

Influence of exercise-induced energy deficit on non-exercise activity thermogenesis in overweight and obese adults

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Introduction

Energy balance is a dynamically regulated system and perturbing one of its components (reduction in energy intake (EI) or increase in energy expenditure (EE)) can result in biological and behavioural compensatory responses of unpredictable magnitude elsewhere in the system. In fact, exercise-induced EE can elicit compensatory changes in EI and/or non-exercise activity thermogenesis (NEAT), which consequently attenuate the energy gap between EI and EE. Although compelling evidence suggests that exercise-mediated changes in NEAT seem to be subject to large inter-individual variance, research investigating the impact of biological sex on exercise-induced modulation of NEAT is lacking. Therefore, the aim of this study was to investigate the effect of an exercise-induced energy deficit on NEAT in overweight and obese men and women.

Methods

After obtaining ethical approval, 10 non-exercised participants (6 women and 4 men) took part in a 21-day investigation of NEAT (see infographic). Group differences in descriptive characteristics were analysed using unpaired t-tests. NEAT from each phase were analysed using a 3 x 2 (Time x Sex) mixed model ANOVA, whereas body mass from the pre-measurement and post-measurement days were analysed through unpaired t-tests.

Exercise:

- Exercise-induced energy expenditure (ExEE) / session = 15% of participant's total daily EE. Exercise intensity = 50 RPM against 2% of participant's body mass.

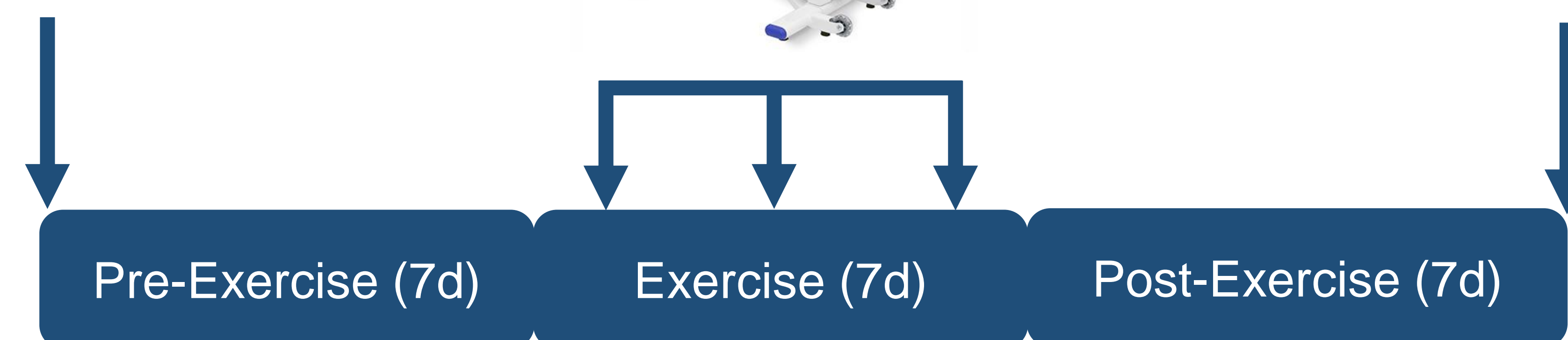


Equipment:

- Indirect calorimetry (Cortex MetaMax 3B)
- Leg ergometer (Monark 894E)
- Bioelectrical impedance (Tanita MC-780Ma P)
- Accelerometer (Xiaomi Mi Band)

- Body composition
- Basal metabolic rate (BMR)

- Body composition

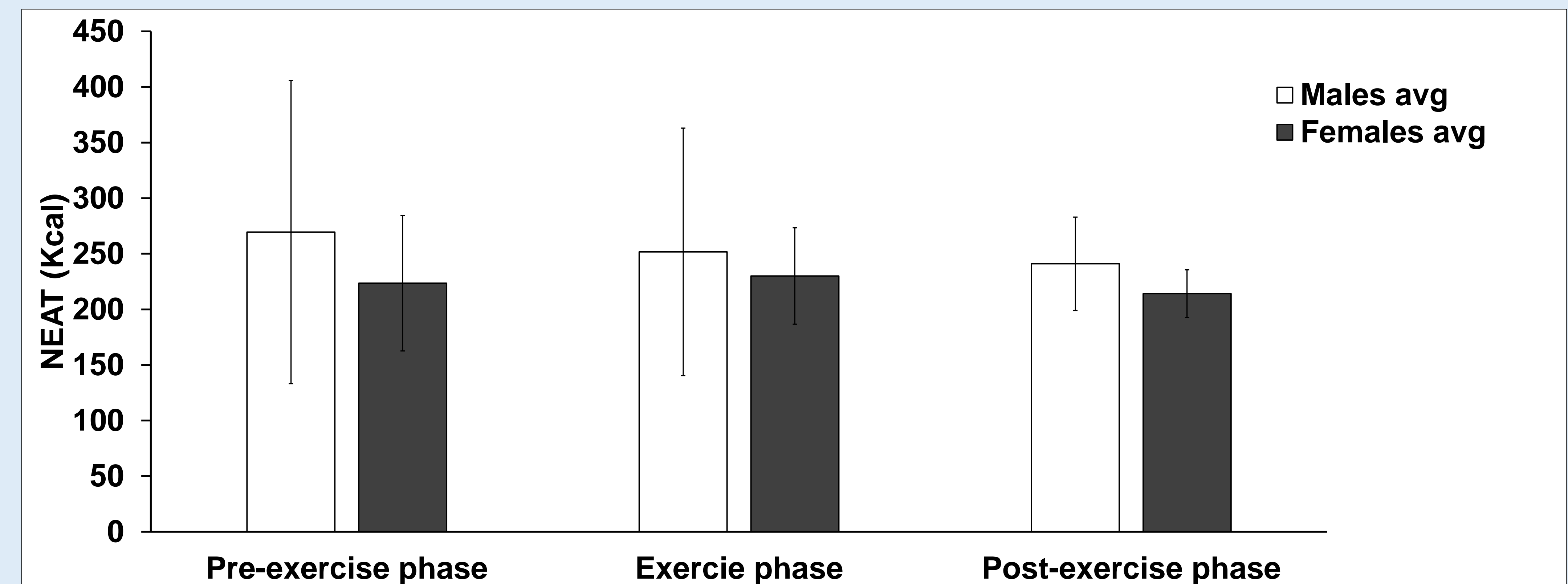


Variable

Variable	Men	Women
Age (years)	30 ± 8	23 ± 2
Height (cm)	184 ± 10*	166 ± 6
Body mass (kg)	96.9 ± 12.8*	79.9 ± 8.6
Body fat (%)	24.5 ± 3.7	34.5 ± 4**
BMI (kg/m ²)	28.4 ± 2.1	29.1 ± 2.5
BMR (Kcal/day)	1721 ± 475*	1053 ± 122

Results

There was no main effect of time ($P = 0.613$), or sex (*mean difference* = 4 %, $P = 0.470$), for NEAT. In addition, there was no interaction between sex and time ($P = 0.806$).



Variable

Variable	Men	Women
ExEE (Kcal/week)	986 ± 292	632 ± 63
Body mass change (%)	1.2 ± 1.9	0.6 ± 0.5

Conclusion

These results suggest that an acute perturbation of energy balance induced by steady-state endurance type of exercise does not elicit substantial changes in NEAT, which can potentially hinder body mass loss in both men and women. Nonetheless, due to our small sample size and short duration of the study, more longer-term trials with larger sample sizes are needed to validate our initial findings.