Reviewer’s report

Title: Validity of sports watches when estimating energy expenditure during running

Version: 0 Date: 11 Oct 2017

Reviewer: Aurelien Pichon

Reviewer's report:

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General

This manuscript aims to assess the validity of new sport watches to assess energy expenditure (EE) during "aerobic" and "anaerobic" running exercises with indirect calorimetry as "gold standard". The use of high running intensity is questionable as EE is really difficult to predict in this condition with only oxygen uptake measurement (Gold standard used as comparison). Moreover, some discrepancies between results and discussion need to be corrected. Even if the scientific power of this manuscript is not maximal the results could be of interest for researcher and trainers who want to assess easily the EE during rehabilitation or training.

Introduction

L95: Other articles studied the use of HR to predict EE (Charlot et al 2014; Hiilloskorpi et al 2003; Hall et al. 2004). Moreover in all the watch tested the speed measured by GPS technology could be used in algorithms to better predict EE. Please discuss this point.

Methods

L175: lactate concentration measurements could have help to assess the anaerobic contribution to global EE. Please discuss this point to improve the EE during high intensity exercise.
Discussion

L255: The proposition done by the authors for the validity of two device is in contradiction with the statement made in the statistical analysis section: "As the threshold for accurate EE estimations, a MAPE ≤10% was defined, similar to the definition used by other researchers [10, 30]. " Indeed, the MAPE is never below 10 % for any device (Table 2). Please modify to be in coherence with the limit of validity accepted.

L275: Numerous studies used speed in addition to HR to predict more precisely EE. Please complete the discussion.

L315: Not only anaerobic but combined aerobic and anaerobic metabolism with a larger part for the aerobic metabolism.

L317: Add the ventilatory anaerobic threshold values or critical speed in the algorithm could perhaps improve the precision of EE estimation.

L320: "…adding additional…". Please modify.

L320: Some studies assess the EE prediction only from accelerometer (Gastin et al. 2017; Zanetti et al. 2014; Brugniaux et al. 2008; Price 2017). Please discuss the level of precision of this device as compared to HR based EE estimation.

L330: Why testing the validity of the devices during high intensity running whereas the validity of EE from VO2 and HR is only partial and mainly false?

L350: the conclusion if globally optimistic according to the results presented in this manuscript.

L359: the HR/running speed relationship is not linear and the prediction of EE from HR for high intensity exercise is improbable (cf also the remarks line 330).

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.
No

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

Quality of written English
Please indicate the quality of language in the manuscript:

Acceptable

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