

Supplementary Table S1. Changes in body composition by sex following 12 weeks of eccentric training

Variable	Unit	Men Pre	Men Post	Women Pre	Women Post	p (time)	p (sex)	p (time × sex)
Body weight	kg	69.40 ± 10.23	69.51 ± 9.83	58.03 ± 7.46	58.58 ± 7.88	0.105	0.001	0.452
Body mass index	kg/m ²	24.78 ± 3.14	24.85 ± 3.02	24.37 ± 2.77	24.62 ± 2.81	0.069	0.763	0.454
Waist-to-hip ratio		0.929 ± 0.061	0.920 ± 0.041	0.869 ± 0.172	0.879 ± 0.057	0.860	0.147	0.702
Thigh girth	cm	46.53 ± 2.84	47.55 ± 2.28	45.18 ± 5.10	47.02 ± 3.97	0.013	0.497	0.558
Calf girth	cm	36.35 ± 1.92	37.04 ± 1.80	33.73 ± 2.49	34.23 ± 2.12	0.030	0.001	0.725
Skeletal muscle mass	kg	27.55 ± 3.19	27.72 ± 2.78	19.42 ± 1.90	19.72 ± 1.89	0.017	<0.001	0.594
Body fat	%	27.19 ± 5.99	27.01 ± 6.42	36.47 ± 5.73	36.07 ± 5.94	0.276	<0.001	0.755
Appendicular skeletal muscle mass	kg	21.87 ± 2.66	21.90 ± 2.27	14.62 ± 1.46	14.67 ± 1.61	0.566	<0.001	0.951
Skeletal muscle index	kg/m ²	7.80 ± 0.68	7.83 ± 0.61	6.14 ± 0.45	6.17 ± 0.48	0.390	<0.001	0.954

Values are mean ± SD. Men, n = 8–10; women, n = 18–26, depending on the variable, because of occasional missing observations. p (time) is the main effect of time reported in the main text; p (sex) and p (time × sex) are the between-subject main effect of sex and the time-by-sex interaction from a 2 (time) × 2 (sex) mixed-model analysis of variance. These analyses were not prespecified and are reported as exploratory.

Supplementary Table S2. Changes in physical function by sex following 12 weeks of eccentric training

Variable	Unit	Men Pre	Men Post	Women Pre	Women Post	p (time)	p (sex)	p (time × sex)
Grip strength	kg	34.90 ± 5.24	35.76 ± 4.39	21.80 ± 3.95	22.25 ± 3.35	0.233	<0.001	0.692
Gait speed	m/s	1.04 ± 0.18	1.17 ± 0.20	1.09 ± 0.20	1.11 ± 0.21	0.137	0.914	0.123
5-times sit-to-stand	s	9.84 ± 2.57	9.31 ± 1.85	10.06 ± 2.13	9.42 ± 1.93	0.080	0.814	0.882
Timed up-and-go	s	7.67 ± 1.11	6.82 ± 0.97	7.66 ± 0.74	7.08 ± 0.62	0.001	0.653	0.522
Stair-climb	s	4.92 ± 1.40	4.58 ± 0.99	4.78 ± 0.71	4.61 ± 0.53	0.020	0.865	0.369

Values are mean ± SD. Men, n = 8–10; women, n = 18–26, depending on the variable, because of occasional missing observations. p (time) is the main effect of time reported in the main text; p (sex) and p (time × sex) are the between-subject main effect of sex and the time-by-sex interaction from a 2 (time) × 2 (sex) mixed-model analysis of variance. These analyses were not prespecified and are reported as exploratory.

Supplementary Table S3. Changes in muscle strength by sex following 12 weeks of eccentric training

Variable	Unit	Men Pre	Men Post	Women Pre	Women Post	p (time)	p (sex)	p (time × sex)
Isometric extensor	%BW	175.1 ± 45.8	196.3 ± 51.4	127.0 ± 42.8	148.3 ± 58.7	0.006	0.008	0.995
Isometric flexor	%BW	64.23 ± 20.27	75.29 ± 19.56	53.53 ± 11.66	56.30 ± 14.61	0.050	0.005	0.139
Isokinetic extensor (60°/s)	%BW	143.5 ± 21.2	155.1 ± 44.7	103.6 ± 24.2	115.1 ± 26.4	0.016	<0.001	0.990
Isokinetic flexor (60°/s)	%BW	65.08 ± 17.35	73.84 ± 17.85	60.42 ± 25.04	65.49 ± 19.24	0.098	0.298	0.714
Eccentric strength	N·m	120.8 ± 23.7	122.3 ± 23.3	83.22 ± 28.25	98.96 ± 28.06	0.002	0.003	0.070

