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Interlimb Asymmetries in Strength, Balance, and Gait Tasks in Marine Officer Candidates

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Interlimb asymmetry (ILA), the difference in performance or function between limbs, may be associated with injury risk and performance decrements. However, ILA values can vary between tasks and metrics, such as strength, balance, or gait assessments. **PURPOSE** To compare the magnitude and directionality of ILAs in strength and balance assessed by laboratory screening tests with ILAs in gait during an in-field training event. **METHODS** This analysis includes 73 candidates during Marine Corps Officer Candidates School (OCS) (age 24.7 ± 3.6 y; height 173.9 ± 8.8 cm; weight 77.5 ± 11.0 kg; 21 women). Candidates performed laboratory screening tests at the start of OCS: isometric mid-thigh pull (IMTP) and single-limb balance (SLB), and an in-field training event during OCS: 9-mile loaded ruck march carrying 50 lb packs. Candidates performed 2 trials of IMTP on dual force plates with 2 minutes rest between each trial; the trial with the highest peak force (PF; N) was used. Candidates performed 2 trials on each limb of 10 second SLB on a force plate to measure average sway distance (SD; mm), defined as the movement of the center of pressure in the medio-lateral and anterior-posterior planes, to determine postural control. During the march, inertial measurement units (IMUs) were placed above the medial malleolus of each limb and average step intensity (9M-I; g) was determined from impact acceleration. ILA was calculated using the symmetry angle equation and reported as a percent difference (%) between the right and left limbs for PF, SD, and 9M-I. A negative ILA value indicated lower PF and greater SD and 9M-I in the left limb compared to the right. The level of agreement between ILAs in PF, SD, and 9M-I was determined using Pearson correlation coefficients (r). For those with an ILA, Kappa coefficients (κ) were calculated to determine if ILA direction was consistent between measures. Data were reported as mean \pm SD (range); $\alpha = 0.05$, two-sided. **RESULTS** Average ILAs were $0.4 \pm 5.7\%$ ($-10.9 - +16.2$) for PF, $1.6 \pm 8.1\%$ ($-17.3 - +20.2$) for SD, and $0.5 \pm 3.2\%$ ($-7.8 - +7.2$) for 9M-I. These ILAs were not significantly correlated ($r = -0.070$ to -0.041 , $p = 0.567-0.728$) and there was poor agreement in directionality ($\kappa = 0.003-0.052$, $p = 0.656-0.983$). **CONCLUSION** The magnitude and direction of ILAs in strength and balance assessed by laboratory tests were not in concordance with the ILA in gait measured during the in-field training event. **SIGNIFICANCE/NOVELTY** Military training often occurs in the field where it is difficult to quantify ILAs. ILAs in strength and balance measured during laboratory screenings are not effective indicators of ILAs in gait measured during in-field training events. When assessing ILAs, practitioners should be aware of differences in measurement from various tasks and metrics. Future studies should explore ILAs of tasks that are specific to the operational demands of military in-field training.