterson, 2012). Acceleration distance will be no more than 20 yards in a single repetition and incorporate only simplistic COD drills with the sprints. Tuesday and Thursday are the primary COD drills during this block. Strength work tempo will be 4:0:0 and 6:0:0 twice a week during the eccentric contractions, and 0:4:0 and 0:6:0 twice a week during the isometric contractions. The work capacity sections will have several longer active rest periods with work to rest intervals at a 1:1 ratio, and progress to 2:1 work to rest ratios.

- Block 2 (Weeks 5-8): The acceleration drill volume will increase; however, the maximum acceleration distance of 20 yards in a single repetition remains the same. COD drills will become more complex in combination with acceleration drills. Strength exercises will begin to focus on the reactive portion of the lift with a tempo of 0:0:0 (Dietz & Peterson, 2012). Power exercises will increase in intensity and complexity. The work capacity will have shorter rest periods of less than 1:1 work to rest ratio.
- Block 3 (Weeks 9-12): The acceleration drills continue to be combined with the COD drills, such as shuttle run variations, and zigzag drills as examples. Each acceleration set will not exceed 200 total yards. Power exercises will become more intense and may be more complex based on individual competency. Strength tempo will remain at 0:0:0. The work capacity section will continue to have short rest periods with a less than 1:1 work to rest ratio.

Week 12, testing. Monday of Week 12 will be the PFT. Testing will be conducted/monitored by the command's Training Shop that conducted the initial test. Coaches will be present to conduct warm-ups, collect scores and verify compliance. Testing attire will be a t-shirt, shorts, socks, and running shoes. The participants will begin with a general warm-up. The PFT will be conducted in accordance with the procedures already established by the USMC (MCO 6100.3A, 2018). A PFT is divided into three events to be completed within two hours of starting the first event. Each event is individually scored with a maximum combined score for all three events of 300 points. The participants will be well rested the night prior to testing. The participants begin with pull-ups where the elbow reaches full extension between repetitions. Kipping is not allowed. The goal is to have 23/12 repetitions for males/females. This is an event score of 100 points. The next event is the abdominal exercise. This will be a plank with a goal time of 3 minutes, 45 seconds for both male and female, which is an event score of 100 points. When performing the plank, the participant's toes, forearms, and palms or fists always remain in contact with the ground. The back, buttocks, and legs must remain straight and in line throughout the test. The third event of the PFT is the 3-mile run or 5km row. The run is conducted by

the participant running 1.5miles out, and 1.5miles back on a relatively level course. The goal times for the run are 21/23 minutes male/female. This is an event score of at least 81-83 points depending on age for males, and 88-89 points depending on age for females. The time for maximum points (100) is 18/21 minutes male/female. The 5km row goal times are 19 minutes 45 seconds/22 minutes 45 seconds.

Which is an event score of 81-92 points depending on age for both male and female. Concerning the row and run, the participant will perform the exercise that they performed on their initial PFT with their command. The 3-mile run times are scored in 10 second intervals and round up to the nearest 10 seconds. Row times are scored in five second intervals and rounded up to the nearest five seconds.

No exercises will be conducted on Tuesday or Thursday of Week 12. Wednesday will consist of a general warm-up lasting approximately 20 minutes followed by self-myofascial release and stretching variations. The total time should be no longer than 45 minutes.

Friday of week 12 will be when the CFT takes place. The attire for the CFT is the Marine combat utility uniform. The participants will begin with a general warm-up. The CFT will be conducted in accordance with the procedures already established by the USMC (MCO 6100.3A, 2018). A CFT is divided into three events to be completed within two hours of starting the first event. Each event is individually scored in accordance with the USMC scoring procedures (MCO 6100.3A, 2018) with a maximum combined score for all three events of 300 points. The participants will be well rested the night prior to testing. The first event is the 800m run conducted in a t-shirt, utility trousers, and boots, on a course without sharp turns/turnarounds. The goal time is 2 minutes 38-41 seconds/3 minutes 10-19 seconds male/female depending on age, which is an event score of 100 points. The times are scored on the second, with fractions of a second not used and time rounded to the nearest second. The second event is the ammunition can overhead lift. This portion is conducted with a 5.56mm ammunition can weighing 30 pounds. The elbows must be fully extended at the top of the lift and the ammunition can must break the plane of the participant's chin at the bottom of the lift. The participant is allowed to use their legs in a push press manner during this portion of the test. The goal repetitions are 106-120/66-75 male/female

