Received: 11 November 2024 | Accepted: 12 November 2024

DOI: 10.1111/jsr.14420

LETTER TO THE EDITOR

Seasonal Daylight Saving Time in UK: A long-standing, successful record with few reasons to change

The UK is an interesting case in the history of seasonal clocks (Daylight Saving Time) because it maintains a record of continued practice since its inception in 1916—when British clocks were first set to UTC + 01 (British summer time) during the summer season—except in the Second World War—when, in addition, clocks were advanced one more hour year round—and a brief excursion into permanent summer time in 1968–1971. British clocks have never been reset to UTC + 00 (winter time or standard time) during the summer season since 1916, yet the British Sleep Society recently issued a position statement endorsing permanent winter time (Crawford et al., Crawford et al., 2024) in line with previous position statements issued elsewhere (Malow, 2022; Rishi et al., 2024; Roenneberg et al., 2019). We would like to raise here some key points that Crawford et al. (2024) do not mention and a context to clock regulations and human activity in the UK. They are crucial to make a correct balance of the pros and cons of either choice related to the issue.

The seasonal clock regulations set two natural experiments. One of them has been thoroughly described by research papers in the past decades: the "immediate effects on sleep and circadian systems elicited by the abrupt switches" of 1 hr that the regulations set twice a year. These immediate effects are the downside of the practice, and consist of a systematic, brief and slight increase of the risks in key issues like myocardial infarctions (Janszky & Ljung, 2008) and fatal traffic accidents (Fritz et al., 2020) around transition dates. From an epidemiological point of view, these increases are weak, with *z*-scores likely below 0.5 (Martín-Olalla & Mira, 2023).

The second natural experiment has been less addressed and, perhaps, less understood globally. It is the fact that clock regulations are an invitation to a bimodal human activity: early during the spring–summer and delayed during the autumn–winter. Note that this is not Crawford et al. (2024)'s "chronic effects of having schedules 1 hour earlier in relation to solar time for over half a year" because these "chronic effects", if they existed, cannot be separated "out from seasonal effects". Instead, the key issue to address in the second natural experiment is the human response to the external stimulus that clock regulations set after a long-standing continued practice.

Martín-Olalla (2019) studied microdata from the UK time use survey and analysed seasonal differences in human daily rhythms. The results show scarce, statistically unsignificant seasonal differences. This refers to the timing (local time sleep/work onset, local time sleep/work offset) and to the daily totals (sleep time and working hours). Understandably, these observations are partially the result of people being comfortable with regular time schedules, say a working schedule from 09:00 hours to 17:00 hours throughout the year. But, with 100 years of continued practice, these observations are also showing a lack of response against the regulations, and a commitment to the aims and goals of the practice: the alignment of work hours close to sunrise and greater use of outdoor recreation in the spring–summer evenings (Hudson, 1898; Willet, 1907). British citizens seem to have settled down to a late 09:00 hours to 17:00 hours (UTC + 00) pre-set schedule during the autumn–winter season, and an early 08:00 hours to 16:00 hours (UTC + 00) pre-set schedule during the spring–summer season—which is rendered as 09:00 hours to 17:00 hours (UTC + 01) nonetheless. They have not pushed for a delay of work hours during the summer, or for an advance of the work hours during the winter. In so doing they show a better alignment with the winter sunrise (morning light) than elsewhere in Europe where clock regulations were discontinued from 1945 to 1980 (Martín-Olalla, 2022). The lack of response is a telling response that challenges that the potential "chronic effects" can be attributed to the regulations. We note that early summer activity and late winter activity can be found elsewhere under more naturalistic conditions (Honma et al., 1992; Martín-Olalla, 2020; van Egmond et al., 2019), for a thorough review see Martín–Olalla & Mira (2024).

