Evidence-based approach to evaluating Daylight Saving Time (DST): The relevance to our Biological Clock

What is the Biological Clock?

As the name implies, biological clocks keep time. They are a mechanism – found in practically all cells of all organisms including humans - that choreographs behaviours and physiologies to specific times of day. Biological clocks control our life at many levels ranging from gene-activation and hormonal regulation to behaviour, cognition and performance – their task is to optimise metabolism, cardiovascular and immune systems as well as our sleep-wake behaviour in the context of the predictable changes within the 24-hour day. Light and darkness are the key signals that synchronise our biological clocks to 24-hours.

Modern life-styles challenge our biological clock

Since biological clocks are encoded in our genes and are thus individual, we are all different so-called chronotypes – some of us are early (larks), some are late (owls) and many in are in between. This is easy to see in sleep behaviour – just compare yourself to your partner or neighbours – or to your teenage child. The clocks of teenagers and young adults make them sleep later than younger children and older adults. The differences between extreme early and late chronotypes can be as much as 12 h. When we were still working outside (with 1,000-fold brighter light than inside buildings), this difference was probably no more than 3 h. Modern lifestyles mean less light and, as a consequence, our biological clocks have become significantly delayed, so that they make us sleep much later.

What is social jetlag?

Although most of the population drifts to a later chronotype when daytime light is weak, work schedules remain relatively early. As a result, our biological clock - our internal time - has drifted away from social clocks (e.g., work and school schedules). This situation resembles the jetlag that results from travel across time zones and is thus called 'social jetlag'. Put simply, social jetlag is the difference in time between when your body clock would wake you naturally and when your alarm clock drives you out of bed in the morning. It's worth reflecting on how much earlier and shorter we sleep on workdays compared to work-free days. This is especially true for teenagers and young adults. About 80% of people in industrialised regions regularly use an alarm clock. They incur chronic sleep deprivation and social jet lag. Social jetlag appears to act as a chronic stressor. It is associated with addiction to nicotine, alcohol and caffeine, and with overweight, metabolic syndrome and depression.

How does DST impact health?

Daylight saving time (DST) is the practice of advancing social clocks during the spring by one hour and then pushing them backward in the autumn to "normal" clock time. Acute effects of DST are apparent during the days following the shift: for example, accidents and heart attacks increase. Beyond these acute effects, DST chronically increases social jetlag. If you suffer jetlag only occasionally, e.g., with travel, the risks are negligible. However, evidence shows clear associations between social jet lag and conditions that are epidemic in western society (e.g. obesity). Chronic exposure to an increased social jetlag may therefore lead to health and performance deficits that cost (directly and indirectly) 1% of the GNP, which could amount to 131 Billion EUR across the EU.

Our biological clocks are synchronised using the timing and amount of light and darkness - not the alarm clock. As a result our biology does not respond to DST changes. Rather, with the spring DST, we simply have to go to work an hour earlier relative to our biological clock. For 7 months, we are adding an extra hour of social jetlag to the European population.

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