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Cost of Work in Relation to Basal Metabolism.

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The extra energy output caused by walking was determined in 65 children, boys and girls, ranging in age from 11 to 14 years. The procedure followed was similar to that of Benedict and Murchhausen.[1] Our results show a general average cost per horizontal kilogram meter for the boys of 0.6449 gm. calories and for the girls 0.5949. The general average for the entire group of boys is approximately 20% higher than the 0.538 gm. cal. given by Smith[2] as an average for 8 normal men examined by him and which he says conforms to the results of Benedict and Murchhausen. The average basal metabolic rate for the group of boys included in our studies was 47.5 cal. per sq. meter surface according to the figures recorded by Du Bois[3] for boys of different ages. This basal rate of 47.5 cal. is also 20% higher than given for adult men in the same table.

Accepting the value of 0.538 gm. cal. reported by Smith[2] as a fair average cost per H. Kgm. M. for horizontal walking by normal adult men and using the Du Bois[3] standard table of B.M.R. for different ages and sex we should be able, if there is any relationship between basal metabolism and unit cost of walking, to calculate the probable cost of a similar activity in each of the different age groups of boys and girls. The calculated values and our experimentally obtained results are set out in Table I for each of the age groups.

TABLE I.

Age	B.M.R.	Girls. Obtained Value gm. cal.	Calculated Value gm. cal.
11	44.5	.6459	.6339
12	43.0	.6045	.6126
13	42.0	.5850	.5982
14	41.0	.5441	.5841
		Boys	
11	48.5	.6527	.6605
12	47.5	.6521	.6469
13	47.0	.6316	.6400
14	46.0	.6434	.6265

[1] Benedict and Murchhausen, Pub. No. 231, Carnegie Institute of Washington.

[2] Smith, Henry M., Pub. No. 309, Carnegie Institute of Washington 143.

[3] Du Bois, Eugene F., Basal Metabolism in Health and Disease, 1924.

While there is not perfect agreement between the obtained and calculated values, there is for this type of work such close accord that we feel justified in drawing the conclusion that the unit cost of work such as walking in normal individuals varies directly with the basal metabolic rate. This finding is in harmony with the results of Plummer and Boothby,[4] from their study of the energy output in horizontal walking by individuals with high basal rate due to hyperthyroidism.

[4] Plummer, H. S., and Boothby, Wm., *Am. J. Phys.*, 1922, **63**, 406.