Comparing accelerometry derived moderate-to-vigorous physical activity and sedentary time with survey data of physical activity and leisure time exercise behavior

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Introduction

Due to its association with health outcomes, research on physical activity behavior is important. Many epidemiological studies aim to quantify physical activity levels in the population at large, usually by relying on self-report data due to the costs of using objective instruments on a large scale.

However, critics doubt the validity of the subjective recall of physical activity, and recommend accelerometers as an alternative.

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Aims:

1. To investigate the comparability between subjectively and objectively assessed physical activity in adolescents and adults.

2. To examine the association between objective physical activity and regular voluntary exercise behavior, which is hypothesized to represent an aspect of physical activity that is more easily and reliably recalled.

Methods

Subjects:
Two projects conducted by the Netherlands Twin Register:
1. Adolescents (N=94)
2. Adults (N=32)

Measurements:
Project 1 & 2
- Actigraph accelerometry during seven consecutive days.
- Short version of the International Physical Activity Questionnaire (IPAQ).
Project 1 (additional)
- Indication of regular voluntary exercise activities including weekly frequency and duration.

Traits extracted from the data:
1. Moderate-to-vigorous physical activity (MVPA) as assessed by accelerometry.
2. MVPA as assessed by the IPAQ.
3. Self-reported exercise behavior in leisure time (EB).
4. Sedentary behavior as assessed by accelerometry.

The first three behaviors are expressed in MET hr/week, and the fourth behavior is expressed in hr/week.

Results

1. MVPA scores from accelerometry vs IPAQ (median MET hr/week):

	IPAQ	Accelerometry
MVPA Project 1	28.0	21.9
MVPA Project 2	20.0	13.9

2. Correlation between IPAQ and accelerometry MVPA measurements was only moderate (around **.45** for both projects).
3. Correlation between IPAQ MVPA and subjectively reported EB (**.35**) → about 10% of MVPA was due to exercise activities in leisure time.
4. Individuals spent most of their time sedentarily (9 hours of the waking daytime on average in both projects).
5. There was a negative correlation between objectively measured MVPA and objectively measured sedentary behavior (-.41 for project 1 and -.32 for project 2).

Conclusions

- MVPA or voluntary exercise behavior measured by self-report surveys differ remarkably from MVPA derived through accelerometer: Self-report systematically overestimates MVPA.
- Rather than automatically favoring the objective method, we propose that survey and accelerometer data provide complementary information, and that the exact research question determines their relative value.
- We did not replicate the often quoted lack of an association between physical activity and sedentary behavior – they were significantly confounded both in adolescents and in adults.

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