

Table S1. COT values at each combination of footwear condition and running speed.

Condition	Speed Category	COT [$\text{kJ}\cdot\text{kg}^{-1}\cdot\text{km}^{-1}$, mean $\pm$ SD]	
OWN	slow	4.23	0.34
OWN	medium	4.17	0.28
OWN	fast	4.28	0.26
HOK	slow	4.13	0.25
HOK	medium	4.06	0.23
HOK	fast	4.14	0.23
MIZ	slow	4.13	0.25
MIZ	medium	4.09	0.21
MIZ	fast	4.14	0.23
PUM	slow	4.19	0.26
PUM	medium	4.10	0.26
PUM	fast	4.20	0.25
SAU	slow	4.15	0.31
SAU	medium	4.07	0.25
SAU	fast	4.16	0.25

Table S2. Pairwise comparisons of COT between footwear conditions. Comparisons are based on estimated marginal means and p-values are adjusted based on Tukey's method for comparing a family of 5 estimates.

Contrast	Estimate	SE	DF	t-ratio	p-value
OWN-HOK	0.118	0.024	259	4.976	<.001 ***
OWN-MIZ	0.107	0.024	259	4.536	<.001 ***
OWN-PUM	0.063	0.024	259	2.650	0.065
OWN-SAU	0.098	0.024	259	4.157	<.001 ***
HOK-MIZ	-0.010	0.024	259	-0.445	0.992
HOK-PUM	-0.055	0.024	259	-2.334	0.137
HOK-SAU	-0.020	0.024	259	-0.835	0.919
MIZ-PUM	-0.044	0.024	259	-1.889	0.326
MIZ-SAU	-0.009	0.024	259	-0.391	0.995
PUM-SAU	0.035	0.024	259	1.497	0.565

Note: SE = standard error, DF = degrees of freedom, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Table S3. Pairwise comparisons of COT between speed categories. Comparisons are based on estimated marginal means and p-values are adjusted based on Tukey's method for comparing a family of 3 estimates.

Contrast	Estimate	SE	DF	t-ratio	p-value
slow-medium	0.065	0.018	259	3.519	0.002 **
slow-fast	-0.019	0.018	259	-1.027	0.561
medium-fast	-0.084	0.018	259	-4.594	<.001 ***

Note: SE = standard error, DF = degrees of freedom, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Table S4. MLE values at each combination of footwear condition, running speed and sensor location.

Condition	Speed Category	Sensor Location	MLE [mean±SD]	
OWN	slow	pelvis	0.610	0.103
OWN	slow	forearm	0.430	0.050
OWN	slow	upper trunk	0.371	0.056
OWN	slow	shank	0.761	0.090
OWN	medium	pelvis	0.582	0.077
OWN	medium	forearm	0.415	0.052
OWN	medium	upper trunk	0.357	0.048
OWN	medium	shank	0.735	0.074
OWN	fast	pelvis	0.593	0.090
OWN	fast	forearm	0.405	0.049
OWN	fast	upper trunk	0.351	0.042
OWN	fast	shank	0.750	0.108
HOK	slow	pelvis	0.636	0.100
HOK	slow	forearm	0.426	0.060
HOK	slow	upper trunk	0.375	0.071
HOK	slow	shank	0.793	0.105
HOK	medium	pelvis	0.585	0.057
HOK	medium	forearm	0.406	0.044
HOK	medium	upper trunk	0.352	0.041
HOK	medium	shank	0.753	0.103
HOK	fast	pelvis	0.597	0.083
HOK	fast	forearm	0.412	0.044
HOK	fast	upper trunk	0.363	0.050
HOK	fast	shank	0.777	0.095
MIZ	slow	pelvis	0.620	0.099

MIZ	slow	forearm	0.440	0.060
MIZ	slow	upper trunk	0.368	0.059
MIZ	slow	shank	0.774	0.087
MIZ	medium	pelvis	0.587	0.074
MIZ	medium	forearm	0.412	0.043
MIZ	medium	upper trunk	0.357	0.043
MIZ	medium	shank	0.761	0.094
MIZ	fast	pelvis	0.588	0.108
MIZ	fast	forearm	0.415	0.054
MIZ	fast	upper trunk	0.358	0.040
MIZ	fast	shank	0.772	0.120
PUM	slow	pelvis	0.624	0.101
PUM	slow	forearm	0.424	0.045
PUM	slow	upper trunk	0.373	0.054
PUM	slow	shank	0.752	0.094
PUM	medium	pelvis	0.608	0.056
PUM	medium	forearm	0.423	0.055
PUM	medium	upper trunk	0.361	0.055
PUM	medium	shank	0.757	0.095
PUM	fast	pelvis	0.617	0.097
PUM	fast	forearm	0.415	0.048
PUM	fast	upper trunk	0.361	0.048
PUM	fast	shank	0.776	0.126
SAU	slow	pelvis	0.611	0.083
SAU	slow	forearm	0.421	0.041
SAU	slow	upper trunk	0.355	0.046
SAU	slow	shank	0.757	0.078
SAU	medium	pelvis	0.602	0.070
SAU	medium	forearm	0.420	0.046
SAU	medium	upper trunk	0.364	0.042
SAU	medium	shank	0.766	0.109
SAU	fast	pelvis	0.590	0.106
SAU	fast	forearm	0.413	0.043
SAU	fast	upper trunk	0.363	0.038
SAU	fast	shank	0.762	0.100

