DIFFERENCES IN MEASURED AND ESTIMATED ENERGY EXPENDITURE DURING ON-HORSE TRAINING IN DIVISION I EQUESTRIAN ATHLETES

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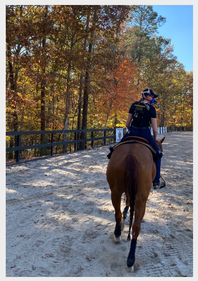
INTRODUCTION

- Tracking energy expenditure (EE) during competition or practice is crucial for optimizing performance, recovery, and nutrition strategies.
- Indirect calorimetry using a metabolic device represents the gold-standard assessment of EE but requires expensive and impractical equipment.
- Instead, noninvasive tools, such as an ECG-based chest-strap can be employed to estimate EE from heart rate (HR-derived EE).
- While HR-derived EE can be effectively utilized, values for measured versus estimated EE may differ substantially.
- **Purpose: assess the agreement between measured and estimated EE (kilocalories [kcals]) during on-horse training sessions in collegiate equestrian riders.**

METHODS & MATERIALS

- Eleven female Equestrian athletes were simultaneously outfitted with a Polar Team Pro chest strap HR monitor (Kempele, Finland) and a portable indirect calorimetry monitor (COSMED K5, Concord, CA, USA).
- Athletes were instructed to breathe and continue on-horse practice as normal.
- Sessions lasted approximately 30 minutes.
- Pearson's correlations and Intraclass Correlations with 95% confidence intervals were conducted along with Bland-Altman analyses between estimated (Polar) and measured (K5) kcal values.



MAIN FINDINGS:

EE derived from HR consistently overestimated caloric expenditure ($P<0.001$) compared to EE assessed via indirect calorimetry in equestrian athletes.

Differences in measures of EE may be due to Polar Team Pro's EE calculation that includes acceleration of horse rather than rider.

Practitioners should be aware of potential discrepancies between estimated and measured EE when developing training and nutrition strategies.

RESULTS

Table 1. Participant Demographics

Age (year)	Height (m)	Weight (kg)	BMI (kg/m^2)
19.9 ± 1.5	1.7 ± 0.1	66.1 ± 7.1	22.1 ± 1.8

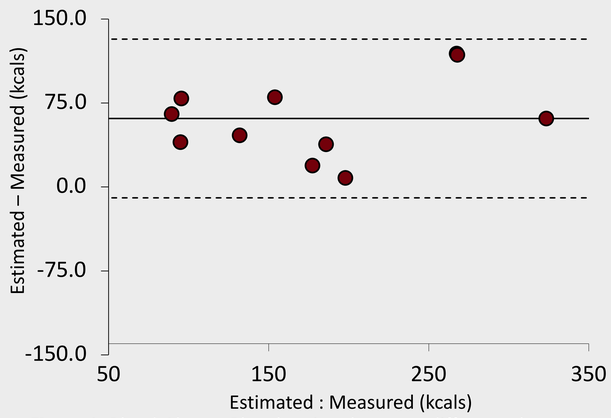


Figure 1. Bland-Altman Plot showing the mean difference between estimated and measured EE compared to the average of estimated and measured EE.

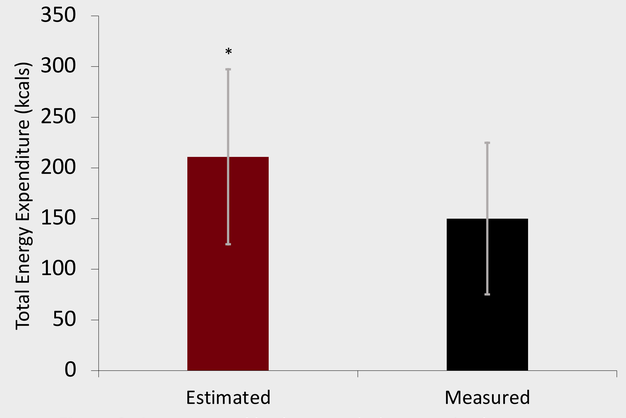


Figure 2. Average total kcals expended at practice between estimated and measured EE ($P = 0.0002$).

RESULTS CONTINUED

Table 2. Estimated vs. Measured EE

Estimated EE	Measured EE
211 ± 86 kcals*	150 ± 75 kcals

* $P = 0.0002$

Table 3. Statistical Analyses of Estimated and Measured EE

Pearson's Correlation	Intraclass Correlation	Limits of Agreement
r = 0.91* [0.68 - 0.98]	0.90* [0.67 - 0.97]	-9.7 - 132.1 kcals

* $P < 0.001$

CONCLUSIONS

- HR-derived metrics overestimated EE by 40.7% compared to indirect calorimetry.
- Differences could be due to increased HR from a catecholamine response and psychological demand of on-horse training and familiarity with the specific assigned horse.
- Further differences may be due to the accelerometry data from the horse rather than the rider.
- Future research could compare EE between the two collegiate disciplines (Western and English).

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GAMECOCK EQUESTRIAN
SOUTH CAROLINA
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