

'Night owls' could have greater risk of type 2 diabetes and heart disease than those who are 'early birds'

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Are you an early bird or a night owl? Our activity patterns and sleep cycles could influence our risk of diseases, such as type 2 diabetes and

heart disease. New research published in *Experimental Physiology* has found that wake/sleep cycles cause metabolic differences and alter our body's preference for energy sources. The researchers found that those who stay up later have a reduced ability to use fat for energy, meaning fats may build up in the body and increase risk for type 2 diabetes and cardiovascular disease.

The [metabolic differences](#) relate to how well each group can use insulin to promote glucose uptake by the cells for storage and energy use. People who are "early birds" (individuals who prefer to be active in the morning) rely more on fat as an energy source and are more active during the day with higher levels of aerobic fitness than "night owls" (people who prefer to be active later in the day and night). On the other hand, night owls use less fat for energy at rest and during exercise.

Researchers from Rutgers University, New Jersey, U.S. classified participants (n=51) into two groups (early and late) based on their "chronotype"—the natural propensity to seek activity and sleep at different times. They used advanced imaging to assess body mass and body composition, as well as insulin sensitivity and breath samples to measure fat and carbohydrate metabolism.

Participants were monitored for a week to assess their activity patterns across the day. They ate a calorie and nutrition-controlled diet and had to fast overnight to minimize dietary impact on the results. To study fuel preference, they were tested while at rest before completing two 15-minute bouts of exercise: one moderate and one high intensity session on a treadmill. Aerobic [fitness levels](#) were tested through an incline challenge where the incline was raised 2.5% every two minutes until the participant reached a point of exhaustion.

Researchers found that early birds use more fat for energy at both rest and during exercise than night owls. Early birds were also more insulin-

sensitive. Night owls, on the other hand, are insulin resistant, meaning their bodies require more insulin to lower blood glucose levels, and their bodies favored carbohydrates as an energy source over fats. This group's impaired ability to respond to insulin to promote fuel use can be harmful as it indicates a greater risk of [type 2 diabetes](#) and/or [heart disease](#). The cause for this shift in metabolic preference between early birds and night owls is yet unknown and needs further investigation.

Senior author Professor Steven Malin of Rutgers University said, "The differences in fat metabolism between 'early birds' and 'night owls' shows that our body's circadian rhythm (wake/sleep cycle) could affect how our bodies use insulin. A sensitive or impaired ability to respond to the [insulin](#) hormone has major implications for our health. This observation advances our understanding of how our body's circadian rhythms impact our health. Because chronotype appears to impact our metabolism and hormone action, we suggest that chronotype could be used as a factor to predict an individual's disease risk.

"We also found that [early birds](#) are more physically active and have higher fitness levels than [night owls](#) who are more sedentary throughout the day. Further research is needed to examine the link between chronotype, exercise and metabolic adaptation to identify whether exercising earlier in the day has greater health benefits."

More information: Early Chronotype with Metabolic Syndrome favors Resting and Exercise Fat Oxidation in Relation to Insulin-stimulated Non-Oxidative Glucose Disposal, *Experimental Physiology* (2022). [DOI: 10.1113/EP090613](https://doi.org/10.1113/EP090613)

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