



Canadian Society for Chronobiology
Société canadienne de chronobiologie

**Official statement of the Canadian Society for Chronobiology
in support of year-round Standard Time**

Summary

The Canadian Society for Chronobiology is advocating for the elimination of twice-yearly time changes. These changes, particularly in the spring, are not only inconvenient and socially disruptive, but also are responsible for short-term negative impacts such as increases in acute health events and accidents. In place of the time changes, we advocate for year-round Standard Time (ST, winter time) rather than Daylight Saving Time (DST, summer time). ST puts the social clock closer to our intrinsic body clock, our circadian rhythm, which is set by the dawn. DST moves dawn later, and creates social jet-lag due to the mismatch between our biological drive to wake up near dawn and the social demands for us to stay up later. Year-round DST is predicted to increase rates of chronic diseases, decrease economic performance, and increase inequities in society. Putative advantages of year-round DST, such as energy savings and benefits for farmers, are not supported by evidence. Previous experiments with year-round DST have proven to be unpopular. Therefore, year-round ST should be adopted as a public health measure.

The Canadian Society for Chronobiology supports year-round Standard Time for the following reasons:

A. We need to align our social time with the human circadian clock

Almost all organisms have internal biological clocks that drive their sleep/wake cycles, activity and body functions in approximately 24-hour (circadian) rhythms. In humans, light through the eyes resets the central clock in the brain, and the brain clock sends signals all over the body to set the clocks in our tissues and organs, including the liver, heart, intestine, and muscles. Our clocks prepare our minds and bodies for the expected activities of the day, and for restful sleep at the end of the day. Our 24-hour activity patterns are not habits or traditions that can be re-learned in any schedule we choose, but instead are driven by biological clocks that are genetically determined. The human clock runs a little slow, losing about 15-20 min per day, and thus it needs to be reset by light every day. Morning light advances our clocks and so resets them correctly to the 24-hour light/dark cycle, while evening light delays our clocks and pushes us further away from the 24-hour day, making us want to stay up later

and wake up later. When given a free choice of sleep times, human sleep/wake times are aligned with dawn, even in urban areas where we live under electric lights (Roenneberg et al., 2007).

The social clock is the clock on the wall, the one that we switch forward and back twice a year, the one that tells us when to wake up and go to work or to school. When the social clock is not aligned with our biological clock, we are forced to wake up at a time when our brain is not prepared for alertness, eat our meals when our metabolism isn't prepared to handle the nutrients, and be active when our muscles are not prepared for activity. This creates a condition known as "social jet lag", similar to the disruption we feel when we fly across time zones and suffer the ill effects of jet lag (Wittmann et al., 2006). This is the condition we find ourselves in under Daylight Saving Time when our biological clocks are trying to reset to dawn but the social clock forces us to wake up earlier. Under Standard Time, noon on the social clock is aligned with solar noon when the sun is at its highest point in the sky; our social clock is more closely aligned to our brain clock, and we minimize the effects of social jet lag.

B. Switching twice a year is disruptive, both socially and biologically

Regardless of any consideration of biological clocks, everyone agrees that switching social clocks twice a year is disruptive to our lives, causing inconvenience and leading to social and business mistakes.

Recent research also shows the negative effects of the time change on health and behavior. Researchers have found that there is an increase in incidents of acute health events for a few days after the spring time change, including increased rates of heart attacks (Janszky and Ljung, 2008; Manfredini et al., 2019) and ischemic stroke (Sipilä et al., 2016). There are also increases in car accidents (Coren, 1996) and increased rates and severity of workplace injuries (Barnes and Wagner, 2009). There is one report that judges impose longer jail sentences for a few days after the time change (Cho et al., 2017).

These negative effects of the time change are mainly seen in the spring when clocks go forward, and less in the autumn when clocks fall back. This tells us that the causes of these acute effects are likely to be the loss of an hour of sleep in the spring, plus the sudden switch away from standard time to daylight saving time when our brains are no longer aligned as well to the dawn. We become jet-lagged in the spring when we move our social clock away from our internal circadian clock and it takes weeks for the lengthening days and earlier sunrises to shift our internal clock back to match our social clock. The time-shift in the autumn moves the social clock back into alignment with our internal clock after the shorter days and later sunrises in autumn have shifted our circadian clock away from the social clock.

There is now general agreement in society that abolishing the twice-yearly time changes would be beneficial. The question then becomes, do we adopt year-round Daylight Saving Time, or Standard Time?

