Table S1. Results of statistical tests.

	ANOVA		Preferred v. Low		Preferred v. High		Low v. High	
Response	**Chi-Sq**	**P**	**t-ratio**	**P**	**t-ratio**	**P**	**t-ratio**	**P**
Δz_{arch}	258	<0.0001	5.8	<0.0001	-10.1	<0.0001	-15.9	<0.0001
peak F_{beam1}	144	<0.0001	3.6	0.0006	-8.1	<0.0001	-11.7	<0.0001
peak F_{beam2}	50	<0.0001	0.7	0.49	-5.7	<0.0001	-6.5	<0.0001
$\Delta\theta_{mid}$	228	<0.0001	5.4	<0.0001	-9.6	<0.0001	-14.9	<0.0001
peak M_{mid}[a]	43	<0.0001	2.2	0.04	-4.3	0.0002	-6.4	<0.0001
FSA[b]	8.3	0.016	244	0.19	325	0.001	221	0.46
$k_{beam1,load}$[a,c]	9.7	0.008	-1.1	0.26	1.9	0.12	3.1	0.010
$k_{beam1,unload}$[a]	68.6	<0.0001	-2.3	0.028	5.7	<0.0001	8.1	<0.0001
$k_{beam2,load}$[a,e]	11.8	0.003	-2.4	0.038	0.9	0.37	3.3	0.006
$k_{beam2,unload}$[a]	86.7	<0.0001	-3.3	0.002	5.8	<0.0001	9.2	<0.0001
$k_{mid,load}$[a,c]	12.7	0.002	-0.54	0.59	2.8	0.016	3.4	0.004
$k_{mid,unload}$[a]	101	<0.0001	-2.3	0.028	5.7	<0.0001	8.1	<0.0001
$k_{leg,load}$[a]	101.0	<0.0001	-7.2	<0.0001	2.4	0.021	9.6	<0.0001
$k_{leg,unload}$[a,d]	68.6	<0.0001	-2.3	0.028	5.7	<0.0001	8.1	<0.0001
$k_{ankle,load}$[a,c]	81.6	<0.0001	-4.9	<0.0001	4.0	0.0002	9.0	<0.0001
$k_{ankle,unload}$[a,d]	582.6	<0.0001	-7.7	<0.0001	15.7	<0.0001	23.8	<0.0001
$k_{knee,load}$[a,d]	40.7	<0.0001	-3.3	0.003	3.0	0.004	6.4	<0.0001
$k_{knee,unload}$[a,f]	30.2	<0.0001	-3.4	0.003	2.0	0.052	5.7	<0.0001

Except where noted otherwise, omnibus tests were Type 3 ANOVAs conducted on model variance from linear mixed models where participant identity was set as a random variable. Except where noted otherwise, post-hoc tests were pairwise comparisons, with the P-value

corrected using a Holm-Bonferroni correction. The sample size for all tests is N=27 participants, except where noted otherwise. FSA was included as a covariate in all tests of quasi-stiffness (*k*) variables.

[a] Variable log-transformed to achieve normality for parametric statistical tests.

[b] Variable could not be made normal by transformation, so non-parametric tests used. Friedman's test used as omnibus test, and Wilcoxon signed-rank tests used as post-hoc paired tests (statistic for these tests is W rather than t-ratio).

[c] FSA had a significant, positive association with the variable.

[d] FSA had a significant, negative association with the variable.

[e] Had to remove three subjects (S04, S13, S31), each of whom exhibited outlier values.

[f] Had to remove three subjects (S02, S06, S10, S15), each of whom exhibited outlier values.

