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Day 1. Posters – Physical Activity for Health

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

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The net heart rate (HR_{net}) is known as the HR value above rest as a result of physical activity. Associations between HR_{net} and energetic expenditure (EE) were already reported for treadmill and stationary bike (Bragada, Bartolomeu & São 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 VO_2 were measured (MetaMax 3B, Cortex, Germany) allowing the EE calculation. Linear regressions between HR_{net} vs VO_2 and HR_{net} vs RER (Respiratory Exchange Ratio) were used to make the link between field and lab tests, and predictive equations where retrieved. The measured HR_{net} values during the hike ranged from 10 to 101 bpm and the correspondent VO_2 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 (R^2 = 0.97 and R^2 = 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 circular. According to this finding, it is possible to estimate the EE by simply applying the formula EE = 0.0013*kg*m, expressed in kcal· kg^{-1}· m^{-1}.

D1.P6. Physical activity levels and visceral adipose tissue in relation to insulin resistance in metabolically healthy obese children

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Unlike normal-weight children, there is controversy about what kind of physical activity (PA) intensity is beneficially associated with insulin resistance in youth with obesity (Tompkins, Moran, Preedom and Brock, 2011, *Current Diabetes Reviews, 7*, 164–170). Visceral adiposity has been identified as a risk factor of cardiovascular disease (Rodicio et al., 2018, *Nutrition, 46*, 83–89), type 2 diabetes and insulin resistance in children (Skoczen, Wojcik, Fijorek, Siedlar and Starzyk, 2015, *Experimental and Clinical Endocrinology and Diabetes, 123*, 252–259). The purpose of this study was to determine the relationship between physical activity levels, visceral adipose tissue (VAT) and insulin resistance in metabolically healthy obese (MHO) child population after one-year physical exercise intervention. With institutional ethics 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/m^2 & ≤ 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 (rho = −0.31, $P < 0.001$) and a positive association between HOMA-IR and VAT (rho = 0.49, $P < 0.001$). After adjustment for confounders,