Curso Avançado em Nutrição Pediátrica

... dos -9 (meses) aos 18 (anos)

Especificidades fisiológicas e considerações nutricionais no atleta jovem; Suplementação: necessária ou proibida
Desporto recreativo vs. alto rendimento: particularidades

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Docente na Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto (FCNAUP)
Doutoranda em Nutrição Clínica na FCNAUP
Co-autora do livro "Comer, Crescer, Treinar"

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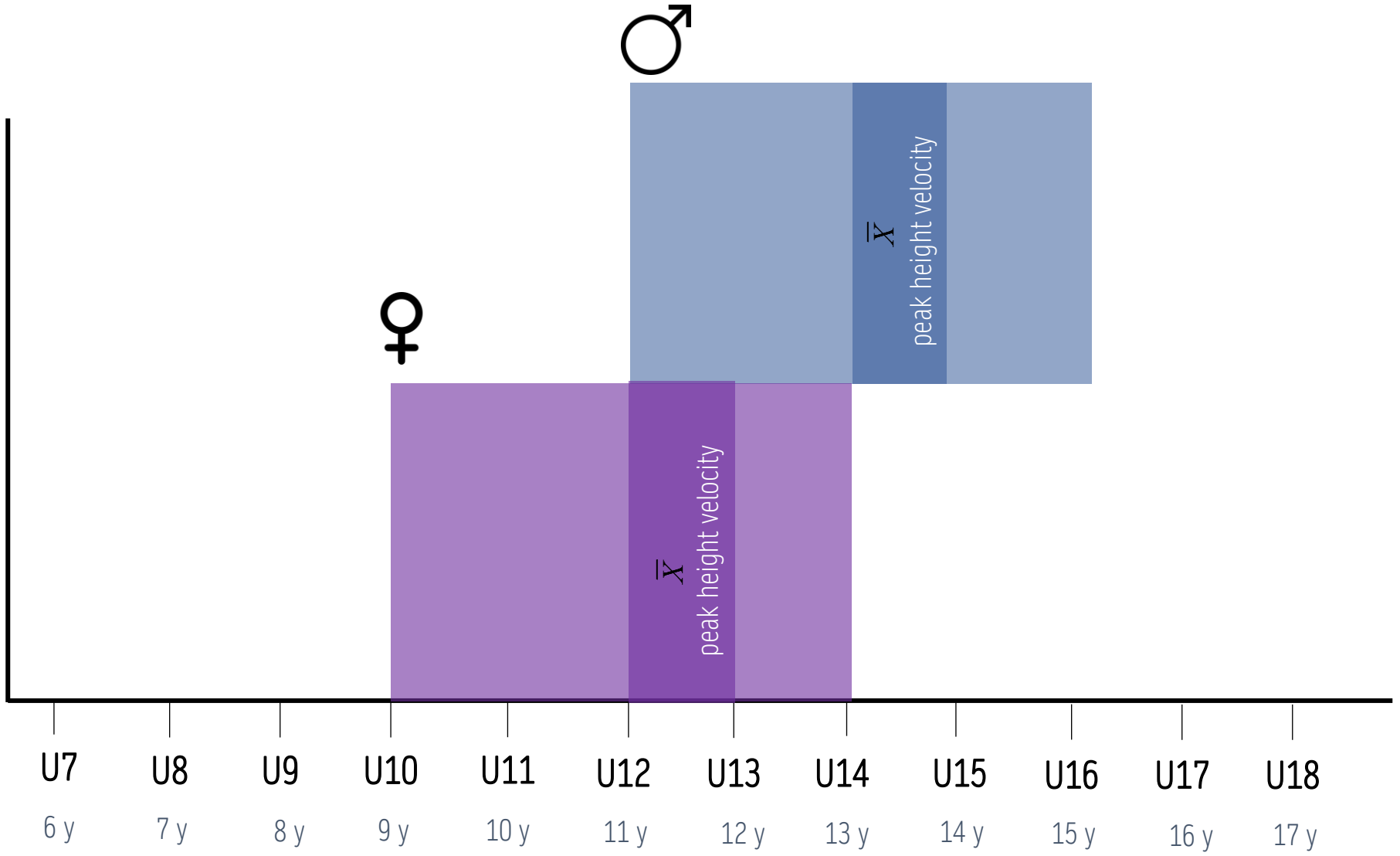
FIFA | MEDICAL CENTRE OF EXCELLENCE

> Pediatrics. 1998 Aug;102(2 Pt 3):507-11.

Growth and normal puberty

V Abbassi [1]



> Pediatrics. 1998 Aug;102(2 Pt 3):507-11.

Growth and normal puberty

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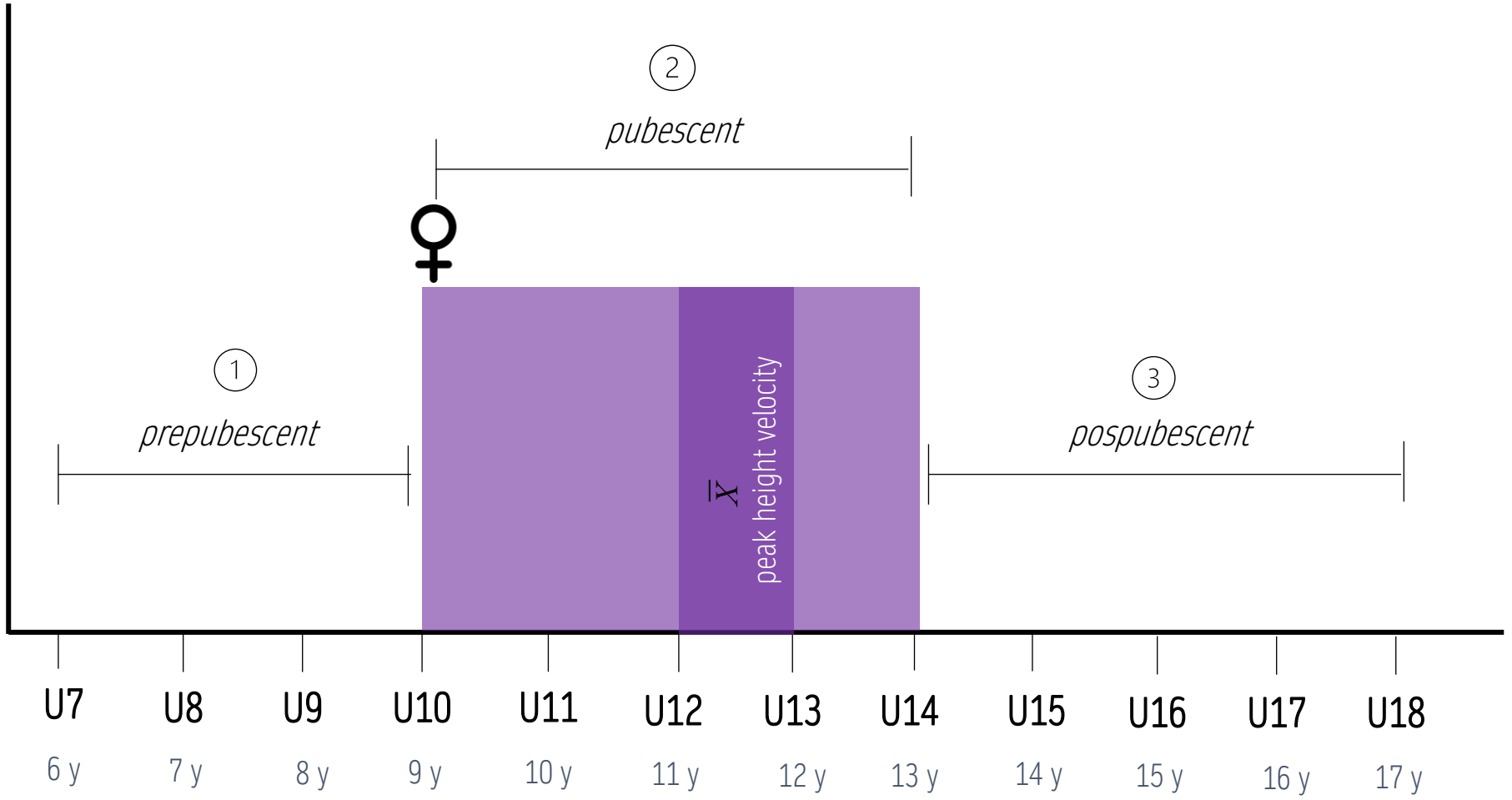

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Growth and normal puberty

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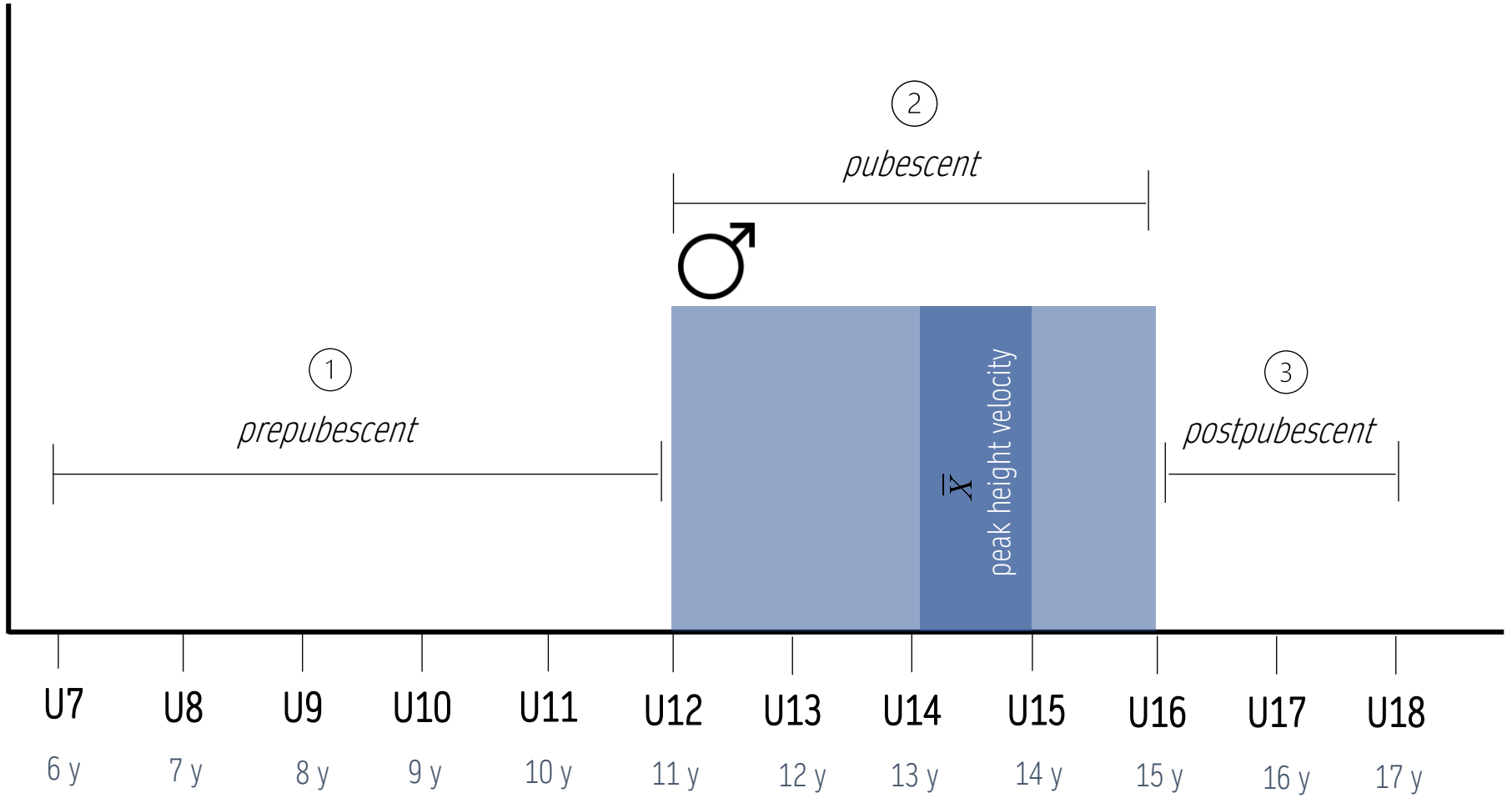


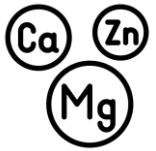
Review > Int J Sport Nutr Exerc Metab. 2019 Mar 1;29(2):220-227.
doi: 10.1123/ijsnem.2018-0269. Epub 2019 Feb 15.

Nutrition for Special Populations: Young, Female, and Masters Athletes

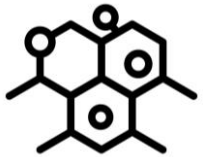
Ben Desbrow [1], Nicholas A Burd [2], Mark Tarnopolsky [3], Daniel R Moore [4], Kirsty J Elliott-Sale [5]

Altered body composition

Nutrient deposits



Metabolic and hormonal fluctuations



Lifelong relationship with food

Maturity of organ systems

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... dos -9 (meses) aos 18 (anos)

REVIEW

Anthropometric Indicators as Body Fat Discriminators in Children and Adolescents: A Systematic Review and Meta-Analysis

Carlos AS Alves Junior,[1] Michel C Mocellin,[2] Eliane C Andrade Gonçalves,[1] Diego AS Silva,[1] and Erasmo BSM Trindade[2]
[1]Federal University of Santa Catarina, Research Center in Kinanthropometry and Human Performance, Florianopolis, Santa Catarina, Brazil; and [2]Department of Nutrition, Graduate Program in Nutrition, Federal University of Santa Catarina, Florianópolis, Santa Catarina, Brazil

