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SHORT REPORT

Bed and rise times during the Age of Enlightenment: A case report

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Abstract

Studies have shown that our modern electrical lighting environment reduces naturally occurring seasonal variations in sleep–wake rhythms, such as longer sleep during the winter versus summer. However, less is known about how timing and duration of sleep were affected by the seasons in the premodern era, before the invention of electrical lighting. The Swedish researcher Olof Hiorter collected and documented geophysical data every hour during wakefulness in Uppsala, Sweden, between December 1746 and November 1747. In this way, his bed and rise times could be approximated. The data revealed that Hiorter's rise times occurred around 1 hr before sunrise in winter versus 1 hr after sunrise in summer. No such association was observed between the time of sunset and Hiorter's bedtimes. Finally, the time in bed was about 3.5–4 hr shorter in summer compared to winter. This 273-year-old case report suggests that time in bed and rise times of people from the premodern era exhibited seasonal variations.

KEYWORDS
historical case report, seasons, sleep, sunrise, sunset

The constant availability of light from artificial sources has turned night into day (Kyba et al., 2017). For instance, when exposed to evening light, such as that emitted by tablets and e-readers, people exhibit signs of circadian rhythm misalignment, take longer to fall asleep and have less deep sleep (Chang, Aeschbach, Duffy, & Czeisler, 2015; Grønli et al., 2016). In addition to daily variations in exposure to both natural and artificial light, seasonal changes in natural light can significantly alter sleep–wake regulation. The body's internal clock can adjust the length of the biological night to the short summer nights or long winter nights when exposed to these different natural light–dark cycles (Stothard et al., 2017). A previous study on current indigenous hunter-gatherers showed a 1-hr decrease in sleep duration during summer versus winter. Even though these populations live around the equator, the small seasonal variations in exposure to natural light still affect their sleep (Yetish et al., 2015). In contrast, these seasonal effects on sleep are absent in our modern electrical lighting environment, where the contrast between daytime and evening light has become less pronounced (Stothard et al., 2017). These data suggest that our modern lifestyle dampens the seasonal influence of light on sleep–wake regulation. However, to our best knowledge, nothing is known about the seasonal effects on bed and rise times in the premodern era at more extreme latitudes, and whether they relate to variations in sunrise and sunset times.

By utilizing a geophysical dataset from the years 1746–1747 at 60°N latitude in Uppsala, Sweden, a recent observation made at the Summer Institute for Historical Geophysics may provide some insight into this topic (Ekman, 2018). The collection of this historical dataset was initiated by Anders Celsius, the Swedish geophysicist known for defining the international temperature scale. He also was the first to show a connection between the aurora borealis and changes in the magnetic field of the Earth. The latter investigation was conducted together with his assistant Olof Hiorter, who proceeded with the measurements after Celsius' death. Between December 1746 and November 1747, Hiorter recorded and documented changes

