Supplementary statistical analyses: 20 m MSRT retrospective reanalysis

All analyses were based on individual records (n = 577). Summary rows (means, minima and maxima) present in the source database were excluded.

Table S1a. Pairwise comparisons of HRpeak between cohorts (two-sided Mann–Whitney U tests with Holm adjustment).

Group 1	Group 2	Unadjusted p	Holm-adjusted p	Rank-biserial r
Children	Adolescents	0.0490	0.0980	0.151
Children	University students	0.0022	0.0067	0.256
Children	Athletes	<0.0001	<0.0001	0.534
Adolescents	University students	0.1466	0.1466	0.083
Adolescents	Athletes	<0.0001	<0.0001	0.409
University students	Athletes	0.0002	0.0008	0.365

Table S1b. Pairwise comparisons of 20 m MSRT distance between cohorts (two-sided Mann–Whitney U tests with Holm adjustment).

Group 1	Group 2	Unadjusted p	Holm-adjusted p	Rank-biserial r
Children	Adolescents	<0.0001	<0.0001	−0.554
Children	University students	<0.0001	<0.0001	−0.619
Children	Athletes	<0.0001	<0.0001	−0.847
Adolescents	University students	0.0891	0.0891	−0.097
Adolescents	Athletes	<0.0001	<0.0001	−0.599
University students	Athletes	<0.0001	<0.0001	−0.514

Table S2. Within-cohort Spearman correlations of HRpeak, BMI, BF%, absolute TBW and TBW% with distance and HRpeak (Benjamini–Hochberg-adjusted q values, 36 tests).

Cohort	Variable	Outcome	Spearman ϱ	FDR q
Children	HRpeak	Distance	0.155	0.2719
Children	BMI	Distance	−0.408	0.0016
Children	BMI	HRpeak	0.121	0.3518
Children	BF%	Distance	−0.653	<0.0001
Children	BF%	HRpeak	0.166	0.2398
Children	TBW (kg)	Distance	0.336	0.0094
Children	TBW (kg)	HRpeak	0.017	0.8928
Children	TBW%	Distance	0.649	<0.0001
Children	TBW%	HRpeak	−0.167	0.2398

Adolescents	HRpeak	Distance	0.165	0.0092
Adolescents	BMI	Distance	−0.162	0.0094
Adolescents	BMI	HRpeak	−0.118	0.0608
Adolescents	BF%	Distance	−0.276	<0.0001
Adolescents	BF%	HRpeak	−0.067	0.3143
Adolescents	TBW (kg)	Distance	−0.057	0.3518
Adolescents	TBW (kg)	HRpeak	−0.146	0.0198
Adolescents	TBW%	Distance	0.289	<0.0001
Adolescents	TBW%	HRpeak	0.060	0.3405
University students	HRpeak	Distance	−0.022	0.8131
University students	BMI	Distance	−0.308	0.0003
University students	BMI	HRpeak	0.062	0.4686
University students	BF%	Distance	−0.374	<0.0001
University students	BF%	HRpeak	0.088	0.3384
University students	TBW (kg)	Distance	−0.231	0.0093
University students	TBW (kg)	HRpeak	0.115	0.2340
University students	TBW%	Distance	0.375	<0.0001
University students	TBW%	HRpeak	−0.087	0.3384
Athletes	HRpeak	Distance	0.448	0.0056
Athletes	BMI	Distance	−0.649	<0.0001
Athletes	BMI	HRpeak	−0.361	0.0244
Athletes	BF%	Distance	−0.714	<0.0001
Athletes	BF%	HRpeak	−0.373	0.0211
Athletes	TBW (kg)	Distance	−0.478	0.0027
Athletes	TBW (kg)	HRpeak	−0.417	0.0094
Athletes	TBW%	Distance	0.714	<0.0001
Athletes	TBW%	HRpeak	0.370	0.0213

Table S3. Multivariable linear regression models for 20 m MSRT distance (HC3 heteroskedasticity-robust standard errors).

Model 1. Primary model (n = 577, R^2 = 0.361).
Predictors: age, BMI, BF% and cohort (reference category: adolescents).

