Comparison of physical activity pattern obtained by uni- or triaxial accelerometers

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Aim: The aim of this study was to compare physical activity (PA) patterns obtained simultaneously by a uniaxial accelerometer and a triaxial accelerometer in adolescents in free living condition.

Methods: Sixty-two subjects, aged 13-16 years, were recruited to participate to this ancillary study as a part of the Healthy Life-style in Europe by Nutrition in Adolescence Cross-Sectional Study (HELENA-CSS). All subjects wore simultaneously a uniaxial accelerometer (Actigraph, Shalimar, CA) and a triaxial accelerometer (RT3, Stayhealthy Inc., Monrovia, CA) on the waist during seven consecutive days. Data for each accelerometer was compared at 1 min, and output was expressed as counts per minute. The activity categories and uniaxial accelerometer counts were: sedentary activity, 0–400 counts$\cdot$min^{-1}; light activity, 401–1900 counts$\cdot$min^{-1}; moderate activity, 1901–3918 counts$\cdot$min^{-1}; and vigorous activity, > 3918 counts$\cdot$min^{-1}, respectively. The triaxial accelerometer counts were: sedentary activity, 0–40 counts$\cdot$min^{-1}; light activity, 41–950 counts$\cdot$min^{-1}; moderate activity, 951–3410 counts$\cdot$min^{-1}; and vigorous activity, > 3410 counts$\cdot$min^{-1}, respectively.

Results: The differences between the triaxial accelerometer and the uniaxial accelerometer were small and non-significant for total PA. Similarly, differences at sedentary, light, moderate and vigorous PA level were small: -2.1 ± 1%, -1.4 ± 1.7 %, 0.6 ± 0.5 %, 0.02 ± 0.09 % respectively when PA pattern was expressed as the percentage of total time spent at each PA intensity. The equivalence test showed that output data between the uni- and triaxial accelerometers were equivalent ($p < 0.001$).

Conclusion: There were no differences in time spent at different PA intensity levels assessed by either uni or triaxial accelerometers. This suggest that the choice of accelerometer is of little relevance for the assessment of PA pattern during free living conditions.

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