Number of days required to estimate habitual activity using GENEActiv accelerometer: A cross-sectional study.

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Background

Objective methods like accelerometers are feasible for large studies and may quantify variability in day-to-day physical activity (PA) better than self-report. The variability between days suggests that day of the week cannot be ignored in the design and analysis of PA studies. Thus the purpose of this paper is to determine the optimal number of days needed to reliably estimate weekly habitual PA using the GENEActiv accelerometer.

Methods

Data are from a subsample of the Mitchelstown cohort; a population-based sample of 2,047 middle-aged Irish adults. Participants wore the wrist accelerometer for 7-consecutive days. Data was collected at 100Hz and summarised into signal magnitude vector using 60s epochs. Each time interval was categorised based on validated cut-offs. Pairwise correlations determined the association between days of the week. Repeated measures ANOVA examined differences in average minutes across days. Intra-class correlations (ICC) examined variability between days, and Spearman-Brown formula estimated intraclass reliability coefficient associated with combinations of 1-7 days.

Results

Three hundred and ninety-eight adults (59.6±5.5yrs) had valid accelerometer data. Overall, men were most sedentary on weekends while women spent more time in sedentary behaviour
on Sunday and Monday. ICC analysis indicated that >1 day monitoring is necessary to achieve reliability >0.80 with the exception of light activity. Results of Spearman-Brown calculations showed the number of required monitoring days to achieve a reliability >0.80 varied across intensity categories. Spearman-Brown analysis indicated that 1-5 days were needed for reliability >0.80, depending on activity level (sedentary (2 days), light (1 day), moderate (2 days) and vigorous activity (5 days)).

Conclusions

This is the first study to determine number of monitoring days required to accurately capture weekly PA in adults using the GENEActiv accelerometer. Collectively our data suggest that five days monitoring are needed to reliably estimate weekly habitual activity in all activity categories.