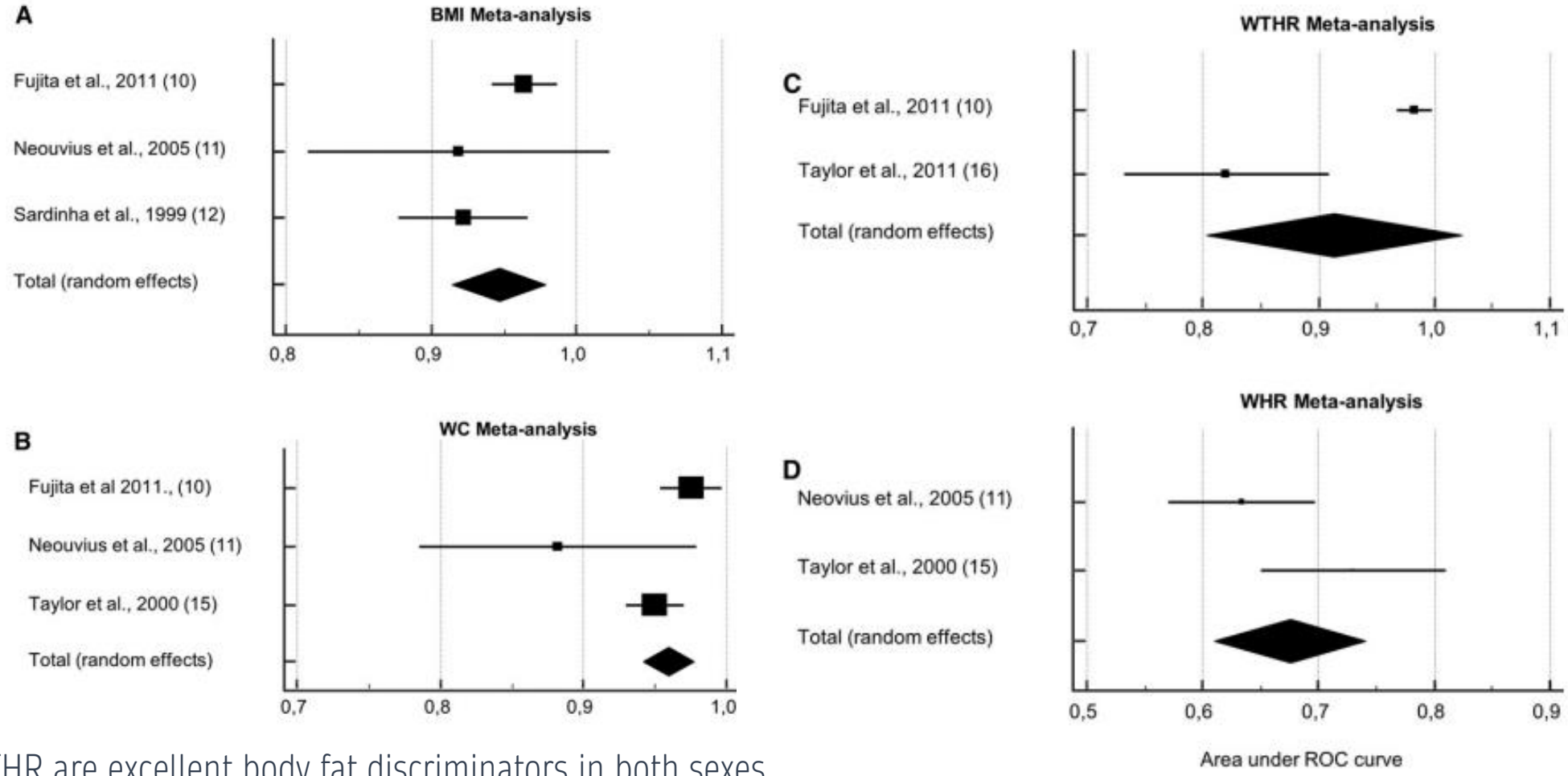


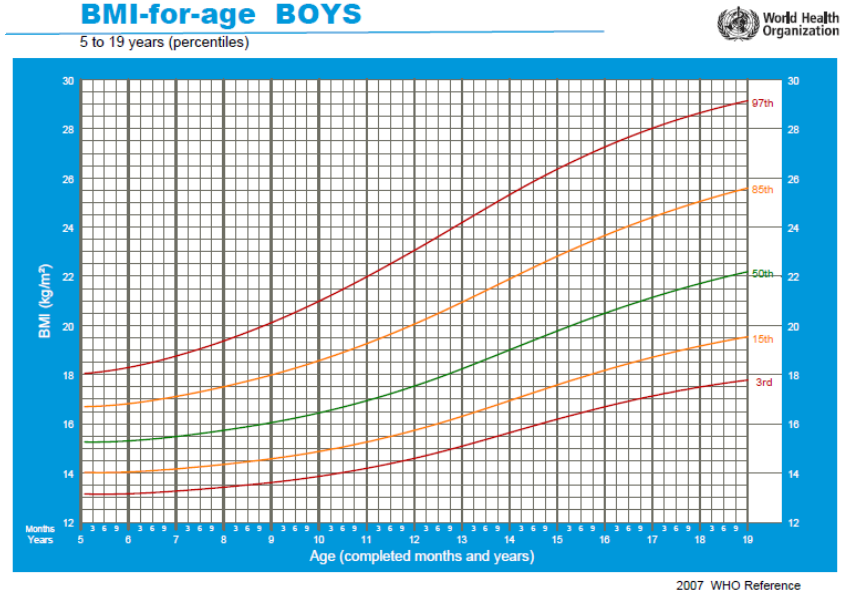
FIGURE 3 Discriminatory power of BMI, WC, WTHR, and WHR for body fat through the AUC in females. WC, waist circumference; WHR,

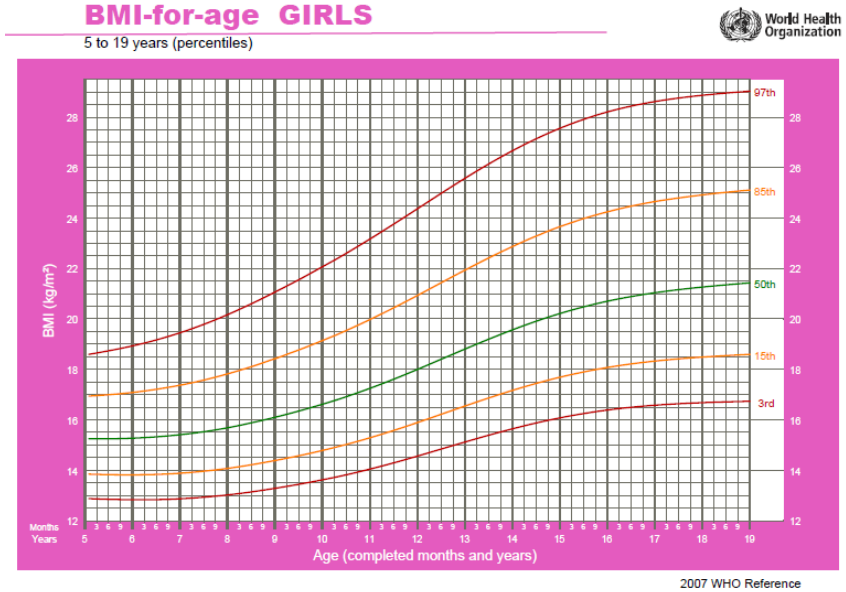
BMI, WC, and WTHR are excellent body fat discriminators in both sexes.

↓

A **value of 0.5** is an appropriate cut-off for classifying cardio-metabolic risk

World Health Organization





≤3rd Percentile – Underweight
3rd-85th Percentile – Healthy weight
85th-97th Percentile – Overweight
≥97th Percentile - Obesity

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... dos -9 (meses) aos 18 (anos)

Eur J Pediatr (2012) 171:499–505
DOI 10.1007/s00431-011-1595-2
ORIGINAL PAPER

Waist circumference percentiles for Portuguese children and adolescents aged 10 to 18 years

Luís B. Sardinha · Rute Santos · Susana Vale · Manuel J. Coelho e Silva · Armando M. Raimundo · Helena Moreira · Fátima Baptista · Jorge Mota

Table 2 Smoothed and weighted age- and sex-specific waist circumference percentile values (centimeters) for Portuguese children and adolescents

Age (years)	*L*	*M*	*S*	5th	10th	25th	50th	75th	85th	90th	95th
Girls											
10	−0.77	63.9	0.11	53.9	55.8	59.4	63.9	69.1	72.2	74.4	77.9
11	−1.16	65.5	0.11	55.5	57.4	61.0	65.5	70.8	74.1	76.5	80.3
12	−1.50	67.4	0.12	57.5	59.3	62.8	67.4	72.8	76.3	78.8	83.1
13	−1.68	68.9	0.11	59.1	61.0	64.4	69.0	74.5	78.0	80.6	85.0
14	−1.74	70.2	0.11	60.3	62.2	65.7	70.2	75.7	79.2	81.8	86.2
15	−1.75	71.4	0.10	61.5	63.4	66.8	71.4	76.9	80.3	82.9	87.3
16	−1.70	72.3	0.10	62.4	64.3	67.8	72.3	77.8	81.3	83.9	88.1
17	−1.60	72.9	0.10	62.9	64.8	68.3	72.9	78.4	81.8	84.3	88.5
18	−1.45	73.3	0.11	63.1	65.1	68.7	73.3	78.7	82.1	84.6	88.7
Boys											
10	−1.58	65.5	0.12	55.3	57.2	60.7	65.5	71.3	75.0	77.8	82.6
11	−1.59	66.2	0.11	56.0	57.9	61.5	66.2	72.1	75.8	78.6	83.4
12	−1.65	67.6	0.12	57.3	59.2	62.8	67.6	73.4	77.2	80.0	84.8
13	−1.84	69.3	0.12	59.2	61.0	64.6	69.3	75.2	78.9	81.8	86.7
14	−1.80	71.2	0.10	61.3	63.1	66.6	71.2	76.9	80.7	83.6	88.5
15	−2.00	73.1	0.10	63.5	65.3	68.6	73.1	78.7	82.4	85.2	90.1
16	−1.89	74.8	1.5	65.5	67.2	70.5	74.8	80.2	83.8	86.5	91.3
17	−1.90	75.9	1.9	67.1	68.8	71.8	76.0	81.2	84.6	87.3	92.0
18	−1.99	76.9	1.8	68.5	70.1	73.0	77.0	81.9	85.3	87.8	92.3

Decimal age was calculated as the difference between date of birth and date of the data collection. Each age group was categorized by the midpoint of an age range. For example, the group of children with 10 years old included all the children between 9.50 and 10.49 years, and so forth

ORIGINAL ARTICLES

WAIST CIRCUMFERENCE PERCENTILES IN NATIONALLY REPRESENTATIVE SAMPLES OF AFRICAN-AMERICAN, EUROPEAN-AMERICAN, AND MEXICAN-AMERICAN CHILDREN AND ADOLESCENTS

José R. Fernández, PhD, David T. Redden, PhD, Angelo Pietrobelli, MD, and David B. Allison, PhD

Table I. Estimated value for percentile regression for European-American children and adolescents, according to sex

	Percentile for boys					Percentile for girls				
	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
Intercept	39.3	43.2	42.9	43.3	43.8	39.9	41.8	43.6	45.0	46.8
Slope	1.8	1.9	2.1	2.6	3.4	1.6	1.7	1.9	2.3	2.9
Age (y)										
2	42.9	46.9	47.1	48.6	50.6	43.1	45.1	47.4	49.6	52.5
3	44.7	48.8	49.2	51.2	54.0	44.7	46.8	49.3	51.9	55.4
4	46.5	50.6	51.3	53.8	57.4	46.3	48.5	51.2	54.2	58.2
5	48.3	52.5	53.3	56.5	60.8	47.9	50.2	53.1	56.5	61.1
6	50.1	54.3	55.4	59.1	64.2	49.5	51.8	55.0	58.8	64.0
7	51.9	56.2	57.5	61.7	67.6	51.1	53.5	56.9	61.1	66.8
8	53.7	58.1	59.6	64.3	71.0	52.7	55.2	58.8	63.4	69.7
9	55.5	59.9	61.7	67.0	74.3	54.3	56.9	60.7	65.7	72.6
10	57.3	61.8	63.7	69.6	77.7	55.9	58.6	62.5	68.0	75.5
11	59.1	63.6	65.8	72.2	81.1	57.5	60.2	64.4	70.3	78.3
12	60.9	65.5	67.9	74.9	84.5	59.1	61.9	66.3	72.6	81.2
13	62.7	67.4	70.0	77.5	87.9	60.7	63.6	68.2	74.9	84.1
14	64.5	69.2	72.1	80.1	91.3	62.3	65.3	70.1	77.2	86.9
15	66.3	71.1	74.1	82.8	94.7	63.9	67.0	72.0	79.5	89.8
16	68.1	72.9	76.2	85.4	98.1	65.5	68.6	73.9	81.8	92.7
17	69.9	74.8	78.3	88.0	101.5	67.1	70.3	75.8	84.1	95.5
18	71.7	76.7	80.4	90.6	104.9	68.7	72.0	77.7	86.4	98.4

Table II. Estimated value for percentile regression for African-American children and adolescents, according to sex

	Percentile for boys					Percentile for girls				
	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
Intercept	40.1	41.2	42.7	44.1	43.6	39.9	41.2	41.7	42.1	42.8
Slope	1.6	1.7	1.9	2.2	3.2	1.6	1.7	2.1	2.8	3.7
Age (y)										
2	43.2	44.6	46.4	48.5	50.0	43.0	44.6	46.0	47.7	50.1
3	44.8	46.3	48.3	50.7	53.2	44.6	46.3	48.1	50.6	53.8
4	46.3	48.0	50.1	52.9	56.4	46.1	48.0	50.2	53.4	57.5
5	47.9	49.7	52.0	55.1	59.6	47.7	49.7	52.3	56.2	61.1
6	49.4	51.4	53.9	57.3	62.8	49.2	51.4	54.5	59.0	64.8
7	51.0	53.1	55.7	59.5	66.1	50.8	53.2	56.6	61.8	68.5
8	52.5	54.8	57.6	61.7	69.3	52.4	54.9	58.7	64.7	72.2
9	54.1	56.4	59.4	63.9	72.5	53.9	56.6	60.9	67.5	75.8
10	55.6	58.1	61.3	66.1	75.7	55.5	58.3	63.0	70.3	79.5
11	57.2	59.8	63.2	68.3	78.9	57.0	60.0	65.1	73.1	83.2
12	58.7	61.5	65.0	70.5	82.1	58.6	61.7	67.3	75.9	86.9
13	60.3	63.2	66.9	72.7	85.3	60.2	63.4	69.4	78.8	90.5
14	61.8	64.9	68.7	74.9	88.5	61.7	65.1	71.5	81.6	94.2
15	63.4	66.6	70.6	77.1	91.7	63.3	66.8	73.6	84.4	97.9
16	64.9	68.3	72.5	79.3	94.9	64.8	68.5	75.8	87.2	101.6
17	66.5	70.0	74.3	81.5	98.2	66.4	70.3	77.9	90.0	105.2
18	68.0	71.7	76.2	83.7	101.4	68.0	72.0	80.0	92.9	108.9

European Journal of Clinical Nutrition (2001) 55, 902–907
© 2001 Nature Publishing Group All rights reserved 0954–3007/01 $15.00
www.nature.com/ejcn

Original Communication

The development of waist circumference percentiles in British children aged 5.0–16.9 y

HD McCarthy*,a, KV Jarrett[1] and HF Crawley[1]

Table 3 Sample size and percentage values of percentiles of waist circumference by age and sex

			Percentiles						
Sex	*Age*	n	*5th*	*10th*	*25th*	*50th*	*75th*	*90th*	*95th*
Boys	5+	254	46.8	47.7	49.3	51.3	53.5	55.6	57.0
	6+	349	47.2	48.2	50.7	52.2	54.6	57.1	58.7
	7+	334	47.9	48.9	50.9	53.3	56.1	58.8	60.7
	8+	333	48.7	49.9	52.1	54.7	57.8	60.9	62.9
	9+	337	49.7	51.0	53.4	56.4	59.7	63.2	65.4
	10+	357	50.8	52.3	55.0	58.2	61.9	65.6	67.9
	11+	298	51.9	53.6	56.6	60.2	64.1	67.9	70.4
	12+	347	53.1	55.0	58.4	62.3	66.4	70.4	72.9
	13+	319	54.8	56.9	60.4	64.6	69.0	73.1	75.7
	14+	279	56.9	59.2	62.6	67.0	71.6	76.1	78.9
	15+	288	59.0	61.1	64.8	69.3	74.2	79.0	82.0
	16+	90	61.2	63.3	67.0	71.6	76.7	81.8	85.2
Girls	5+	401	45.4	46.3	48.1	50.3	52.8	55.4	57.2
	6+	400	46.3	47.3	49.2	51.5	54.2	57.0	58.9
	7+	376	47.4	48.4	50.3	52.7	55.6	58.7	60.8
	8+	413	48.5	49.6	51.5	54.1	57.1	60.4	62.7
	9+	395	49.5	50.6	52.7	55.3	58.5	62.0	64.5
	10+	364	50.7	51.8	53.9	56.7	60.0	63.6	66.2
	11+	357	52.0	53.2	55.4	58.2	61.6	65.4	68.1
	12+	375	53.6	54.8	57.1	60.0	63.5	67.3	70.5
	13+	390	55.2	56.4	58.7	61.7	65.3	69.1	71.8
	14+	404	56.5	57.8	60.2	63.2	66.8	70.6	73.2
	15+	433	57.6	58.9	61.3	64.4	67.9	71.7	74.3
	16+	462	58.4	59.8	62.2	65.3	68.8	72.6	75.1

CAUTION Measurement location

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> Obesity (Silver Spring). 2020 Apr;28(4):803-812. doi: 10.1002/oby.22751. Epub 2020 Mar 6.

