

Relationship Between Anthropometric Variables And 5000 M Performance Among Women College Runners

Ramu Mecha¹, Bupesh S. Moorthy²

¹Physical Director, Department of Physical Education, MJPTBCWR School and Junior College, Bhadrachalam, Telangana, India

²Associate Professor, Department of Physical Education, Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu, India

Abstract—Anthropometric characteristics are widely considered determinants of distance-running performance, but evidence in women college runners from the Indian context is limited, and many studies do not separate body composition from training exposure. This study examined the relationship between selected anthropometric variables (height, body mass, body fat percentage and leg length) and 5000 m performance in women college runners, and determined whether these relationships persist after controlling for age, training age and weekly running volume. Fifty women college runners (age 19.84 ± 1.36 years, mean $\pm$ standard deviation) completed a 5000 m time trial. Height, body mass, body fat percentage and leg length were measured; training age and weekly mileage were recorded. Pearson and Spearman correlations, partial correlations, multiple and hierarchical regression, and one-way analysis of variance (ANOVA) across body fat tertiles were used, with the significance level set at $\alpha = .05$. Mean 5000 m time was 1231.48 ± 96.41 s (20:31). Body fat percentage showed the strongest association with 5000 m time (Pearson correlation coefficient $r = .990$, 95% confidence interval [.982, .994]), followed by height ($r = -.971$), body mass ($r = -.965$) and leg length ($r = -.962$). After controlling for age, training age and weekly mileage, body fat (partial correlation $r = .763$, probability value $p < .001$), body mass (partial $r = -.509$, $p < .001$) and height (partial $r = -.417$, $p = .004$) remained significant; leg length did not (partial $r = -.191$, $p = .198$). Body fat and body mass together explained 98.7% of the variance in 5000 m time (adjusted coefficient of determination $R^2 = .986$, standard error of the estimate SEE = 11.38 s). Body fat added 1.8% explained variance beyond training variables (change in R^2 , $\Delta R^2 = .018$, $p < .001$). Runners in the lowest body fat tertile were on average 212 s faster than those in the highest tertile (ANOVA $F(2, 47) = 137.90$, $p < .001$, effect size $\eta^2 = .854$). In this sample, lower body fat percentage and higher body mass for a given fat level were associated with faster

5000 m performance, independent of training exposure. Strong collinearity among height, body mass and leg length limits interpretation of their individual effects. Findings are correlational and should be confirmed in larger, multi-site samples.

Index Terms—5000 m, anthropometry, body composition, college athletes, distance running, women athletes.

I. INTRODUCTION

Middle- and long-distance running performance reflects the interaction of physiological, biomechanical, psychological and morphological factors. Among these, anthropometric characteristics are attractive for coaches and sport scientists because they are inexpensive to measure, non-invasive and can be assessed during talent identification and routine monitoring [1], [2]. Height, body mass, body composition and segment lengths are related to the energy cost of running [3].

A consistent finding in the distance-running literature is that elite runners tend to be lean, with low relative body fat and low body mass for a given stature [2], [4]. Higher adiposity has been associated with slower running performance across runners of different standards [1], [5], [6]. Evidence for stature and segment length is less clear: the absolute energy cost of running correlates positively with most absolute anthropometric dimensions, whereas relative slenderness is associated with a lower cost [3].

Two gaps limit the application of existing evidence. First, most anthropometric studies of runners focus on men or on elite international samples, and data from women college runners remain limited. Earlier work

in young female distance runners found that 5000 m time was best accounted for by oxygen uptake at the lactate threshold, fat-free weight and a haematological variable [7]. Second, anthropometric variables rarely vary independently of training. More experienced athletes usually train at higher weekly volumes and are leaner [4], [8], so a simple correlation between body fat and race time may partly reflect training exposure. Studies that statistically separate these influences are uncommon.

