

Supplementary Information

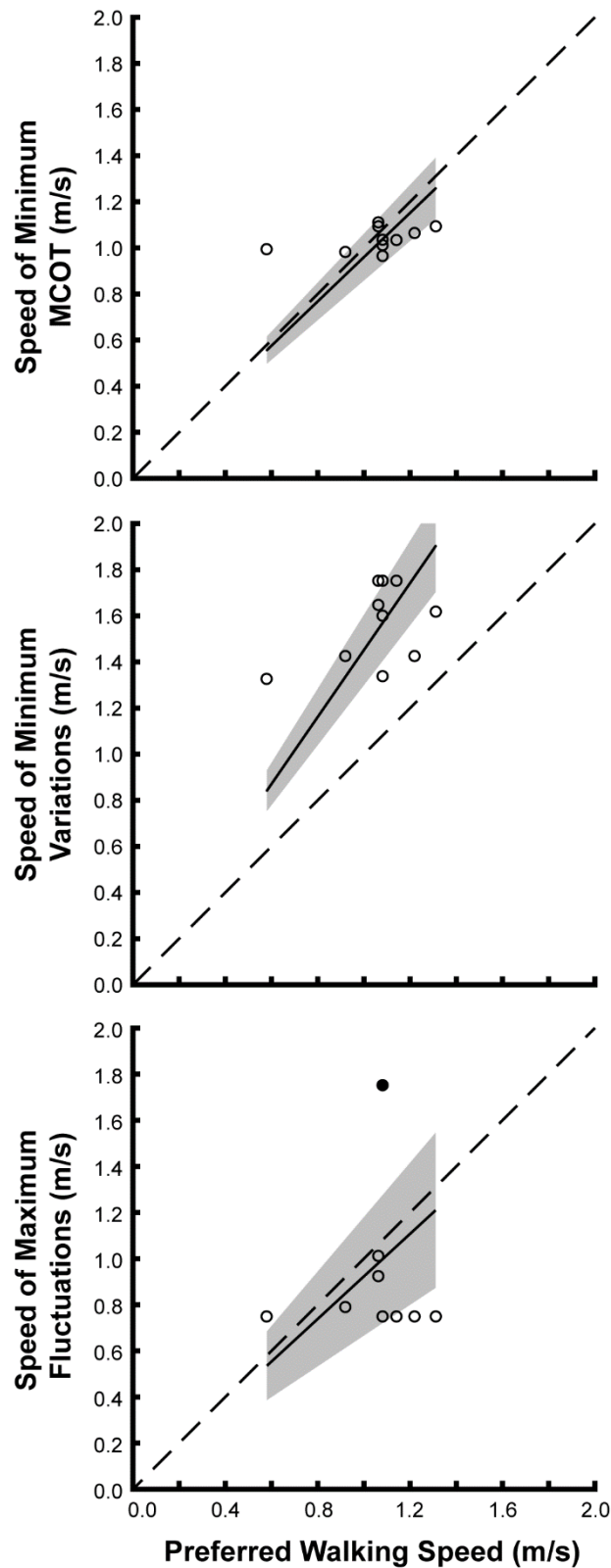


Figure S1. No-intercept regressions showing the relationships between the preferred walking speed and minimum of net metabolic cost of transport (MCOT) and Variations (step length CV) and the maximum of Fluctuations (DFA- α). A slope of 1 (dashed line for reference) would indicate that the variable is perfectly capable of predicting preferred walking speed. The slopes from MCT ($p = 0.447$) and Fluctuations ($p = 0.564$) were not significantly different from one, but the slope from Variations was significantly different than one ($p < 0.001$). Shaded areas indicate 95% confidence intervals around each regression line. Each circle represents a single subject. Filled circle denotes two data points at same position. CV = Coefficient of Variation; DFA = Detrended Fluctuation Analysis