Validity of Slaughter Equations and Bioelectrical Impedance Against Dual-Energy X-Ray Absorptiometry in Children

Miguel Martín-Matillas [1], Jose Mora-Gonzalez [1], Jairo H Migueles [1], Esther Ubago-Guisado [1 2], Luis Gracia-Marco [1], Francisco B Ortega [1 3]

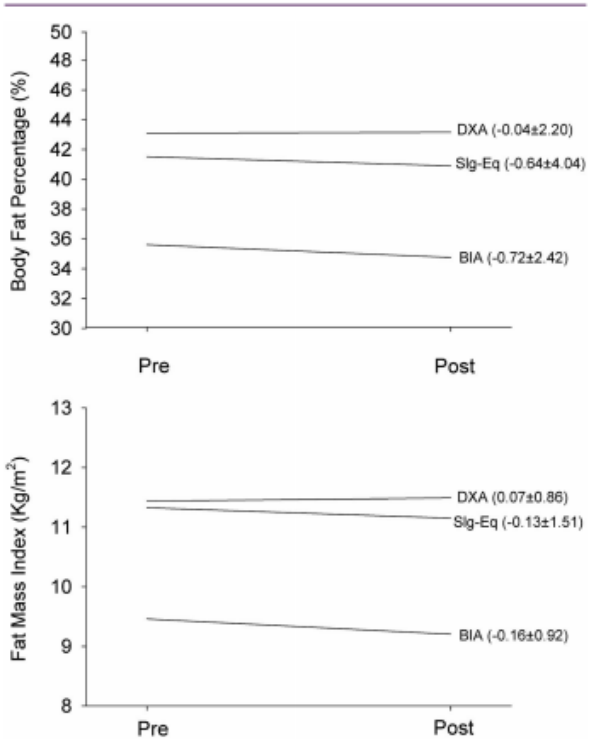

Figure 3 Descriptive intervention changes in body fat percentage and fat mass index estimated by skinfolds using the Slaughter equations (Slg-Eq) (8), bioelectrical impedance analysis (BIA), and dual-energy x-ray absorptiometry (DXA). Data in parentheses are mean difference ± SD of the change from pre- to postintervention.

Hindawi Publishing Corporation
Journal of Obesity
Volume 2013, Article ID 148696, 14 pages
http://dx.doi.org/10.1155/2013/148696

Review Article

A PRISMA-Driven Systematic Review of Predictive Equations for Assessing Fat and Fat-Free Mass in Healthy Children and Adolescents Using Multicomponent Molecular Models as the Reference Method

Analiza M. Silva,[1] David A. Fields,[2] and Luis B. Sardinha[1]

The predictive equations of Slaughter, developed against a 4C model, used a wide and diverse sample ranging in age, maturation status, ethnicity, gender, and adiposity levels and should, therefore, be recommended as a feasible and valid alternative for assessing body composition in paediatric populations.

European Journal of Clinical Nutrition (2005) 59, 1158–1166

www.nature.com/ejcn

ORIGINAL COMMUNICATION

Body fat measurement in adolescents: comparison of skinfold thickness equations with dual-energy X-ray absorptiometry

G Rodríguez[1]*, LA Moreno[2], MG Blay[3], VA Blay[3], J Fleta[2], A Sarría[1] and M Bueno[1], the AVENA-Zaragoza Study Group[4]

We recommend the use of the Brook equation to predict %FM in white female adolescents and Slaughter et al (1988) equations in white adolescents from both sexes.

Skinfold Equations for Estimation of Body Fatness in Children and Youth

BY M.H. SLAUGHTER[1], T.G. LOHMAN[2], R.A. BOILEAU, C.A. HORSWILL[3], R.J. STILLMAN, M.D. VAN LOAN[4] AND D.A. BEMBEN[5]

For Triceps and Subscapular

10-12 y	Prepubescent White Males: PFDWB = 1.21 (triceps + subscapular) − .008 (triceps + subscapular)² 1.7
	Prepubescent Black Males: PFDWB = 1.21 (triceps + subscapular) − .008 (triceps + subscapular)² − 3.2
12-15 y	Pubescent White Males: PFDWB = 1.21 (triceps + subscapular − .008 (triceps + subscapular)² − 3.4
	Pubescent Black Males: PFDWB = 1.21 (triceps + subscapular) − .008 (triceps + subscapular)² − 5.2
>15 y	Postpubescent White Males: PFDWB = 1.21 (triceps + subscapular) − .008 (triceps + subscapular)² − 5.5
	Postpubescent Black Males: PFDWB = 1.21 (triceps + subscapular) − .008 (triceps + subscapular)² − 6.8

For a sum of tricep and subscapular greater than 35 mm, the following equation should be applied.

All Males PFDWB = .783 (triceps + subscapular) + 1.6
All Females PFDWB = .546 (triceps + subscapular) + 9.7

International Journal of Obesity (2006) 30, 598–602
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PEDIATRIC HIGHLIGHT

Body fat reference curves for children

HD McCarthy[1], TJ Cole[2], T Fry[3], SA Jebb[4] and AM Prentice[5]

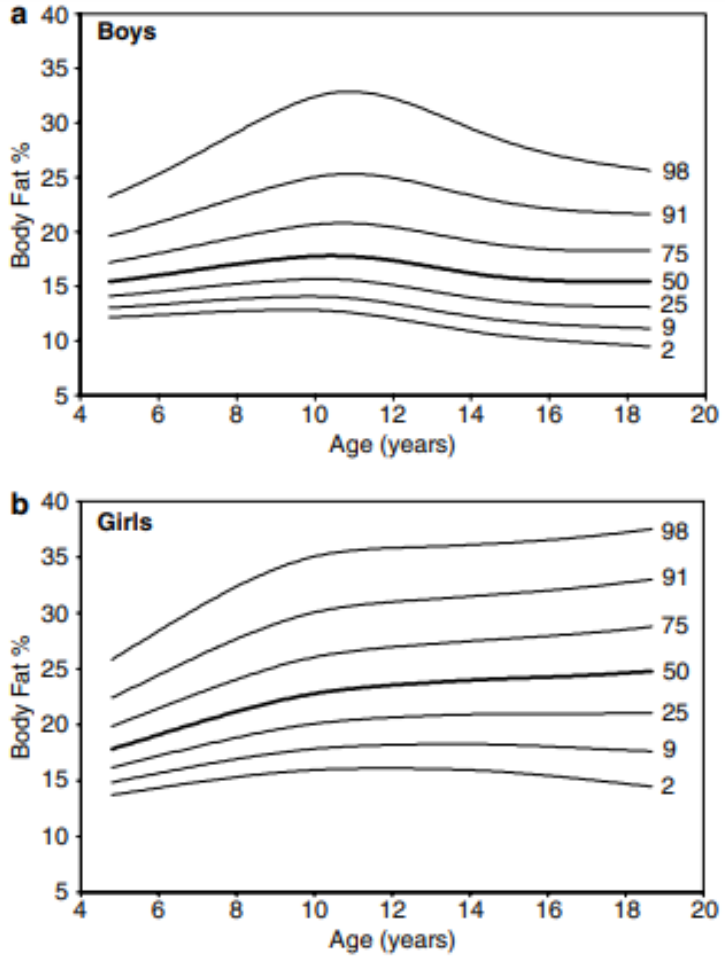


Figure 1 Body fat centile curves for Caucasian boys and girls. Data from 1116 boys and 869 girls aged 5–18 years smoothed by the LMS method. Numbers on right-hand side represent centiles.

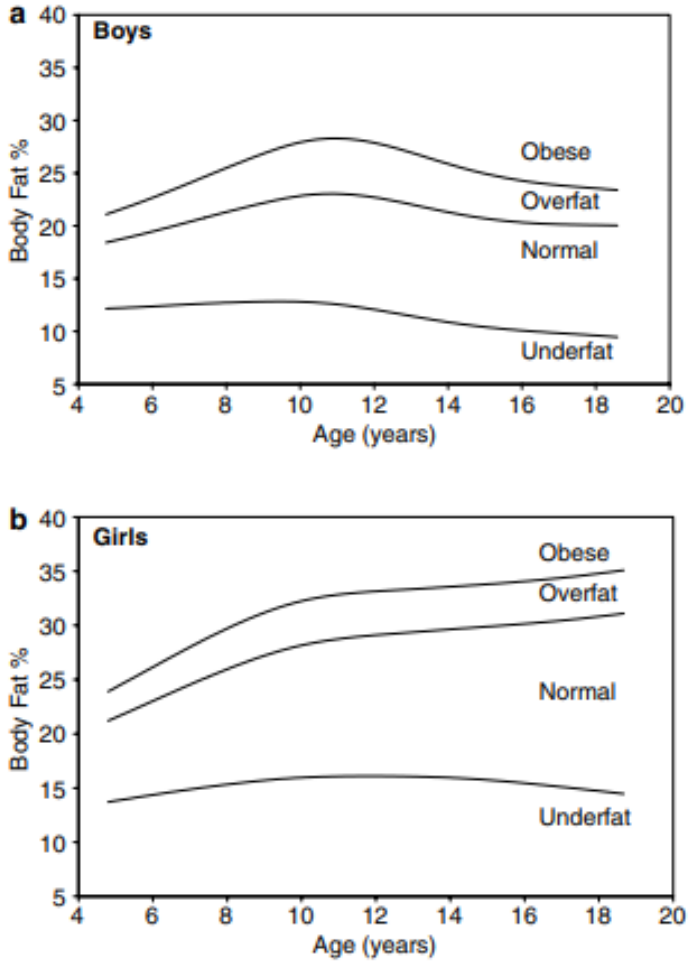


Figure 2 Recommended cutoffs for defining underfat, normal, overfat and obese children. Data as in Figure 1 Charts apply to Caucasian children.

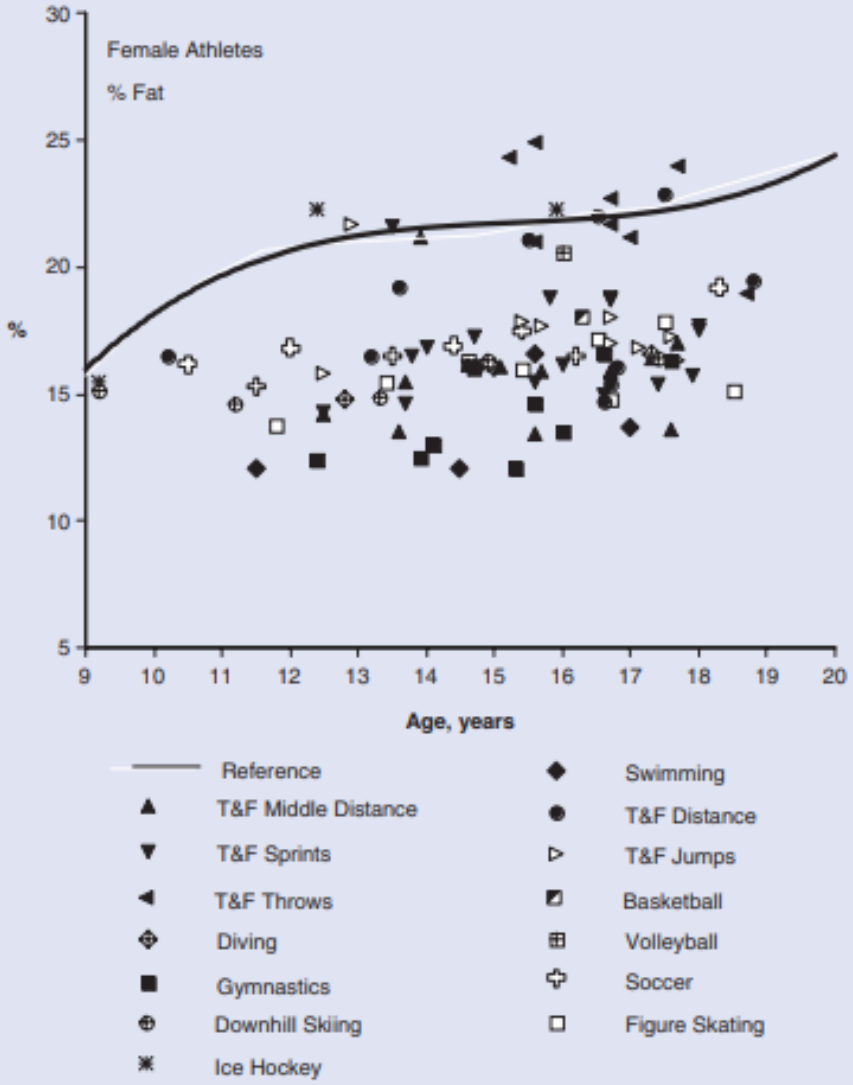
vol. x • no. x American Journal of Lifestyle Medicine

Robert M. Malina, PhD,
and Christina A. Geithner, PhD

Body Composition of Young Athletes

Figure 4.

