

Field and laboratory testing variance and application to daily physical training
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Context: Army physical training is often performed at the unit level utilizing similar activities for each soldier regardless of differing musculoskeletal and physiological abilities. The current training format may not most effectively address unit variance to ensure the proper load application or musculoskeletal and physiological progression results. **Objective:** The purpose of this study was to identify the between-subject variance of physical and physiological testing of the 101st Airborne (Air Assault) Division. **Design:** A retrospective cohort design was utilized. **Setting:** University sports medicine laboratory. **Patients or Other Participants:** A total of 111 male and female 101st Airborne (Air Assault) soldiers participated (Age: 28.1 ± 6.8 years; Height: 1.74 ± 0.09 m; Mass: 79.7 ± 14.4 kg). **Interventions:** Subjects performed the standard Army Physical Fitness Test (APFT) and a battery of laboratory assessments consisting of strength, cardiorespiratory, anaerobic, and body composition tests. Isokinetic strength testing was performed on the shoulder, knee, and torso. VO₂ max and lactate threshold were measured with a portable metabolic system during an incremental treadmill protocol to exhaustion. Anaerobic power and anaerobic capacity were measured during a 30 second maximal effort sprint on a cycle ergometer. Body composition was measured using air displacement plethysmography. The laboratory testing battery was based on variables that would most contribute to combat readiness and those most likely related to injury in the Army. A coefficient of variation (CV) was calculated for each dependent variable to determine the relative variance for APFT, musculoskeletal, and physiological testing within the Division. **Main Outcome Measures:** The dependent variables were the APFT, peak torque (normalized to body mass) for knee flexion and extension, shoulder internal and external rotation, and torso rotation, VO₂ max, anaerobic power and capacity, and percent body fat. **Results:** The CV for the APFT ranged from 13.9-28.1% for the push-up, sit-up, and run components. The CV for strength testing was 32.6% for shoulder internal rotation and 23.5% for shoulder external rotation, 24.8% for knee flexion and 21.6% for knee extension, and 24.7% for the torso. The CV for physiological testing was 37.3% for percent body fat, 18.1% for anaerobic power, 14.3% for anaerobic capacity, and 15.5% for VO₂ max. **Conclusions:** The CV for testing ranged from approximately 14-40% indicating a large variance of scores for the APFT, musculoskeletal, and physiological testing. Such variance may support stratified within-unit training that accounts for the different musculoskeletal and physiological abilities, particularly if optimal performance is being sacrificed or high injury rates are observed. Stratified, within-unit training will allow for proper modification of the training stimulus that promotes optimal fitness, without inducing injury. **Word Count:** 425