

Seasonal clock changing helps to synchronize human sleep/wake cycle across latitude

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Scientific Reports released this month a paper by prof. José María Martín-Olalla (Universidad de Sevilla) analyzing seasonal similarities between the sleep/wake cycle in subtropical, pre-industrial and extratropical

industrial societies.

The results show that in [winter](#), the sleep/[wake](#) cycle is dominated by sunrise. Wake-up times tend to occur during the winter twilight regulated by the circadian photoreceptive mechanism. Bedtimes tend to occur eight hours earlier or sixteen hours later, in the middle of the winter night, regulated by the homeostatic mechanism that induces sleepiness after a prolonged wake. This setting delays the sleep/wake cycle as [latitude](#) increases following the delay in the winter sunrise time.

From the subtropic to 50 degrees latitude (the latitude of London or Berlin), the lag amounts to two hours. This winter lag is less than in summer due to the change in two natural magnitudes. Sunrise time now advances with increasing latitude. Noon insolation increases significantly in the extratropical region. Below the 47th parallel (which divides Switzerland), noon insolation in summer is greater than at the equator.

Although extratropical societies have been using different seasonal mechanisms to mitigate in summer the winter lag, contemporary societies achieve that by means of Daylight Saving Time (DST). The spring clock change advances the phase of the sleep/wake cycle so that it shows a great coincidence from the equator to 55 degrees latitude. The [sleep/wake cycle](#) is dominated by distance to noon. Wake-up times occur some six hours before noon, bedtimes occur some 10 hours after noon. That means 7 a.m. and 11 p.m. local time during DST.

For the analysis, prof. Martín-Olalla retrieved data from seven previous reports involving nine pre-industrial societies. The Tsimané (in Bolivia), the Hadza (in Tanzania), the San (in Namibia), the Toba/Qom (in Argentina) and the Quilombolas (in Brazil); also, the locations of Fondwa in Haiti, Milange and Tengua in Mozambique, Mandena in Madagascar and Chico Mendes in Brazil.

The *European Journal of Internal Medicine* published a Comment Letter in which Professor Martín-Olalla explains how latitude influences the ways by which contemporary societies adapt to the seasonal cycle, including their preference for continuing or discontinuing seasonal clock changing. Prof. Martín-Olalla suggests that European Commission must allow opt-outs in this issue and let every member state decide this issue. The seasonal cycle of light and dark at the lowest bound of latitude in the union (the Iberian peninsula) is fairly different to that observed in the highest bound (the Scandinavian peninsula) in terms of seasonal change of sunrise time and of the efficiency of the insolation.

More information: José María Martín-Olalla, Seasonal synchronization of sleep timing in industrial and pre-industrial societies, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-43220-8](https://doi.org/10.1038/s41598-019-43220-8)

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