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Differential Impact of Biological and Behavioral Traits on Post-exercise Energy Intake in Men and Women

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Objectives: The energy intake response to exercise is highly variable and energy (over-) compensation via increased post-exercise energy intake occurs in some individuals but not others. In explorative analyses, we aimed to identify biological and behavioral predictors of post-exercise *ad libitum* energy intake and whether these predictors differ from *ad libitum* energy intake after rest.

Methods: In a randomized crossover design, 57 healthy participants (21.7 ± 2.5 y; 23.7 ± 2.3 kg/m², 54% female) completed two single-item (cheese pizza) laboratory-based test-meals following (1) a 45-min exercise session (60% VO_{2peak}, bike ergometer) and (2) a 45-min rest (control) condition. We used simple linear regression analyses to assess the associations between biological (sex, body composition, appetite hormones) and behavioral (habitual exercise via prospective exercise log, appetite traits) characteristics and energy intake after each study condition.

Results: Post-exercise energy intake was inversely associated with habitual exercise behavior ($\beta = -0.29$, $P = 0.03$) and positively associated with fat-free mass (FFM; $\beta = 0.30$, $P = 0.03$) and fasting peptide YY (PYY; $\beta = 0.39$, $P = 0.02$) concentrations. Different characteristics were associated with post-exercise energy intake in men than in women. PYY ($\beta = 0.88$, $P < 0.01$) and additionally adiponectin ($\beta = 0.66$, $P = 0.01$) predicted post-exercise energy intake only in men, while habitual exercise ($\beta = -0.44$, $P = 0.02$) was only predictive in women. Appetitive traits did not predict post-exercise energy intake. Energy intake after rest (control) was only associated with weight ($\beta = 0.35$, $P = 0.01$) and FFM ($\beta = 0.38$, $P < 0.01$).

Conclusions: Post-exercise energy intake is associated with different factors than energy intake after rest and behavioral and biological traits differentially affect post-exercise energy intake in men and women. In women, habitual exercise behavior seems to predict post-exercise energy intake, protecting against compensatory eating. In men, appetite-regulating hormones play a role in the energy intake response to acute exercise. Our findings may help identify individuals who are likely to show post-exercise energy compensation and help explain why it occurs in some individuals but not others.

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