Predictor	B	HC3 SE	95% CI	p
Intercept	1281.57	221.05	[848.33, 1714.82]	<0.0001
Cohort: athletes	483.15	104.43	[278.47, 687.84]	<0.0001
Cohort: children	−206.63	73.29	[−350.27, −62.98]	0.0048
Cohort: university students	125.23	58.84	[9.90, 240.56]	0.0333
Age	16.96	10.51	[−3.64, 37.56]	0.1066
BMI	17.67	9.86	[−1.64, 36.99]	0.0729
BF%	−41.27	5.26	[−51.57, −30.97]	<0.0001

Model 2. Sensitivity analysis excluding distances below 400 m (n = 571, R^2 = 0.384).
Predictors: age, BMI, BF% and cohort (reference category: adolescents).

Predictor	B	HC3 SE	95% CI	p
Intercept	1257.68	213.34	[839.55, 1675.82]	<0.0001
Cohort: athletes	536.05	95.63	[348.61, 723.49]	<0.0001
Cohort: children	−187.48	72.12	[−328.82, −46.13]	0.0093
Cohort: university students	154.59	55.69	[45.44, 263.74]	0.0055
Age	14.44	10.46	[−6.06, 34.94]	0.1673
BMI	21.89	9.20	[3.86, 39.93]	0.0174
BF%	−43.40	5.05	[−53.31, −33.49]	<0.0001

Model 3. Model without BMI (n = 577, R^2 = 0.357).
Predictors: age, BF% and cohort (reference category: adolescents).

Predictor	B	HC3 SE	95% CI	p
Intercept	1519.92	187.35	[1152.73, 1887.12]	<0.0001
Cohort: athletes	483.24	103.06	[281.24, 685.24]	<0.0001
Cohort: children	−257.91	69.23	[−393.61, −122.21]	0.0002
Cohort:	123.32	59.55	[6.61, 240.03]	0.0384

university students				
Age	19.57	10.57	[−1.14, 40.29]	0.0641
BF%	−32.68	2.57	[−37.72, −27.64]	<0.0001

Model 4. TBW% in place of BF% (n = 577, R^2 = 0.323).
Predictors: age, BMI, TBW% and cohort (reference category: adolescents).

Predictor	B	HC3 SE	95% CI	p
Intercept	316.98	1876.45	[−3360.79, 3994.76]	0.8659
Cohort: athletes	460.61	105.29	[254.24, 666.97]	<0.0001
Cohort: children	−348.62	111.70	[−567.54, −129.70]	0.0018
Cohort: university students	100.59	62.26	[−21.44, 222.62]	0.1062
Age	22.30	11.85	[−0.92, 45.53]	0.0598
BMI	−22.97	25.07	[−72.11, 26.17]	0.3596
TBW%	19.64	21.45	[−22.40, 61.67]	0.3599

Model 5. Sensitivity analysis excluding HRpeak below 85% of age-predicted maximum (n = 565, R^2 = 0.356).
Predictors: age, BMI, BF% and cohort (reference category: adolescents).

Predictor	B	HC3 SE	95% CI	p
Intercept	1308.93	222.91	[872.04, 1745.83]	<0.0001
Cohort: athletes	494.67	104.19	[290.46, 698.88]	<0.0001
Cohort: children	−201.12	73.73	[−345.63, −56.62]	0.0064
Cohort: university students	132.73	58.67	[17.73, 247.73]	0.0237
Age	16.01	10.47	[−4.51, 36.54]	0.1262
BMI	16.38	9.94	[−3.11, 35.86]	0.0995
BF%	−40.24	5.29	[−50.62, −29.87]	<0.0001

Notes on data verification.
Two university students had a recorded distance of 20 m and one handball player had a recorded distance of 190 m. At least five adolescents had a recorded HRpeak of 130 bpm. These values could not be verified against the original test forms or heart rate recordings.

The 400 m threshold applied in the sensitivity analysis excluded three children, the two university students and the athlete mentioned above. This exclusion served only as a sensitivity analysis and does not imply that these records are erroneous. The HRpeak screening based on age-predicted maximal heart rate was likewise exploratory.