Estimates of Relative Fatness (% Fat) in Samples of Female Athletes Predicted From Skinfold Thicknesses (see text for details).[a]



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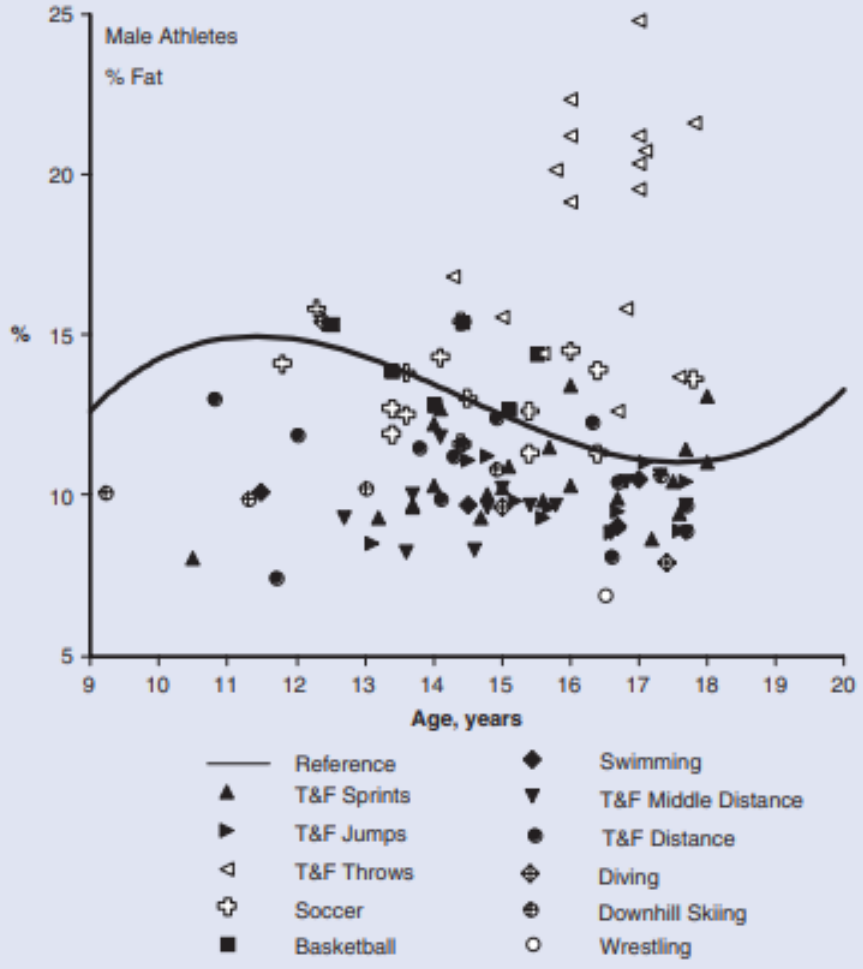
Robert M. Malina, PhD,
and Christina A. Geithner, PhD

Body Composition of Young Athletes

Figure 5.

Estimates of Relative Fatness (% Fat) in Samples of Male Athletes Predicted From Skinfold Thicknesses (see text for details).[a]



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... dos -9 (meses) aos 18 (anos)

The Young Athlete

Editor(s): Helge Hebestreit, Oded Bar-Or

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Chapter 30

Body Composition Assessment in the Young Athlete

TIMOTHY G. LOHMAN, SCOTT B. GOING, AND BRADLEY R. HERRIN

Table 30.5 Percent fat standard for athletic youth.

	Body fat level (%)		
	Low	Mid	Upper
Boys			
Prepubescent	10	13	18
Post-pubescent	7	10	14
Girls			
Prepubescent	16	20	25
Post-pubescent	14	17	20

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Original article

Influence of different sports on fat mass and lean mass in growing girls

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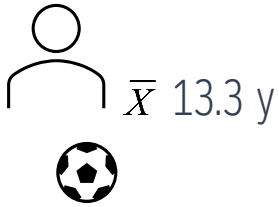
Table 2
Fat mass and lean mass in the 5 groups of prepubertal and pubertal girls.

	Swimming	Football	Basketball	Handball	Control
Prepubertal					
Percent body fat (%)	26.86 ± 6.79	26.99 ± 5.55	28.94 ± 5.62	27.81 ± 6.90	32.38 ± 5.65[a]
Total fat mass (g)	7779.80 ± 2807.73	9388.80 ± 3114.85	12,430.72 ± 4608.84	10,588.96 ± 4754.89	12,648.63 ± 4599.68[a]
Fat mass arms (g)	451.88 ± 198.67	471.56 ± 189.50	719.47 ± 255.71[b]	606.35 ± 276.95	771.53 ± 305.87[a]
Fat mass trunk (g)	2887.40 ± 1139.96	3507.98 ± 1416.40	5187.54 ± 2692.31[b]	5052.47 ± 2264.05	5099.30 ± 3159.16
Fat mass legs (g)	1632.54 ± 681.82	2099.25 ± 677.85	2534.79 ± 837.76	1780.46 ± 570.79	2657.81 ± 906.24[a,d]
Total lean mass (g)	19,632.44 ± 2460.38	23,698.05 ± 4363.06	28,182.20 ± 5280.04	25,191.76 ± 4827.06[a]	23,257.44 ± 5014.84
Muscle mass arms (g)	882.18 ± 129.85	1064.92 ± 191.93	1252.38 ± 253.07[e]	1109.14 ± 266.77	1033.79 ± 205.68
Lean mass trunk (g)	9405.51 ± 1316.65	11,347.95 ± 2213.93	14,127.28 ± 3123.16[e]	13,204.71 ± 2731.77[a,b,e]	11,347.60 ± 2136.99
Muscle mass legs (g)	3014.55 ± 460.98	3864.05 ± 865.34[e]	4374.80 ± 887.07	4012.07 ± 901.74[e]	3517.92 ± 747.72
Pubertal					
Percent body fat (%)	25.83 ± 6.23	27.43 ± 4.71[a]	29.32 ± 6.50	26.99 ± 4.90	27.74 ± 7.06[a]
Total fat mass (g)	12,782.56 ± 5666.25	12,247.14 ± 4580.89	16,548.59 ± 6439.27[e]	14,349.03 ± 5035.06	11,375.02 ± 4930.07
Fat mass arms (g)	711.22 ± 333.15	615.00 ± 300.47	931.10 ± 376.64	803.07 ± 303.27	616.24 ± 336.12
Fat mass trunk (g)	5888.63 ± 2935.90	4796.38 ± 2252.87	7055.00 ± 3342.12	6311.68 ± 2567.08	4301.61 ± 2387.68
Fat mass legs (g)	2361.57 ± 1135.92	2680.50 ± 855.57	3429.01 ± 1232.18	2550.77 ± 983.54	2831.14 ± 969.02[a]
Total lean mass (g)	33,711.83 ± 6493.51[b,e]	29,708.51 ± 4898.89[e]	36,161.50 ± 5945.94[e]	35,565.89 ± 5887.83[b,e]	26,919.27 ± 3960.52
Muscle mass arms (g)	1610.21 ± 347.71[b,e]	1490.67 ± 241.65	1631.51 ± 239.70[e]	1606.98 ± 287.07[b,e]	1234.88 ± 187.11
Lean mass trunk (g)	18,160.29 ± 3789.42[b,e]	14,555.66 ± 2663.12[e]	18,176.47 ± 3721.08[e]	19,127.48 ± 3435.61[b,e]	12,579.14 ± 1963.78
Muscle mass legs (g)	4720.14 ± 1047.43	4985.56 ± 849.41[e]	5870.78 ± 980.56[e]	5125.49 ± 871.92	4341.65 ± 1271.40

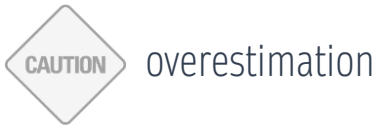
Notes: Data adjusted by height. Differences concerning the mentioned group at [a]swimming, [b]football, [c]basketball, [d]handball, [e]control, $p < 0.05$.

Accurate Prediction Equation to Assess Body Fat in Male and Female Adolescent Football Players

Gabriel Lozano-Berges [1 2], Ángel Matute-Llorente [1 2], Alejandro Gómez-Bruton [1 2], Alejandro González-Agüero [1 2], Germán Vicente-Rodríguez [1 2], José A Casajús [1 2]



$\overline{X}$ 13.3 y

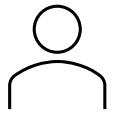


overestimation

Br J Nutr. 1967 Aug;21(3):681-9. doi: 10.1079/bjn19670070.

The assessment of the amount of fat in the human body from measurements of skinfold thickness

J V Durnin, M M Rahaman



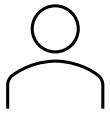
13-16 y

overestimation

Comparative Study > Eur J Clin Nutr. 1998 Aug;52(8):573-6. doi: 10.1038/sj.ejcn.1600606.

Skinfold thickness measurements are better predictors of body fat percentage than body mass index in male Spanish children and adolescents

A Sarría [1], L A García-Llop, L A Moreno, J Fleta, M P Morellón, M Bueno



7-17 y

overestimation

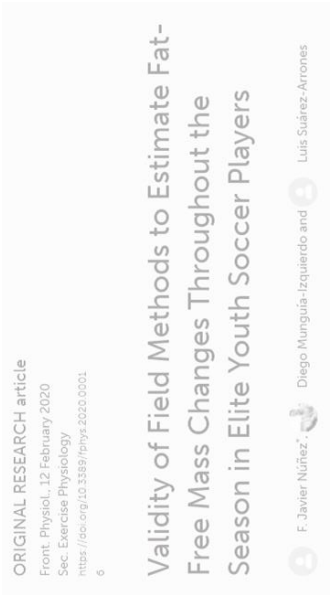


TABLE 3 | Correlations, biases, limits of agreement, and standardized differences between changes in FFM with DXA and other practical estimates in elite youth soccer players (n = 40).

Estimates of fat-free mass	Correlation (90% CI)	Bias (±LoA)	Standardized differences (90% CL)
Slaughter et al.	0.87 (0.79;0.92)	0.16 (± 1.40)	0.02 (0.40)
Faulkner	0.86 (0.77;0.91)	−0.18 (± 1.50)	−0.09 (0.39)
Carter	0.86 (0.77;0.92)	−0.02 (± 1.52)	−0.09 (0.39)
Durnin-Womersley	0.82 (0.71;0.89)	0.23 (± 1.65)	0.19 (0.33)
Durnin-Rahaman	0.79 (0.66;0.87)	3.10 (± 1.81)	3.13 (0.74)**
Brook	0.79 (0.67;0.87)	−0.37 (± 1.74)	−0.51 (0.36)*
Withers et al.	0.85 (0.76;0.91)	0.75 (± 1.57)	0.14 (0.36)**
Lohman	0.82 (0.72;0.89)	0.61 (± 1.84)	0.19 (0.37)**
Sarria et al.	0.83 (0.72;0.90)	−0.27 (± 1.60)	−0.39 (0.35)*
Deurenberg et al.	0.82 (0.71;0.89)	0.45 (± 1.73)	0.18 (0.41)*
Reilly et al.	0.88 (0.80;0.93)	0.00 (± 1.41)	0.01 (0.39)
Lean mass index	0.89 (0.81;0.93)	−0.29 (± 1.62)	−0.41 (0.38)*
Munguia-Izquierdo et al.	0.75 (0.61;0.85)	0.29 (± 2.31)	0.09 (0.36)
BIA inbody	0.70 (0.53;0.82)	0.87 (± 2.54)	0.58 (0.41)**
BIA Tanita	0.78 (0.64;0.86)	−0.28 (± 1.85)	−0.14 (0.39)

*Significant differences between criterion (DXA) fat-free mass and others practical estimates of fat-free mass using paired t test *($p < 0.05$), **($p < 0.01$). CI, confidence interval; LoA, level of agreement; CL, confidence level; BIA, bioelectrical impedance analysis.*

The main finding of this study was that the equations developed by **Durnin and Womersley (1974), Carter (1982), Slaughter et al. (1988), Reilly et al. (2009), and Munguia Izquierdo et al. (2018)** were accurate, highly correlated with DXA, and showed lower biases in estimating FFM changes in elite youth soccer players.

MDPI
International Journal of Environmental Research and Public Health

Article

Can the Neuromuscular Performance of Young Athletes Be Influenced by Hormone Levels and Different Stages of Puberty?

Paulo Francisco de Almeida-Neto [1,*], Dihogo Gama de Matos [2], Vanessa Carla Monteiro Pinto [1], Paulo Moreira Silva Dantas [1], Tatianny de Macêdo Cesário [1], Luiz Felipe da Silva [1], Alexandre Bulhões-Correia [1], Felipe José Aidar [2,3,4,5] and Breno Guilherme de Araújo Tinôco Cabral [1]

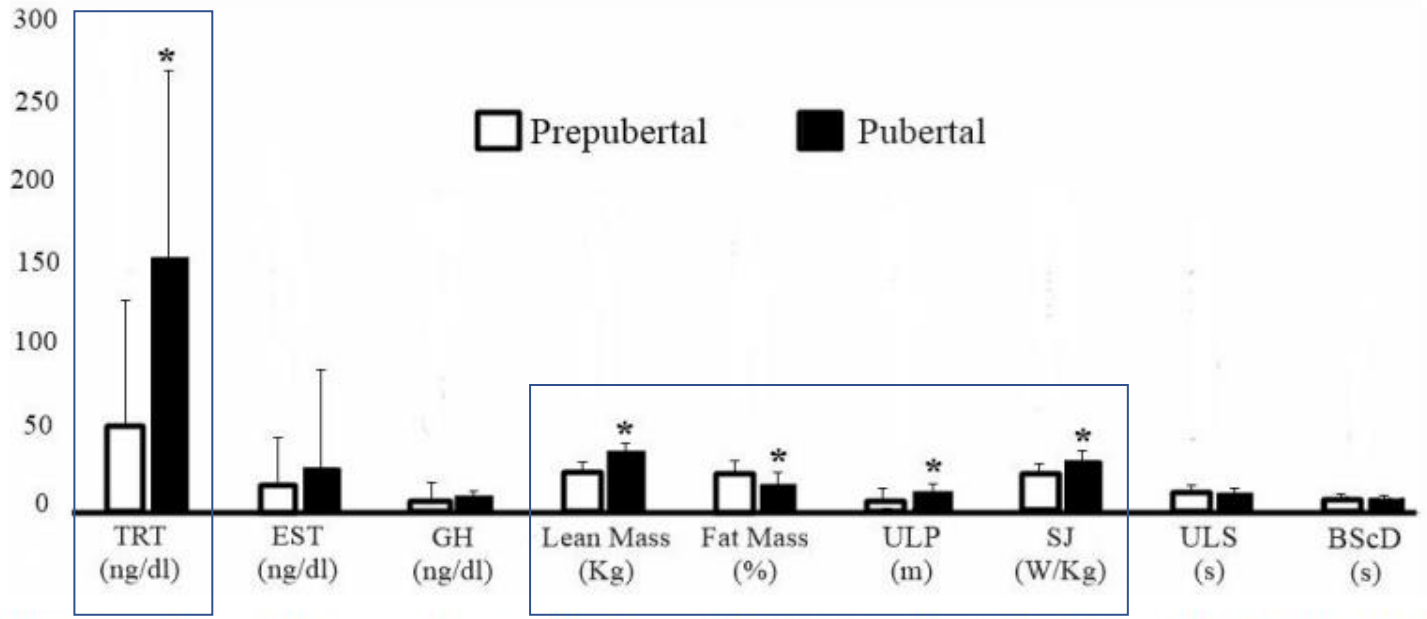


Figure 2. Comparison according to the stage of sexual maturation. * Statistically significant. TRT = Testosterone. EST = Estradiol. GH = Growth Hormone. ULP = Upper limbs power. SJ = Squat Jump. ULS = Upper limb speed. BScD = Body speed with change of direction.