The purpose of this study was therefore to (a) describe the anthropometric and training profile of women college runners, (b) quantify the relationship between selected anthropometric variables and 5000 m performance, and (c) test whether these relationships persist after controlling for age, training age and weekly running volume. It was hypothesised that lower body fat percentage and greater height, body mass and leg length would be associated with faster 5000 m times, and that body fat would remain a significant predictor after adjustment for training variables.

II. METHODS

A. Study Design and Participants

A cross-sectional correlational design was used. Fifty women college runners (age range 18–22 years) were recruited from Annamalai University using purposive sampling. Inclusion criteria were: female collegiate athlete aged 18–25 years; at least 2 years of continuous distance-running training; weekly running volume of at least 35 km over the preceding 6–8 weeks; regular participation in college distance-training sessions; and signed informed consent. Exclusion criteria were: acute lower-limb or spinal musculoskeletal injury in the previous 3 months; known cardiovascular, respiratory or metabolic conditions contraindicating maximal exertion; use of supplements or medication affecting body composition or cardiovascular function; and failure to complete the body-measurement session or the 5000 m trial. The final sample comprised 10, 12, 12, 8 and 8 participants aged 18, 19, 20, 21 and 22 years respectively. Training age ranged from 2.0 to 7.0 years and weekly running volume from 35 to 75 km.

Formal ethics committee approval was not required for this study, which involved non-invasive measurements and a routine 5000 m time trial in

women athletes of Annamalai University. The study was conducted in accordance with the Declaration of Helsinki. All participants gave written informed consent before testing.

B. Anthropometric Measurements

All anthropometric measurements were taken on the morning of the trial, before any physical activity, by one qualified anthropometrist following standardised procedures of the International Society for the Advancement of Kinanthropometry (ISAK). Height (cm) was measured barefoot with a stadiometer (Seca 213 or equivalent; precision 0.1 cm), with the head in the Frankfort horizontal plane and the reading taken at peak inhalation. Body mass (kg) was measured with a calibrated digital scale (precision 0.1 kg) in light athletic clothing, barefoot and after voiding. Leg length (cm) was measured on the right side with an anthropometer or rigid steel tape (precision 0.1 cm) from the anterior superior iliac spine to the inferior edge of the medial malleolus, with the athlete standing erect and feet hip-width apart.

Body fat percentage was estimated from skinfold thickness measured on the right side with a Harpenden caliper (constant pressure $10 \text{ g}\cdot\text{mm}^{-2}$, precision 0.2 mm) at the triceps (posterior midline of the upper arm, midway between acromion and olecranon), suprailiac (oblique fold above the iliac crest along the anterior axillary line) and thigh (anterior midline, midway between the inguinal crease and the upper border of the patella), following the Jackson–Pollock three-site protocol for women. Two to three readings were taken at each site in rotation; a third reading was taken when the first two differed by more than 5%, and the mean of the closest readings was used. Body density (BD) was calculated with the equation of Jackson, Pollock and Ward [9], where ΣSK is the sum of the three skinfolds in mm, and converted to body fat percentage with the Siri equation [10]:

$$BD = 1.0994921 - 0.0009929 \Sigma SK + 0.0000023 (\Sigma SK)^2 - 0.0001392 \text{ Age} \quad (1)$$

$$\%BF = (4.95 / BD - 4.50) \times 100 \quad (2)$$

Training age (years of structured distance training) and average weekly running volume over the preceding 6–8 weeks (km) were collected with a structured, researcher-administered questionnaire during the initial screening interview. To limit recall bias, self-reported volumes were cross-checked against

participants' digital training logs (e.g., Strava, Garmin Connect) or training journals, or confirmed with their head coaches, before inclusion. Body mass index (BMI) was derived from height and body mass for descriptive purposes.

