WORKSHOP

Requested by the TRAN committee

European Parliament

# Research for TRAN Committee - Discontinuing seasonal changes of time in the EU

Workshop presentations


Policy Department for Structural and Cohesion Policies
Directorate-General for Internal Policies
21 January 2019

EN

Directorate-General for Internal Policies of the Union
Directorate B – Structural and Cohesion Policies

COMMITTE ON TRANSPORT AND TOURISM

# "Discontinuing seasonal changes of time in the EU"

## WORKSHOP

Brussels, 21 January 2019, 15:45-17:00
Meeting Room: Paul-Henri Spaak PHS 1A002

## PROGRAMME

*INDICATIVE*[1]*:*

| | |
|---|---|
| 15:45 | **Long distance travel - potential impacts of discontinuing seasonal changes of time in the EU**<br>Professor Przemysław Borkowski, Vice-Dean for Science, Chair of Transport Economics, University of Gdańsk, Poland |
| 15:55 | **Possible consequences of discontinuing seasonal changes of time on road safety**<br>Dr Kiran Sarma, Senior Lecturer in Psychology, National University of Ireland, Galway, Ireland |
| 16:05 | **Discontinuing seasonal changes of time - impacts on energy savings and energy markets: evidence from previous research**<br>Andrew Jarvis, Vice President, ICF |
| 16:15 | **Potential health and well-being impacts of discontinuing seasonal changes of time**<br>Darío Acuña Castroviejo, MD, PhD, Professor of Physiology, Biomedical Research Center, University of Granada |
| 16:25 | Debate with the Members of the European Parliament |
| 17:00 | End of workshop |

[1] Please note that the starting time of the workshop is indicative and might start +/-15 minutes earlier or later

Przemyslaw Borkowski

Brussels 21.01.2019

# Long distance travel - potential impacts of discontinuing seasonal changes of time in the EU

Faculty of Economics

UNIVERSITY OF GDAŃSK

FACULTY OF ECONOMICS

# Scope of the research

- Impact on long distance road transport
  - Effects on road haulage enterprises
  - Effects on supply chains
- Impact on long distance rail transport
  - Effects on rail enterprises
- Impact on long distance air transport
  - Effects on airport managers
  - Effects on airlines

Study method: interviews and questionnaires with transport managers

# Effect on road haulage companies

- According to the industry opinion the change is irrelevant from the business perspective.
- Additional costs related to seasonal time change occur only in those instances where driver rest-work hours are affected. Since seasonal time change usually happens over weekend and usually weekly rest periods correspond to weekends, it has very little impact on costs.
- What has been however stressed by the industry is that the worse situation would be to replace unified time change with individual MS decisions. It would create huge administrative barrier with need to keep track of many different time changes.

# Effects on supply chains

- None or small positive effects are expected.
- Industry representatives already have well established procedures for time change days. The only cost is that change has to be remembered and work schedule of night shifts changed (with sometimes additional pay requirement) But industry representatives point out that in the scope of the whole business this happens twice a year and is not important.
- There are no additional energy costs related to longer dusk/dark periods in winter – properties have to be illuminated anyway.

# Rail enterprises

- Impact on scheduling
  - Seasonal time change or its lack has almost no impact on scheduling. Time change results in very limited changes in operation of few trains which either arrive 1h late or arrive early. Sometimes trains wait for an hour but this is more and more avoided by train operators. Sometimes selected trains departure or arrival time is modified for this single night of operations. In general this is not very time consuming or costly for schedulers.
- Impact on operating costs
  - No impact on infrastructure related costs. Infrastructure has to be lighted anyway. Some small savings on personnel costs. During time change weekends some trains are stopped and thus additional hour of worktime for train personnel is added to the total cost (night work compensation is also higher than day shift compensation). This is however only one time per year for very few trains (less than 5% are affected). Similarly a very small savings on global electricity consumption might be expected (stopped trains still use electricity for heating and lighting – this is again a very small cost).