Table S5. Pairwise comparisons of MLE between footwear conditions. Comparisons are based on estimated marginal means and p-values are adjusted based on Tukey's method for comparing a family of 5 estimates.

Contrast	Estimate	SE	DF	t-ratio	p-value	Significance
OWN-HOK	-0.010	0.006	1228	-1.669	0.454	
OWN-MIZ	-0.008	0.006	1228	-1.339	0.667	
OWN-PUM	-0.011	0.006	1228	-1.879	0.329	
OWN-SAU	-0.005	0.006	1228	-0.917	0.890	
HOK-MIZ	0.002	0.006	1228	0.330	0.997	
HOK-PUM	-0.001	0.006	1228	-0.211	1.000	
HOK-SAU	0.004	0.006	1228	0.751	0.944	
MIZ-PUM	-0.003	0.006	1228	-0.540	0.983	
MIZ-SAU	0.002	0.006	1228	0.422	0.993	
PUM-SAU	0.006	0.006	1228	0.962	0.872	

Note: SE = standard error, DF = degrees of freedom, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Table S6. Pairwise comparisons of MLE between sensor locations. Comparisons are based on estimated marginal means and p-values are adjusted based on Tukey's method for comparing a family of 4 estimates.

Contrast	Estimate	SE	DF	t-ratio	p-value	
pelvis-forearm	0.185	0.005	1228	35.927	<.001	***
pelvis-upper trunk	0.242	0.005	1228	46.905	<.001	***
pelvis-shank	-0.160	0.005	1228	-31.013	<.001	***
forearm-upper trunk	0.057	0.005	1228	10.978	<.001	***
forearm-shank	-0.345	0.005	1228	-66.941	<.001	***
upper trunk-shank	-0.401	0.005	1228	-77.919	<.001	***

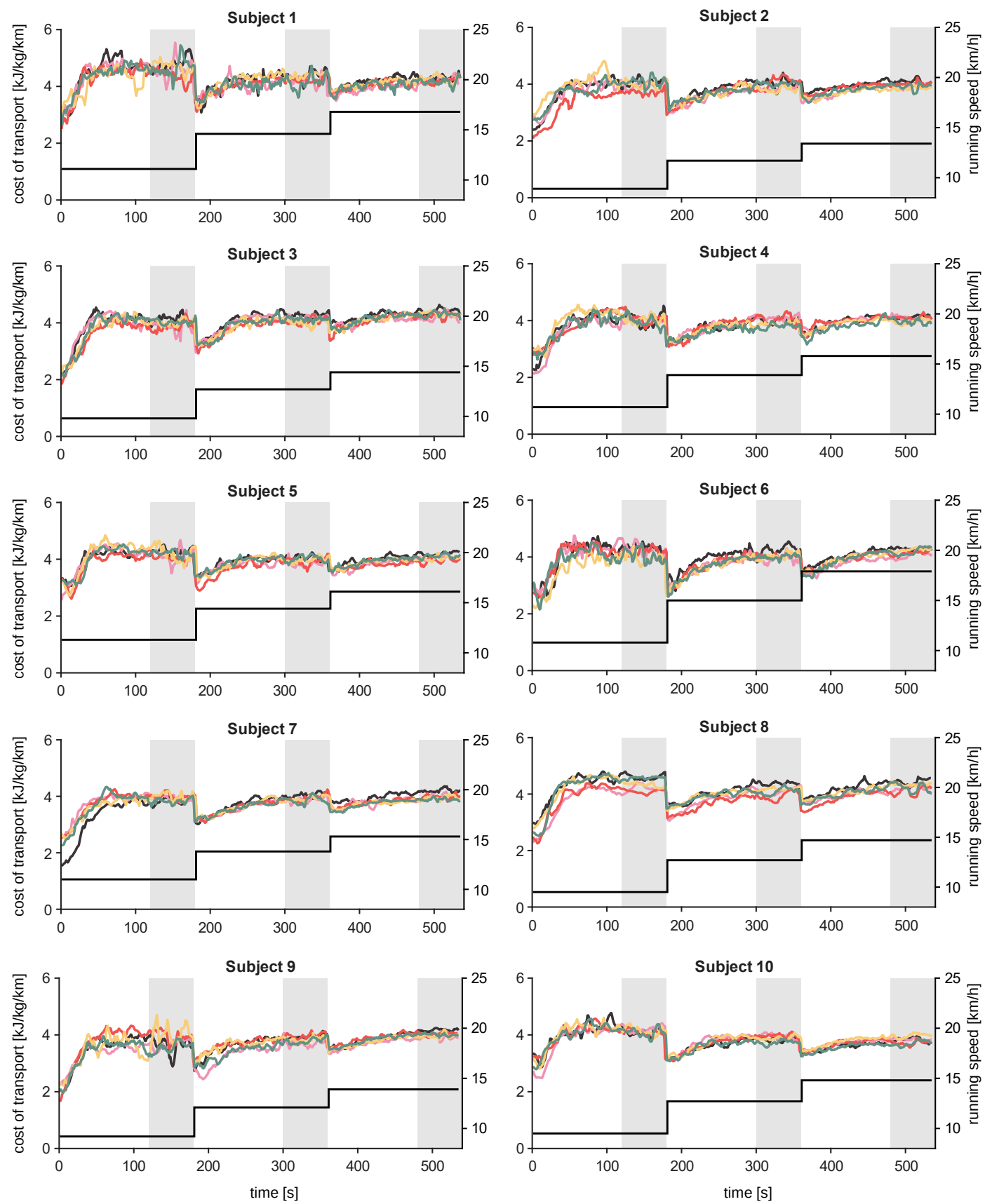
Note: SE = standard error, DF = degrees of freedom, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