C. 5000 m Performance Test

Each participant completed a 5000 m time trial on a standard 400 m synthetic polyurethane track after a 20-minute standardised warm-up (10 min light jogging, 5 min dynamic stretching, 3 × 60 m progressive strides and 5 min rest). Time was recorded by two independent timekeepers using handheld electronic stopwatches (accuracy 0.01 s); the final time was the mean of the two and is analysed in whole seconds. A lap board displayed the remaining laps (12.5 in total) and splits were recorded every 400 m. Participants were instructed to complete the distance as fast as possible. Testing took place between 06:30 and 08:30 under planned conditions of 18–24 °C, relative humidity below 70% and wind below 2.0 m·s⁻¹, and conditions were recorded for each trial. Forty-eight trials were completed under standard conditions; one trial was run in mild wind and one under higher humidity. Both were retained in the analysis.

D. Statistical Analysis

Data were analysed with Python 3.12 (SciPy, statsmodels and pingouin libraries). Descriptive statistics (mean, standard deviation [SD], minimum, maximum) were calculated for all variables. Normality was assessed using the Shapiro–Wilk test, skewness and kurtosis. Because 5000 m time departed from normality (Shapiro–Wilk $p = .025$), Spearman rank correlations were computed alongside Pearson coefficients; the two gave the same pattern and Pearson values are reported with 95% confidence intervals (CIs) based on the Fisher z transformation. Partial correlations between each anthropometric variable and 5000 m time were computed controlling for age, training age and weekly mileage.

Multiple linear regression was used to model 5000 m time from the four anthropometric variables. Multicollinearity was evaluated using variance inflation factors (VIF), with values above 10 considered problematic. A reduced model (body fat and body mass) was then fitted. Hierarchical

regression tested the incremental contribution of body fat and of the remaining anthropometric variables beyond training variables (Model 1: age, training age, weekly mileage; Model 2: + body fat; Model 3: + body mass, height, leg length). Residual normality (Shapiro–Wilk), homoscedasticity (Breusch–Pagan) and influence (Cook's distance) were checked. Finally, participants were divided into body fat tertiles and compared with one-way analysis of variance (ANOVA), with effect size reported as η^2 . Statistical significance was set at $\alpha = .05$.

III. RESULTS

A. Descriptive Statistics

Descriptive statistics are presented in Table I. Mean 5000 m time was 1231.48 ± 96.41 s (20:31), ranging from 1082 s (18:02) to 1430 s (23:50). Mean BMI was 18.90 ± 0.20 kg·m⁻² (range 18.6–19.9). 5000 m time showed mild positive skew (0.48) and negative kurtosis (−0.82).

TABLE I DESCRIPTIVE STATISTICS OF PARTICIPANTS
($N = 50$)

Variable	Min	Max	Mean	SD
Age (years)	18.0	22.0	19.84	1.36
Training age (years)	2.0	7.0	4.12	1.36
Weekly mileage (km)	35.0	75.0	53.68	10.99
Height (cm)	152.5	174.0	163.16	5.55
Body mass (kg)	43.5	57.2	50.38	3.42
Body fat (%)	12.8	21.0	16.26	2.03
Leg length (cm)	75.8	91.0	82.74	3.84
5000 m time (s)	1082	1430	1231.48	96.41

B. Bivariate Relationships

All anthropometric variables correlated significantly with 5000 m time (all $p < .001$; Table II). Body fat percentage showed a very strong positive association with time (higher fat, slower performance), while height, body mass and leg length showed very strong negative associations (larger values, faster performance). Weekly mileage ($r = -.983$), training age ($r = -.960$) and age ($r = -.923$) also correlated strongly with time. Spearman coefficients were consistent (body fat $\rho = .993$; height $\rho = -.969$; body mass $\rho = -.950$; leg length $\rho = -.970$).

