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Energy compensation during exercise for weight loss in overweight adults

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Statement of the Problem: An often recommended treatment by physicians and other health professionals is to initiate an exercise program to achieve weight loss. However, large variability is observed in the success rates of individuals who exercise to lose weight. When individuals do not lose the expected amount of weight with exercise it is assumed they are compensating for the energy expended primarily by concurrently increasing energy intake. The primary drivers of greater energy intake are hunger and reward-driven feeding (i.e. motivation to eat, or food reinforcement) although it is uncertain if the dose of exercise has an effect on the compensatory response to exercise and these drivers of energy intake. The purpose of this study is to determine whether energy compensation in response to 1,500 kcal/week of energy expenditure differed from 3,000 kcal/week energy expenditure and whether exercise-induced changes in compensatory mechanisms (hunger, food reinforcement) differed between groups.

Methodology & Theoretical Orientation: This study employed a 12-week exercise intervention of either 1,500 or 3,000 kcal energy expenditure per week. Changes in bodily energy stores (lean mass, fat mass) were analyzed by DXA. The difference in total energy expended from exercise and changes in bodily energy stores reflected each individuals' level of compensation. An operant responding task was used to evaluate the reinforcing value of food and fasting levels of serum peptide PYY, glucagon-like peptide 1 (GLP-1), acylated grehlin, and insulin was determined pre/post-intervention.

Findings: The 3000 kcal/week group decreased (<0.01) percentage body fat while the 1500 kcal/week group did not. The 1500 and 3000 kcal/week groups compensated 943 (-164 to 2050) and 1007 (32 to 1982) kcal/week (mean, 95% CI, P>0.93), or 62.9% and 33.6% of exercise energy expenditure, respectively. Food reinforcement and GLP-1 decreased (P<0.02), while acylated ghrelin increased (P>0.02) similarly in both groups.

Biography

Kyle Flack, PhD, RD is an assistant professor in the Department of Dietetics and Human Nutrition at the University of Kentucky, and formally a research molecular biologist at the USDA Grand Forks Human Nutrition Research Center. His research centers on obesity prevention/treatment utilizing randomized controlled trials focusing on nutrition and exercise interventions that improve psychological health and the adoption of long-term healthy habits. Dr. Flack studies ways exercise can impact dietary behaviors with the goal of improving the effectiveness of exercise for weight loss and weight loss maintenance. Dr. Flack is also interested in behavioral reinforcement in the context of eating and exercise behaviors as a means to sustain behavioral change. He has led interventions that have aimed at increasing the reinforcing value of exercise and physical activity behaviors, how the reinforcing value of foods can be altered, and how individuals compensate for energy expended during exercise.

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