

Exercise makes female rats hungrier, sustains weight gain

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Sex differences play a large role in the relationship between exercise, appetite and weight loss, according to new research in rats. The study is published in the *American Journal of Physiology-Regulatory, Integrative*

and Comparative Physiology. It was chosen as an APSselect article for August.

One of the greatest challenges associated with obesity is sustaining weight loss. Research has shown that most people who lose weight regain it within a year, largely due to the physiological changes in the body—particularly in appetite-regulating hormones and energy balance—that occur with [weight loss](#). Energy balance is the difference between [energy intake](#) and energy expended, including through physical activity. Previous studies have suggested that [exercise](#) may help people maintain a healthy weight even if they have not recently lost weight. However, [sex differences](#) may play a role in the effectiveness of exercise as a key to regulating appetite.

Researchers studied male and [female rats](#) placed on either a high-fat or low-fat diet. After six weeks, half of the rats began a four-week exercise regimen, while the other half remained sedentary. The exercise group used a treadmill for an hour each day, five days a week. The research team analyzed the animals' energy expenditure and meal patterns along with levels of cholesterol, insulin and leptin—one of the appetite-regulating hormones.

As expected, male rats that exercised gained less weight—regardless of which diet they followed—compared to the sedentary group. However, the exercise and sedentary groups of females gained about the same amount of weight. In addition, a test in which the rats were given a choice between a sugary or soybean-based beverage showed that exercise did not prevent animals of either sex from overindulging in the high-calorie drinks. Exercise lowered the levels of cholesterol and leptin in the males, but it did not change these levels in the females.

The research team found that the exercising females—but not the males—ate more than those that did not exercise. However, "only on the

days the rats exercised is [food intake](#) acutely suppressed in males and [increased] in females. Intakes on the days the exercisers are rested reflected those of sedentary rats, regardless of sex. These results suggest that the effect of exercise on energy intake, and subsequently energy balance, in response to exercise are not a chronic adaptation to training," the researchers wrote. The change in [energy balance](#) seems more likely to be a short-term and direct effect of the day's physical activity, the team explained.

"There is some evidence that these biologically driven sex differences in appetite in response to exercise translate to humans," the researchers wrote. Although there are numerous health benefits that come with exercise, women in particular may need to make a conscious effort to increase their [physical activity](#) levels and decrease their food intake to gain the benefits of exercise on body [weight](#), the research team explained.

"Compensatory eating behaviors in male and female rats in response to exercise training" is published in the *American Journal of Physiology-Regulatory, Integrative and Comparative Physiology*.

More information: Rebecca M. Foright et al. Compensatory eating behaviors in male and female rats in response to exercise training, *American Journal of Physiology-Regulatory, Integrative and Comparative Physiology* (2020). [DOI: 10.1152/ajpregu.00259.2019](https://doi.org/10.1152/ajpregu.00259.2019)

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