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IDEEA Estimation of Daily Behavior Energy Consumption: Verified by Metabolic Chamber

Qi Lu, Xiaomei Zhu, Lei Ai, Junfei Chen, Ling Liu
jiangsu research institute of sports science

Objective To investigate the accuracy of Intelligent Device for Energy Expenditure and Activity (IDEEA) in the measurement of energy consumption in the evening of adults in Nanjing.

Methods 120 subjects were selected, and worn IDEEA into the metabolic chamber for 11 hours of energy consumption test. Body composition by Dual-Energy X-ray Absorptiometry. Sleep metabolic rate (SMR), Rest metabolic rate (RMR) and Basal metabolic rate (BMR) by metabolic chamber.

Results The energy consumption results were paired with sample T test. The results showed significant difference between MC and IDEEA, but the effect size was between 0.004 and 0.042. The correlation between MC and IDEEA was 0.85 to 0.96. The absolute error rate of energy consumption measurement was from 6.16 % to 7.92 %, of which the measurement error of sleep energy consumption was $6.16 \% \pm 4.16 \%$, and that of Internet energy consumption was $7.92 \% \pm 5.99 \%$.

Conclusions Energy measurement of IDEEA absolute error rate is within acceptable range, and it provides a high-precision alternative method for estimating energy consumption. The immediate and cumulative energy consumption data can be used to estimate the energy consumption for human physical activities over a period of time.