

Researchers link sleep health to insulin resistance in obese teens

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Researchers at Children's Hospital Colorado (Children's Colorado) have identified a connection between overweight and obese teens' sleep health and their insulin sensitivity. In what is believed to be the first study to use an objective measurement of circadian rhythm—salivary melatonin—to examine associations of sleep health with insulin sensitivity in adolescents, researchers found that shorter sleep duration, later weekday bedtimes and later circadian timing of sleep were associated with reduced insulin sensitivity in a cohort of adolescents with overweight/obesity during the school year. The related article was recently published in *The Journal of Pediatrics*.

"More than 33 percent of adolescents in the U.S. are obese and at risk for [health conditions](#) such as type 2 diabetes," said Stacey L. Simon, Ph.D., pediatric sleep psychologist in the Breathing Institute at Children's Colorado and lead author of the study. "Insulin resistance is a significant risk factor for type 2 diabetes, and while [insulin sensitivity](#) decreases by approximately 50 percent in all adolescents during puberty, over half of teens with overweight/obesity demonstrate an even greater degree of [insulin resistance](#). This puts them at particular risk for developing type 2 diabetes and related health conditions."

"Knowing that traditional weight management interventions in general tend to be less effective for adolescents, we sought to look at alternative prevention and intervention measures, including how sleep health might play a role," continued Simon. "Though a connection between short and delayed sleep and insulin resistance has been demonstrated in adults, it

had not been studied extensively in adolescents."

Thirty-one adolescents between the ages of 14 and 19 with a body mass index (BMI) in the 90th percentile or higher for their age/sex were recruited for the study from Children's Colorado's weight management and other specialty clinics. Participants wore an actigraphy monitor, a watch-like device worn on the wrist that measures sleep duration and timing, for one week. After seven days, fasting labs and a three-hour oral glucose tolerance test were used to measure participants' insulin sensitivity. They also stayed overnight at Children's Colorado's Clinical and Translational Research Center and provided saliva samples regularly to measure melatonin levels, a marker of circadian rhythm. Participants were in dim light throughout the visit to avoid the impact of light exposure on melatonin.

Study results showed that, when comparing participants who slept less than 6.6 hours per night with those who slept at least 6.6 hours per night, the participants with more sleep had better insulin sensitivity. When analyzing melatonin and insulin sensitivity, better alignment between measures of circadian rhythms and actual bedtimes and waketimes was also associated with better [insulin sensitivity](#).

Although further research is needed to better understand the physiology underlying these observations, the study indicates potential for sleep and circadian interventions or delayed school day start times as recommended by the American Academy of Pediatrics as a possible means for improving metabolic health for this population.

More information: Stacey L. Simon et al, Too Late and Not Enough: School Year Sleep Duration, Timing, and Circadian Misalignment Are Associated with Reduced Insulin Sensitivity in Adolescents with Overweight/Obesity, *The Journal of Pediatrics* (2018). [DOI: 10.1016/j.jpeds.2018.10.027](https://doi.org/10.1016/j.jpeds.2018.10.027)

Provided by Children's Hospital Colorado

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