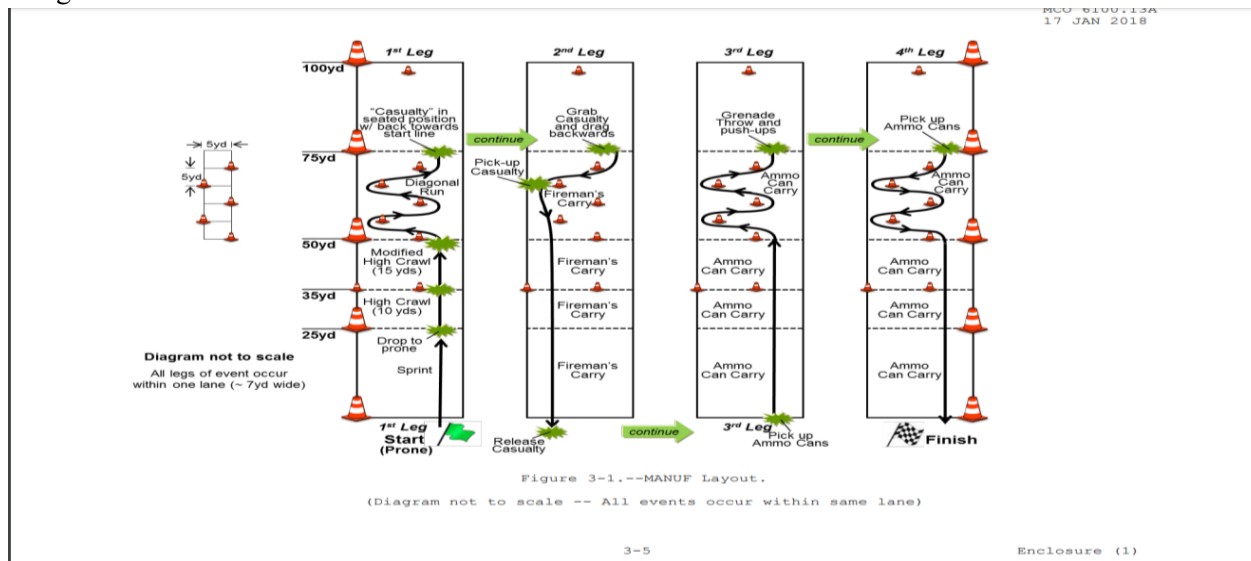
depending on age, which is an event score of 100 points. During the ammunition can press participants will wear t-shirt, utility trousers, and boots. The final event of the CFT is the maneuver under fire. The participant wears the utility jacket, trousers, and boots. This is a 300-yard shuttle conducted on a smooth and level surface free of excess debris. Prior to beginning this portion of the test, the participant being tested is paired with a partner within 10 pounds weight and within six inches height. This person is designated as the “buddy” and is placed at the 75-yard line seated upright and facing away with legs straight and forearms clasped within their hands. Also prior to beginning the last event a dummy grenade is placed at the 75-yard line and two 30-pound ammunition cans used from the previous event are placed at the starting line. Cones are set to mark the course as shown in Figure 1 along with a visual breakdown of the event. (MCO 6100.3A, 2018). The participant being tested begins in the prone position with their chest on the ground. Staggered feet are permitted. The participant conducts the 300-yard shuttle in the following manner:

- The participant will begin with a 25-yard sprint that ends with a forward facing “J-hook” in a clockwise direction around the cone.
- The participant executes a 10-yard high-crawl with elbows, knees, and torso maintaining ground contact.
- The participant executes a 15-yard ‘modified’ high crawl with six points of contact on the ground (hands, knees, and feet).
- Upon reaching the 50-yard line, the participant gets to their feet and zigzags around the outside of each cone to the “buddy” at the 75-yard line.
- The participant approaches the “buddy” from behind and conducts a casualty drag by reaching under the “buddy’s” arms, grasping the “buddy’s” forearms, lift, and drags him/her around the first two cones as shown in Figure 1. From here, the monitor tells the “buddy” to stand, and the participant lifts the “buddy” into the fireman’s carry position. The participant carries the “buddy” straight back to the start line and releases him/her.

- The participant picks up the two ammunition cans, (one in each hand) and retraces the initial path back down the course conducting the zigzag through the cones as shown in Figure 1.
- At the 75-yard line the participant sets down the ammunition cans and picks up the dummy grenade. From a standing position, the subject throws the grenade to a five-by-five yard square 20 yards away and immediately conducts five push-ups.
- o An observer will verbally and physically signal the monitor if the grenade throw was a hit or miss. In the case of a hit, five seconds will be removed from the final time. In the case of a miss, five seconds will be added to the final time.
- After the push-ups, the participant picks up his two ammunition cans and reverses his route back to the starting line (as shown in Figure 1) completing both the event and the CFT.

The goal time for the 300-yard shuttle will be 2 minutes 4-10 seconds/2 minutes 42-55 seconds male/female depending on age, which is an event score of 100 points.

Figure 1



Set up and execution of 300-yard shuttle event during the CFT (MCO 6100.3A, 2018).

Data Collection:

When performing the tests, each participant will be monitored during the individual events and their results recorded on a roster/event sheet to be compiled and scored. The participants will be immediately aware of their performance on each event. Specifically for the run portions, the participants will be monitored at the start and finish. During the 3-mile run, monitors will be at the turnaround point with sharpie markers to place a mark on the right arm of each participant before they begin their run back. One monitor per ten participants will be placed at the turnaround point so no participant's progress will be inhibited during the run. The 800m run will be conducted on a track in groups of no more than 25 at a time. The participants will conduct the PFT and CFT in their respective training groups they were placed in during the 12-week program. No more than 50 participants will perform a test at a time.

Quantitative Analysis:

Means and standard deviations, will be calculated for each dependent variable broken down into overall PFT and CFT scores, and individual events. This will be done for both the pretest consisting of collected scores from the command and the post-test. Data will be compared overall using one paired T-test, then divided based on the independent variables of overall participants, an age category, and a gender category. If applicable, the data will be evaluated for statistical significance using a factorial ANOVA. A P-Value of 0.05 will be used to identify statistical significance.

Ethical Considerations:

Informed consent will be collected during the initial briefing, screening, and selection process prior to beginning the 12 weeks. The informed consent form will be approved by the IRB prior to use. Each session will be supervised by a Certified Strength and Conditioning Specialist (CSCS) with 3-5 other coaches assisting. The assistant coaches will have a minimum certification of Certified Personal Trainer. At least one assistant coach will be a CSCS. There will be no more than 50 participants per session. During the 12-week program, the participants will report verbally to a coach on how they feel before and after each session so any physical issues or concerns can be assessed. Any reports that result in

a participant missing a session will be recorded with the name, date, and a description of the participant's issue/concern. These notes are kept for tracking and comparison purposes in case of repetitive complaints from one participant or similar complaints from multiple participants. If necessary, athletic trainers or physical therapists will be made available to the participant. Participants also have full access to their command's medical team and should report any issues that impact their participation in the study. Any electronic communication involving personally identifiable information will be encrypted. All hard-copy records will be stored in a file cabinet and locked. Anyone meeting exclusion criteria will not be required to disclose any information since that individual's command is able to withhold their names as potential participants. Data collected will be kept anonymous and only shared with members of that participant's immediate command and medical team. Video will not be taken; however, use of photographs will require a separate consent form collected along with the informed consent.