Table S2

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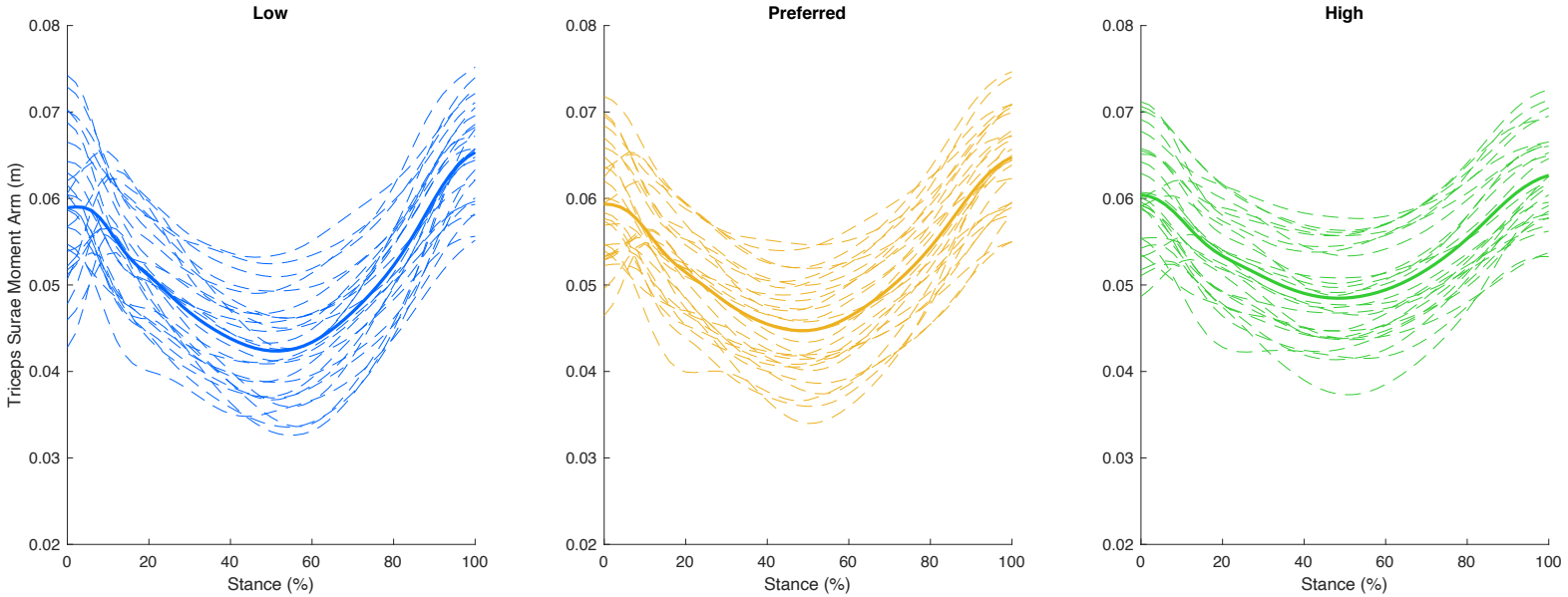

Fig. S1. Average triceps surae moment arm values across stance phase among different running frequency conditions. Dashed lines represent averages from all steps for individual participants, and solid lines indicate average of all participants.

