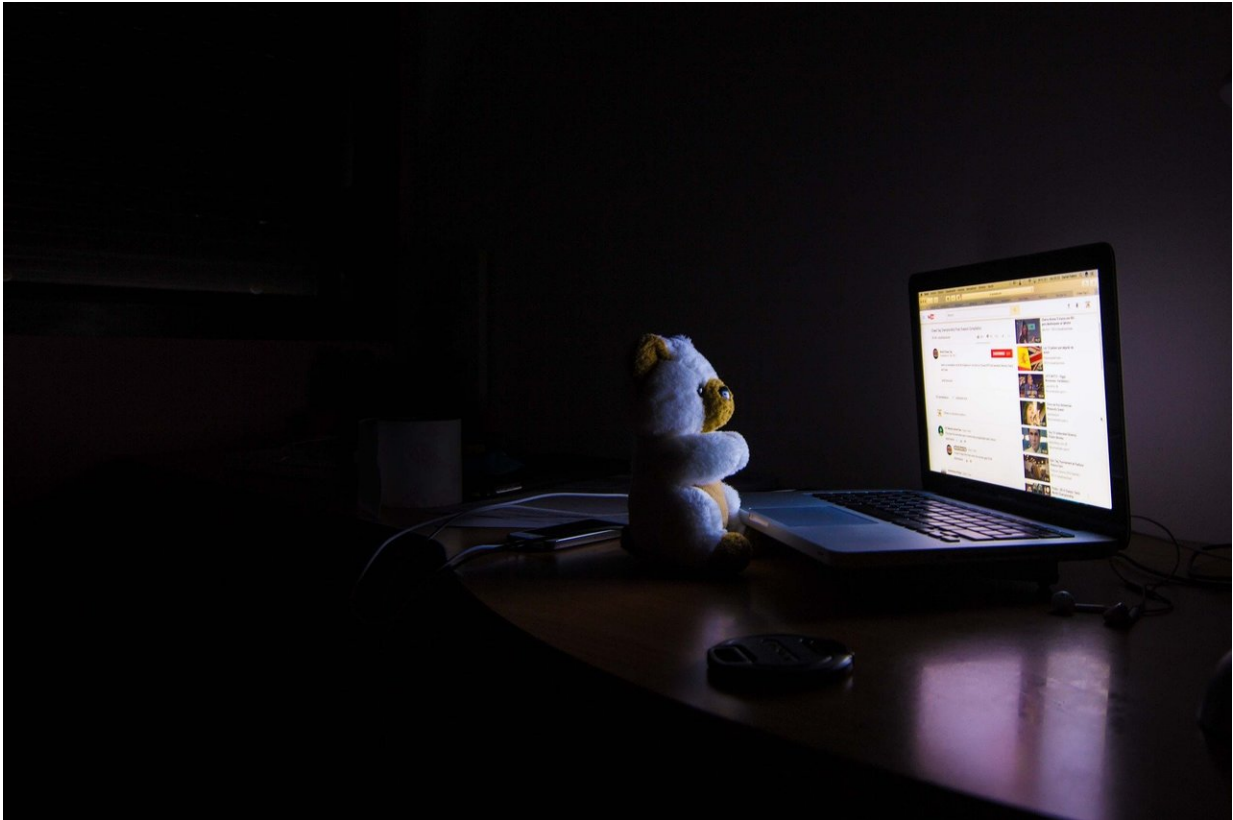


# The rhythms of the night?

April 30 2018

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New research published in *The Journal of Physiology* has illuminated the effects of night-time light exposure on internal body clock processes. This is important for helping those who have poor quality sleep, such as shift workers, and could help improve treatments for depression.

The body has an internal clock that causes various physiological processes to oscillate in 24-h cycles, called circadian rhythms, which includes daily changes in sleepiness. Light is the strongest environmental time cue that resets the body's internal 24-h clock. Melatonin is a hormone produced in the brain at night that regulates this body clock and exposure to [light](#) before bedtime may reduce sleep quality by suppressing its production. The research team aimed to explore the link between the physiological process that enables our [internal body clock](#) to synchronise to external time cues (i.e. day and night) - called circadian phase resetting - and suppression of melatonin.

Melatonin suppression and circadian phase resetting are often correlated such that high levels of melatonin suppression can be associated with large shifts of the body clock. This association between the two responses has often been assumed to represent a functional relationship, resulting in the acceptance that one could be used as a proxy measure for the other. Circadian phase resetting is more difficult to measure than melatonin suppression, meaning the latter has often been used to assess disruption to the [body](#) clock caused by [light exposure](#) at night. However, this research has found that the magnitude of the shift in internal [body clock](#) is functionally independent from melatonin suppression. This casts doubt on the use of melatonin suppression as a proxy for circadian phase resetting. This knowledge may shape future research designed to improve treatments for depression and shift work sleep disorder.

The researchers tested the association between melatonin suppression and circadian phase resetting in participants who received either continuous or intermittent bright light exposure at night. This research procedure involved each participant completing a 9-10 day inpatient study at Brigham and Women's Hospital, Boston, under highly controlled laboratory conditions with strict control over their sleep/wake, activity and light/dark schedules. Intermittent exposure patterns were found to show significant phase shifts with disproportionately less melatonin

suppression. Moreover, each and every intermittent bright light pulse induced a similar degree of melatonin suppression, but did not appear to cause an equal magnitude of phase shift.

Despite the results of this study suggesting functional independence in circadian phase resetting and melatonin suppression responses to exposure to light at night, the study's conclusions may be restricted by the limited sample size in each light exposure condition.

Lead author Dr Shadab Rahman is excited by his team's findings, and is looking forward to investigating new avenues of interest they have opened up:

"Overall, our data suggest that melatonin suppression and phase resetting are sometimes correlated, but ultimately are regulated by separate neurophysiological processes. Therefore [melatonin](#) suppression is not a reliable surrogate for [phase](#) resetting. This is an important consideration for developing light-therapy treatments for people who have poor quality sleep and biological clock disruption, such as [shift workers](#), or disorders such as depression. Additional work is needed to optimize light therapy protocols used as treatment."

**More information:** Shadab A. Rahman et al, Functional decoupling of melatonin suppression and circadian phase resetting in humans, *The Journal of Physiology* (2018). [DOI: 10.1113/JP275501](https://doi.org/10.1113/JP275501)

Provided by The Physiological Society

Citation: The rhythms of the night? (2018, April 30) retrieved 23 April 2024 from <https://medicalxpress.com/news/2018-04-rhythms-night.html>

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