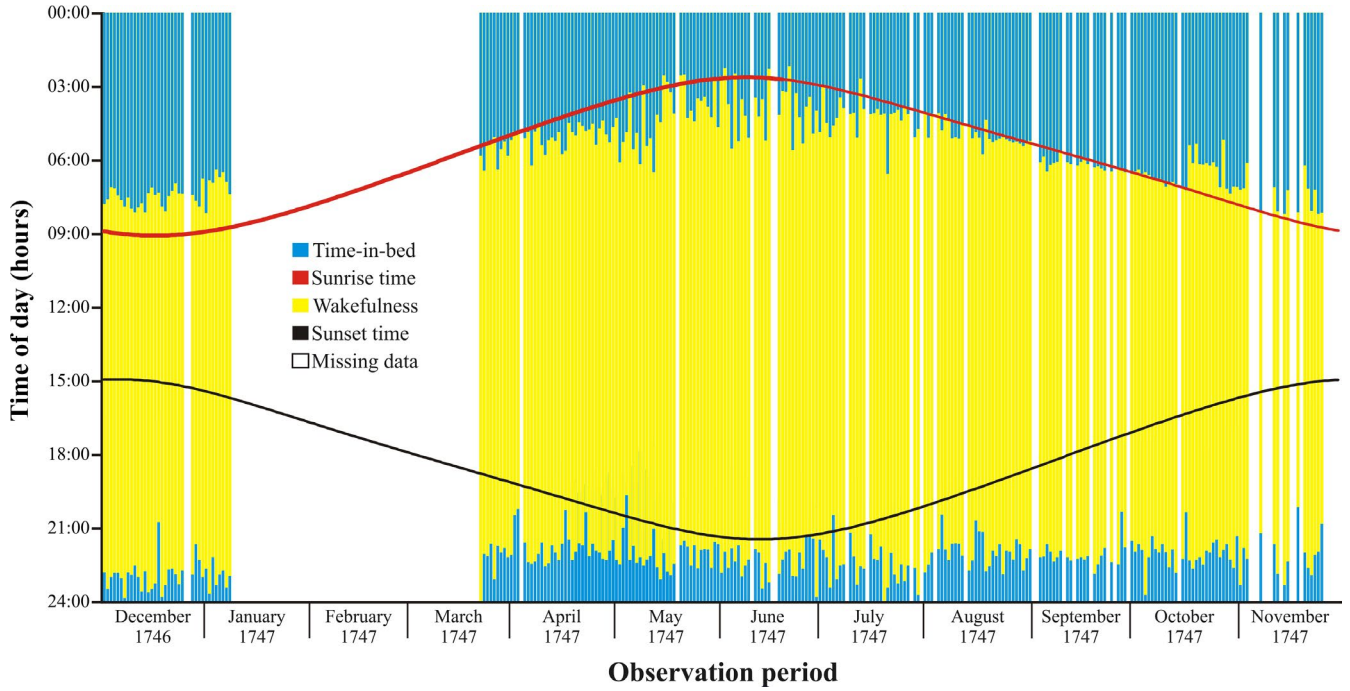

FIGURE 1 Daily bed and rise times of the researcher Olof Hiorter during the observation period December 1746 until November 1747 in Uppsala, Sweden. Data derived from Ekman (2018). Vertical bar charts represent the period of wakefulness (yellow) and time in bed (blue) for each day. The times of the first reading and the last reading of the magnetic needle were used to estimate the time of rising and time of going to bed, respectively. No bars were created if bedtime, rise time or both were missing (blank). For example, no data were available for the period 08 January–21 March 1747. Data concerning sunrise (red) and sunset (black) times for Uppsala were derived from https://www.timeanddate.com/sun/sweden/uppsala (date of retrieval: 19 February 2019)

in the magnetic field hourly during wakefulness. These data allow approximation of his bed and rise times, using the times of the first reading and the last reading of the magnetic needle, respectively. As illustrated in Figure 1, Hiorter's rise time occurred about 1 hr before sunrise in winter, whereas in summer it was about 1 hr after sunrise. No such association was observed between the time of sunset and bedtime. Finally, the time in bed was approximately 3.5–4 hr shorter in summer compared to winter (Ekman, 2018).

This 273-year-old case report from the premodern era reinforces recent findings from modern and hunter-gatherer populations (Stothard et al., 2017; Yetish et al., 2015), suggesting that naturally occurring seasonal variations in the time of sunrise may considerably alter sleep duration and rise times. The ability to create light by means of candles, oil lamps or fire, might help to explain why bedtimes were not affected by sunset times to the same extent as the rise times were by the sunrise times. When interpreting these findings, however, it must be kept in mind that in the preindustrial era, many people divided their nocturnal sleep into two bouts with a wake period in between (Ekirch, 2005). Hence, the time in bed as shown in Figure 1 does not necessarily represent total sleep duration. Yet, this may have had little effect on the found seasonal pattern between the researcher's rise times and time of sunrise. Finally, it cannot be ruled out that variations in seasonal bed and rise times were affected by the ambient temperature, which could have resulted in spending more time in bed during winter.

CONFLICT OF INTEREST

No conflict of interest declared.

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