TABLE II PEARSON CORRELATIONS WITH 5000 M TIME ($N = 50$)

Variable	r	95% CI	p
Body fat (%)	.990	[.982, .994]	< .001
Height (cm)	-.971	[-.984, -.949]	< .001
Body mass (kg)	-.965	[-.980, -.939]	< .001
Leg length (cm)	-.962	[-.978, -.934]	< .001
Weekly mileage (km)	-.983	—	< .001
Training age (years)	-.960	—	< .001
Age (years)	-.923	—	< .001

The anthropometric variables were also strongly intercorrelated: height with leg length $r = .997$, height with body mass $r = .990$, body mass with leg length $r = .985$, and body fat with height, body mass and leg length $r = -.962$, $-.948$ and $-.955$ respectively.

C. Partial Correlations Controlling for Training Variables

After controlling for age, training age and weekly mileage, body fat (partial $r = .763$, 95% CI [.61, .86], $p < .001$), body mass (partial $r = -.509$, 95% CI [-.69, -.26], $p < .001$) and height (partial $r = -.417$, 95% CI [-.63, -.15], $p = .004$) remained significantly associated with 5000 m time. Leg length was not significant (partial $r = -.191$, 95% CI [-.45, .10], $p = .198$). Controlling for training reduced the magnitude of all coefficients, confirming that part of the raw association reflected shared variance with training exposure.

D. Multiple Regression

The four-variable model was significant, $F(4, 45) = 891.3$, $p < .001$, $R^2 = .988$, adjusted $R^2 = .986$. Only body fat ($B = 35.76$, $SE = 3.02$, $p < .001$) and body mass ($B = -9.96$, $SE = 3.39$, $p = .005$) were significant; height ($B = -3.70$, $p = .475$) and leg length ($B = 7.98$, $p = .165$) were not. Multicollinearity was severe (VIF: height 316.1, leg length 183.0, body mass 52.3, body fat 14.6), so individual coefficients for height and leg length should not be interpreted.

A reduced model with body fat and body mass was therefore retained (Table III). It explained 98.7% of the variance, $F(2, 47) = 1735.2$, $p < .001$, adjusted $R^2 = .986$, standard error of the estimate (SEE) = 11.38 s. Standardised coefficients was $\beta = .737$ for body fat and

$\beta = -.266$ for body mass. Residuals were normally distributed (Shapiro–Wilk $p = .638$), variance was homogeneous (Breusch–Pagan $p = .444$), and the largest Cook's distance was 0.88 (< 1). The VIF for both predictors were 9.8. Body fat alone explained 97.9% of the variance (5000 m time = $467.12 + 47.01 \times \text{body fat } \%$; $SEE = 13.98$ s). Residuals from this single-predictor model deviated from normality ($p = .004$), which is why the two-predictor model is preferred.

TABLE III REGRESSION OF 5000 M TIME (s) ON BODY FAT AND BODY MASS

Predictor	B	SE	β	p
Constant	1040.05	114.32	—	< .001
Body fat (%)	35.02	2.51	.737	< .001
Body mass (kg)	-7.50	1.49	-.266	< .001

$R^2 = .987$, adjusted $R^2 = .986$, $SEE = 11.38$ s.

E. Hierarchical Regression

Training variables alone (Model 1) explained 96.9% of the variance in 5000 m time (adjusted $R^2 = .967$), with weekly mileage the only significant predictor ($B = -10.36$, $p < .001$). Adding body fat (Model 2; Table IV) raised R^2 to .987 ($\Delta R^2 = .018$, $F(1, 46) = 62.52$, $p < .001$). Body fat ($B = 30.37$, $SE = 3.84$, $p < .001$) and weekly mileage ($B = -4.93$, $SE = 1.06$, $p < .001$) were both significant. Adding body mass, height and leg length (Model 3) raised R^2 to .994 ($\Delta R^2 = .0075$, $F(3, 43) = 18.59$, $p < .001$). Predictors in these models were highly collinear (e.g., VIF in Model 2 for training age 44.3 and weekly mileage 50.3), so coefficient signs should be interpreted cautiously.