Table S1. **Step parameters for each condition, reported as mean (s.d.).**

Speed (m s ⁻¹)	0.75	1.00	1.25	1.50	1.75
Step Width (cm)	9.0(3.6)	9.2(3.2)	9.5(3.1)	10.4(2.8)	11.1(3.1)
Step Length (m)	0.50(0.04)	0.59(0.05)	0.67(0.05)	0.74(0.05)	0.80(0.06)
Right only (m)	0.51(0.04)	0.59(0.05)	0.68(0.05)	0.75(0.05)	0.81(0.06)
Left only (m)	0.50(0.03)	0.59(0.05)	0.67(0.05)	0.74(0.05)	0.79(0.05)
Step time (s)	0.68(0.05)	0.60(0.05)	0.55(0.04)	0.51(0.04)	0.47(0.03)
Stance time (s)	0.92(0.07)	0.79(0.07)	0.71(0.06)	0.65(0.05)	0.60(0.04)

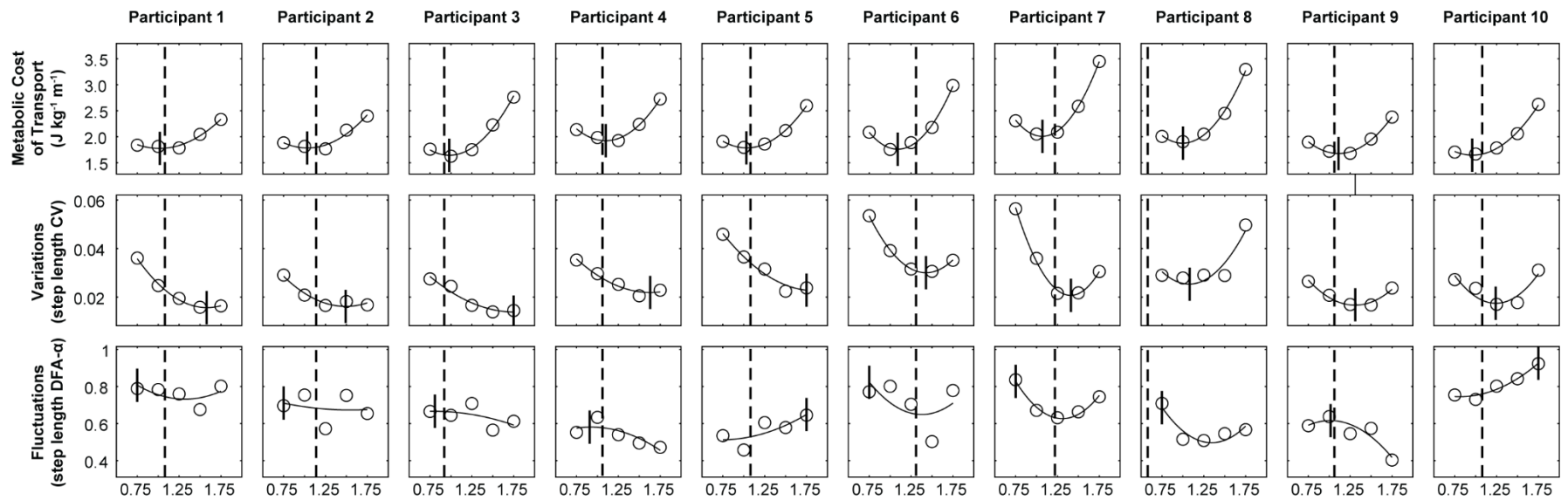


Figure S2. Subject-specific data across speeds. Row 1: Net metabolic cost of transport; solid vertical line denotes estimated minimum. Row 2: Variations (step length CV). Solid vertical line denotes estimated minimum Row 3: Fluctuations (step length DFA- α). Solid vertical line denotes estimated maximum. Dashed vertical line denotes preferred walking speed. CV = Coefficient of Variation; DFA = Detrended Fluctuation Analysis