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Sex-Differences in Counter Movement Jump Kinetics and Kinematics Following 10-week Marine Officer Candidates School

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The Counter Movement Jump (CMJ) is a field expedient test to evaluate kinetics and kinematics relating to readiness, and injury risk. There is a greater incidence of injuries in women during military training and understanding key measures within the CMJ between sexes may be useful in determining injury/performance differences. **PURPOSE:** To evaluate sex differences in kinetics and kinematics during the loading phase of the CMJ in Marine Officer Candidates (MOC) pre and post Officer Candidates School (OCS). **METHODS:** 375 MOCs (women n=72, 25±3 y, 65.9±7.1 kg, 164.9±5.7 cm; men n=303, 25±3 y, 81.3±9.4 kg, 177.5±6.9 cm) performed three maximal CMJs, 15 second rest between CMJs, on Hawkin Dynamics force plate (FP) and DARI marker less motion capture (mMoCap) pre and post 10-weeks of OCS, a rigorous graded physical, leadership and academic training pipeline for incoming Marine Officers. Three CMJs were averaged to one jump, and right and left limbs were averaged for mMoCAP. Separate 2-way mixed measures ANOVAs (Time*Sex) were conducted on each CMJ dependent variable 1) FP: avg. propulsive force (APF), avg. braking force (ABF), jump height (JH) 2) mMoCap: loading hip flexion (LHF), loading knee flexion (LKF), loading ankle flexion (LAF). **RESULTS:** There was a significant interaction effect on JH ($p < .001$, $\eta^2 = .04$) and APF ($p < .001$, $\eta^2 = .07$). Simple main effects of time showed that JH declined differently between women (.29±.05 to .28±.04 m, $p < .001$, $\eta^2 = .16$) and men (.40±.06 to .37±.06 m, $p < .001$, $\eta^2 = .04$), and APF improved in women (1053±144 to 1063±140 N, $p = .242$, $\eta^2 = .02$) but declined in men (1404±201 to 1361±177 N, $p < .001$, $\eta^2 = .22$). ABF displayed a significant decline over time ($p < .001$, $\eta^2 = .04$) and men performed better than women ($p < .001$, $\eta^2 = .25$). There were no significant interactions or main effect of sex for mMoCap, but LHF ($p < .001$, $\eta^2 = .12$), LKF ($p < .001$, $\eta^2 = .12$) and LAF ($p < .001$, $\eta^2 = .03$) decreased significantly over time. **CONCLUSION:** Kinematics decreased for men and women, while kinetics were less consistent from this trend in women. Although stiffer CMJ loading flexions in all joints, JH and ABF declined for both men and women, women slightly gained propulsive force, thus contributing to efficiencies in the CMJ protected and improved after OCS for women.

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