Validation of the Move II in comparison to the GT3X for assessing human energy expenditure during free-living activities

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Figure 1: Move II Sensor

Introduction

The aim of this report is to determine which procedure is more accurate in determining the energy expenditure during common everyday life activities; a single regression or an activity based approach[1]. For this we used a device that utilizes single regression models (GT3X, ActiGraph Manufacturing Technology Inc., FL., USA) and a device using an activity-dependent calculation model (Move II, movisens GmbH, Karlsruhe, Germany) (Fig. 1). The Move II sensor records the raw data of 3D acceleration, barometric air pressure and temperature for up to 30 days. From this data secondary parameter like activity class, body position, steps, activity energy expenditure (AEE), and metabolic equivalents in addition to meaningful reports (PDF) can be calculated with the movisens DataAnalyzer software.

Methods

Nineteen adults (11 male, 8 female; age: 30.4 ± 9.0 years) wore the activity monitors attached to the waist and a portable indirect calorimeter (IC) served as a reference measure for AEE while performing several typical daily activities. The accuracy of the two devices for estimating AEE was assessed by a Bland-Altman analysis using the mean differences between their output and the reference value.

Results & Discussion

Figure 2 depicts the results of the GT3X and the Move II. The GT3X overestimated the AEE of walking (GT3X minus reference, 1.26 kcal/min), walking fast (1.72 kcal/min), walking up-/downhill (1.45 kcal/min) and walking upstairs (1.92 kcal/min) and underestimated the AEE of jogging (-1.30 kcal/min) and walking upstairs (-2.46 kcal/min). The errors for Move II were smaller than those of the GT3X for all activities. The Move II overestimated the AEE of walking (Move II minus reference, 0.21 kcal/min), walking up-/downhill (0.06 kcal/min) and stair walking (upstairs: 0.13 kcal/min; downstairs: 0.29 kcal/min) and underestimated AEE of walking fast (-0.11 kcal/min) and jogging (-0.93 kcal/min).
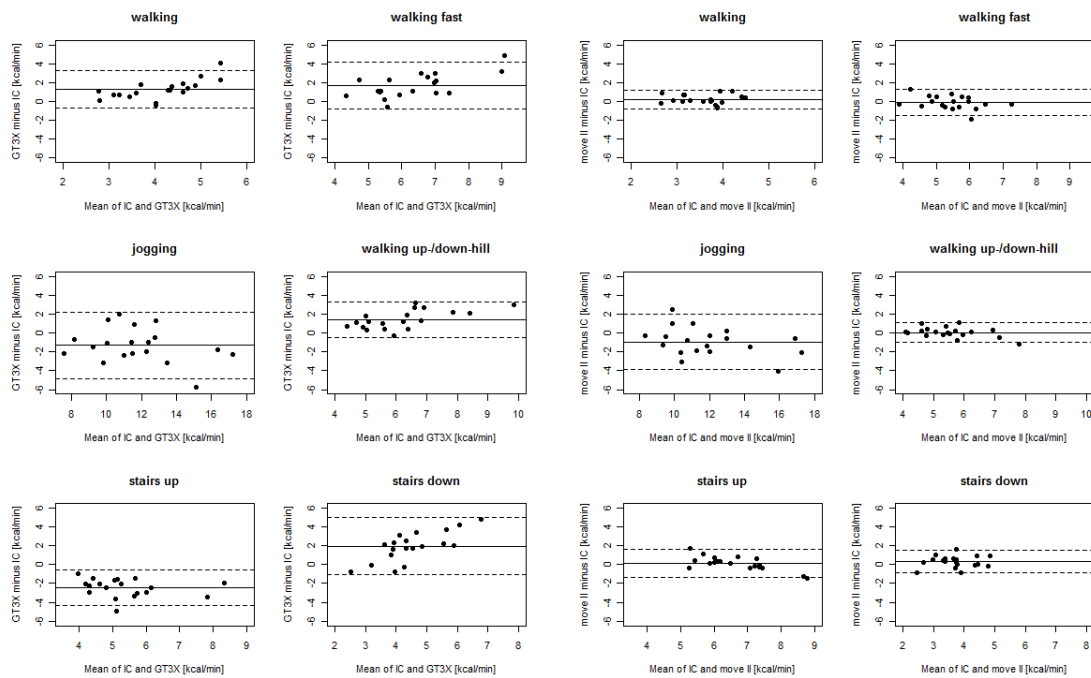
Figure 2: AEE of the GT3X (left) and AEE of the Move II (right)

Conclusion

Our data suggests that the activity monitor using activity-dependent calculation models (Move II) is superior to the activity monitor using a single regression model (GT3X) in predicting AEE in daily life.

References

1. Anastasopoulou et al. Validation and Comparison of Two Methods to Assess Human Energy Expenditure during Free-Living Activities. Plos, 2014.