New research shows that brighter days make for better nights

September 23 2021

Credit: CC0 Public Domain

A new study finds that more access to daylight at home improves circadian alignment, sleep and mental health in healthy adults.

The REVOLV study was conducted by the Light and Health Research Center at the Icahn School of Medicine at Mount Sinai (Icahn Mount Sinai) to explore how increasing daylight access at home affects circadian rhythm, sleep, vitality and mental health.

The peer-reviewed paper was published on Sept. 23 in the *International Journal of Environmental Research and Public Health*.

"The REVOLV study demonstrates the impact of daylight on the physiological, behavioral and subjective measures of circadian health in a real-world environment," said senior author Mariana G. Figueiro, Ph.D., professor and director, Light and Health Research Center, Icahn Mount Sinai. "The findings highlight the importance of ensuring people are exposed to circadian-effective electric light or daylight indoors as well as outside for human health and well-being."

As the primary environmental cue for the body's master biological clock, light-dark patterns are key for circadian alignment and are fundamental to multiple dimensions of health, including sleep and mental health. Although daylight provides the proper timing, quantity and color of light for promoting circadian alignment, modern indoor lifestyles typically offer fewer opportunities for adequate daylight exposure.

In 2020, people spent 65% of their waking hours at home, compared to 50% in 2019, according to the Bureau of Labor Statistics. Leveraging this natural experiment during the COVID-19 pandemic, researchers tracked residents living in the Exo apartments in Reston, Virginia. During the crossover study, 20 residents spent one week in their apartments with electrochromic glass windows, also known as smart windows, which tint dynamically based on the location of the sun, and another week with standard windows with blinds. The participants wore sleep tracking devices, completed surveys on their health and well-being and provided saliva samples every 30 minutes over the course of five

evening hours to measure their melatonin levels, a hormone that rises in the evening and triggers sleepiness.

Researchers found that, in just one week, melatonin production in the body was delayed by 15 minutes when residents used their blinds, resulting in them falling asleep 22 minutes later and sleeping 16 minutes less each night. In contrast, consistent and quality sleep in the smart window condition resulted in increased vitality during the day, an 11% reduction in anxiety and a 9% reduction in stress.

"When it comes to choosing a place to live, access to daylight and quality views are key features for prospective tenants," said study author Piers MacNaughton, Sc.D., vice president of health strategy, View Inc. "This study shows that daylight and views are not just desirable amenities but also have fundamental impacts on our health and even our hormones."

In a previous study, the Urban Green Council looked at the prevalence of window coverings, which block daylight from entering residences when closed. They found that regardless of time of day, direction the window faced or whether a building was commercial or residential, 59% of the window area was covered by blinds or shades. More than 75% of the buildings they surveyed in New York City had more than half of their window area covered.

The REVOLV study demonstrates that smart windows are one method of optimizing indoor daylight access in the built environment to improve occupant health without the drawbacks of visual and thermal discomfort, energy consumption and reliance on occupant behaviors that come with traditional solutions such as blinds.

"In technology-driven markets like the Dulles Corridor in Northern Virginia, smart home technology, wellness-focused amenities and health-promoting activities are becoming increasingly higher priorities in

making a final decision on where to call home," said Jessica Murphy-Work, senior regional manager at Greystar. "In addition to improving access to daylight, design choices like incorporating smart windows can have implications on tenant attraction, retention and asset value."

The new REVOLV study reveals new insights about how daylight impacts our sleep, critical knowledge due to the ramifications these biological changes can have on our long-term health. Previous research has demonstrated that daytime light, especially natural daylight, can impact nighttime sleep quality. It has also been shown that electric lighting indoors tends to be dim and constant, which may not be beneficial for the circadian system's needs. Lack of a robust light-dark pattern can lead to circadian disruption and poor sleep and health.

A 2020 study, EVOLV, found that office workers in an office using smart glass to optimize daylight and views slept longer at night than those working in an office with traditional glass and blinds. Participants also scored 42% higher on cognitive assessments when exposed to optimized daylight and views. The benefits to sleep and cognitive performance were immediate, substantial and sustained.

More information: Rohan Nagare et al, Access to Daylight at Home Improves Circadian Alignment, Sleep, and Mental Health in Healthy Adults: A Crossover Study, *International Journal of Environmental Research and Public Health* (2021). DOI: 10.3390/ijerph18199980

Mohamed Boubekri et al, The Impact of Optimized Daylight and Views on the Sleep Duration and Cognitive Performance of Office Workers, *International Journal of Environmental Research and Public Health* (2020). DOI: 10.3390/ijerph17093219

Provided by The Mount Sinai Hospital