RELATIONSHIPS BETWEEN METABOLISM AND BODY COMPOSITION IN COLLEGIATE WRESTLERS DURING A SEASON

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INTRODUCTION

- Wrestling is a sport that requires the maintenance of weight in specific classes throughout a season.
- The aim was to investigate the prevalence of low energy availability (LEA) through changes in body composition and resting metabolic rate (RMR) and self reported diet logs, throughout the collegiate wrestling season.
- Indicators of LEA:
  - Resting metabolic rate ratio (RMRratio) [measured vs predicted using the Mifflin-St. Jeor Estimation] under 0.9.
  - Energy Availability (EA) < 30 calories/kg of fat-free mass (FFM).

METHODS

- 19 male Division III wrestlers completed a testing of their RMR which was assessed using indirect calorimetry and body fat percentage (BF%), along with FFM, was derived using a three-site skinfold technique, prior to, and throughout the season.
  - Skinfold measurement were performed by the same individual.
- Self-reported diet logs using Cronometer were obtained the week of RMR testing. Only diet logs that contained at least 3 days were included and the average dietary intake was used to represent the energy intake.
- Exercise energy expenditure was estimated as 21 METS using the Compendium of Physical Activity to account for practice and lifting sessions.
- A modified EA was calculated as:

  EA = (energy intake – energy expenditure) / kg of FFM.
- A repeated measures analysis of variance with was used to examine changes across time.

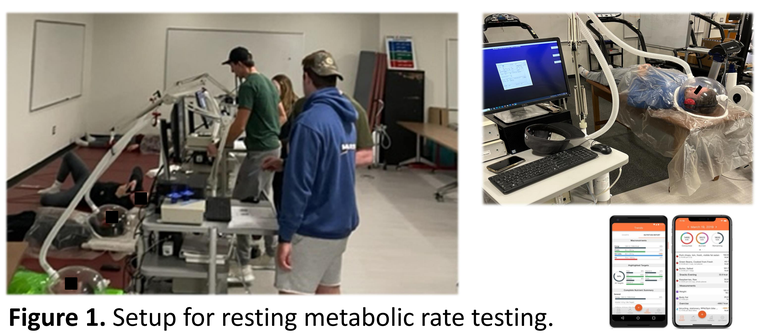

Figure 1. Setup for resting metabolic rate testing.

RESULTS

Table 1. Measurements of interest across time, represented as mean ± standard deviation (n = 19).

Timepoint	Body weight (kg)	BF%	FFM (kg)	RMR (calories)	RMRratio	RER	USG
Pre-Fall Camp	75.8±11.1	11.5±2.2	66.9±8.8	2315±338	1.30±0.14	0.75±0.06	1.007±0.007*
Post-Fall Camp	74.9±10.3*	11.4±2.7	66.1±8.0*	2318±244	1.32±0.07	0.73±0.04	1.027±0.005
Mid-Season	76.9±10.3	12.0±2.2	67.5±8.1	2237±277	1.26±0.09	0.86±0.07*	1.021±0.006
Post-Season	78.5±9.7*	14.0±2.1*	67.4±7.3	2379±322	1.32±0.11	0.79±0.09	1.021±0.005

*, significantly different ($p<0.05$) from the other timepoints; BF% = body fat percentage; FFM = fat-free mass; RER = respiratory exchange ratio; RMR = resting metabolic rate; RMRratio = measured resting metabolic rate divided by predicted metabolic rate; USG = urine specific gravity.

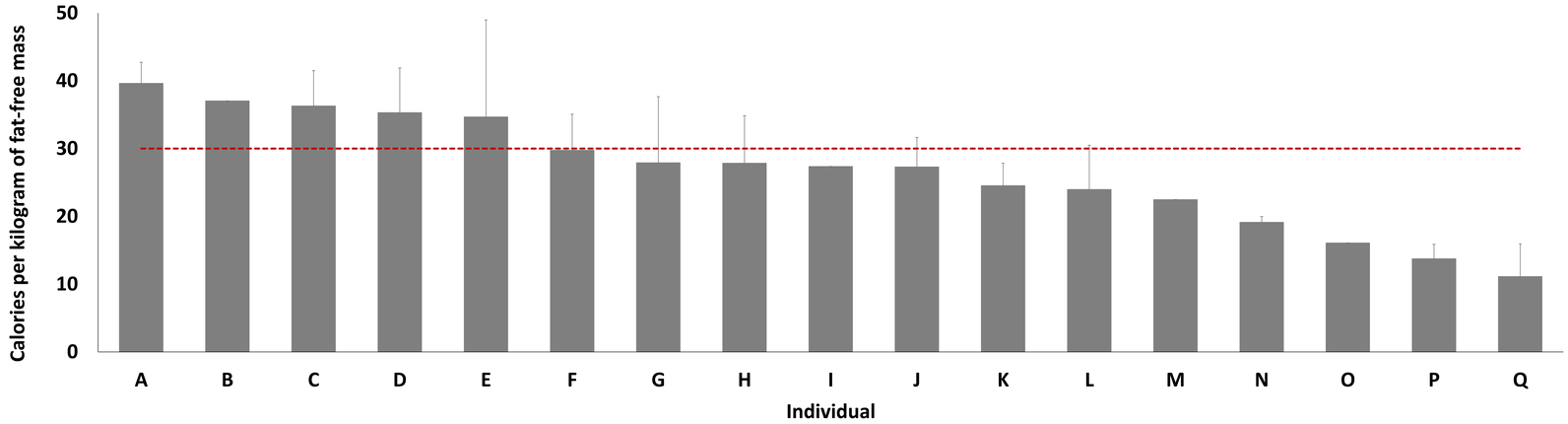

Figure 2. Self reported caloric intake (n = 17). Columns represent the average calories per kilogram of fat-free mass recorded by individual along with the standard deviation of multiple records with at least three days were recorded. The dashed red line represents the cutoff for LEA of 30 calories per kg of fat-free mass. Energy availability had a moderate association with winning percentage r = 0.56 (0.07-0.83).

DISCUSSION

- Changes in body weight were likely attributed to a decline in FFM due to the preparation of minimal weight certifications for the upcoming season and not a change in metabolism.
- The use of RMRratio did not show the presence of LEA. However, when evaluating self-reported diet logs, 12 of the 17 participants who had complete logs were below 30 calories per kilogram of lean mass, suggesting LEA.

PRACTICAL APPLICATIONS

- RMRratio may not be sensitive to identify LEA in collegiate wrestlers as the Mifflin-St. Joer equation consistently underestimated the RMR compared to measured values.
- The use of diet logs to estimate EA may be a better option for determining LEA and caloric intake should be examined for individuals who participate in weight class specific sports, such as wrestling.

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