Human physiology provides an explanation on this behaviour, therefore, an explanation on the physiological grounds of clock regulations, which indeed were described by their original sponsors. Crawford et al. (2024; section 2) note the importance of "timed light exposure" to keep circadian rhythms aligned to the solar day. At the 50° circle of latitude this is achieved in winter by delaying the onset of activity until the sun rises some 2 hr later than the yearly average sunrise time and 2 hr later than the sunrise time at the Equator. By the spring equinox, the delay in sunrise times ceases to exist. Early morning light then "plays a central role in preventing our body clocks from becoming too late and aligning them adequately" with the day and pushes for an early activity. Modern, extratropical societies synchronized by preset schedules can currently achieve this with the 1-hr clock changing.

Why not a 2-hr clock changing or two 1-hr clock changings that would offset the 2-hr delay that the winter sunrise set in the UK? On the other side of the day, "light exposure during the late evening delays sleep onset and our natural waking". Eventually the 1-hr shift allows in the UK—and elsewhere—a natural onset of the activity in winter—the most challenging season for the wake—and a natural onset of sleep in summer—the most challenging season for sleeping. Figure 1 shows winter human activity (top) and summer human activity (bottom) in the UK

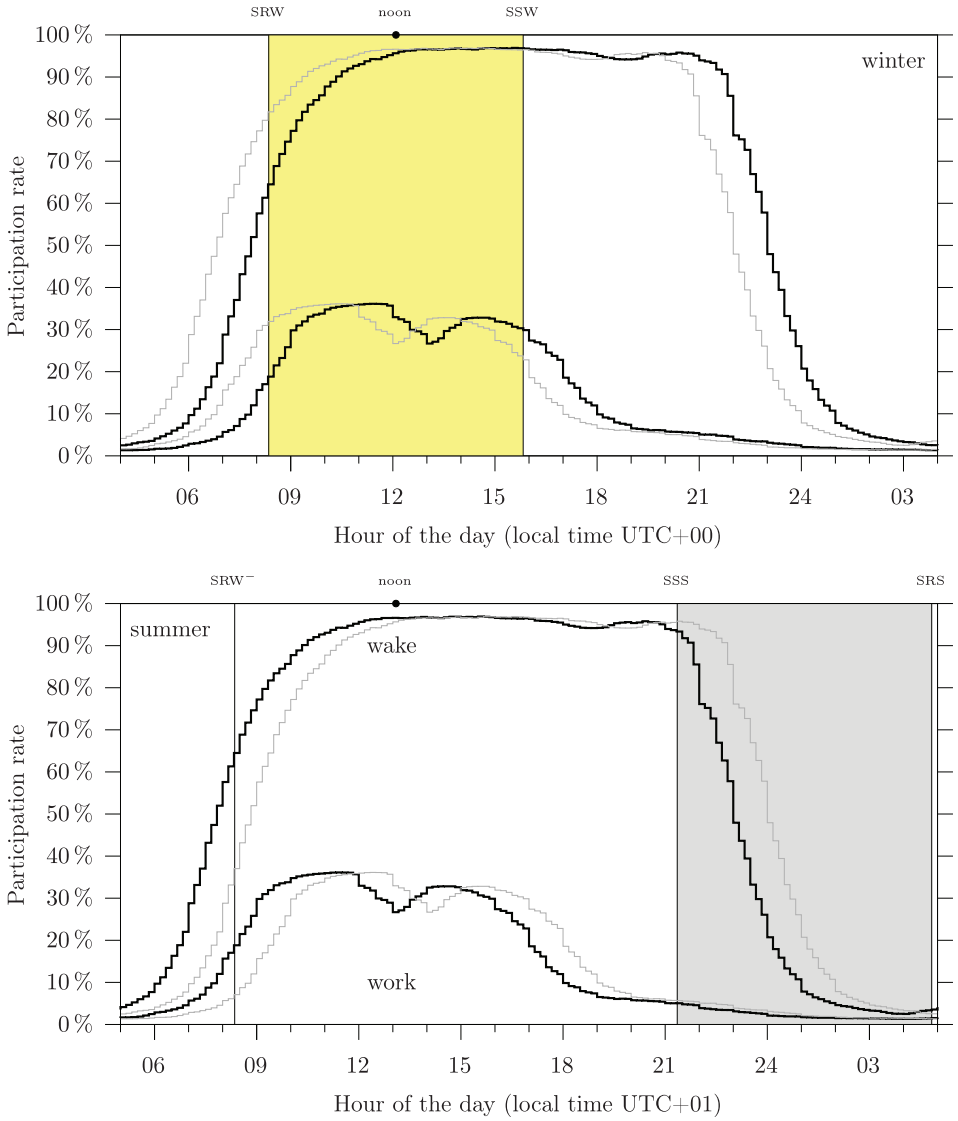

FIGURE 1 The yearly averaged wake (not sleeping and not doing personal care) participation rate and the yearly averaged work participation rate in the UK as obtained from the Harmonized European Time Use Survey (Hetus), black thick lines. The thin grey lines show the alternate scenario where permanent summer time (top) or permanent winter time (bottom) would apply. The top panel annotates the winter sunrise (SRW) and the winter sunset (SSW), daytime is highlighted in yellow shade. The bottom panel annotates the summer sunrise (SRS) and the summer sunset (SSS), with nighttime highlighted in grey shade. SRW^{-} is 1 hr ahead SRW. The horizontal axes display local time. Note from top to bottom the horizontal axes are synchronous: the change in time zone is offset by a shift in the horizontal scale. In winter (top), sleep offset and work onset occur around SRW. Correspondingly, bedtimes come after sunset in summer (bottom). For simplicity, solar time marks are set for 52.1° N, 1.4° W.

from the Harmonized European Time Use Survey (Eurostat, 2010), and highlights daylight (winter) and nighttime (summer). Notice that human activity resumes in winter (top panel) around the winter sunrise time SRW, while in summer (bottom panel), and under clock regulations, bedtimes still come after summer sunset time SSS.

