Day 1. Posters – Physical Activity for Health

**D1.P5. The use of net heart rate to estimate energetic expenditure in hiking: The trails4health project**

RAUL F. BARTOLOMEU¹,²,⁴, JOSE A. BRAGADA³, NATALINA CASANOVA¹,², JORGE CASANOVA¹,², & MÁRIO J. COSTA¹,²,⁴

¹Research Unit for Inland Development, ²Politechnic Institute of Guarda, ³Polytechnic Institute of Bragança, ⁴Research Centre in Sport Sciences, Health Sciences and Human Development

*Corresponding author: rfbartolomeu@gmail.com

The net heart rate (HRnet) is known as the HR value above rest as a result of physical activity. Associations between HRnet and energetic expenditure (EE) were already reported for treadmill and stationary bike (Bragada, Bartolomeu & Sao Pedro, 2017, Motricidade, 13(1), 121-122). The purpose of this study was to extend this approach to hiking and provide an easy way for practitioners to calculate EE and compare it with the health-related guidelines. With institutional approval, 29 subjects underwent a 11 km hike in a previously homologated circular route, divided into 9 sections according to the terrain characteristics. The velocity was monitored continuously with a GPS device (Fenix 5, Garmin, USA) to ensure a consistent 5.5 km·h⁻¹ pace. No stops longer than 1 min were allowed. Every subject used a HR monitor (Fenix 5, Garmin, USA). In a different day, all subjects underwent an intermittent and progressive test protocol of 5 × 5 min in a treadmill at progressive velocities (4.5, 6.5, 8.5, 10.5 and 12.5 km·h⁻¹). Both HR and VO₂ were measured (MetaMax 3B, Cortex, Germany) allowing the EE calculation. Linear regressions between HRnet vs VO₂ and HRnet vs RER (Respiratory Exchange Ratio) were used to make the link between field and lab tests, and predictive equations where retrieved. The measured HRnet values during the hike ranged from 10 to 101 bpm and the correspondent VO₂ and EE ranged from 8.2 to 41 ml·kg⁻¹·min⁻¹ & 2.4 and 15.6 kcal·min⁻¹, respectively. No significant differences were found between genders. For both linear regressions, the mean coefficients of determination were very high (R² = 0.97 and R² = 0.95, respectively). The overall value for EE during the 9 stages of the hike were: i) 1.9411; ii) 2.4218; iii) 0.8535; iv) 0.7567; v) 1.6744; vi) 2.5470; vii) 1.4638; viii) 1.7223; and ix) 0.3112 kcal·kg⁻¹. The overall hike EE was 13.76 kcal·kg⁻¹. This allows to previously predict the individual EE and compare it to the standard guidelines. The only individual variable needed to be known is the weight. This approach can be extended to other hiking routes, as long as they are related guidelines. With institutional approval, we included 80 MHO children (44 boys, 36 girls; mean age: 8.8 ± 1.4 years) with an average BMI of 24.5 ± 4.6 kg/m² ≤ 1 of criteria: waist circumference and blood pressure with percentile ≥ 90, triglycerides > 90 mg/dL, HDL-c < 40 mg/dL or impaired fasting glucose. The Actigraph GT3X accelerometer was used to assess PA. Accelerometers were programmed to assess 7 days. We utilized cut points from Pulsford et al. (2011) to determine the time spent in different intensity levels of PA and sedentary time. Blood analyses were carried out to obtain biomarkers and insulin resistance was evaluated by HOMA-IR. Total and regional body composition were estimated using dual-energy x-ray absorptiometry. Children performed 3 days of aerobic PA (1h) per week during one year. Associations between variables were analysed by Spearman correlations coefficient. A paired sample t-test was conducted to examine temporal changes. Significant changes for moderate and vigorous PA (Moderate PA min/d 12.4 ± 11.3 vs. 33.5 ± 16.5, P < 0.001; Vigorous PA min/d 1.2 ± 3.1 vs. 8.9 ± 6.5 P < 0.001 respectively) and HOMA-IR (4.5 ± 2.4 vs. 3.3 ± 2.6, P < 0.001) were observed between baseline and one-year follow-up. There were no significant differences for body composition variables, VAT included. An inverse correlation was obtained between moderate PA and HOMA-IR (r = -0.31, P < 0.001) and a positive association between HOMA-IR and VAT (r = 0.49, P < 0.001). After adjustment for confounders,