Values are mean ± SD. Men, n = 8–10; women, n = 18–26, depending on the variable, because of occasional missing observations. p (time) is the main effect of time reported in the main text; p (sex) and p (time × sex) are the between-subject main effect of sex and the time-by-sex interaction from a 2 (time) × 2 (sex) mixed-model analysis of variance. These analyses were not prespecified and are reported as exploratory. All strength values are normalized to body weight (%BW) except eccentric strength.

Supplementary Table S4. Changes in single muscle fiber contractile properties by sex following 12 weeks of eccentric training

Variable	Unit	Men Pre	Men Post	Women Pre	Women Post	p (time)†	p (sex)	p (time × sex)
Cross-sectional area — type I	μm ²	5594 ± 1326	5659 ± 1300	5035 ± 648	5103 ± 741	0.556	0.164	0.991
Maximal force — type I	mN	0.548 ± 0.154	0.610 ± 0.232	0.510 ± 0.101	0.540 ± 0.116	0.008	0.381	0.299
Specific force — type I	kN/m ²	98.32 ± 14.99	111.7 ± 22.3	103.6 ± 18.6	109.8 ± 21.6	0.013	0.841	0.298
Shortening velocity — type I	FL/s	0.763 ± 0.333	1.06 ± 0.67	0.590 ± 0.149	0.691 ± 0.230	0.017	0.047	0.153
Reference isometric force — type I	mN	0.519 ± 0.083	0.436 ± 0.006	0.471 ± 0.072	0.500 ± 0.164	0.918	0.887	0.485
Reference isometric specific force — type I		93.73 ± 4.24	80.82 ± 2.31	94.65 ± 10.43	103.6 ± 44.8	0.744	0.496	0.550
Absolute RFE — type I	mN	0.016 ± 0.021	0.016 ± 0.006	0.013 ± 0.012	0.016 ± 0.012	0.608	0.794	0.844
Relative RFE — type I	%	2.23 ± 5.29	3.59 ± 2.32	2.65 ± 2.58	4.13 ± 3.68	0.338	0.794	0.978
Cross-sectional area — type IIa	μm ²	5702 ± 763	5431 ± 744	3896 ± 764	3953 ± 1132	0.836	<0.001	0.583
Maximal force — type IIa	mN	0.642 ± 0.144	0.624 ± 0.100	0.427 ± 0.100	0.485 ± 0.119	0.341	<0.001	0.272
Specific force — type IIa	kN/m ²	112.4 ± 17.9	118.6 ± 16.2	111.6 ± 13.5	127.1 ± 19.7	0.006	0.579	0.283
Shortening velocity — type IIa	FL/s	1.70 ± 0.51	1.70 ± 0.31	1.82 ± 0.32	1.97 ± 0.77	0.528	0.321	0.669
Reference isometric force — type IIa	mN	0.648 ± 0.000	0.516 ± 0.077	0.405 ± 0.157	0.340 ± 0.030	0.182	0.024	0.632
Reference isometric specific force — type IIa		92.52 ± 15.35	76.91 ± 13.46	99.30 ± 13.41	76.24 ± 10.30	0.007	0.766	0.519
Absolute RFE — type IIa	mN	0.037 ± 0.021	0.034 ± 0.014	0.008 ± 0.025	0.011 ± 0.002	0.910	0.092	0.763
Relative RFE — type IIa	%	5.19 ± 4.13	7.51 ± 2.70	-0.314 ± 9.304	3.26 ± 0.65	0.362	0.246	0.875

Values are mean ± SD. Because sex varies between participants rather than between fibers, single-fiber values were first averaged within each participant and fiber type, and the participant mean was used as the unit of analysis. Active contractile properties: men, n = 7; women, n = 13–17. Residual force enhancement: men, n = 2; women, n = 4–8. †p (time) is therefore computed at the participant level and differs from the fiber-level values reported in Table 3 and Fig. 3 of the main text, where all individual fibers were analysed. p (sex) and p (time × sex) are from a 2 (time) × 2 (sex) mixed-model analysis of variance. These analyses were not prespecified and are reported as exploratory.