C. Year-round Daylight Saving Time would have negative impacts on public health and the economy

Over much of the highly-populated areas of Canada, the sun would not rise until about 9 am in winter under DST, and the daylight will linger an hour later in summer evenings than under Standard Time. As a Northern country, Canada includes higher latitudes where the effects of late winter dawns and late summer dusks under DST would be felt more profoundly. What long-term effects on health can we expect from year-round DST? As predicted from our understanding of the human biological clock, our brain clock will try to synchronize to dawn and push us to go to bed later. However, our social clock will force us to wake an hour earlier in the morning. Will this have any health effects?

We have good evidence for the negative impact of being an hour off of biological time, and this comes from studies on the health of populations living on the edges of time zones. We have arbitrarily divided the earth into one-hour time zones, so that people on the east side of a time zone see the sun rise an hour earlier (according to their social clocks) than people on the west side of the same time zone. Researchers have analyzed the health records and economic status of those two populations, and have found poorer health outcomes on the west side: increased rates of obesity and diabetes, heart disease, and cancer (Gu et al., 2017). Moreover, people on the west sides of time zones earned 3% less in per

capita income (Giuntella and Mazzonna, 2019). What could account for this? As predicted, people on the west sides of time zones go to bed later than people on the east sides, but then have to get up at the same time in the morning because of fixed work and school schedules. Therefore they lose sleep: about 20 minutes per weeknight, which adds up to a significant sleep debt over the week. We know from other research that sleep deprivation negatively impacts health and workplace performance. We can already see the negative impacts of a one-hour difference across a time zone, and year-round DST would put our social clocks another hour out of alignment with our biological clocks.

D. Year-round Daylight Saving Time would increase existing inequities in society

The advocates for year-round Daylight Saving Time cite the advantages of an extra hour of daylight in the afternoon, particularly in summer, for more outdoor leisure (and shopping) opportunities. Indeed, the first advocate for DST in England was an outdoorsman who wanted more time on the golf links in the summer. These advocates fail to consider the perspective of those segments of society who are most likely to feel the negative impacts in the winter of year-round DST: essential workers (mostly racialized) getting up before dawn to get to their minimum-wage jobs without paid sick leave; parents (usually mothers) struggling to get their kids out of bed and ready to go to school in complete darkness. Racialized individuals, women, and people with low socioeconomic status are known to suffer higher rates of sleep disturbance (Jehan et al., 2018), and year-round DST is likely to exacerbate these problems.

E. Year-round Standard Time is the rational and popular choice

Advocates for legislation for year-round DST draw on strong positive emotional reactions to the idea of more summer afternoon sun, with names like “Daylight Saving Time” and “The Sunshine Protection Act” creating the illusion that daylight and sunshine are in danger and need saving. Referring to the legislation as “year-round Summer Time” leads us to imagine summer weather in January. Of course it is impossible to legislate astronomy, and we will always have the same number of hours of sunshine.

Historical arguments in favor of year-round DST cited the proposed benefits in energy savings, such as Germany and Austria in World War I, and the US during the energy crisis in the 1970’s. These energy savings never materialized, and studies have shown either very small positive or negative effects, depending on the location and climate, but no overall savings (Kotchen and Grant, 2011). Arguments have also been made that DST is a benefit to farmers, but there is no evidence that farmers ever advocated for DST; their animals and crops follow the sun, and DST would have no benefits for agriculture. Farmers need to interact with businesses that follow social time, such as grain silos and machine repair shops, and with DST the earlier closing of businesses relative to the summer daylight hours can create problems for the farmers.

Most of the world does not participate in Daylight Saving Time, with the majority of countries using Standard Time. In fact, year-round DST has been tried several times in countries that then abandoned it. The US tried it in 1974, when 79% of the public supported it; after the first winter, public support dropped to 42% and the experiment was ended after 2 years (Ripley, 1974). It was also tried in the UK, and in Russia, and both countries ended year-round DST after a few years due to its unpopularity.

Conclusions

The Canadian Society for Chronobiology, an organization of scientists working on biological rhythms in Canada, supports the enactment of year-round Standard Time to better align our biological clocks with the day/night cycle, protect public health and the economy, minimize harm to vulnerable sectors of society, and align with the majority of jurisdictions around the world. We advocate for governments to follow the scientific evidence and not pander to the emotional appeal of misleadingly-named legislation.

We endorse the statements made in support of year-round Standard Time by the Society for Research on Biological Rhythms (Roenneberg et al., 2019), the European Biological Rhythms Society, the European Sleep Research Society, and the American Academy of Sleep Medicine.

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