The biggest risk to the participants comes from overreaching during prescribed active recovery and de-load sessions of the workouts. This stems from a learned behavior that more is better. The mitigations include implementation of RPE, the briefing of expectations prior to starting the 12-week program, and supervision from the coaches and athletic trainers. With the implementation of the risk mitigations, the overall risk for the participants should be less than normal based on previous literature (Jensen et al., 2019; Kollock, 2016; Waterman et al., 2016; Whittle, 2020).

Chapter 3: Discussion

Expected findings are based on the body's use of energy systems when stressed through high intensity exercises and the aerobic demands of repeated efforts. The 12-week program the participants will go through is designed to elicit specific adaptations. These include an increase of overall strength, the ability to move faster under a load, an increase in work capacity which will allow for longer sustained efforts (Haff & Triplett, 2016; Siff, 2003). It is expected to see similar results to the increased work capacity in the soccer players studied by Polczyk, M. and Marek Z. (2015), which also allowed for greater distances to be covered by soccer athletes within a set time limit. Additionally, we expect to find results similar to Marek and Michalik (2015) that show positive effects in performance during movements over a long distance or duration. Due to the primary measurement of this study consisting of the two fitness tests, a contradiction of the hypothesis could be found if the PFT/CFT scores have no significant change. A contradiction may be found if there was a decrease in scores. In the case of either outcome, the important next steps would concern injuries and body composition in order to determine if the increase in strength, power, work capacity can reduce the likelihood of overuse/overtraining injuries commonly found in military populations.

Practical Applications:

The overall conclusion could be that participants are better prepared, physically, to meet the demands of their training. The intent is to show progressive programming of the anaerobic energy systems can improve the performance of U.S. Marines. If the hypothesis is supported, the following training recommendations should be incorporated into regular training activities:

1. Deliberate movements in ballistic exercises ranging from sprints, plyometrics, and external loads.
2. Movement in multiple planes.
3. Strength exercises for trunk stability and anti-rotation.
4. Bilateral and unilateral strength exercises for legs and arms.
5. Interval circuits stressing the anaerobic energy system.

Limitations:

A PFT/CFT score of 285 is generally considered, among the USMC population to be a high score. An awareness must be made in the case of any participant with a score already close to the maximal score of 300 which leaves little room for improvement from any exercise program. The participants will receive a nutritional brief during the program introduction; however, they will ultimately control their diet. Some adaptations, positive or negative may be due to an individual participant's eating habits. A participant whose eating habits closely resemble recommended nutritional guidelines for athletes may have better results than a participant whose eating habits are further from the recommended guidelines. Due to individual response and/or training age, there may still be some neurological adaptations taking place in an individual who has experienced little to no training of this type prior to this program.

Recommendations for future research:

There are multiple avenues to continue researching other possible benefits from an anaerobic focused conditioning program among military personnel. Some possibilities are as follows:

- To understand the participant's own perceptions on how capable they feel when performing their job, conduct surveys of RPE during combat training exercises pre and post program. Feedback in this context will provide insight into what areas the combat athlete personally sees or does not see improvement specifically when performing their job tasks.
- Track body composition pre and post program to gauge change in fat mass and fat-free mass. The maintenance of body composition within certain standards is an important aspect of a professional military life that all branches of service are concerned with. Data concerning changes in body composition will help to apply the integration of scientifically based training programs with military training and lifestyle.

- Track number and type of reported injuries before, during, and after a strength and power program among participants. This can expand on previous literature concerning overuse/overtraining injuries.
- Track injury recovery time of trained and untrained personnel. Injuries can happen during intense and/or extremely fast paced combat training evolutions. We would be able to further understand the response to injuries in the military population of a strength/power focused conditioning routine versus the normal endurance conditioning routine.

