

A Comparison Of Running Economy Across Seven Carbon-Plated Racing Shoes

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ABSTRACT

Running economy is defined as the oxygen consumption (VO_2) or energy cost required to run at a given speed. It is a key determinant of performance, as improved economy allows a runner to run faster at the same physiological intensity. Advancements in running shoe technology, particularly in the Nike Vaporfly, have been shown to improve running economy. Other brands have now also developed new, advanced shoes with a carbon-fiber plate and thicker, new midsole foams. However, none of these new shoes have been compared to the Vaporfly. **PURPOSE:** Compare the effects of 7 different carbon-plated shoes and 1 traditional racing shoe on running economy. **METHODS:** Seven carbon-plated shoes: Hoka Rocket X (Hoka RX), Saucony Endorphin Pro (Saucony EP), Nike Alphafly (Nike AF), Asics Metaspeed Sky (Asics MS), Nike Vaporfly 2 (Nike VF2), New Balance RC Elite (New Bal RC), Brooks Hyperion Elite 2 (Brooks HE2), and 1 traditional shoe: Asics Hyperspeed (Asics HS) were tested in 12 male runners (5k best: 16.0 ± 0.7 min) on two visits. Shoes were tested in a random sequence over 8×5 -minute trials ($16 \text{ km} \cdot \text{hr}^{-1}$; 5-minute rest between trials) on visit 1, and in the reverse/mirrored order for visit 2. Metabolic and running mechanics data were collected and averaged across visits. A repeated-measures ANOVA was used to compare dependent variables across shoe conditions along with follow-up pairwise comparisons. **RESULTS:** VO_2 ($\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$; % change from Asics HS) was significantly different across shoes. Hoka RX (51.67 ± 2.07 ; $-0.08 \pm 1.04\%$) and Brooks HE2 (51.42 ± 1.72 ; $-0.53 \pm 0.90\%$) did not differ from Asics HS (51.71 ± 2.02). While Saucony EP (50.93 ± 1.82 ; $-1.48 \pm 0.72\%$) and New Bal RC (50.99 ± 1.83 ; $-1.37 \pm 0.78\%$) were statistically better than Asics HS, they were inferior to Nike AF (50.13 ± 1.86 ; $-3.03 \pm 1.48\%$), Nike VF2 (50.29 ± 1.72 ; $-2.72 \pm 1.02\%$), and Asics MS (50.39 ± 1.71 ; $-2.52 \pm 1.08\%$). In terms of running mechanics, statistically significant differences were limited. However, cadence ($\text{steps} \cdot \text{min}^{-1}$) was significantly lower in the Nike AF (174.6 ± 10.4) than the Asics HS (176.5 ± 10.3). **CONCLUSION:** While some of the shoes tested improved running economy relative to the traditional racing shoe, only Nike AF and Asics MS matched the previously established Nike VF2. From these data, it appears the running shoe market as a whole has not caught up to the advantages conferred by the Nike VF2.