Abstract

THESIS: Pelvic obliquity, arm swing kinematics, strength, and speed in recreational distance runners

STUDENT: Mary Momper

DEGREE: Master of Science

COLLEGE: College of Health

DATE: December 2021

PAGES: 85

Running has become an immensely popular form of exercise for recreational, professional, social, health, and overall fitness purposes. There is no shortage of existing research on lower extremity running mechanics and sex differences in running-related injury rates, but research regarding pelvic obliquity (PVO), upper extremity running mechanics, and isometric trunk strength is limited. The purpose of this study was to determine the connection between PVO, arm swing crossover (ASC), and trunk and pelvic strength as a function of running speed in recreational distance runners and to determine whether sex differences exist in these relationships. Data from 16 apparently healthy recreational runners (age 24.25 ± 4.25 years; 6 females) were analyzed in this study. Motion capture data was collected during four, 2-minute treadmill running trials at varying speeds between 2.68 and 4.02 $m \cdot s^{-1}$, followed by a series of maximal voluntary isometric contraction (MVIC) tests for lateral trunk flexion, trunk rotation, hip abduction, and unilateral hip flexion and extension strength. While significant correlations were found between PVO and right ASC at some speeds (3.13 $m \cdot s^{-1}$ – $p = .027$, 3.57 $m \cdot s^{-1}$ – $p = .048$), PVO shared no correlations with left ASC ($p > .05$). Significant negative correlations were found between left ASC and various strength measures ($p < .05$), while right

ASC was only correlated with right hip abduction strength ($p < .04$). Significant main effects of speed were observed on PVO ($p = .004$) and right ASC ($p = .003$). Findings suggest that limb dominance, strength differences between left and right limbs, and neuromuscular movement patterns may have contributed to asymmetric biomechanical relationships between left and right sides. Speed effects on running kinematics may have been influenced by neuromuscular control abilities, novelty of certain speeds, and differences in energy demands.