# Rail enterprises

- Impact on seasonal scheduling
  - No impact since seasonal scheduling is done regardless of time change and in response to demand changes. Time change rescheduling is one time action and happens in the off-peak services. In addition  for cargo trains this is even less important since they do not operate under scheduling but rather on the individual contractual basis.
- Impact on coordination of trains
  - There will be a visible positive effect if time change is abandoned. Coordination of arrivals and departures currently is difficult. Arriving train arrives late and thus either subsequent train has to wait or traveler is rescheduled for the following train. This is more important to travelers than rail service providers.
- Impact on coordination with access/egress services
  - Coordination with rail services poses a scheduling problem for city public transport companies. Trains are not scheduled in connection with local public transport but other way round. However there is currently visible negative impact on public services since they tend to cease at night. With postponed train arrival it is likely that connecting public services on those particular days might be out of synchronization. Again possible gains are rather on the part of traveler and not rail company.

# Airlines

- Impact on scheduling
  - In air transport scheduling UTC time is used. Only UTC+/- X hours are translated into local times. Since crossing even multiple time zones is typical for many airlines any seasonal time change  plays very minimal role. During air travel while airplane is in the air UTC time is used for air crews and air operations. Local time is constantly recalculated into all journey points, navigation signs etc. only for the passenger convenience. In that way seasonal time change is simply accommodated into regular airline activity. Abandoning seasonal time change is neutral from the scheduling point of view. The simplification of mostly automated time recalculation into local times is a tiny programming issue.
  - What airlines fear is however that within a same region time will be changed differently in each country – this would make passenger interfaces more demanding. It is crucial that time change (if any) is conducted at the same time in all European countries. Otherwise coordination of air services will suffer. And in that scenario costs of rescheduling could be very high.
- Impact on operating costs
  - No significant savings are expected, there will be no impact on energy and fuel consumption
  - The only savings expected are on distribution of local timetables

# Airlines

- Impact on seasonal scheduling
  - Seasonal change of timetables is done due to demand changes and seasonal time change is irrelevant in this respect. The airline managers point out that only limited benefits are expected from the reduced room for mistakes while recalculating time from UTC to local times. Another possible benefit is that scheduling will be easier since seasonal time change somewhat disturbs sequential flights.
  - Limited benefits for passengers are expected as they might finish more flights during daylight which is often passenger preference.
- Impact on coordination of connecting flights
  - No impact
- Impact on coordination with access/egress services
  - None on the side of airlines. There might be positive impact for passengers often arriving at destinations unfamiliar to them, whereas there is no change in operation of local public transport

# Airports

- The most significant problem is slot availability. While this is no issue in local/regional airports, which usually have spare slots, slot allocation could be a limiting factor in congested airports.
- Each seasonal time change requires some reallocation of slots. Abandoning seasonal time change will remove this necessity.  On the other hand this process has been already well coordinated by the industry. Abandoning seasonal time change will probably require a single major reallocation. This in turn will change departure/arrival schedules for most airlines.
- Similarly, like airline industry, what airport representatives fear most is uncoordinated time changing within Europe.

# Thank you for your attention

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# Possible consequences of discontinuing seasonal changes of time on road safety