Diferencias de maduración:
temprano-normal-tardío

age: 15
Tanner: 5
Muscle: 37 kg

age: 15
Tanner: 1
Muscle: 17 kg

Biological maturation of youth athletes: assessment and implications

Robert M Malina,[1,2] Alan D Rogol,[3] Sean P Cumming,[4] Manuel J Coelho e Silva,[5] Antonio J Figueiredo[5]

- Skeletal age
- Age at PHV
- Pubertal status
- Age at menarche

Non-invasive methods of maturity assessments **have limitations** when applied to youth athletes and need to be applied with caution.

Selection/exclusion in many sports follows a maturity-related gradient largely during the interval of puberty and growth spurt. **Numbers of late maturing boys (SA, pubertal status) in several team sports, swimming and athletics decrease between 11 and 12 years of age and 15–16 years with a corresponding increase in numbers of average, early and mature youth**. The trends reflect selective inclusion/exclusion and voluntary cessation, and are particularly noticeable in sports that demand speed, strength and power, and at more elite levels.

In contrast, **a preference for later maturing boys in artistic gymnastics and distance runs in athletics is also suggested.**

	Breast	Pubic Hair	Genitals	Pubic Hair
Stage 1	Small nipples. No breast. 	No pubic hair. 	No signs of puberty. Scrotum, testes, and penis as in childhood. 	No pubic hair. 
Stage 2	Breast and nipples have just started to grow. The areola has become larger. Breast tissue bud feels firm behind the nipple. 	Initial growth of long pubic hairs. These are straight, without curls, and of light color. 	Initial growth of scrotum and testes. The skin on the scrotum has become redder, thinner, and more wrinkled. The penis may have grown a little in length. 	Few hairs around the root of the penis. The hairs are straight, without curls, an of light color. 
Stage 3	Breast and nipples have grown additionally. The areola has become darker. The breast tissue bud is larger. 	The pubic hair is more widespread. The hair is darker, and curls may have appeared. 	The penis has now grown in length. Scrotum and testes have grown. The skin of the scrotum has become darker and more wrinkled. 	Hairs are darker and curlier and still sparse, mostly located at the penis root. 
Stage 4	Nipples and areolas are elevated and form an edge towards the breast. The breast has also grown a little larger. 	More dense hair growth with curls and dark hair. Still not entirely as an adult woman. 	The penis has grown in both length and width. The head of the penis has become larger. The scrotum and testes have grown. 	More dense, curly, and dark hair. The hair growth is reaching the inner thighs. 
Stage 5	Fully developed breast. Nipples are protruding, and the edge between areola and breast has disappeared. 	Adult hair growth. Dense, curly hair extending towards the inner thighs. 	Penis and scrotum as an adult. 	Pubic hair extends upwards to the umbilicus. It is dense and curly. 

			Age, years			
	n	Tanner score	Range	Mean	SD	Median
Female	23	I	9.2–12.4	10.5	1.0	10.2
	27	II	9.2–13.7	10.9	1.1	10.5
	32	III	9.7–15.2	12.5	1.3	12.3
	67	IV	10.7–15.9	14.0	1.2	14.4
	39	V	13.4–15.9	14.9	0.7	15
Male	27	I	9.1–12.2	10.4	1.0	10.4
	40	II	9.1–13.5	11.1	1.2	11.2
	27	III	10.2–14.4	12.7	1.2	13
	52	IV	11.6–15.9	14.5	1.0	14.6
	18	V	12.3–15.7	14.2	1.0	14.5

Review > J Sport Health Sci. 2021 Jul;10(4):403-412. doi: 10.1016/j.jshs.2020.09.003. Epub 2020 Sep 19.

Maturity-associated considerations for training load, injury risk, and physical performance in youth soccer: One size does not fit all

Chris Towlson [1], Jamie Salter [2], Jack D Ade [3], Kevin Enright [4], Liam D Harper [5], Richard M Page [6], James J Malone [7]

The 'gold standard' indicator for assessing biological maturation includes assessments of skeletal age [20]. However, this method is invasive and involves radiation exposure due to medical scanning to assess the skeletal maturity of the hand/wrist (e.g., X-Ray, Dual energy X-ray Absorptiometry (DXA); Magnetic Resonance Imaging (MRI) [21,22] and requires clinical expertise when applied in youth environments.

Radiografia de mão e punho ou radiografia carpal

Similarly, for predicting adult height, the Bayley-Pinneau [1952] method is widely used, as it aims to predict adult height from skeletal age and is based on the high correlation between skeletal ages attained from hand/wrist scans and the proportion of adult stature attained by adolescents at the time of the scan [35].

Annals of Human Biology, November–December 2011; 38(6): 662–668
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DOI: 10.3109/03014460.2011.598189

informa
healthcare

RESEARCH PAPER

A chart to predict adult height from a child's current height

Tim J. Cole[1] & Charlotte M. Wright[2,3]

[1]*UCL Institute of Child Health, University College London, London, UK,* [2]*Community Child Health, School of Medicine, University of Glasgow, Glasgow, Scotland, UK, and* [3]*Academic lead, Growth Chart Project, Royal College of Paediatrics and Child Health, London*

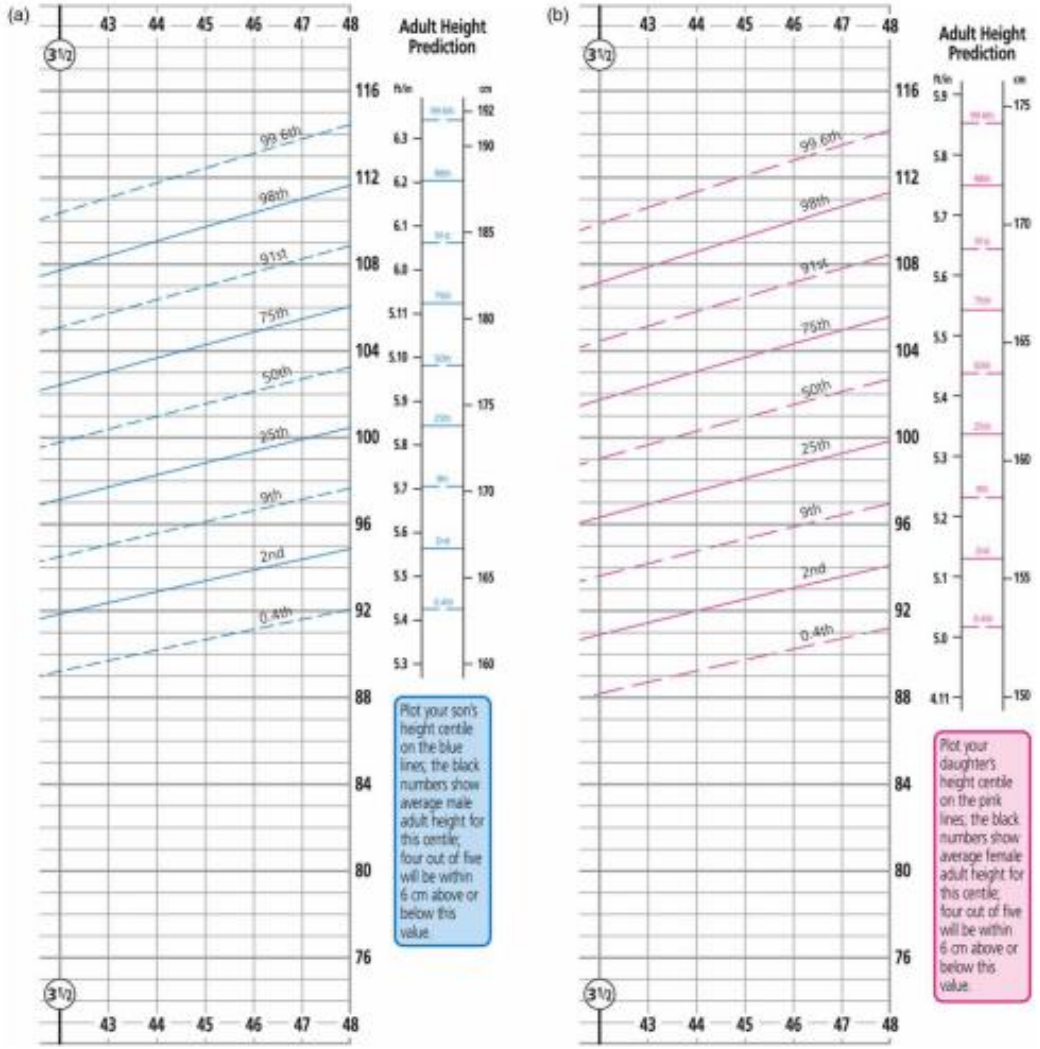


Figure 4. The adult height predictor in the UK-WHO 2–4 years height chart, for boys (left) and girls (right).

Sportverletz Sportschaden. 2015 Mar;29(1):56-63. doi: 10.1055/s-0034-1399043. Epub 2015 Feb 24.

[The assessment of biological maturation for talent selection – which method can be used?]

[Article in German]
L Müller [1], E Müller [2], C Hildebrandt [1], K Kapelari [3], C Raschner [1]

The prediction equations to determine APHV seem to be a valid method of assessing the biological maturity status of youths aged 10 - 13 years.

♂ Maturity Offset = −9.236 + 0.0002708·Leg Length and Sitting Height interaction −0.001663·Age and Leg Length interaction + 0.007216·Age and Sitting Height interaction + 0.02292·Weight by Height ratio, where R = 0.94, R^2 = 0.891, and SEE = 0.592.

♀ Maturity Offset = −9.376 + 0.0001882·Leg Length and Sitting Height interaction + 0.0022·Age and Leg Length interaction + 0.005841·Age and Sitting Height interaction − 0.002658·Age and Weight interaction + 0.07693·Weight by Height ratio, where R = 0.94, R^2 = 0.890, and SEE = 0.569.

Journal of Science in Sport and Exercise
https://doi.org/10.1007/s42978-020-00072-3

ORIGINAL ARTICLE

Coaches' Evaluations of Match Performance in Academy Soccer Players in Relation to the Adolescent Growth Spurt

Megan Hill[1,2] · Sam Scott[2] · Darragh McGee[1] · Sean Cumming[1]

Age group	*N*	Chronological age		Match grade		*N*	% of PAH	
		M	SD	M	SD		M	SD
Under 9	1684	8.99	0.39	2.49	0.63	1642	74.73	1.89
Under 10	1608	9.91	0.45	2.50	0.63	1566	77.35	1.90
Under 11	1609	10.90	0.47	2.48	0.63	1577	80.31	1.83
Under 12	1658	11.86	0.48	2.49	0.62	1658	83.00	2.04
Under 13	1836	12.89	0.49	2.29	0.71	1828	86.87	2.52
Under 14	1580	13.92	0.54	2.25	0.68	1552	91.28	2.81
Under 15	1213	14.80	0.50	2.21	0.71	1182	95.15	2.03
Under 16	1084	15.72	0.55	1.93	0.71	1052	97.64	1.39

Maturity status	Match grade (expected frequency)			
	1 (10.29%) (%)	2 (45.45%) (%)	3 (42.67%) (%)	4 (1.59%) (%)
Pre-growth (< 86%)	5.41	41.88	50.73	1.97
During growth (86%–95%)	13.65	50.30	35.00	1.04
Post-growth (> 95%)	23.03	47.76	27.79	1.42

NUTRITION RESEARCH
www.elsevier.com/locate/nutres
Nutrition Research 24 (2004) 235–242
Body composition in young male football (soccer) players
Luis A. Moreno*, Juan F. León, Ruth Serón, María I. Mesana, Jesús Fleta
ELSEVIER

Table 4
Body composition in male children aged 12 years

	Reference group		Football (soccer) group		*P* value
	Median	IQR	Median	IQR	
N	61		44		
Weight (kg)	43.00	10.00	41.50	6.75	NS
Height (m)	1.53	0.09	1.51	0.08	NS
BMI (kg/m^2)	18.47	2.77	18.16	3.41	NS
Sum 4 skinfolds (mm)	37.40	28–90	26.80	17.60	<0.05
% Body fat	20.50	11.89	14.78	8.69	0.01
Fat-free mass (kg)	33.01	6.28	34.19	6.75	NS
Waist circumference (cm)	66.50	7.70	65.00	7.88	NS
Arm fat (%)	35.26	16.87	25.08	11.81	0.0001
Arm muscle area (cm^2)	26.26	5.30	28.12	5.40	<0.05

Abbreviations as in Table 1.

Table 6
Body composition in male children aged 14 years

	Reference group		Football (soccer) group		*P* value
	Median	IQR	Median	IQR	
N	54		38		
Weight (kg)	54.50	15.50	56.50	9.50	NS
Height (m)	1.65	0.10	1.68	0.06	NS
BMI (kg/m^2)	19.97	4.20	20.53	2.34	NS
Sum 4 skinfolds (mm)	30.20	21.32	26.30	13.02	<0.05
% Body fat	18.19	9.69	15.87	6.85	<0.05
Fat-free mass (kg)	45.17	9.01	47.61	6.62	<0.05
Waist circumference (cm)	72.05	9.68	70.25	5.62	NS
Arm fat (%)	26.51	10.91	19.84	9.55	<0.001
Arm muscle area (cm^2)	33.77	8.61	37.82	7.65	<0.01

Abbreviations as in Table 1

Total-body skeletal muscle mass: development and cross-validation of anthropometric prediction models[1-3]

Robert C Lee, ZiMian Wang, Moonseong Heo, Robert Ross, Ian Janssen, and Steven B Heymsfield

Skeletal Muscle Mass (kg)

$$\begin{aligned} \text{SM (kg)} = \text{Ht} \times (&0.00744 \times \text{CAG}^2 + 0.00088 \\ &\times \text{CTG}^2 + 0.00441 \times \text{CCG}^2) + 2.4 \\ &\times \text{sex} - 0.048 \times \text{age} + \text{race} + 7.8 \end{aligned} \qquad (4)$$

where $R^2 = 0.91$, $P < 0.0001$, and SEE = 2.2 kg; sex = 1 for male and 0 for female, race = −2.0 for Asian, 1.1 for African American, and 0 for white or Hispanic.

