



Letters to the Editor

Inaccuracy of applying energy expenditure rates of adults to children

Dear Sir:

Bouchard et al (1) suggested a diary activity record to assess energy expenditure in children and adults based on recording at 15-min intervals a categorical value corresponding to the dominant activity during that time period, with a score ranging from 1 to 9 depending on the activity's energy demand. I wish to express my concern about the conversion of the categorical scores of children into energy expenditure. The energy cost for each category of activities used by Bouchard et al (1) was established from several sources, based exclusively or primarily on the energy cost of activities measured in adult men and women. We (2) have recently showed the inapplicability of energy cost values measured in adults for use in children 2 to 4 yr old. Table 1 summarizes the large differences in the energy cost of activities performed by these two age groups, whether expressed in absolute energy terms per kg body weight or as multiples of the corresponding basal metabolic expenditure.

The error in applying the energy cost of

activities performed by adults to children of other age groups is illustrated in Table 2. Although the data were obtained from various sources and the activities performed were not identical or standardized for all ages, there is a clear trend of a decrease in energy cost per kg body weight as age increases. The error seems to become smaller when the energy cost of an activity is expressed as a multiple of the basal metabolic rate for the corresponding age group, at least after 9 or 11 yr. More information on the energy cost of children's activities should be obtained or analyzed to have a better estimate of the error's magnitude.

These considerations do not alter the test-retest reliability results of Bouchard et al's (1) categorical scoring but they may affect their estimates of mean energy expenditure of children and they might influence the correlations between energy expenditure and physical working capacity or body fatness.

In conclusion, the data in Tables 1 and 2

TABLE 1

Comparison of energy cost of activities of preschool children (1.5-4 yr) and adults*

	Energy cost (cal/kg/min)			Basal metabolic energy (times†)		
	Child	Adult‡	Child/adult	Child	Adult‡	Child/adult
Basal metabolism	38	18	2.1			
Lying down, awake	44	20	2.2	1.2	1.2	1.0
Sitting quietly, playing or in sedentary work	47	22	2.1	1.2	1.2	1.0
Walking leisurely on level ground	71	58	1.2	1.9	3.4	0.6
Walking up- and downhill	87	80	1.1	2.3	4.6	0.5
Walking rapidly at a grade	98	85	1.2	2.6	4.7	0.6
Leisure ride on tricycle (children) or bicycle (adults)	75	58	1.3	1.9	3.3	0.6
Climbing stairs slowly	94	85	1.1	2.5	4.7	0.5

* From Torún et al (2). Data for adults are from various sources.

† Ratio of energy cost of the activity/basal energy expenditure.

‡ Combining data for men and women.

TABLE 2
Comparison of the energy cost of selected activities at different ages

Age	BMR cost*	Sitting or standing still, reading, doing puzzles or school-work, singing		Playing musical instruments, cooking, dusting		Moderate play at home or schoolground, dressing and undressing, light-to-moderate domestic work		Walking leisurely indoors or outdoors		Carpentry work		References
		Cost	BMET†	Cost	BMET	Cost	BMET	Cost	BMET	Cost	BMET	
2-4	38	47	1.2			73	1.9	79	2.1			2
6-9	30	44	1.5									3,4
9-11	26	36	1.4	47	1.8	66	2.5					3-8
12-14	21	32	1.5	44	2.1	56	2.7	70	3.3	75	3.6	4-6,9
14-16	20	26	1.3	47	2.4			62	3.4	63	3.5	10
adult	18	23	1.3	38	2.1	50	2.8					‡

* Energy cost of the activity, cal/kg/min.
† Basal metabolic energy times.
‡ Weighted averages from various sources.

show that in order to obtain a reliable estimate of children's energy expenditure and dietary energy needs, the frequent error of assigning adult energy expenditure rates to children must be avoided. If there are no data in children about the energy cost of an activity, it will be better to calculate it as a multiple of the basal metabolic rate of that child's age group using the multiple of the adult's basal metabolic expenditure for that activity, rather than on the basis of the energy expended by an adult per kg of body weight. This, however, may still result in an erroneous estimate, specially in the case of young children.

Benjamin Torun, MD, PhD
Head, Division of Nutrition and Health
Institute of Nutrition of Central
America and Panama (INCAP)
Apartado Postal 1188
Guatemala City, Guatemala

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