**Dr Kiran Sarma**
**School of Psychology, National University of Ireland Galway**
**kiran.sarma@nuigalway.ie**

**21 January 2019**

# Structure of the Presentation

1. Road safety and the light-shift hypothesis
2. The evidence
3. Conclusions

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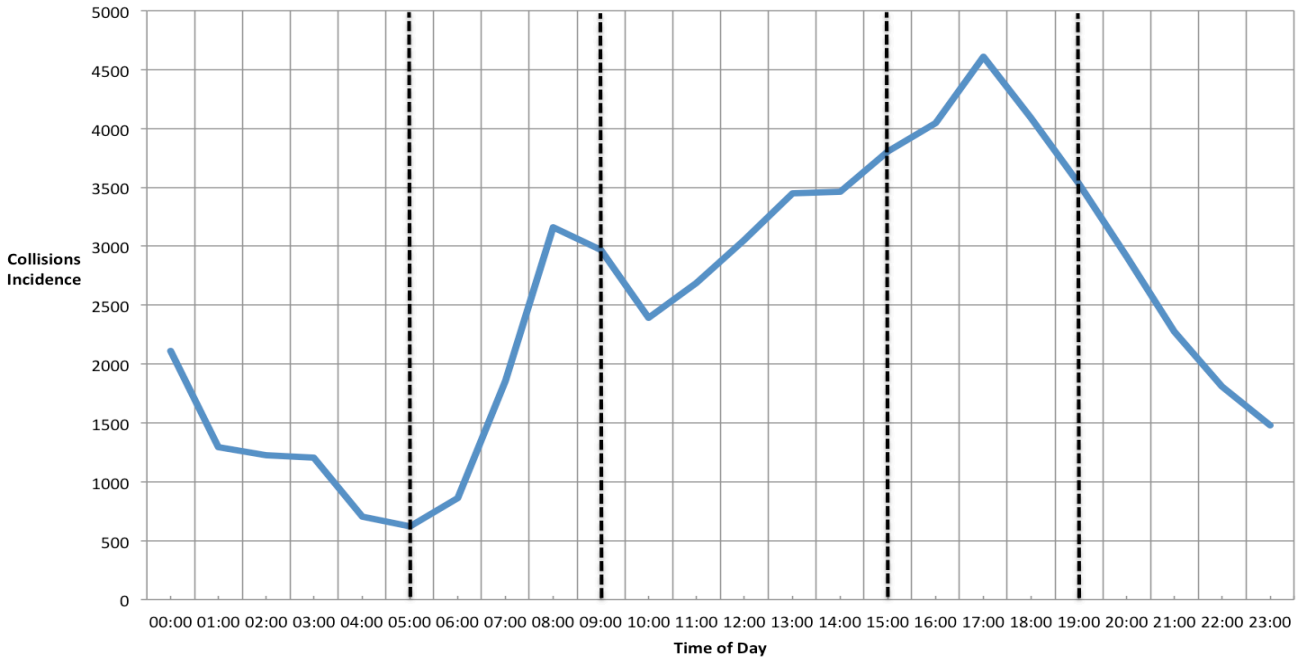
# 1. Road safety and the Light-Shift Hypothesis

- **Shifting light from the morning (when collision risk is lower) to the evening (when collision risk is higher) should have a net road safety benefit.**




*Based on collision data in Republic of Ireland (Sarma, 2017)*

# 2. The Evidence - The British Summertime Experiment

1. 1968-1971 UK and Eire maintain summertime year-round.
2. Three studies looked at Road Traffic Collision (RTC) data. All reported increase in morning collisions, decrease in evening collisions and net savings (0.7% reduction in serious injuries).
3. ROSPA draw on this evidence in calling for a move to CET in the UK.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## However

1. The data is 50 years old. How valid is it? Seatbelts, ABS, airbags, driver behavior, road infrastructure, traffic density?
2. Permanent summertime in different jurisdictions (and within jurisdictions) within a time zone differs due to different longitude (i.e. more westerly) and latitude.
3. Experiment abandoned in part because of perceived increased risk to farmers and children.

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**Conclusion:** The British Summertime Experiment studies should not be used to support the argument that discontinuing seasonal changes of time would confer a road safety benefit (due to poor validity).

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# Evidence - Studies on DST

Sarma & Carey for the RSA, 2015, summarized 24 studies.

**<u>Shifting light to evening in March</u>**

should lead to a reduction in RTCs.

- 12 studies looked at long term effects up to 13 weeks and 11 reported small reductions in RTCs (all were from the US).
  - However this could be due to changes in climate, traffic densities etc. heading into summer.
  - 16 studies looked at short term effects (should control for traffic flow etc.) but sleep disruption is a confound. Findings mixed.

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## Shifting light to morning in October

should lead to an increase in RTCs.

- 15 studies looked at short-term effects – 5 reported increase, 5 decrease and 5 no-change.
- A number of studies reported a long-term deterioration in road safety after the transition, but these are attributable to range of factors including climate.

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**Conclusion:** Findings mixed and studies did not control for other explanations (e.g. changes in climate or traffic flow over time).

International DST literature does not support assertion that shifting light from morning to evening has a positive impact on road safety.

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# 3. Overall conclusion

Deliberations on a move to permanent summertime should be based on factors other than road safety because the evidence available is inconclusive and does not support the assertion that shifting light from the morning to the evening in the EU would lead to a road safety benefit.