Estimation of Total-Body Skeletal Muscle Mass in Children and Adolescents

JACQUES R. POORTMANS[1], NATHALIE BOISSEAU[4], JEAN-JACQUES MORAINE[2], RODRIGO MORENO-REYES[3], and SERGE GOLDMAN[3]

[1]Physiological Chemistry Departme... [2]...ical Education and Physiotherapy; [3]Physiology Department, Higher Institute of Phy... iotherapy; and [4]Department of Nuclear Medicine, Erasmus Hospital, Free University of Brusse... nd [4]Faculty of Sport Sciences, University of Poitiers, Poitiers, FRANCE

$$\begin{aligned} \text{SMM (kg)} = \text{Ht} \times [&(0.0064 \times \text{CAG}^2) + (0.0032 \times \text{CTG}^2) \\ &+ (0.0015 \times \text{CCG}^2)] + (2.56 \times \text{sex}) + (0.136 \times \text{age}). \end{aligned} \qquad [2]$$

PMCID
Int J Environ Res Public Health. 2021 May; 18(9): 4982.
Published online 2021 May 7. doi: 10.3390/ijerph18094982

Body Composition in Elite Soccer Players from Youth to Senior Squad

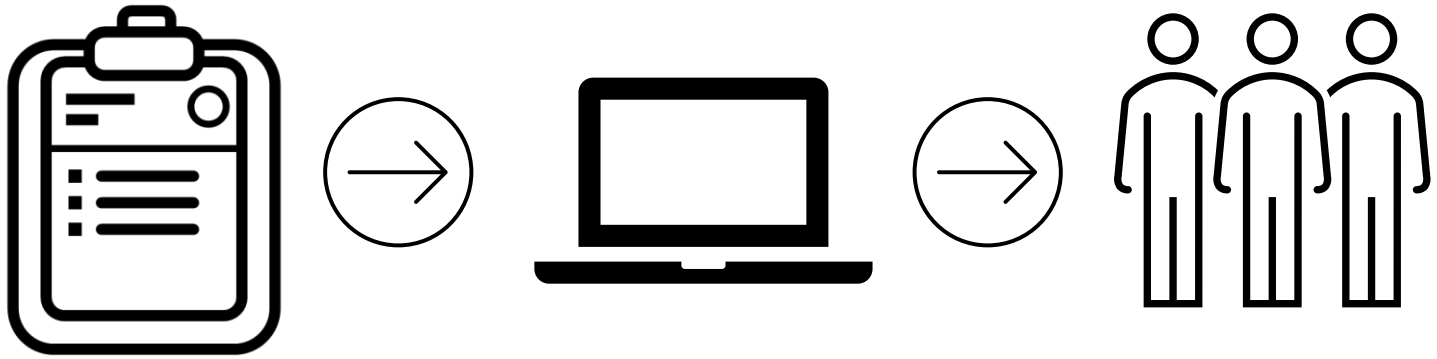
Marijan Spehnjak,[1] Marko Gušić,[2] Slavko Molnar,[2] Mario Baić,[3] Slobodan Andrašić,[4] Musa Selimi,[5] Draženka Maćak,[1] Dejan M. Madić,[1] Suzana Žilić Fišer,[6] Goran Sporiš,[3] and Nebojša Trajković[7,*]

Jorge Pérez-Gómez, Academic Editor

Table 1

Body height, weight and composition across age-related categories of soccer players.

Measures	U-15 (n = 152)	U-17 (n = 154)	U-19 (n = 61)	Seniors (n = 27)
Age (years)	13.7 ± 1.9	16.5 ± 0.5	18.2 ± 0.4	22.5 ± 4.9
BH (cm)	168.1 ± 14.1 *	180.6 ± 6.5	180.7 ± 6.6	179.7 ± 6.8
BW (kg)	56.5 ± 1278 *	70.5 ± 8.0	73.0 ± 8.4	72.4 ± 7.9
BMI (kg/m^2)	19.7 ± 2.4 *	21.7 ± 2.0	22.3 ± 2.0	22.4 ± 1.8
MM (kg)	27.5 ± 7.5 *	36.0 ± 4.1	37.2 ± 4.5	36.6 ± 4.3
BF (kg)	7.1 ± 3.8	7.1 ± 3.0	7.7 ± 3.4	8.5 ± 3.0
BF (%)	12.9 ± 6.8 #	10.0 ± 3.6	10.4 ± 3.9	11.6 ± 3.7
FFM (kg)	49.1 ± 12.7 *	63.4 ± 6.9	65.3 ± 7.5	64.0 ± 7.1
TBW (kg)	36.3 ± 9.1 *	46.4 ± 5.0	46.9 ± 7.6	46.9 ± 5.2
BMR (kcal/day)	1437.7 ± 269.5 *	1738.8 ± 148.3	1779.8 ± 163.3	1752.2 ± 153.1



academia clínica espregueira

Curso Avançado em Nutrição Pediátrica

... dos -9 (meses) aos 18 (anos)

Review > Int J Sport Nutr Exerc Metab. 2019 Mar 1;29(2):220-227.
doi: 10.1123/ijsnem.2018-0269. Epub 2019 Feb 15.

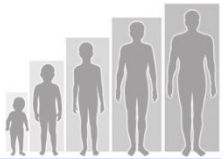
Nutrition for Special Populations: Young, Female, and Masters Athletes

Ben Desbrow [1], Nicholas A Burd [2], Mark Tarnopolsky [3], Daniel R Moore [4], Kirsty J Elliott-Sale [5]
Affiliations + expand
PMID: 30632423 DOI: 10.1123/ijsnem.2018-0269

- ✓ Training
- ✓ Recovery
- ✓ Performance

- ✓ Training
- ✓ Recovery
- ✓ Performance

⊕



Growth and Maturation

↑ RMR

(when RMR is examined per unit of body mass)

Growth and Maturation

- energy deposited in growing tissues
- energy expended to synthesize those tissues

Dietary Plan or Counseling?

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Affiliations + expand

PMID: 30632423 DOI: 10.1123/ijsnem.2018-0269

Plan

- prepubescent and pubescent ⊖
- postpubescent ⊕

- low competitive level ⊖
- high competitive level ⊕

Counseling

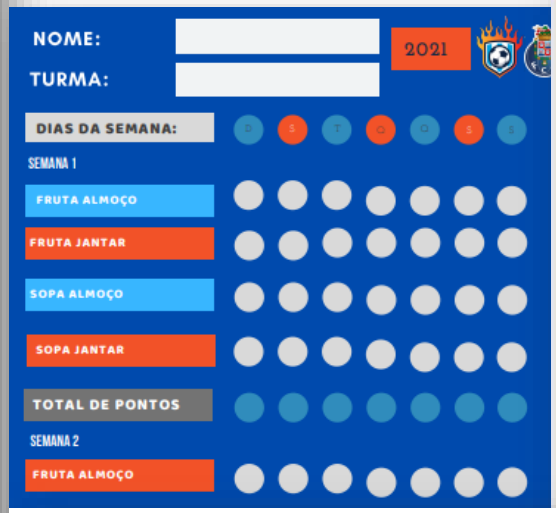
- prepubescent and pubescent ⊕
- postpubescent ⊕

- low competitive level ⊕
- high competitive level ⊖

Counseling

- Apelativo;
- Personalizado;
- Respeite as Preferências e Preterências Alimentares;
- Tenha em consideração o objetivo;
- Concreto;
- Ferramenta de Educação Alimentar.

Counseling



academia clínica espregueira

Curso Avançado em Nutrição Pediátrica

... dos -9 (meses) aos 18 (anos)

Plan

CME

INVITED REVIEW

Accurate Estimation of Energy Requirements of Young Patients

Andrea Carpenter, Paul Pencharz, and Marialena Mouzaki

TABLE 1. Summary of commonly used predictive equations

Name	Equation	
FAO/WHO/UNU (1)	BMR = 7.4 [wt (kg)] + 482 [ht(cm)] + 217	
	BMR = 12.1 [wt (kg)] + 499	
Schofield (weight and height) (3)	BMR = 8.4 [wt (kg)] + 4.7 [ht (cm)] + 200	
Schofield (weight) (3)	BMR = 13.4 [wt (kg)] + 693	
Oxford (2)	BMR = 0.255wt − 0.141	Males, 0–3 years
	BMR = 0.0937wt + 2.15	Males, 3–10 years
	BMR = 0.0769wt + 2.43	Males, 10–18 years
	BMR = 0.246wt − 0.0965	Females, 0–3 years
	BMR = 0.0842wt + 2.12	Females, 3–10 years
	BMR = 0.0465wt + 3.18	Females, 10–18 years

BMR = basal metabolic rate; ht = height; wt = weight; FAO/WHO/UNU = Food and Agriculture Organization/World Health Organization/United Nations University.

Plan

> Int J Sport Nutr Exerc Metab. 2020 Jul 1;30(4):249-257. doi: 10.1123/ijsnem.2019-0323. Epub 2020 May 26.

Metabolic Rate in Adolescent Athletes: The Development and Validation of New Equations, and Comparison to Previous Models

Reid J Reale [1], Timothy J Roberts [1], Khalil A Lee [1], Justina L Bonsignore [1], Melissa L Anderson [1]

RMR = 11.1 × body mass (kg) + 8.4 × height (cm) – (340 male or 537 female)

Plan

Energy and Macronutrient Considerations for Young Athletes

Marcus P. Hannon, MSc, Graeme L. Close, PhD, and James P. Morton, PhD
Research Institute for Sport and Exercise Sciences (RISES), Liverpool John Moores University, Liverpool, United Kingdom

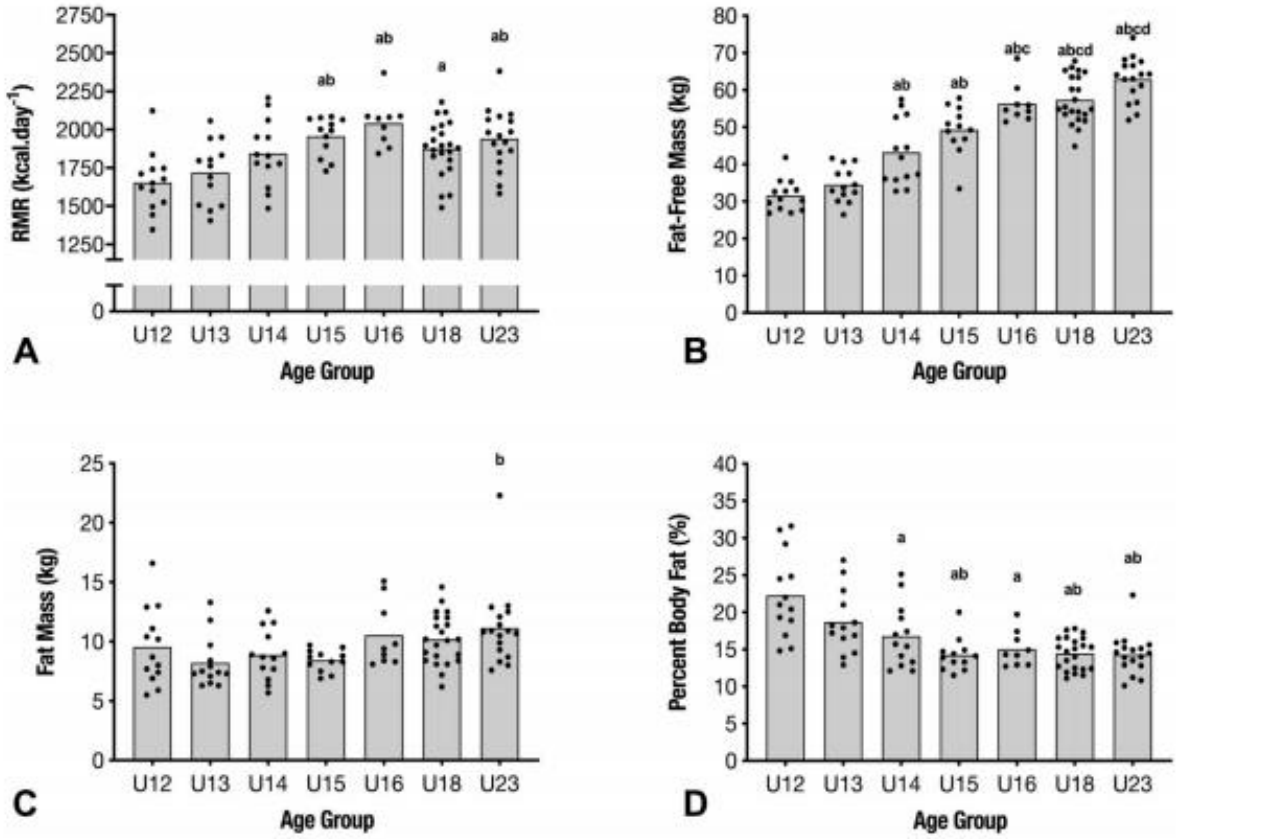


Figure 1. Adapted from Ref. 24: a comparison of (A) resting metabolic rate (RMR), (B) fat-free mass, (C) fat mass, and (D) percent body fat between youth soccer players (U12–U23 age groups; $n = 99$) from a Category One English Premier League academy [a]Significant difference from U12 age group, $P < 0.05$. [b]Significant difference from U13 age group, $P < 0.05$. [c]Significant difference from U14 age group, $P < 0.05$. [d]Significant difference from U15 age group, $P < 0.05$.

Plan

A Youth Compendium of Physical Activities: Activity Codes and Metabolic Intensities

NANCY F. BUTTE[1], KATHLEEN B. WATSON[2], KATE RIDLEY[3], ISSA F. ZAKERI[4], ROBERT G. MCMURRAY[5], KARIN A. PFEIFFER[6], SCOTT E. CROUTER[7], STEPHEN D. HERRMANN[8], DAVID R. BASSETT[9], ALEXANDER LONG[4], ZEKARIAS BERHANE[4], STEWART G. TROST[9], BARBARA E. AINSWORTH[10], DAVID BERRIGAN[11], and JANET E. FULTON[2]

TABLE 3. Model-based MET_y for play and sports activities for the Youth Compendium of Physical Activities.

Code	Activity Category	Specific Activity	MET_y by Age-group (yr)			
			6–9	10–12	13–15	16–18
30100X	Calisthenics/gymnastics	Active classroom instruction	4.3	4.4	4.4	4.5
30120X		Broadcast calisthenics—"colorful sunshine"	4.0	4.1	4.1	4.1
30140X		Broadcast calisthenics—"flourishing youth"	4.1	4.2	4.2	4.3
30160X		Broadcast calisthenics—"flying ideal"	3.6	3.7	3.7	3.7
30180X		Broadcast calisthenics—"hopeful sail"	3.8	3.8	3.9	3.9
30200X		Calisthenics—light	4.0	4.1	4.1	4.2
30220X		Gymnastics	2.7	2.7	2.7	2.7
30240X		Jumping jacks	4.6	4.7	4.7	4.8
30260X		Radio gymnastics	3.5	3.5	3.5	3.6
30280X		Strength exercises—curl-ups	2.4	2.4	2.4	2.4
30300X		Strength exercises—push-ups	3.9	4.0	4.0	4.1
85100X	Weight lifting[a]	Hand weights exercises	3.0	3.0	2.9	2.9
85120X		Strength exercises—bench press	2.0	2.0	1.9	1.8
85140X		Strength exercises—leg press	2.6	2.7	2.7	2.7
65100X	Sports/games	Basketball—game	6.7	7.0	7.2	7.5
65120X		Basketball—shooting and retrieving a basketball, continuously, without stopping	5.9	6.2	6.4	6.6
65140X		Basketball game (mini basketball)	4.9	5.0	5.1	5.2
65160X		Bowling—game	5.2	5.4	5.6	5.7
65180X		Boxing—punching bag and gloves	4.9	5.0	5.0	5.1
65200X		Catch/throw ball	4.1	4.1	4.1	4.1
65220X		Golf—game (mini golf)	4.0	3.9	3.9	3.9
65240X		Handball	5.4	5.6	5.7	5.8
65260X		Hockey—game (mini floor hockey)	3.8	3.7	3.7	3.6
65280X		Juggling	6.2	6.4	6.6	6.8
65300X		Kickball, continuous movement	8.2	8.3	8.4	8.6
65320X		Rollerblading	5.2	5.2	5.3	5.4
65340X		Skiing	5.6	5.8	6.0	6.2
65360X		Slide board—40 slides per minute	4.9	5.0	5.0	5.1
65380X		Slide board—50 slides per minute	5.4	5.5	5.7	5.8
65400X		Slide board—60 slides per minute	5.6	5.8	5.9	6.1
65420X		Slide board—70 slides per minute	6.0	6.2	6.3	6.5
65440X		Slide board—80 slides per minute	5.9	6.1	6.3	6.4
65460X		Soccer—around cones	5.4	5.6	5.7	5.8
65480X		Soccer—game	7.7	8.1	8.4	8.7
65500X		Table tennis	4.2	4.2	4.2	4.2
65520X		Tennis practice and games	6.1	6.3	6.5	6.7
65540X		Ultimate frisbbe	5.6	5.8	5.9	6.1
65560X		Volleyball	5.0	5.1	5.2	5.3
40100X	Dance/aerobics/steps	Aerobic dance/dance	3.6	4.1	4.5	4.8

Plan

In conclusion, applicability of PAL values recommended for adult athletes to estimate energy requirements in adolescent athletes must be questioned. Instead, a PAL range of 1.75-2.05 is suggested.