Conclusion:

Based on previous literature (Dietz & Peterson, 2012; Drain et al., 2015; Haff & Triplett, 2016; Siff, 2003), it is hypothesized that the musculoskeletal system will be strengthened, and the body will be prepared to absorb, create greater force production, and handle higher loads in a manner that advances an individual's ability to move more efficiently. It is expected the overall physical performance of Marine personnel to improve and be quantified in their fitness testing. It is possible the occurrence of the injuries discussed in previous research (Jensen et al., 2019; Kollock, 2016; Waterman et al., 2016; Whittle, 2020) would be reduce with the proposed training. Future research will be needed to determine its impact on injury prevalence in this population.

Enclosure 1:

12 Week Program

Warm-up			MONDAY, WEDNESDAY, FRIDAY FLEXIBILITY (Cool Down 1)		
movement prep			EXERCISES		
EXERCISES	SETS	distance	NOTES: 2 Sets of each exercise. Hold for 30 sec. each.		
Lunge w/ T-Spine Rotation	1	10 yards	Hamstring/Calf Stretch		
Shoe Swipes	1	10 yards	Quad/Hip Flexor Stretch		
Alternating Lateral Lunges	1	10 yards	Glute/Piriformis Stretch		
A-March	1	10 yards	Chest Stretch		
Close the Gate	1	10 yards	Back Stretch		
Open the Gate w/ Backwards Skip	1	10 yards			
High Kicks	1	10 yards			
Lateral Shuffle w/ Arm swing	2	10 yards	TUESDAY, THURSDAY FLEXIBILITY (Cool Down 2)		
Cario ca w/ Knee Drive	2	10 yards	EXERCISES		
Power Skip (height)	1	15 yards	Band Hamstring PNF Stretch	NOTES: 2 Sets of each exercise. Hold for 30 sec. each	
Backward Skip	1	15 yards	Distracted Hip Mobility		
Power Skip (distance)	1	15 yards	Cross Body Stretch Lower Body		
NOTES: Exercises with 2 sets = 1 set going in one direction and then another set coming back in the opposite direction.					