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# Discontinuing seasonal changes of time - impacts on energy savings and energy markets: evidence from previous research

**Andrew Jarvis**

*Vice President*

21 January 2019

# Introduction

- In 2014 ICF, a consultancy, carried out a study for the European Commission that examined the implications for the internal market, business and citizens of the application of summertime no longer being synchronised
- These remarks are based on the research conducted for that study plus a review of a number of research papers published in the subsequent period
- Its focus is on the energy sector
- We also offer remarks on the lead time needed for any change from current arrangements

# There is a historic link between adoption of seasonal time changes and energy policy

- **William Willetts' 1907 pamphlet proposing a seasonal time change estimated the savings in lighting costs that the UK would experience**
- **The need to achieve to energy savings prompted the adoption of seasonal time changes in Europe on more than one occasion over past century**
  - During the first World War
  - In the 1970s energy crisis
- **The last amendment to United States law on daylight savings time, in 2005, used the Energy Policy Act**

# Some contemporary studies that have found that summertime provides energy savings in specific contexts….

- In 2013 an Italian grid operator estimated savings to Italian consumers from summertime of €90m, the energy being equivalent to consumption of 180,000 households
- Looking at Sweden and southern Norway, Mirza and Bergland (2011) estimated annual financial savings of €30m and €16m respectively
- Bergland and Faisal (2017) estimated summertime's effects on energy consumption in 35 European countries and found savings ranging between less than 0.5% to more than 2.5%, depending on the country

# ….but all recent strategic appraisals of the issue have concluded that the evidence of energy savings is ambiguous or that the effects are, at best, small

- A 2007 Commission study concluded the energy saving impact was small
- A literature review by Aries and Newsham (2008) found that the evidence on energy savings was mixed and inconclusive
- A 2016 study from the German Bundestag's Office of Technology Assessment found that impacts could be marginally positive or negative, depending on context
- A meta-analysis published in 2017 (Havranek *et al*) considered 162 estimates from 44 studies from around the world and found a mean reported electricity saving of 0.34%

# ICF consulted certain stakeholders on the effects of summertime on energy consumption

- Member State Governments
  - Thirteen of the governments responding to the survey suggested that summertime arrangements result in a small decrease in energy consumption but were not generally able to quantify it
  - Some suggested that there could be off-setting increases in energy use beyond lighting (e.g. increased demand for air conditioning)

- Energy sector stakeholders
  - Some energy consultees suggested summertime had limited impact on the sector
  - One noted that summertime creates issues for gas suppliers that book pipeline flow and storage for the gas with the Transmission System Operators – one day is 23 hours and another 25 hours.

# Technology change is reducing lighting-related energy use, and so reducing the potential savings associated with seasonal time changes

- The  shift to LED and other energy-efficient technologies reduces lighting-related energy demand and so reduces the lighting-related energy savings of summertime
- Increases in demand for heating or air-conditioning may offset savings in lighting
- The actual change in energy demand would also be influenced by whether Member States settled on permanent summertime or permanent wintertime

# Asynchronous changes in summertime within the EU could create challenges for some organisations in the energy sector

- An electric utility company consulted for the ICF study explained that if summertime arrangements were not harmonised there could be issues with asynchronised electricity consumption curves which could cause some problems in managing electricity flows between highly connected systems
- No evidence of this effect being observed was located
- The wider conclusion from the ICF study was that synchronisation of time changes within the EU was convenient, avoiding confusion and adjustment costs.

# Adequate advance notice of any change to current arrangements would help to reduce transition costs

- **Certain stakeholders would need time to adjust and plan for the end of summertime:**
  - There are sectors where service timetables need to accommodate daylight savings time
    - Timetabling is often done many months in advance
    - Effects may reach beyond the EU (e.g. for international transport services)
  - ICT systems and technologies that are pre-programmed for seasonal time changes would need adjustment to accommodate the abolition of the current schedule
    - Software upgrades would take time to specify, test and deploy
    - For some technologies users may need to change settings on their devices
- **To our knowledge this issue has not been explored in depth so there is uncertainty about costs and implications**

