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The long-standing focus of military performance experts has been to identify relationships between modes of training and military performance success (6). Different styles of physical training have been explored to identify relationships between training style characteristics and successful completion of a military physical test battery (6). Integrating sports-specific training may contribute to larger training-induced changes compared to general military training, specifically due to its integration of strength and power versus the endurance-heavy nature of military training. Furthermore, identifying predictors of military load carriage performance may further refine the needs of a comprehensive and effective military training program.

COMBINING SPORT AND CONVENTIONAL MILITARY TRAINING PROVIDES SUPERIOR IMPROVEMENTS IN PHYSICAL TEST PERFORMANCE. *INTERNATIONAL JOURNAL OF SPORTS SCIENCE AND COACHING* 18(5): 1567-1576, 2023.

HAVENETIDIS, K, BISSAS, A, MONASTIROTIS, N, NICHOLSON, G, WALKER, J, BAMPOURAS, TM, AND DINSDALE, AJ

Soldiers engage in many physically-demanding tasks both near and on the battlefield, including sprinting, traversing obstacles, and heavy load carriage over long distances of variable speed and duration (1,3). The general approach to training for these tasks has focused on the incorporation of calisthenics, aerobic activities (e.g., running), obstacle courses, and load carriage, with recent integration of structured strength training (5,9). Although biomechanical and physiological interplay may exist between military and sport activities, reduced specificity may exist, particularly when addressing load carriage training. The purpose of this interventional study was to identify the effects of sport-specific and military-specific training on the performance of a military physical test battery among Army cadets. Furthermore, links between types of sport-specific training and the magnitude of training-induced changes were identified within the physical test battery.

Male army cadets of the Hellenic Army Academy (N=423) underwent a four days per week, 13-week training program and were split into two study cohorts: a general military training (GMT) group (n=211) and a sports military training (SMT) group (n=212). A physical test battery was completed pre- and post-training intervention to assess the effect of each training program on four field tests: pull-ups, a 500-m 20-event obstacle course run, 50-m freestyle swimming, and a one-mile run. A random sub-sample of participants (n=14) was identified to test the reliability of these field measurements by performing repeated trials on successive days. Intraclass correlation coefficients ranged from 0.93 (obstacle course) to 0.99 (50-m swim and one-mile run).

Both GMT and SMT groups performed a standardized morning training session prior to their specific training group's program. The morning session consisted of 10 min of total body ballistic stretching (four sets of 12 repetitions), 25 min of low pace running, and 20 min of total body calisthenic exercises (four sets of 12 repetitions in various forms of push-ups, sit-ups, pull-ups, inverted crawls, hops, high jumps, supine bicycles, and lunges). Both groups then underwent 90-min afternoon training sessions in accordance with their training style. A series of five different classes were carried out across the four-day weekly training period, which consisted of running, swimming, weight training, obstacle running, and calisthenics. In the SMT group, participants individually selected a sports team to participate in for the study duration from a list of sports teams, such as indoor climbing, tennis, track and field, and martial arts. Each sports team included an undulating periodized sports-specific training program that modified intensity and volume on a daily and weekly basis. Both groups abided by an obligatory dietary program consisting of four meals a day and were monitored by a quartermaster officer to ensure 100% compliance.

Both groups improved performance post-training; however, the SMT group contributed greater pre-post training differences compared to the GMT for each event of the physical test battery (large to very large for the SMT compared to medium to large for the GMT). All sports groups improved their performance in all four battery tests following the 13-week training period. The pre-post results of the pull-up test displayed a nearly five times greater improvement in the SMT group compared to the GMT group (25.7% versus 4.7%).

RELEVANCE FOR THE PRACTITIONER

A training program that incorporates both military and sport-specific training may be more beneficial than traditional military physical conditioning. Sport-specific training programs influenced by climbing, track sprinting, jumping, and basketball appeared to improve military performance, which may be due to their inherent strength and power training components, especially for the upper-body (3,5,10). Some sports, such as fencing and pankration, may be suboptimal for inducing military-specific adaptations to training performance, given their lack of resistance-based training and low-intensity exercise.