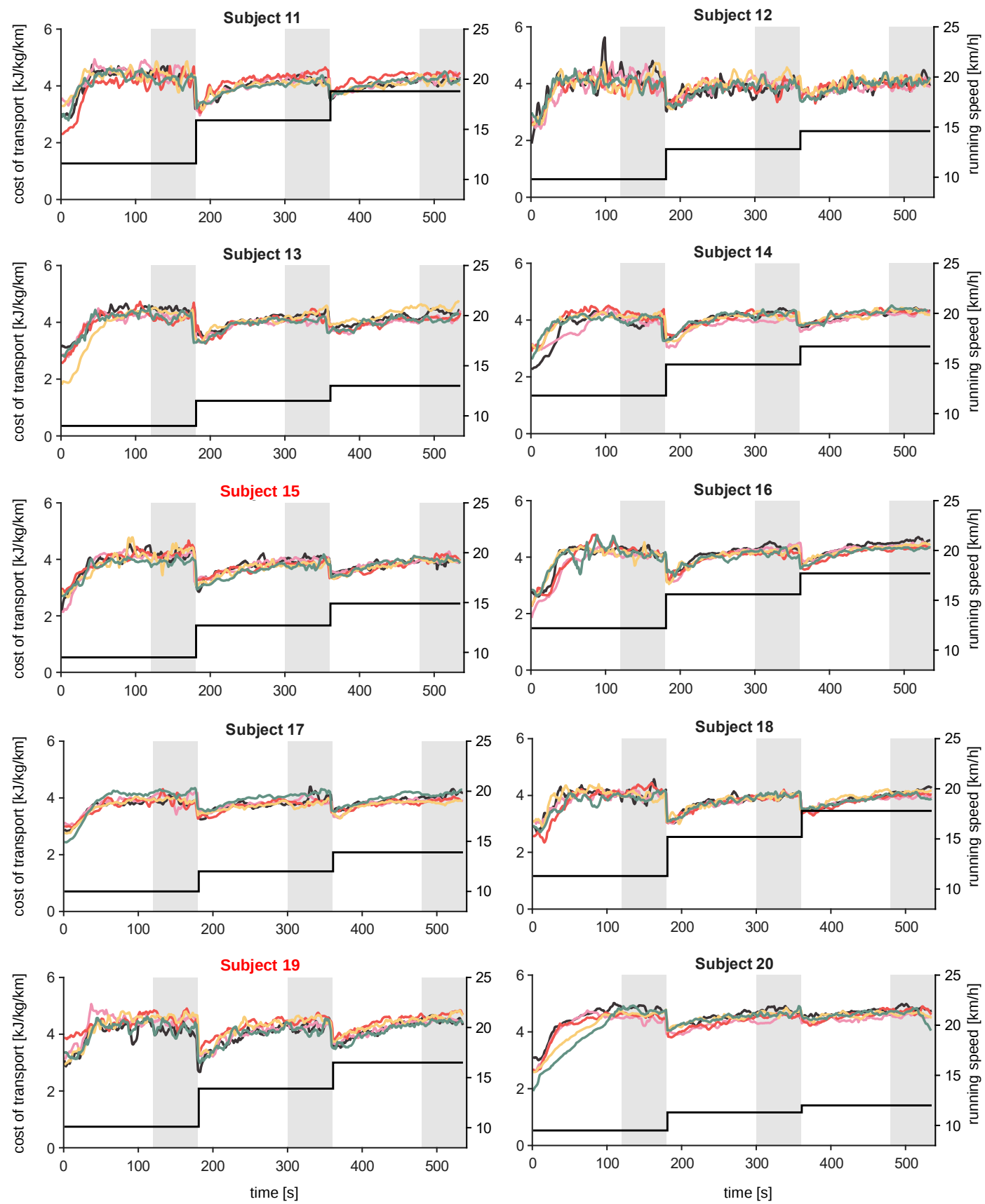
Table S7. Pairwise comparisons of speed trends of MLE between sensor locations. Comparisons are based on estimated marginal means of linear trends and p-values are adjusted based on Tukey's method for comparing a family of 3 estimates.