# Potential health and well-being impacts of discontinuing seasonal changes of time


Darío Acuña-Castroviejo
University of Granada, Spain

Brussels, 21/01/2019

# Structure of the Presentation

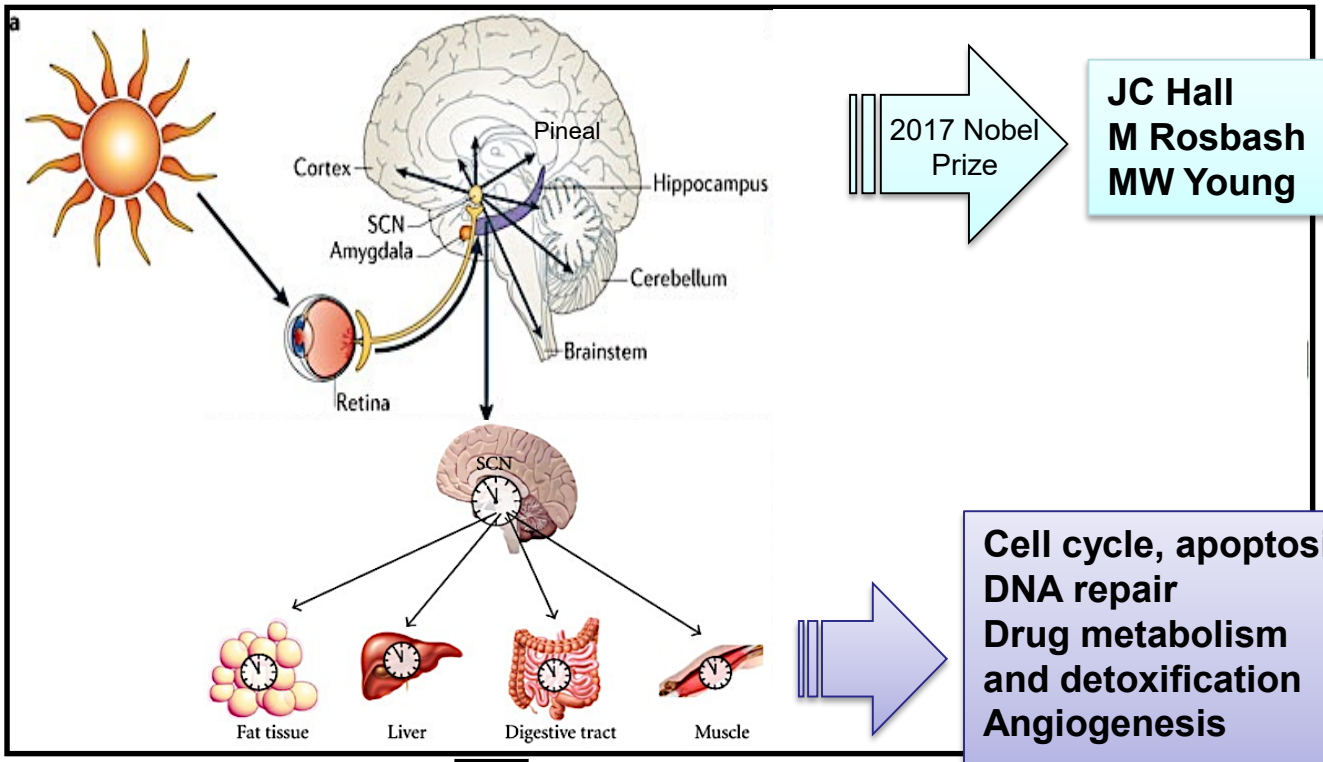
1. How the living beings function
2. How DST impacts health
3. First expert statement publication on DST deleterious effects

# 1. How the living beings function

## Biological clocks coordinately keep life on time:

- Master clock controls the adaptation of the human body to the environment
- The human body contains 30 billions of biological clocks
- Circadian timing system comprises a complex network between master (central) and peripheral clocks
- Master clock maintains the harmony of the human body through melatonin, which sets the peripheral clocks

# Biological clocks coordinately keep life on time




2017 Nobel Prize

**JC Hall**
**M Rosbash**
**MW Young**

**Cell cycle, apoptosis**
**DNA repair**
**Drug metabolism and detoxification**
**Angiogenesis**
**...**

We are 30 billions of biological clocks running in harmony!!!