		Habitual physical activity		
Age (y)	*Sex*	*Light*	*Moderate*	*Heavy*
1-5	M, F	1.45	1.60	-
6-13	M	1.55	1.75	1.95
14-18	M	1.60	1.80	2.05
6-13	F	1.50	1.70	1.90
14-18	F	1.45	1.65	1.85

Plan

Table A2-2

Estimated Calorie Needs per Day, by Age, Sex, and Physical Activity Level, Ages 2 and Older

AGE	Males			Females		
	Sedentary*	Moderately Active*	Active*	Sedentary*	Moderately Active*	Active*
2	1,000	1,000	1,000	1,000	1,000	1,000
3	1,000	1,400	1,400	1,000	1,200	1,400
4	1,200	1,400	1,600	1,200	1,400	1,400
5	1,200	1,400	1,600	1,200	1,400	1,600
6	1,400	1,600	1,800	1,200	1,400	1,600
7	1,400	1,600	1,800	1,200	1,600	1,800
8	1,400	1,600	2,000	1,400	1,600	1,800
9	1,600	1,800	2,000	1,400	1,600	1,800
10	1,600	1,800	2,200	1,400	1,800	2,000
11	1,800	2,000	2,200	1,600	1,800	2,000
12	1,800	2,200	2,400	1,600	2,000	2,200
13	2,000	2,200	2,600	1,600	2,000	2,200
14	2,000	2,400	2,800	1,800	2,000	2,400
15	2,200	2,600	3,000	1,800	2,000	2,400
16	2,400	2,800	3,200	1,800	2,000	2,400
17	2,400	2,800	3,200	1,800	2,000	2,400
18	2,400	2,800	3,200	1,800	2,000	2,400
19-20	2,600	2,800	3,000	2,000	2,200	2,400
21-25	2,400	2,800	3,000	2,000	2,200	2,400

Plan

Routledge
Taylor & Francis Group

Journal of Sports Sciences, 2007; 25(S1): S73–S82

Nutrition for the young athlete

FLAVIA MEYER[1], HELEN O'CONNOR[2], & SUSAN M. SHIRREFFS[3]

If a reduction in body mass is required, it should be gradual and not more than **1.5%** of body mass each week (American Academy of Paediatrics, 2005)

67 kg → x 1.5% → 1.005 kg/week → x 4 → 4.02 kg/month

Plan

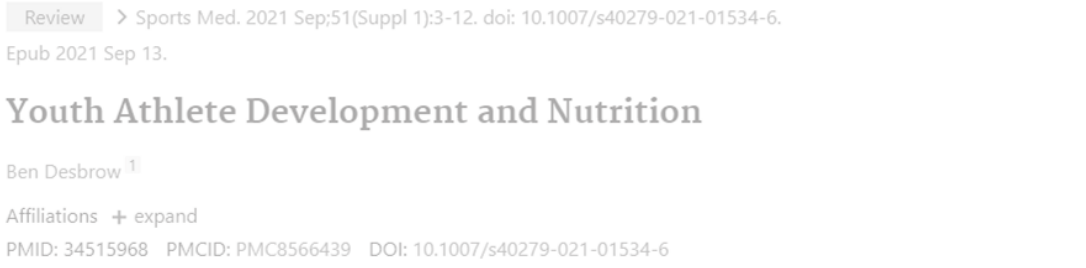
Original Article | Published: December 2002

Protein intake and nitrogen balance in male non-active adolescents and soccer players

N. Boisseau, C. Le Creff, M. Loyens & J. Poortmans

European Journal of Applied Physiology **88**, 288–293 (2002) | Cite this article

780 Accesses | 39 Citations | Metrics



Review > Sports Med. 2021 Sep;51(Suppl 1):3-12. doi: 10.1007/s40279-021-01534-6. Epub 2021 Sep 13.

Youth Athlete Development and Nutrition

Ben Desbrow [1]

Affiliations + expand

PMID: 34515968 PMCID: PMC8566439 DOI: 10.1007/s40279-021-01534-6

1.57 g kg^{-1} day^{-1}

- Protein should be consumed at breakfast to shift whole-body protein balance from a negative into a positive state, and moderate doses of protein (0.22–0.33 g kg^{-1} per meal/ snack) should be consumed every 3–4 hours throughout the day. **The equivalent of ~1.5 $g \cdot kg^{-1} \cdot day^{-1}$** should be sufficient to replace any exercise-induced amino acid oxidative losses, enhance whole-body net protein balance, and support the normal growth and development of adolescent athletes.

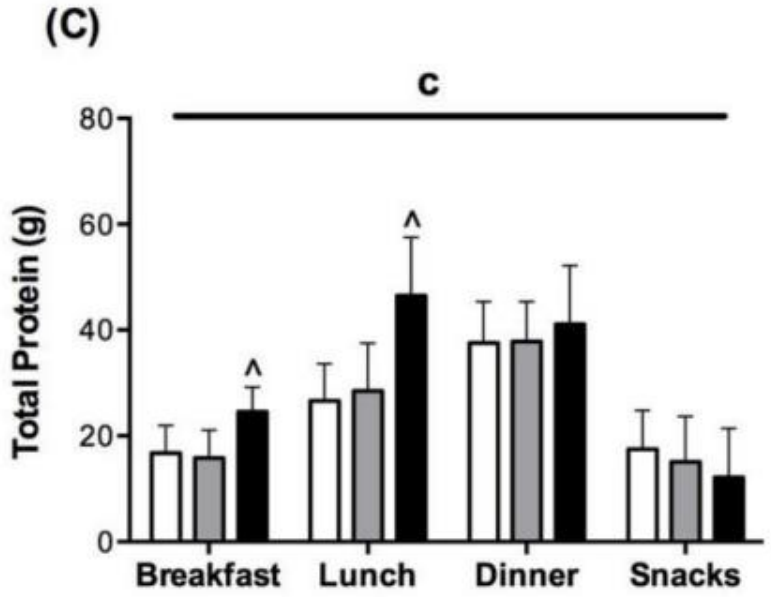
Plan

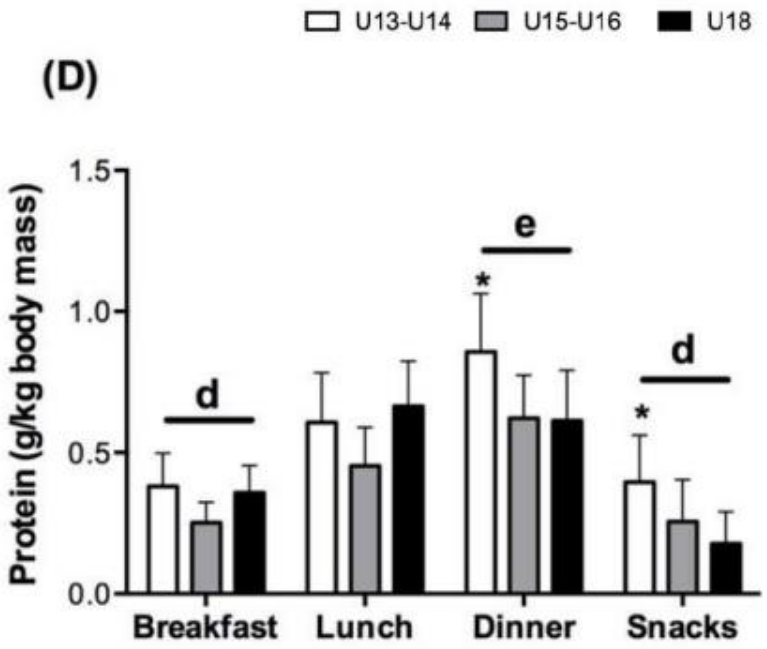
> Int J Sport Nutr Exerc Metab. 2016 Oct;26(5):473-480. doi: 10.1123/ijsnem.2015-0340. Epub 2016 Aug 24.

Daily Distribution of Carbohydrate, Protein and Fat Intake in Elite Youth Academy Soccer Players Over a 7-Day Training Period

Robert J Naughton, Barry Drust, Andy O'Boyle, Ryland Morgans, Julie Abayomi, Ian G Davies, James P Morton, Elizabeth Mahon

PMID: 27633998 DOI: 10.1123/ijsnem.2015-0340





Plan

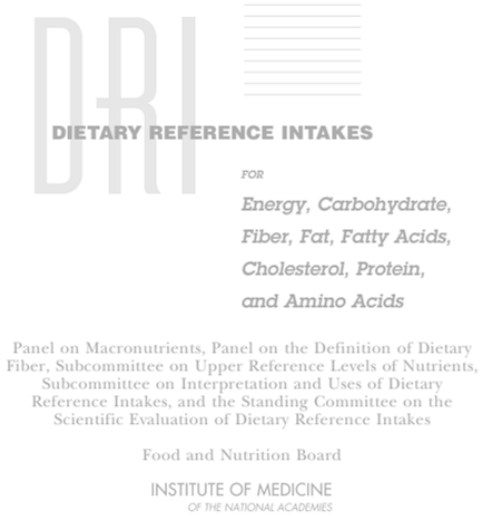
Sport nutrition for young athletes

Laura K Purcell; Canadian Paediatric Society, Paediatric Sports and Exercise Medicine Section

$3 – 8\ g\ kg^{-1}\ day^{-1}$

Average number of daily training hours

Activity		Daily carbohydrate intake target
Light	low intensity or skill-based activities	3-5 g/kg/day
Moderate	Moderate exercise program (eg 1h per day)	5-7 g/kg/day
High	Endurance program 1-3h a day moderate-high intensity	6-10 g/kg/day
Very high	Extreme commitment 4-5h a day moderate-high intensity	8-12 g/kg/day


DRI

DIETARY REFERENCE INTAKES

FOR

Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids

Panel on Macronutrients, Panel on the Definition of Dietary Fiber, Subcommittee on Upper Reference Levels of Nutrients, Subcommittee on Interpretation and Uses of Dietary Reference Intakes, and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes

Food and Nutrition Board

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

FAT

25-35% TEI

Appl Physiol Nutr Metab. 2008 Apr;33(2):420-7. doi: 10.1139/H07-185.

Children's thermoregulation during exercise in the heat: a revisit.

Falk B[1], Dotan R.

Children Advantage* on Thermoregulation	Children Disadvantage* on Thermoregulation
Higher body surface area to body mass ratio (more efficient "dry" heat dissipation)	Lower rate of sweating (less heat loss by evaporation)
Lower rate of sweating (prevents a greater decrease in plasma volume)	Less effective at transferring heat from the central core (muscle, brain,etc) to the periphery (skin)
Higher peripheral blood flow in the heat (facilitates heat dissipation)	Higher internal heat production, through a higher energy cost of locomotion.

Int J Sport Nutr Exerc Metab. 2014 Oct;24(5):570-84. doi: 10.1123/ijsnem.2014-0031. Epub 2014 Mar 25.

Sports Dietitians Australia position statement: sports nutrition for the adolescent athlete

Ben Desbrow [1], Joanna McCormack, Louise M Burke, Gregory R Cox, Kieran Fallon, Matthew Hislop, Ruth Logan, Nello Marino, Susan M Sawyer, Greg Shaw, Anita Star, Helen Vidgen, Michael Leveritt

400–600 mL
2–3 h before

reduce body weight loss to between 0 and 2%

100–250 mL every 20 min

450–675 mL for every 0.5 kg of body mass lost

moderate-to-high intensity exercise > 60 min

30–60 g/h carbohydrates

(6% carbohydrate drink i.e., a commercial sports drink because drinks with a higher carbohydrate content (8%) have been shown to increase gastrointestinal discomfort in both male and female adolescents)

> Int J Sport Nutr Exerc Metab. 2014 Oct;24(5):570-84. doi: 10.1123/ijsnem.2014-0031. Epub 2014 Mar 25.

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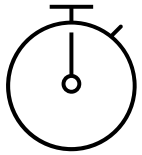
Clinical Trial > Int J Sport Nutr Exerc Metab. 2004 Dec;14(6):673-83. doi: 10.1123/ijsnem.14.6.673.

Gastrointestinal discomfort during intermittent high-intensity exercise: effect of carbohydrate-electrolyte beverage

Xiaocai Shi [1], Mary K Horn, Kris L Osterberg, John R Stofan, Jeffrey J Zachwieja, Craig A Horswill, Dennis H Passe, Robert Murray



TEMPO DE COMPETIÇÃO

Seniores e Juniores A: 2x45 minutos
Juniores B (Juvenis): 2x40 minutos
Juniores C (Iniciados): 2x35 minutos
Juniores D (Infantis): 2x30 minutos
Juniores E (Benjamins): 2x25 minutos

ACUTE FUELLING STRATEGIES – these guidelines promote high carbohydrate availability to promote optimal performance in competition or key training sessions

General fuelling up	• Preparation for events < 90 min exercise	7–12 g/kg per 24 h as for daily fuel needs	• Athletes may choose carbohydrate-rich sources that are low in fiber/residue and easily consumed to ensure that fuel targets are met, and to meet goals for gut comfort or lighter "racing weight".
Carbohydrate loading	• Preparation for events > 90 min of sustained/intermittent exercise	36–48 h of 10–12 g/kg body weight per 24 h	
Speedy refuelling	• <8 h recovery between 2 fuel demanding sessions	1–1.2 g/kg/h for first 4 h then resume daily fuel needs	• There may be benefits in consuming small regular snacks • Carbohydrate rich foods and drink may help to ensure that fuel targets are met.
Pre-event fuelling	• Before exercise > 60 min	1–4 g/kg consumed 1–4 h before exercise	• Timing, amount and type of carbohydrate foods and drinks should be chosen to suit the practical needs of the event and individual preferences/experiences. • Choices high in fat/protein/fiber may need to be avoided to reduce risk of gastrointestinal issues during the event. • Low glycemic index choices may provide a more sustained source of fuel for situations where carbohydrate cannot be consumed during exercise.
During brief exercise	• <45 min	Not needed	
During sustained high intensity exercise	• 45–75 min	Small amounts including mouth rinse	• A range of drinks and sports products can provide easily consumed carbohydrate. • The frequent contact of carbohydrate with the mouth and oral cavity can stimulate parts of the brain and central nervous system to enhance perceptions of well-being and increase self-chosen work outputs.
During endurance exercise including 'stop and start' sports	• 1–2.5 h	30–60 g/h	• Carbohydrate intake provides a source of fuel for the muscle to supplement endogenous stores. • Opportunities to consume foods and drinks vary according to the rules and nature of each sport. • A range of everyday dietary choices and specialised sports products ranging in form from liquid to solid may be useful • The athlete should practice to find a refuelling plan that suits their individual goals including hydration needs and gut comfort.
During ultra-endurance exercise	• >2.5–3 h	Up to 90 g/h	• As above. • Higher intakes of carbohydrate are associated with better performance. • Products providing multiple transportable carbohydrates (Glucose:fructose mixtures) achieve high rates of oxidation of carbohydrate consumed during exercise.