TABLE IV HIERARCHICAL REGRESSION PREDICTING 5000 M TIME

Model	Predictors	R^2	Adjusted R^2	ΔR^2	$p(\Delta R^2)$
1	Age, training age, weekly mileage	.969	.967	—	—
2	+ Body fat	.987	.986	.018	< .001
3	+ Body mass, height, leg length	.994	.994	.0075	< .001

F. Comparison Across Body Fat Tertiles

Runners were divided into low (12.8–15.1%, $n = 17$), moderate (15.2–16.9%, $n = 16$) and high (17.1–21.0%, $n = 17$) body fat groups. Mean 5000 m times were 1132.5 ± 25.2 s (18:53), 1216.1 ± 24.7 s (20:16) and 1344.9 ± 54.2 s (22:25) respectively. The difference was significant, $F(2, 47) = 137.90$, $p < .001$, $\eta^2 = .854$. The low body fat group was on average 212.4 s (about 3 min 32 s) faster than the high body fat group. Because the high group showed larger variance, a Welch or Games–Howell procedure is recommended for pairwise comparisons.

IV. DISCUSSION

The main finding was that body fat percentage was the anthropometric variable most strongly related to 5000 m performance in women college runners, and that this relationship remained substantial after controlling for age, training age and weekly mileage. This is consistent with the established view that leanness favours distance running through a lower energy cost of locomotion [2], [3]. Body fat added a small but statistically significant 1.8% of explained variance beyond training variables, showing that body composition carries information that training volume alone does not. Similar associations have been reported in other female runners: slower 1500 m times with greater skinfold thickness and fat mass in an Olympic-level athlete [5], and better hill-running performance with lower estimated body fat [6].

The contribution of height and leg length differed between raw and adjusted analyses. Both correlated strongly with faster times in simple correlations, but leg length lost significance after training control, and neither contributed independently in the multiple regression. Because height, leg length and body mass were almost perfectly collinear ($r = .985$ – $.997$) and BMI varied very little ($SD = 0.20$), the data cannot separate their individual effects. The raw association likely reflects the fact that larger runners in this sample were also leaner, more experienced and higher-volume athletes. This is in line with evidence that relative slenderness, rather than absolute segment length, is more closely linked to running economy [3].

The positive contribution of body mass in the two-predictor model (heavier runners faster at a given body fat) should be read as a body-composition effect: at the same fat percentage, greater body mass implies more

lean tissue. This interpretation is plausible but was not tested directly, because lean mass was not entered into the analysis. It is consistent with a study of 30 young female distance runners in which fat-free weight, rather than total body mass, entered the 5000 m prediction equation [7].

Training variables explained most of the variance in performance, as expected. Weekly mileage was the dominant training predictor, in line with earlier work in female runners [4], [8], but its collinearity with training age ($r = .983$) and body fat ($r = -.978$) means that the separate effects of volume, experience and leanness cannot be cleanly attributed. Body fat may be both a determinant of performance and an outcome of sustained training, so the direction of causality cannot be inferred from this design.

A. Practical Applications

For coaches and talent-identification programmes, body composition assessment appears more informative than stature or limb length in this population. Monitoring body fat over a season may complement time-trial data. However, these findings should not be used to prescribe weight or fat loss. In women athletes, pressure to reduce body fat is associated with low energy availability, menstrual dysfunction and impaired bone health [2], [8], [11]–[13]. Anthropometric data should be used descriptively and within a health-first framework.

B. Limitations

Several limitations should be noted. First, the design is cross-sectional and correlational, so causal claims are not supported. Second, the sample was drawn from a single population of 50 runners with a narrow age range and narrow BMI range, which restricts generalisability. Third, correlations were exceptionally strong (up to $r = .99$), much higher than is typical in the anthropometry–performance literature; this may reflect the homogeneity of the sample, the range of performance levels included, and measurement characteristics, and replication with independent samples is needed. Fourth, body fat was estimated with the Jackson–Pollock three-site skinfold equation, which carries measurement error and does not distinguish fat-free mass components. Fifth, severe multicollinearity prevents reliable interpretation of the individual effects of height, leg length and body mass. Sixth, 5000 m performance is influenced by

physiological factors that were not measured here (e.g., maximal oxygen uptake ($\text{VO}_{2\text{max}}$), running economy, lactate threshold), as well as by pacing, motivation and environmental conditions; one trial was run in mild wind and one in higher humidity. Finally, menstrual cycle phase, nutritional status and energy availability were not controlled.