# Biological clocks coordinately keep life on time

**STANDBY CLOCK**

**GMT 0**

Peripheral clocks = master clock = sun hours

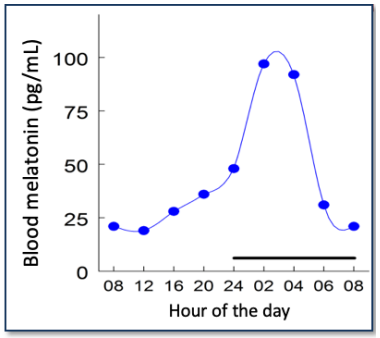
Master clock

Pineal

**Melatonin**

Blood

Melatonin peak at 3 am




Brain

Heart

Liver

Kidney

Muscle

# 2. How DST impacts health

## Dissociation between environmental light and biological clocks:

- DST change is not immediately transduced to the biological clocks
- Sunrise and sunset times remain the same, but clocks time changed
- As an example, a great difference exists between one-hour DST and one hour traveling to West

# Dissociation between environmental light and biological clocks

Traveling one hour to West → Get up and go to bed one hour later in close association to one hour of delay in the sunrise and sunset respect to subjective internal time (SIT) → This promotes a phase-delay which accelerates our synchronization

Hour change in Fall → We will get up and go to bed also an hour later, but the sunset and sunrise will continue at the same time with respect to SIT → Thus, we will be exposed to more light in the morning and less in the afternoon, favouring a phase-advance that counteracts our rapid synchronisation

Traveling one hour to East, similar to the DST in March, yields a similar pattern of behavior

# 2. How DST impacts health

## Desynchronization of peripheral clocks:

- The resultant chronodisruption, i.e., dissociation between environmental time and biological clock time affects the organism in multiple forms
- There are times of risk to suffer disease that are regulated by circadian machinery acting on a complex clusters of genes

# Desynchronization of peripheral clocks

**DST CHANGE IN FALL**

**GMT +1**

Master clock

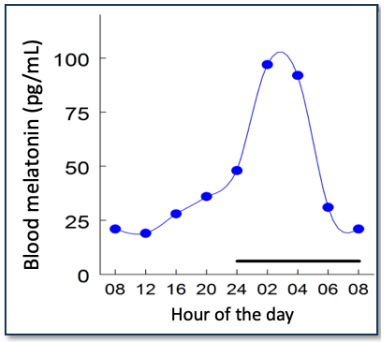
one-hour turn the clock back

Pineal

**Melatonin**

Blood

Melatonin peak at 3 am




Peripheral clocks = master clock ≠ sun hours

**CHRONODISRUPTION**

| | |
|---|---|
| Brain | Mental health disorders |
| Heart | Heart diseases |
| Liver | Obesity |
| Pancreas | Diabetes |
| Muscle | Weakness |
| Immune system | Inflammation |
| Any organ | Cancer |

# 3. First expert statement publication on DST

## Clinical, observational and epidemiological studies:

- It is still common that people think in sleep when speaking about circadian rhythms
- Not only sleep, but the body comprises thousands of rhythms, from hormones to immunity, meal time, exercise performance, blood pressure, alertness, cognitive, ...
- All these are altered after DST changes

# Clinical, observational and epidemiological studies

European Journal of Internal Medicine xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

European Journal of Internal Medicine

journal homepage: www.elsevier.com/locate/ejim


Review

## Impact of Daylight Saving Time on circadian timing system: An expert statement

Meira e Cruz M.[a,*], Miyazawa M.[b], Manfredini R.[c], Cardinali D.[d], Madrid J.A.[e], Reiter R.[f], Araujo J.F.[g], Agostinho R.[h], Acuña-Castroviejo D.[b]

1. There is sufficient scientific literature showing **the adverse impact of the DST** on different levels of circadian timing system, either related to circadian master clock and multiple peripheral oscillators from which depends adequate organic function.

2. Since there is evidence on the potentially negative effects of DST-related disruption of circadian timing system associated to several negative health outcomes, **DST cannot be encouraged and therefore should be discontinued.**