Finally, we would like to put forward a few words on clocks to clarify some misunderstandings that often appear in this context. Not only winter time "aligns closely with the natural light–dark cycles of day and night"; summer time also does it. Both are set to one cycle per day, and just differ in a phase shift, which makes a difference for the preset time schedules that govern the rhythms of modern societies, but not for the natural light–dark cycles of day and night. Also, both winter time and summer time are standard times: they both apply to a wide area—UK in our present discussion—and are set to a whole number of hours relative to the prime meridian. Therefore, opposing "standard time" to "daylight saving time" is misleading when it comes to analysing the aims and goals of the regulations, whereas opposing "winter time" to "summer time" catches the issues at stake.

Whether winter time or summer time be more practical or more adequate for a given purpose or on a given season is only a matter of preferences, uses or costumes. With 100 years of continued practice and the overwhelming majority of the UK population having lived only under this alternating setting, winter time is de facto the standard of time in winter, and sets the standard preset schedules during the winter in accordance with the winter light and dark conditions. Likewise, summer time is de facto the standard of time in summer, and sets the standard summer preset schedules in accordance with the light and dark conditions in summer. We note that the UK once tested permanent summer time (1968–1971) with no success due to the discomfort that onset times ahead of SRW brought. On the contrary, since 1916, permanent winter time has not even been tested or considered seriously. Back in 1916, and seemingly once and for all, a regular summer schedule from 08:00 hours to 16:00 hours (UTC + 00) was preferred to a regular summer schedule from 09:00 hours to 17:00 hours (UTC + 00). Currently, this preference is still shown by polls (Rubin, 2023), when scores for permanent summer time regularly

outnumber scores for permanent winter time. It is like saying: "we love our current summer schedule; please, do not delay it".

AUTHOR CONTRIBUTIONS

José María Martín-Olalla: Conceptualization; writing – original draft; methodology; writing – review and editing. **Jorge Mira:** Conceptualization; writing – review and editing; methodology; writing – original draft.

ACKNOWLEDGMENTS

The authors thank Xavier Lombardero for updating them with the BSS position statement. Data about the history of time in UK were obtained from https://www.timeanddate.com/time/zone/uk/london.

FUNDING INFORMATION

This work was not funded.

CONFLICT OF INTEREST STATEMENT

The authors declare no competing interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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A letter response to the British Sleep Society position statement endorsing permanent winter time in the UK. We review human activity in the UK and the continued record of clocks regulations in this country since 1916.

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