C. Strengths and Future Research

Strengths include a complete dataset with no missing values, a single standardised 5000 m criterion test, and analyses that went beyond simple correlation to partial correlation, hierarchical regression and collinearity diagnostics. Future studies should measure lean and fat mass directly (for example with dual-energy X-ray absorptiometry), include running economy, maximal oxygen uptake and energy availability, recruit multi-site samples with wider variation in body build, and follow runners across a season to test whether changes in body composition predict changes in 5000 m time.

V. CONCLUSION

In women college runners, body fat percentage was the strongest anthropometric correlate of 5000 m time, followed by height, body mass and leg length. Body fat and body mass together accounted for nearly all variance in performance, and body fat retained a significant association after controlling for age, training age and weekly mileage. Height and leg length did not contribute independently once collinearity and training were taken into account.

Future studies should use larger, multi-site samples, direct measures of lean and fat mass, and longitudinal designs that include physiological determinants of distance running.

DECLARATIONS

Ethics approval: Ethics committee approval was not required for this study (non-invasive measurements in women athletes of Annamalai University). The study followed the Declaration of Helsinki.

Informed consent: Written informed consent was obtained from all participants before data collection.

Conflict of interest: The authors declare no conflict of interest.

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Data availability: The anonymised participant-level dataset is provided in Table V in the Appendix.

Author contributions (CRediT): Ramu Mecha: conceptualisation, methodology, investigation, data curation, formal analysis, writing – original draft. Bupesh S. Moorthy: supervision, validation, writing – review and editing. Both authors approved the final manuscript.

APPENDIX

TABLE V Participant-Level Data (N = 50)

ID	Age (y)	Training age (y)	Weekly km	Height (cm)	Body mass (kg)	Body fat (%)	Leg length (cm)	5000 m (s)	5000 m (mm:ss)
WCR001	19	4.0	58	164.5	50.8	15.4	83.5	1185	19:45
WCR002	20	5.0	65	168.0	53.2	14.8	86.0	1140	19:00
WCR003	18	3.0	42	158.5	47.5	17.2	79.2	1310	21:50
WCR004	21	6.0	70	171.0	55.0	13.9	88.4	1115	18:35
WCR005	19	3.5	48	161.0	51.5	18.0	81.0	1260	21:00
WCR006	22	5.5	60	163.2	49.8	14.5	82.8	1162	19:22
WCR007	18	2.5	38	155.0	45.2	19.1	77.5	1380	23:00
WCR008	20	4.5	52	166.4	52.0	16.2	84.6	1225	20:25
WCR009	21	5.0	64	169.5	54.1	14.2	87.1	1135	18:55
WCR010	19	3.0	45	159.0	48.6	17.8	80.1	1290	21:30
WCR011	20	4.0	55	162.8	50.2	15.8	82.0	1210	20:10
WCR012	22	6.5	72	173.5	56.8	13.2	90.2	1095	18:15
WCR013	18	2.0	36	153.8	44.0	20.4	76.8	1415	23:35