Week 9 - Reactive - Day 1					Week 9 - Reactive - Day 2					Week 9 - Reactive - Day 3					Week 9 - Reactive - Day 4					Week 9 - Reactive - Day 5				
SAG					SAG					Acceleration					COO					SAG				
EXERCISES	SETS	REPS	TIME	REST	EXERCISES	SETS	REPS	TIME	REST	EXERCISES	SETS	REPS	TIME	REST	EXERCISES	SETS	REPS	TIME	REST	EXERCISES	SETS	REPS	TIME	REST
Box Drill	3	3	30 sec	1 min	Box Drill	4	3	30 sec	1 min	High Knees	4	3	30 sec	1 min	T-Drill	4	3	30 sec	1 min	8 & Sports (see Week)	6	5.5	30 sec	1 min
Extended Z-Run	3	3	30 sec	1 min	Box Drill	4	3	30 sec	1 min	Side Step	4	3	30 sec	1 min	Box Drill	4	3	30 sec	1 min	8 & Sports (see Week)	6	5.5	30 sec	1 min
Archie Rocks	3	3	30 sec	1 min	Box Drill	4	3	30 sec	1 min	Box Drill	4	3	30 sec	1 min	Box Drill	4	3	30 sec	1 min	8 & Sports (see Week)	6	5.5	30 sec	1 min
NOTES: Exercise performed individually. Exercise 2 is paired with IP/W. RPE 8.					NOTES: Core drills to be performed as stand-alone exercises. Perform each core movement 2 times in each direction. RPE 8.					NOTES: Exercises 1 & 2 performed consecutively for 20 yards total. RPE 9.					NOTES: Core drills can be performed as a circuit or stand-alone exercises. Perform each core movement 2 times in each direction. RPE 8.					NOTES: Perform 4 sprints turning each way. RPE 9.				
Strength and Power					Cardiovascular/Endurance					Strength and Power					Cardiovascular/Endurance					Strength and Power				
Power Clean (see Week)	4	2	30 sec	1 min	Staircase	4	3	30 sec	1 min	Trap Bar Deadlift	4	3	30 sec	1 min	Ball Drag (see Week)	2	2	30 sec	1 min	Power Clean (see Week)	4	3	30 sec	1 min
Front Squat (see Week)	4	4	30 sec	1 min	Staircase	4	3	30 sec	1 min	Trap Bar Deadlift	4	3	30 sec	1 min	Ball Drag (see Week)	2	2	30 sec	1 min	Power Clean (see Week)	4	3	30 sec	1 min
Box Jump (see Week)	4	4	30 sec	1 min	Staircase	4	3	30 sec	1 min	Trap Bar Deadlift	4	3	30 sec	1 min	Ball Drag (see Week)	2	2	30 sec	1 min	Power Clean (see Week)	4	3	30 sec	1 min
Alternating DB Rows	4	4	30 sec	1 min	Staircase	4	3	30 sec	1 min	Trap Bar Deadlift	4	3	30 sec	1 min	Ball Drag (see Week)	2	2	30 sec	1 min	Power Clean (see Week)	4	3	30 sec	1 min
DB Bench Press	3	3	30 sec	1 min	Staircase	4	3	30 sec	1 min	Trap Bar Deadlift	4	3	30 sec	1 min	Ball Drag (see Week)	2	2	30 sec	1 min	Power Clean (see Week)	4	3	30 sec	1 min
DB Floor Press	3	3	30 sec	1 min	Staircase	4	3	30 sec	1 min	Trap Bar Deadlift	4	3	30 sec	1 min	Ball Drag (see Week)	2	2	30 sec	1 min	Power Clean (see Week)	4	3	30 sec	1 min
High Plank	3	3	30 sec	1 min	Staircase	4	3	30 sec	1 min	Trap Bar Deadlift	4	3	30 sec	1 min	Ball Drag (see Week)	2	2	30 sec	1 min	Power Clean (see Week)	4	3	30 sec	1 min
Plank (see Week)	3	3	30 sec	1 min	Staircase	4	3	30 sec	1 min	Trap Bar Deadlift	4	3	30 sec	1 min	Ball Drag (see Week)	2	2	30 sec	1 min	Power Clean (see Week)	4	3	30 sec	1 min
NOTES: Complete all sets of the first 3 exercises prior to moving on to the shaded exercises. The first exercise is performed individually, the second exercise is paired with IP/W, the third exercise and is performed consecutively. The shaded exercises are to be conducted as a circuit and performed after completion of all sets of the primary exercises. A subjective measurement of effort is taken throughout the workout using the Rate of Perceived Exertion Scale (RPE: 8).					NOTES: Exercises should be conducted as a circuit. RPE: 7.					NOTES: Complete all sets of the first 3 exercises prior to moving on to the shaded exercises. The first exercise is performed individually, the second exercise is paired with IP/W, the third exercise and is performed consecutively. The shaded exercises are to be conducted as a circuit and performed after completion of all sets of the primary exercises. A subjective measurement of effort is taken throughout the workout using the Rate of Perceived Exertion Scale (RPE: 8).					NOTES: Shaded exercises should be conducted as a circuit. Row at RPE: 7.					NOTES: Complete all sets of the first 3 exercises prior to moving on to the shaded exercises. The first exercise is performed individually, the second exercise is paired with IP/W, the third exercise and is performed consecutively. The shaded exercises are to be conducted as a circuit and performed after completion of all sets of the primary exercises. A subjective measurement of effort is taken throughout the workout using the Rate of Perceived Exertion Scale (RPE: 8).				

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