ACUTE FUELLING STRATEGIES – these guidelines promote high carbohydrate availability to promote optimal performance in competition or key training sessions

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During ultra-endurance exercise	• >2.5–3 h	Up to 90 g/h	• As above. • Higher intakes of carbohydrate are associated with better performance. • Products providing multiple transportable carbohydrates

Exemplo: jogo às 11h00

- Sub16
- 62 kg

Pequeno-almoço (1h30 antes)

124 g HC

(2 g HC/kg)

Pequeno-almoço


80 g


2 fatias


80 g


2 fatias

Intervalo


~30g HC

Pós-Jogo

Exemplo: jogo às 11h00

- Sub16
- 62 kg

> Int J Sport Nutr Exerc Metab. 2014 Oct;24(5):570-84. doi: 10.1123/ijsnem.2014-0031. Epub 2014 Mar 25.

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- Advice for young athletes is the same as adult athletes: 1.2 g/kg/h of high-GI carbohydrate should be consumed in the 4 hours immediately postexercise or Co-ingestion of 0.8 g/kg/h of high-GI carbohydrate + 0.3 g/kg/h of high biological value Protein.
- High-GI carbohydrates rapidly elevate blood glucose and promote glycogen resynthesis and are therefore preferred to low-GI carbohydrates during this timeframe.

Exemplo: jogo às 11h00

- Sub16
- 62 kg

74 g (0.3 g P/kg * 4h)

198 g (0.8 g HC/kg * 4h)

Pequeno-almoço (1h30 antes)

124 g HC

(2 g HC/kg)

Pós Jogo 28 g P + 58 g HC

Almoço 60 g P + 140 g HC

Pequeno-almoço


80 g


2 fatias


80 g


2 fatias

Intervalo


~30g HC

Pós-Jogo

Almoço


150 g


200 g


80 g

> Int J Sport Nutr Exerc Metab. 2014 Oct;24(5):570-84. doi: 10.1123/ijsnem.2014-0031. Epub 2014 Mar 25.

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Ergogenic Aids
(*only postpubescent*)

- ✓ sufficient training load
  and
- ✓ supplementation is supervised by an adult
  and
- ✓ supplement intake represents optimization of sports performance, with no reported adverse effects

→ Yes

- ✓ either training load or physiological characteristics of the sport do not justify the intake
  or
- ✓ there is no adult to supervise
  or
- ✓ there is no evidence of the supplement´s safety

→ No

Int J Sport Nutr Exerc Metab. 2014 Oct;24(5):570-84. doi: 10.1123/ijsnem.2014-0031. Epub 2014 Mar 25.

Sports Dietitians Australia position statement: sports nutrition for the adolescent athlete

Ben Desbrow [1], Joanna McCormack, Louise M Burke, Gregory R Cox, Kieran Fallon, Matthew Hislop, Ruth Logan, Nello Marino, Susan M Sawyer, Greg Shaw, Anita Star, Helen Vidgen, Michael Leveritt

Nutritional Supplements

- ✓ deficiency

or

- ✓ tried to improve dietary habits

→ Yes

- ✓ no deficiency

or

- ✓ no attempt to improve dietary habits

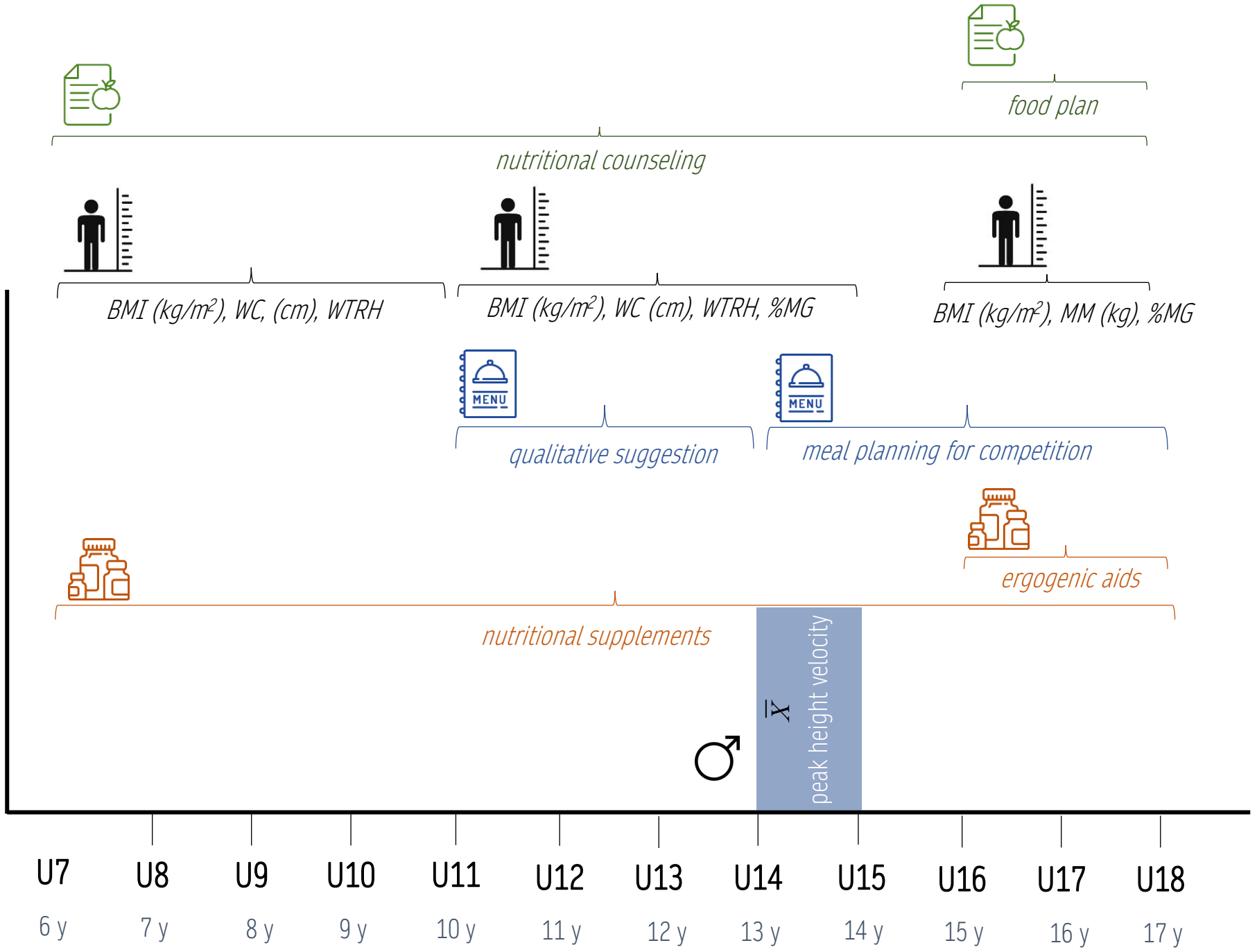
→ No

	Yes	*No*	*Yes, but*	
Multivitamins			Every other day and after trying to improve eating habits	PRE and POST
Magnesium				PRE and POST
Omega-3 FA			If a low consumption of fish is found	PRE and POST
Vitamin D			When deficiency is observed	PRE and POST
Vitamin C				
Creatine			0.1 g/kg of body weight or 3 to 5 g/day	POST
Caffeine			3 mg kg-1day-1 maximum daily dose Limit caffeine intake during the week and save it for just before the competition	POST
Sodium bicarbonate				
Nitrate				
B-alanine				
Tart-cherry				POST

PRE – prepubescent | POST - postpubescent

	Yes	*No*	*Yes, but*	
Whey Protein			If it is necessary to meet protein requirements	PRE and POST
Sports Beverages	●			PRE and POST
Energetic Beverages			Attention to the caffeine dosage	POST
Iron			If deficiency is observed	

PRE – prepubescent | POST - postpubescent


food plan
nutritional counseling
BMI (kg/m²), WC, (cm), WTRH
BMI (kg/m²), WC (cm), WTRH, %MG
BMI (kg/m²), MM (kg), %MG
MENU
MENU
qualitative suggestion
meal planning for competition
ergogenic aids
nutritional supplements
peak height velocity
U7
U8
U9
U10
U11
U12
U13
U14
U15
U16
U17
U18
6 y
7 y
8 y
9 y
10 y
11 y
12 y
13 y
14 y
15 y
16 y
17 y

> Appetite. 2020 Jul 1;150:104645. doi: 10.1016/j.appet.2020.104645. Epub 2020 Feb 27.

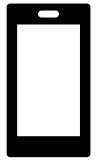
Sports nutrition interventions: A systematic review of behavioural strategies used to promote dietary behaviour change in athletes

Meghan R N Bentley [1], Nigel Mitchell [2], Susan H Backhouse [3]

Meetings with registered Dietitian for individualised education following dietary assessments.

Individual and group workshops (gardening, cooking, etc).

Athlete and parent interactive supermarket tour.



Access to regular nutritional support.

Monitoring of body mass.

Individual and group feedback on dietary intake.

Free and discounted food and batch-tested food/supplements.

Educational lecture or session

Access to social media group

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Review > J Nutr Educ Behav. 2017 Feb;49(2):142-165.e1. doi: 10.1016/j.jneb.2016.09.003. Epub 2016 Nov 1.

Factors Influencing Efficacy of Nutrition Education Interventions: A Systematic Review

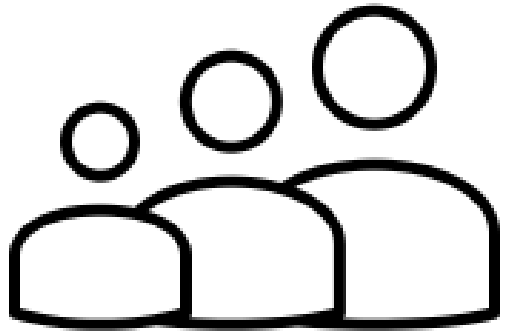
Mary W Murimi [1], Michael Kanyi [2], Tatenda Mupfudze [2], Md Ruhul Amin [2], Teresia Mbogori [2], Khalid Aldubayan [2]

Results: Efficacy of nutrition education interventions depended on major factors: interventions **that lasted ≥5 months**; having **≤3 focused objectives**; **appropriate design** and use of theories; fidelity in interventions; and support from policy makers and management for worksite environmental interventions.

Lead Article

Factors that contribute to effective nutrition education interventions in children: a systematic review

Mary W. Murimi, Ana Florencia Moyeda-Carabaza, Bong Nguyen, Sanjoy Saha, Ruhul Amin, and Valentine Njike



Age-appropriate activities.

Although age-appropriate interventions were important in all age groups, they were critical in the preschooler age group. Age appropriate activities in preschool included learning **through a story book; using role models through play acting, posters, or videos; exploring with the senses; and playing games or coloring sheets with peers**. For instance, the intervention conducted by Witt and Dunn consisted of hands-on, 30-minute weekly lessons. It included the use of music, exploration of the senses, colors, and imaginary trips to promote the consumption of fruits and vegetables. The intervention was delivered in short but frequent sessions to accommodate the short concentration span of preschoolers.

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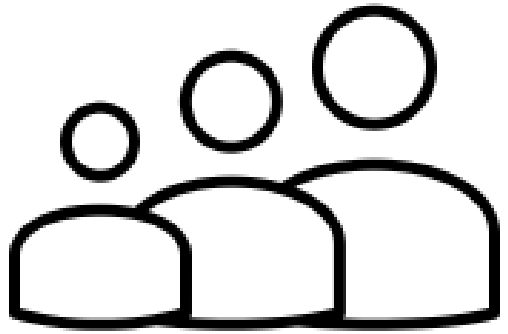

Age appropriate activities at the elementary school level included cooking and/or tasting sessions; a learning-through-playing approach based on age or grade; gardening sessions; training classes in physical activity; the use of posters, masks, and songs; and the use of vocabulary and mathematics questions based on nutrition-related issues. In particular, the intervention carried out by Keihner et al designed different activities based on grade level. For example, 4th-grade students were asked to search for a nutrition-related word and write a composition about its qualities and health benefits, while the 5th grade students completed a word scramble and prepared a group oral report about food qualities and health benefits.

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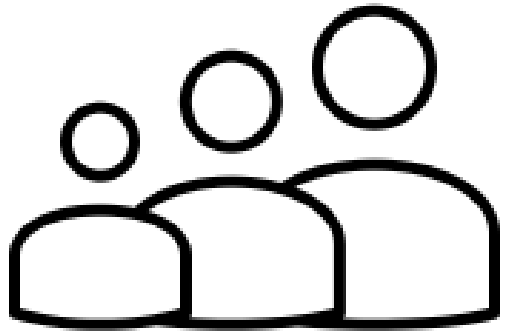

The successful nutrition education interventions that targeted secondary school children added policy and environmental changes to the intervention, used age appropriate activities that included technology, identified specific behaviors, aligned activities with their stated objectives, offered the intervention frequently (such as weekly or biweekly), engaged parents on a face-to-face basis, and trained implementers to ensure fidelity.

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The use of social media in nutrition interventions for adolescents and young adults—A systematic review

Michelle M. Chau*, **Marissa Burgermaster**[1], **Lena Mamykina**
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The results show that use of social media in public health interventions for improving nutrition among adolescents and young adults is limited but promising. Of sixteen studies reviewed, eleven had significant nutrition outcomes suggesting social media may be valuable for delivering interventions for adolescents and young adults.

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ge-Assisted Mobile Applications Improve Dietary Habits, Knowledge, and
ours in Elite Athletes? A Pilot Study

tsell, 2017 Sep; 5(3): 60.
online 2017 Aug 11. doi: 10.3390/sports5030060

Table 1

Participant engagement with education material.

Week	Topic	Views/Downloads of Fact Sheets	Views/Downloads of Education Videos
1	Hydration	6	11
2	Body composition	144	6
3	Supplements	52	7
4	Nutrition across a training week	2	7
5	Event nutrition	6	3
6	Nutrition for optimal recovery	4	4

Curso Avançado em Nutrição Pediátrica

... dos -9 (meses) aos 18 (anos)

Obrigada pela atenção.

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