THE RELATIONSHIP BETWEEN REACTIVE-STRENGTH AND ECONOMY IN COMPETITIVE DISTANCE RUNNERS

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Introduction
Economy is now thought to be one of the main performance indicators in elite distance runners. Economy is the amount of metabolic energy expended at a given velocity. In addition to cardiovascular capacity, economy is believed to be partly dictated by the neuromuscular system (Paavolainen et al 1999). Reactive-strength is the ability of the runner to have proficient eccentric and concentric muscular capabilities to rapidly absorb and utilise the elastic energy produced during each ground contact. This short ground contact phase in running is the only phase in which a runner can produce force to horizontally propel the body. The purpose of this study was to examine the relationship between economy, velocity at maximum oxygen uptake ($V\dot{O}_2\max$) and reactive-strength in competitive distance runners.

Methodology
Twenty competitive club runners (age 31.7 ± 8.4 years, height 162 ± 55.2 cm, weight 71.3 ± 6.9 kg and $\dot{V}O_2\max$ 58.8 ± 2.3 mL/kg/min) were recruited from local running clubs. Each runner was assessed for economy, $V\dot{O}_2\max$, and reactive-strength. The reactive-strength test assessed countermovement jump (CMJ) height (slow stretch shortening cycle performance) and drop-jump (DJ) reactive strength index (RSI) from a 30 cm box (fast stretch shortening cycle performance).

Results
There was no relationship found between economy (taken from the runner’s most economical velocity during the sub-maximal test) and reactive-strength performance (both CMJ height and DJ RSI) in competitive distance runners. However, the results showed that there was a moderate correlation between CMJ height (slow stretch shortening cycle function) and velocity at maximum oxygen uptake ($V\dot{O}_2\max$) ($r = .52$, $p < .01$).

Conclusion
The results from this study show that there is no relationship between economy and reactive-strength in competitive distance runners. However, it is possible that the economy protocol used was not specific to the current sample of runners. The sample consisted of middle- and long-distance runners. The most valid measurement of economy may be at specific race velocities (Berg, 2003). Future research in the area should assess economy by measuring steady-state oxygen consumption at specific race velocities to the runner.