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The Characterization and Prediction of a Safe Workload for the Unilateral Loaded Carry

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The unilateral loaded carry (ULC) is a multi-planar, locomotive exercise that challenges the core and hip musculature, and may provide unique opportunities to develop lateral stabilization, muscle co-contraction, and balance. Due to compressive and shear forces on the spine with the ULC, caution must be exercised to account for potential injury risk. **PURPOSE:** To quantify and compare male and female ULC performance, and determine if additional variables allow the prediction of a safe starting load. **METHODS:** Anthropometric (height, body weight (BW), body mass index, and bioelectrical impedance analysis), muscular endurance (maximal duration side plank) and balance (balance error scoring system (BESS)) tests were completed. On a subsequent visit, participants performed a series of 20-second ULC trials (non-dominant side) at a consistent cadence. Initial load was 10% of BW and increased by 10% per trial. Five minutes of rest transpired between trials. When video analysis revealed deviations in spinal alignment or compromised gait patterns, the series ended. The highest load carried before technical failure was recorded. Descriptive and comparative statistics and a stepwise linear regression analysis were utilized to determine relationships between ULC performance and anthropometric, muscular endurance, and balance tests. **RESULTS:** Males (n=25) were significantly taller (177.3 ± 6.7 v. 164.7 ± 7.2 cm, $p < 0.05$), heavier (81.7 ± 7.0 v. 62.0 ± 9.4 kg, $p < 0.05$), and leaner (14.4 ± 4.4 v. 22.4 ± 4.8 %, $p < 0.05$) than their female (n=26) counterparts. Further, males had a higher amount of fat-free mass (FFM_{kg} ; $p < 0.05$) than females. Males and females carried an average ULC load of 52.2 ± 9.0 (64% BW) and 32.5 ± 7.1 kg (53% BW), respectively, with males able to carry a significantly heavier load ($p < 0.05$). Fat-free mass was strongly predictive of ULC load (ULC load = $-9.88876 + 0.88679 * (FFM_{kg})$; $r^2 = 0.774$, $p < 0.0001$). **CONCLUSION:** There are differences in ULC performance ability between males and females. As our method does not account for all potential confounding variables, the use of this equation should always be combined with technique analysis and participant feedback to ensure the safe prediction of a starting workload.