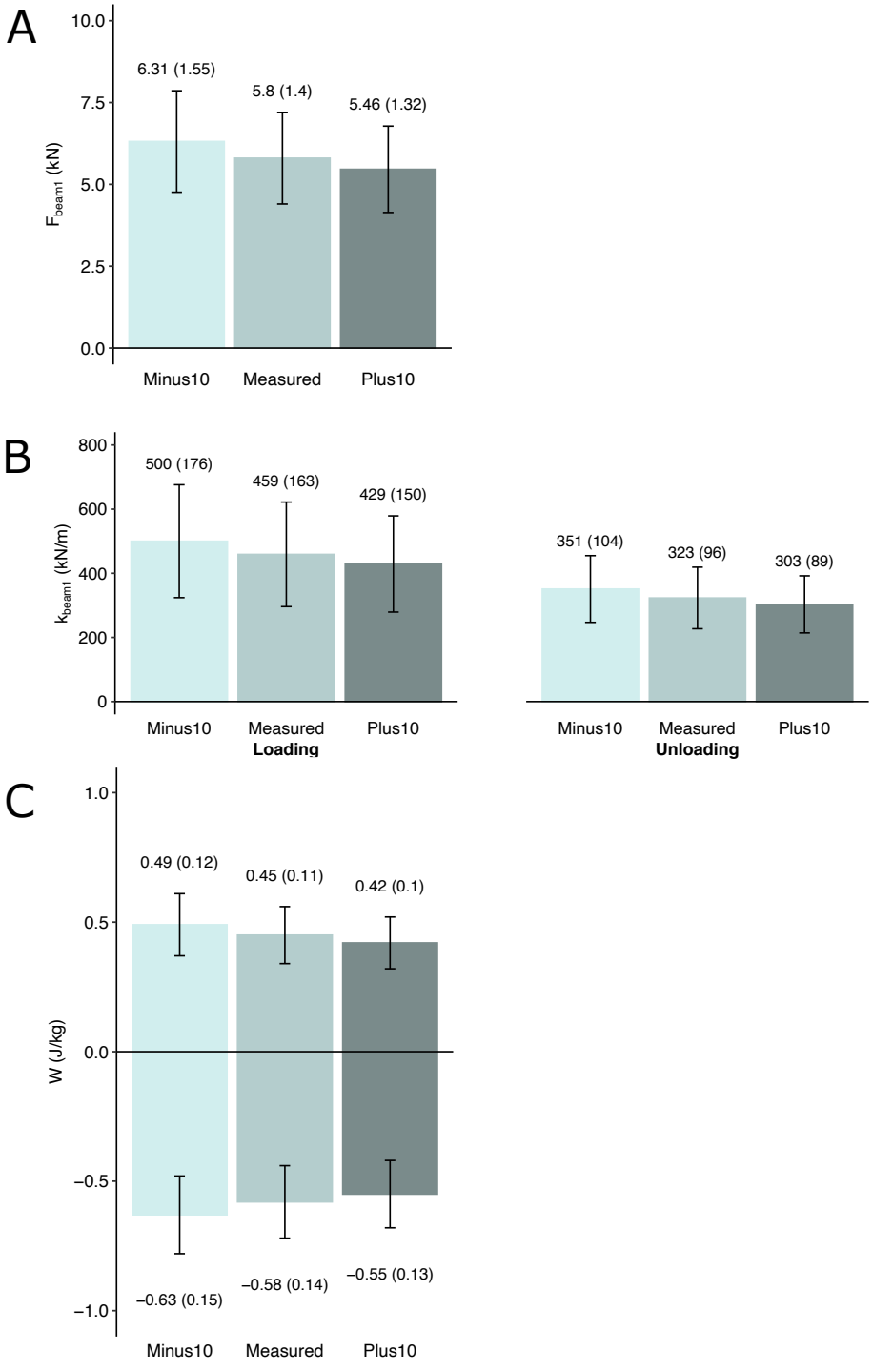

Fig. S2. Effects of adjusting triceps surae moment arm length by -10% ('Minus10') and +10% ('Plus10'), relative to the actual distance measured ('Measured'). Bars represent average values calculated from all participants (N=27) during preferred frequency runs, and error

bars represent ± one standard deviation. Numbers above/below bars indicate *mean* (*s.d.*). (A) Beam1 bending force (F_{beam1}) differs by 16% on average between ±10% moment arm length values. (B) Beam1 stiffness (k_{beam1}) differs by 17% and 16% during the 'loading' and 'unloading' periods of stance, respectively, between ±10% moment arm length values. (C) Beam1 positive and negative work (W_{beam1}) values differ by 15% and 14%, respectively, between ±10% moment arm length values.

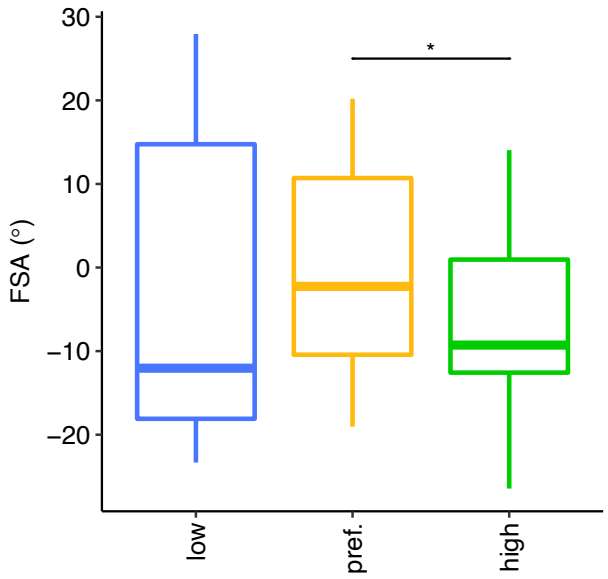

Figure S3. Average foot strike angle (FSA) among frequency conditions (N=27). Values above 0 represent rearfoot strikes, and values below 0 represent forefoot strikes. Asterisk denotes significant difference among running conditions.