

# The Effect of Stride Frequency on Running Economy and Running Distance During High Intensity Treadmill Running

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## Abstract

Running economy (RE; ml·kg<sup>-1</sup>·km<sup>-1</sup>) considers as a valid predictor of endurance running performance. Theoretically, improving RE allows runners to cover more distance at constant speed or run faster at a given distance. Stride frequency (SF) is one of the important parameters that affects running performance. The purpose of this study was to investigate the effect of SF on RE and distance while running on the treadmill at the speed of VO<sub>2</sub>max (sVO<sub>2</sub>max) until volitional fatigue. The second purpose was to determine a relationship between RE and running distance during high intensity running. We hypothesized that both RE and running distance would affect significantly by SF variations and there is a positive relationship between RE and running distance.

**Keywords:** running economy, stride frequency, high intensity running performance

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## Methods

Ten male recreational runners (age: 25.8 ± 5.0 yrs, height: 171.4 ± 6.2 cm, mass: 71.9 ± 7.5 kg) completed total seven experimental sessions including graded exercise test and running session for determining VO<sub>2</sub>max (55.4 ± 5.9 ml·kg<sup>-1</sup>·min<sup>-1</sup>) and preferred SF (PSF; 88.0 ± 3.9 strides/min), respectively. Running speed was calculated based on VO<sub>2</sub>max using the metabolic equation; VO<sub>2</sub> (ml·kg<sup>-1</sup>·min<sup>-1</sup>) = [0.2 × Speed(m/min)] + 3.5(ml·kg<sup>-1</sup>·min<sup>-1</sup>). Participants performed five separate running sessions (PSF, ±5%, ±10%) on the treadmill at the sVO<sub>2</sub>max with 0% gradient until volitional fatigue. A computer-based metronome was played in order to help maintain a target SF while running.

## Results

The running distance was significantly different among SF variations (p < 0.01) and all participants ran the greater distance at 105% PSF. However, RE was not statistically significant (p = 0.19) across the SF conditions. There was a low correlation between RE and running distance (r = 0.214, p = 0.14).

## Discussion

SF variations have a significant influence on running distance, but not RE during high intensity running. Recreational runners may use 105% PSF during high intensity running to train both aerobic and anaerobic capacity.



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