

Comparison of factorial estimates of energy expenditure using six or fifteen activity categories with measures using doubly labelled water and intake-balance

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In a previous study we found that factorial estimates of daily energy expenditure (EE) were consistently lower using a method based on fifteen activity categories (15AC) than using a method based on six categories (6AC) (1). It is important to know which of these methods is most accurate because the 15AC method has been used to derive recommended dietary intakes for energy in Australians (2), while the 6AC method is easier for subjects to use. The aim of the present study was therefore to compare daily EE measured by both the 6AC and the 15AC factorial methods (6ACEE and 15ACEE respectively) with daily EE measured using both doubly labelled water (DLWEE) and intake-balance (IBEE).

The study was carried out on 10 non-smoking volunteers as reported previously (3), except that activity records were kept using the 15AC method (4) and analysed for both 15ACEE (4) and 6ACEE (3) for the present study. Daily EE was 4.8 ± 1.0 % higher for 6AC than 15AC for all subjects with values (expressed as multiples of basal metabolic rate) of 1.55 ± 0.20 and 1.47 ± 0.23 respectively (P<0.001). The results for the various measures of EE in MJ/day are shown in the table. In females there were no significant differences between 6ACEE, IBEE and DLWEE, but in males 6ACEE was lower than both IBEE and DLWEE.

	15ACEE ¹ MJ/day	p ^{2a}	6ACEE ¹ MJ/day	p ^{2b}	IBEE ¹ MJ/day	p ^{2c}	DLWEE ¹ MJ/day	p ^{2d}
Males (n=4)	10.40 ± 1.38	ns	10.88 ± 1.49	<0.03	12.83 ± 1.9	ns	12.90 ± 1.9	<0.05
Females (n=6)	8.13 ± 0.92	<0.01	8.56 ± 0.77	ns	8.41 ± 1.51	ns	9.10 ± 1.82	ns
All subjects (n=10)	9.04 ± 0.50	<0.001	9.50 ± 0.05	ns	10.18 ± 0.88	ns	10.62 ± 0.83	<0.06

¹ mean ± SD of measures of EE; ² P = statistical significance of differences between various measures of EE, where a is between 15ACEE and 6ACEE, b is between 6ACEE and IBEE, c is between IBEE and DLWEE and d is between DLWEE and 6ACEE

These results confirm our previous findings that factorial estimates using 15AC are lower than 6AC, and suggest that the 6ACEE measures are the more accurate as they agree more closely with IBEE and DLWEE. However, the present study suggests that 6ACEE underestimates EE compared with DLWEE and IBEE in males but not females.

1. Warwick P, Busby R. Factorial estimates of energy expenditure using six or fifteen activity categories. Proc Nutr Soc Aust 1996;20:(see index of this volume).
2. National Health and Medical Research Council. Recommended dietary intakes for Australians. Canberra: AGPS, 1990.
3. Warwick P, Baines J. Energy expenditure in free-living smokers and nonsmokers: comparison between factorial, intake-balance and doubly labelled water measures. Am J Clin Nutr 1996;63:15-21.
4. Warwick P, Busby R. Factorial estimation of daily energy expenditure in university students. Aust J Nutr Diet 1991;48:95-9.