THE RELATIONSHIP BETWEEN ISOMETRIC MIDTHIGH PULL FORCE-TIME CHARACTERISTICS AND 2-KM LOAD-CARRYING PERFORMANCE IN TRAINED BRITISH ARMY SOLDIERS. *JOURNAL OF STRENGTH AND CONDITIONING RESEARCH* 38(2): 360-366, 2024.

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Load carriage is an essential requirement of the modern soldier. Methods of assessing realistic load carriage performance typically require maximum effort short (i.e., 2 km) or long (i.e., 12 km) duration field-based time-to-completion testing, which can be time-consuming (4). Proxy assessments of load carrying ability, such as measuring body mass, body composition, lower- and upper-limb strength, and aerobic capacity, have demonstrated strong relationships, and may be more reliable and convenient for the strength and conditioning practitioner to monitor (8). However, lower- and upper-limb strength assessments can be more challenging to assess, as standard one-repetition maximum (1RM) testing requires time, skill, and familiarization by the practitioner, and is highly fatiguing for the participant (2). Conversely, isometric testing methods, such as the isometric mid-thigh pull (IMTP), provide key strength-related force-time characteristics, while minimizing the testing consequences of maximum strength testing (2). Therefore, the purpose of this study was to evaluate the relationship between isometric force-time characteristics and 2-km loaded march performance while carrying a 25-km load. Additionally, the study also examined the relationship between isometric force-time characteristics and standing long jump (SLJ) performance, given the power required to react to enemy contact may be required following a loaded march.

Thirty-nine male British Army infantry soldiers participated in a single testing session, during which an IMTP, SLJ, and a 25-kg loaded 2-km march were performed. Key force-time characteristics included absolute peak force (PF), relative PF, and rate of force development (RFD). During the IMTP assessment, participants performed a test-specific warm-up of two IMTP repetitions at 50, 70, and 90% maximal perceived effort, followed by a one-minute rest between repetitions and a two-minute rest following the last warm-up set. A series of three maximal efforts were performed for the IMTP test, where each maximal isometric effort was held for five seconds. A minimum of three IMTP testing trials were completed, with the highest absolute PF and RFD identified in a time epoch of 0 – 250 ms used for analysis. Following the IMTP, participants performed the SLJ, where participants jumped horizontally as far as possible with a two-footed take-off and two-footed landing. A total of three SLJ trials were performed, with the furthest distance recorded for analysis. Finally, participants performed a 2-km time-to-completion loaded march on a tarmacked road surface. The external load configuration was a 25-kg day sack with British Army-issued Virtus webbing and represented 34.3 ± 4.6% of participant's body mass.

IMTP and SLJ were identified as being reliable tests of strength and power, with both IMTP (0.96) and SLJ (0.91) displaying excellent intraclass correlation coefficients. Isometric PF (r=-0.059), relative PF (r=0.135), and RFD (r=-0.162), displayed non-significant and small, negative correlations with loaded march performance time. Absolute isometric PF and relative isometric PF only explained 0.03% and 1.8% of the total variance. Only isometric relative PF and SLJ performance exhibited a strong, positive relationship (r=0.545), and explained 29.7% of the observed variance in SLJ performance.

RELEVANCE FOR THE PRACTITIONER

Although the IMTP and SLJ are reliable methods for measuring isometric strength and power, isometric force-time characteristics are limited in their ability to predict load carriage performance. Loaded walking integrates multi-joint movement patterns, as well as low-force, cyclic muscular contractions, which differ from the isometric strength and maximal power characteristics of the IMTP and SLJ assessments (7). Isometric muscular contractions also exhibit different motor unit recruitment patterns to more dynamic muscular activities performed during a loaded march (7). It is recommended that strength and conditioning practitioners are aware of the lack of transferability between isometric lower-limb force-time characteristics and load carriage performance, although IMTP assessments may be useful in assessing explosive strength and monitoring overall training readiness and program progression.

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