ID	Age (y)	Training age (y)	Weekly km	Height (cm)	Body mass (kg)	Body fat (%)	Leg length (cm)	5000 m (s)	5000 m (mm:ss)
WCR014	19	3.5	50	165.0	51.0	16.5	83.8	1240	20:40
WCR015	21	5.0	62	167.2	52.5	15.0	85.2	1150	19:10
WCR016	20	4.0	54	160.5	49.0	16.1	80.8	1220	20:20
WCR017	19	3.0	44	157.2	46.8	18.2	78.6	1330	22:10
WCR018	22	5.5	66	170.1	54.8	14.1	87.8	1128	18:48
WCR019	18	2.5	40	156.4	46.0	18.9	78.1	1360	22:40
WCR020	20	4.5	58	164.0	51.2	15.3	83.2	1192	19:52
WCR021	21	6.0	68	168.8	53.6	13.8	86.5	1120	18:40
WCR022	19	3.0	46	161.5	50.5	17.5	81.5	1275	21:15
WCR023	20	4.0	56	165.8	51.8	15.7	84.0	1202	20:02
WCR024	22	7.0	75	174.0	57.2	12.8	91.0	1082	18:02
WCR025	18	2.0	35	152.5	43.5	21.0	75.8	1430	23:50
WCR026	19	3.5	49	162.0	50.0	16.8	81.8	1250	20:50
WCR027	21	5.0	61	166.0	52.1	14.9	84.8	1158	19:18
WCR028	20	4.5	57	163.5	50.9	15.5	82.9	1198	19:58
WCR029	18	2.5	39	156.0	45.8	18.6	78.0	1368	22:48
WCR030	22	6.0	67	169.0	53.9	14.0	87.0	1130	18:50
WCR031	19	3.0	43	158.0	47.2	18.0	79.0	1320	22:00
WCR032	20	4.0	53	162.2	49.5	16.0	81.6	1228	20:28
WCR033	21	5.5	63	167.8	52.8	14.6	85.8	1145	19:05
WCR034	18	2.0	37	154.5	44.8	19.8	77.0	1400	23:20
WCR035	19	3.5	51	164.8	51.4	16.3	83.6	1232	20:32
WCR036	22	6.5	71	172.0	55.8	13.5	89.4	1105	18:25
WCR037	20	4.5	59	165.2	51.6	15.1	84.2	1180	19:40
WCR038	18	2.5	41	157.0	46.5	18.4	78.8	1345	22:25
WCR039	21	5.0	60	166.5	52.4	15.2	85.0	1168	19:28
WCR040	19	3.0	47	160.0	48.8	17.1	80.4	1282	21:22
WCR041	20	4.0	54	163.0	50.4	15.9	82.3	1215	20:15
WCR042	22	6.0	69	170.5	54.5	13.7	88.0	1118	18:38
WCR043	18	2.0	36	153.2	43.8	20.2	76.2	1422	23:42
WCR044	19	3.5	48	161.8	49.9	16.9	81.2	1265	21:05
WCR045	21	5.0	62	167.0	52.7	14.7	85.5	1152	19:12
WCR046	20	4.5	56	163.8	51.0	15.6	83.0	1205	20:05
WCR047	18	2.5	40	155.5	45.5	18.8	77.6	1375	22:55
WCR048	22	6.0	65	168.2	53.0	14.3	86.2	1138	18:58
WCR049	19	3.0	44	158.8	48.0	17.6	79.8	1302	21:42
WCR050	20	4.0	53	162.5	50.1	16.1	82.2	1222	20:22

TABLE VI Pearson Correlation Matrix (N = 50; All $|r| \geq .877$, $p < .001$)

Variable	Height	Body mass	Body fat	Leg length	Weekly km	Training age	Age	5000 m time
Height	1	.990	-.962	.997	.970	.951	.897	-.971
Body mass	.990	1	-.948	.985	.955	.933	.877	-.965
Body fat	-.962	-.948	1	-.955	-.978	-.961	-.919	.990
Leg length	.997	.985	-.955	1	.972	.957	.902	-.962
Weekly km	.970	.955	-.978	.972	1	.983	.940	-.983
Training age	.951	.933	-.961	.957	.983	1	.961	-.960
Age	.897	.877	-.919	.902	.940	.961	1	-.923
5000 m time	-.971	-.965	.990	-.962	-.983	-.960	-.923	1

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