Contrast	Estimate	SE	DF	t-ratio	p-value	
pelvis-forearm	0.003	0.002	1228	1.344	0.535	
pelvis-upper trunk	0.002	0.002	1228	0.796	0.856	
pelvis-shank	-0.010	0.002	1228	-4.677	<.001	***
forearm-upper trunk	-0.001	0.002	1228	-0.548	0.947	

forearm-shank	-0.012	0.002	1228	-6.021	<.001 ***
upper trunk-shank	-0.011	0.002	1228	-5.473	<.001 ***

Note: SE = standard error, DF = degrees of freedom, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.





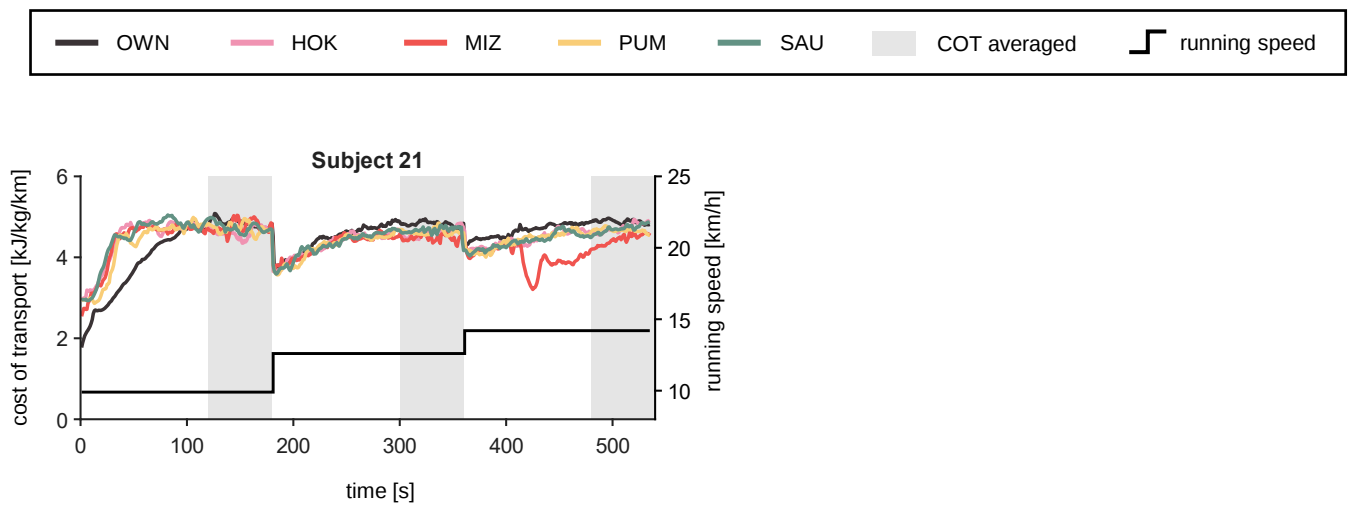


Fig. S1 Continuous cost of transport data from all subjects across all footwear conditions (left y-axis) and running speed (right y-axis). *Note:* Subjects 15 and 19 were removed from cost of transport analysis due to exceeding RER of 1.0 during the fastest running speed